

















JOHN W. WALKER





WILLIAM WILSON, Esq. F.R.S.









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THE  
**ANIMAL KINGDOM,**

ARRANGED ACCORDING TO ITS ORGANIZATION,

SERVING AS A

FOUNDATION FOR THE

**NATURAL HISTORY OF ANIMALS,**

AND AN

INTRODUCTION TO COMPARATIVE ANATOMY.

BY

**BARON CUVIER,**

Great Officer of the Legion of Honour, Counsellor of State, and Member of the Royal Council of Public Instruction; One of the Forty of the French Academy; Perpetual Secretary to the Academy of Sciences; Member of the Academies and Royal Societies of London, Berlin, Petersburg, Stockholm, Turin, Edinburgh, Copenhagen, Gottingen, Bavaria, Modena, the Netherlands and Calcutta; and of the Linnæan Society of London.

WITH FIGURES DESIGNED FROM NATURE :

THE

**CRUSTACEA, ARACHNIDES, & INSECTA,**

BY

**M. LA TREILLE,**

Chevalier of the Legion of Honour, Member of the Institute (Royal Academy of Sciences) and of the greater portion of other learned Societies in Europe, America, &c.

Translated from the latest French Edition.

WITH

ADDITIONAL NOTES,

AND

ILLUSTRATED BY NEARLY 700 ADDITIONAL PLATES.

IN FOUR VOLUMES.

VOL. IV.

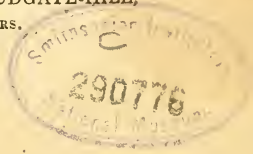
INSECTA--ZOOPHYTES.

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## P. A. LATREILLE.



LATREILLE, PETER ANDREW, a very distinguished and active naturalist, was born in 1762. From early youth he devoted himself to the study of natural history, and was latterly Professor of Zoology at the Museum of Natural History in Paris. He was also a member of the Academy, of the Legion of Honour, &c. Of his works on natural history, the most important are *Précis des Caractères génériques des Insectes*, 1797 : *Histoire Nat. des Salamandres de France*, with engravings, 1800 : *Histoire Nat. des Singes, faisant Partie de celle de Quadrupèdes de Buffon*, 2 vols. 1801 : *Histoire Nat. des Reptiles, faisant Partie du Buffon de M. Castel*, 4 vols. 1802 : *Essai sur l'Histoire des Fourmis, &c.*, with engravings, 1802 : *Genera Crustaceorum et Insectorum*, with coloured engravings, 1806—1809 : *Considérations gén. sur l'Ordre naturel des Animaux, composant les classes des Crustacées, des Arachnides et des Insectes*, 1810 : *Mémoires sur divers sujets de l'Histoire Nat. des Insectes, de Géographie ancienne et de Chronologie*, 1819 : *Familles naturelles du Règne Animal*, 1825. Owing to the discontinuance of the venerable Lamarck's Lectures on the Invertebrated Animals at the Jardin des Plantes, not long before the appearance of the last-named work, the duty devolved on M. Latreille, who thereafter extended his studies to other departments of natural history than those over which he had made himself master previously. About the same period Cuvier confided to him that portion of the last edition of the Animal Kingdom which treats of the Crustacea, Arachnides, and Insecta. He was also engaged upon a Popular Introduction to Entomo-

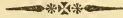
logy, and a Treatise upon the Natural Classification of the Weevils (Curculionidæ), together with several other works which were left in an incomplete state at his death. Indeed, his writings are very voluminous, were we merely to count his contributions to the *Nouv. Dictionnaire d'Histoire Nat.*, to the *Annales du Museum d'Histoire Nat.* and other scientific works; so that he stands in the first rank of naturalists, and especially in the department denominated Entomology. He died in 1833.

## A NOTICE

OF

## KIRBY AND SPENCE,

## THE ENTOMOLOGISTS.



THE Rev. William Kirby, and William Spence, Esq., are certainly two of the most eminent entomologists of the present day. Indeed, previous to the publication of the "Introduction to Entomology, or Elements of the Natural History of Insects," which, as most of our readers are aware, was their joint work, their favourite science was regarded, both by the vulgar and a vast majority of the learned, as trifling and futile in the highest degree. Nay, the time was, when a Lady Glanville's will was attempted to be set aside on the ground of lunacy, merely because she had evinced an extraordinary fondness for collecting insects; and Ray had to appear at Exeter, on the trial, as a witness of her sanity. Chiefly owing to the authors of the "Introduction," however, Entomology now divides the empire of Nature with her sister Botany.

The former ridicule which in this country had been thrown upon the science in question, principally arose from the want of a more popular and comprehensive Introduction, than was to be found in the English language. While elementary books on botany had been multiplied in every shape, Curtis's translation of the *Fundamenta Entomologiæ*, published in 1772; Yeats' *Institutions of Entomology*, which appeared the year after; and Barbut's *Genera Insectorum*, which came out in 1781—the two former in too unattractive, and the latter in too expensive a form for general readers—there were no other works professedly devoted to this subject, in our literature.

Convinced that this was the great obstacle to the spread of entomology in Britain, the authors of the "Introduction" resolved to do what was in their power to remove it, and accordingly laid open to their countrymen a mine of knowledge and of pleasure, new, boundless, and inexhaustible. In order to accomplish this purpose, they did not content themselves with merely giving a translation of one of the many works on the subject extant in Latin, German, or French, adding only a few obvious improvements. This would have been an easy affair, but a most unsatisfactory contribution to science. In the technical department of entomology, there existed, previous to Kirby and Spence's labours, much confusion—the same name sometimes applied to parts anatomically different, and different names to parts

essentially the same, while others of primary importance were without any name at all. And with reference to the anatomy and physiology of insects, they could no where meet with a full and accurate generalization of the various facts connected with these subjects, scattered here and there in the pages of the authors who have studied them.

They therefore began, in some measure, *de novo*, to institute a rigorous revision of the terms employed, making such additions and improvements as seemed to be called for; and to attempt a more complete account of the existing discoveries respecting the anatomical and physiological departments of the science, than had yet been given to the world. But they did not halt here; for in the present age, when the love for popular treatises is so prevalent, they felt it to be necessary to conduct the student through the attractive portal of the economy and natural history of the objects of the science. It is to this branch that they have devoted the most considerable portion of their work, bringing into one view, under distinct heads, the most interesting discoveries of Reaumur, De Geer, Bonnet, Lyonet, the Hubers, &c., as well as their own individual observations, relative to the noxious and beneficial properties of insects; their affection for their young; their food, and modes of obtaining it; their habitations, societies, &c., &c.

In this undertaking, which must have been one of no moderate labour—a labour, too, from which any fame that could result was necessarily to be very limited, and to the completion of which great pecuniary outlay was inevitable—the authors of the “Introduction” adopted the epistolary form of writing, because it admitted of digressions and allusions often called for in a popular work, and because it was better suited than any other for conveying those practical directions, which in some branches of the pursuit the student requires.

The most alluring side of the science is first discussed, viz. that which belongs to the manners and economy of insects, and where there was the least room for originality. They enter more fully, however, into the other branch, viz. that which belongs to the anatomical, physiological, and technical parts of the work. As far as regards the general physiology and internal anatomy, they have done little more than bring together and combine the observations of other naturalists who have attended to these branches; but the external anatomy they have examined for themselves, through the whole class of insects. Here they are assuredly entitled to the praise of having thrown much new light upon the subject, particularly by pointing out and giving names to many parts never before noticed.

In the *Terminology*, or what they call the *Orismology* of the science, the authors have introduced a great degree of precision and concinnity—dividing it into general and partial orismology. Under the former they define such terms as relate to Substance, Resistance, Density, Proportion, Figure, Form, Superficies (under which are introduced Sculpture, Clothing, Colour, &c.), Margin, Termination, Incision, Ramification, Division, Direction, Situation, Connection, Arms, &c.; and, under the latter, those that relate to the body and its parts or members, considered in their great subdivisions of Head, Trunk, and Abdomen,

There is no science to which the adage, *Dies diem docet*, is more strikingly applicable than to natural history. New discoveries are daily made, and will be made to the end of time. The utmost, therefore, that can reasonably be expected from naturalists, is to keep pace with the progress of knowledge; and this our authors have used their best diligence to accomplish. They tell us, that every new year since they took the subject in hand, up to the very time when the sheets were sent to the press, numerous corrections and alterations have suggested themselves. Accordingly, they informed the reader in an advertisement to the fifth edition, which was published in 1828, that a gradual and great alteration had taken place in the nomenclature of the genera, occasioned by the old ones, as set down in former editions, being further subdivided according to their natural groups, and each distinguished as a genus or subgenus, by its peculiar name. Thus it is manifest that the authors of the "Introduction to Entomology," not only originated and completed a first-rate work on the subject, both as a strictly scientific and a popular treatise, but that they have kept pace, nay, have taken the lead, in making constant discoveries, as well as in noting and arranging every thing new which is contributed from any other quarter.

We think it cannot be misplaced, under the names of Kirby and Spence, to consider for a little the advantages to be derived from the study which they have so assiduously and satisfactorily pursued. These advantages, indeed, they themselves earnestly labour, and at great length, to lay before their readers, as well as to answer the objections urged by those who endeavour to throw obloquy on the science. For instance, they say, that amusement and instruction may doubtless be derived from mineralogy and botany; but they also argue that entomology is not certainly behind any of her sisters in these respects. Insects indeed appear to have been Nature's favourite productions, in which, to manifest her power and skill, she has combined and concentrated almost all that is either beautiful and graceful, interesting and alluring, or curious and singular, in every other class and order of her children, and even to the minutest has given the most delicate touch and highest finish of her pencil. Some she has armed with glittering mail, possessing all the lustre of burnished metals; in others, she lights up the luminous radiance of polished gems. She has bedecked a few with what looks like liquid drops or plates of gold and silver, or with scales which mimic the colour and emit the ray of the same precious metals. Like stones in their native state, some insects exhibit a rough unpolished exterior, whilst others represent their smooth and shining face after they have been submitted to the tool of the polisher. Others again, by the rugged and various elevations and depressions of their tuberculated crust, present to the eye of the beholder no unapt imitation of the unequal surface of the earth—now studded with misshapen rocks, ridges, and precipices, at one time swelling into hills and mountains, and at another sinking into valleys, glens, and caves—while not a few are covered with branching spines, which, with a little stretch of fancy, as M. Reaumur observes, may represent a forest of trees.

If we extend the comparison to the vegetable kingdom, we shall find that insects vie with its finest productions; some in the delicacy and variety of their colours—colours, however, not like those of flowers, evanescent and fugitive, but fixed and durable, outliving the insect which they adorn, and appearing as fresh and brilliant as when it was alive. Others are no less remarkable in the texture and veining of their wings, or in the rich cottony down, or rather feathers, that clothe them. Nature, indeed, has in many insects carried her mimetic art to so great a degree of nicety, that some of them appear to have robbed the trees of their leaves to form for themselves artificial wings, so exactly do they resemble them in form, substance, and vascular structure—some representing green, and others dry withered leaves. Sometimes this mimickry, if we may call it so, is so exquisite, that a whole insect might be mistaken for a portion of the branching spray of a tree, or for a dead lifeless twig—appearances which seem to be intended to deceive their natural enemies. The rich and velvet tints even of the plumage of birds are not superior to what the curious observer may discover in a variety of moths; and those iridescent eyes which deck so gloriously the peacocks' tail, are successfully imitated in the wings of one of our most common butterflies.

In variety, indeed, insects certainly exceed any other class of animals. Nature, in her sportive mood, when painting them, sometimes imitates the clouds of heaven, at others the meandering course of the rivers of the earth, or the undulation of the waters. Many have the semblance of a robe of the finest net-work thrown over them; some have fins like those of fishes, or a beak resembling that of birds; to others horns are given; the bull, the stag, the rhinoceros, and even the hitherto vainly sought for unicorn, have in this respect many representatives among insects. It would, indeed, be endless to produce all the instances which occur of such imitations; but it may be added, that their arms and members, generally speaking, far exceed in structure and finishing those which they resemble.

Some of the preceding descriptions and comparisons may appear exaggerated and hyperbolic to such of our readers as have taken little notice of our native insects; nor can Britain boast of examples to bear us out in all that has now been said. Still, we are profusely rich in many of the tribes—to an extent, indeed, which the uninitiated might, with some colour of reason, refuse to credit. But whoever begins the study of entomology, will be utterly astonished, at every step, that he had so long overlooked the countless variety and beauty of our native specimens, many of which have wings

“With silver fringed, and freckled o'er with gold.”

Let us now consider some of the real advantages to be derived from the study of entomology. And here it may be proper, first of all, to weigh the burden of the objections urged by its impugners. They say it tends to withdraw the mind from subjects of higher moment; that it cramps and narrows the range of thought; that it destroys, or at least weakens, the finer processes of the imagination and fancy; and that it must be hostile to every thing like knowledge which leads to practical results. All this might be feasible enough, were it the fact



that in proportion to the exact material dimensions of an object, its value is to be ascertained; or if the study of the history of the larger animals could be properly followed out by despising and neglecting the smaller; or if an entomologist were merely a collector of specimens, without ever being led to reason upon and arrive at higher truths than those which go no farther than the satisfaction of curiosity; or, lastly, if it were consistent with experience and every-day observation that naturalists were unintellectual, unimaginative beings, or men devoid of practical wisdom. We might mention many great names in the higher walks of poetry and eloquence, or that were most sagacious in moral and political philosophy, who were enthusiastic naturalists. But a better illustration need not be given than that of Mr. Kirby himself, who has lately, in his celebrated *Bridgewater Treatise*, presented to the learned and the religious world two volumes "On the Power, Wisdom, and Goodness of God as manifested in the Creation of Animals, and in their History, Habits, and Instincts." Mr Spence is also well known as the author of certain "Tracts on Political Economy," works of very considerable merit, and at least evincing a mind and a taste which could grapple with such thorny and intricate questions as those connected with commerce, agriculture, and the corn laws, as freely as with moths and butterflies. The truth is, that it is too late in the day for any one now to pronounce any disparaging opinion with regard to natural science, no matter what branch be instanced; and from what has already been said, entomology, as treated by our authors, must not be quoted as an exception; for by all their labour and minuteness, they guide the attention of their readers "from Nature up to Nature's God."

But to glance at some of the real and practical advantages which the study of entomology confers on society, let us consider the injuries caused by various insects to the valuable products of the earth, or of the land. Many insects, in the state of larvæ, or maggots, destroy wheat, and that in such quantities as to cause serious loss in agriculture, amounting to many hundred acres in some cases. In America, the Hessian fly is one of the most formidable enemies to vegetation that can be named. On one occasion it proceeded from Long-Island inland, at the rate of 15 or 20 miles a year, till at last it extended over a space of 200 miles. Neither mountains nor rivers stopped this tribe; they crossed the Delaware like a cloud, and even filled the houses of the inhabitants, injuring or destroying whatever they fastened on, to an incalculable amount. Indeed, every sort of grain and vegetable growth have their appropriate enemies, or peculiar admirers, if you will, among the insect tribes; and a more serviceable or worthy study can surely not be set about, than that which tends to guide to a remedy for these evils.

To instance one other insect, and its ravages, let us listen to what is said of the ant of Barbadoes, the *formica saccharivora*. This enemy appeared, we learn, above eighty years ago, in such infinite hosts in the island of Granada, as to put a stop to the cultivation of the sugar cane. A reward of 20,000*l.* was offered to any one who should discover an effectual mode of destroying the vermin. Their numbers were incre-

dible : they descended from the hills like torrents ; and the plantations, as well as every path and road for miles, were filled with them. Rats, mice, reptiles, birds, and even some of the domestic quadrupeds, were killed by them. Streams of water opposed only a temporary obstacle to their progress : the foremost rushing blindly on to a certain death, and fresh armies continually following, till a bank was formed of the carcasses of those that were drowned, sufficient to dam up the waters, and allow the main body to pass over in safety below. They even rushed into the fires that were lighted to stop them. This pest was at length exterminated by a hurricane.

In many cases the labours of entomologists have been highly useful, in discovering the mode and times of their breeding, hatching, or laying of eggs, thereby enabling observers to know the period at which it is most easy to destroy them. Their labours have also been very important in tracing the animal through its transformations, and thus affording the means of determining the destructive parent of an innocent progeny, or the reverse. For example, it may be worth while for housewives to know, that it is not the moth, but the maggot that eats the blankets ; and that, if such be exposed to light during the laying season, they may be neglected all the rest of the year.

It is not the pleasure nor the worldly profit which attend the study of entomology, which alone can be adduced in its behalf, but lessons and themes of the highest import are enforced by the pursuit. The greatest benefits resulting from a well regulated knowledge of the forms and laws of nature, arise from the manner in which the student beholds in them the power, the wisdom, and the providence of the Supreme Being. We have noticed the ravages of the formidable march of some of the tribes of insects, and others still more terrific might be quoted. But we rather proceed to mention, or rather to allude, in a few words, to some of the wonderful facts connected with the history of this countless class of creatures.

It is fortunate for the human species that many of our greatest enemies make war on each other. Thus, if we find among insects foes, we have also allies. The misfortune, however, is, that the ignorant do not always know their friends from their enemies ; so that he who destroys the great dragon-fly, or a few wasps, leaves, for each of the former, many thousands of plagues, which that tiger of its division was created to slay ; and for every wasp, hundreds of flies to prey upon certain of the most valuable garden fruits. To pass over the many curious discoveries which have been made relative to the care which insects take in depositing their eggs, or providing for their young—their kinds of food, or their various ways of eating it—their stratagems to ensnare their prey—the construction of their habitations—their motions in flying, jumping, swimming, &c., let us observe what is said of the vitality of some species, which, to us miserable mortals, who die when the brains are out, and long before, as says a reviewer on this very subject, is a very provoking circumstance. Thus, the females of moths and butterflies will live after the roughest treatment, till they have laid their eggs. There are many of them that will go on living and perform their usual functions without wings, or legs, or

heads, or intestines. They look as comfortable when impaled on a pin, and stuck into a pill-box, as in their native element. At least they make love, and eat each other; and what more is wanted to prove that they are happy? Some mites will live in alcohol. Caterpillars may be frozen to the hardness of a stone, and yet revive. Many resist drowning for a long time; and Lord Bute has said, that in the boiling springs of Albano, there were not only *confervæ* living, but black beetles, which died on being taken out and plunged into cold water.

We might extend to a great length an account of the contents of our author's "Introduction to Entomology," and by every paragraph show more convincingly the interest and importance which belong to the subject, and the distinguished station these gentlemen hold as cultivators of the science. But our edition of the "Animal Kingdom" affords abundant instances of the estimation in which their labours and authority are regarded by us; and therefore a more lengthened or minute account of their contributions to Natural History does not seem called for in this sketch. Were we writing a memoir or life of our authors it would be requisite to enumerate their other works, and bestow some observations upon them. Mr. Kirby's "*Monographia Apum Anglicæ*," and papers by both, frequently to be met with in the Transactions of certain learned or scientific Societies, would have to be examined. But it is as entomologists that we speak of them, and entomologists as set forth in their great and professedly principal work—a work that still stands pre-eminent in the department to which it belongs, that we have here solely regarded them.



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FOURTH GREAT DIVISION OF THE ANIMAL KINGDOM.  
ANIMALIA RADIATA.

Distribution of the Radiata into five Classes, 389.

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II. ENTOZOA.	IV. POLYPI.
V. INFUSORIA.	

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  - Proteus, 454
  - Monas, 454
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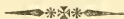


THIRD  
GREAT DIVISION  
OF THE  
ANIMAL KINGDOM.

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INSECTA.

(CONTINUED.)



FAMILY VI.

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LAMELLICORNES.

IN our sixth and last family of pentamerous Coleoptera, we find the antennæ inserted into a deep fossula under the lateral margin of the head; they are always short, usually consist of nine or ten joints, and are always terminated in a club usually composed of the three last, which are lamellar, sometimes flabelliform or disposed like the leaves of a book, opening and closing in a similar way, sometimes concentrically contorted and fitting in each other, the first or inferior then being semi-infundibuliform and receiving the others, and sometimes arranged perpendicular to the axis and forming a sort of comb.

The body is generally ovoid or oval, and thick. The exterior side of the two anterior tibiæ is dentated, and the joints of the tarsi, with the exception of those of some males, are entire and without brush or pellet beneath.

The anterior extremity of the head most commonly projects or is dilated in the manner of an epistoma. The mentum is usually large, covers the ligula or is incorporated with it, and bears the palpi. The mandibles of several are membranous, a character observed in no other coleopterous Insects. The males frequently differ from the females, either by prominences on the thorax or head in the form of horns or tubercles, or by the largeness of their mandibles.

This family is very numerous, and with respect to the size of the

body, the variety of forms exhibited in the head and thorax, sexually considered, is one of the most beautiful of the order, and frequently also as regards the species, which in their perfect state live upon vegetable substances, by the splendour of the metallic colours with which they are ornamented. Most of the other species, however, feeding on decomposed vegetable aliment, such as dung, tan, or excrementitious matters, are usually of one uniform black or brown hue. Some of the Coprophagi, however, do not yield even in this respect to the former. They are all furnished with wings, and their gait is heavy.

The body of the larvæ is long, almost semicylindrical, soft, frequently rugose, whitish, and divided into twelve annuli, with six squamous feet; the head is squamous and armed with stout mandibles. Each side of the body is furnished with nine stigmata; its posterior extremity is thicker, rounded and almost always doubled under it, so that the back being arcuated or convex, the animal cannot extend itself in a straight line, crawls badly on a level surface, and falls backwards on its side at every instant. An idea of their form may be obtained from that of the larva, so well known to gardeners by the name of *ver blanc*, which is that of the *Melolontha vulgaris* (a).

Some of them require three or four years to become pupæ; they construct in their place of residence an ovoid shell, or one resembling an elongated ball, composed of earth or the debris of substances they have gnawed, the particles of which are cemented by a glutinous matter produced from their body. Their aliment consists of the dung of various animals, mould, tan, and roots of vegetables, frequently such as are necessary to man, of which they sometimes destroy immense quantities, to the great loss of the cultivator of the soil. The tracheæ of these larvæ are elastic, while those of the perfect Insect are tubular. There is also a remarkable difference in the nervous system in these two states. The ganglions are less numerous and more closely approximated in the perfect Insect, and the two posterior ones give off numerous radiating filaments. According to the observations of M. Marcel de Serres on the eyes of Insects, those of most of the Lamellicornes present peculiar characters, which approximate their organization to that of the Tenebrionites, Blattæ, and other lucifugant Insects.

The alimentary canal is generally very long, particularly in the Coprophagi, and contorted round itself; the chylific ventricle is

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☞ (a) Our common *grubs*, which are so abundant in dung-hill, gardens, &c., are larvæ of various species of Lamellicornes.—ENG. ED.

studded with papillæ, which M. Dufour has ascertained to be bursæ, intended for retaining the alimentary fluid. The biliary vessels in number, and the manner of their insertion, resemble those of the carnivorous Coleoptera, but are much longer and more slender,

We will divide this family into two tribes \*. In the first, or that of the SCARABÆIDES, we find the antennæ terminating in a foliaceous and generally plicatile club, and composed in others of joints that fit into each other, either in the form of a reversed cone or nearly globular. The mandibles are identical or almost similar in both sexes, but the head and thorax of the males exhibit peculiar projections or eminences; sometimes also their antennæ are more developed. This tribe † corresponds with the genus

### SCARABÆUS, *Lin.*

The alimentary canal is generally much longer than that of the Lamellicornes of the following tribe or the Lucanides, and the œsophagus is proportionally much shorter. The adipose tissue, or the epiploon, is generally almost reduced to nothing, whilst here it is well marked. But it is chiefly by the genital apparatus of the males that the Scarabæides are distinguished, not only from the latter, but also from all other Pentamera. Their testes, according to the observations of M. Dufour, consist of spermatic capsules—tufts according to M. Cuvier—which are tolerably large, very distinct and pendiculated; the number varies according to the genus.

The larvæ—Cuv., Régn. Anim.—have a cylindrical stomach surrounded by three ranges of little cæca, a very short small intestine, an extremely thick, turgid colon, and a moderate rectum.

We will divide this genus into several small sections established on characters drawn from the organs of manducation, antennæ, and habits; divisions, the distinction of which has been confirmed by the researches of M. Dufour.

The COPROPHAGI or the Scarabæides of our first section usually have their antennæ composed of nine joints, and of eight in the others, the three last forming the club. The labrum and mandibles are membranous and concealed. The terminal lobe of the maxillæ is also of the same nature, wide and arcuated at the superior margin and curved inwards. The last joint of the maxillary palpi is always the largest and almost oval or nearly cylindrical; but the same of the labial palpi is almost always more slender than the preceding ones, or very small. Behind each of the latter palpi there is a membranous

\* The anatomy is so different, according to M. Dufour, that these two tribes should constitute as many families. The sections would then become tribes, and some of their divisions so many principal genera—*Copris*, *Aphodius*, *Geotrupes*, *Scarabæus*, *Rutela*, *Melolontha*, *Glaphyrus*, and *Cetonia* for the first tribe.

† In thus retaining the primitive extent of this division, we have acted in conformity with our first edition; we still think, however, that although we may reject several of the genera established in modern times, there are some that must be received; such in general are those of Fabricius.

projection in the form of a ligula. The mentum is emarginated. The sternum exhibits no particular prominence, and the hooks of the tarsi are always simple. The anterior tarsi are frequently wanting in several, either ab ovo or because they are deciduous.

The length of the alimentary canal is always very great; occasionally (as in *Copris lunaris*) ten or twelve times that of the body. The chylic ventricle occupies the largest portion of it, is studded with conoid papillæ, is closely folded together and kept in this state of agglomeration by numerous tracheal bridles. The intestine is filiform, and terminates by an inflation. The testes of the Coprophagi, dissected by M. Dufour, appeared to him to consist of six orbicular, slightly depressed spermatic capsules, usually united by tracheæ in one bundle, each placed on a tubular and tolerably long pedicle, which terminates in a short vas deferens. There is but one pair of vesicuke seminales; they are very long, filiform, and in numerous folds.

This first section corresponds to the third division of the genus *Scarabæus*, Oliv., or to that of *Copris*, but with the addition of some of the *Scarabæides*—*Aphodius*—of that naturalist.

In some, the two intermediate legs are more remote at base than the others; the labial palpi are very hairy, with the last joint much smaller than the others, or even indistinct; the scutellum null or extremely small, and the anus exposed.

Coprophagi of this division peculiar to the eastern continent, with a rounded body, usually depressed above or but slightly convex, similar or but little different, and without horns in both sexes; in which the antennæ of nine joints terminate in a foliaceous club; without scutellum, or sutural hiatus indicating its place; in which the four posterior tibiæ, usually furnished with ciliated or hairy fringes, are slender, elongated, not dilated at the extremity, or but slightly so, truncated obliquely, and terminated by a single stout and spiniform or acuminate spur; and finally, in which the epistoma is more or less lobate or dentated, form the genus

#### ATEUCHUS, *Web. Fab.*,

Since, however, restricted to those species in which the exterior margin of the elytra is straight, or unemarginated and without a sinus near their base exposing the corresponding portion of the superior margin of the abdomen. The tibiæ and tarsi of the four last legs are furnished with long hairs; the four first joints of the tarsi are generally longer than in the others. The first joint of the labial palpi is nearly cylindrical, or in the form of a reversed cone. The epistoma is most commonly divided into three lobes or festoons, and its contour presents six teeth.

These Insects which M. Mac Leay, Jun., in his ingenious *Horæ Entomologicæ*, I, p. 184, designates by the generic appellation of *Scarabæus*, as being the name originally bestowed upon them by the Latins\*, and of which in the same work—part II, p. 497—he gives an excellent Monograph, conceal their ova in balls of dung, and even

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\* The *Heliocantharos* of the Greeks.

of human fæces, so similar to large pills that some authors have given them the name of *Pilularia*. They roll them along with their hind feet, and frequently in company, until they find a hole fitted to receive them, or a soil in which they can bury them.

Two species of *Ateuchus* were worshipped by the ancient Egyptians, and formed a part of their system of hieroglyphics. They are sculptured in various positions, and sometimes of gigantic dimensions, on all their monuments. They were also figured separately and on the most precious materials, such as gold; they used them as seals and as amulets, which were suspended to the neck and buried with the mummies. The Insect itself has been found in some of their coffins\*. The

*A. sacer*; *Scarabæus sacer*, L.; Oliv., Col. I, 3, VIII, 59, which is found not only in all Egypt but in the South of France, in Spain, Italy, and the South of Europe generally, has hitherto been considered the object of this superstitious distinction; but another species discovered in Sennar by M. Caillaud of Nantes, appears from its most brilliant colours, and the country in which it is found, the original residence of the Egyptians, to have first attracted their attention. The latter, which I have named the *Ateuchus des Egyptiens*—Voy. à Meroé, un fleuve Blanc, IV, p. 272, Atl. d'Hist. Nat. et d'Antiq., II, lviii, 10, is green with a golden tinge, while the former is black. The epistoma has six dentations in all, but here the vertex presents two little eminences or tubercles, while that of the other or the *A. des Egyptiens* exhibits a more slight and elongated, smooth, and very glossy projection. The thorax, except in the middle of its back, is entirely punctured and even scabrous on the sides, with dentated margins. The intervals of the elytral striæ are besides finely scabrous, with numerous and tolerably wide, deep punctures. The internal side of the two anterior tibiæ presents a series of small teeth. In the *Ateuch. sacer* this same side usually presents two stout teeth.

*Ateuchi*—the *S. Æsculapius*, and another species, the *Hippocrates*—in which the thorax and abdomen are shorter, rounder, and more convex, and in which the first joint of the labial palpi is also shorter, wider, and in the form of a reversed triangle, form the genus *Pachysoma* of Kirby †.

Those in which the exterior side of the elytra is strongly emarginated near the base, are now the

#### GYMNOPLEURUS, Illig.

The four posterior tibiæ are usually simply ciliated or furnished

\* See my memoir on the Insects painted and sculptured on the ancient monuments of Egypt, and the works of M. de Champollion, Jun.

† In addition to the *Ateuchi* above mentioned, refer to the same subgenus, the *A. laticollis*, *variolosus*, *semipunctatus*, *miliaris*, *sanctus*, &c., of Fabricius. See Mac Leay, op. cit., and the Entomog. Imp. Russ., where several species of this and the following subgenera are exactly delineated.

with small spines, and the last joint of their tarsi is as long as all the preceding ones taken together, or longer. The first joint of the labial palpi is dilated internally, and almost triangular. There is a fossula on each side of the thorax\*.

Other Coprophagi, very analogous to the preceding ones, and also placed by Fabricius among the Ateuchi, are distinguished from them by the intermediate tibiæ, the extremity of which, as well as that of the two last, frequently dilated or clavate, presents two spines or spurs. The epistoma, in several, exhibits but four or two teeth. The first joint of the labial palpi is always larger than the second, and dilated externally. The third and last joint is distinct. First comes

#### SISYPHUS, *Lat.*

The Sisyphi differ from the other Coprophagi in their antennæ, which consist of but eight joints, and in their abdomen, which is triangular. The four last legs are long and narrow, their thighs clavate. The body is short and thick; no scutellum †.

#### CIRCELLIUM, *Lat.*

The body hemispherical and convex; the abdomen almost semi-circular, and the lateral edges of the thorax straight or not dilated, or but slightly, in the middle. No scutellum. Five or six dentations in the epistoma ‡.

#### COPROBIUS, *Lat.*

No scutellum; the body ovoid, not arched, or but slightly so: middle of the lateral margins of the thorax dilated into an obtuse or rounded angle, abdomen nearly square; epistoma bidentate. These Insects are more particularly proper to the western continent §.

Those species, in which the four posterior tibiæ are proportionally shorter, dilated, or remarkably widened at the extremity, and the first joints of the tarsi are broader, form the genus *Chæridium* of MM. Lepeletier and Serville—Encyc. Méthod.;—we will also unite to the Coprobii the *Hyboma* of the same authors.

Another subgenus allied to the preceding, the species of which are also proper to America, that which they call *Æschrotes*, but which had been previously published by Dalman—Ephem. Entom., 1824—under another name, that of

#### EURYSTERNUS, *Dalm.*

Differs from the preceding subgenera in the presence of a scutel-

\* The Ateuchi *sinuatus*, *pilularius*, *flagellatus*, *Leei*, *Kœnigii*, *cupreus*, *profanus*, &c., Fab.; the *Sc. fulgidus*, Oliv., &c. The Ateuchi of Fabricius, proper to America, belong to other subgenera. M. Mac Leay—Hor. Entom., I, pars II, p. 510—still retains the *Gymnopleuri*, the Ateuchi, or his *Scarabæi*, but forms a section of them, of which he points out the species.

† *Ateuchus Schæfferi*, Fab.;—*Sc. longipes*, Oliv., and some undescribed species from the Cape of Good Hope.

‡ The Ateuchi, *Bacchus*, *Hollandiæ*, Fab.

§ The *A. volvens*, *violaceus*, *triangularis*, *6-punctatus*, &c., Fab.

lum. The body is also an oblong oval, and plane above; the sides of the thorax are obliquely and abruptly truncated. The intermediate coxæ are directed longitudinally with the body, and parallel to its sides.

In all the following Coprophagi, the four posterior tibiæ are always dilated at their extremity, and almost in the form of an elongated triangle; the intermediaries, as in the last, terminate in two stout spurs or spines; but the head or thorax, or both in the males, presents horns or projections which distinguish them from the females. In several, the three last joints of the antennæ are semicupular and concentrically piled or fitted into each other. They compose the genera *Onitis* and *Copris* of Fabricius.

Two subgenera with a foliaceous antennal club present a character which, in this section, is exclusively peculiar to them: the third joint of the labial palpi is but slightly or not at all distinct, and the second is larger than the first.

#### ONITICELLUS, *Zieg. Dej.*

The body is oblong and depressed; the thorax large, nearly oval, and almost as long as it is wide, and always smooth. The scutellum is distinct. Simple and elevated lines or tubercles on the head distinguish the males from the females\*.

#### ONTHOPHAGUS, *Lat.—COPRIS, Fab.*

No scutellum. Their body is short, thorax thick, broader than long, either almost semi-orbicular or nearly orbicular, but strongly emarginated or truncated before. The head, and frequently the thorax, of the male is furnished with horns.

*O. taurus*; *S. taurus*, L.; Oliv. Col. I, 3, viii, 63. Small; black; two semicircular horns on the head of the male; two transverse and elevated lines on that of the female. In cowdung.

*O. nuchicornis*; *S. nuchicornis*, L.; Panz., Faun. Insect. Germ. I. and XLIX, 8. Small; black; elytra grey with little black spots; a compressed laminiform projection terminating in an almost straight point on the hind part of the head of the male; two elevated and transverse lines on that of the female; a tubercle on the anterior of the thorax. With the preceding.

Africa and India produce several other species, some of which are very brilliant, but they are all small †.

Two subgenera presenting a scutellum, or sutural hiatus indicating its place, and which the anterior legs are frequently destitute of tarsi, and frequently also longer, more slender and arcuated in the males, are distinguished from all other Coprophagi by the form of their antennal club; its first joint, or the seventh of the whole num-

\* Dej., Catalogue, &c. p. 53.

† Dej., Ib. See Lat., Gener. Crust. et Insect., II, p. 83.



ber, is semi-cuculliform and receives the following one, a portion of which at least is concealed and is shaped like a horse-shoe; the third or last is in the form of a reversed cup. The thorax is large, and usually presents two little fossulæ near the middle of the posterior margin. In

ONITIS, *Fab.*,

The second joint of the labial palpi is the largest, and the scutellum, though very small and depressed, is still visible. The anterior legs are generally longer, more slender and arcuated in the males. The tarsi are usually deficient, and the thorax, that of a small number excepted, is without horns\*.

PHANÆUS, *Mac Leay.*—LONCHOPHORUS, *Germ.*—SCARABÆUS, *L.*—  
COPRIS, ONITIS, *Fab.*

Where the first joint of the labial palpi is the largest and dilated on the internal side. A simple sutural hiatus indicates the place of the scutellum. The males differ greatly from the females in the horn-like prominences of their head and thorax; but the respective length of the legs is the same.

Several large and beautiful species of Copris, *Fab.*, peculiar to America, compose this subgenus †.

COPRIS, *Geoff. Fab.*—SCARABÆUS, *Lin.*

This subgenus, or Copris properly so called, is at present composed of those species only, whose antennæ are terminated by a trifoliate club; in which the four posterior tibiæ are strongly dilated and truncated at the extremity; that have neither scutellum nor hiatus; in which the body is always thick, and differs above according to the sex, and whose labial palpi are composed of three distinct joints, of which the first is the largest, almost cylindrical and not dentated on the inner side.

The largest species belong to those parts of Africa or India that are situated between the tropics or in their immediate vicinity.

*C. lunaris*; *S. lunaris*, *L.*; *Oliv.*, *Ib.*, v, 36. Eight lines in length; black, very glossy; the head emarginated at the anterior edge, is provided with a long horn, longer and pointed in the male, short and truncated in the female—*S. emarginatus*, *Oliv.*, *Ib.*, viii, 64—thorax truncated before, with a horn on each side; elytra deeply striated ‡.

Like the Lamellicornes of the ensuing section, the last Coprophagi have all their feet inserted equidistant from each other, and a very

\* See *Encyc. Méthod.*, article *Onitis*.

† See *Encyc. Méthod.*, article *Phanée*, and particularly the *Hor. Entom.*, I, p. 124. The author of the latter refers to it the following Scarabæides of Olivier: *Sc. bellicosus*, *lancifer*, *jasius*, *minas*, *beelzebut*, *festivus*, *caruifex*, &c.

‡ The Copris: *Antenor*, *Hamadryas*, *Midas*, *gigas*, *bucephalus*, *molossus*, *hispanus*, *nemestrinus*, *nemestrinus*, *sabaus*, *Jachus*, &c., of Fabricius; the *Atuckus Tmolus*, *Fischer*, *Entomog. Russ.*, I, viii, 1, 2, is a Copris.



distinct scutellum. The labial palpi are glabrous or but slightly pilose, and their third and last joint is larger, or at least longer than the preceding ones. The elytra completely envelope the contour of the abdomen, or form an arched roof to it, a character which approximates them to the Scarabæides of the following section. Independently of this, these Insects, with respect to their antennæ and legs, are closely allied to those of the preceding subgenus; but the sexual variations are less strongly marked, and frequently consist of mere tubercles. They are all small. Several species appear in the very beginning of Spring. They form two subgenera.

APHODIUS, *Illig., Fab.*—SCARABÆUS, *Lin., Geoff.*—COPRIS, *Oliv.*

In which the last joint of the palpi is cylindrical, and that of those attached to the labium somewhat more slender than the preceding ones, or at least not thicker. There is no appendage or corneous and dentated lobe to the inner side of the maxillæ. The body is rarely short, with the abdomen arched, and when these characters are present, the thorax is not transversely sulcated.

*A. fimetarius*; *S. fimetarius*, *L.*; *Panz., Faun. Insect. Germ., XXXI, 2.* Three lines in length; black; elytra and a spot on each side of the thorax fulvous; three tubercles on the head; elytra with punctured striæ\*.

PSAMMODIUS, *Gyll.*

Where the last joint of the palpi is oval and the thickest and longest of the whole number, and in which the internal lobe of the maxillæ is corneous and bidentated, The body is short, the thorax transversely sulcated, and the abdomen inflated †.

This subgenus conducts us naturally to the first of the following section, that of the ARENICOLI. These Scarabæides, with the Aphodii and Psammodii, are the only ones whose elytra entirely cover the posterior extremity of the abdomen, so that the abdomen is completely concealed; but they are distinguished from the latter by several characters. The labrum is coriaceous, and most frequently juts out beyond the epistoma. The mandibles are corneous, and usually salient and arcuated. The terminal lobe of the maxillæ is straight, and has no inward curve. The third and last joint of the labial palpi is always very distinct, and at least almost as long as the preceding one. With some few exceptions their antennæ are composed of ten or eleven joints.

These Insects are also coprophagous, make deep holes in the

\* See Schœnherr, *Synon. Insect., I, 1, p. 66*; *Panz., Ind. Entom., p. 7.*

† The only one I refer to it is the *Psammodius sulcicollis*, *Gyll., Insect. Suec. I, p. 9.* The other species are true Aphodii. See *Encyc. Méthod., article Psammodie.*

The genus *Euparia*, established in the *Encyc. Méthod.*, by MM. Lepeletier and Serville, belongs to this section, but as they have not completely described it, and I have never seen the Insect on which it is founded, I cannot assign its place. According to those gentlemen, the sides of the head are dilated and form a triangle. The posterior angles of the thorax are emarginated, and the humeral angles of the elytra are prolonged anteriorly into a point. The only species quoted is the *castanea*. These characters, and even the colour, induce me to suspect that this genus is closely allied to the *Eurysterne* of Dalman, which we have already mentioned.

ground, fly particularly during the evening, after sun-set, and counterfeit death when seized. According to M. Leon Dufour, the alimentary canal of *Geotrupes*, one of the principal subgenera of this section, is somewhat shorter than in *Copris*, and the stomach presents no vestige of papillæ\*.

Here—*Geotrupides*, Mac Leay—the labium is terminated by two lobes, or salient ligulæ, the mandibles are generally salient and arcuated; the labrum is either wholly or partially exposed, and the antennæ in most of them are composed of eleven joints. The body is black or reddish, and the elytra smooth or simply-striated. The males generally have horns, or differ in other external characters from the females. They feed more particularly on excrementitious matters.

The antennæ of some are composed of nine joints.

*ÆGIALIA*, Lat.—*APHODIUS*, Fab.

The labrum short, transversal, scarcely apparent and entire; terminal point of the mandibles bifid; internal lobe of the maxillæ corneous and bidentated; the body short and inflated; thorax transversal; abdomen gibbous; the four posterior tibæ thick and incised, the two last terminated by two compressed and almost elliptical or spatuliform spurs; the two anterior tibæ have no tooth on the inner side; the posterior thighs are the largest †.

*CHIRON*, Mac Leay.—*DIOSOMUS*, Dalm.—*SINODENDRON*, Fab.

The Chirons, in their antennal club, which is rather semi-pectiniform than foliaceous, approach the Lamellicornes of the second tribe, where in fact they have been placed by M. Mac Leay; but in the ensemble of their other characters they belong to this section. Their labium is broad, ciliate, quadridentate, and completely exposed. Their mandibles are robust, in the form of an elongated triangle, and have two teeth on the inner side. The two maxillary lobes are coriaceous and without any kind of armature. The body is narrow, elongated, and almost cylindrical; the thorax is longitudinal and separated from the abdomen by a deep strangulation; the abdomen is elongated, and the anterior tibæ are wide, digitated, and furnished on the inner side, after the spur, with a tooth, silky at the end. The thighs are lenticular, and the two anterior are the largest. There is a transverse range of small tubercles on the anterior extremity of the head ‡.

Those of others are composed of eleven joints ||.

Some are distinguished from all others by the antennal club in the form of a reversed cone, which consists of joints or leaflets contorted

\* See Ann. des Sc. Nat. III, p. 234.

† *Psammodius arenarius*, Gyll., Insec. Suec. I, p. 6; *Scarabæus globosus*, Panz., Faun. Insect. Germ., XXXVII, 2; *Aphodius arenarius*, Fab.

‡ *Sinodendron digitatum*, Fab.; *Chiron digitatus*, Mac Leay, Hor. Entom., I, p. 107; *Diosomus digitatus*, Dalm., Ephem. Entom., I, p. 4.

|| This supputation is sometimes doubtful, inasmuch as it is not always easy to distinguish the joint that precedes the club, and that it may, apparently, seem confounded with the first of the club itself. The base of the second also forms a sort of knot or rotula that may be taken for a joint.

into a kind of funnel and fitting concentrically into each other, and by their mandibles, the inner side of which is entirely serriform, and which present underneath, particularly in the males, a projection or horn. In these individuals the thorax is deeply emarginated before, and its angles project considerably forwards. The abdomen is very short, almost semicircular, and the last legs near its extremity. The labial palpi are a little longer than the others; their second joint is elongated, and the two others are almost equal in length. The inner side of the maxillæ is furnished with hairs and cilia, in the form of little spines, and their terminal lobe is narrow and elongated. The mentum is triangular, and transversely truncated at its extremity. Such are those which form the

#### LETHRUS, Scop. Fab.

The species, but few in number, are peculiar to Hungary and the eastern part of Russia.

*L. cephalotes*, Fab; Fisch., Entomog. Russ. Imp., I, p. 133, XIII, 1. This Insect, distinguished from the other species by its entirely black colour, and smooth thorax and elytra, according to professor Gothelf Fischer, is extremely noxious in cultivated grounds, as it attacks the scarcely visible buds and leaves of plants, and cuts them off with the trenchant forceps of its mandibles, a habit which in Hungary, where it does great injury to the vines, has caused it to be styled the *Schneider*, or Cutter. As the pectus projects greatly underneath the abdomen, and the hind legs seem to be inserted very near the anus, it is a good climber, and in descending moves backwards. After having amputated the heart of a plant, it descends with its prey, which it transports to its hole. Each of these holes, which are made in the earth, is occupied by a pair, but in the nuptial season a strange male frequently claims admittance. A furious combat is the consequence, during which the female closes the entrance of the domicil, and keeps continually pushing her companion forwards. The battle only ceases with the death or flight of the intruder. The same savant describes—Ibid., p. 136, 140—three other species hitherto unknown.

In all the other *Arenicoli* the antennal club is composed of the ordinarily shaped leaflets, laid one on another, or like the leaves of a book. They form our subgenus *GEOTRUPES*, or the *Scarabæus*, Fab., from which the following subgenera have since been detached.

Those, in which the antennal club is oval or ovoid, and of which the edges of the leaflets are totally or partially exposed even when contracted, form two of them. In

#### GEOTRUPES, Lat.

Or *Geotrupes* properly so called, the labrum is a transverse square, entire or simply dentated; the mandibles are arcuated, highly compressed, dentated at the extremity, and frequently sinuous on the exterior side, and the maxillæ furnished with a very thick fringe of

hairs; the last joint of the maxillary palpi is not larger than the preceding one, while the same of the labial palpi is longer; the mentum is profoundly emarginated; the anterior tibiæ are elongated, their external side is furnished with numerous teeth, and the extremity on the opposite side with a single spur or spine; the epistoma is lozenge-shaped.

Sometimes the thorax of the male is armed with horns. They are the *Ceratophyus* of Fischer, or *Armidens*, Ziegler.

*G. typhæus*; *S. typhæus*, L.; Oliv., Col. I, 3, vii, 52. Black; three projecting black horns before the thorax of the male, of which the intermediate is the shortest; elytra striated. In high and sandy localities.

*G. momus*; *S. momus*, Fab. This species, discovered in Spain by Count Dejean, differs from the *Typhæus* in the smoothness of the elytra; it is otherwise similar.

*G. dispar*; *Ceratophyus dispar*, Fisch., Entomog. Russ. Imp., II, xviii. A horn on the head and thorax. Italy and Russia.

Sometimes both sexes are destitute of horns. They are the *Geotrupes* proper.

*G. stercorarius*; *Scarabæus stercorarius*, L.; Oliv., Ib. V, 39. A shining black or deep green above, violaceous or golden green beneath; a tubercle on the vertex; dotted bands on the elytra, with smooth intervals; two indentations at the base of the posterior thighs.

*G. vernalis*; *Scarab. vernalis*, L.; Oliv., Ib., iv, 23. Shorter than the *stercorarius*, and approximating to a hemispherical figure; a violet or blue-black; antennæ black; elytra smooth.

#### OCHODÆUS, *Meg.*—MELOLONTHA, *Fab.*

The labrum in this subgenus is strongly emarginated, and almost in a form of a heart truncated posteriorly. The mandibles are in the form of an elongated triangle, one of them terminating in a simple point, with a notch beneath, and the other in two obtuse teeth. The exterior lobe of the maxillæ is bordered with little spines or stout cilia hooked at the end and two small horny and equal inner teeth; the other, or internal lobe, is formed by a pointed pencil of hairs. The last joint of their palpi is cylindrical, and much longer than the penultimate; the second of the labial palpi is larger than the others, and the following, or last, in the form of a truncated ovoid. There are but two teeth on the exterior side of the anterior tibiæ, and two spines may be observed on the extremity of the opposite side, of which the inferior is the smallest. The body is less elevated, in proportion, than that of the other *Geotrupes*, and is destitute of horns\*.

Those *Geotrupes*, in which the antennal club is large, orbicular or nearly globular, and whose first and last leaflet when contracted com-

\* *Melolontha chrysomelina*, Fab.; Panz., Faun. Insect. Germ., XXXIV, 2.

pletely envelope the intermediate or tenth, or form a sort of box for it, form three subgenera. That of

ATHYREUS, *Mac Leay*,

Approximates to the Coprophagi in its intermediate legs, which are more remote at base than the others\*.

ELEPHASTOMUS, *Mac Leay*.

The Elephastomi are remarkable for their epistoma, which is dilated on both sides and prolonged anteriorly, in their middle, in an almost square lamina, thickest and forked at the end; and for the length of their maxillary palpi, which is almost thrice that of those attached to the labium. The mentum is profoundly emarginated, and the mandibles are dentated at the extremity †.

BOLBOCERAS, *Kirby*.—ODONTÆUS, *Zieg*.—SCARABÆUS, *Lin. Fab*.

Where, as in Ochodæus, to which they closely approximate, one of the mandibles is simple at the extremity, and the other dentated. The maxillary palpi are not much longer than the others, and there is no emargination in the mentum.

*B. mobilicornis*; *Scarab. mobilicornis*, *Fab.*; *Panz., Faun. Insect. Germ., XII, 2.* Small; black above, fulvous beneath; the head armed with a very long, linear, slightly recurved and mobile horn; the thorax deeply punctured, canaliculated in the middle, and furnished anteriorly with four tubercles; elytra marked with dotted striæ; the body sometimes all fulvous—*S. testaceus*, *Fab.* Found in France.

One of the sons of that celebrated traveller and ornithologist, Le Vaillant, observing that Frogs and Toads are excessively fond of this Insect, procured numerous specimens by eviscerating those Reptiles †.

Our first division of the Scarabæides Arenicoli is terminated by those in which the antennæ, as in the most of the subsequent Scarabæides, are composed of ten joints.

The last joint of their palpi is elongated. The maxillary lobes are membranous. The labrum is less salient than in the preceding, or projects but little. The mandibles are not at all or but very slightly dentated. The epistoma is short, either arcuated and rounded, or projecting into an angle. They are very small Insects, whose thorax is destitute of horns.

HYBOSORUS, *Mac Leay*.—CARABÆUS, GEOTRUPES, *Fab*.

The first joint of the antennæ in the form of a reversed and elon

\* *Hor. Entomol., I, 1, p. 123.*

† *Hor. Entom., I, p. 121*; *Scarabæus proboscideus*, *Schreib. Lin. Trans., VI, p. 189.*

‡ *Balbocheras australasiæ*, *Kirb., Lin. Trans., XII, xxiii, 5*;—the *Scarab. quadridens*, *cyclops*, and *lazarus*, *Fab.*

gated cone; the intermediate joint of the club entirely enveloped by the two others, as in the last subgenera; the tibiæ narrow and elongated; the epistoma rounded anteriorly\*.

ACANTHOCERUS, *Mac Leay.*

First joint of the antennæ very large, dilated superiorly and lamiform; the edges of the intermediate leaflet of the club, when it is bent, are exposed. The tibiæ, the four last particularly, are lamelliform and cover the tarsi, folding over them when the leg is contracted. The epistoma tapers to a point or terminates in an angle. The thorax is almost semilunar †.

There, or in our second division of the Arenicoli—*Trogides*, Mac Leay—the antennæ, scarcely longer than the head, are always composed of ten joints, the first of which is large and very hairy. The ligula is entirely concealed by the mentum. The labrum and mandibles are but little exposed, and the latter are thick. The palpi are short. The mentum is entirely pilose. The inner side of the maxillæ is armed with teeth. The cinereous or earth-coloured body is very scabrous or tuberculous above. The head is inclined, terminates in an angle or narrows to a point. The thorax is short, transversal, without a lateral border, sinuous posteriorly, with projecting anterior angles. The abdomen is large, arched, and covered with very hard elytra. The anterior legs advance, and their thighs cover the under part of the head. These Insects produce a stridulous noise by the reiterated and alternate rubbing of the pedicle of the mesothorax against the internal parietes of the thoracic cavity.

They are found in earth or sand, and appear to gnaw the roots of vegetables. They form the genus

TROX, *Fab., Oliv.*

From which, under the generic name of PHOBERUS, M. Mac Leay, Jun., has separated those in which the sides of the thorax are depressed, dilated and bordered with spines, and which are destitute of wings. On each side of the posterior edge of the thorax is a deep emargination; the epistoma is rounded anteriorly ‡.

\* Hor. Entom., I, 1, p. 120; *Geotrupes orator*, Fab.

† Mac Leay, Ib. p. 136; *A. æneus*, a species for the knowledge of which I am indebted to one of our most able naval engineers, and not less excellent entomologist, M. Lefebure de Cerisy. M. Mac Leay refers the *Trox spinicornis*, Fab., to the same genus.

‡ *Trox horridus*, Fab.; Mac Leay, Hor. Entom., I, 1, p. 137. The species of *Trox*, Fab., remain where they are. See this author, Olivier and Schœnherr.

The genera *Cryptodus* and *Machidius*, arranged by Mac Leay in his family of the Trogidæ directly after that of *Phoberus*, have the posterior extremity of the abdomen exposed, and nine joints in the antennæ, characters which appear to remove them from *Trox*. I suspect that the *Machidii*, from the form and emargination of the labrum, and from some other characters, are allied to the *Melolonthæ*. The *Cryptodi* are distinguished from all other *Scarabæides* by their mentum, which almost completely covers the mouth beneath, and even by the labial palpi, situated, as well as the ligula, behind it. These two genera are established on Australian insects which I have not seen.



A third section, that of the XYLOPHILI, will comprise the Geotrupes of Fabricius, and some of his Cetoniæ. Here the scutellum is always distinct, and the elytra do not cover the posterior extremity of the abdomen. The tarsial crotchets of several are unequal. The antennæ always consist of ten joints, the three last forming a foliaceous club, of which the intermediate leaflet is never completely concealed or encased by the two others. The labrum is not salient, and its anterior extremity at most is exposed. The mandibles are entirely corneous, and jut out beyond the sides of the head. The maxillæ are corneous or of a solid consistence, straight and commonly dentated. The ligula is covered by an ovoid or triangular mentum narrowed and truncated at its extremity, the angles of which are frequently dilated. All the legs are inserted at an equal distance from each other.

A first division will comprise the Geotrupes of Fabricius. The males differ from the females in particular projections resembling horns or tubercles on the head or thorax, or on both, and sometimes also in the form of the latter. The epistoma is small, triangular, and either pointed, or truncated and bidentated at the extremity. The labrum is almost entirely concealed. Here, the maxillæ terminate in a simple, coriaceous, crustaceous lobe, more or less pilose and without teeth; there, they are entirely squamous, pointed, and present but a small number of teeth, accompanied with hairs. The mentum is ovoid or in the form of a truncated triangle. There is no projection on the pectus. The tarsial crotchets are generally equal. The scutellum is small or moderate. Their colours verge on black or brown.

Sometimes the maxillæ are terminated by a coriaceous or crustaceous edentated lobe, simply pilose or furnished with spinuliform cilia.

#### ORYCTES, Illig.—SCARABÆUS, Lin.

Where the legs differ but little in length, and the four posterior tibiæ are thick, strongly incised or emarginated, with an extremely wide extremity, which, in several, is as if stelled.

*O. nasicornis*; *S. nasicornis*, L.; RÆS., II, vi, vii. Fifteen lines in length; of a glossy maroon-brown; point of the epistoma truncated; a conical horn, more or less long, arcuated posteriorly on the head; front of the thorax cut obliquely, with three teeth or tubercles on the elevated portion posterior to the section; elytra smooth. Found, together with its larva, in tan.

*O. silenus*; *G. silenus*, Fab.; Oliv., Col., I, 3, viii, 62, a—c. Smaller than the nasicornis; of a lighter but similar hue; a little recurved and pointed horn on the head of the male; a deep excavation in the middle of the thorax; the last joint of the two anterior tarsi inflated, and with two very unequal hooks; elytra finely and irregularly punctured\*. In

#### AGACEPHALA, Manh.,

The anterior legs, at least in the males, are longer than the suc-

\* Add the *Geotrupes*, *boas*, *rhinocerus*, *stentor*, &c. of Fabricius.

The genus *Orphanus*, Mac Leay, established on the *G. bicolor* of Fabricius, does

ceeding ones, and the four posterior tibiæ are slender or not thick, almost cylindrical, slightly dilated at the extremity, and without deep lateral incisures or emarginations.

The labrum is entirely concealed. The terminal lobe of the maxillæ is simply pilose. The antennæ consist of ten joints; the supputation of their number in the Encyc. Method., article Scarabées, which amounts to but nine, is erroneous.

I know two species, both from Brazil\*.

Sometimes the maxillæ, usually corneous or scaly, are more or less dentated. In

SCARABÆUS *proper*.—GEOTRUPES, *Fab.*

The body is thick and convex, and the outer side of the mandibles sinuous or dentated.

The equatorial countries of both hemispheres produce very remarkable species of this subgenus.

*S. Hercules*, L.; Oliv., Col. I, 3, 1, xxiii, 1. Five inches long; black; elytra greenish-grey mottled with black; a recurved and dentated horn on the head of the male, and a second one, long, projecting and pilose beneath, with a tooth on each side on the thorax. South America. Some travellers call it the *Mouche cornue* †.

*S. dichotomus*, Oliv., Ib. XVII, 156. A fine maronne-brown; a large bifurcated horn with cleft branches on the head; a second one, smaller, curved and bifid at the end, on the thorax of the male. The East Indies.

*S. longimanus*, L.; Oliv., Ib. IV, 27. Fulvous-brown; head and thorax destitute of horns and tubercles; the two anterior legs more than half as long again as the body, and arcuated. The East Indies.

*S. punctatus*, Oliv., Ib., VIII, 70. Black; punctured; [no elevation in the shape of a horn in either sex; the epistoma truncated anteriorly, and the angles of the section slightly raised in the manner of teeth; two approximated tubercles on the middle of the head ‡ (a)]. The only species in France.

not differ from the preceding. The anterior margin of the labrum is salient or exposed. The maxillæ are terminated by a bundle of spinuliform cilia, acuated outwards, with a crustaceous triangular lobe. The antennal club is nearly globular. His genus *Dasygnathus*, placed by him in his family of the Dynastides, is unknown to us, but we presume, from the description of its characters, that it approaches the preceding and following genus.

\* The *Ægeon* of Fabricius is perhaps congeneric.

† This species is the type of the genus *Dynastes*, Kirby. The *S. Actæon* forms another, that of *Megasoma*. See Lin. Trans., XIV.

‡ The *Geotrupes* of Fabricius, with the exception of the precited species, forming the genus *Oryctes*, and of the following one.

(a) ↵ Several species of this genus are found in the United States, among which should be particularly noticed the large and splendid *Sc. Tityus*, the *Antæus*, &c.—  
ENG. ED.



## PHILEURUS, Lat.—GEOTRUPES, Fab.

The Phileuri only differ from the Scarabæi in their mandibles, which are straighter, destitute of sinus or teeth on the outer side, and, in their depressed body, the thorax of which is dilated and rounded on the sides\*.

Our second division contains Scarabæides, closely allied to the preceding in some respects, but also closely approximating to various Melolonthæ, and particularly to the Cetoniæ, which they resemble externally, but from which they differ in the arrangement of the mouth; Fabricius and Olivier even arranged most of these Insects with them. Their body is generally shorter, more rounded, smoother than that of the Scarabæi, and decorated with brilliant colours. The head and thorax are identical, and without any particular projection in both sexes. The anterior margin of the labrum is almost always exposed or apparent. The maxillæ are entirely scaly, as if truncated at the extremity, and furnished on the inner side with five or six strong teeth. The mentum is proportionally shorter and wider than that of the same Coleoptera, and less narrowed superiorly. The mesosternum is frequently prolonged into a horn or blunt point, extending between the second legs and even beyond them. The scutellum is usually large. The tarsial hooks are generally unequal. With the exception of a small number, these Xylophili are peculiar to the equatorial countries of the western continent.

Here, as in all the preceding Scarabæides, we find no axillary piece † filling the interval comprised between the posterior angles of the thorax and the exterior angles of the base of the elytra.

We will first speak of those subgenera in which the middle of the pectus presents no point or horn.

## HEXODON, Oliv. Fab.

The body is almost orbicular and plane beneath; the head square, and received into a deep emargination of the thorax; the outer margin of the elytra dilated and preceded by a small groove; the legs are slender, and the hooks of the tarsi very small and equal.

The labrum is apparent. The antennal club is small. The maxillæ are strongly dentated ‡.

## CYCLOCEPHALA, Lat.—CHALEPUS, Mac L.—MELOLONTHA, Fab.

The body ovoid; head free; elytra slightly bordered, without any

\* *G. dydimus, vulgus, depressus*, Fab. Certain undescribed species from Brazil and Cayenne, somewhat analogous to *Sinodendron*, have a thicker body, and connect the Phileuri with our Scarabæides, or the Geotrupes of Fabricius, a genus which has not been sufficiently studied with respect to the organization of the parts of the mouth.

† A lateral portion of the sternum larger and thicker than usual, and which, perhaps, corresponds to that small rounded scale (the *tegula* of some authors) found at the origin of the superior wings of Hymenoptera. See the *Mém. sur le thorax des Insectes*, by M. Audouin.

‡ See Oliv., and Lat., *Gener. Crust.*, II, p. 106.

lateral dilatation or groove; terminal joint of the anterior tarsi clavate, with unequal hooks, both bifid.

The anterior margin of the labrum is apparent. The mandibles are narrow, without any notable emargination or sinus on the outer side, and project but slightly outwards\*.

In the following subgenera, the sternum projects between the second pair of legs in a conical point, more or less long, pointed or rounded at the extremity.

The anterior margin of the labrum is always apparent. The mandibles are generally crenulated or dentated on the outer side. The tarsial crotchets are unequal. In the

#### CHRYSOPHORA, *Dej.*

The posterior legs of the males are very large, the thighs very thick, the tibiæ arcuated and terminated at the inner angle in a stout point †.

RUTELA, *Lat.*—RUTELA, PELIDNOTA, *Mac L.*, *Kirb.*—OPLOGNATHUS, *Kirb.*, *Mac L.*

No remarkable difference in the proportions of the legs in the two sexes; the mentum almost isometrical; the scutellum small or moderate; sternal point short and not reaching to the origin of the two anterior feet. The body is ovoid or oval ‡. The

#### MACRASPIDIS, *Mac L.*—CETONIA, *Fab.*

Differs from *Rutela* in the proportions of the mentum which is evidently longer than it is broad; in the short and rounded form of the body; in the length of the scutellum, which is at least one-third of that of the elytra, and of that of the sternal point, the extremity of which reaches to the origin of the two anterior legs or extends beyond it. The mandibles are almost triangular, and their extremity is pointed and emarginate. The maxillæ are furnished with several teeth. The mentum forms an elongated square slightly narrowed near the superior extremity; its superior margin is destitute of cilia. One of the crotchets of the tarsi, at least of the four anterior ones, is bifid, the other entire ||.

#### CHASMEDIA, *Mac Leay.*

The *Chasmodiæ* are similar to the *Macraspidis* in the general form

\* The *Melolonthæ geminata, barbata, castanea, signata, ferruginea, melanocephala, pallens*, &c., of Fabricius. In the first, the mandibles are strong, arcuated, and hooked at the end. Those of the *M. signata, melanocephala*, &c., are smaller, straight, truncated, or obtuse at the end. The summit of the maxillæ and mentum is also furnished with hairs. From such characters we might form a separate subgenus of these and analogous species. They all belong to South America.

† *Melolontha chrysochlora*, *Lat.*; *Voy. de MM. Humb. and Bonpl.*, II, xv, 1, fem.; 2, male;—*Scarabæus macropus*, *Shaw, Nat. Miscel.*, CCCLXXX, iv.

‡ See *Catal. de la Coll.*, &c., *Dej.*; *Horæ Entom.*, I, *Mac L.* and *Encyc. Méthod.*, article *Retèle*. The characters of the genera *Pelidnota* and *Oplognathus* do not seem to me sufficiently determined.

|| See *Catal.*, &c., *Dej.*; *Horæ Entom.*, I; *Ency. Méthod.*, art. *Rutèle*.

of their body, the proportions of the scutellum and of the sternal point; but the extremity of the narrower mandibles is obtuse and entire; the maxillæ have only two teeth and a pencil of hairs, and the mentum is an elongated ovoid narrowed near the superior extremity, and its margin ciliated. All the tarsial crotchets are entire\*.

There, an axillary piece—the same observed in that place in *Cetonia*, or the *epimera* of M. Audouin—fills the space comprised between the posterior angles of the thorax and the exterior angles of the base of the elytra.

#### OMETIS, Lat. †

The genus *Melolontha* of Fabricius will form our fourth and fifth sections.

The fourth, that of the PHYLLOPHAGI, is composed of Scarabæides that closely approach those of the two last subgenera; but the mandibles are covered above by the epistoma, and concealed beneath by the maxillæ; their outer side is alone exposed, without however overlapping; the outer side presents none of the sinuses or dentations observed there in *Rutela* and other analogous subgenera. The anterior edge of the labrum is exposed; it is sometimes in the form of a reversed and wide triangle, and most frequently transversely laminiform, and emarginated in the middle. The number of the antennal joints is not constant, and varies from eight to ten; the same remark applies to those of the club, and in several, with respect to this, the two sexes differ greatly. The ligula is entirely covered by the mentum, or incorporated with its anterior face, and the elytra are completely joined along the whole of the suture, characters which distinguish these Insects from those of the fifth section.

The family of the Anoplognathides of M. Mac Leay, and some other subgenera closely allied to some of those in the preceding section, will compose our first division. The epistoma is thickened anteriorly, and either alone or with the labrum forms a vertical facet in the figure of a reversed triangle, the point of which rests on the mentum. The latter is sometimes almost ovoid, densely pilose, with the extremity either rounded or truncated and unemarginate; sometimes it forms a transverse square, with the middle of the superior margin prolonged into a tooth, simple or emarginate. The maxillæ of some are terminated by a coriaceous or membranous lobe that is densely pilose, edentate, or with but very small teeth, situated near the middle of the inner side; those of others are entirely corneous, resemble mandibles, and are either truncated, or obtuse and entire at the end, or terminated by two or three teeth.

Those, in which the mentum is almost ovoid and very hairy, and whose maxillæ terminate in a similarly pilose, triangular lobe, without teeth, or with but very small ones situated near the middle of its inner margin, form two subgenera ‡.

\* See *Rutela*, Encyc. Méthod., and Hor. Entom.

† *Rutela cetonioides*, Encyc. Méthod.; — *Rutela cerata*, Germ.; — *Anisopliu histrio*? Dej., but with antennæ of nine joints.

This subgenus seems to connect these and the preceding Insects with the *Cetonia*.

‡ The sternum presents no projection whatever.

## PACHYPUS, Dej.—GEOTRUPES, MELOLONTHA, Fab.

The antennæ of the males are composed of but eight joints, of which the five last form the club. The mandibles are in the form of very thin, triangular, elongated leaflets, and are entirely concealed, as is also the labrum. The terminal lobe of the maxillæ is very small, scarcely distinct, and without teeth. The mentum is extremely prominent, projects forwards, and is rounded on the summit. The terminal joint of the palpi is the longest of all, and nearly cylindrical.

The body is thick, the epistoma semicircular, concave above, and distinguished posteriorly from the vertex by a transverse carina. The thorax of the males is excavated and armed anteriorly with a horn; the four posterior tibiæ are strong, deeply incised transversely, with their extremity widened and crowned with a range of little spines; the spurs are large. The tarsi are long, slender, pilose, and terminated by two small equal and simple hooks.

With the exception of the antennæ and the form of the epistoma, this subgenus approximates much nearer to *Oryctes* than to *Melolontha* \*.

## AMBLYTERES, Mac Leay.

The antennæ consist of ten joints, the three last forming the club. The labrum is exposed and lobate. The mandibles are strong and scaly. The maxillary lobe is of a moderate size, and its inner side armed with corneous teeth. The middle of the superior extremity of the mentum is slightly prolonged and truncated, the angles rounded and bearing the palpi; their last joint is ovoid, the same of the maxillæ is much elongated and very cylindrical. The scutellum is large †.

In the other subgenera of the same division, the mentum forms a transverse square, the middle of the superior margin projecting in the manner of a tooth, entire or emarginated. The maxillæ are entirely corneous and resemble mandibles terminated by a stout, inclined, elongated tooth, either entire and very obtuse at the end, or divided there into two or three points. The mandibles are always scaly and robust. The labrum is exposed.

Some, peculiar to Australia, have a sternal point; their tarsial crotchets are entire and unequal. Such is the

## ANOPLOGNATHUS, REPSIMUS, Leach,

The antennæ are composed of ten joints, and the extremity of the

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\* *Geotrupes excavatus*, Fab., the male; *Melolontha cornuta*, Oliv., Col., I, 5, vii, 74, a, b, the male; *Scarab. candida*, Petag., Insect. Calab., I, 6, a, b, the male; a black variety also, observed in Corsica by M. Peyrandeau, and subsequently in Sicily by M. Lefevre;—*M. atripilus*, Fab., a female of another species.

† Mac Leay, Hor. Entom., I, p. 142. This gentleman says nothing about the crotchets of the tarsi, nor sexual differences. From the description of the species which is the type of the genus, the thorax must be destitute of horns, and the anterior tibiæ are tridentate on the outer side; but two teeth are found in the same of *Pachypus*.

maxillæ is truncated, or obtuse and entire. These Insects are generally large and ornamented with brilliant colours\*.

The others, proper to the hot climates of both continents, are destitute of the sternal projection; the crotchets of the tarsi, or one of them, are bifid; their maxillæ frequently terminate by two or three teeth.

Sometimes the antennæ consist of ten joints, and the superior extremity of the jaws is entire or at most emarginate or bidentate. In

*LEUCOTHYREUS, Mac Leay.*

One of the tarsial crotchest is entire and the other bifid.

The tarsi, at least the anterior ones, are furnished with a brush beneath; the latter are dilated in the males. The under part of their head is more densely pilose than in the females †. In

*APOGONIA, Kirb. Mac Leay.*

All the crotchest of the tarsi are bifid ‡.

Sometimes the antennæ consist of but nine joints, and the extremity of the maxillæ presents three teeth. In

*GENIATES, Kirb.*

The extremity of the mandibles is emarginated. Under the mentum of the males we observe a sort of circular brush formed of compact hairs, plane or incised like a whisk (en manière de vergette). The four first joints of their anterior tarsi are dilated and furnished underneath with a brush. One of the crotchets of all the tarsi is entire and the other bifid. The anterior of the two first is accompanied at its base by a corneous lamina, emarginated inferiorly and rounded at the end, forming a sort of spur ||.

A second division of the Xylophili, which will comprise the Melolonthidæ of Mac Leay, presents the following characters: the labrum is in the form of a transversal leaflet, most commonly strongly emarginated underneath in its middle, so that viewed from before, it has almost the figure of a reversed and semitruncated heart. The mentum is as long as it is broad, or longer, somewhat narrowed before the summit, and either square or almost cordiform; its superior margin is straight, or more or less emarginated or concave in the middle, but without any dentiform dilatation. The maxillæ are usually scaly and armed with several—commonly five or six—teeth.

This division may be separated into two sections, one of which will embrace the genus *Melolontha* of Fabricius, as restricted by Illiger and myself, and the other that of *Hoplia*, Lat. The first of these sub-

\* See Hor. Entom., I, 143, and Lin. Trans., XII, p. 401, 405.

† Hor. Entom., I, p. 145;—*Melolontha sulcicollis*, Germ., Insect. Spec. Nov., p. 124.

‡ Kirb., Lin. Trans., XII, p. 401;—*A. gemellata*, ejusd., Ib. XXI, 9.

|| Kirby, Lin. Trans., XII, p. 401;—*Geniates barbatus*, Ib., XXXI, 8. The *Melolonthæ obscura, lanata*, Feb., the species called *nigrifrons* by M. Stevens, and described in the Synon. Insect. of Schœnherr, I, 3, App. 115, and probably other species, seem to form a separate subgenus allied to that of *Geniates*, but with undilated tarsi.

ditions may retain the name of *Melolonthidæ*, and the other receive that of *Hoplidæ*.

The first may be described as follows:—The number of perfect leaflets of the club exceeding three in several. The body extremely thick. Mandibles stout, wholly or mostly corneous, presenting at most a membranous and pilose appendage, situated in a cavity or emargination of the inner side; the superior extremity strongly truncated with two or three teeth or angular projections. All the tarsi terminated by two crotchets; the first joint of the two anterior ones not prolonged inferiorly into a hooked appendage. Labrum usually apparent. Maxillary teeth robust.

In those species of the *Melolonthidæ*, Fab., which compose the subgenus

#### MELOLONTHA, *Fab.*

Or *Melolontha* properly so called, the antennæ consist of ten joints, of which in the males, the last six or seven, and in the females, the last six or four, form the club. The labrum is thick and strongly emarginated beneath. All the hooks of the tarsi are equal, terminate in an entire point, and are simply unidentate at base. The posterior extremity of the abdomen most commonly ends in a point or stylet, at least in the males.

Of those species in which the antennal club is composed of seven leaflets in the males, and of six in the females, we will mention

*M. fullo*; *Scarabæus fullo*, L.; Oliv., Col. I, 5, iii, 28. About an inch and a half long; brown or blackish; three lines on the thorax, two white ovoid spots on the scutellum, and several other irregular ones on the elytra. The antennal club of the male is very large. Found near the sea coast on the Downs.

*M. vulgaris*; *S. melolontha*, L.; Oliv., Ib., I, 1, a—d\*. Black; hairy; the antennæ, anterior margin of the epistoma, elytra and greater part of the feet reddish-bay; thorax somewhat dilated and marked with an impression near the middle of its lateral edges, sometimes black, and sometimes red; four elevated lines on the elytra, whose outer margin is the colour of the ground; triangular white spots on the sides of the abdomen: the anal stylet tapering insensibly to a point.

*M. hippocastani*, Fab.; Oliv., Ib., I, 3, a, b, c. This Insect, formerly confounded with the *vulgaris*, is rather smaller, shorter and more convex; the elytra are margined with black, and the anal stylet is proportionably shorter and contracted before the extremity which thus appears broad and obtuse.

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\* While this work was in press, that of M. Straus on the anatomy of the *M. vulgaris* was presented to the Acad. Royale des Sciences, at whose expense it was published. We sincerely regret that we had not time to profit by this excellent work. M. Leon Dufour had already made us acquainted with every thing relative to the system of digestion and the organs of generation, M. Chabrier has also described and figured with great exactness the muscles of the wings and the thorax, M. Straus has completely supplied all other deficiencies.



The alimentary canal of the *Melolontha vulgaris*, according to M. Leon Dufour—Ann. des Sc. Nat., III, p. 234—is not so long as that of *Copris*, but its parietes are shorter. The chylic ventricle is wholly destitute of papillæ, and exhibits beautiful fringes on its surface, which are formed by hepatic vessels. The small intestine is followed by a species of colour furnished with internal valvulæ under the form of small, triangular, and imbricated pouches, arranged in six longitudinal series, separated by as many muscular cords. M. Dufour has frequently found these pouches filled with a green, vegetable pulp. The structure of the biliary vessels is extremely delicate; they form multiplex flexures, and several of them, right and left, are furnished with little fringe-like filaments. The copulating armature of the male is extremely thick, very hard, terminated by two stout hooks, and presents an articulation near its posterior third, which facilitates its motion. Each testis is an agglomeration of six orbicular, and as if umbilicated, spermatic capsules, each one furnished with a separate, tubular duct, resembling the kind of leaf designated by botanists as *peltate* or *umbilicated*.

These Insects occasionally appear in such numbers that they speedily destroy the leaves of considerable tracts of forest. The larvæ are not less injurious in our gardens. It is commonly called the *Ver blanc*.

*M. villosa*, Oliv., Ib. I, 4. Distinguished from the preceding species by the club of its antennæ, which consists of five leaflets in the males, and four in the females; body brown, more or less dark, sometimes reddish above; three grey lines on the thorax formed by down; scutellum and under part of the body furnished with a similar down, which forms spots on the sides of the abdomen\*.

Now the antennal club in both sexes never presents more than three leaflets. The

#### RHISOTROGUS, Lat.

Closely resembles *Melolontha* in the general form of the body, that of the labrum and tarsi; but the antennæ, which consist of nine or ten joints, have but three leaflets in the club †. In

#### CERASPIS, *Lepel.* and *Serv.*

There are two small longitudinal incisures in the middle of the posterior margin of the thorax, the space comprised between them forming a tooth, the extremity of which is received into a corresponding emargination in the scutellum. The antennæ are composed

\* Add *M. hololeuca*, Fisch., Entom. Russ. Imp., II, xxviii, 3;—*M. Anketeri*, Ejuds., 4;—*M. pilosa*, Fab.; Fisch., Ib., 9;—*M. occidentalis*, Fab., &c. See Schœnh., Synon. Insect. I, 3, p. 162.

† As it is not always an easy matter to ascertain exactly the number of joints that immediately precede the club of the antennæ, I unite the genus I had named *Amphimalla*, where those organs consist of but nine joints, to *Rhisotrogus*. The *M. solstitialis*, *pini*, *serrata*, *ferrida*, *atra*, *æquinotialis*, *ruficornis*, &c., of Fabricius. The third joint appears to be decomposed.

of ten joints. All the hooks of the tarsi, with the exception of the anterior, are unequal; the strongest of the intermediaries is entire in the male; the others, and the six in the females, are bifid. The body is covered with little scales.

But few species are known, and all of them are from Brazil\*. The

AREODES, *Leach, Mac L.*,

Have ten joints in the antennæ, a corneous sternum, and all the hooks of the tarsi equal in the individuals presumed to be females—Lepel. and Serv.—and unequal in the males; the thickest of the two anterior ones of the latter is bifid, and all the others are entire.

The colours of these Insects are very brilliant †.

In all the preceding Phyllophagi, with some few exceptions, we have found the antennæ to consist of ten joints. In all the following ones of the same division, or that of the Melolonthidæ, we shall find but nine.

Here all the hooks of the tarsi are equal; one of the two anterior ones, at most, is sometimes larger.

DASYUS, *Lepel. and Serv.*

Hooks of the anterior tarsi, at least in the males, bifid; and the others entire ‡.

SERICA, *Mac. L.—OMALOPHA, Dej.*

All the hooks of the tarsi bifid; body ovoid, arched, silky, and frequently with changeable reflections; thorax much wider than long ||.

DIPHUCEPHALA, *Dej.*

Here also all the hooks of the tarsi are bifid; but the body is narrow and elongated, and the thorax almost square. The first joints of the four (male) or two (female) anterior tarsi are short, and provided with brushes underneath; the same joints are dilated, or wider in the four first tarsi of the males. The epistoma is strongly and angularly emarginated.

These Insects are peculiar to New Holland §.

MACRODACTYLUS, *Lat.*

Similar to Diphucephala in the hooks of the tarsi and the elongation of the body; but here the thorax is longer, almost hexagonal,

\* The *Ceraspis pruinosa*, Lepel. and Serv., Encyc. Méthod., is the *M. biculnata* of Germar. The *M. variegata* of the latter also appears to me to be a true *Ceraspis*.

† Hor. Entom., I, p. 158.

‡ Encyc. Méthod., article *Scarabéides*.

|| Mac Leay, Hor. Entom., I, 146. The *M. brunnea, variabilis, ruricola*, &c., of Fabricius. M. Mac Leay says that the antennæ are composed of ten joints, but I can find but nine. The length and form of the tarsial segments vary.

§ *Melolontha colaspoides*, Schœnh., Synon. Insect., I, 3, App., p. 101. See the Catalogue, &c., of Dej., p. 58.



and all the joints of the tarsi are alike in both sexes, elongated and simply pilose.

They are peculiar to the western continent\*.

There, the hooks of the intermediate tarsi are alone unequal.

PLECTRIS, *Lepel.* and *Serv.*

The largest of these hooks and the two of the other tarsi bifid; first joint of the posterior tarsi very long †.

In the others, all the hooks of the tarsi are unequal; those of the two posterior ones, at least, are always entire; one at least of the two or four anterior tarsi of the males, and sometimes of the females, is bifid.

POPILIA, *Leach.*

The sternum advancing between the legs in a compressed and truncated, or very obtuse lamina ‡.

EUCHLORA, *Mac L.*—ANOMALA, *Meg. Dej.*

No sternal projection; one of the hooks of the four anterior tarsi bifid in the males; body arched; epistoma short and transversal ||.

ANISOPLIA, *Meg. Dej.*

No sternal elongation; but one of the hooks of the four anterior tarsi is bifid in the two sexes; the back is depressed, and the epistoma usually narrowed anteriorly, and raised at its extremity §

LEPISIA, *Lepel.* and *Serv.*

No sternal spine, but distinguished from the preceding by the four anterior tarsi, the hooks of which are bifid\*\*.

The Hoplidæ or the Phyllophagi, of our third and last division have small depressed mandibles, as if divided longitudinally into two parts, the inner of which is membranous, and the other corneous; there are no sensible dentations at their superior extremity. The labrum is concealed, or but little apparent ††. The maxillæ have frequently but small dentations. The body is short, depressed, and wide; the elytra are narrowed posteriorly on the outer side. The two last tarsi usually have but one hook; in those where they all have two—*Dicrania*—the first joint of the anterior tarsi is prolonged inferiorly, and presents on the inner side a stout, hooked tooth.

\* *M. subspinoso*, Fab., and several undescribed species.

† Encyc. Méthod., article *Scarabéïdes*.

‡ *Trichius 2-punctatus*, Fab.

|| The *M. viridis*, *bicolor*, *errans*, *marginata*, *cynocephala*, *vitis*, *Julii*, *Frischii*, *holosericea*, *aurata*, &c., of Fabricius. See Hor. Entom., I, p. 147. The genus *Mimela*, Kirby, appears to me to approximate closely to *Euchlora*; not having seen a specimen of the former, I can say no more.

§ The *M. horticola*, *floricola*, *auricola*, *fruticola*, *agricola*, *lineata*, &c., Fab.

\*\* Encyc. Méthod., article *Scarabéïdes*.

†† In the latter of the preceding subgenera this part also, viewed from before, merely presents a linear, transverse edge, either entire or slightly emarginated in the middle.

M. Leon Dufour remarks that the digestive canal of the *Hopliæ* is much shorter than that of the *Cetoniæ*. The chylific ventricle is smooth and flexuous. The small intestine is shorter than in *Melolontha*, and frequently presents an ovoid inflation at its origin. It is followed by an elongated colon, destitute of valvular anfractuosités. The rectum is separated from it by a well-marked collar. The organs of generation hardly differ from those of *Melolontha*.

#### DICRANIA, *Lepel.* and *Serv.*

Two equal and bifid hooks to all the tarsi, the first joint of the two anterior ones prolonged inferiorly into a hooked tooth; the body very smooth and without scales; the scutellum tolerably large; two stout spines at the extremity of the four posterior tibiæ; the inferior extremity of the two last tibiæ dilated. These Insects inhabit Brazil\*.

#### HOPLIA, *Illig.*

A single hook to the two posterior tarsi; the two of the others unequal and bifid; extremity of the four last tibiæ crowned with small spines, none of which is perceptibly longer than another. The body is nearly square or almost semicircular, and the thighs of the two posterior legs are moderately inflated, their tibiæ long, straight, and without a hooked tooth at the extremity.

*H. formosa*, *Illig.*; *Melolontha farinosa*, *Fab.*; *Oliv.*, *Col.*, I, 5, ii, 14, a, c. Nine joints in the antennæ; the body entirely covered with brilliant silvery scales, the upper ones reflecting a violet blue tint; the lower ones somewhat greenish or gilt.—This most beautiful of all the known species is common in the south of France along the banks of brooks and rivers.

The antennæ of some others are composed of ten joints †. The

#### MONOCHELES, *Illig.*

Only differs from *Hoplia* in the epistoma, which forms a triangle truncated at the anterior extremity, and in the two posterior legs, of which the thighs are very large and the tibiæ short, with a stout hooked tooth at the extremity ‡.

Certain *Scarabæides*, closely allied to the last of the preceding section, and which were at first united with them in the genus *Melolontha*, but in which the paraglossæ, or two divisions of the ligula, project beyond the superior extremity of the mentum, and where the elytra gape or are slightly remote on the side next the suture, at their posterior extremity, which is either narrowed into a point or rounded, form a fifth section, that of the ANTHOBII.

The antennæ are composed of nine or ten joints, the three last of which alone form the club in both sexes. The lobe terminating the maxillæ is frequently almost membranous, silky, penicilliform, coriaceous, and dentated along the inner edge in others. The labrum

\* *Encyc. Méthod.*, article *Scarabæides*.

† See *Latr.*, *Gener. Crust. et Insect.*, II, p. 115.

‡ *Encyc. Méthod.*, article *Scarabæides*.

and mandibles are more or less solid in proportion as they are more or less exposed.

The *Anthobii* live on flowers or leaves.

In some, the mandibles and labrum are salient, and all the tarsi have two entire and equal hooks.

The antennæ consist of ten joints; the maxillary palpi are rather larger near the end, the last joint short, or but slightly elongated and truncated; the mandibles are corneous.

Some of these Insects inhabit the north of Africa, and other countries situated on the Mediterranean; most of the others are found in the higher portions of western Asia.

In these, the first joint of the antennal club is concave and encases the others. In

#### GLAPHYRUS, *Lat.*

The inner edge of the mandibles is dentated, and the outer forms an acute angle; the antennal club is almost ovoid; the teguments are firm and the posterior thighs inflated. The maxillary palpi are much longer than the others, with the last joint longer than the preceding one. The inner lobe of the maxillæ is dentiform, the outer or terminal one coriaceous. The thorax is oblong, and the posterior legs large\*.

#### AMPHICOMA, *Lat.*

Outer sides of the mandibles rounded and arcuated, the inner not dentated; antennal club globular; abdomen soft, and all the legs of the ordinary size.

The epistoma is strongly bordered, The anterior tibiæ have three teeth exteriorly. The four first joints of the tarsi are strongly ciliated in the males.

In this and the following subgenus, the maxillæ terminate in a membranous, narrow, elongated, thong-like lobe. Their palpi are hardly longer than the others, and the length of their last joint is scarcely greater than that of the preceding one †.

In those, such as

#### ANTHIPNA, *Escholtz,*

The antennal club is formed of free and oval leaflets.

The epistoma is not bordered before; the median portion of the head forms with it a plate of a long square figure, bordered lateeth. and posteriorly. The outer side of the anterior tibiæ has  $m$  in the The four first joints of the tarsi are dilated and  $deymæ$  †.

These Insects otherwise resemble the *Amphid* or non-salient, In the others, the labrum and mandibles are  $fid$ . The mentum is and some at least of their tarsial hooks  $ar$  elongated and pilose.

\* *Lat., Gen. Crust. et Insect., I, p. 117.*

† See *Lat., Gener. Crust. et Insect., II, p. 118*; genus *Amphicoma*, first division,

‡ *Amphicoma abdominalis* *Lat., Gener. Crust. et Insect., II, p. 119*; *M. alpina*,

*Oliv., Col., I, 5, x, 117*

Sometimes there are two hooks to all the tarsi. The antennæ never have more than nine joints. The epistoma is usually transversal. The palpi are but slightly elongated, and their last joint is oval.

Here; the posterior legs differ but little from the others.

CHASMOPTERUS, *Dej.*—MELOLONTHA, *Illig.*

All the hooks of the tarsi bifid; terminal lobe of the maxillæ narrow, elongated, with two remote teeth on the inner margin; the body almost oval, thorax rounded, and the elytra of equal width throughout\*.

CHASME, *Lepel.* and *Serv.*

The Chasmes only seem to differ from the preceding Insects in the hooks of the two posterior tarsi, the largest of which is alone bifid †.

There, the posterior thighs, at least in the males, are very large and dentated, their tibiæ thick, and terminated by a strong hook.

DICHELES, *Lepel.* and *Serv.*—MELOLONTHA, *Fab. Oliv.*

The body is short, but slightly pilose, and the elytra are narrowed towards the extremity, forming an elongated triangle. The posterior legs are partly contractile. All the hooks of the tarsi are equal and bifid. The terminal lobe of the maxillæ is dentated along its inner margin, as in *Hoplia*, to which this subgenus closely approaches ‡.

Sometimes the two posterior tarsi have but a single hook—those of the others are unequal and bifid.

Some, like the preceding, have but nine joints in the antennæ.

LEPITRIX, *Lepel.* and *Serv.*—TRICHIUS, MELOLONTHA, *Fab.*

The body short; thorax narrower than the abdomen, nearly square, and slightly narrowed posteriorly; abdomen broad and posterior legs large; last joint of the maxillary palpi much longer than in the preceding subgenera; terminal lobe of the maxillæ very small and in the form of a short triangle §.

The others have ten joints in their antennæ.

The body is short and densely pilose; the epistoma forms an elongated triangle, truncated or very obtuse at the end; the salient palpi long, terminated by a long and cylindrical joint; the maxillary lobe of the abdomen large, salient at the extremity and destitute of teeth; the posterior legs long.

PACHYCNEMUS, *Letz.* and *Serv.*—MELOLONTHA, TRICHIUS, *Fab.*

The elytra narrowed in their extremity, thighs and tibiæ of the two posterior legs inflated, the latter almost clavate, with one of the two extreme spurs much stouter than the other.

\* See Catalogue, &c., *Dej.*, p. .

† *Encyc. Méthod.* article *Scarabéus.*

‡ *Ibid.*, *idem.*

§ *Ibid.*, *idem.*

ANISONYX, *Lat.*—MELOLONTHA, *Fab.*

The elytra forming a long square, rounded posteriorly; posterior tibiæ almost cylindrical, or in the form of an elongated cone, and the spurs at their extremity of an unequal size.

The sixth and last section of the Scarabæides, that of the MELITOPHILI, is composed of Insects in which the body is depressed, most commonly oval, brilliant, and without horns, and the thorax is trapeziform, or nearly orbicular; an axillary part, in the greater number, occupies the space comprised between the posterior angles and the exterior of the base of the elytra. The anus is exposed. The sternum is frequently extended into a point or projecting horn. The hooks of the tarsi are equal and simple. The antennæ consist of ten joints, the three last of which form a club, always foliaceous. The labrum and mandibles are concealed, laminiform, flattened, and membranous, or nearly so. The maxillæ terminate in a silky, penicilliform lobe without horny teeth. The mentum is commonly ovoid, truncated superiorly, or almost square, and the middle of the superior margin more or less concave or emarginate. The ligula is not salient.

From the anatomical observations of M. Leon Dufour on several of these Insects, we may conclude that of all the Scarabæides their alimentary canal is the shortest. The external tunic of the chylic ventricle is usually covered with extremely small, superficial papillæ, in the form of salient points. The inflation which terminates the small intestine is not cavernous, as in the Melolonthæ. The copulating armature of the males also differs from that of the latter. Each testis consists of ten or twelve spermatic capsules. Their peculiar ducts do not unite in one common point to form the vas deferens, but communicate with each other in various ways. The number of vesiculæ seminales is from one to three pairs. The ejaculating canal is extremely tortuous, and becomes greatly inflated before it penetrates into the organ of copulation\*.

The larvæ live in rotten wood. The perfect Insect is found on flowers, and frequently on trunks of trees that give out a fluid which they suck.

This section is susceptible of being separated into three principal divisions, the first of which corresponds to the genus *Trichius*, *Fab.*; the second to that of *Goliath*, *Lam.*; and the third to *Cetonia*, *Fab.*, but reduced and simplified by the abstraction of the second genus, as well as of *Rutela* and other analogous sections.

The Melitophili of the two first divisions have no well marked sternal projection; the lateral portion of the mesosternum, which we have designated by the term axillary—epimera of Audouin—is not generally visible above, or merely occupies a portion of the space comprised between the posterior angles of the thorax and the exterior base of the elytra. The thorax does not widen from before posteriorly, as in the *Cetoniæ*. The outer side of the elytra is not

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\* See *Ann. des Sc. Nat.*, III., p. 235, and IV, p. 178.

abruptly narrowed or insinuate a little below the humeral angles, as in the latter Insects. A more rigorous character, however, is, that here the labial palpi are inserted in lateral fossulæ of the anterior face of the mentum, so that they are entirely exposed, and that the sides of this mentum jut beyond them, even at their origin, and protect them behind. In the two first divisions these palpi are inserted under the lateral margin of the mentum, or even in the margin, so that when viewed from before, the first joints are not perceptible.

In the first—*Trichides*—the mentum is either isometrical, or longer than wide, and leaves the maxillæ exposed. It comprises the

TRICHIUS, *Fab*\*.

*T. nobilis*; *Scarabæus nobilis*, L.; Oliv., Col., I, 6, iii, 10. About an inch long; golden-green above; cupreous with yellowish-grey hairs beneath. On umbelliferous plants.

*T. fasciatus*; *Scarabæus fasciatus*, L.; Oliv., Ib., ix, 84. Rather smaller; black, with scattered yellow hairs; elytra yellow with three transverse, black bands, interrupted at the suture. Very common in spring on flowers.

*T. eremita*; *Scarab. eremita*, L.; Oliv., Ib., iii, 17. Large, and of a brown-black; margin of the head turned up; three sulci on the thorax.—On the trunk of old trees, in the interior of which resides the larva.

The female of the *T. hemipterus*—*Scarabæus hemipterus*, L., Oliv., Ib., IX, 83, xi, 103—and those of some other species of North America are remarkable for the horny ovipositor at the posterior extremity of their abdomen, by which they effect a lodgment for their ova.

These species are generally found on the ground, where they move very slowly. The last joint of their maxillary palpi is proportionably shorter and thicker than that of other *Trichii*; the length of the first of the posterior tarsi also appears to me to be considerably greater than the following one, while in the other *Trichii* it is not so †.

The second division, *Goliathides*, is distinguished from the preceding by the mentum, which is much longer, wider, and covers the maxillæ.

Here the mentum is concave in the middle, and in the form of a widened heart or of a transversal square. The anterior extremity of the epistoma is neither dentate nor cornute. The thorax has the form of a heart, truncated at both ends and abruptly narrowed behind, or that of a transverse square, rounded laterally.

The first joint of the antennæ is very large, triangular, or in the form of a reversed cone. The palpi are short: the last joint of the

\* Messrs. Lepeletier and Serville, Encyc. Méthod., have established several new divisions, some of which, it appears to us, should form separate subgenera.

† See Schœnherr, Synon. Insect., I, iii, p. 99.

maxillaries is elongated. The outer side of the two anterior tibiæ presents two teeth.

PLATYGENIA, *MacL.*

The body much flattened; thorax almost cordiform and widely truncated at both ends; maxillæ terminated by a pencil of hairs, the internal lobe triangular and emarginate at the end; last joint of the palpi ovoido-cylindrical; mentum almost square, emarginated in the middle of its superior edge, and slightly on the sides; inner sides of the posterior tibiæ densely pilose\*. In

CREMASTOCHEILUS, *Knoch,*

The thorax nearly forms a transversal square; the maxillæ are terminated by a strong hooked or falciform tooth, with setæ or little spines in lieu of an inner lobe; the last joint of the palpi is very long and cylindrical; and the mentum in the form of a widened heart, or of a reversed triangle, with its superior angles rounded and without any sensible emargination †.

There, the mentum is in the form of a much widened heart, without a discoidal cavity, and its superior margin emarginate or sinuous. The anterior extremity of the epistoma, in the males, is divided into two lobes, in the form of truncated or obtuse horns. The thorax is nearly orbicular.

GOLIATH, *Lam. Kirb.*—CETONIA, *Fab. Oliv.*

A subgenus which, according to M. de Lamarck, is composed of large and beautiful species, some of which inhabit Africa and the East Indies, and the others, tropical America. Messrs. Lapeletier and Serville—*Encyc. Méthod.*, article *Scarabéïdes*—have separated the latter from it under the generic appellation of *INCA*. The epimera is not prominent. The inner sides of the thighs of the two anterior legs are furnished at base with a tooth and an emargination. The middle of the superior margin of the mentum is strongly emarginated; this part in the true Goliaths presents four lobes or teeth, two superior and the two others lateral. The labial palpi are inserted on its edges in the emarginations of these latter lobes. All the known species are large; but M. Verreaux, Jun., the nephew

\* *Hor. Entom.*, I, p. 151; *Trichius barbatus*, Schœnherr, *Synon. Insect.*, I, iii, App. 38.

† *Lat., Gener. Crust. et Insect.*, p. 121. M. Dupont, naturalist to the Duke of Orleans, whose collection of Colcopterous Insects, next to that of Count Dejean, is the most extensive in Paris, has received from Lamana—French Guiana—an Insect presenting all the essential characters of a *Cremastocheilus*, but in which the epimera or axillary pieces are more apparent when the animal is viewed from above. The anterior tibiæ are arcuated, and have a strong dentiform projection on the inner side. All the tarsi are short, thick, cylindrical, and terminated by two very long hooks. The anterior extremity of the epistoma is turned up in the manner of an almost square blade. The posterior extremity of the head presents an elevation divided into two teeth or tubercles. The Insect is about an inch long, black, with a red spot on each elytron.

The *Cetonia elongata*, of Olivier, appears to be a *Cremastocheilus*.



and fellow traveller of the late Delalande, and who has returned to the Cape of Good Hope, has lately sent us a species which is not larger than the *C. gagates*, which it also resembles in its colours, and which presents all the characters of a Goliath. The *C. geotropina* of M. Schœnherr is perhaps also congeneric. The thorax in Goliath is less round and pointed than in Inca. The anterior thighs are not dentated, and there is no emargination in the inner side of their tibiæ\*.

In the third division of the Melitophilii, a section corresponding to the family of the *Cetoniidæ*, Mac Leay, the sternum is prolonged more or less into an obtuse point between the second pair of legs; the epimera or axillary piece is always apparent above, and occupies all the space that separates the posterior angles of the thorax from the base of the elytra; the thorax usually becomes widened posteriorly, and has the form of a triangle truncated anteriorly or at the point †. The mentum is never transversal, and its superior edge is more or less emarginated in the middle. The terminal lobe of the maxillæ is silky or penicilliform. The body is almost ovoid, and depressed.

This division comprises the genus

CETONIA, *Fab.*,

With the exception of the species that belong to the preceding subgenus and to *Rutela* ‡.

In some, the thorax is prolonged posteriorly in the form of an angle, so that the scutellum totally disappears. They form the genus *Gymnetis*, Mac Leay, *Hor. Entom.*, I, p. 152. Several are found in America. Some inhabit Java, and the eastern parts of Asia, in which the thorax is similarly prolonged, but where the scutellum, although very small, is still visible §; the mentum is also more deeply and angularly emarginated, and the last joint of the labial palpi is proportionably longer. The epistoma is more or less bifid. There are others in New Holland and the East Indies in which the epistoma is still bifid or armed with two horns in the males, but the body is proportionally narrower and more elongated, the abdomen considerably narrowed posteriorly, even almost triangular, and the antennal club considerably elongated—they compose the genus *Macronota* of

\* See *Encyc. Méthod.*, art. *Scarabéïdes*; the *Hist. des Anim. sans verteb.*, Lam.; the *Observ. Entom.*, Weber, and *Lin. Trans.*, XII, p. 407, where M. Kirby describes two species. There is an Insect in Java, that at a first glance appears to be a Goliath, and which Messrs. Lepeletier and Serville have considered as such; but it has all the essential characters of a Cetonia; the thorax is merely rounded and narrowed posteriorly. The male has a bifurcated horn on the head.

† Almost orbicular in some, as in the *C. cruenta*, Fab.; *C. ventricosa*, Schœnherr, &c.

M. Chevrolat, possessor of a splendid collection of Coleoptera, among which are several from that of Olivier, has shown me a species found in Cuba by M. Poe which has the air of a Trichius, but the axillary pieces and sternal prolongation of the Cetoniæ. Certain species of this last genus—*C. cornuta*, Fab.—have the thorax furnished with a small horn, and at the first glance resemble Scarabæi.

‡ *Lat. Gener. Crust. et Insect.*

§ *C. chinensis*, Fab.;—*C. regia*, Fab.; *C. palma*, and *imperialis*, Schœnherr.



Wiedemann. These sections however can only be considered as established, when the numerous species of the genus *Cetonia* of Fabricius have been particularly studied.

Those of Europe are provided with a scutellum of an ordinary size. Such are the

*C. aurata*; *Scarabæus auratus*, L.; Oliv., Col., I, 6, i. i. Nine lines in length; a brilliant golden-green above, cupreous-red beneath; white spots on the elytra. Common on flowers and frequently on those of the Rose and Elder.

*C. fastuosa*, Fab.; Panz., Faun. Insect. Germ., XLI, 16. Larger than the *aurata*; immaculate, uniform, golden-green; tarsi bluish. South of France.

*C. stictica*; *Scarab. sticticus*, L.; Panz., Ib., I, 4. Five lines in length; black, somewhat pilose, with white points; those on the venter arranged in two or three lines, according to the sex. Very common on thistles\*.

In the second tribe of the Lamellicornes or the LUCANIDES, so called from the genus *Lucanus* of Linnæus, the antennal club is composed of leaflets or teeth arranged perpendicularly to its axis in the manner of a comb. These organs always consist of ten joints, the first of which is usually much the longest. The mandibles are always corneous, most commonly salient and larger, and even very different in the males. The maxillæ, in most of them, are terminated by a narrow, elongated and silky lobe; those of others are entirely corneous and dentated. The ligula in the greater number is formed of two small silky pencils projecting more or less beyond an almost semi-circular or square mentum. The anterior legs are most frequently elongated, and their tibiæ dentated along the whole of the outer side. The tarsi terminate by two equal and simple hooks with a little appendage terminated by two setæ between them. The elytra cover the whole of the abdomen above.

We will divide it into two sections, corresponding to the genera *Lucanus* and *Passalus* of Olivier.

In the first we find the antennæ strongly geniculate, glabrous or but slightly pilose; the labrum very small or confounded with the epistoma; maxillæ terminated by a membranous or coriaceous, very silky, penicilliform lobe without teeth, or at most with but one; and a ligula either entirely concealed or incorporated with the mentum, or divided into two narrow, elongated, silky lobes, extending more or

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\* See the first division of the Cetoniæ of Olivier; Latr., Gener. Crust. et Insect., I, iii, p. 126; Schœnh. Synon., I, iii, p. 112, and Lin. Trans., XIV, with respect to the genera, *Genuchus*, *Schizorhina*, and *Gnathocera*, established at the expense of that of *Cetonia*.

less beyond the mentum. The scutellum is situated between the elytra.

The first section will form the genus

#### LUCANUS.

We will make a first division with those in which the antennal club consists of but from three to four joints or leaflets.

We will begin with Insects, which, with the exception of their antennæ, are almost entirely similar to *Oryctes*, a subgenus of the preceding tribe. The mandibles are concealed, edentate, and alike in both sexes. The mentum is almost triangular, and completely conceals the ligula, as well as the base of the maxillæ. The body is thick and convex above, almost cylindrical and rounded exteriorly. The thorax is truncated and excavated before. The head of the males is furnished with a horn.

#### SINODENDRON, *Fab.*

Antennal club formed by the three last joints\*.

Those which have a thick, convex, ovoid body; mandibles forming a compressed and vertically projecting forceps in the males; a head much narrower than the thorax measured in its greatest width; and the tibiæ, at least the two anterior ones, broad and in the form of a reversed triangle, form two subgenera, viz.

#### ÆSALUS, *Fab.*

Where the mandibles, even in the males, are shorter than the head, and terminated posteriorly in the manner of a horn; the mentum conceals the maxillæ; the ligula is very small; the body short and arched; the head almost entirely received into the emargination of the thorax; the tibiæ are compressed and triangular, and the sternum simple or without any projection †.

#### LAMPRIKA, *Lat.*

Where the body is more elongated; the mandibles much longer than the head, in the males laminiiform, vertical, angular, much dentated and pilose on the inner side; the maxillæ are exposed down to the base; the ligula very distinct; the labrum elongated; the two anterior tibiæ widened, and offering in the males a palette (spur) in the form of a reversed triangle, and a sternal point ‡.

Two other subgenera established by M. Mac Leay, Jun., approximate to Lamprima in their prolonged mesosternum, projecting, however, less than in the preceding ones, in the head, which is much narrower than the thorax, and finally in their mandibles, the inner side of which is furnished with down; but their body is flattened or

\* *Scarabæus cylindricus*, L.; Oliv., Col., I, 3, ix, 88. It is the only species known, the remaining Sinodendrons of Fabricius belonging to other genera.

† *Æsalus scarabæoides*, Fab.; Panz., Faun. Insect. Germ., XXVI, 15, 16.

‡ Lat. Gener. Crust. et Insect., II, p. 132, *Lethrus æneus*, Fab.; Schreib., Lin. Trans., VI, 1. See also Mac Leay, Hor. Entom., I, 99.

but slightly elevated, particularly in the females. The labrum is concealed, the anterior tibiæ are narrow and without a palette. The palpi and lobes of the ligula are more elongated.

RYSSONOTUS, *Mac L.*

The mandibles of the males, as in *Lamprima*, forming a vertically compressed, angular and dentated forceps\*.

PHOLIDOTUS, *Mac L.*—CHALCIMON, *Dalm.*—LAMPRIMA, *Schænh.*

Where the mandibles in the same sex are very long, narrow, arcuated, terminated in a hook curved downwards and securiform on the inner side.

The club of the antennæ formed by the three last joints is less pectinated than in the others, and almost perfoliaceous. The mentum covers the maxillæ †.

In the following subgenera the mesosternum does not project. The head is as wide as the thorax or (in various males) wider. The mandibles are glabrous, or at least without a thick down on the inner side. The body is always flattened.

Here, the eyes are not cut transversely by the margin of the head; the maxillæ are terminated by a very slender penicilliform lobe without corneous teeth.

LUCANUS, *Lin.*

The digestive canal of the true *Lucani* is much less elongated than that of the *Scarabæides*, but the œsophagus is much longer. The male organs of generation also differ greatly from those of the preceding Insects, the testes being formed by the circumvolutions of a spermatic vessel, and not by an agglomeration of seminal capsules. The adipose tissue, which almost disappears in the *Scarabæides*, is here abundant and disposed in clusters, which converge to the median line.

The larva of the *L. cervus*, which inhabits the interior of the Oak for several years previous to its final metamorphosis, is considered as the *Cossus* of the Romans, or that verminiform animal which they regarded as a delicious article of food.

*L. cervus*, L.; Oliv., Col., I, i, l; Rœs., Insect. II; Scarab., I, iv, v. The male two inches in length, and larger than the female; black, with brown elytra; head wider than the body; mandibles very large, arcuated, with three very stout teeth; two of which are at the end and diverge, the other is in the inner side, all furnished with small ones. The females, called *Does*, have a narrower head and much smaller mandibles. It flies at night in the heat of summer. Its size and mandibles vary. It

\* *Lucanus nebulosus*, Kirb., Lin. Trans., XII, xxi, 12; Mac L., Hor. Entom., I, p. 98.

† *Lamprima Humboldtii*, Schænh.; *Chalcimon Humboldtii*, Dalm., Ephem. Entom., I, p. 3; *Pholidotus lepidosus*, Mac L., Hor. Entom., I, p. 97, the male; *Cassignetus geotrupoides*, ejusd., the female.

is to one of these varieties that we must refer the *Lucane chèvre* of Olivier, or the *L. capreolus* of Fabricius. The Lucanus, so called by Linnæus, is a species from North America, and very distinct from the preceding.

*L. caraboides*, L.; Oliv., Col., Ib., II, 2. Five lines in length; greenish brown; mandibles crescent-shaped, and not surpassing in length that of the head, even in the males\*.

There, the eyes are entirely and transversely divided by the edges of the head. The maxillæ are terminated by a shorter and narrower lobe than in the preceding Insects, and frequently present a corneous tooth on the inner margin.

#### PLATYCERUS, Lat.

The palpi, maxillary lobes, and ligula are proportionally shorter than in the preceding subgenus. The mentum forms a transversal square, while in the preceding it is frequently semicircular. It conceals the whole base of the jaws. The mandibles are generally short †.

The club of the antennæ in the remaining Lucanides is composed of the seven last joints.

#### SYNDESUS, Mac L.—SINODENDRON, Fab.

A small horn on the anterior of the thorax, which is also, as in most of the Passali, marked with a median sulcus. Its separation from the abdomen is also more strongly marked than in Lucanus. The two posterior legs are placed further behind. The antennæ are less geniculate ‡.

The Lucanides of our second section have their antennæ simply arcuated, or but slightly geniculate and pilose; the labrum always exposed, crustaceous, and transversal; the mandibles strong and much dentated, but without any very remarkable sexual difference; the maxillæ entirely corneous with at least two strong teeth; the ligula equally corneous or very hard, situated in a superior emargination of the mentum, and terminated by three points; the abdomen pediculated, presenting the scutellum above, and separated from the thorax by a strangulation or considerable interval. They form the genus

#### PASSALUS, Fab.

Restricted by M. Mac Leay to those species in which the club of the

\* I unite the *Ceruchus* and *Platycerus*, Mac Leay, with *Lucanus*. The proportions of the mandibles, palpi, maxillary lobes, ligula and club of the antennæ, do not furnish constant and rigorous characters.

† The *Lucanus parallelipedus* of Fabricius, forming, with another species, the genus *Dorcus* of Mac Leay. I also unite to *Platycerus* the *Nigidius*, *Ægus*, and *Figulus* of the same learned entomologist.

‡ *Synodendron cornutum*, Fab.; *Donov.*, *Insect. of New Holl.*, tab. I. 4; *Syn-desus cornutus*, Mac L., *Hor. Entom.* I, p. 104.

antennæ consists of but three joints, where the labrum forms a transversal square, and the maxillæ have three strong terminal teeth, and two on the inner side in place of the interior lobe.

The species, in which the club is composed of five joints, the labrum is very short, and the maxillæ have but two teeth, one terminal and the other on the inner side, for his genus *PAXILLUS*.

Finally, in his family of the Passalides, he unites to the preceding the genus *Chiron*, which we have placed in the tribe of the Coprophagi\*.

These Insects are foreign to Europe, and, as it would appear, to Africa, being chiefly found in the eastern parts of Asia, and particularly in America. Madame Merian says, that the larva of the species figured by her lives on the roots of the sweet potato. The perfect Insect is not uncommon in the sugar-houses †.

In the second general section of the Coleoptera, or the *HETEROMERA*, we find five joints in the four first tarsi, and one less in the two last.

These Insects all feed on vegetable substances. M. Leon Dufour—*Annal. des Sc. Nat.*, VI, p. 181—has observed that the texture of the male organs of generation approximates them to those of the Scarabæides and Clavicornes; their testes consist of spermatic capsules or sacculi.

We will divide this section into four great families ‡, the two first of which are somewhat analogous to the first pentamerous Coleoptera, in an excrementitious apparatus discovered in several of their genera by the same savant; their chylific ventricle also is frequently covered with papillæ. In several of these Insects, we find the vestiges of another secreting apparatus but seldom observed among Coleoptera, that which is denominated the salivary apparatus. The hepatic vessels, as in the Pentamera, with but few exceptions, are six in number, and have two insertions distant from each other: “at one extremity,” says M. Dufour, “they are inserted by six insulated ends round the collar, which terminates the chylific ventricle; the other opens into the origin of the cæcum by trunks, varying in number according to the family and genus.”

In some, where the elytra are generally solid and hard, and the hooks of the tarsi are almost always simple, the head is ovoid or oval, susceptible of being received posteriorly into the thorax, or sometimes

\* *Hor. Entom.* I, p. 105, et seq.

† See *Fabricius, Syst. Eleuth.*, II, p. 155; *Web., Obser. Entom.*; *Palis. de Beauv., Insect. d'Afr. et d'Amér.*; *Lat., Gener. Crust. et Insect.*, II, p. 136; and *Schœnh., Synon.*, I, iii, p. 331, and *Append.*, p. 143, 144.

‡ In a natural order, the fourth is connected with the first by the *Helopii* which *Linnaeus* places in his genus *Tenebrio*. It is also evident that the *Tenebrios* lead to *Phaleria*, *Diaperis*, &c., or to our second family.

narrowed behind, but not abruptly, and without a neck at its base. Many of these Heteromera avoid the light. This division will comprise the three following families.

## FAMILY I.

### MELASOMA.

This family consists of unmixed black or cinereous coloured Insects, (from which is derived the name of the division,) mostly apterous, and frequently with soldered elytra. Their antennæ, entirely or partly granose, almost of equal thickness throughout or slightly inflated at the extremity, and the third joint wholly elongated, are inserted under the projecting edges of the head. The mandibles are bifid or emarginated at the extremity; the inner side of their maxillæ is furnished with a corneous tooth or hook, all the joints of the tarsi are entire, and the eyes oblong and but very slightly prominent, a circumstance which, according to M. Marcel de Serres, indicates their nocturnal habits. Almost all these Insects live on the ground, either in sand, or under stones, and frequently in cellars, stables, and other dark places about our habitations.

According to M. Dufour—Ann. des Sc. Nat. V. p. 276—the biliary vessels are inserted into the inferior face of the cæcum by a single trunk, resulting from the confluence of two very short branches, formed by the union of three biliary vessels. The bile is yellow, sometimes brown or violet. The alimentary canal—Ann. des Sc. Nat., III, p. 478—is long, and its length in our first tribe, or the Pimeliariæ, is thrice that of the body; the œsophagus is long and leads to a crop smooth or glabrous externally, that is more developed in these latter Insects where it forms an ovoid sac lodged in the pectus; it is marked internally with longitudinal plicæ or fleshy columns, terminating in some—*Erodi*, *Pimeliæ*—near the chylic ventricle, at a valve formed of four principal corneous, oval, and connivent parts; the chylic ventricle is elongated, flexuous or doubled, most commonly covered with little papillæ resembling projecting points, and terminated by a small collar, callous within, which receives the first insertion of the biliary vessels. The same anatomist has observed in some subgenera of this family—*Blaps*, *Asida*—a salivary apparatus, consisting of two floating vessels or tubes, sometimes perfectly simple—*Asida*—and at others irregularly ramous—*Blaps*;—he is also convinced that they exist in the other Pimeliariæ. M. Marcel de Serres—Observations sur les usages des diverses parties du

tube intestinal des Insectes, Ann. du Mus. d'Hist. Nat.—has carefully studied the texture of the tunics of the alimentary canal\*. The adipose tissue is more abundant in these Heteromera than in the following ones, which enable them, even when transfixcd and confined with a pin, to live six months without food, a fact I have witnessed in an Akis.

Our first division of this family, which in the Linnæan system forms the genus *TENEBRIO*, is founded on the presence or absence of wings.

Of those which are deprived of these organs, and in which the elytra are generally soldered, some have the palpi almost filiform, or terminated by a moderately dilated joint, and do not form a distinctly securiform or triangular club. They will compose a first tribe, that of the *PIMELIARIE*, so named from the genus

### *PIMELIA, Fab.*

Which is the most numerous of the whole.

Sometimes the mentum is more or less cordiform, the superior margin either emarginated in the middle, and divided as it were into two short and rounded lobes, or broadly emarginated or widened.

Here, the two last joints of the antennæ, or the tenth or eleventh, always distinct, sometimes unite to form an ovoid or pyriform body, or are evidently separated from each other. The superior margin of the mentum is rounded and emarginated in the middle, or as if divided into two festoons.

These have the anterior margin of the head almost straight or projecting but slightly in the middle, without a profound emargination for the reception of the mentum, and its lateral margin simply and slightly dilated above the insertion of the antennæ; the head does not seem to be sensibly narrowed behind, nor widened and truncated before. The thorax is not cordiform, deeply emarginated before and truncated posteriorly.

From these last, we may separate those in which the anterior margin of the head is straight, or nearly so, without any angular or dentiform dilatation in the middle, in which the almost square and moderate sized labrum is entirely exposed, the thorax is transversal, and the abdomen extremely voluminous and inflated.

Those, in which the body is more or less ovoid or oval, the thorax narrower than the abdomen even at base, generally convex, without acute prolongations at the posterior angles, and without a posterior projection to the præsternum, compose the subgenus properly called

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\* What M. Dufour styles the chylific ventricle, M. de Serres calls the stomach, and, relative to other Insects, the duodenum. What he calls the small intestine is considered by the first as the cæcum. According to M. Dufour, M. de Serres has not mentioned the crop of the *Melasoma*, although in *Akis* and *Pimelia* it is very apparent.



PIMELIA—TENBRIO, *Lin.*

These Heteromera are proper to the countries situated round the basin of the Mediterranean, to western and southern Asia, and to Africa. They are not found in India, or at least none have as yet been discovered there.

Some species, usually more elongated, have the mentum exposed, and the antennæ slightly and insensibly enlarged at the extremity; the three last joints do not form a club, divided into two equal portions, the last of which is composed of the tenth and last joint confounded together.

In some of these, the abdomen is proportionally wider and more voluminous, and the legs are less elongated; the anterior tibiæ are in the form of a reversed triangle, elongated, and have the exterior angle of their extremity prolonged; the spurs are stout and the tarsi short.

M. Fischer—Entomog. Russ. Imp.—has divided them into three genera, *Pimelia*, *Platyopus*, and *Diesia*, but their characters, being only founded on the greater or less projection of the last joint of the antennæ and the dentations of the anterior tibiæ, do not appear to us sufficiently determinate. The eleventh and last joint of the antennæ is most distinct in the *Diesiæ*. The anterior tibiæ are much dentated exteriorly in *Platyopa*, where the thorax forms a transversal square, the base of the elytra is straight, and the exterior angles or the shoulders slightly project. Among the *Pimelia*, properly so called of this author, or those in which the eleventh and last joint of the antennæ unites, or is almost confounded with the preceding one, where the thorax is almost semilunar and convex, and the abdomen nearly ovoid or globular, is placed the

*P. 2-punctata*, Fab.; Oliv. III, 59, i, 1. Length eight lines; glossy-black; thorax granulated, with two large punctures in the middles, united in some individuals in a transverse line; elytra granulated, each with four elevated lines, the lateral carina included, not visibly dentated, of which the two inner ones are shorter; suture elevated. Common on the shores of the Mediterranean.

The *Tenebrio muricatus*, L., is a different species—Schœnh., Synon. Insect, I, tab. III, 9.

*P. coronata*, Oliv., Ib., II, 17. Fifteen lines in length; blackish; covered with reddish-brown hairs; a range of posteriorly curved spines on the lateral carina of each elytron.

M. Payraudeau has discovered in Corsica a new species—*Payraudii*—allied to the first, but with a more elongated abdomen and more strongly granulated elytra, on which the two inner elevated lines are almost effaced.

In other species,—*TRACHYDERMA*, Lat.,—the abdomen is proportionally narrower and more elongated, and frequently much compressed laterally; the legs are long, and the tibiæ, the anterior ones



not excepted, slender, narrow, and terminated by small spurs. They are usually found further south than the preceding species\*.

A last division of the Pimeliæ—*CRYPTOCHYLE*, Lat.—is composed of species in which the body is relatively shorter or more thick-set, the mentum covered by the præsternum, and the antennæ are abruptly terminated by a club, divided into two parts, one formed by the ninth joint and the other by the two following ones, which are confounded together. These species appear to be concentrated in the southern extremity of Africa †.

Under the generic appellation of *Erodius* were formerly united certain Pimeliariæ, closely allied to the preceding ones, but in which the body is ovoid, short, arcuated or gibbous above, the thorax short, as wide posteriorly as the base of the elytra, and terminated on each side by an acute angle; and the præsternum dilated posteriorly in the manner of a lamina or point, with its posterior extremity resting on the mesosternum.

These *Erodii* now form three subgenera. In

*ERODIUS*, Lat.,

Or *Erodius* properly so called, the two last joints of the antennæ are united and form a small globuliform club, the anterior tibiæ have a stout tooth near the middle of their outer side, and another on the same side at the extremity, and the mentum is incased (*encadré*) inferiorly and covers the base of the maxillæ. Their body is usually convex ‡.

*ZOPHOSIS*, Lat.—*ERODIUS*, *Fab.*, *Oliv.*

Where the antennæ are almost filiform or enlarge insensibly towards the end, with the tenth joint very distinct from the preceding, somewhat larger and almost ovoid, and where the anterior tibiæ as well as the following ones have no tooth near the middle of the outer side. The mentum is incased (*encadré*) inferiorly, and covers the base of the maxillæ. The third joint of the antennæ is hardly longer than the second, and the ninth and tenth are almost turbiniform §. Those of the third, or the

*NYCTELIA*, Lat.—*ZOPHOSIS*, *Germ.*,

Are almost similar to the *Zophoses*, but the third joint of their antennæ is much longer than the preceding one; the following, as well as the ninth and tenth, is nearly globular. The base of the maxillæ is exposed. Besides this, these Insects are peculiar to South America, whilst the *Zophoses* and *Erodi* are exclusively confined to

\* The Pimeliæ *longipes*, *hispida*, *norbilosa*, &c., of Fabricius; the *Pim. anomala* of Fischer.

† The Pimeliæ *maculata* and *minuta*, Fab. For the other Pimeliæ, see Olivier, Schœnherr, and Fischer.

‡ The *Erodi* *bilineatus*, *gibbus*, *levigatus*, Oliv., Col., III, No. 63. See Lat., Gener. Crust. et Insect., II, p. 145, and the Catalogue, &c. of Dejean.

§ See Lat., Gener. Crust. et Insect., II, p. 146.

the western and southern parts of Asia, and the south of Europe and Africa\*.

Other Pimeliariæ, terminating the subdivision of those in which the labrum is not received into a deep emargination of the anterior border of the head, and in which this last part of the body is neither truncated before nor narrowed behind, are distinguished from the preceding by the following characters. The middle of the anterior margin of this part projects in the manner of an angle or tooth. The labrum does not appear when the mandibles are closed, or but very little. The thorax is sometimes trapezoidal, almost as long as it is broad, and at others almost orbicular or nearly semicircular. The antennæ are filiform, and the eleventh and last joint is always very distinct from the preceding one. The mentum is incased inferiorly and covers the base of the maxillæ. The præsternum is slightly prolonged into a point in several. These Insects, like those of the two following subdivisions, are exclusively peculiar to the hot and western countries of the eastern continent.

#### HEGETER, *Lat.*

The thorax forming a trapezium, almost as wide at the posterior margin as the base of the elytra, and in contact with it throughout; the last joint of the antennæ somewhat smaller than the preceding one †.

#### TENTYRIA, *Lat.*—AKIS, *Fab.*

The thorax almost orbicular, sometimes narrower than the abdomen, and at others of equal width, but rounded at the posterior angles, and leaving an hiatus between them and the base of the elytra. The last joint of the antennæ is at least as large as the preceding one ‡.

Other Pimeliariæ are removed from the preceding ones by the form of their head and thorax. The first is a kind of square, more or less narrowed behind, and the middle of its anterior edge presents an emargination which receives the labrum. The dilatation of the lateral margin covering the base of the antennæ is greater, and prolonged to the anterior edge. The latter organs are always composed of eleven very distinct joints, almost cylindrical, the last few excepted, with the third very long. The middle of the outer side of the mandibles is deeply excavated, and the inferior sides of the head, forming the lateral casing or frame of the maxillæ and mentum, terminate in a point, or in the manner of a tooth. The thorax is in the form of a truncated heart, and well emarginated before in most of them. These Pimeliariæ comprise a great portion of the genus

#### AKIS, *Fab.*,

Now restricted to those species in which the thorax is wider than

\* *Zophosis nodosa*, Germ., Insect. Spec. Nov., p. 133.

† *Lat.*, Gener. Crust. et Insect., II, p. 157; I, ix, 2; *Pimelia silphoides*, Oliv.; —*Gnathosia glabra*, Fischer, Entom. Russ., II, xx, 8.

‡ *Lat.*, Gener. Crust. et Insect., II, 154; the *Akis glabra*, *punctata*, *abbreviata*, *angustata*, *orbiculata*, of Fabricius. I also think we should refer the *Tagonæ*—*Tagona*, Fischer, Entom. Russ., I, xvi, 8, 9—to this subgenus.

the head, strongly emarginated before, short, its posterior margin widely truncated, and the lateral edges turned up\*.

Another species—*A. collaris*, Fab.—in which the head measured anteriorly is rather wider than the thorax, more prolonged posteriorly, and slightly strangulated at base in the manner of a neck, and where the thorax is much narrower throughout than the abdomen, small, convex, inclined and not turned up on the sides, forms the genus

*ELENOPHORUS*, Meger., Dej.,

Where the antennæ are also somewhat longer than in *Akis*, and the eyes are narrower and emarginated.

The last Pimeliariæ of that division, in which the mentum is emarginated, are distinguished from the preceding ones by the manner in which it terminates: instead of being rounded and divided into two festoons, it is slightly emarginate or concave, with the lateral angles acute, and proportionally shorter and narrower at its base or more cordiform; it covers the maxillæ. The eleventh joint of the antennæ is not apparent; they are terminated by the tenth, which is somewhat larger than the preceding ones, turbiniiform, and obliquely truncated at the end. In the form of the head, its anterior emargination, and frequently also in the figure of the thorax, these Insects closely resemble the true *Akis*. In

*EURYCHORA*, Thunb.,

The body is oval with acute and ciliated edges; the thorax semi-circular, and receives the head into an anterior emargination, the abdomen almost cordiform. The antennæ are composed of linear joints, compressed or angular, the third of which is longer than the preceding and following ones †.

*ADELSTOMA*, Dup.

These Insects have a narrow and elongated body, with an almost square thorax, slightly narrowed posteriorly; the antennæ tolerably stout, almost perfoliated, and all the joints, the last excepted, nearly lenticular and equal. Their labrum, mandibles and palpi are concealed ‡.

We will terminate the Pimeliariæ with those in which the superior edge of the square mentum is neither emarginated nor widened. Their body is always oblong, and the thorax sometimes almost square, rounded or dilated, and at others narrow, elongated, almost

\* The first division of the *Akis*, Fab. See also Fischer, Entom. Russ., I, xv, 7, 8, 9.

† Lat., Gener. Crust. et Insect., II, p. 150; Schœnh., Synon. Insect., I, ii, 5;—Schœnh., Synon. Insect., I, i, tab. 2, 5.

‡ *Adelostoma sulcatum*, Duponchel, Mem. de la Soc. Lin. de Paris, 1827, XII, A, B, C; an Insect found in the environs of Cadiz by the son of that savant, at Tangier, by M. Goudot, Jun., but brought from Syria a long time ago by M. Labillardière.

cylindrical, and the abdomen ovoid or oval. The antennæ always consist of eleven distinct joints. The anterior thighs are inflated, and even sometimes dentated in several or at least in one of the sexes. These Insects evidently form the passage from this tribe to the following one.

Sometimes the antennæ are entirely or almost entirely granose or composed of short joints, either ovoid or globular, turbiniform, or almost hemispherical.

Of these, some resemble the *Pimeliariæ* of the last subgenera in the dilatation and prolongation of the lateral margin of the head. Their labrum is very short or projects but little. The lateral borders of the thorax are straight or simply arcuated and rounded, and without any angular or dentiform dilatation. The eyes are but slightly protuberant.

Here the thorax is narrow, either cylindrical or in the form of an elongated heart, truncated at both ends. Such are

*TAGENIA, Lat.—STENOSIS, Herbst.—AKIS, Fab.*

Where the antennæ are almost perfoliate with the third joint hardly longer than the following ones, and the eleventh or last very small or united with the preceding one. The head is elongated posteriorly, and borne on a kind of neck or knot. The thorax is in the form of an elongated heart truncated at both ends. The abdomen is oval\*.

*PSAMMETICHUS, Lat.*

Where the antennæ are composed of turbiniform joints, of which the third is much longer than the following ones, and the eleventh or last, as large as the preceding, is very distinct. The head and thorax form a long square of equal width. The abdomen is almost oval, and truncated at its base †.

There, the thorax is at least as wide as the abdomen, and of an almost orbicular or square form, rounded laterally, and either isometrical or wider than long.

*SCAURUS, Fab.*

Where the last joint of the antennæ is ovoido-conical and elongated; where the thorax is almost isometrical, and where the anterior thighs are strongly inflated and frequently dentated in the males. The tibiæ are long and narrow.

These Insects are peculiar to the hot and western parts of the eastern continent ‡.

*SCOTOBIUS, Germ.*

Where the last joint of the antennæ is hardly longer than the preceding and in the form of a reversed top; where the thorax is evidently wider than it is long, and the lateral edges are strongly arcu-

\* *Lat., Gener. Crust. et Insect., II, p. 149; Herbst., Col., VIII, cxxvii, 1—3.*

† A subgenus established on some undescribed Insects from Chili.

‡ *Oliv., Col., III, No. 62; Lat., Gener. Crust. et Insect., II, 159; Encyc. Méthod., article Scature.*

ated; where the thighs differ but little in size, and when the anterior tibiæ are in the form of an elongated triangle, and angular.

These Heteromera are peculiar to South America\*.

The other Pimeliariæ, with moniliform antennæ and the mentum entire, are remarkable for the lateral, angular or strongly dentiform dilatations of the thorax. The middle of the back presents a sulcated carina terminated anteriorly in the manner of a rounded and bilobate gibbosity. The lateral margins of the head are briefly dilated. The labrum is entirely exposed and of an ordinary size. The eyes are more prominent than in the other Pimeliariæ; the antennæ, besides, are pilose or pubescent.

The elytra are very unequal.

#### SEPIDIUM, *Fab.*

They are found in the southern countries of Europe and in Africa †.

The last Pimeliariæ, the mentum as in the preceding ones, being unemarginate superiorly, are removed from the latter by the form of the joints of their antennæ; they are mostly cylindrical or in the form of an elongated and reversed cone; the three or four last are alone rounded, and either ovoidal, turbiniform or hemispherical. The labrum is entirely exposed, and the marginal dilatation of the head covering the origin of these organs is but slightly prolonged, as in Sepidium. The eyes are nearly round or oval, entire or but slightly emarginate and prominent; the thorax is depressed, sometimes dilated on each side in the manner of an angle, sometimes narrower, but sulcated and carinated above; the last joint of the antennæ is evidently longer and thicker than the preceding.

These Insects are proper to the Cape of Good Hope. Such are the

#### TRACHYNOTUS, *Lat.*—SEPIDIUM, *Fab.* ‡

There, the eyes are narrow, elongated, and almost flat. The thorax is convex, almost orbicular, emarginate before, truncated posteriorly, without angular dilatations and dorsal carina. The second joint of the antennæ is, at most, the size of the preceding.

#### MOLURIS, *Lat.*—PIMELIA, *Fab.*, *Oliv.*—PSAMMODES §, *Kirby.*

The second tribe of the Melasoma, that of the BLAPSIDES, receives its denomination from the genus BLAPS of Fabricius.

The maxillary palpi terminate by a manifestly securiform or triangular joint. M. Dufour has observed, that in this genus as well as in that of Asida, the crop is less developed than in the Pimeliariæ, and that the little valve, at which it terminates posteriorly, is not formed

\* Germ., *Insect. Spec. Nov.*, p. 136.

† The Sepid. *tricuspidatum*, *variegatum*, and *cristatum* of Fabricius.

‡ The Sepid. *reticulatum*, *rugosum*, *vittatum* of Fabricius; the *S. acuminatum* of Schenherr. A species, which Count Dejean calls the *cucurlioides*, and figured by De Geer, forms a separate division.

§ The Pimeliæ *striata*, *unicolor*, *gibba* of Fabricius. See *Lat.*, *Gener. Crust. et Insect.*, II, p. 148;—*Psammodes longicornis*, *Kirb.*, *Lin. Trans.*, XII, xxi, 13.

of those four principal corneous or connivent pieces of which it is composed in the preceding tribe, but by the approximation of its interior fleshy columns. The chylic ventricle is proportionally longer, and the spermatie capsules are less numerous. These Insects, according to the same naturalist, are provided with a double excrementitious secreting apparatus, totally differing in structure from that of the Pentamera. It consists of two tolerably large oblong bladders, situated altogether under the viscera of digestion and generation, closely approximated to each other, with extremely thin parietes, and surrounded with adhering vascular folds more or less turgid; the precise point of their insertion, from the utter impossibility of unrolling them, can scarcely be determined. The same remark applies to the canals by which the secreted liquid is evacuated; they are concealed by a sort of membranous diaphragm, which, by means of a fleshy panicle, is applied to the last segment of the venter. The secreted fluid issues laterally from the last annulus, and not from its extremity; it is ejected to the distance of seven or eight inches, is brownish, acrid, extremely irritating, and has a peculiar and penetrating odour.

This tribe is formed of a single genus, that of

#### BLAPS.

Those, in which the body is generally oblong, with the abdomen clasped laterally by the elytra, that are most usually narrowed towards the end, and terminated in a point or in the manner of a tail, and in which the tarsi are almost similar in the two sexes, and without any notable dilatation, will form our first division.

The mentum in some is small, or hardly occupying in width more than the third of that of the under part of the head, and almost square or orbicular.

Here, all the tibiæ are slender, without strong ridges or teeth on the outer side. The thorax is never dilated anteriorly, nor in the form of a widely truncated heart. In

#### OXURA, *Kirb.*,

The body is narrow and elongated; the thorax longer than it is wide, ovoid, and truncated at both ends; and the intermediate joints of the antennæ long and cylindrical\*. In

#### ACANTHOMERA, *Lat.*—*PIMELIA, Fab.*,

The thorax is almost orbicular and transversal; the abdomen nearly globular; the third joint of the antennæ cylindrical and much longer than the following ones, which are almost of the same form, and the three last at most granose †.

\* *Oxura setosa*, Kirby, Lin. Trans., XII, xxii, 3.

† *Pimelia dentipes*, Fab., and some other species. The anterior thighs are inflated and dentated; the body is very unequal and cinereous; the spurs of the tibiæ very m all.

MISOLAMPUS, *Lat.*—PIMELIA, *Herbst.*

Where the thorax is almost globular and the abdomen nearly ovoid; the third and fourth joints of the antennæ are equal, and cylindrical, the eighth and two following ones a little stouter, almost turbiniform, and the eleventh or last larger and ovoid\*. In

BLAPS, *Fab.*,

Or Blaps properly so called, the thorax is almost square and plane, or but slightly convex. The abdomen is oval, truncated transversely at base, and more or less elongated. The elytra of most of them are narrowed and prolonged into a point, those of the males especially. The third joint of the antennæ is cylindrical and much longer than the following ones; the latter, or at least the three antepenultimate ones, are granose; the last is ovoid and short.

With those species in which the body and abdomen are proportionally less elongated and wider, in which the elytra of the females terminate in a very short point, and where the thorax is almost plane, are arranged the

*B. mortisaga*, Oliv., Col., III, 60, 1, 2, 6; *Tenebrio mortisaga*, L. Length, ten lines; black, but slightly lustrous; smooth; simply punctured above; thorax almost square, offering on each side of its posterior margin vestiges of a small flattened border; extremity of the elytra forming a short and obtuse point. In dark and filthy localities near privies, and frequently in houses.

*B. lævigata*, Fab. This species might constitute a particular subgenus. Its body is much shorter than that of the others, and extremely convex or gibbous. The antennæ are granose from the fourth joint. The anterior tibiæ terminate in a stout point or spine formed by a spur.

It is stated by Fabricius that the Turkish women inhabiting Egypt, where the Insect is very common, eat the *Blaps sulcata*, cooked with butter, in order to become fat. The same author also says that it is used as a remedy for the head-ach, and the sting of a Scorpion †.

There, all the tibiæ are angular with longitudinal ridges; the two anterior are wider and strongly dentated exteriorly. The thorax is dilated anteriorly, cordiform, and widely truncated.

GONOPUS, *Lat.*

The third joint of the antennæ is elongated and cylindrical as well as the two or three following ones; those which succeed are granose; the last is ovoid and somewhat longer than the penultimate. The anterior margin of the head is concave, and the mentum forms a

\* *Lat.*, Gener. Crust. et Insect., II, p. 160, and I, x, 8, *Pimelia gibbula*, *Herbst.*, Col., VIII, cxx, 7.

† The *Blaps gages, sulcata* of Fabricius. See the Catal. de la Coll., &c., of Count Dejean.



transverse square. The inferior side of the thighs is trenchant with a sulcus; the two anterior are furnished with a tooth, and the four posterior tibiæ are narrow, arcuated, and somewhat dentated; the tarsi are glabrous\*.

The other Insects of this tribe, with similar legs in both sexes, differ from the preceding in their mentum, which occupies transversely the greater portion of the under part of the head, and has the form of a heart truncated inferiorly or at base. The thorax is always transversal, emarginate or concave before and arcuated laterally, either trapezoidal and widest posteriorly, or strongly dilated laterally and narrowed towards the posterior angles. The labrum is emarginated.

Most of these Insects are cinereous, and live on the ground in sandy localities.

Sometimes the thorax is widened before, or near the middle of its sides, and narrowed posteriorly. The base of the jaws is exposed. In

#### HETEROSCELS, *Lat.*,

We observe two stout teeth on the outer side of the four first tibiæ, one in the middle, and the other terminal. The posterior extremity of the præsternum is prolonged, laminiform, flattened, and received into an emargination of the mesosternum. The body is oval, and rounded at both ends; the lateral edges of the thorax are strongly arcuated, and simply narrowed near the posterior angles. The antennæ are slightly and gradually enlarged towards the extremity †.

#### MACHLA, *Herbst.*

The antennæ terminated by a little globuliform club composed of the three last joints; they can be received into cavities underneath the sides of the thorax, which are extremely thick and rounded ‡. In

#### SCOTINUS, *Kirb.*,

The antennæ are also terminated by a little club, but in which the two last joints are almost confounded; they are not susceptible of being received into particular cavities. The thorax is dilated before §.

Sometimes the thorax is almost trapezoidal, gradually arcuated throughout the whole extent of its lateral edges, and is not abruptly narrowed posteriorly. The mentum covers the base of the maxillæ.

The two last joints of the antennæ are united in a small club. Such are the

\* *Blaps tibialis*, Fab.

† *Pimelia dentipes*, Fab.; *Platynotus reticulatus*, ejusd.;—*Pimelia obscura*, Oliv.; Insects from the Cape of Good Hope.

‡ *Platynotus serratus*, Fab.

§ *Scotinus crenicollis*, Kirb., Lin. Trans. XII, xxi, 14, a subgenus peculiar to South America.



ASIDA, *Lat.\**

Next come Blapsides, with an oval and slightly elongated body, in which the lateral curve of the elytra is narrow, and extends but little underneath; in which the thorax is always transversal, almost square or trapezoidal, and the lateral edges arcuated; and which are still more remarkable for the sexual difference in their tarsi, the two or four anterior ones being most dilated in the males †.

These Insects frequent sandy localities. The two anterior tibiæ are usually wider, dilated triangularly at the extremity, and fitted for digging.

Here the anterior edge of the head is always emarginated. The two anterior tarsi of the males are alone manifestly wider, or more dilated than the following ones.

PEDINUS, *Lat.*

M. Megerle and Count Dejean have divided them into several other subgenera, but without giving their characters,

Those, where the males have the four first joints of the anterior tarsi of the same width, with the radical triangular, the three following transversal and almost equal, all the tibiæ narrow and elongated, the thorax narrowed posteriorly and terminated by acute angles, form the genus *OPATRINUS* of Count Dejean.

They all belong to America ‡.

Those, where the same tarsi, and in the same sex, have the first joint, and particularly the fourth, sensibly narrower or smaller than the two that are intermediate, and in which the thorax is narrowed near the posterior angles, form four other subgenera, the characters of which are so faint and blended that they may all be united in one, that of *DENDARUS*, Meg., Dej.

In some species, as in *Opatrinus*, the tibiæ are narrow, elongated, but slightly dilated at their extremity and almost identical in both sexes; and the thorax is abruptly narrowed on each side near the posterior angles, which form a small acute tooth: they form the *Dendari*, properly so called §.

In the following, the four anterior tibiæ, or at least the two first, are dilated triangularly at the extremity. The body is oval. Such is the *HELIOPHILUS* of Count Dejean. Sometimes the thorax terminates insensibly on each side in an acute angle. The body is proportionally shorter and wider.

Certain species, with a large thorax hardly wider than it is long,

\* *Lat.*, Gener. Crust. et Insect., II, p. 155. See the Catalogue, &c., of Dejean, p. 65. The *Platynotus undatus* of Fabricius differs but little from the *A. grisea*. That author is, I think, mistaken as to its habitat.—*Plat. lævigatus*, Id.

† The inferior surface of these tarsi is usually silky or furnished with a brush.

‡ *Blaps clathrata*, Fab.;—*B. punctata*, Fab., and perhaps his *Platynotus dilatatus*.

§ See Catalogue, &c., Dej., p. 65, and the *Platynotus excavatus*, and *crenatus*, Fab.

with a strong lateral border, and in which the body is but slightly convex above, compose the genus *EURYNOTUS* of Kirby\*.

Others, in which the body is evidently more convex above, and the thorax is transversal and but very slightly bordered, form the *ISO-CERUS*, Meg. Dej. †

In the males of the Pedini, the three first joints of the two anterior tarsi, always strongly dilated, diminish progressively in breadth, and the fourth is very small. The posterior thighs of the same individuals are concave and silky underneath ‡; the body is oval and the thorax slightly bordered, widening from before posteriorly or slightly narrowed behind, always terminated posteriorly and insensibly by a prolonged and pointed angle. Such are the true Pedini of Dejean or the *PEDINUS*, Dej. §

There, the anterior margin of the head is entire or unemarginate in several. The four anterior tarsi of the males are equally, or almost equally dilated. The form of the body, and that of the thorax in particular, is still similar to that of the last Pedini.

Those, in which the anterior margin of the head still presents an emargination, form the genus

*BLAPTINUS*, Dej. ¶

Those in which it is entire or unemarginate, the

*PLATYSCELIS*, Lat. ¶¶

We now come to *Melasoma*, provided with wings. Their body is usually oval or oblong, depressed or but slightly elevated; their thorax square or trapezoidal, and its posterior extremity as wide as the abdomen. The palpi are larger at the extremity; the last joint of the maxillary palpi has the figure of a reversed triangle, or is securiform; the mentum is but slightly extended in width\*, and leaves the base of the maxillæ exposed.

These Insects compose the third and last tribe of the *Melasoma*, that of the *TENEBRIONITES*, formed of the single genus

*TENEBRIO*.

As originally arranged by Fabricius, and to which we will annex his *Opatrum* and *Orthocera*; they will serve for types of as many particular divisions.

\* *Eurynotus muricatus*, Kirb., Lin. Trans, XII, xxii, 1. See *Platynotus striatus*, Schœnh., Synon. Insect, I, 1, tab. ii, 6.

† Catalogue, &c., Dej., p. 65.

‡ The underpart of the same thighs is also silky in the male *Heliophilus*.

§ Catalogue, &c., Dej., p. 65.

¶ Dej., Catalogue, &c., p. 66.—*Blaps tibidens*, Schœnh., Synon. Insect., I, i, tab. ii, 8.

¶¶ Dej., Ibid.; Fisch., Entomog. Russ., II, xx, 1—5.

\*\* The *Epitragi*, by their jaws, which are armed on the inner side with a tooth, in a systematic arrangement, should be placed in this tribe; they would be removed from all the subgenera of which it is composed, by their much larger mentum that covers the origin of the maxillæ: but in a natural order, it appears to me they should be placed near *Helops*.

1. Those in which the body is oval; the thorax nearly trapezoidal, arcuated laterally, or forming a semioval, truncated anteriorly, wider than the abdomen, at least at its posterior margin, but slightly or not at all bordered; in which the maxillary palpi terminate by a securiform joint or one of an analogous figure, and where the antennæ insensibly enlarge. In

CRYPTICUS, *Lat.*—BLAPS, *Fab.*,

The body is convex and smooth above; the head exposed or but slightly received into the emargination of the thorax, and its anterior edge unemarginate; the eyes exterior or entirely outside of the anterior concavity of the thorax; and this last part insensibly inclined on the sides and but slightly emarginated before. The antennæ are almost as long as the thorax, and most of their joints in the form of a reversed heart or turbiniform, the penultimates alone being more rounded or almost granose, but not transversal. The tibiæ are always narrow and elongated, and the spurs of their extremity tolerably salient\*.

OPATRUM, *Fab. Dej.*—PHYLAN, *Meg.*

The body generally less elevated and even frequently depressed; the head and eyes received posteriorly into a deep notch in the thorax, with a small anterior emargination in which the labrum is fixed.

The thorax is depressed along its sides; the antennæ are shorter than the thorax, mostly granose, and the last joints lenticular and transversal.

The elytra are scabrous or striated. The spurs of the tibiæ are very small, and the two anterior are broad and triangular in several.

*O. sabulosum*; *Silpha sabulosa*, L.; Oliv., Col., III. 56, i, 4. Length of the body four lines; black; usually appearing of a cinereous-grey above; oval; thorax arcuated laterally, and rather wider in its middle than the abdomen. Each elytron has three longitudinal elevated lines, each of which, on each side, is accompanied by a range of little tubercles, arranged alternately and frequently uniting with them; between the exterior margin and the first line, and between the last and the suture, there is also a series of similar tubercles. The anterior tibiæ are wider and triangular. Very common in all Europe in sandy localities, and appearing with the first fine weather in spring †.

2. Those in which the body is narrow and elongated, almost of the same width posteriorly or wider; where the thorax is nearly square, and at least almost as long as it is broad, and where the antennæ form a thick club, or are abruptly dilated at the extremity.

\* *Pedinus glaber*, Lat., Gener. Crust. et Insect., II, p. 164; *Helops glaber*, Oliv., Col., III, 58, ii, 12; *Blaps glabra*, Fab., and some other undescribed species from Spain and the Cape of Good Hope.

† The *Opatr.*, 7, 8, 10, Oliv., Ib. See Encyc. Méthod., article *Opatrum*, and the Catalogue, &c., of Dejean. The genus *Phylan*, Meg. and Dej., presents no character which clearly distinguishes it from that of *Opatrum*.

In some, the antennæ are thick, cylindrical or fusiform, perfoliate, pilose, and apparently composed of but ten joints, the eleventh or last being very short and but little distinct; the second is as large as the following one.

CORTICUS, *Dej.*—SARROTRIUM, *Germ.*

Where the antennæ are cylindrical and terminated by a larger joint, forming a little club\*.

ORTHO CERUS, *Lat.*—SARROTRIUM, *Illig.*

Where the antennæ, wider in the middle, form a densely pilose club, with most of the joints transversal, and the last much narrower than the preceding ones †.

The antennæ of the others are of an ordinary size, simply granose, neither perfoliate nor pilose, and consist of eleven distinct joints.

CHIROSCELIS, *Lam.*

Two stout teeth on the outer side of the two first tibiæ; antennæ terminating in a small and nearly globular transverse club, formed by the two last joints ‡.

TOXICUM, *Lat.*

The tibiæ simple; club of the antennæ compressed and formed by the three last joints; head triangular; thorax nearly square, and almost isometrical §.

BOROS, *Herbst.*—HYPOPHLÆUS, *Fab.*

The tibiæ simple, and the club of the antennæ compressed and formed by the three last joints; but the body is almost linear, the head oval and narrowed posteriorly, the thorax oval and truncated at each extremity, and the last joint of the maxillary palpi forming a truncated ovoid and but slightly inflated ||.

3. Those in which the body is equally narrow and elongated, and the thorax almost square, but where the antennæ are of the ordinary thickness, and are not abruptly terminated by a club.

The two anterior thighs are stout, and the tibiæ narrow and curved, or arcuated.

Here the penultimate joint is perfectly similar, both in form and size, to the preceding; and the latter, like all the others, is neither dilated nor canaliculated above. In

CALCAR, *Dej.*—TROGOSITA, *Fab.*,

The thorax forms a long square, the body is linear, of equal width

\* *Sarrotrium cellis*, *Germ.*, *Insect. Spect. Nov.*, p. 146.

† *Hispa mulica*, *L.*; *Panz.*, *Faun. Insect. Germ.*, I, 8.

‡ *Chiroscelis bifenestra*, *Lam.*, *Ann. du Mus. d'Hist. Nat.*, No. 16, XXII, 2;—*Tenebrio digitatus*, *Fab.*

§ *Toxicum richesianum*, *Lat.*, *Gener. Crust. et Insect.*, II, p. 168, and I, ix, 9. I have seen another species in the cabinet of M. Labillardière, which from its appearance seems to be closely allied to *Opatrum*.

|| *Boros corticalis*, *Gyll.*, *Insect. Suec.* I, ii, p. 584; *Hypophlæus boros*, *Fab.*;—*B. thoracicus*, *Gyll.*, *Ib.*, p. 586.

throughout, the anterior border of the head is emarginated, and the three last penultimate joints of the antennæ are almost globular, and not sensibly transversal\*.

*UPIS, Fab.*

The thorax as in *Calcar*; the body narrow, but not linear; anterior edge of the head straight and unemarginate; penultimate joints of the antennæ lenticular and transversal †. The

*TENEBRIO, Lin., Fab.,*

Or *Tenebrio* properly so styled, only differs from *Upis* in the thorax, which is more broad than long.

*T. molitor*, L.; Oliv., Col., III, 57, 1, 12. Length seven lines; brown, verging on a black, above; maroon and glossy beneath; thorax as wide as the elytra; square, and with two posterior impressions; elytra striate and punctured.—Very common, in the evening, in the less inhabited parts of houses, flour-mills, bake-houses, on old walls, &c.

Its larva is long, cylindrical, of an ochreous yellow colour, scaly, and very smooth. It lives in bran and flour, and is given to the Nightingales. It becomes a chrysalis in the midst of the substance on which it has fed.

*T. grandis*, which is found in Brazil, under the bark of old trees, darts a caustic liquid from its anus to the distance of more than a foot. Other but smaller species from the same country completely cover themselves with this material. For these observations I am indebted to M. de la Cordaire ‡.

There, the penultimate joint of the tarsi is very small, in the form of a little knot, and received into a longitudinal groove in the preceding, which is more dilated, and almost cordiform.

The anterior edge of the head presents an emargination occupied by a portion of the labrum.

*HETEROTARSUS, Lat.*

A subgenus founded on an Insect from Senegal, having all the characters of a *Tenebrio*, but with singular tarsi. At the first glance, the two anterior ones appear to consist of but four joints, and the two others of three.

## FAMILY II.

### TAXICORNES.

In this second family of the heteromerous Coleoptera, we find no small corneous tooth on the inner side of the maxillæ. All these

\* *Trogosita calcar*, Fab.

† *Upis ceramboides*, Fab.;—*U. saperdoides*, Bosc.

‡ For the other species, see Catalogue, &c., Dej., and Fabricius. This genus, however, as now composed, needs depuration; several of its species belong to *Phaleria*, or other subgenera. Some of them may even form new ones.

Insects are winged, their body is most commonly square, their thorax trapezoidal or semicircular, and concealing or receiving the head. The antennæ, usually inserted under a marginal projection of the sides of the head, are short, more or less perfoliate or granose, enlarge insensibly, or terminate in a club. The legs are only adapted for walking, and all the joints of the tarsi are entire, and terminated by single hooks; the anterior tibiæ are frequently broad and triangular. Several males have the head furnished with horns. Most of them inhabit the fungi on trees, or under the bark; some live on the ground, under stones.

M. Leon Dufour has observed in certain subgenera of this family, such as *Hypophlæus*, *Diaperis* proper, *Eledona* or *Boletophagus*, an excrementitious apparatus, and in the second salivary vessels. The chylic ventricle of these *Heteromera* is bristled with little piliform papillæ. These characters, and the conformation of the organs of generation, point out the connexion between this and the preceding family\*.

In some, the head is completely exposed, and never entirely received into a deep notch in the anterior of the thorax. This last is sometimes trapezoidal or square, and at others almost cylindrical; its sides, as well as those of the elytra, do not extend remarkably beyond the body.

This division will form the tribe of the *DIAPERIALES*, the type of which is the genus

#### DIAPERIS.

Sometimes the antennæ are generally stout, almost straight, and mostly perfoliate, or terminated abruptly by a thick club. The body is smooth, or the elytra are lightly striated. The sides of the thorax have but a slight border, and are neither depressed nor dentated; there is no remarkable separation nor hiatus between its posterior angles and the base of the elytra. The two anterior legs are triangular, and dilated exteriorly at the extremity, in a great number.

Here the antennæ enlarge insensibly, or at least are not abruptly terminated by an oval or ovoid club, of which most of the joints are larger than the preceding ones.

In some, and the greater number, the body is oval or ovoid, sometimes even hemispherical, with the thorax either nearly square or trapezoidal, most frequently transversal, but never long and narrow.

*PHALERIA*, *Lat.*—*ULOMA*, *PHALERIA*, *Dej.*

The last joint of the maxillary palpi larger and securiform, or like

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\* It is the same with the following one. The transition from *Tenebrio* to *Phaleria* and *Helops*, is almost insensible, and consequently the characters of these families, in some cases, are ambiguous.

a reversed triangle; anterior tibiæ wider, dilated in the manner of a reversed triangle, and frequently dentated, or furnished with small spines on one of its sides\*. In

DIAPERIS, *Geoff., Fab.,*

Or Diaperis properly so called, the maxillary palpi terminate in an almost cylindrical joint, hardly thicker than the penultimate; and the anterior tibiæ, hardly or not at all wider than the following ones, are narrow, almost linear, and slightly dilated at the extremity.

Among those species where the body is ovoid and convex, the thorax is lobate posteriorly, and the antennæ are thick and almost entirely perfoliate, comes the *D. boleti*; *Chrysomela boleti*, L., Oliv., Col., III, 55, 1, whose body is about three lines long, of a glossy black, with three fulvous-yellow, transverse, and dentated bands on the elytra.—In the fungi of trees.

Another more elongated species, placed among the Ips by Fabricius—*hæmorrhoidalis*—forms the genus *Neomida* of Ziegler. The head of the male is armed with two horns †.

Some others, but in which the five last joints are alone perfoliate and form a little club, also constitute a separate genus, that of *Pentaphyllus* ‡.

Other Insects of this tribe, whose antennæ gradually enlarge and are almost entirely perfoliate, are distinguished from Diaperis and

\* Some by their elongated form approach Tenebrio. The intermediate joints of the antennæ are almost obconical, and the four last compose a perfoliate club. The head of the males is horned. M. Dalmar has figured a species of this division—*Phaleria furcifera*, *Analect. Entom., IV.* M. Fischer—*Entomog. Imp. Russ., II, xxii, 3*, has figured another. The Trogositæ *taurus, quadricornis, vacca* of Fabricius belong to this division.

Others have the body oval and depressed; and the antennæ very perfoliate—such are the Tenebriones *culinaris, retusus, chrysoelinus, impressus, nitidulus* of that author.

The species of these two divisions form the genus *Uloma*, Meg. and Dej. Those, in which the body is shorter and more rounded, in the form of a short ellipsis, or even hemispherical, and in which the six or seven last joints of the antennæ are almost globular, constitute the *Phaleria*, Dej. The *Tenebrio cadaverinus*, Fab., is of this number.

A species—*bicolor*—from the Cape of Good Hope, belonging to this division, is distinguished from the preceding ones by the maxillary palpi, which are terminated by a proportionally larger securiform joint, and by its antennæ, of which the four last joints are alone globular.

Another—*peltoides*—approaches *Peltis* and *Cossyphus*, Fab., in its flattened form. Its antennæ are hardly perfoliate; most of the joints, and even the last, being in the form of a reversed cone.

† The Trogositæ *cornuta*, and *maxillosa* of Fabricius, on account of the difference in the mandibles presented in the two sexes, might be formed into a separate subgenus. The *T. ferruginea*, Fab., also appears to constitute another by its antennæ, which abruptly terminate in a perfoliate club of three joints, the preceding ones being very small and granose.

‡ See Catalogue, &c., Dej., and Dahl., and for the other species, Fabricius, Olivier, and Gyllenhal.



Phaleria by the linear form of their body, and their thorax, which forms a long square or is almost cylindrical. They are the

**HYPOPHLÆUS, Fab.—Ips, Oliv.**

They are found under the bark of trees\*.

There, the antennæ, exposed at base or but very slightly covered, are abruptly terminated by a large oval or ovoid perfoliate club, of at least four joints, the second of which, in those where it consists of five, is very small. The body is ovoid, or almost hemispherical, and convex. In

**TRACHYSCELIS, Lat., Dej.,**

The antennæ, hardly longer than the head, terminate in an ovoid club of six joints; all the tibiæ are broad, triangular, and fitted for digging, and the body short and most usually hemispherical. They bury themselves in the sand on the sea shore †.

**LEIODES, Lat.—ANISOTOMA, Illig., Fab.**

The body similarly short and convex; but the antennæ, as long as the head and thorax, are terminated by an oval club of five joints, the second of which is smaller. The tibiæ are narrow, elongated or but slightly dilated; the four anterior ones, at least, are spinous ‡.

**TETRATOMA, Herbst., Fab.**

The body somewhat more elongated than that of the preceding Insects, ovoid, less elevated above; all the tibiæ narrow and without spines; the antennæ as long as the head and thorax, and terminated by an oval club of four joints §.

Sometimes the antennæ, always terminated by a perfoliate club of five or three joints, the preceding ones of which are almost in the form of a reversed cone, or slightly dilated on the outer side in the manner of a tooth, are arcuated, or somewhat curved. The body is ovoid, very unequal above, or the elytra are deeply punctured and striated. The thorax is depressed laterally, and the edges of this marginal border are dentated; it is separated posteriorly on each side by a remarkable hiatus. The palpi are filiform, or slightly enlarged at the extremity, as in Phaleria and Diaperis. The head of the males is frequently horned. They are also found in the fungi on trees: they form the genus

**ELEDONA, Lat.—BOLETOPHAGUS, Fab., and most others.**

M. Ziegler and Count Dejean only refer to it those species in

\* *Hypophlæus castaneus*, Fab.; Panz., Faun. Insect. Germ., XII, 13;—*H. linearis*, Fab.; Panz., Ib., VI, 16;—*H. fasciatus*, Panz., Ib., VI, 17;—*H. bicolor*, Fab.; Panz., Ib., XII, 14;—*H. pini*, Ib., LXVII, 19. In *Hypophlæus* and *Eledona*, M. Leon Dufour found but four biliary vessels; in *Diaperis* there are six.

† Lat., Gener. Crust. et Insect. IV, p. 379.

‡ Lat., *Ibid.*, II, p. 180;—the *Anistomæ humerale, axillare, castaneum, orbiculare, pisceum, ferrugineum* of Gyll., Insect. Suec., I, ii, p. 180, and I, et seq.

§ Lat., Gener. Crust. et Insect., II., p. 180, and I, ix, 10. See Fab. and Gyllenhal.



which the club of the antennæ is formed by the last five joints, and the preceding ones are slightly securiform\*.

Those, in which the three last alone form the club, and the three preceding ones, are in the form of reversed cones without an interior projection, compose the genus *COXELUS* †.

Our second tribe of the *Taxicornes*, the *COSSYPHENES*, consists of Insects analogous in form to the *Peltis* of Fabricius, and to several *Nitidulæ* and *Cassidiæ*; it is ovoid or sub-hemispherical, and overlapped in its contour by the dilated or flattened sides of the thorax and elytra; the head is sometimes entirely concealed under that thorax, and at others received into an interior emargination of the same part. The last joint of the maxillary palpi is larger than the preceding ones, and securiform.

This tribe is composed of the genus

*COSSYPHUS, Oliv. Fab.*

Some of them have a flat body, of a solid consistence, in the form of a shield, and antennæ terminated by a club composed of four or five joints; they are peculiar to the eastern continent and to New Holland. Such are those which form the

*COSSYPHUS, Oliv. Fab.*

Or *Cossyphus* properly so called, where the almost semicircular thorax presents no anterior emargination, and entirely conceals the head; where the antennæ are short, and terminate abruptly in an oval mass of four joints, most of which are transversal; the second of the whole number and the following ones are almost identical.

These Insects inhabit the East Indies, southern part of Europe, and north of Africa ‡. In

*HELÆUS, Lat. Kirb.*

The head is received into a deep emargination or median aperture of the thorax, and is exposed at least superiorly. The antennæ, at least as long as these two parts of the body taken together, terminate almost gradually in a narrow, elongated club, formed by the last five joints, the last of which is ovoid, and the preceding ones turbiniform; the second of the whole number is shorter than the third.—They are peculiar to New Holland §.

The others, where the head is always exposed and simply received into a deep notch in the thorax, have a convex, soft or but slightly solid, almost hemispherical body, and granose antennæ, nearly equal

\* See the Catalogue, &c., Dej., p. 68; but refer my *Eledona spinosula* to the genus *Coxelus*.

† Catalogue, &c., Dej., p. 67. The *Cis*, in a natural order, seem to approach these Insects.

‡ Lat., Gener. Crust. et Insect. II, p. 4.

§ Cuv. Règn. Anim., III, p. 301, IV, xiii, 6;—*Helæus Brownii*, Kirb., Lin. Trans., XII, xxiii, 8.

throughout. They are peculiar to South America, and at a first glance resemble Coccinellæ and various species of Cryptoli. Such are those which form the

NILIO, *Lat.* \*

### FAMILY III.

#### STENELYTRA.

The third family of heteromorous Coleoptera only differs from the second in the antennæ, which are neither granose nor perfoliate, and whose extremity, in the greater number, is not thickened. The body is most frequently oblong, and arcuated above, and the legs are elongated as in many other Insects. With the exception of their antennæ and size, the males resemble the females. These Heteromera are usually much more agile than the preceding ones; several conceal themselves under the bark of old trees, while most of the others are found on leaves and flowers. Most of them were referred by Linnæus to his genus *Tenebrio*; he distributed the remainder in *Necydalis*, *Chrysomela*, *Cerambyx* and *Cantharis*. In the first edition of this work, we united these Insects in the single genus HELOPS, but their internal as well as external anatomy proves that we may divide them into five tribes, attached to as many genera, viz. Helops, Cistela, Dircæa, Fab., and the Œdemera and Mycterus of Olivier. With respect to the liliary vessels, which have a cæcal insertion, or the posterior ones, we learn from M. Dufour, that this insertion is not effected in the two last genera as in the first and other preceding heteromera, by a common trunk, but by three canals, one of which is simple, the second bifid, and the third trifid. In the Œdemeræ he found salivary vessels. Their head is more or less narrowed and prolonged anteriorly in the form of a snout, and the penultimate joint of the tarsi is always bilobate characters which seem to approximate these Insects to the Rynchophora. With respect to the alimentary canal, and several other considerations, Helops and Cistela approach *Tenebrio*, but the Cistelæ have a smooth chylic ventricle, entire mandibles, and usually live on flowers or leaves, by which they are distinguished from Helops. Most of the Dircææ have the faculty of leaping, and the penultimate joint of their tarsi, or at least of some, is bifid; some of them inhabit mushrooms, others old wood.

\* *Lat.*, Gener. Crust. et Insect., II, p. 198, and I, x, 2; *Ægithus marginatus*, Fab. See Germ., Insect. Spec. Nov., p. 162.

The genera *Eustrophus* and *Orchesia* which we formerly placed in this family now belong to the next.

These Insects are connected on the one hand with the Helopii, and on the other, with the CEdemeræ, and still more closely with Nothus, a subgenus of the same tribe: such are the principles which have guided us in the division of this family.

In some, the antennæ are approximated to the eyes, and the head is not prolonged in the manner of a proboscis, but terminated at most by a very short snout. They will form our four first tribes.

Those of the first or the HELOPII, have their antennæ covered at base by the margin of the head; they are generally filiform or slightly thickened towards the extremity, generally composed of almost cylindrical joints attenuated at base, of which the penultimate ones are frequently a little shorter, and in the form of a reversed cone, and the last is usually almost ovoid; the third is always elongated. The extremity of the mandibles is bifid; the last joint of the maxillary palpi is larger and securiform, or in the figure of a reversed triangle; the eyes are oblong, and reniform or emarginated. None of the legs are fitted for leaping; the penultimate joint of the tarsi, or at least of the last ones, is almost always entire or not deeply emarginate; their terminal hooks are simple, or without fissure or dentation; the body is most commonly arcuated above, and always solid and firm.

Such of the larvæ as are known to us are smooth, filiform and glossy, with very short legs, like that of a Tenebrio. They are found in old wood, and the perfect Insect lives under the bark of trees.

This tribe mostly corresponds to the genus

#### HELOPS, Fab.

In some, the body is alsoelliptical, strongly arcuated above, or very convex; the antennæ, at most, as long as the thorax, compressed, and dilated like the teeth of a saw towards the extremity; the thorax is transversal, plane above, either trapezoidal and becoming widened posteriorly, or almost square; and the elytra frequently terminate in a point or by a tooth. The posterior extremity of the præsternum projects in a little point, which is received into a forked emargination of the mesosternum.

In these the mentum is broad, and conceals the origin of the maxillæ. The middle of the posterior extremity of the thorax projects along the side of the scutellum in the manner of an angle. Such is the

#### EPITRAGUS, Lat.\*

In the others the mentum does not cover the base of the maxillæ, and the posterior margin of the thorax is straight, or but slightly dilated behind.

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\* Lat., Gener. Crust. et Insect., II, p. 183, and I, x, 1. The maxillæ are unguiculated like those of Melasoma. This subgenus and the two following subgenera are peculiar to South America.

CNODALON, *Lat.*

Where, from the fifth joint, the antennæ are strongly compressed and serrated, and where the head is much narrower than the thorax\*.

CAMPSIA, *Lepelet. and Serv.*—CAMARIA, *Id.*

Where the antennæ, from the sixth joint, are slightly serrated, and the head is as wide as the posterior margin of the thorax. The body is proportionally longer and less convex, and the thorax wider posteriorly †.

In all the other Helopii, the mesosternum presents no remarkable emargination, and the posterior extremity of the præsternum is not extended into a point.

Here the body is sometimes ovoid or oval, and at others more oblong but narrowed at both ends; it is never cylindrical or linear, nor much flattened. Certain subgenera have been formed with Helopii, which approach the first in their strongly inflated body, which is gibbous posteriorly.

Those, in which the body is almost ovoid or short, and the thorax transversal, plane or simply curved, compose the following subgenera.

SPHENISCUS, *Kirby.*

Easily mistaken at the first glance for Erotylus, and in which, as in the preceding subgenera, the inner side of the last joints of the antennæ are dilated like the teeth of a saw, and the thorax is plane ‡.

ACANTHOPUS, *Meg. Dej.*

Shorter and rounder than the Insects of the preceding subgenus, with simple antennæ terminated by a larger and ovoid joint; the anterior thighs inflated and dentated, at least in one of the sexes, and the tibiæ almost linear with very short spurs, or almost none; anterior tibiæ arcuated §.

AMARYGMUS, *Dalm.*—CNODALON, HELOPS, CHRYSOMELA, *Fab.*

Allied to Acanthopus, with simple but filiform antennæ, and the anterior thighs neither inflated nor dentated. All the tibiæ are straight and terminated by very apparent spurs ||.

\* *Lat.*, Gener. Crust. et Insect., II, p. 182, and I, x, 7.

† *Encyc. Méthod.*, article *Sphenisque*. Messrs. Lepeletier and Serville give but ten joints to the antennæ of the *Camaria*, a character which would distinguish them from the other Helopii: but we have distinctly seen eleven in various Helopii from Brazil, which appear to us closely allied to the *C. nitida*, quoted by them. Until we can verify this anomaly in the individuals examined by those gentlemen, we think it best to unite the two subgenera. Besides the *Cnodalon irroratum* of Germar, quoted in this article, refer the *Toxicum geniculatum* and *nigripes*, ejsd., to the same subgenus.

‡ *Spheniscus erytoloides*, Kirb. *Lin. Trans.*, XII, xxii, 4; *Encyc. Méthod.*, article *Sphenisque*. The Helopii *suturalis* and *geniculatus* of Germar form the passage from this subgenus to Helops proper.

§ *Helops dentipes*, Panz., Ross.; — *Helops dentipes*, Fab., another species, but from the East Indies.

|| *Dalm.*, *Anál. Entom.*, p. 60. The *Helops ater*, Fab., should also be referred to this subgenus.

Those, in which the thorax is inflated above, ovoid and truncated at both ends, narrower throughout than the abdomen, with simple antennæ enlarging towards the extremity, and all the tibiæ narrow, long, and curved or arcuated, form the

SPHÆROTUS, Kirby\*.

The same naturalist comprises under the generic appellation of

ADELIUM, Kirb.—CALOSOMA, Fab.

Helopii, of an oval form, with the thorax wider than it is long, almost orbicular, emarginated before, truncated behind, dilated and arcuated laterally, and with almost filiform antennæ, of which most of the joints are in the form of a reversed cone. They more particularly inhabit New Holland †.

Those species, in which the body forms an oblong oval, insensibly arcuated and convex, or almost straight above, with simple antennæ, either filiform, or somewhat larger towards the extremity, particularly in the females, and the thorax is almost square, or in the form of an elongated heart, truncated posteriorly, form two other subgenera ‡. In.

HELOPS, Fab.

Or Helops, properly so styled, most of the joints of the antennæ are almost obconical or cylindrical, and attenuated at base. The thorax is transversal, or hardly as long as it is wide, either square or trapezoidal, or cordiform, abruptly narrowed posteriorly, terminated by pointed angles, and always exactly applied to the base of the elytra §.

LÆNA, Meg., Dej.—HELOPS, Fab.—SCAURUS, Sturm.

The antennæ generally composed, at least in the females, of short turbiniform joints, the last of which is thicker than the preceding ones and ovoid. The thorax is almost in the form of a truncated heart, elevated or convex above, separated from the abdomen by a considerable hiatus, and with the angles obtuse or rounded. The thighs, particularly the anterior ones, are inflated ||.

The last Helopii have the body elongated, narrow, almost of the same width throughout ¶, and either thick and almost cylindrical, or much depressed. The thorax is nearly square, or almost in the form of a truncated heart.

Those, in which the body is tolerably thick, almost cylindrical or

\* *Sphærotus curripes*, Kirb., Lin. Trans. XXI. 15.

† *Adelium calasonoides*, Kirb., Ibid., XII. xxii, 2.

‡ The two or four anterior tarsi are dilated and pilose beneath in several males.

§ The *Helops cæruleus*, *lanipes*, *caraboides*, Fab.; the *Helops arboleus*, *gracilis*, of Fischer—Entom. Russ., II, xxii, 4, 5—and several other species foreign to France.

|| Also refer to it the *Catops flavipes* of the first, which, as well as his *Helops obliquatus*, seems to form the transition from *Amarygmus* to the *H. caraboides*.

¶ *Læna pimelia*, Dej., Catal.; *Helops pimelia*, Fab.; *Scaurus viennensis*, Sturm; *Læna pulchella*, Fisch., Entomog. Imp. Russ., II, xxii, 8; var.?

¶ Rather narrower before.

linear, with the thorax nearly square, and not narrowed posteriorly, form two subgenera.

STENOTRACHEEUS.—DRYOPS, *Payk.*

Where the head is elongated, and narrowed posteriorly almost in the manner of a neck; the antennæ are abruptly terminated by three joints, shorter and somewhat thicker than the rest; the third is much longer than the following ones\*.

STRONGYLUM, *Kirb.*—STENOCHIA, *ejusd.*—HELOPS, *Fab.*

Where the head is neither elongated nor narrowed posteriorly, and the last joints of the antennæ—somewhat more dilated—do not suddenly differ from the preceding ones; the third is merely somewhat longer than the following one †.

Those, in which the body is flattened, and the thorax narrowed posteriorly almost in the form of a truncated heart, compose the last subgenus, that of

PYTHO, *Lat., Fab.,*

Where the antennæ hardly enlarge towards the extremity, or are filiform, with the last joint almost conical; the third is hardly longer than the preceding and following ones.

Certain species peculiar to Brazil closely approach Pytho; but the second joint is much shorter than the third, and the angles of the thorax are acute, instead of being rounded or obtuse as in that genus ‡.

The second tribe, that of the CISTELIDES, is very closely allied indeed to the first, but the insertion of the antennæ is not covered, the mandibles terminate in an entire or unemarginate point, and the hooks of the tarsi are pectinated inferiorly. Several of these Insects live on flowers. The digestive canal is shorter than in Helops, and the chylic ventricle presents no papillæ.

This tribe forms the genus

CISTELA, *Fab.*

In some, all the joints of the tarsi are entire. The last of the maxillary palpi is merely somewhat larger, and obconical or triangular.

\* *Dryops æna*, Payk.; *Calopus æneus*, Gyll.: *Ædemera ænea*, Oliv. The *Agathus decoratus* of Germar—Faun. Insect. Europ., fascic. XII, fig. 4—a specimen of which I found near Brives, appears to me to approximate closely to the *Stenotracheles*. The *Pelmatopis Hunnелиi*, Fisch.—Entom. Imp. Russ., II, xxii, 7—is, I presume, congeneric and closely approaches the first species.

N.B. *Pelmatopus*. M. Fischer, who at first thus designated this genus in his plates, has, in the text, adopted the name of SCOTODES, previously given to it by M. Eschscholtz.

† *Strongylium chalconatum*, Kirb., Lin. Trans., XII, xxi, 16:—*Stenochia rufipes*, Ib., xxii, 5. See also the *Helops splendidus*, *aurichalceus*, *azureus*, *interstitialis*, *flavicornis*, *luteicornis*, *limbatus*, of Germar.

‡ See Fab., System. Eleuth., II, p. 95; Lat. Gener. Crust. et Insect., II, p. 195; Schœnh., Synon. Insect., I, iii, p. 55; Frisch., Entom. Imp. Russ., II, xxii, 1.



Here the thorax is thick, narrower than the abdomen, and almost orbicular or nearly cordiform. The antennæ thicker at the extremity and the thighs clavate.

*LYSTRONICHUS, Lat.\**

There the thorax is depressed, trapezoidal, and its posterior margin is as wide as the abdomen, or hardly narrower. The antennæ are filiform or slightly enlarged towards the extremity. In

*CISTELA, Fab.,*

Or *Cistela* properly so called, the head projects in the manner of a snout, and the labrum is hardly wider than it is long; most of the joints of the antennæ either obconical, triangular, or even serrated; the last is always oblong. The body is ovoid or bordering on an oval.

*C. ceramboides*; *Chrysomela ceramboides*, L.; Oliv., Col. III, 54, 1, 4. This species, on account of its antennæ, of which the three first joints are shorter than the following ones, and of the serrated form of the latter, might constitute a separate subgenus: It is five lines in length; black; elytra reddish and striated; thorax almost semicircular. The larva inhabits the tan of old Oaks, where it undergoes its metamorphosis.

*C. sulphurea*; *Chrysomela sulphurea*, L.; Oliv., Ib., I. 6. A more elongated form than that of the *ceramboides*; length four lines; lemon-yellow; eyes black; elytra striate; antennæ simple. Very common on different flowers, those of the Yarrow particularly †.

*MYCETOCHARES, Lat.—MYCETOPHILA, Gyll., Dej.—CISTELA, Fab.*

Where the head does not project in the manner of a snout; where the labrum is very short, transversal and linear, and where most of the joints of the antennæ are short and nearly turbiniform; the last is ovoid. The body, particularly in the males, is narrow and elongated. The maxillæ and the labium are soft †

In the others, the penultimate joint of the tarsi is bilobate, and the last of the maxillary palpi strongly dilated and securiform. The body is generally more oblong. They form the

*ALLECULA, Fab. §*

The third tribe, that of the *SERROPALPIDES* ||, is remarkable, as inti-

\* *Helops equestris*, Fab., and some others from Brazil;—*Helops columbianus*, Germ.;—*Notoxus helvolus*, Dalm.

† See Lat., Gener. Crust. et Insect., II, p. 225; Oliv., Col., Ib.; Schœnh., Synon. Insect. I, ii, p. 332, et seq.

‡ See Gyllenh., Insect. Suec., I, ii, p. 451; Lat., Gener. Crust. et Insect., II, p. 189, *Helops barbatus*. The name of *Mycetophila* having been employed by M. Meigen, I have thought it necessary to give a substitute in *Mycetochares*.

§ The *Allecula contracta, geniculata* of Germar—Insect. Spec. Nov., p. 163, 164—have their anterior tarsi strongly dilated.

|| The *Securipalpes* of my Fam. Nat. du Règne Animal. The term *Serropalpides* is preferable, inasmuch as it reminds us of the genus *Serropalpus*, which forms part of this tribe.

mated by its name, for the maxillary palpi, which are frequently serrated, very large and inclined. The antennæ are inserted in an emargination of the eyes, exposed, as in the preceding tribe, and most usually short and filiform. The mandibles are emarginated or bifid at the extremity, and the hooks of the tarsi are simple. The body is almost cylindrical in some, and oval in others; the head is inclined, and the thorax trapezoidal. The anterior extremity of the head does not project, and the posterior thighs not inflated, characters which distinguish these Insects from various Heteromera of the ensuing tribe. The penultimate joint of the tarsi, or at least of the four anterior ones, is most commonly bilobate, and in those where it is entire the posterior legs at least are fitted for leaping; in this case they are long and compressed, the tarsi small, almost setaceous, and their first joint elongated; the anterior ones are frequently short and dilated.

The type of this tribe is the genus

#### DIRCÆA, Fab.

Some few have their antennæ terminated by a club. Such are those which constitute the

#### ORCHESIA, Lat.—DIRCÆA, Fab.,

Where the maxillary palpi are terminated by a securiform joint. The legs are fitted for leaping, and the penultimate joint of the four anterior tarsi is bifid\*.

The antennæ of the others are filiform.

Here the legs are fitted for leaping, the body is oval or ovoid, the antennæ are always short and almost cylindrical, the maxillary palpi merely somewhat larger at the extremity, but not terminated by a securiform joint, and all those of the tarsi entire.

#### EUSTROPHUS, Illig.—MYCETOPHAGUS, Fab.

The body is ovoid and the thorax broad, emarginated before, and with prolonged posterior angles; the antennæ are shorter than the thorax, and the four posterior tibiæ elongated and terminated by two long spurs †

#### HALLOMENUS, Payk.—DIRCÆA, Fab.

The body more elongated, oval; antennæ longer than the thorax, and the posterior tibiæ long and slender, with two very short terminal spurs ‡.

\* Lat., Gener. Crust. et Insect., II, p. 194; Schœnh., Synon. Insect., I, iii, p. 51.

† *Mycetophagus dermestoides*, Fab. Another species has been brought from Brazil by M. de la Cordaire.

‡ See Gyllenh., Insect. Suec., I, ii, p. 526.



There the body is usually narrow and elongated, the maxillary palpi are terminated by a securiform joint, and the penultimate joint of the tarsi, or at least of the four anterior ones, is bilobate.

Sometimes the antennæ are thick and composed of short obconical or turbiniform joints.

In some, as in the two following subgenera, the body is oval, and the thorax transversal or almost isometrical, and becomes widened from before posteriorly.

DIRCÆA, *Fab.*—XYLITA, *Payk.*

Or *Dircæa* properly so called, where the maxillary palpi are not serrated, and their last joint projects more on the inner side than the preceding ones. The thorax is insensibly lowered on the side. The scutellum is very small\*.

MELANDRYA, *Fab.*,

Where the maxillary palpi are evidently serrated, the extremity of the second and third joint being prolonged into a point, and on a level with the fourth or the last. The thorax is abruptly depressed laterally, near its posterior angles, and the posterior margin is sinuous. The scutellum is of an ordinary size †.

In the following subgenus, the body is narrow and almost linear. The thorax forms a long square, narrowed posteriorly.

HYPULUS, *Payk.*—DIECÆA, *Fab.*

The antennæ longer than in the preceding subgenus, slightly perfoliate and more separate; the three last joints of the maxillary palpi forming, together, an oval club ‡.

Sometimes the antennæ are slender, and composed of elongated and almost cylindrical joints; the body is long and narrow, and the abdomen elongated.

SERROPALPUS, *Hellw. Payk.*—DIRCÆA, *Fab.*

Where the body is firm, the maxillary palpi are strongly serrated, the thorax is at least as long as it is wide, and the four posterior tarsi are long; all the joints of the two last are entire or without any apparent incisures §.

CONOPALPUS, *Gyll.*,

Where the body is soft, the maxillary palpi are but slightly serrated, the thorax is transversal, and the tarsi moderately elongated; the penultimate joint of the whole number is bilobate ||.

\* *Gyll.*, *Insect. Suec.*, I, p. 516, minus the species which he calls the *bifasciata*, *quercina*—see *HYPULUS*, and *fuscata*—see *SCRAPTIA*.

† *Gyll.*, *Insect. Suec.*, I, ii, p. 533, with the exception of the *M. ruficollis*—*Dircæa ruficollis*, *Fab.*—which it appears to me should be referred to the subgenus *Conopalpus*.

‡ *Dircæa bifasciata*, *Gyll.*, *Insect. Suec.*, I, ii, p. 522;—*ejud.*, *D. quercina*, *Id.*, p. 523.

§ *Gyll.*, *Insect. Suec.*, I, ii, p. 514; *Lat.*, *Gener. Crust. et Insect.*, II, p. 192, and I, ix, 12.

|| *Gyll.*, *Id.*, p. 547; *Dejean, Catal.*, p. 70.

The fourth tribe, that of the **ÆDEMERITES**, is connected with the third by several characters, such as having the antennæ inserted near the eyes, and their origin exposed, the mandibles bifid at the end, the penultimate joint of the tarsi bilobate, and the maxillary palpi terminated by a larger and securiform joint; but if we except the Nothi, approximated by the form and breadth of the thorax, and by some other characters, to certain Heteromera of the preceding tribe, and yet distinguished from them by their strongly inflated posterior thighs, and their bicleft tarsial hooks, the **Ædemerites** present a union of characters which will not allow us to confound them with the other Heteromera. The body is elongated, narrow, almost linear, and the head and thorax are somewhat narrower than the abdomen. The antennæ are longer than the two latter, serrated in some—*Calopus*—filiform or setaceous, and composed of long and almost cylindrical joints in the others; the anterior extremity of the head is more or less prolonged into a little snout, and somewhat narrowed behind; the eyes are proportionally more elevated than in the preceding Heteromera. The thorax is at least as long as it is broad, almost square, or nearly cylindrical, and slightly narrowed behind; the elytra are linear or subulate posteriorly, and frequently flexible. These Insects are allied to *Telephorus* and *Zonitis*.

M. Leon Dufour has discovered in the **Ædemerites** two very simple, flexuous, and floating salivary vessels\*, as well as a paunch formed by a lateral crop, furnished with a neck or pedicle. They are the only Coleoptera in which he has observed it. These Insects are found on flowers or trees. Their metamorphoses are unknown.

These Heteromera will be comprised in a single genus, the

#### **ÆDEMERA, Oliv.**

Here, where the antennæ are always short, inserted into an emargination of the eyes, and simple, the posterior thighs are inflated, at least in one of the sexes, the thorax is as wide as the base of the abdomen, and wider than the head; the hooks of the tarsi are bifid.

**NOTHUS, Ziegl. Oliv.—OSPHYA, Illig.—DRYOPS, Schænh.**

Where the maxillary palpi are terminated by a large, securiform

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\* The Mordellones present the same character. In a more natural series it would perhaps be necessary to place the *Horiae*, which also have the posterior thighs inflated, immediately after *Zonitis* and *Sitaris*, then pass to the **Ædemerites** and **Mordellones**, and terminate the **Heteromera** with the *Notoxi* or *Anthicus* of Fabricius, Insects evidently connected with the **Mordellones** by the **Scraptiæ**. In my *Gener. Crust. et Insect.*, I have placed the **Ædemerites** at the end of the same section. The *Rhæbi* of M. Fischer, although tetramerous, are allied in many respects to the *Nothi* and **Ædemeræ**. The *Xylophili*, also tetramerous, are however closely related to the *Notoxi*.

and elongated joint. The posterior legs are very stout in one of the sexes, with one stout tooth and two small spurs beneath, near the inner extremity of their tibiæ. The head is not prolonged anteriorly\*.

In a natural order this would perhaps be the place for the *Rhæbus* of M. Fischer †.

In the others, where the antennæ are always longer than the head and thorax, and where the legs are most commonly of the same thickness, the thorax is narrower than the base of the abdomen and somewhat narrowed behind, and the hooks of the tarsi are entire.

CALOPUS, *Fab.*—CERAMBYX, *De Geer.*

Where the posterior legs, in both sexes, are the size of the others, or nearly so, and where the serrated antennæ are inserted into an emargination of the eyes, with the second joint much shorter than the third, in the form of a knot and transversal ‡.

SPAREDRUS, *Meq. Dej.*—PEDILUS?, *Fisch.*

Similar to *Calopus* in the legs and insertion of the antennæ; but these latter organs are simple, with their second joint obconical like the third, and at least half as long §.

DYTILUS, *Fisch.*—HELOPS, DRYOPS, NECYDACIS, *Fab.*—ÆDEMERA, *Oliv.*

Where the legs are also of the same thickness, or nearly so, in both sexes, but where the antennæ, always filiform, are inserted before the eyes. The elytra are not subulate or abruptly narrowed towards the extremity ¶.

ÆDEMERA, *Oliv.*—NECYDALIS, DRYOPS, *Fab.*

Where the posterior thighs are strongly inflated in one of the sexes, where the antennæ are usually long and smaller at the extremity, and the elytra suddenly narrowed near the end ¶¶.

The fifth and last tribe of the Stenelytra, that of the RHYNCHOSTONA, is composed of Insects, some of which, such as the first, are evidently related by the ensemble of their characters to the Ædemeræ, while the others, in a natural series, appear to belong to the family of the Rhynchophora. The head is considerably prolonged anteriorly in the form of an elongated snout or flattened proboscis, bearing the

\* *Oliv.*, *Encyc. Méthod.*, article *Nothus*. See *Schænh.*, *Synon. Insect.*, I, iii, App., p. 8.

† See the family of the Rhynchophora.

‡ *Calopus serraticornis*, *Fab.*; *Oliv.*, Col. IV, 72, 1, 1.

§ *Calopus testaceus*, *Schænh.*, *Synon. Insect.*, I, iii, p. 4—11;—*Pedilus fuscus*, *Fisch.*, *Entom. Imp. Russ.*, I, iv.

¶ *Dytillus helopioides*, *Ib.*, I, v, 1;—*D. rufus*, *Ib.*, 2, and the Ædemeræ with simple thighs of *Olivier*.

¶¶ The Ædemeræ of *Olivier* with inflated posterior thighs, and subulate elytra. See *Encyc. Méthod.*, article *Ædémère*.

antennæ at its base and before the eyes, which are always entire or unemarginate. These Insects form a single genus, that of

### MYCTERUS.

Sometimes the antennæ are filiform and the snout is not widened at the end; the thorax is narrowed before in the form of a truncated cone or a trapezium; the ligula is emarginated, and the penultimate joint of the tarsi bilobate. They are found on flowers, a habit indicated by the silky prolongation of the terminal lobe of their maxillæ.

STENOSTOMA, *Lat. Charp.*—LEPTURA, *Fab.*

Where the body is narrow, and the thorax in the form of an elongated truncated cone; the elytra are flexible, narrow, elongated and contracted into a point; the antennæ are composed of long and cylindrical joints, and the maxillary palpi are terminated by an almost cylindrical joint, hardly thicker than the preceding ones\*.

MYCTERUS, *Clairv. Oliv.*—BRUCHUS, RHINOMACER, *Fab.*—MYLABRIS, *Schæff.*,

Or Mycterus properly so called, where the body is ovoid, solid, covered by a silky down, and the thorax trapeziform. The abdomen is square, long, rounded posteriorly; the antennæ are composed of joints, mostly obconical, the complete number of which seems to be twelve, the eleventh or last being abruptly narrowed and acuminated, and the maxillary palpi are terminated by a large joint in the form of a reversed triangle †.

Sometimes the antennæ are terminated by an elongated club formed by the last three to five joints; the snout is much flattened, with a salient angle on each side before the extremity; the thorax is in the form of a truncated heart, narrowed posteriorly; the ligula is entire, and so are all the joints of the tarsi.

These Insects live under the bark of trees, and in a natural order seem to approach the Anthribus of Fabricius, who has confounded them. The body is depressed, the proboscis slightly pointed before, and the tarsi are short. The palpi are thickest at the extremity.

They form the subgenus

RHINOSINUS, *Lat. Oliv.*—CURCULIO, *Lin. De G.*—ANTHRIBUS, *Fab.*

Designated by Illiger under the denomination of *Salpingus*. Some entomologists have adopted both, but restrict the latter generally to species in which the club of the antennæ is triarticulated, and apply

\* *Ædemera rostrata*, *Lat.*, *Gener. Crust. et Insect.*, II, p. 229; *Stenostoma rostratum*, *Charpent.*, *Horæ Entom.*, IX, 8; *S. variegatum*, *Ib.*, 6; *S. variaiegata*, *Germ.*, *Entom.*, *Insect. Spec. Nov.*, p. 167.

† *Lat.*, *Gener. Crust. et Insect.*, ii, p. 230, genus *Rhinomacer*. See Olivier, *Encyc. Méthod.*, article *Myctère*.

ing the former, or *Rhinosimus*, to those in which the club is composed of four or five joints\*.

## FAMILY IV.

### TRACHELIDES.

In our second general division and fourth family of Heteromerous Coleoptera, the head is triangular or cordiform, and borne on a sort of neck or pedicle, abruptly formed, beyond which, being as wide at this point as the thorax, or wider, it cannot enter the cavity of the latter. The body is most commonly soft, the elytra are flexible, without striæ, sometimes very short, and a little inclined in others. The maxillæ are never unguiculated. The joints of the tarsi are frequently entire, and the hooks of the last bifid.

Most of the perfect Insects live on different plants, devour their leaves, or suck the nectar of their flowers. Many, when seized, curve their head and fold up their feet as if they were dead; the others are very active.

We will divide this family into six tribes, forming as many genera.

In the first, or that of the *LAGRIARIE*, the body is elongated and narrower before; the thorax either almost cylindrical or square, or ovoid and truncated; the antennæ, inserted near an emargination of the eyes, are simple, filiform, or insensibly enlarged towards the end, most frequently and at least partially granose, the last joint being longer than the preceding ones in the males; the palpi are thicker at the extremity, and the last joint of those of the maxillæ is larger, and in the form of a reversed triangle; the thighs border on an oval and are clavate; the tibiæ are elongated and narrow, the two anterior, at least, arcuated; the penultimate joint of the tarsi is bilobate, and the hooks of the last are neither incised nor dentated.

The species indigenous to France are found in woods, on various plants; their body is soft, their elytra are flexible, and like the *Meloes*, the *Cantharides*, when taken, counterfeit death.

This tribe is formed of the genus

*LAGRIA*, *Fab.*—*CHRYSOMELA*, *Lin.*—*CANTHARIS*, *Geoff.*

Those species, in which the antennæ gradually enlarge, and are either wholly or partly almost granose, with the last joint ovoid or oval; in which the head projects but little before, and is prolonged and insen-

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\* See *Lat., Gener. Crust. et Insect., II, p. 231*; *Oliv., Col., and Encyc. Méthod.*; *Dej., Catalogue, &c., p. 77*, and *Gyll., Insect. Succ., I, ii, p. 640*, and *III, p. 715*.

sibly rounded behind; and where the thorax is almost cylindrical or square, compose our genus *LAGRIA* properly so called\*.

That, which I have named *STATYRA*, consists of species, similar at a first glance to the *Agræ*, of the family of the carnivorous Pentamerous Coleoptera. Here the antennæ are filiform and composed of almost cylindrical joints, the last of which is very long and tapers to a point. The head projects anteriorly, and is strongly and abruptly narrowed behind the eyes. The thorax is longitudinal, oval and truncated at both ends. The sutural extremity of the elytra terminates in a tooth or spine †.

We refer, with some hesitation, to the same tribe our genus *HEMIPLEPLUS*—Fam. Nat. du Règne Anim., p. 398—where the antennæ are filiform, almost granose, short and geniculate, with the second and third joints shorter than the following ones; where the body is linear and depressed; the head cordiform, somewhat wider posteriorly than the thorax; the eyes are entire and oval; the thorax forms a long square, slightly narrowed posteriorly; the elytra are truncated at the end, and do not cover the posterior extremity of the abdomen. The maxillary palpi are salient, and terminated by a larger and triangular joint. The legs are short. This genus does not belong to the Tetramera, as I formerly thought, but to the Heteromera. The penultimate joint of the tarsi is bilobate. I have established this division on an Insect, found in Scotland in a shop, which was sent to me by Dr. Leach.

The second tribe, that of the *PYROCHROIDES*, approaches the first in the tarsi and the anterior elongation and narrowing of the body, but it is flattened, and the thorax is almost orbicular or trapezoidal. The antennæ, at least in the males, are pectinated or plumous—*en panache*; the maxillary palpi are slightly serrated, and terminated by an elongated and almost securiform joint; the labial palpi are filiform; the abdomen is elongated, entirely covered by the elytra, and rounded at the extremity.

These Heteromera, which are found in the spring in woods, and whose larvæ live under the bark of trees, form the genus

*PYROCHROA*, Geoff. *Fab. Dej.*—*LAMPYRIS*, *Lin.*

Those species, in which the antennæ are almost as long as the body in the males, and give off long bearded filaments; where the eyes, in the same sex, are large and approximated behind; where the thorax is in the form of a truncated cone, or is trapezoidal; and, finally, where the body is proportionally narrower and more elongated as well as the legs, constitute the genus

*DENDROIDES*, *Lat.*—*POGONOCERUS*, *Fisch.* ‡

Those, in which the antennæ are simply pectinated and shorter, in

\* See Fabricius, Olivier, Latreille and Schœnherr.

† See Encyc. Méthod., article *Statyre*.

‡ I had established this genus on an Insect from Canada, which formed part of



which the eyes are remote from each other, and the thorax is almost orbicular and transversal, form the genus

*PYROCHROA*, properly so called\*.

In the third tribe, that of the MORDELLONÆ, so far as respects the form of the joints of the tarsi and of their hooks, and of that of the antennæ and palpi, we find no common and constant character. These Insects, however, are easily distinguished from other Heteromera of the same family, by the general conformation of their body, which is elevated and arcuated; the head is low, the thorax trapezoidal or semicircular, and the elytra are very short or narrowed, and terminate in a point, like the abdomen. Several of these Insects approach the Pyrochroides in their antennæ; others, by their maxillæ, the hooks of their tarsi and parasitical habits, approximate to *Nemognathus* and *Sitaris*, subgenera of the last tribe of this family; but they are removed both from the former and the latter by their extreme agility and the firm and solid nature of their teguments.

They form the genus

*MORDELLA*, *Lin.*

In some, the palpi are almost of equal thickness throughout. The antennæ of the males are strongly pectinated, or flabelliform. The extremity of the mandibles is unemarginated. The joints of the tarsi are always entire, and the hooks of the last one are dentated or bifid. The middle of the posterior margin of the thorax is always strongly prolonged backwards, and simulates a scutellum. The eyes are not emarginated. The larvæ of some of these Insects—*Ripiphori*—inhabit the nests of certain Wasps.

*RIPIPHORUS*, *Bosc. Fab.*

Their wings are extended, reaching beyond the elytra, which are the length of the abdomen; the hooks of the tarsi are bifid; the antennæ, inserted near the inner edge of the eyes, are pectinated on both sides in the males, serrated, or with but a single range of short teeth in the females. The terminal lobe of the maxillæ is very long, linear, and salient, and the ligula equally elongated and strongly bifid.

Certain naturalists have found several living specimens of the *Ripiphorus paradoxus* in the nests of the Common Wasp, which led to the opinion, that they had lived there in their larvæ state. According to an observation of M. Farines, however, communicated to Count Dejean—*Ann. des Sc. Nat.*, VIII, 244—the larva of the *R.*

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the collection of M. Bosc, that closely approximates to the *Pyrochroa flabellata*, *Fab.* M. Fischer has made the same generic section, under the denomination of *Pogonocerus*, from a second species—*thoracicus*—discovered in southern Russia. The figure of it, given by him in the *Mem. of the Nat. of Mosc.*, is reproduced in the first volume of his *Entomog. Imp. Russ.*

\* See Geoffroy, De Geer, Fabricius, Latreille, Schœnherr, &c.

*bimaculatus* lives in the root of the *Eryngium campestre*, where it also undergoes its metamorphosis\*.

MYODITES, Lat.—RIPIDIUS, Thunb.—RIPIPHORUS, Oliv. Fab. &c.

Where the wings are also extended, but the elytra very short, in the form of a truncated scale, or very obtuse at the extremity. The hooks of the tarsi are indented beneath. The antennæ are inserted on the summit of the head, and strongly pectinated in both sexes—on the two sides and forming long filaments in the males, and on the inner side only in the females. The maxillæ are but slightly prolonged. The ligula is elongated and entire†.

PELOCOTOMA, Fisch.—RIPIPHORUS, Payk. Gyll.

These Insects approach the Myodites in the serrated hooks of their tarsi; but their wings are covered by the elytra. The antennæ, inserted before the eyes, have but a single range of filaments or teeth in both sexes. The scutellum is very apparent. The maxillæ do not project, and the ligula is emarginated‡.

In the others, the wings are always covered by elytra extended almost to the extremity of the abdomen and tapering to a point. The posterior margin of the thorax is not lobate, or but very slightly so. The abdomen of the females terminates in the manner of a tail, pointed at the end. The eyes are sometimes emarginated. The maxillary palpi are terminated by a large joint, securiform, or like a reversed triangle. The extremity of the mandibles is emarginated or bifid. The antennæ, even in the males, are at most serrated. In

MORDELLA, Lin., Fab.,

Or Mordella properly so called, the antennæ are of equal thickness throughout, and somewhat serrated in the males; all the joints of the tarsi are entire, and the hooks of the last present one or two indentations beneath. The eyes are not emarginated.

M. Leon Dufour has observed in the *Mordelle à bandes* two floating salivary vessels longer than the body. The hepatic vessels have no cæcal insertion, an exceptive character in this section.

*M. aculeata*, L.; Oliv., Col., III, 64, 1, 2. Length two lines; black, glossy, immaculate, with a silky down; an ovipositor as long as the thorax, by means of which it introduces its ova into the cavities of old wood§.

\* See the Nouv. Dict. d'Hist. Nat., Ed. II, article *Ripiphore*.

† Ibid., article *Myode*.

‡ Ibid., article *Pelocotome*; Fisch., Entom. Imp. Russ., II, xxxvii, 9. Several species are found in Brazil.

§ Add the following species of Olivier: *fasciata*, *duodecim-punctata*, *octo-punctata*, *abdominalis*. See also Fisch., Entomog. Imp. Russ., II, xxxviii, fig. 3, 4. His genus *Ctenopus*—Ibid., tab. ead., fig. 1—appears to form the transition from the *Pelocotomæ* to the *Mordellæ*. The antennæ are simple; the labrum is bifid; the mandibles are strong and arcuated; the maxillary palpi are very long and almost filiform; all the joints of the tarsi are entire, and the hooks of the last are pectinated.



ANASPIS, *Geoff.*—MORDELLA, *Lin. Fab.*

Distinguished from the preceding by the antennæ, which are simple, and gradually enlarge by the emargination of the eyes, and by the four anterior tarsi, of which the penultimate joint is bilobate. The hooks of the last are entire and without sensible indentations\*.

In the fourth tribe, that of the ANTHICIDES, we find the antennæ simple or slightly serrate, filiform, or a little thicker towards the extremity, most of the joints being nearly obconical and almost similar, with the exception of the last (and sometimes also of the two preceding ones), which is somewhat larger and oval. The maxillary palpi are terminated by a securiform club; the penultimate joint of the tarsi is bilobate; the body is narrower before, and the eyes are entire or but slightly emarginated. The thorax is sometimes obovoid, narrowed and truncated posteriorly, sometimes divided into two knots, and at others semicircular. Some of these Insects are found on various plants, but the greater number live on the ground. They run with great quickness. Their larvæ are perhaps parasitical.

They will compose the genus

NOTOXUS, *Geoff.*

SCRAPTIA, *Lat.*—SERROPALPUS, *Illig.*,

Which, by the almost semicircular, transversal thorax, the filiform antennæ with almost cylindrical joints inserted in a little emargination of the eyes, are easily distinguished from all other Insects of this tribe. Their port is very analogous to that of the Mordellæ, Cistelæ, &c†.

STEROPES, *Stev.*—BLASTANUS, *Hoffm.*

Where the antennæ are terminated by three cylindrical joints much longer than the preceding ones ‡. In

NOTOXUS, *Geoff. Oliv.*—ANTHICUS, *Payk. Fab.*,

Or Notoxus properly so called, where the antennæ enlarge insensibly, and are almost entirely composed of obconical joints, and where the thorax is obovoid, narrowed, and truncated posteriorly, or divided into two globular points.

Some species, such as the *N. monoceros*; *Meloe monoceros*, *L.*; *Oliv.*, *Col.*, III, 51, 1, 2, have a projecting horn on the thorax. The body is two lines in length, of a light fulvous colour, with two points at the base of each elytron, and a transverse band curved towards the suture, black; the horn is dentated. Of

\* Fischer, *Ib.*; *Anaspis frontalis*, *tab. ead.*, f. 5;—*lateralis*, f. 6;—*thoracica*. f. 7;—*flava*, f. 8.

† *Lat.*, *Gener. Crust. et Insect.*, II, p. 195.

‡ *Steropes caspius*, *Stev. Mem. Nat. Mosc.*, I, 166, x. 9, 10; *Fisch.*, *Entomog. Imp. Russ.*, II, xii, 6; *Schœnh.*, *Synon. Insect.*, I, ii, 54.

those in which the thorax is destitute of a horn, some are apterous\*.

The two last tribes of this family, and of the section of the Heteromera present certain common characters, such as mandibles terminating in a simple point; the palpi filiform, or merely slightly thickened towards the extremity, but never ending in the securiform club; the abdomen soft; the elytra flexible, and in most of them epispartic; all the joints of the tarsi, some few excepted, entire, and their hooks generally bifid. In a perfect state they are all herbivorous, but several, in their first state, or that of larvæ, are parasitical.

The HORIALES, composing the fifth tribe, differ from those which constitute the sixth, or the CANTHARIDÆ, in their hooks, which are indented and accompanied (each) by a serrated appendage. These Insects have filiform antennæ, as long, at most, as the thorax, a small labrum, strong and salient mandibles, filiform palpi, square thorax, and very robust posterior legs, at least in one of the sexes.

The metamorphoses of the Spotted Horia, an Insect inhabiting the Antilles and South America, are described in the fourteenth volume of the "Transactions of the Linnæan Society of London;" its larva destroys that of a species of *Xylocopa*—*Teredo*; *X. morio*, Fab.—which perforates the dead trunks of trees, and deposits its ova there in the manner of other *Xylocopæ*. The author of the Memoir alluded to, suspects that the larva of this coleopterous Insect lives on the provisions destined for the other, which consequently is starved to death.

This tribe is composed of the genus

#### HORIA, *Fab.*

These Insects inhabit the intra-tropical countries of South America and of the East Indies. One of these species, from the latter, is removed from all others by its head, which is narrower than the thorax, and by its posterior thighs which are strongly inflated, a character which perhaps only belongs to one of the sexes. It is the type of my genus *Cissites* †.

The sixth and last tribe, that of the CANTHARIDÆ, is distinguished from the preceding one by the hooks of the tarsi, which are deeply cleft, and seem to be double. The head is usually large, wider, and doubled posteriorly. The thorax is commonly narrowed behind, and approaches the form of a truncated heart; in others it is almost

\* See Oliv., Col., and Encyc, Méthod; Schœnh., Ibid. The *Odocantha tripustulata* of Fabricius is a Notoxus.

† See Lat., Gener. Crust. et Insect., II, p. 211; Fabricius, Schœnher, Olivier, and the Transactions of the Linnæan Society, already quoted.

orbicular. The elytra are frequently somewhat inclined laterally, or tectiform, flattened, and rounded. These Insects simulate death when they are seized, and several, thus situated, produce a caustic yellowish liquid of a penetrating odour, from the articulations of their feet; the organs which secrete it have not yet been detected.

Various species—*Meloes*, *Mylabres*, *Cantharides*—are employed externally as epispastics, and internally as a powerful stimulant; the latter use of them, however, is extremely dangerous.

This tribe is formed of the genus

MELOE, *Lin.*,

Which has been divided into several others. The anatomical observations of M. Leon Dufour, with the highly interesting experiments of Dr. Bretonneau, of Tours, on the vesicating property of the Insects of this tribe, and of several other Coleoptera, enable us to arrange these generic sections in a natural order, which differs but little from that we have already adopted. The latter gentleman has ascertained that the *Sitaris* do not possess the property in question, and the former found but four biliary vessels in the same *Heteromera*, instead of six, which exist in the other Insects of this tribe. Independently of this, *Sitaris* resembles *Zonitis* in the whole ensemble of the organization, and these latter are contiguous to the *Cantharides*. These Insects thus occupying one of the extremities of this tribe, it is easy, by a comparative study of their other relations, to follow the series until we reach the opposite extremity—it accords with the progressive changes in the form of the antennæ.

In some, those of both sexes consist of but nine joints, the last of which is very large, and in the form of an ovoid head\*; those of the males, as well as their maxillary palpi, are very irregular. The body is depressed. Such is the

CEROCOMA, *Geoff. Schæff. Fab.*

These Insects make their appearance during the summer solstice, and frequently in great numbers in the same spot; they are found on flowers, particularly on those of the wild Chamomile, the Milfoil &c.

*C. Schæfferi*; *Meloe Schæfferi*, L.; Oliv., Col., III, 48, i, 1.

Green or bluish-green; antennæ and feet of a wax-yellow †.

In all the others, the palpi are identical and irregular in both sexes. The antennæ usually consist of eleven joints, and when there is one or two less, they always terminate regularly in a club. The body is tolerably thick, and the elytra are somewhat inclined.

In these, the antennæ, always regular and granose in both sexes, sometimes appearing to be composed of nine or ten joints ‡, and

\* All the Insects of this tribe with clavate antennæ, or such as are larger near the end, are foreign to New Holland and America.

† See Lat., *Gener. Crust. et Insect.*, II, p. 212; Olivier, Fabricius, Schœnherr, and Fischer, *Entomog. Imp. Ross.*, II, xli, 1, 2, 3, 4.

‡ The two or three last ones appear to be confounded or intimately united, at least in the females; for the articulations of the clauæ more distinct in the males.

never longer than half the body, here, terminate in an arcuated club, or are evidently larger at the extremity, and there, from the second joint, form a short, cylindrical, or almost fusiform stem.

They form the genus *Mylabris*, of Fabricius.

Those, in which the two or three last joints of the antennæ are united, at least in the females, and form an abrupt, thick, ovoid, or globuliform club, the extremity of which does not extend beyond the thorax, and in which the total number of joints in these organs is then but from nine to ten, form the subgenus

HΥCLEUS, Lat.—DICES, Dej.—MYLABRIS, Oliv.\*

Those, in which these same organs, proportionally larger, present in both sexes eleven very distinct and well separated joints, gradually enlarge, or only terminate regularly in an elongated club, and of which the eleventh or last joint, well separated from the preceding one, is larger and ovoid, constitute the

MYLABRIS, Fab. Oliv. Lat.,

Or our *Mylabris* properly so styled. The respective length of the antennæ varies slightly, and these modifications have an influence on the form of their joints, and principally the intermediate ones. These considerations appear to have induced M. Megerle—Dejean Catalogue, &c.—to form certain species into the genus *Lydus*; but two of those which he places there—*algericus*, *trimaculatus*—present to us a much less uncertain and more decided character: the inferior division of the hooks of their tarsi is pectinated, while in the other *Mylabres* it is simple.

*M. chicorii*, L.; Oliv., Col. III, 47, I. a, b, c. d, e. Length from six to seven lines; black; pilose; an almost round yellowish spot on the base of each elytron, and two transverse and indented bands of the same colour, one near their middle, and the other before their extremity; antennæ entirely and constantly black, I have occasionally found this species in the vicinity of Paris, but it is much more common in the south of France and other southern parts of Europe. Its vesicating properties are quite as active as those of the *Cantharides* of the shops. In Italy it is mixed with the latter, or even used alone. The Chinese employ the *M. pustulatus*—Oliv., Ibid., I, f. and II, 10, b †.

CENAS Lat. Oliv.—MELOE, Lin.—LYTTA, Fab.

These insects seem to form the passage from the *Mylabres* to the following *Heteromera*. Their antennæ, the length of which is hardly

\* *Mylabris impunctata*, Oliv., Encyc. Méthod.;—*M. argentata*, Fab.;—*M. lunata*, Fab.;—*M. Bilbergii*, Schœnh.

† For the other species see Encyc. Méthod., article *Mylabre*; Schœnh., Synon. Insect.; and Fischer, Entomog. Imp. Russ., II, xli, and xl, 5, 8—but these synonymes, notwithstanding the excellent Monograph of Bilberg, require a re-examination.

greater than that of the thorax, are nearly of equal thickness throughout. The first joint is almost clavate and obconical; directly after the following one which is very short, the stem is geniculate, and forms a cylindrical or fusiform body, composed of short, crowded, and, with the exception of the last, which is conoid, transversal joints\*.

In the other Heteromera of the same tribe, the antennæ are always composed of eleven very distinct joints, almost of equal thickness throughout, or smaller near the extremity, and frequently much longer than the head and thorax. They are irregular in several males.

MELOE, *Lin. Fab.*

In Meloe properly so called, the antennæ are composed of short and rounded joints, the intermediate of which are the largest, and sometimes so disposed, that these organs present in this point, in several males an emargination or crescent. The wings are wanting, and the elytra, oval or triangular, with a portion of the inner margin crossing each other, only partially cover the abdomen, particularly in the females, where it is extremely voluminous.

According to M. Leon Dufour the crop of these Insects may be considered as a true gizzard, being furnished internally with callous, and as it were anastomosing plicæ, and separated from the chylic ventricle or stomach, by a valve formed of four principal pieces, each of which results from two hollow cylinders placed back to back, and tridentated posteriorly. The stomach is formed of transverse, well marked, muscular fillets.

They crawl along the ground, or upon low plants on the leaves of which they feed. A yellowish or reddish oleaginous liquid exudes from the articulations of their legs.

In some districts of Spain, these Insects are used in place of Cantharides, or are mixed with them. They are also employed by the Farriers. They were formerly regarded as a specific in hydrophobia. I suspect—Mém, du Mus. d'Hist. Nat.—that our Meloes are the *Buprestes* of the ancients, Insects to which they attributed very noxious qualities, and which, according to them, killed the oxen that accidentally swallowed them while grazing.

*M. proscarabæus*, L.; Leach, *Lin. Trans.*, XI, vi. 6, 7. About an inch long; glossy-black, and densely punctured; sides of the head and thorax, and the antennæ and legs, verging on violet; elytra finely rugose; middle of the antennæ of the male dilated and forming a curve.

According to De Geer, the females deposit in the earth a great number of eggs in piles. The larvæ have six feet and two filaments at the posterior extremity of their body; they attach themselves to Flies, whose juices they suck. M. Kirby thinks that it is an apterous or parasitical Insect, which he calls the

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\* See *Lat. Gener. Crust. et Insect.*, II, p. 219, and I, x, 10; and the *Encyc. Méthod.*, article *Ænas*.

*Pediculus melittæ*, and I was formerly of his opinion. M. Walckenaer, in his "Mémoire pour servir à l'Histoire Naturelle des Abeilles Solitaires du genre Halicte," has brought forward all the facts relative to this subject of controversy. I also have since spoken of it in the article *Méloé* of the *Nouv. Dict. d'Hist. Naturelle*. The same insect is the type of the genus *Triongulin* of M. Léon Dufour—*Ann. des Sc. Nat.*, XIII, ix., B—already noticed in our exposé of the Parasita. But the late researches of MM. Lepeletier and Serville, who by isolating several females have obtained larvæ from their eggs exactly similar to those described by De Geer, or *Triongulins*, compel us to believe that they are those of Meloes. We know that several *Heteromera* deposit their ova in the nests of various Bees. Is it not possible that this may be the fact with respect to the Meloes, and that their larvæ live on these Bees, until the period at which these hymenoptera insure the existence of their young ones, and that also of their enemies, which then establish themselves in the provisioned cells?

*M. majalis*, Oliv. Panz.; Leach, *Ibid.*, I, 2. The antennæ regular and almost similar in both sexes; body bronze and cupreous-red mixed; head and thorax deeply punctured; elytra scabrous; cupreous and transverse bands on the abdomen. It had been considered as the *M. majalis* of Linnæus, a species which is found in Spain and Roussillon\*.

All the *Heteromera* of the following subgenera are furnished with wings, and their elytra, as usual, extend longitudinally over the abdomen.

Of these subgenera we will first describe those in which the elytra are not abruptly subulate near their posterior extremity, and where they completely cover their wings. In

TETRAONYX, *Lat.*—APALUS, *Fab.*—LYTTA, *Klüg.*,

The maxillæ, as in *Cantharis* and *Zonitis*, are not prolonged and terminated by a silky thread, and curved inferiorly. The penultimate joint of the tarsi is emarginated or almost bilobate, and the thorax forms a transverse square. These Insects are closely related to the *Cantharides*, and are peculiar to the western continent †.

CANTHARIS, *Geoff. Oliv.*—MELOE, *Lin.*—LYTTA, *Fab.*

All the joints of the tarsi entire, and the thorax almost ovoid, slightly elongated, narrowed anteriorly and truncated posteriorly, by which this subgenus is distinguished from the preceding one. The second joint of the antennæ is much shorter than the following one, and the last of the maxillary palpi is evidently larger than those

\* For the other species, see Leach, *Monog.*, cit., that of Meyer Fabricius, Olivier, &c. The *M. marginata*, *Fab.*, is a *Galeruca*.

† *Lat.*, *Zool.*, and *Anat.*, of Messrs. Humboldt and Bonpland, pl. xvi, 7;—*Apalus quadrimaculatus*, *Fab.*; *Lytta bimiculata*, *Klüg.*, *Spec. Entom. Brasil.*, XLI, 10;—*Lytta sex-guttata*, *Klüg.*;—*Lytta crassa*, *ejud.*, XLI, 12.



that precede it. The head is a little wider than the thorax. These characters distinguish it from *Zonitis*. The antennæ of the males are sometimes irregular and even semipectinated.

*C. vesicatorius*; *Meloe vesicatorius*, L.; Oliv., Col., III. 46, I, 1, a, b, c. (The Spanish Fly.) From six to ten lines in length, of a glossy-golden-green, with simple, regular, black antennæ. This insect, well known for its medical uses, has furnished M. Victor Audouin, with the subject of an excellent Memoir, published in the Ann. des Sc. Nat. IX. p. 31. pl. xlii and xliii; he there minutely describes its anatomy, the external sexual differences which had hitherto remained unnoticed, its mode of copulation, &c. Excellent figures, drawn with the greatest care by Guerin, give additional value to these interesting facts.

This Insect appears in France, near the time of the summer solstice, and is more particularly found about the Ash and Lilac, on the leaves of which it feeds; it diffuses a highly penetrating odour. The larvæ lives in the ground and gnaws the roots of plants. In the United States of America, the species called by Fabricius the *vittata*, and which abounds on the potatoe plants, is applied to the same uses as the one of which we are speaking\*,

*ZONITIS, Fab.—APALUS, Oliv.*

The antennæ, those of the males particularly, more slender than in *Cantharis*, and the length of their second joint at least equal to half that of the third. The maxillary palpi are filiform, and the last joint is almost cylindrical. The head is somewhat prolonged anteriorly, and is the width of the thorax. These Insects are found on flowers †.

The males of the two following subgenera present a truly insulated character: the terminal lobe of their maxillæ is extended into a sort of thread, more or less long, silky and curved. Such is

*NEMOGNATHUS, Lat.—ZONITIS, Fab.,*

Where the antennæ are filiform, with the second joint shorter than the fourth; the thorax is almost square, or rounded laterally ‡.

*GNATHIUM, Kirb.,*

Where the antennæ are somewhat larger towards the extremity, with their second joint almost as long as the fourth. The thorax is bell-shaped, and narrowed anteriorly §.

Finally, the last subgenus of this tribe, or

\* See Fabricius, Olivier, Schœnherr; the Entomog. Imp. Russ., of Fischer; the Spec. Entom. Bras. of Klüg, and the Insect. Spec. Nov., Germar.

† The *Zonitis* of Fabricius, those species excepted which belong to the following subgenus. See also Encyc. Méthod., article *Apale*.

‡ The *Zonitis chrysomelina, rostrata*, and *vittata*, Fab. See Lat., Gener. Crust. et Insect., II, p. 222.

§ *Gnathium Francillonii*, Kirb., Lin. Trans. XII, xxii, 6. This subgenus, from the form of the antennæ and that of the thorax, should come directly after that of *Cantharis*. The tribe should be terminated by *Sitaris* and *Zonitis*.

## SITARIS, Lat.—APALUS, Fab.,

Is remarkable for the abrupt narrowing of the posterior extremity of the elytra, which exposes a portion of the wings. Independently of this, these Insects bear a close resemblance to *Zonitis*, living in their larva state, like those of the latter subgenus, in the nests of some of the solitary Mason Bees. In *Apalus*, Fab., properly so called, the elytra are somewhat less narrowed, and the internal extremities of the joints of the antennæ are slightly dilated in the manner of little teeth\*.

The third general section of the Coleoptera, that of the TETRAMERA, consist exclusively of those in which all the tarsi are quadricarticulated †.

All these Insects live on vegetable matters. The feet of their larvæ are usually very short, and they are even wanting or are replaced by mammillæ in a great number. The perfect Insect is found on the flowers or leaves of plants.

I will divide this section into seven families. The larvæ of the first four or five most commonly live concealed in the interior of plants, and are generally destitute of feet, or have but very small ones; many attack the hard or ligneous portions of their domicile. These Coleoptera are the largest of the section.

## FAMILY I.

## RHYNCHOPHORA †.

This family is distinguished by the entire prolongation of the head, which forms a sort of snout or proboscis.

\* See Lat., Ibid. p. 221; Schœnh., Synon. Insect., I, ii, p. 341;—*Apalus bimaculatus*, Fab.

Messrs. Lepeletier and Serville, in the Encyc. Méthod., article *Sitaris*, mention a new genus, *Onyctenus*, allied to the preceding, but in which one of the divisions of the hooks of the tarsi is dentated. The *Lydus* of Megerle and Dejean, as we have already seen, presents the same character.

† If the first joint of a Pentamerous tarsus be very short, and the second acquire in length what the other has lost, the tarsus becomes Tetramerous. Hence, in this respect, some Insects become equivocal.

‡ Since the publication of the first edition of this work, Messrs. Germar and Schœnherr have especially devoted their attention to this family, and created a great number of new genera, amounting (in the work published by the latter on these Insects in 1826) to one hundred and ninety-four, exclusive of subgenera. To describe them is so much the more at variance with our plan, as it would compel us to enter into a multitude of very minute details. On this subject, therefore, we refer the reader to our article *Rhynchophora* in the Dictionnaire Classique d'Histoire Naturelle, where we have given a general view of these sections, but in a new, and, as we think, a more natural order. The following is a brief sketch of the same. The Rhynchophora, called by Schœnherr *Cucurlionites*, are divided, according as the antennæ are



The abdomen is bulky in most of them, the antennæ geniculate, and frequently clavate. The penultimate joint of the tarsi is almost always bilobate. The posterior thighs are dentated in several.

The larvæ have an oblong body, and resemble a small, very soft, white worm; their head is squamous, and they are destitute of feet, or in lieu of them there are merely small mammillæ. They gnaw various parts of plants. Several live exclusively in the interior of their fruit or seeds, and frequently do us much injury. Their chrysalides are enclosed in a shell. Many of the Rhynchophora, when very abundant within certain limits, are even very noxious in their perfect state. They tap the buds or leaves of various cultivated vegetables, useful or necessary to man, and feed on their parenchyma.

In some the labrum is apparent, the anterior elongation of their head short, broad, depressed, and in the form of a snout; the palpi are very visible and filiform, or larger at the extremity. They compose the genus

### BRUCHUS, *Lin.*,

Which are subdivided as follows:—

Those species in which the antennæ are clavate, or very evidently larger at the extremity, where the eyes are unemarginated, and where

straight or geniculate, into two great sections, the *Recticornes* or Orthocera, and the *Fracticornes* or Gonatocera. The anatomical observations of M. Leon Dufour seem to strengthen this distinction. The latter are furnished with salivary vessels, while in the former they are wanting. These form four tribes, the *Bruchelæ*, the *Anthribides*, the *Attelabides*, and the *Brentidæ*. The labrum and palpi are very visible in the two first; these palpi are filiform or larger at the extremity; they are very small and conical in the two other tribes, as in all the following Rhynchophora. The Fracticornes form a fifth tribe, that of the *Cucurlionites*. They are divided into the *Brevirostres* and *Longirostres*, thereby indicating the insertion of their antennæ. In the former, these organs, at their origin, are even with the base of the mandibles, and behind or nearer the head in the other. The genera of the *Brevirostres* are arranged in three sub-tribes, viz. the *Pachyrhyncides*, *Brachycerides*, and *Liparides*, which correspond to the genera *Curculio*, *Brachycerus*, and *Liparus* of Olivier; the last also comprises some of his *Lixi*. The relative size and form of the mentum, the mandibles, the presence or absence of wings, the direction of the lateral sulci of the proboscis, or rather of the proboscis-snout (museau-trompe), where the first joint of the antennæ is partly lodged, the length of that joint, the proportions and forms of the thorax, and other very secondary considerations, furnish the characters of these various groups. The *Cucurlionites Longirostres* are divided into two principal sections from their habits, and the composition of their antennæ. In the *Phyllophagi*, they consist of ten joints at least, and the three last, at least, form the club which terminates them. Those of the *Spermatophagi* present at most but nine joints, of which the last, or two last at most, constitute the club. The legs of the *Phyllophagi* are sometimes contiguous at their origin, and sometimes remote. Those in which they touch are divided into four tribes: the *Lixides* (*Lixus*, Fab.), the *Rhynchænidæ* (*Rhynchæus*, Oliv.), *Cionides* (*Cionus*, Clairv.), and the *Orchestides* (*Orchestes*, Illig.). The *Spermatophagi* are divided into three principal sections, or sub-tribes: the *Calandrideæ* (*Calandra*, Clairv., Fab.), the *Cossomides* (*Cossomus*, Clairv.), and the *Dryophthorides* (*Dryophthorus*, Schœnh.—*Bulbifer*, Dej.). These latter lead to the *Hylesimi*, Fab., and other *Xylophagi*.

the four anterior tarsi appear to consist of five joints, form the genus RHINOSIMUS, which, agreeably to this character, we have placed among the Heteromera, but which is allied to the following subgenus by many others.

Those which, with similar antennæ and eyes, have but four joints to all the tarsi and the penultimate bilobate, re-enter that of

ANTHRIBUS, Geoff., Fab.\*

To which may be united the *Rhinomaceres* of Olivier †. These Insects are usually found in old wood—others live on flowers. In

BRUCHUS, Fab., Oliv.—MYLABRIS, Geoff.,

Or *Bruchus* proper, the antennæ are filiform, and frequently serrated or pectinated; the eyes are emarginated.

The anus is exposed, and the posterior legs are usually very large.

The females deposit an egg in the yet diminutive and tender germ of various leguminous cerealia, of the Coffee-tree, Palms, &c., where the larva lives and is metamorphosed. To obtain an issue the perfect Insect detaches a portion of the epidermis in the form of a cap, thus producing those holes but too often found in peas, beans, dates, &c. ‡ The perfect in taken on flowers.

*B. pisa*, L.; Oliv., Col. IV, 79, 1, 6, a, d. Length two lines; black; base of the antennæ and part of the legs fulvous; elytra dotted with grey; a whitish cruciform spot on the anus.

A very noxious little Insect, that in certain seasons has occasioned much damage in North America §. The

RHÆBUS, Fisch.

Is distinguished from *Bruchus* by the flexible elytra and bifid hooks of the tarsi ¶. The

XYLOPHILUS, Bonnelli,

Is removed from it by the palpi, which are clavate ¶¶.

The others have no apparent labrum; the palpi are extremely

\* The *Macrocephala*, Oliv., Col., IV, 80; the *Anthribes*, Nos. 1—3, of Geoffroy—*Anthribus latirostris, varius, scabrosus*, Fab.

† Oliv., Col. V, 87. The *Rhino. lepturoides, atelaboides*, Fab. The penultimate joint of the tarsi is not between the lobes of the preceding one, a circumstance which distinguishes them from *Anthribus*.

‡ These habits are also common to certain small species of *Anthribus*.

I have not noticed the genus *Rhimaria* of Kirby, because I have no precise idea of its characters. In so concise a work as this, it is impossible for me to give all the generic, or subgeneric sections of M. Schœnherr, without stepping beyond my prescribed limits.

§ For the other species, see Fabricius and Olivier, *Ibid.* The *B. rufipes* of the latter, so common in the vicinity of Paris on various species of *Reseda*, forms the genus *Urodon* of Schœnherr. The antennæ terminates in three thicker joints, forming a club.

¶ *Rhæbus Gebleri*, Fisch., *Entomog. Imp. Russ.*, II, 178, xlvii, 1.

¶¶ The *Anthicus populneus, oculatus, pygmaeus*, of Gyllenhal.

small, hardly perceptible to the naked eye, and conical; the anterior prolongation of their head resembles a rostrum or proboscis.

Sometimes the antennæ are at once straight, inserted on the rostrum, and consist of nine or ten joints.

Those, in which the three or four last joints are united into a club, form the genus

*ATTELABUS*, *Lin.*, and more particularly of *Fab.*—*BECMARES*, *Geoff.*

They attack the leaves or most tender parts of plants. Most of the females roll up these leaves into a tube or cornet, in which they deposit their eggs, thus preparing a domicile for their young ones, which also furnishes them with food.

The proportions of the rostrum, the manner in which it terminates, as well as the tibiæ and form of the abdomen, have given rise to the four following subgenera: *APODERUS*, *ATTELABUS*, *RHYNCHITES*, and *APION*. The first is the most distinct. The head of these Insects is narrowed posteriorly, or presents a sort of neck, and is united to the thorax by a kind of rotula. Their snout is short, thick, and widened at the end, a character common to *Attelabus*, properly so called, but where the head, as in the two other subgenera, is received into the thorax up to the eyes. Here the snout is elongated into the form of a proboscis. In *Rhynchites*, it is somewhat widened at the end, and the abdomen is almost square.

*R. Bacchus*, *Herbst.*; *Oliv.*, *Col. V*, 81, ii, 27. Cupreous-red and pubescent; antennæ and extremity of the proboscis black.

The larva of this species lives in the rolled leaves of the Vine, from which, in certain seasons, and when unusually numerous, they sometimes completely strip the foliage. They are known in some parts of France, by the names of *Lisette*, *Béche*, &c.

The snout in *Apion* is not widened at the end, and even frequently terminates in a point. The abdomen is strongly inflated.\*

The following genera have been formed with *Rhynchophora*, very similar to the *Attelabi*, but with a narrower and more elongated body.

*RHINOTIA*, *Kirb.*—*BELUS*, *Schœnh.*,

Where the antennæ gradually enlarge without forming a club, and the body is almost linear †.

*EURHINUS*, *Kirb.*,

Where they terminate in an elongated club, of which the last joint is very long in the males ‡.

\* See *Lat.*, *Gener. Crust. et Insect.*; *Herbstein*, *Olivier*, and *Schœnherr*.

† *Kirby*, *Lin. Trans.*, XII.

‡ *Kirby*, *Ibid.*

TUBICENUS, *Dej.*—AULETES, *Schœnh.*,

Where they also terminate in a club, but it is perfoliate, and the joints are nearly of a similar length or differ but little. The abdomen also forms a long square, and not an oval, like that of Eurhinus\*.

Those, in which the antennæ are filiform, or where the last joint alone forms the club; where the proboscis, frequently longer in the males than in the females, and often differently terminated, always projects forwards; in which all the other parts of the body are usually much elongated, and the penultimate joint of the tarsi is bilobate, form the genus

BRENTUS, *Fab.*—CURCULIO, *Lin.*

These Insects are peculiar to hot climates.

In some the body is linear, and the antennæ, filiform or slightly enlarged towards the extremity, are composed of eleven joints. They constitute the genus

BRENTUS *properly so called.*

M. Steven has separated from them, under the generic name of *Arrhenodes*, those species in which the head is as if cut behind the eyes, where the snout is short and terminated by two narrow and projecting mandibles in the males. All the Brenti of North America, and the only species found in Europe—the *B. italica*—belong to this group. The latter, according to the observations communicated to me by M. Savi, Jun., professor of Zoology and Mineralogy at Pisa, is always found under the bark of trees and in the midst of certain Ants which have a similar domicil. M. de la Cordaire, who made a splendid collection of Insects in Brazil, has also informed me that he always found the Brenti under the bark of trees †.

Others, similar as to the form of their body, have but nine joints in the antennæ, the last of which forms a small club. Such are those which constitute the

ULOCERUS, *Schœnh.* ‡

In the last, or the

CYLAS, *Lat.*

The antennæ are composed of ten joints, the last of which forms an oval club. The thorax is as if divided into two knots, the posterior, or that which forms the pedicle, being the smallest. The abdomen is oval §.

Sometimes the antennæ are distinctly geniculate, the first joint

\* Schœnh., *Circul. Dispos. Méthod.*, 46; *Dej.*, *Catalogue*, &c.

† *Lat.*, *Gener. Crust. et Insect.* II, p. 244; *Oliv.*, *Ibid.*, 84; *Schœnh.*, *Curcul. Dispos. Méthod.*, p. 70.

‡ *Schœnh.*, *Ibid.*, 75.

§ *Lat.*, *Ibid.*, p. 268; *Olivier*, *Ibid.*, 84, bis. For some other genera derived from Brentis, see the *Dict. Class. d'Hist. Nat.*, article *Rhynchophores*.

being much longer than the following ones. They form the genus *CURCULIO* of Linnæus.

We will divide them into the *Brevirostres* and the *Longirostres*, according as the antennæ are inserted near the extremity of the proboscis, and even with the origin of the mandibles, or further back, either near its middle or close to its base.

The *Brevirostres* of this naturalist, according to the system of Fabricius, are divided into two genera.

#### BRACHYCERUS.,

Where all the joints of the tarsi are entire and without brush or pellet beneath. Their short and but slightly geniculate antennæ present externally but nine joints, the last of which forms the club. They are destitute of wings, and their body is very scabrous or uneven. These Insects are peculiar to the south of Europe and to Africa, live on the ground and appear very early in the spring. The women of Ethiopia use one species as a sort of amulet; they pass a string through its body and hang it round their neck\*.—"Voyage de M. Calliaud au fleuve Blanc."

#### CURCULIO.,

Where almost the whole under part of the tarsi is furnished with short and stiff hairs, forming pellets, and their penultimate joint is deeply bilobate. Their antennæ are composed of eleven joints, or even of twelve if we count the false one, which sometimes terminates them, the last of which form the club.

As this genus, although much more restricted than in the Linnean system, still comprises numerous species discovered since the time of that naturalist, various savans, Germar and Schœnherr in particular, have divided it into many others. It may be separated, from our own observations, into two principal divisions.

1. Those in which the mentum, more or less widened superiorly, and more or less orbicular, occupies all the width of the buccal cavity, and entirely or very nearly conceals the maxillæ, and where the mandibles are not very sensibly dentated, or merely present a slight sinus under the joint.

We may form a first subgenus,

#### CYCLOMUS.

Of those *Brevirostres* in which, as in the preceding ones, the tarsi are destitute of a brush, and the penultimate joint is entire or slightly emarginated, and without very distinct lobes. To it should be referred the *Cryptops*, *Deracanthus*, *Amycterus*, and *Cyclomus* of Schœnherr †.

\* Oliv., Col., 82. M. Schœnherr forms the genus *Episus* with the species called the *rostratus*. The thorax is elongated and almost linear.

† These genera seem to connect themselves with the *Myrniops* and *Rhytirhinus* of this author, and in that case the *Brachyceri* should be placed further back. See our article *Rhynchophores* in the Dict. Class. d'Hist. Nat.

The tarsi of all the others are furnished with a brush, and the penultimate joint is deeply bilobate.

Some are provided with wings.

Here the lateral sulci of the proboscis are oblique and directed inferiorly. The anterior legs differ but little in their proportions from the following ones. They form a first subgenus, that of

*CURCULIO, proper* \*.

Which comprises a great number of the genera of Messrs. Germar and Schöenherr, the characters of which are of but little importance and frequently very equivocal. At most, we can only detach those whose antennæ are proportionally longer.

Among those in which the antennæ are short, the thorax is longitudinal and forms a truncated cone, the shoulders are salient, and of which the genera *Entimus*, *Chlorima*, &c. have been formed, come certain species from South America, remarkable for their splendour and frequently for their size.

*C. imperialis*, Fab.; Oliv., Col. V, 83, i, 1. A brilliant golden-green with two black and longitudinal bands on the thorax; ranges of golden-green impressed points on the elytra, with black intervals.

*C. regalis*, L.; Oliv., Ibid. I, 8. A blue-green, with very brilliant cupreous or golden bands on the elytra. It is found in St. Domingo and Cuba.

The name of *fastuosus*, *nobilis*, &c. given to other species, indicates the magnificence of their attire.

One of those that inhabit France, which is most analogous to the preceding, is the *C. viridis*; *Chlorima viridis*, Dej.; *Curculio viridis*, Oliv., Ib., ii, 11. It is about five lines in length; the first joint of the antennæ is proportionally shorter than in the preceding species; obscure-green above; sides and inferior parts yellow; the termination of the elytra is somewhat pointed; the proboscis is carinated. Very rare in the environs of Paris.

Some others, also inhabiting the same country, arranged by Schöenherr in the genus *Polydrosus sericeus*, Gyll., *micans*, be-

\* 1. Thorax lobate anteriorly.

The genera *Entimus*, *Rhigus*, *Promecops Phædropus*, *Dereodus* (subgenus of *Hypomeces*, *Polydius*, *Entypus* of Schöenherr, and the *Brachysoma* of Dejean, but reduced to the species which he calls the *suturalis*.

2. Thorax non-lobate anteriorly.

\* Thorax sensibly longer than it is wide.

\* Proboscis shorter than the head, or at most of equal length.

The genera *Clorophanus*, *Ithycerus*, *Anæmerus*, *Hypomeces*, *Anymecus*, *Astycus*, *Lissorhinus*, *Prosthenomus*?, *Artipus*, *Sitona*, of Schöenherr.

\*\* Proboscis evidently longer than the head.

The genera *Hædropus*, *Cyphus*, *Callizonus*.

\*\* Thorax transversal, almost isometrical.

The genera *Eustales*, *Exopthalmus Diaprepes*, *Ptilopus*, *Pacnaus*, *Polydrosus*, *Metalites*. The relative length of the first joint of the antennæ also furnishes good characters, which might be employed before resorting to those drawn from the thorax. See Dict. Class. d'Hist. Nat., article *Rhynchophores*, and my Faun. Nat. du Règne Animal.



*tulæ*, &c.—although small are not less attractive by their golden or silvery-green colour. In some the mandibles of the males are narrow, pointed, and project forwards. This character is common to species foreign to Europe. The subgenus

#### LEPTOSOMUS, *Schænh.*,

Although formed of a single species—*Curculio acuminatus*, Fab. Oliv.—presents such isolated characters, that it may still be retained as a subgenus. The head is elongated posteriorly and the snout is very short. The thorax is almost cylindrical. The elytra terminate in the manner of diverging spines. The antennæ are short.

We now pass to another subgenus, that of

#### LEPTOCERUS,

Which differs from the first in the two anterior legs, which are larger than the following one, with the thick thighs, arcuated tibiæ, and the tarsi frequently dilated and ciliated. The antennæ are usually long and slender. The thorax is almost globular or triangular. The abdomen is hardly wider than the thorax.

These Insects are most abundant in Brazil, and several analogous species are found in the Isle of France, or that of Bourbon. Others inhabit Africa\*.

A fourth subgenus, that of

#### PHYLLOBIUS,

Will include other *Brevirostres* of the same division, also furnished with wings, but in which the lateral sulci of the proboscis are straight, short, and even consist of a simple fossula. To this we unite various genera of M. Schœnherr—his *Phyllobius*, *Macrorynus*, *Mylocerus*, *Cyphicerus*, *Amblirohinus* and *Phytoscapus*.

Those *Brevirostres*, in which the penultimate joint of the tarsi is bilobate, but that are apterous and almost always destitute of a scutellum, will form other subgenera, viz., *OTHIORHYNCHUS* and *OMIAS*, in which the antennal sulci are straight; and *PACHYR- HYNCHUS*, *PSALIDIUM*, *THYLACITES*, and *SZYGOPS*, in which those sulci are curved. The *Othiorhynchi* are distinguished from *Omiæ* by the auricular dilatation of the lateral and inferior portion of the proboscis, which gives the insertion to the antennæ; the *Szygops*, or *Cyclops* of Dejean, by their eyes, almost united superiorly; the *Psalidia* by their salient and arcuated or crescent-shaped mandibles. The *Thylacites* are removed from the *Pachyrhynchi* by their at-

\* The genera *Prostomus*, *Leptocerus*, *Cratopus*, *Lepropus*, *Hædromerus*, *Hybsonotus*, of Schœnherr. The *Hybsonotes* have the body proportionally narrower, and more elongated; the proboscis almost as long as the head and thorax; the antennal sulci almost straight, but oblique, and the thorax lobate anteriorly. The *Leptoceri* are distinguished from all the others, by the length of the first joint of the antennæ, the end of which when thrown back extends beyond the head; in the other genera it extends to but little, if at all beyond the eyes. The *Cratopi* are peculiar to the Isles of France, Bourbon, and some other islands of the Indian Ocean. Their thorax is trapezoidal, and their abdomen in the form of a reversed triangle. The genus *Prostomus* has, perhaps, been established on males only, their mandibles being sometimes larger than those of the females.

tenuated antennæ, as long or nearly as long as the thorax, whilst here they are thick and much shorter. The abdomen also is ventricose. To *Omiæ* \* and *Thylacites* † we unite several of the genera of Schœnherr. We may retain that of *HYPHANTUS*, closely related to *Othiorhynchus* ‡, but distinguished from it by the thorax, which, compared to the abdomen, is very large and almost globular.

Our second general division of the genus *Curculio* of Fabricius differs from the first in the narrowing of the mentum, which, not occupying the whole width of the buccal cavity, leaves the jaws exposed on each side, and in the mandibles that are evidently dentated. The club of the antennæ is frequently formed by the five or six last joints.

Some have scarcely more than two teeth in the mandibles. Their labial palpi are distinct. The club of the antennæ, which is tolerably abrupt, only commences at the eighth or ninth joint, and is not elongated and fusiform.

The body, although frequently oblong, is not of the same figure. Some are apterous, and their tarsi are destitute of pellets. Their penultimate joint is slightly bilobate.

Such is the subgenus *MYNIORS*, Schœnherr, to which may be united his *Rhytirrhinus*.

In others, also apterous, the under part of the tarsi, as in most of the Rhynchophora, is furnished with pellets, and the penultimate joint is strongly bilobate. They form the subgenus *LIPARUS*, which will also comprise various other genera of the same author §.

Those which are winged may form two other subgenera, viz, *HYPERA*, Germ.,—*Phytonomus*, *Coniatus*, Schœnh., where the tibiæ have no hook at their extremity, or but a very small one ||, and that of *HYLOBIUS*, where there is a very strong one at their inner extremity \*\*.

Among the species of the first, one is found on the Tamarisk,—*C. tamarisci*, Fab., which for beauty of colours rivals the most splendid exotics. It is the type of Schœnherr's genus *Coniatus*.

The others, whose mandibles have three or four teeth, present a mentum abruptly narrowed near its superior extremity, truncated, and with scarcely perceptible palpi. Their antennæ terminate almost gradually in an elongated fusiform club. The body has frequently a similar figure. Olivier confounded them with the *Lixi*, from which in fact they differ but little.

They will compose the subgenus *CLEONUS* ††.

The *Longirostres*, or those whose antennæ are inserted beyond the

\* The genera *Peritelus*, *Trachyphlæus*, *Episomus*, *Pholicodes*, *Ptochus*, *Stomodes*, *Sciobius*, *Cosmorhinus*, *Erennus*.

† The *Liophlæus*, *Barynotus*, *Brachyderes*, *Herpisticus*.

‡ To this genus add the genera *Tylodera* and *Elytrodon*.

§ *Molytes*, *Plinthus*, *Hypporhinus*, *Epirhynchus*, *Geophilus*.

|| Refer it to the genera *Aterpus*, *Listroderes*, *Gronops*, *Phytonomus*, *Coniatus*, of Schœnherr.

\*\* To his *Hylobii*, add also the genera *Lepyrus* and *Chrysolopus*.

†† To this genus of M. Schœnherr, add the following: *Pachycerus*, *Mecaspis*, *Rhytideres*, *Stenocorhinus*.



origin of the mandibles, and frequently near the middle of the proboscis, which is usually long, comprise, with some exceptions, the genus *Lixus*, *Rhynchænus*, and *Calandra* of Fabricius.

In the two first the antennæ present ten joints at least, but most commonly eleven or twelve, of which the three last at least form the club.

### LIXUS, *Fab.*

The *Lixi* almost resemble the *Cleoni* in their organs of manducation, as well as in the elongated fusiform club of their antennæ, the narrow and elongated figure of their body, and the armature of their tibiæ. The *L. paraplecticus*, whose larva lives in the stem of the *Phellandrium* and produces in Horses which swallow it with the plant the disease called paraplegia, is almost linear. Another species, for which a particular genus—*Rhinocillus*—has been formed on account of its having but very slightly geniculate antennæ, is reputed an odontalgic\*.

### RHYNCHÆNUS, *Fab.*

The *Rhynchæni* present no such ensemble of characters.

Sometimes the legs are contiguous at base, and there is no sternal fossula for the reception of the proboscis.

Some never leap, and their antennæ are composed of eleven or twelve joints. These are winged.

### TAMNOPHILUS.

The *tamnophili*, in which the antennæ are but slightly geniculate, short, composed of twelve joints terminated by an oval club, and placed on a short, projecting, and but slightly arcuated proboscis, where the eyes are approximated superiorly, the extremity of the abdomen is exposed, and the tibiæ are armed at the extremity with a stout hook, will form this first subgenus, which we must distinguish from that of *Rhinus* (*Rhine*), with which Olivier and myself confounded it †.

Other *Rhynchæni* are remarkable for their arcuated tibiæ, furnished with a stout hook at the end; their tarsi are long, filiform, but scantily provided with hair beneath, and the penultimate joint is but very little dilated and simply cordiform. They will compose the subgenus

### BAGOUS.

Small Insects which are found in marshes ‡.

Some others with the same habits are removed from their congeners by their tarsi, of which the penultimate joint completely encloses the last between its lobes. The last one is frequently destitute of hooks. They will be comprised in the subgenus

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\* The genera *Rhinocillus*, *Lachnæus*, *Nerthops*, *Larinus*, *Lixus*, *Pacholenus* of Schœnherr. The sexual organs of the *Lixi* presented characters to M. Dufour not observed by him in any other Coleoptera.

† The genera *Læmosaceus*, *Tamnophilus*, of the same.

‡ The genera *Bagous*, *Hydronomus*, *Lyprus*, of the same.

## BRACHYPUS.\*

In that of

## BALANINUS,

We find very singular Rhynchophora; their proboscis is at least as long as the body, and sometimes much longer. The larva of one species—*Rhynchænus nucum*, Fab.—feeds on the filbert †. That of

RHYNCHÆNUS *proper*,

Only differs from the preceding subgenera in negative characters, and from the following subgenus in the antennæ, which consist of twelve joints ‡. In

## SYBINES

We find but eleven, seven of which are anterior to the club §.

Those are deprived of wings. Such is the subgenus

MYORHINUS, *Schænh.*—*APSIS*, *Germ.*

To which we will unite the genera *Tanyrhynchus*, *Solenorhinus*, *Styphlus Trachodes*—*Comasinus*, Dej.—of Schœnherr.

We now pass to those which have but nine or ten joints in the antennæ, and possess the faculty of leaping.

CIONUS, *Clairv.*

The Cioni do not leap, and they have nine or ten joints in their antennæ. Their body is usually very short, and almost globular. Several of them, together with their larvæ, live on the Verbascum and Scrophularia ||.

Next come those in which the posterior thighs are very stout, which enables them to leap. The antennæ consist of eleven joints. The body is short and ovoido-conical.

Those whose antennæ are inserted into the proboscis, form the subgenus

ORCHESTES, *Illig.*—*SALIUS*, *Germ.* ¶

Those in which they originate between the eyes, that of

RHAMPHUS, *Clairv.* \*\*

In the last Rhynchæni of which we have to speak, the legs are remote at base, and the sternum frequently presents a cavity of more

\* The genera *Brachypus*, *Brachonyx*, *Tanysphyrus*, *Anoplus*, of Schœnherr.

† The genera *Balaninus*, *Antliarhinus*, *Erodiscus*, of the same.

‡ The genera *Heilipus*, *Orthorhinus*, *Paramecops*, *Pissodes*, *Penestes*, *Eriirhinus*, *Anthonomus*, *Euderes*, *Derelomus*, *Coryssomerus*, *Accalopistus*, *Endæus*, *Tychius*, *Sternachus*, and *Tylomus*, of the same.

§ The genera *Sybines*, *Microtogus*—a subgenus of *Tychius*, the genus *Ellescus*, Dej.—*Bradybatus* (*Rhinodes*, Dej.)

|| The genera *Cionus*, *Mecinus*, *Gymnætron*, Schœnh., in which the antennæ consist of ten joints; the genus *Nanodes* of the same, and that of *Prionævus*, Dalman, where there are nine. See Oliv., Col., V, p. 106.

¶ Oliv., *Ibid.*, p. 87.

\*\* Oliv., *Ibid.*, p. 39.

or less extent, which receives the proboscis, and even frequently the antennæ.

Those in which it does not exist may form two subgenera, viz. that of

#### AMERHINUS,

Where the body is oval or almost cylindrical and convex beneath\*; and that of

#### BARIDIUS,

Where it is depressed and rhomboidal †.

Those Rhynchæni of Fabricius, in which the sternum presents a cavity for the reception of the proboscis, have been arranged by M. Schœnherr in a great many genera, which we will reduce in the following manner.

They are either winged or apterous.

Of the former, some are almost rhomboidal, with the thorax abruptly narrowed in the manner of a tube near its anterior extremity; the abdomen is almost triangular. They are connected with the Baridii.

Here the antennæ are composed of twelve joints.

#### CAMPTORHYNCHUS—EURHINUS, *Schœnh.*

The Camptorhynchi are distinguished from all the following subgenera by their antennæ, which, from the bend, form a thick, perfoliate club ‡.

#### CENTRINUS,

Where the scutellum is distinct, and the abdomen completely covered by the elytra; the eyes are remote, and the club of the antennæ is elongated. There is frequently a tooth or horn on each side of the cavity of the pectus §.

#### ZYGOPS,

Where the eyes are very remarkable, being extremely large and closely approximated or united superiorly, as well as the generally long legs, of which the posterior at least are very remote ||.

#### CENTORHYNCHUS,

Where the scutellum is hardly apparent, and the elytra, rounded at the extremity, do not entirely cover the abdomen. The eyes are remote. The club of the antennæ is oval, and the extremity of the tibiæ is without spines ¶.

There, the antennæ have but eleven joints.

\* The genera *Amerhinus*, *Netarhinus*, *Alcides*, *Solenopus*, of Schœnherr.

† The genera *Rhinastus*, *Cholus*, *Lionychus*, *Platyonyx*, *Madarus*, *Baridius*.

‡ M. Kirby having already applied the name of Eurhinus to another genus of this family, it became necessary to change the denomination of this one.

§ See Schœnherr.

|| His genera *Zygops*, *Mecopus*, *Lechriops*.

¶ His genera *Centorhynchus*, *Mononychus*.

## HYDATICUS\*.

Others have the body ovoid, short, strongly inflated above, with the circumference of the abdomen clasped by the elytra. The thighs are canaliculate, and receive the tibiæ in their sulcus. Their eyes are large. The antennæ always consist of twelve joints.

## OROBITIS †.

Others, with an oblong, convex body, and the anterior legs usually longer, particularly in the males, with antennæ consisting of twelve joints, the eyes remote, and elytra covering the abdomen, will form the subgenus

## CRYPTORHYNCHUS ‡.

Those which are apterous, or where the wings are at least very imperfect, and the scutellum is wanting, will form another, or

TYLODE.—ULOSOMUS.—SELEROPTERUS? *Schænh.*

M. Chevrolat has discovered one species—*Rhynchænus ptinoides*, Gyll.—in the vicinity of Paris.

The remaining Longirostres have generally nine joints at most in the antennæ, and the last, or two last at most, form a club with a coriaceous epidermis and spongy extremity. They feed, at least while in the state of larvæ, on seeds or ligneous substances.

They may be united in the single genus

## CALANDRA,

Which may be divided into six subgenera.

The two first are apterous, and present, as well as the preceding and following ones, the last excepted, four joints in all the tarsi, and of which the penultimate is bilobate. The antennæ are geniculate and inserted at but a little distance from the middle of the proboscis.

In the first or

ANCHONUS, *Schænh.*,

These organs present nine joints before the club. The tenth, and perhaps two others, but intimately united with the preceding one, and but little distinct, form a short ovoid club.

In the second

\* Add his *Amalus*.

† The *Orobitis*, *Diorymerus*, *Ocladius*, *Cleogonus*, of Schœnherr.

‡ The genera *Arthosternus*, *Pinarus*, *Cratosomus*, *Macromerus*, *Cryptorhynchus* of Schœnherr. The *Gasterocerus* of Messrs. Brullé and Laporte appears to me to belong to the *Cratosomus* proper of Schœnherr, or those in which the proboscis is straight and flattened. His subgenus *Gorgus* is composed of large species, all from South America, and in the males of which the proboscis is usually armed with two teeth or horns near the insertion of the antennæ. I could not find any dentation in the mandibles, one of the characters which distinguish the *Cratosomi* from the *Cryptorhynchi*, where these organs are dentated.

ORTHOCHÆTES, *Germ.\**,

It is the eighth which forms the club, the figure and composition of which appear to be the same as in *Anelonus*.

The other four subgenera are furnished with wings.

In the three following ones the tarsi consist of but four joints, the penultimate of which is bilobate.

RHINA, *Lat.*—LIXUS, *Fab.*

The antennæ are strongly geniculate, and inserted near the middle of the straight, projecting proboscis, their eighth joint forming a highly elongated and almost cylindrical club. The anterior legs, at least in the males, are longer than the others †. In

CALANDRA, *properly so called,*

The antennæ are strongly geniculate, but inserted near the base of the proboscis; their eighth joint forms an ovoid or triangular club.

*C. granaria*; *Curculio granarius*, L., Oliv., Col. V, 83, xvi, 196. But too well known; its body is elongated and brown; thorax as long as the elytra, and punctured. Its larva, known by the name of weevil (*genre*), is the destroyer of our granaries.

*C. oryzæ*; *Curculio oryzæ*, L.; Oliv., Ib., VII, 81. Similar to the preceding, but with two fulvous spots on each elytron. It attacks rice.

*C. palmarum*; *Curculio palmarum*, L.; Oliv., Ib., II, 16. Length an inch and a half; club of the antennæ truncated; entirely black, with silky hairs at the extremity of the proboscis. It lives on the pith of the Palms of South America. The inhabitants of that country consider its larva, called the *ver-palmiste*, as a great delicacy ‡.

In the fifth subgenus, or

COSSONUS, *Clairv.,*

We observe antennæ hardly longer than the head and proboscis, with eight joints anterior to the club. They are stout, and inserted near the middle of the proboscis §.

The last or

DRYOPHORUS, *Schœnh.*—BULBIFER, *Dej.,*

With respect to the tarsi is anomalous. They consist of joints, neither of which is bilobate. The antennæ have but six joints, the last forming the club ||.

\* *Insect. Spec. Nov.*, p. 302.

† *China barbirostris*, Lat., Oliv.;—*R. scrutator*, Oliv.

‡ The genera *Sipulus* (*Acorhinus*, Dej.) *Oxyrhynchus*, *Rhynchophorus* (*Calandra*) of Schœnherr. See the article *Calandra* of Olivier.

§ The genera *Amorphocerus*, *Cassonus*, *Rhincolus*, of Schœnherr.

|| *Lixus*, *Lymexylon*, Fab.

## FAMILY II.

## XYLOPHAGI.

In our second family of tetramerous Coleoptera, we find the head terminating as usual, without any remarkable projection, in the form of a proboscis or snout. The antennæ are thicker near the extremity, or perfoliate at base, always short, and consist of less than eleven joints in a great number. The joints of the tarsi are usually entire\*, the penultimate being sometimes widened, and cordiform in others; in this case the antennæ always terminate in a club, either solid and ovoid, or trifoliate, and the palpi are small and conical.

These Insects mostly live in wood, which is perforated and channelled in various directions by their larvæ. When they happen to abound in forests, those of Pines and Firs particularly, they destroy in a few years immense numbers of trees, which are rendered useless for any purpose of art. Others do great injury to the Olive, and some again feed on Mushrooms.

We will divide this family into three sections.

1. Those in which the antennæ are composed of ten joints at most, sometimes terminating in a stout club, most commonly solid, and sometimes consisting of three elongated leaflets; and at others forming a cylindrical and perfoliate club from their base, and in which the palpi are conical. The anterior legs of the greater number are dentated and armed with a stout hook, and the tarsi, of which the penultimate joint is frequently cordiform or bilobate, are susceptible of being flexed on them.

Some have very small palpi, the body convex and rounded above, or almost ovoid, the head globular and plunged into the thorax, and the antennæ solid or trilamellate, and preceded by five joints at least.

These Xylophagi form the genus

*SCOLYTUS, Geoff.,*

Confounded by Linnæus with the Dermestes.

Sometimes the penultimate joint of the tarsi is bilobate, and there are seven or eight joints in the antennæ anterior to the club. In

*HYLURGUS, Lat.—HYLESINUS, Fab.,*

The club of the antennæ is solid, almost globular, obtuse, not at

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\* Their number in some appears to amount to five. These Insects seem to connect themselves with the Cryptophagi and other analogous Pentamera.

all or but slightly compressed, and annulated transversely; the body is almost cylindrical\*.

HYLESINUS, *Fab.*

Where the club of the antennæ is also terminated in a solid club, but slightly or not at all compressed, and annulated transversely, but tapering to a point. The body is almost ovoid †.

In the two following subgenera this club is still solid, but strongly compressed; its inferior joints form concentric curves. In

SCOLYTUS, *Geoff.*—HYLESINUS, *Fab.*—ECCOPTOGASTER, *Herbst.*  
*Gyllenh.,*

Or Scolytus properly so called, the antennæ are straight, beardless, and inserted close to the inner margin of the eyes, which are narrow, elongated, and vertical ‡.

CAMPTOCERUS, *Dej.*—HYLESINUS, *Fab.*

Where the antennæ of the males are strongly geniculate and furnished exteriorly with long hairs or threads; they are inserted at a considerable distance from the eyes, which are elliptical and oblique §.

PLOIOTRIBUS, *Lat.*—HYLESINUS, *Fab.*

The Ploiotribi are removed from all the other Insects of this family by the club of their antennæ, which is composed of three elongated leaflets ||.

Sometimes all the joints ¶ of the tarsi are entire, and the club of the antennæ, always solid and compressed, commences at the sixth or seventh joint. In

TOMICUS, *Lat.*—IPS, *De Geer.*—BOSTRICHUS, *Fab.,*

The antennæ are not susceptible of being folded under the eyes, and their club is distinctly annulated. The head is rounded above, and almost globular\*\*.

There is an emargination of the side of the thorax. The tibiæ are not striated. The tarsi, at most, are as long as the latter, with the first joint but slightly elongated. The body is cylindrical, and the eyes are elongated and somewhat emarginated ††.

\* *Lat., Gener. Crust. et Insect., II, p. 274; Gyll., Insect., Suec., IV, p. 618.*

† *Lat., Ib., p. 279.*

‡ *Lat., Ib., p. 278; Gyll., Insect. Suec., III, p. 215, and IV, p. 279.*

§ *Hylesinus æneipennis, Fab.*

|| *Lat., Ib., p. 280.*

¶ They appear to be five in number; the penultimate is very small. The two posterior legs are very remote from the preceding ones, and the body is cylindrical or linear. The antennæ are very short.

\*\* Broadly trilobate behind. According to M. Dufour their chylic ventricle, which forms two thirds of the whole length of the alimentary canal, is covered with papillæ, while that of the Bostrichi is perfectly smooth. The same naturalist has observed worms, resembling *Ascarides*, in the intestinal canal of the former, as well as in that of various other Coleoptera.

†† *Lat., Gener. Crust. et Insect., II, p. 276.*



PLATYPUS, *Herbst.*—BOSTRICHUS, *Fab.*

The antennæ, shorter than the head, fold under the eyes and terminate in a very large club without distinct annuli. The body is linear, and the head cut vertically before; the eyes are almost round and entire. The thorax is emarginated on each side to receive a portion of the anterior thighs; the two anterior tibiæ are divided on their posterior face by transverse ridges; the tarsi are long and very slender, their first joint being much elongated. The two posterior legs are placed very far back\*.

The others have large and very apparent palpi of unequal lengths. Their body is depressed and narrowed before; their antennæ sometimes consist of two joints, the last of which is very large, flattened, and almost triangular or nearly ovoid, and sometimes of ten, and are entirely perfoliate.

The labium is large; the elytra are truncated, and tarsi short, with all the joints entire. These Insects are all foreign to Europe, and compose the genus

PAUSSUS, *Lin., Fab.*

Those in which the antennæ consist of but two joints, with the last large and compressed, form the subgenus

PAUSSUS *proper.*

A species—*P. bucephalus*, Schœnh., *Synon. Insect.*, I, 3, App. VI, 2—in which the head resembles two simple eyes; where the eyes are small and but slightly prominent, and where the antennæ, hardly longer than the head, are laid on its anterior face, and terminated in an acuminate joint, constitutes the genus *Hylotorus* of Dalman—*Anal. Entom.*, p. 102 †.

Those in which the antennæ consist of ten entirely perfoliate joints form the subgenus

CERAPTERUS, *Swed. ‡*

2. A second section will comprise those Xylophagi, whose antennæ consist of but ten joints, and in which the palpi, at least those of the maxillæ, do not gradually taper to a point, but are of equal thickness throughout, or dilated at the extremity. The joints of their tarsi are always entire.

We will divide them into principal genera, according to the mode in which the antennæ terminate. The three last joints form a perfoliate club in the first, or

\* *Lat.*, *Gener. Crust. et Insect.* II, p. 277. M. Dalman has figured a species—*flavicornis?*, *Fab.*—enclosed in amber.

† See *Lat.*, *Gener. Crust. et Insect.*, III, p. 1, and Schœnherr, *Synon. Insect.* I, 3, App. vi, 1.

‡ *Lat.*, *Gener. Crust. et Insect.*, III, p. 4.



## BOSTRICHUS.

In

BOSTRICHUS, *Geoff.*—APATE, *SYNODENDRON*, *Fab.*—DERMESTES, *Lin.*,

Or Bostrichus proper, the body is more or less cylindrical, the head rounded, almost globular, and capable of being received into the thorax as far as the eyes; the thorax is more or less convex before, and forms a sort of hood; the two first joints of the tarsi, as well as the last, are elongated.

*B. capucinus*; *Dermestes cupucinus*, *L.*, *Oliv.*, *Col. IV*, 77, i, 1. Five lines in length, with red abdomen and elytra of the same colour. Very common in old wood in timber yards\*.

PSOA, *Fab.*

The Psoæ only differ from the Bostrichi in their proportionally narrower and more elongated body, with a depressed and almost square thorax. The maxillæ have but one lobe instead of two †.

CIS, *Lat.*—ANOBIUM, *Fab.*

Where the body is oval, depressed, or but little elevated, the thorax transversal, rounded, and with a recurved lateral margin, slightly dilated in the middle of the anterior edge; the last joint of the tarsi is much longer than the preceding ones. The head of the males is frequently tuberculated or furnished with horns.

These Insects inhabit the fungi of trees ‡. In

NEMOSOMA, *Desmar.*—IPS, *Oliv.*—COLYDIUM, *Helw.*,

The body is long and linear; the antennæ are hardly longer than the head; the mandibles are strong, salient, and dentated at the extremity; the anterior tibiæ are triangular and dentated exteriorly, and the tarsi slender and elongated §.

The second genus of this division, or

## MONOTOMA,

Is distinguished from the first by the solid and globuliform club—the tenth joint—of the antennæ.

The body is elongated, depressed, and frequently forms a paralleloiped; the anterior part of the head is narrowed, and projects somewhat in the manner of a triangular and obtuse snout. The palpi are very small, and, as well as the mandibles, not salient.

In some, the head is not separated from the thorax by a strangulation or sort of neck, and can be received into it.

\* For the other species, see Olivier, Fabricius, &c.

† See Fabricius and Rossi.

‡ *Lat.*, *Gener. Crust. et Insect.*, III, p. 11, and *Gyll.*, *Insect. Suec.*, III, p. 377, and IV, p. 624. I have seen but a single and badly preserved specimen of the *Sphindus Gyllenhalii*: it appeared to me that this genus differed but little from the present one.

§ *Lat.*, *Gener. Crust. et Insect.*, III, p. 12, and I, xi, 4.

SYNCHITA, *Hellw., Dej.*—LYCTUS, ELOPHORUS, *Fab.*

Where the anterior extremity of the head is transverse and without any prolongation, where the two first joints of the antennæ are almost identical, and where the thorax, much wider than it is long, is separated from the base of the elytra by an evident interval\*.

CERYLON, *Lat.*—SYNCHITA, *Hellw.*—LYCTUS, *Fab.*

Where the anterior extremity of the head projects in the manner of an obtuse triangle; the first joint of the antennæ is much larger than the second; the thorax is applied posteriorly to the base of the elytra, is wider than it is long, or almost isometrical, and without any recurvature of the margin. The body is almost oval or nearly forms a parallelepiped, and the elytra are truncated posteriorly and cover the whole top of the abdomen †.

RHYZOPHAGUS, *Herbst., Gill.*—LYCTUS, *Fab.*

Resembling the preceding in the head, the relative dimensions of the first joints of the antennæ, and the junction of the thorax with the abdomen; but the body is narrow and elongated, the thorax wider than long, with a recurved margin; the elytra are truncated posteriorly. Some authors have asserted, that by their tarsi they are heteromerous—I rather think they prove them to be pentamerous ‡.

The others,

MONOTOMA, *Herbst.*—CERYLON, *Gyll.,*

Or *Monotoma* properly so called, have a head of the same width as the thorax, and separated from it by a strangulation.

The two first joints of the antennæ are stouter than the following ones, and almost equal—the first a little larger. The superior extremity of the club, or button, seems to present vestiges of one or two joints. The head is triangular, and somewhat extended into an obtuse snout. The body is elongated, and the thorax longer than it is wide §.

3. The *Xylophagi* of the third division have eleven very distinct joints in the antennæ; their palpi are filiform, or thicker at the extremity in some, and smaller in others; all the joints of the tarsi are entire.

We will begin with those in which the club of the antennæ consists of but two joints. They form the genus

## LYCTUS.

In some, the mandibles and first joint of the antennæ are com-

\* *Cerylon terebrans*, *Lat.*; *C. juglandis*, *Gyll.*; *Lyctus juglandis*, *Fab.*; *Elophorus humeralis*, *EjUSD.*

† *Cerylon histeroides*, *Lat.*, *Gyllenball.*

‡ See *Gyll., Insect. Suec.*, I, iii, p. 419.

§ *Cerylon picipes*, *Gyllenball.*

pletely exposed. The body is narrow, elongated, and almost linear; the eyes are large and the thorax is elongated.

LYCTUS, *Fab.*\*

In *Lyctus* proper, the margin of the head covers the whole or greater part of the first joint of the antennæ. The mandibles are not salient. In

DIODESMA, *Meg., Dej.*,

The antennæ are as long as the thorax, the body is a convex oblong oval, the thorax is almost semiorbicular, and the abdomen nearly oval †.

BITOMA, *Herbst., Gyll.*—LYCTUS, *Fab.*

Where the antennæ are shorter than the thorax; the body is long, narrow, depressed, and almost a parallelopiped; the thorax is square ‡.

In the other *Xylophagi* with antennæ composed of eleven joints, the three or four last form the club, or the last is alone larger than the preceding ones. They are subdivided thus:

Sometimes the mandibles are covered or project but little, as in

MYCETOPHAGUS, *Fab.*

Here the antennæ, hardly longer than the head, are inserted under the projecting margin of the head, and terminated abruptly by a tri-articulated, perfoliate club.

COLYDIUM, *Fab.*

Their body is linear, and the head very obtuse before; the thorax is as wide as the abdomen, and forms a square more or less long; the abdomen is elongated. The two first joints of the antennæ are larger than the following ones, which, to the eighth inclusively, are very short and transversal §.

There the antennæ are at least as long as the thorax.

The body is oval, the thorax transversal and widest posteriorly; the first and last joints of the tarsi are elongated, and the antennæ terminate in a perfoliate club, either oval or commencing near the sixth or seventh joint, or abrupt, somewhat oval and formed of the three last.

They live in mushrooms or under the bark of trees.

MYCETOPHAGUS, *Fab.*—TRITOMA, *Geoff.*

In *Mycetophagus* proper, the club of the antennæ commences at the sixth or seventh joint; the the last is almost ovoid ||.

\* See Lat., and Gyllenhal. The genus *Lyctus* of Fabricius is a mixture.

† *Diodesma subterranea*, Dej., Catal., p. 67.

‡ See Lat., Gyllenhal.

§ See Lat., Fab., Dej.

|| See Lat., Gener. Crust. et Insect., III, p. 9, first division of the *Mycetophagi*; and Gyll., Insect, Succ., I, iii, 387, and IV. 630.

TRIPHYLLUS *Meg. Dej.*—MYCETOPHAGUS, *Gyll.*

Where the club of the antennæ is shorter, abrupt, and formed by the three last joints only; the last one is almost globular\*.

Those who have an oblong body and the thorax narrower than the abdomen, at least posteriorly; the first joint of the tarsi is the length of the following one, or hardly longer, and the antennæ are terminated by a narrow elongated club, but slightly or not at all perfoliate, formed by the three last joints. The

MERYX, *Lat.*,

Is distinguished from the following subgenera by the maxillary palpi—always salient—which are terminated by a larger joint in the form of a reversed triangle †.

DASYCERUS, *Brong.*

Although the tarsi of the Dasyceri present but three joints, they are connected with this family by other affinities. The two first joints of their antennæ are globular, the following ones very small, capillary and pilose, and the three last also pilose and globular. The head is triangular and distinct from the thorax. The maxillary palpi are salient, small, and subulate. The thorax and the elytra are sulcated. The abdomen is almost globular ‡.

LATRIDIDIUS, *Herbst.*—TENEBRIO, *Lin.*—DERMESTES, *Fab.*

Where the palpi are very short and subulate; the head and thorax are narrower than the abdomen; the first joint of the antennæ is very stout and globular, and the following ones, to the tenth inclusively, are almost conical, glabrous, or simply pubescent; the last is larger than the preceding ones, and ovoid. The thorax is wider than it is long, or almost isometrical, and the abdomen square, or almost oval §.

SILVANUS, *Lat. Gyll.*—DERMESTES, *Fab.*

Where the body is nearly linear or almost forms a parallelopiped; the thorax, longer than it is broad, is as wide as the anterior part of the abdomen; the first joints of the antennæ are nearly equal, almost turbiniform, and the last is nearly globular; the palpi are almost filiform, and the anterior extremity of the head is somewhat elongated into a sort of triangular and obtuse snout ||.

Sometimes the mandibles are entirely exposed, salient and robust. The body is generally elongated, narrow, and depressed. These Insects form the genus

\* See *Lat. Gener. Crust. et Insect.*, III., second division; *Dej.*, *Mycetophagi*, and *Gyllen.*, *Ibid.*, IV, 631.

† *Lat.*, *Gener. Crust. et Insect.*, III, p. 17, and I, xi. 1.

‡ See *Dumeril, Dict. des Sc. Nat.*, where this Insect is well figured and *Arrh.*, *Faun. Insect. Eur.*, IV, 5.

§ See *Lat.*, *Ibid.*, and *Gyllen.*, *Insect. Succ.*, I, iv. 123.

|| See *Lat. and Gyllen.*, *op. cit.*

TROGOSITA, *Oliv. Fab.*—PLATYCERUS, *Geoff.*

In some, the antennæ are shorter than the thorax, or at most of an equal length, and terminated by a compressed and somewhat serrated club, formed by the three or four last joints. The ligula is entire.

TROGOSITA, *Fab.*

In *Trogosita* proper, the mandibles are shorter than the head, and crossed; the ligula, almost square, is not prolonged between the palpi, and the maxillæ have but a single lobe.

*T. mauritanicus*; *Tenebrio mauritanicus*, L.; *Oliv.*, Col. II, 19, i, 2. About four lines in length; blackish above; light brown beneath; elytra striate. Found in nuts, bread, and under the bark of trees. Its larva known in Provence by the name of *Cadella*; attacks grain\*.

PROSTOMIS, *Lat.*—MEGAGNATHUS, *Meg.*—TROGOSITA, *Fab.*

Where the mandibles are longer than the head, and project parallel to each other; the ligula is narrow, elongated and extended between the palpi, and there are two lobes to the maxillæ. The body is long, narrow and almost linear †.

The antennæ of the others are as long as the body, and of equal thickness, as far as the tenth joint inclusively; the following and last one is larger, in the form of a reversed triangle, and obliquely truncated at the end. The ligula is bifid. They form the

PASSANDRA *Dalm. Schænh.* †

## FAMILY III.

## PLATYSOMA.

Our third family of the Tetramera approaches the second, so far as relates to the internal anatomy, the tarsi, and habits; but the antennæ are of equal thickness throughout, or more slender towards the extremity. The mandibles are always salient, the ligula is bifid or emarginated, the palpi are short, the body is depressed and elongated, and the thorax almost square. These Insects are found under the bark of trees, and may be reduced to a single genus, the

\* For the other species, see *Oliv.*, *Ibid.*

† *Trogosita mandibularis*, *Fab.* *Sturm* in his *Faun. Insect. Germ.*, has figured it well, and the parts of the mouth also.

‡ *Schænh.*, *Synon. Insect.*, I, 3, App., p. 146, vi, 3. These Insects evidently form the passage from this family to the following one. They even only differ from the *Platysoma* in their antennæ.

For some other genera of the Tetramera, such as *Litophilus*, *Agathidium*, and *Clypeaster*, see the family of the Clavipalpi.

CUCUJUS, *Fab.*

We distinguish

CUCUJUS, properly so called,

Where the antennæ, much shorter than the body in several, are composed of obconical or turbiniform and almost granose joints, the first of which is shorter than the head\*.

DENDROPHAGUS, *Gyll.*—CUCUJUS, *Fab. Payk.*

Where those organs are generally formed of elongated and cylindrical joints, the first of which is longer than the head, and the second and third are shorter than the following ones. The labial palpi terminate in a club †.

ELEOIOTA, *Lat.*—BRONTES, *Fab.*

Where the antennæ are analogous, but where the third joint is as long as the following one, and all the palpi are smaller at the extremity. The mandibles of the species most common in France, the *flavipes*, and on which M. Dufour has made some anatomical observations, are furnished, in the males, with a long and acute prolongation resembling a horn ‡.

## FAMILY IV.

## LONGICORNES.

Here the under part of the three first joints of the tarsi is furnished with a brush; the second and third are cordiform; the fourth is deeply bilobate, and there is a little nodule resembling a joint § at the base of the last. The ligula, placed on a short and transversal mentum, is usually membranous, cordiform, emarginated, or bifid, corneous, and forming the segment of a very short and transversal circle in others ||. The antennæ are filiform or cetaceous, most commonly as long as the body at least; they are sometimes simple in both sexes, and sometimes serrated, pectinated or flabelliform in the males. The eyes\* of a great many are reniform and surround them at base. The thorax is trapezoidal or narrowed before, in

\* The Cucuji *clavipes*, *depressus*, *rufus*, *bimaculatus*, *piceus*, *testaceus*, *ater*, Oliv. Col., IV. No. 74, bis. See also Gyllenh., Insect. Succ.

† Gyllenh. Ibid.

‡ Lat. Gener. Crust. et Insect., III., p. 25. See also Fabricius and Gyllenhall, Ibid.

§ The Parandæ, in this respect, perfectly resemble the Longicornes, and if this little nodule be considered as a true joint, not only this family, but the following one likewise, would belong to the section of the Pentamera. It may in fact represent the fourth joint of the latter, but as it has no peculiar motion, it is understood as forming part of the next.

|| *Parandra*.

those where the eyes are rounded and entire, or but slightly emarginated; even in this case the legs are long and slender, and the tarsi elongated.

M. Leon Dufour remarks, that in their alimentary canal, as well as in the disposition of their hepatic vessels, these Insects bear a general resemblance to the *Melasoma*; contrary to the opinion of M. Marcel de Serres, he denies the existence of a gizzard. The alimentary canal, most commonly covered with papillæ, is preceded by a crop, but less or slightly marked in the *Lamiæ* and *Lepturæ*, which, according to our system, terminate this family. The testes are formed by distinct, pediculated, and tolerably large spermatic capsules or sacs, which vary in number according to the genus.

As almost all their larvæ live in the interior of trees, or under their bark, they are destitute of feet, or have but very small ones. Their body is soft, whitish, thickest anteriorly, and the head squamous and provided with stout mandibles, but without any other projecting part. They do much injury to trees, the large ones particularly, perforating them very deeply, or boring holes in them in every direction.\* Some of them attack the roots of plants. The abdomen of the females is terminated by a tubular and horny ovipositor. These Insects produce a small sharp sound by the rubbing of the pedicle of the base of their abdomen against the interior of the parietes of the thorax.

In the system of Linnæus, these Insects form three genera, *Cerambyx*, *Leptura* and *Necydalis*, which Geoffrey, Fabricius, and other naturalists have endeavoured to regulate and simplify by the transposition of species, or by establishing other generic sections. If we consider the number of species that have been discovered since the time of the Pliny of the North, the insufficiency of the characters which designate these genera, and the confusion which still exists in several of them, it will be plain that a general and elaborate revision has become necessary. Let us hope that the researches of Messrs. Lapeletier and Serville, who have paid particular attention to this family, will remove these difficulties.

We will, in the first place, divide the *Longicornes* into two sections.

In those of the first, the eyes are either strongly emarginated or lunate, or elongated and narrow; the head is plunged into the thorax, as far as those organs, without being distinguished from it by

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\* See the Nat. Hist. of the *Lamia amputator*, by M. Langsd. Quilling, Linn. Trans. XIII.



an abrupt contraction of its diameter, forming a kind of neck; in several it is vertical.

In some, the last joint of the palpi is sometimes almost in the form of a cone or reversed triangle, and sometimes nearly cylindrical and truncated at the extremity. The lobe terminating the maxillæ is straight, and not curved on the inner one at its end. The head usually projects, or is simply inclined, and in those, where, by a very rare exception—the *Dorcaceri*—it is vertical, its width is nearly equal to that of the body, and the antennæ are very remote at base, and spinous. The thorax, frequently unequal or square, is rarely cylindrical.

These Longicornes are subdivided into two principal sections or small tribes.

I. The PRIONI, characterized as follows: the labrum null, or very small and indistinct; the mandibles stout, or even very large, particularly in most of the males; the internal lobe of the maxillæ null, or very small; the antennæ inserted near the base of the mandibles or the emargination of the eyes, but not surrounded by the latter at base; the thorax most frequently trapezoidal or square, crenated or dentated laterally.

The first genus, or

PARANDRA, *Lat.*—ATTELABUS, *De Geer*,—TENEBRIO, *Fab.*, Where, as in the following, the antennæ are simple, almost granose, compressed, of equal thickness throughout, and as long as the thorax at most, and the terminal lobe of the maxillæ is very small, scarcely reaching to the extremity of the first joint of the palpi, is distinguished from that genus\*, as well as from all others of the same family, by its corneous ligula, which is in the form of the segment of a very short transversal circle, without emargination or lobes, and by its tarsi, the penultimate joint of which is slightly bilobate, and the last, much longer than the preceding ones taken together, presents between its hooks a little appendage with two terminal setæ. The body is a paralleliped, and depressed, and the thorax square, rounded at the posterior angles, and without spines or teeth.

These Insects are peculiar to America †.

SPONDYLIS, *Fab.*—ATTELABUS, *Lin.*—CERAMBYX, *De Geer*.

The Spondyles, which approximate to the Parandræ in their antennæ and the exiguity of their maxillary lobes, are removed from them by their ligula; the latter, as in all the following Longicornes, is membranous and cordiform. They also differ in the tarsi; the penultimate joint is deeply bilobate, and the last is not longer than the

\* The mandibles of the Spondyles and Parandræ are, at most, as long as the head, triangular or conical and arcuated at the end.

† See *Lat., Gener. Crust. et Insect., III, 28, and I, ix, 7; Schœnh., Synon. sect., I, iii, p. 334, and App., p. 145, and Encyc. Méthod., article Parandre.*



preceding ones taken together, and is without an appendage bearing two setæ between the hooks. The Spondyles are also distinguished from the following genera by their almost globular thorax, the margin of which is neither recurved nor furnished with teeth or spines.

Their larvæ live in the interior of the European Pines and Firs.

*S. buprestoides*; *Attelabus buprestoides*, L.; Oliv. Col. IV, 71, i, l. From six to seven lines in length; black; densely punctured, with two elevated and longitudinal lines on each elytron. These lines are sometimes obliterated, and the individuals in which this occurs are considered by some entomologists as forming a separate species—the *elongatum*. No others are known\*.

In the third and last genus of this tribe, or

PRIONUS, *Geoff. Fab. Oliv.*,

The antennæ are longer than the head and thorax, serrated or pectinated in some; simple, attenuated near the extremity, and with elongated joints in others. The terminal lobe of the maxillæ is at least as long as the two first joints of the palpi. The body is generally depressed, and the thorax square or trapezoidal, and either dentated or spinous, or angular laterally.

These Insects only fly towards evening or at night, and always remain on trees. Certain species, foreign to Europe, are remarkable for their great size, and that of their mandibles. The larva of the *P. cervicornis*, which lives in the wood of the Gossampinus, is eaten.

This genus comprises a considerable number of species, which, from the difference in the form and size of their mandibles, antennæ, thorax and abdomen, might constitute several small groups or subgenera.

We might, in the first place, separate those species in which the body is straight, elongated, or forms a parallelopiped; the thorax is much shorter than the abdomen, square or trapezoidal, and strongly arcuated laterally; the scutellum is small or moderate; the antennæ are simple or but slightly serrated, and the mandibles frequently large in the males.

Among the species of this division, with mandibles shorter than the head, the antennæ almost setaceous, tolerably long, and composed of eleven joints, the third of which is much longer than the following ones, we find the

*P. scabricornis*, Fab. Oliv., Col. IV. 66, XI, 42. Length an inch and a half; antennæ bristled with small spines; a single tooth on each side of the thorax formed by its posterior angles†.

Other species, generally less oblong and slightly inclined before, in which the mandibles are always moderate, or project but little in both sexes, with the thorax strongly dentated laterally; where the

\* See Fab., Oliv., Lat., Gyll., &c., &c.

† The *Prioni giganteus*, *cervicornis*, *danicornis*, *maxillosus*, *barbatus*, *faber*, *serripes*, &c., of Fabricius and Olivier.

antennæ are pectinated or strongly serrated in the males, and composed of more than eleven joints in several of these individuals; and where the elytra are as long as the abdomen, and cover it superiorly, as well as the wings, would form a second general division.

*P. coriarius*; *Cerambyx coriarius*, L.; Oliv., Ib. I, 1. Length, fifteen lines; blackish-brown; the antennæ serrated and composed of twelve joints in the male; three teeth on each lateral margin of the thorax. The larva lives in the decayed trunks of Oak and Birch trees. When about to undergo its metamorphosis it enters the earth\*.

It appears to me that other Prionii, peculiar to Brazil, of an analogous form, but with small triangular elytra which do not entirely cover the abdomen—Fam. Nat. du Règne Anim.—should form a distinct genus—ANACOLUS. Messrs. Lepeletier and Serville have described two species—*sanguineus*, *lugubris*—in the Encyclopédie Méthodique.

Finally, others with various and metallic colours in several have a shorter, wider, and almost oval body; the head is frequently prolonged posteriorly behind the eyes; the antennæ are simple and compressed; the mandibles short; the thorax is wide, dilated, arcuated, and unidentented laterally, and obliquely truncated or emarginated at the posterior angles; the abdomen is nearly square, about one-half longer than it is wide. The scutellum is usually large. The ligula is proportionally more elongated †.

2. The CERAMBYCINI have a very apparent labrum extending across the whole width of the anterior extremity of the head; their two maxillary lobes are very distinct and salient; their mandibles of an ordinary size, and similar or but little different in both sexes; their eyes always emarginated and surrounding, at least partially, the base of the antennæ, which are usually as long as the body, or longer; the thighs, or the four anterior ones at least, are commonly in the form of an ovoid or oval club, narrowed into a pedicle at base.

In the first place we have those in which the last joint of the palpi is always manifestly thicker than the preceding ones, and in the form of a reversed triangle, or obconical; where the head is not sensibly narrowed and prolonged anteriorly in the manner of a snout; where the thorax is not widened from before posteriorly, and does not present the figure of a trapezium or truncated cone; and where the elytra are neither very short and squamiform, nor abruptly narrowed a little beyond their base, and subulate at the extremity. The species

\* The *P. brevicornis*, *imbricornis*, *depsarius*, &c.

† The *P. nitidus*, *lineatus*, *Thomæ*, *bifasciatus*, *canaliculatus*, &c., Fab.

The *P. Spencii*, Kirby, Lin. Trans. XII, xxii, 13, appears to belong to the same division, or to form a separate one. See Lat., Gener. Crust. et Insect. I, ii, p. 30, et seq.; and Encyc. Méthod., article *Prione*.

of this subdivision might be designated by the title of *regular* Cerambyci, in contradistinction to those of the following one, which, in many respects, are anomalous, and the last of which seem to be connected with those of the tribe that follows it. They compose the genera *Cerambyx*, *Clytus*, *Callidium* of Fabricius, and some of his *Stenocori*, a different genus from that similarly and previously so named by Geoffroy. They form the genus *Cerambyx* of Linnæus, to which we must also add some of his *Lepturæ*.

Modern entomologists have augmented the number of these generic sections, but their characters are so little distinct, and so much blended, that these genera may all be united in one, or in

#### CERAMBYX,

A number of species, all from South America, proportionally shorter and wider than the following ones, with the antennæ frequently pectinated, serrated, or spinous, are remarkable for the extent of their thorax, the length of which is almost equal to that of the elytra; sometimes glabrous, it is almost semi-orbicular, and nearly unidentate at the posterior angles; at others it is very uneven and tuberculous. Their præsternum is either carinated or terminated in a point, or plane, truncated, entire or emarginated at its posterior extremity, which is laid on an anterior projection of the mesosternum. Their anterior legs, at least, are remote at base. The scutellum is large in several; the tarsi are short and dilated.

Those of this division, in which the thorax, almost semi-orbicular and always very large, is smooth or simply granulous, with a single tooth on each side, at the posterior angles, in which the posterior extremity of the præsternum is plane and truncated, either unemarginated, or marginated and laid on the mesosternum; where the scutellum is always very large, and the legs are very remote, form two subgenera.

#### LISSONOTUS, *Dalm.*—CERAMBYX, *Fab.*

Where the antennæ are long, strongly compressed, and serrated or pectinated, and where the posterior extremity of the præsternum offers no emargination\*,

#### MEGADERUS, *Dej.*—CALLIDIUM, *Fab.*

Where the antennæ are simple, and shorter than the body, and the posterior extremity of the præsternum is emarginated, and receives, in that emargination the opposite end of the mesosternum, so that they are intimately united or seem to form but one plane †.

Those in which the thorax is very uneven, tuberculous, or pluridentate, with the præsternum carinated or terminated posteriorly in a point, have been arranged in four subgenera.

\* See Schœnh., *Synon. Insect.*; Dalman, *Anal. Entom.*; and Germar, *Insect. Spec. Nov.*

† *Callidium stigma*, *Fab.*; *Dej., Catal.*, p. 106.

Here the antennæ are long, setaceous and simple, or at most slightly spinous or furnished with fasciculi of hairs.

The thorax is always large, very uneven, and hardly wider than it is long.

DORCACERUS, *Dej.*—*CERAMBYX*, *Oliv.*

The species of this subgenus are distinguished from all the others by their large vertical head, which is almost as wide as the thorax taken in its greatest transversal diameter; plane and densely pilose before. The antennæ are very remote. The præsternum is not raised into a carina, and terminates simply in a point. The scutellum is small\*.

TRACHYDERES, *Dalm.*—*CERAMBYX*, *Fab.*

Where the thorax is large, much wider than the head, and the posterior (and frequently the opposite) extremity of the præsternum is raised into a carina; where the scutellum is elongated, the elytra are widest at base, and become narrower as they progress towards the extremity; and where the antennæ are not furnished with fasciculi of hairs †.

LOPHONOCERUS, *Lat.*

Where the head is also narrower than the thorax, and the posterior extremity of the præsternum is carinated; but this thorax, as well as the scutellum, is proportionally smaller. The elytra are widened towards their extremity, or at least do not become narrower; the third joint of the antennæ, and the three following ones are furnished with fasciculi of hairs ‡.

There, the antennæ are shorter than the body, and pectinated or serrated. The thorax is transversal and dentated laterally. The elytra are widened posteriorly.

CTENODES, *Oliv.*, *Klüg.* §

Now the thorax, either almost square or cylindrical, or orbicular or nearly globular, is much shorter than the elytra, at least in those in which it is extended in width, and the præsternum presents neither carina nor pointed prolongation at its posterior extremity. The scutellum is always small, and the legs are approximated at base.

A single subgenus,

PHENICOCERUS, *Lat.*,

Is removed from the following ones by the form of the antennæ of the male, the joints of which, commencing with the third, are prolonged into long and narrow laminæ forming a large fascis or fan.

\* *Cerambyx barbatus*, *Oliv.*; *Dej.*; *Catal.*, p. 105.

† *Schœnherr*, *Synon. Insect.*, I. 3, p. 364.

‡ *Cerambyx barbicornes*, *Oliv.*;—*Trachyderes hirticornis*, *Schœnh.*;—*Cerambyx hirticornis*, *Kirby*.

§ *Oliv.*, *Col.*, VI, 59, bis, I, 1; *Schœnh.*, *Synon. Insect.* I, 3, p. 346;—The *Ctenodes zonata*, *minuta*, *geniculata*, *Klüg.*, *Entom. Bras.*, XLII, 1, 2, 3. As the only knowledge I have of these Insects is through drawings, I merely place them here from analogy.

But a single species is yet known—*P. Dejeanii*—and that is peculiar to Brazil.

In the others, the antennæ, at most, are spinous, or slightly serrated.

Several, which are very remarkable for their colours, and the agreeable odour they diffuse, present an anomaly with respect to the relative proportions of their palpi: the maxillary palpi are smaller than the labials, and even shorter than the terminal lobe of the maxillæ which frequently projects. Their body is depressed, and the anterior part of the head narrowed and pointed; the posterior tibiæ are often strongly compressed.

They compose the subgenus

CALLICHROMA, Lat.—CERAMBYX, Fab., Dej.

Among the species with simple, setaceous antennæ, and a dilated thorax, spinous and tuberculated on the middle of its side, and in which the posterior thighs are elongated, and their tibiæ strongly compressed: there is one in France, found on the Willow, that diffuses a strong odour of roses.

*C. moschatus*; *Cerambyx moschatus*, L.; Oliv., Col. IV, 67, xvii, 7. It is about an inch long, entirely green, or of a deep blue, and somewhat gilded in certain individuals.

*C. ambrosiacus*, Stev., Charpent. Very similar to the preceding, but the thorax is entirely, or only on the sides, of a blood-red. It is found in the south of Europe, in the Crimea, &c.

South America and the tropical countries of the eastern continent produce several others\*.

Other Longicornes of the same division, but in which the maxillary palpi, as usual, are at least as long as the labials, and extend beyond the extremity of the maxillæ, are distinguished from the following ones by their antennæ, which distinctly present twelve joints instead of eleven, at least in the males; they are always long and setaceous, and frequently spinous or bearded. The thorax is dentated or spinous on the sides. We will unite them in the subgenus

\* The *Cerambyx virens*, *albicans*, *nitens*, *micans*, *ater*, *festivus*, *vittatus*, *sericeus*, *elegans*, *suturalis*, *latipes*, *regius*, *albicornis*, &c., Fab.

Certain African species, such as the *Cerambyx longicornis*, *flavicornis*, and *claviger*, of Schœuberr, which, though very analogous at a first glance to the preceding, appear to form a separate subgenus by their compressed antennæ dilated near the end; but the mouth of the *Cerambyx sex-punctatus* of this same naturalist—*Saperda 6-punctata*, Fab.—which, from its analogy to the *Cerambyx clavicornis*—*Sap. clavicornis*, Fab.—of the same, appears to be congeneric, in the proportions of its palpi, resembles a *Cerambyx*, properly so called.

The *Saperda hirsuticornis*, Fab.—Kirby, Lin. Trans., XII, p. 442—is a *Callichroma* by its mouth, it is true, but differs from it in the antennæ and the form of the body.

ACANTHOPTERA, *Lat.*—*CALLICHROMA*, *PURPURICENUS*, *STENOCORUS*,  
*Dej., Dalm.*

Certain species of America, in which the thorax is almost square, or nearly cylindrical, and the elytra are most frequently terminated by one or two spines, form the *Stenocorus* of Dalman\*.

Others, but generally peculiar to the western countries of the eastern continent, in which the body is tolerably elevated, the thorax almost globular, and the antennæ are simple and without fasciculi of hairs, constitute the *Purpuricenus* of Ziegler and Dejean †.

Another species with a depressed body, and in which the third joint of the antennæ, and the three following ones are terminated by a little bundle of hairs, approaches the *Callichromæ*, with which we formerly arranged it, in its general form and the musky odour it diffuses. It is the *A. alpina*; *Cerambyx alpinus* L.; Oliv., *Ib.*, 67, IX, 58; cinereous-blue; six blackish spots disposed longitudinally on each elytron, the two middle ones united and forming a band; a spot of the same colour on the anterior part of the thorax; superior part of the joints of the antennæ also black. Common in the Alps; it is sometimes taken in the timber yards at Paris.

The following *Cerambycini* have but eleven joints in the antennæ.

In some, at least in the males, the antennæ are long and setaceous, the last joint of the palpi is obconical, the thorax is either almost square, and slightly dilated in the middle, or oblong and nearly cylindrical—it is frequently rugose and tuberculated on the sides. They compose the subgenus

*CERAMBYX, proper.*—*CERAMBYX, Lin., Fab.*

Certain species, with an unequal or rough thorax, usually spinous or tuberculated and dilated on the middle of its sides, with the third, fourth, and fifth joints of the antennæ, evidently thicker than the following ones, thickened and rounded at the end; and the latter abruptly longer and thinner, almost cylindrical, forming, with the preceding ones, an abrupt transition, have been generically distinguished by the name of *Hamaticerus*. The antennæ are much longer in the males than in the females.

*C. heros*, Fab.; Oliv., *Ib.*, I, 1. Length one inch and a half; black; extremity of the elytra brown, and prolonged into a small tooth at the suture; thorax extremely rugose and with a pointed or spiniform tubercle on each side; antennæ simple, Common

\* *Insect., Spec., Nov.*, p. 511, et seq.

† The *Cerambyx Kahleri, Desfontainii*, Fab.;—*C. budensis*, Goeze. The *C. rinculatus* of M. Germar, which he refers to the *Purpuriceni*, is a *Callichroma*. M. Sahlberg, professor of Nat. History, has described and figured this last Insect under the name of *Cerambyx zonatus*, in a work entitled *Periculi Entomographici, Species Insectorum nondum descriptas proposituri fasciculus*, with four plates. He then figures various *Cucurionites* forming new genera, according to the system of M. Schœnherr. The descriptions are modelled on those of M. Gyllenhal, and are very complete.



in all the warm and temperate parts of Europe. The larva bores deep holes in the Oak, and is perhaps the *Cossus* of the ancients.

A species called the *militaris* by Bonelli, very similar to the heros, but without the sutural tooth, and with antennæ proportionally shorter and more knotted, particularly in the female, is found in the departments of the south of France.

The characters drawn from the antennæ are much less strongly marked in another species from the same country—the *cerdo*, L.—which is much smaller, narrower, entirely black, and without a tooth at the extremity of the elytra\*.

We refer to the same subgenus various species of *Callichroma*, Dej., with a smooth or but slightly unequal thorax, which is proportionally longer, and either of an oval shape, and truncated at both ends, or almost cylindrical. They are foreign to Europe; nearly all of them belong to South America, and are of a small size. They are usually highly decorated, and some of them have one or two globular bundles of hairs on the antennæ. Some even present this singular appearance on their posterior feet. Fabricius and Olivier arranged some of these species among the Saperdæ. The thighs of these Insects are generally clavate, and borne on a long pedicle, and their antennæ composed of long and slender joints †.

We will also unite to the same subgenus of *Cerambyx* the *Gnomæ* of Count Dejean. Their thorax is much longer and cylindrical. The inner angle of the superior extremity of the joints of the antennæ is somewhat dilated. The palpi are almost filiform, and the inner side of the mandibles exhibits a tooth. Of the two species, he mentions one—*G. rugicollis*, Fab.—as peculiar to Carolina, and the other—*sanguinea*, Dej.—to Brazil.

Those *Cerambycini*, in which the antennæ are hardly longer than the body, and rather filiform than setaceous; where the thorax, always unarmed, is sometimes almost globular or orbicular, and sometimes narrower, almost cylindrical, and simply dilated and rounded in the middle; and where the palpi, always very short, terminate in a joint somewhat thicker and wider than the preceding ones, and in the form of a reversed triangle, constitute, in the early works of Fabricius and in the Entomology of Olivier, the genus

#### CALLIDIUM,

Which is now divided into three.

\* For the other species, see Dej., Catalogue, &c., p. 105. In some, foreign to Europe, the thorax is elongated and unarmed, as in the *Gnomæ*. The *Cerambyx battus*, and some others with spinous or serrated antennæ, should form a particular division to be placed after the preceding one.

† The *Callichromæ* of Count Dejean—Catalogue, with the exception of the *alpina*, and probably the *globosa* also. Refer to it also the *Callichromæ* described by M. Germar in his *Insect.*, Spec., Nov.; the *Callichroma scopiferum*, the *Cerambyx* of the *Entom. Ind.*, of M. Klüg, and the *Saperda scobulicornis* of M. Kirby, *Lin. Trans.* The *Cerambyx perforatus*, and the *collaris* of Klüg, and the *Gnoma clavipes* of Fabricius, are remarkable for the length of the thorax, and approach the *Gnomæ* of Dejean.

Those species, in which the head is at least as wide as the thorax, and where the latter is almost cylindrical, and simply dilated and rounded in the middle, compose the genus *CERTALLUM* of MM. Megerle and Dejean\*.

Those in which the head is narrower than the thorax, elevated, and almost globular, form that of *CLITUS*, Fab.

Finally, those in which the thorax, also wider than the head, is flattened and orbicular, have retained the generic appellation of *CALLIDIUM*. A species of this division,

*C. sanguineus*; *Cerambyx sanguineus*, L. Oliv., Ib., 70, 1, about five lines in length, black, with villous elytra, and thorax of a fine sanguineous red, is very common in the wood yards, and even houses of Paris, in the spring. The

*C. arcuatus*; *Leptura arcuata*, L.; Oliv., Ib., 70, ii, 16, which is about half an inch long, of a deep black, with two bands on the thorax, three arcuated streaks on the elytra, and some points on their base and extremity of a golden-yellow, is a *Clitus*. This insect also is very common.

We will terminate this tribe with *Insecta*, which, in relation to their palpi, form of their head, thorax, and elytra, as well as in their proportions, present remarkable exceptions or anomalies.

We will commence with those in which the form of the thorax is very analogous to that of the preceding ones, and particularly of the *Certalla*. It is equal in width to the head, and to the base of the elytra, or scarcely narrower, and either almost cylindrical, or rounded, or nearly orbicular, and wider near the middle in both cases. The last joint of the palpi is sometimes attenuated near the end and terminated in a point, and sometimes truncated, thicker, and obconical, at the same extremity. All the thighs are clavate, and supported by an abrupt, slender, and elongated pedicle. The elytra of the greater number are either very short or abruptly narrowed at but little distance from their base, and then become subulate.

In the first place we have those in which no such dissimilarities are to be found, their forms and relative proportions being always the same as those of the elytra of the preceding *Insecta*.

The first genus,

*OBRIUM*, *Meg. Dej.*—*CALLIDIUM*, *SAPERDA*, *Fab.*,

Is characterized as follows: the head rounded, and not prolonged anteriorly in the manner of a snout; palpi filiform, the last joint terminating in a point; antennæ long and setaceous; thorax long, narrow, almost cylindrical, or forming a truncated oval †.

The second genus,

\* *Callidium ruficoli*, *Fab.*;—*C. fugax*, *Ejusd.*;—*Callidium setigerum*, *Germ.*

† See Catalogue, &c., of Count Dejean, p. 110.



RHINOTRAGUS, *Dalm.\**,

Differs from the preceding one in the head, which is narrowed and prolonged anteriorly in the manner of a snout; in the palpi, of which the last joint is rather thicker than the preceding ones, and truncated at the end; in the antennæ, shorter than the body, slightly dilated, and somewhat serrated at the extremity; and in the almost orbicular thorax.

These Insects are evidently allied to those of the following genus; the

NECYDALIS, *Lin.*,

The only one of this tribe in which the elytra are either very short, and squamiform, or prolonged, as usual, to the extremity of the abdomen, but abruptly contracted a little beyond their origin, then much narrowed, and terminating in a point, or subulate. This is the only point in which these last mentioned Insects resemble the *Ædemeræ*, with which Fabricius has arranged them. The last joint of the palpi is a little longer, and almost obconical and compressed. Their abdomen is long, narrow, contracted, and as if pediculated at base. The wings are folded at their extremity.

Those species in which the elytra are subulate will form a first subgenus,

STENOPTERUS, *Illig.*,

From which we might separate various species, foreign to Europe, with shorter antennæ, thickest, and almost serrated at the extremity †.

In those that inhabit France, such as the

*N. rufa*, L.; or the *Lepture à étuis étranglés*, Geoff.; *Ib.*, 74, i, 6, the antennæ are filiform and as long as the body ‡.

Those in which the elytra are short and squamiform will constitute the subgenus

NECYDALIS, *proper*,

Which corresponds to the genus *Molorchus* of Fabricius. Its type is the *Necydalis major* of Linnæus and Geoffroy—Oliv. *Ib.* I, 1. Found in old Willows in June and July §.

Certain Insects generally proper to the African islands, New Holland, New Ireland and New Zealand, ambiguous in several respects, and which, in a natural order, should perhaps be placed between the

\* *Dalm.*, *Insect. Spec. Nov.*, p. 513. We may also refer to it the *Stenopteri luridus*, *punctatus*, *albicans*, of the *Entom. Bras.*, of Klüg.

† See the *Entom. Bras.*, Klüg.

‡ The *Necydales atra* and *præusta*, Fab., and the *N. femorata* of Germar, are analogous.

§ See Fabricius, Olivier, Klüg, Kirby, and Schœnherr.

The *Stenocorus hemipterus* of Fabricius, which should apparently be placed here in a natural order, approximates more closely to the *Stenocori* of Germar and Dejean.

Lamiariæ and the Lepturetæ, will terminate the division of the Cerambycini.

Their palpi are almost filiform, the last joint almost cylindrical, and somewhat attenuated towards the base; their thorax is usually smooth, or but slightly uneven, without acute tubercles, and becomes widened posteriorly, or presents the form of a trapezium or truncated cone, as in the last tribe of this family; the abdomen in the greater number is almost in the form of a reversed triangle, and the elytra are truncated at the extremity.

These Insects form four genera,

#### DISTICHOCERA, Kirby,

Where the antennæ of the males are gradually dilated towards the extremity, and their joints, from the third, are forked or divided into two branches at the end\*.

#### TMESISTERNUS, Lat.,

Where the antennæ are simple, setaceous, and longer than the body; the thorax is lobate posteriorly, and the præsternum prolonged behind, truncated, and received into the emargination of the mesosternum†.

#### TRAGOCERUS, Dej.,

Where there is no præsternal projection; the antennæ are filiform, a little shorter than the body, and somewhat serrated; the thorax is unequal, slightly sinuous laterally, and the elytra form a large square‡.

#### LEPTOCERA, Dej.,

Where the præsternal projection is also wanting; but the antennæ are setaceous and much longer than the males; the thorax is smooth, and in the form of a truncated cone, and the abdomen and the elytra are almost triangular§.

The Longicornes of our third tribe, that of the LAMIARIÆ, are distinguished by their vertical head, and by their palpi, which are filiform or hardly larger at the extremity, and terminated by a joint more or less ovoid and tapering to a point. The outer lobe of the maxillæ is slightly narrowed at the end, and curved on the inner division. The antennæ are most frequently setaceous and simple, and the thorax, exclusive of the lateral tubercles or spines, is nearly of an equal width

\* Kirby, Lin. Trans., XII, xxiii, 10.

† Undescribed Insects from New Holland which are closely related to the *Callidia variegatum*, *lineatum*, and *sulcatum*, Fab.

‡ Dej., Catal., iii.

§ *Cerambyx scriptus*, L., Isle of France. For these genera, see the Trans. Lin. Soc., and Donovan's work on New Holland Insects.

throughout. Some species are apterous, a character exhibited by no other division of this family.

This tribe is composed of the genera *Lamia* and *Saperda* of Fabricius, of some of his *Stenocori*, and of the *Colobothæ* of Count Dejean, as well as several of his *Cerambyces*; but I have not yet succeeded in detecting characters which clearly separate the first of these genera from the following one.

The *Cerambyx longimanus* of Linnæus and Fabricius belongs neither to this genus nor to that of *Prionus*, in which it was first placed, but forms a separate one—and such was the opinion of Illiger and Thunberg—of the tribe of the *Lamiariæ*. It is the

ACROCINUS, Illig.—MACROPUS, Thunb.

It is distinguished from all the *Longicornes* by the thorax, each side of which is terminated by a moveable tubercle, terminating in a point, or by a spine. The body is flattened, and the thorax transversal; the antennæ are long and slender, and the anterior legs longer than the others; the elytra are truncated at the end, and terminated by two teeth, the exterior of which is the strongest.

*A. longimanus*; *Cerambyx longimanus*, L.; Oliv., Col. IV, 66, iii, iv, 12, known by the vulgar name of the *Cayenne Harlequin*. The thighs and tibiæ of the two anterior legs are very long and slender. The moveable tubercles of the thorax are terminated by a strong spine, and the elytra are beautifully variegated with grey, red, and black\*.

All the remaining *Lamiariæ* compose but the single genus

LAMIA,

Which we will separate into two sections: those in which the sides of the thorax are sometimes tuberculous or rugose, and sometimes spinous, and those in which it is smooth and cylindrical.

The first are divided into those that are furnished with wings, and those which are apterous.

The genus *ACANTHOCINUS*, Meg. Dej., is formed of a great number of species, mostly from South America, in which the body is proportionally shorter, wider, depressed, or but slightly elevated, and the abdomen almost square and hardly longer than it is wide. The legs are robust, and the tarsi strongly dilated.

There are several species in Europe, one of which, the

*L. ædilis*, Fab., brown, with a greyish down, four yellow dots on the thorax, and two blackish bands on the elytra, is remarkable for the length of the antennæ of the male, which is quadruple that of the body †.

Next to the *Acanthocini* should come the genus *TAPEINA* of Messrs.

\* Add *Prionus accentifer*, Olivier.

† For the other species see Catalogue, &c., Dej., p. 106.

Lepelletier and Serville—Encyc. Méthod., X, 545. The antennæ of the males are inserted into a posterior extremity of a long appendage which arises from the lateral margin of the forehead, extends transversely, and covers the eyes.

All the species known are from Brazil.

Others of a very similar form, with antennæ either bearded or furnished with bundles of hairs, constitute the genus *POGONOCHERUS*, Meg. Dej.

Some of the species inhabit Europe, and nearly all of these are remarkable for their elytra, which are truncated obliquely at the extremity\*.

Others again, still slightly elongated, but with a more cylindrical body, have each eye completely divided into two parts by the tubercle which gives rise to the antennæ—they compose the genus *TETRAOPES* †.

Certain *Lamiæ* of Fabricius, with a narrow and elongated body, very long antennæ, and a stout spine on each side of the thorax, in which the anterior tibiæ are slightly curved, and the intermediate ones are furnished with a tooth on the outer side, form that of the *MONOCHAMUS*, Dej.—*Monochammus*, Dahl., Catal.; as those gentlemen have not indicated its characters, I only give the above for such as I presume them to be ‡.

In the “Catalogue de la Collection des Coléoptères” of Count Dejean, with the exception of the apterous species, the remaining *Lamiæ* of Fabricius retain the generic appellation of *LAMIA*; but it appears from another Catalogue, that of Dahl, that two species from France—*cucurlionides*, *nebulosa*—have been separated by M. Megerle to form another generic section, or *MESOSA* §; if we suppose that the *Saperdæ* differ from the *Lamiæ* in the absence of lateral points on the thorax, these species in this respect would approach the *Saperdæ*; but their body is proportionally shorter and wider than that of these last Insects, and by this character they are more nearly allied to the *Lamiæ*. Of these two species, that called

*L. cucurlionides*, Fab.; Oliv., Ib., IV, 67, x, 69, is one of the prettiest that is found in France. It is about six lines in length, brown, with round, black, villous spots surrounded by a ferruginous circle, which induced Geoffroy to term it the *Lepture aux yeux de paon*.

*L. textor*; *Cerambyx textor*, L.; Oliv., Ib., vi, 39. Another species very common in Europe, but its thorax is armed on each

\* See Catalogue, &c., Dej., p. 107.

† See Schœnh., Synon. Insect., and the Catal., Dej. The *Cerambyx maxillosus*, and *nigripes* of Olivier appear to approach these Insects.

‡ See Dej., Catal., p. 106.

§ Another might have been formed with the *Lamia hystrix*, Fab., whose antennæ are pectinated. There are some, such as the *L. 5-fasciata*, *3-fasciata*, *capensis*, &c., in which the sides of the thorax are rather rugose or plicated, than furnished with spines. Others, such as the species called the *pulchra*, *regalis*, *imperialis*, *oculator*, are rather more shortened and widened.

side with a pointed tubercle. It is an inch long, of an obscure black, with short antennæ and granulated elytra. This Insect, with some others, evidently leads to the apterous species, all peculiar to Europe and those parts of Asia which border on it, and of which the larvæ probably feed on the roots of plants. These species form the genus *DORCADION* of Dalman, which is adopted by most entomologists. The antennæ are generally shorter than the body, and are composed of obconical joints, which give them a nodulous appearance; their abdomen is a sort of oval, or almost triangular.

M. Megerle has formed the genus *PARMENA*, with certain small species that appear to me to be removed from the others only by the antennæ, which are longer than the body, and as their joints are more elongated, they become rather cylindrical than conical. According to this, we would be obliged to connect others with them, much larger, but presenting the same characters, such as the *tristis*, *lugubris*, and *funesta*.

Among those with short antennæ, or the *Dorcadians* properly so called, there is one very common in Europe, but almost exclusively confined to calcareous localities, or to such as border on that kind of soil called the *L. fuliginator*; *Cerambyx fuliginator*, L.; Oliv., Ib. X, 21. It is about six lines in length; black; elytra sometimes cinereous, and sometimes blackish-brown, each, in both cases, presenting three white lines, one along the suture, a second along the exterior margin, and a third between the two first, but not extending to their posterior extremity. Several other species are found in Germany and the south of Russia\*.

In the other Lamiaræ, the thorax is destitute of lateral tubercles or spines, and is cylindrical; the body is always elongated, and in some almost linear. They compose the genus

*SAPERDA, Fab.*

That which he calls *Gnoma*, restricting it to certain species from Java, Sumatra, New Holland, &c., in the direction of the head, and in the parts of the mouth, resembles the Lamia; but the thorax is as long as the abdomen, cylindrical, somewhat narrower in the middle, and destitute of spines and tubercles. The antennæ are longer than the body, and are sometimes furnished with bundles of hairs. The anterior feet are elongated †.

Count Dejean has detached from the Saperdæ the genera *ADEMUS*, *APOMECYNA*, and *COLOBOTHEA*.

The *Adesmi* ‡ only differ from the ordinary Saperdæ in the first and third joint of the antennæ, which are, proportionally, much more elongated; the length of these two joints, added to that of the intermediate one or the second, constitutes more than a third of the total length of the antennæ.

\* See Schœnh., Synon. Insect., I, 3, p. 307; and the Catalogue, &c., of Count Dejean, both for this genus and *Parmena*.

† The species named *longicollis*, *giraffa*, *cylindricollis*, and some others not yet described.

‡ See Dej., Catalogue, &c., p. 108.

The *Apomecynæ*\* have a cylindrical body; the antennæ are filiform, short, terminated by an acute point, and with the third and fourth joint very long, and the following ones extremely short. These species are peculiar to the East Indies and the Isle of France. They are closely allied to the true *Lamiæ*, and Fabricius places one of them, the *histris*, in that genus.

The *Colobothææ*, which include the major part of his *Stenocori*, have their antennæ closely approximated at their insertion, the body compressed, and as if carinated laterally, and the elytra emarginated or truncated at the end, with the exterior angle prolonged in the manner of a tooth or spine. The thighs are clavate and pediculated. The face forms a long square. These Insects are peculiar to South America and to the most eastern islands of Asia that are situated in the vicinity of the equator †.

Other *Saperdæ*, and all from Brazil, in which the thorax is as wide as the elytra, or scarcely narrower; in which the third and fourth joints of the antennæ, or at least the preceding one, are much elongated or dilated, and furnished with hairs, and the last ones are abruptly shorter; and where the elytra are widened and rounded at the end, form another division ‡.

Several *Saperdæ*, with an always long and narrow body, on account of their antennæ, which are composed of twelve joints and not of eleven, should also form a particular subgenus §.

Of those species, considered by all the entomologists of the day as *Saperdæ* properly so called, we will cite the two following:

*S. carcharias*; *Cerambyx carcharias*, L.; Oliv., Ib., 68, ii, 22. An inch long, covered with a cinereous-yellow down punctured with black, and the antennæ picked in with black and grey.

Its larva lives in the trunk of the Poplar, and sometimes destroys young plantations of that kind of tree.

*S. linearis*; *Cerambyx linearis*, L.; Oliv., Ib., ii, 13. About six lines long; very narrow, linear; black; legs short and yellow; elytra punctured in lines and truncated at the extremity. Its larva inhabits the Hazel-tree.

Other species have been described in which the body is still narrower, and the antennæ are excessively long and almost as slender as a hair ||.

\* See Dej., Catalogue, &c., p. 108.

† Ibid. The *Stenocorus pictus*,—Oliv., Saperde, 68, iv, 40,—*annulatus* of Fabricius. His *Saperda acuminata* appears to belong to the same genus, as well as the Insect figured by Olivier among the *Cerambyces*, pl. xvi, 117, although its thorax is bi-spinous.

‡ Such are the *Saperda amicta*, *togata*, *palliata*, *dascyera*, *ciliaris*, of the Entom. Bras., Klüg. The genus *Thyrsia* of Dalman—Anal. Entom., p. 171, vol. III—approximates in some respects to these species, but in others seems to approach the last of our *Prioni*.

§ The *Saperda cardui*, *asphodeli*, *suturalis*, &c. In some of the preceding species the eleventh and last joint is somewhat abruptly attenuated, but without being really divided into two.

|| See Fabricius, Olivier, Schöenherr, and the Catalogue, &c., of Count Dejean.



In the fourth and last tribe, that of the *LEPTURETÆ*, we find *Longicornes* in which the eyes are rounded, entire, or scarcely emarginated, and where, in this case, the antennæ are inserted before, or at most at the anterior extremity of this slight emargination. The head is always inclined posteriorly behind the eyes in several, or abruptly narrowed at its junction with the thorax, in the manner of a neck; the thorax is conical or trapezoidal, and narrowed before. The elytra become gradually narrower.

This tribe forms the genus

*LEPTURA\**, *Lin.*,

With the exception of certain species which belong to the preceding tribes and to the *Donaciæ*. Thus modified, this genus corresponds to the *Stenocorus* of Geoffroy, and the *Rhagium* and *Leptura* of Fabricius.

Sometimes the head is elongated posteriorly, immediately behind the eyes. The antennæ, frequently shorter than the body, are approximated at base, and inserted beyond the eyes, on two little eminences in the form of tubercles, and separated by an impressed line. The thorax is generally tuberculous or spinous on the sides.

Here, the palpi are filiform; the last joint of the maxillaries is almost cylindrical, and the same of the labials ovoid; the third and two following ones of the antennæ are dilated at their external angle, and are curved and silky, particularly in the males. Such are those which constitute the

*DESMOCERUS*, *Dej.*

The thorax is in the form of a trapezium, without tubercles or points on the sides; its posterior angles are extremely pointed. The maxillæ and labium appeared to me to resemble those of the *Lamiæ*.

But a single species, well represented with all its details by Knoch, is known. It inhabits North America †.

There, the palpi are inflated at the extremity, and terminated by a joint in the form of a reversed cone or triangle. The antennæ are regular, glabrous, or simply pubescent.

Some are removed from the others, by the fact that their males

\* Or the *Stenocorus* of the first edition of the *Règne Animal*, a denomination which I have thought it best to suppress, on account of the confusion resulting from the different applications that have been made of it.

N.B. Messrs. Lapeletier and Serville—*Encyc. Méthod.*, X, 687—have placed in this tribe a genus established by them under the name of *EURYPTERA*, which should be distinguished from all those of this division of the *Longicornes*, by the number of joints in the antennæ, amounting to twelve instead of eleven. Its type is an Insect of Brazil, which is unknown to us.

† *Stenocorus cyaneus*, Fab.; Knoch, *N. Beyt.*, I, p. 148, vi, l.; *Rhagium cyaneum*, Schöenherr.

alone are furnished with wings. Their thorax is conical and smooth, without spines or tubercles. They compose the genus

VESPERUS, *Dej.*—STENOCORUS, *Fab. Oliv.*

Their head is large and placed on a kind of rotula. The antennæ are long and slightly serrated, with the first joint shorter than the third. The last joint of the palpi is almost triangular. The eyes are oval and slightly emarginated. The elytra of the females are short, soft, and gaping\*.

In the following Insects, and of the same subdivision, both sexes are furnished with wings, the thorax is tuberculous or spinous laterally, unequal, and as if turned up at the two extremities. They compose the genus *Rhagium* of Fabricius, or *Stenocorus* of Olivier, including also some of the *Leptureta* of the former. Later entomologists have thought it best to divide these Insects into five genera, which may be reduced to four.

RHAGIUM, *Dahl.*,

Or *Rhagium*, properly so called, where the antennæ, always simple, are at most half as long as the body, and where the last joint of the palpi forms a triangular club. The head is large, and almost square; the eyes are entire. Each side of the thorax offers a conical spiniform tubercle †.

RHAMNUSIUM, *Meg.*,

Where the antennæ, somewhat shorter than the body, are serrated, with the third and fourth joints shorter than the following ones. The eyes are evidently emarginated ‡.

TOXOTUS, *PACHYTA, Meg. Dej.*,

Where the antennæ are at least as long as the body, simple, and with the first joint much shorter than the head; the eyes are entire, or but very slightly emarginated. The abdomen is triangular, or forms a long square, narrowed posteriorly §.

STENODERUS ||, *Dej.*—CERAMBYX, *Fab.*—LEPTURA, *Kirb.*—STENOCORUS, *Oliv.*,

Where the antennæ are also long, but their first joint is at least

\* *Stenocorus strepens*, Oliv., Col., IV, 69, i, b., I, *S. luridus*, Ross., Faun. Etrusc.; Mant., II, App. p. 96, tom. III, fig. 1.

† The *Rhag. bifusciatum*, *indagator*, *inquisitor*, *mordax*, Fab.

‡ *Rhagium salicis*, Fab.

§ See the Catal. of Dejean and Dahl. In the *Leptura virginea* and *collaris* of Fabricius, which I refer to the subgenus *Toxotus*, the third and fourth joints of the antennæ are rather shorter than the fifth.

|| Near the subgenus *Stenoderus* come *DISTENIA* and *COMETES*, two genera established by Messrs. Lepeletier and Serville, Encyc. Méthod., X, 485. Their thorax is tuberculous or spinous laterally, which removes them from *Stenoderus*, where the palpi are also shorter, and the antennæ simply furnished with a dense pubescence, and not pilose, as in these two subgenera. The elytra of the *Distenia* are gradually narrowed from their humeral angles to their extremity, which is armed with a spine; they are linear and unarmed in *Cometes*. The species of both subgenera are from Brazil.



as long as the head; their body is long, narrow, and almost linear. The palpi also are more salient. The eyes are entire\*.

Sometimes the head is abruptly narrowed immediately behind the eyes. The antennæ, inserted near the anterior extremity of their internal emargination, are remote at base. The two eminences from which they rise are almost confounded in one plane. The thorax is almost always smooth or without lateral tubercles. They are the

#### LEPTURA, Dej. Dahl.,

Or *Leptura* properly so called.

In some the thorax is almost plane above, and trapezoidal or conical. Of this number are

*L. armata*, Gyll.; *L. calcarata*, Fab., the male; *L. subspinoso*, Ejud., the female; which is very common in summer in the woods, on the flowers of the Bramble. The body is elongated and black, the elytra are yellow with four transverse black lines, the anterior of which is formed by points. The antennæ are picked in with black and yellow. The posterior tibiæ of the male are armed with two teeth.

*L. nigra*, L.; Oliv., Col., 73, III, 36. Black and glossy, with a red abdomen.

In others, the thorax is much more elevated and rounded, or almost globular. Such is

*L. tomentosa*, Fab.; Oliv., Ib., II, 13. Black, with a yellowish pubescence on the thorax; elytra of the same colour, and the extremity black and truncated. Very common in the environs of Paris †.

## FAMILY V.

### EUPODA.

Our fifth family of the tetramerous Coleoptera is composed of Insects, the first of which so closely approach the last Longicornes that they were confounded both by Linnæus and Geoffroy, and the last are so closely allied to the Chrysomelæ, the type of the following family, that the first of those naturalists places them in that genus. The organs of manducation present the same affinities; thus in the first, the ligula is membraneous, bifid, or bilobate, as in the Longicornes; their maxillæ also greatly resemble those of these latter; but

\* *Leptura ceramboides*, Kirby, Lin. Trans., XII, xxiii, 11, and some other species from Brazil.

† See the species called *rubra*, *virens*, *hastata*, *2-punctata*, *scrutellata*, &c., and as regards the genus, the Catalogues already quoted, the last volume of Gyllenhal's Insect. Suec., and Olivier, Fabricius, &c.

in the last this ligula is almost square or rounded, and analogous to that of the Cyclica.

The maxillary lobes, however, are membranous, or but slightly coriaceous, whitish or yellowish; the external one is widened near the extremity, and does not present the figure of a palpus, characters which give these parts more resemblance to those of the Longicornes than to those of the Cyclica. The body is more or less oblong, and the head and thorax are narrower than the abdomen; the antennæ are filiform, or gradually enlarge towards the extremity, and are inserted before the eyes, which, in some, are entire, round, and tolerably prominent; and, in others, are slightly emarginated. The head is received posteriorly into the thorax, which is cylindrical, or forms a transverse square. The abdomen is large, compared to the other joints of the body, and forms a long square or an elongated triangle. The joints of the tarsi, with the exception of the last, are furnished with pellets beneath, and the penultimate is bifid or bilobate. The posterior thighs are strongly inflated in a great many, and hence the denomination of the family.

All these Insects have wings, and are found on the stems or leaves of various plants, but, so far as regards a great number of species that inhabit France, on those of the Liliaceæ particularly. The larvæ of some—the Donaciæ—attack the internal part of the roots of aquatic plants, on which we find the perfect Insect. Those of several others live exposed, but they cover themselves with their excrements, which they form with a sort of case or scabbard, like that of the Cassidæ.

We will divide this family into two tribes:

The first, that of the SAGRIDES, is composed, as its name indicates, of the genus

#### SAGRA.

The mandibles terminate in a sharp point. The ligula is profoundly emarginate or bilobate.

In some, the palpi are filiform, the eyes emarginated, the posterior thighs very stout, and the tibiæ arcuated.

#### MEGALOPUS, *Fab.*

The anterior extremity of the head projecting in the manner of a snout; strong and crossed mandibles; the palpi terminated by an elongated and very pointed joint; the ligula deeply cleft into two elongated lobes; the body short, with a transversal, square, or trapezoidal thorax. The antennæ gradually enlarge towards the extremity, or are terminated by an elongated club; their third joint is longer than the second and fourth, and the four posterior legs are long, slender, and arcuated.

These Insects are peculiar to South America\*. The

SAGRA, *Fab.*,

Or Sagrae properly so called, originally designated by the name of *Alurnæ*, are exclusively confined to certain parts of southern Africa, Ceylon, and China. Their palpi are terminated by an ovoid joint, the divisions of the ligula are short, the thorax is cylindrical, the antennæ are almost filiform, longer than the head and thorax, with their inferior joints shorter than the others, and the four anterior tibiæ tolerably thick, but slightly elongated, angular and straight. These Insects have a uniform but very brilliant colour, green, golden, or a fulgid-red, with a slight mixture of violet †.

In the others, the palpi are thicker at the extremity, the eyes are entire, and the thighs of nearly equal thickness. The body is almost always elongated, narrow, slightly depressed, or but little elevated, and the thorax narrowed posteriorly, and almost always cordiform.

ORSODACNA, *Lat., Oliv.*—CRIOCERIS, *Fab.*,

Where the antennæ are filiform and composed of obconical joints, where the last joint of the palpi is merely a little larger than the preceding ones, and nearly forms a truncated ovoid, and where the thorax is at least as long as it is wide ‡.

PSAMMÆCUS, *Boudier.*—ANTHICUS, *Fab.*—LATRIDIVS, *Dej.*

Where the antennæ, composed of short and crowded joints, gradually enlarge, and where the maxillary palpi are abruptly terminated by a stout triangular club. The thorax is wider than it is long. The body is more depressed than in the preceding species, the antennæ are shorter, and the eyes less prominent §.

The second tribe, or that of the CRIOCERIDES, is distinguished from the preceding by the mandibles, the extremity of which is truncated, or presents two or three teeth, and by the ligula, which is entire, or but slightly emarginated.

It is composed of the genus

CROICERUS, *Geoff.*—CHRYSOMELA, *Lin.*,

Which we will divide as follows :—

Sometimes the mandibles taper to a point, and present two or three teeth at that extremity. The palpi are filiform. The antennæ, of an ordinary thickness, are almost granose in some, and in others are mostly composed of obconical joints, or such as are evidently thicker at their superior extremity.

\* Besides Fabricius, Latreille, Olivier, Germar, and Dalman, see the excellent Monograph of this genus, published by M. Klüg, and the observation on this genus by Count Mannerheim, who, to the figures of certain species, has added some very good ones of the parts of the mouth.

† See *Fab.*, and *Oliv.*, V, 90.

‡ See *Lat.*, *Gener. Crust. et Insect.* III, p. 45, and I, xi, 5; *Oliv.*, Col. VI, 98, bis, and *Gyll.*, *Insect. Succ.* III, 642.

§ *Anthicus 2-punctatus*, *Fab.*; I place this genus here with some hesitation.

DONACIA, *Fab.*—LEPTURA, *Lin.*,

Where the posterior thighs are large and inflated; the antennæ are of equal thickness throughout, and their joints are elongated; the eyes are entire, and the last joint of the tarsi is enclosed for most of its length between the lobes of the preceding one.

These Insects are frequently ornamented with brilliant colours, bronzed or gilded. Several are likewise covered with an extremely fine and silky down, which may prove useful to them when they happen to fall into water, as they live on aquatic plants, such as the *Iris*, *Sagittaria*, *Nymphœa*, &c., to which they cling with great tenacity. Their larvæ live in the roots of the same plants. Their chrysalides, according to the observations of M. A. Brongniart, are attached to their filaments by one edge only, forming knots or bulbs.

The anatomical researches of M. Leon Dufour have induced him to think that the *Donaciæ* should form a particular family. Their hepatic vessels, in number, arrangement, form, and structure, constitute a very remarkable exception to those of the *Tetramera*, and one which even appears to be peculiar to these Insects. These vessels only open into the chylic ventricle, while in all the other *Tetramera* dissected by this able anatomist, they have two insertions, one ventricular, and the other cæcal. These biliary ducts, only four in number, are of two different kinds; those of the first are capillary, disposed in two strongly flexed curves, and are inserted by four distinct ends into a short obround vesicle, situated at the inferior and somewhat lateral extremity of the chylic ventricle; the others, much shorter, thicker, more dilatable, thin and tapering at both ends, have one extremity free, and are separately inserted by the other into the superior and dorsal region of that organ. The whitish pulp contained in them is considered by M. Dufour as alimentary matter. The œsophagus is capillary, and without any dilatation in the form of a crop. The chylic ventricle is roughened with very salient papillæ. The testes are very similar to those of the *Lepturæ*. The larvæ are naked and concealed, as well as those of the last *Longicornes*, an observation which strengthens the conjectures of M. Dufour.

HÆMONIA, *Meg.*, *Dej.*

The *Hæmonia* are *Donaciæ* in which the penultimate joint of the tarsi is very small, in the form of a knot, almost entire; the last is very long\*. The

PETAURISTES, *Lat.*

United by Fabricius with the *Lemæ*, or our *Crioceræ* properly so called, also have very stout posterior thighs; but the eyes are emarginated; the antennæ, as in the latter, are generally composed of shorter joints, and the lobes of the penultimate joint of the tarsi are much less elongated, and merely clasp the root of the following one †.

\* The *D. equiseti*, *zosteræ*, *Fab.*

† The *Lema varia*, *posticuta*, *Fab.*

CRIOCERIS, Geoff., Oliv.—LEMA, Fab.—CHRYSOMELA, Lin.,

Or Crioceræ properly so called, are removed from the preceding by this character: their posterior legs are similar to the others, or differ from them but very slightly; the antennæ become somewhat and gradually enlarged towards the extremity and are almost granose, their joints not being much longer than they are wide. The eyes are prominent and emarginated. The posterior extremity of the head forms a sort of neck behind these latter organs.

These Insects live on the Liliaceæ, Aspargi, &c., and, like those of the preceding family, make a slight noise when siezed. Their larvæ feed on the same plants, to which they cling by means of their six squamous feet. Their body is soft, short, and inflated; their own fæces, with which they cover their back, protect them from the action of the sun and the changes of weather. In order that they may accomplish this, their arms are placed above. When about to become nymphs they enter the ground. The

*C. meridigera*; *Chrysomela meridigera*, L.; Oliv, Col. VI, 94, i, 8, is three lines in length, with the thorax and elytra of a beautiful red. The thorax is strangulated on each side. The elytra are marked with longitudinal lines of punctures. In all Europe on the white Lily.

M. Boudier, of Versailles, a zealous entomologist, to whom I am indebted for several rare and curious species, has published, in the Memoires de la Société Linneenne de Paris, some observations on the *C. brunnea*—*Lema brunnea*, Fab.—which is fulvous, with the antennæ, pectus, and base of the abdomen black. It is found together with its larva, on the *Lilium convallaria*,

*C. asparagi*; *Chrysomela asparagi*, L.; Oliv., Ib, II, 28. Bluish, with a red thorax, sometimes immaculate, and sometimes with a blue and cordiform spot in its middle; the elytra are yellowish, with a blue band along the suture, which, being united with three lateral spots of the same colour, forms a cross.

The same plant is devastated by another species—the *C. 12-punctata*, L.,—which is fulvous, with six black spots on each elytron\*.

#### AUCHENIA, Thunb.

The Auchenia differ from the Crioceræ, with which they were at first confounded, by their entire eyes; by their palpi narrowed and terminated in a point, and not obtuse; by the last seven joints of their antennæ which are wider; and by their thorax, which is dilated near the middle of each side into an angle or tooth †.

Sometimes the mandibles are truncated; the palpi are terminated by a strongly inflated truncated joint, with a little annular prolonga-

\* See Olivier and Fabricius, but without including the leaping species, some of which belong to the subgenus *Petauristes*, and the others to the last one of this family, or *Megascelis*.

† *Crioceris subspinosa*, Fab.

tion, presenting the appearance of another joint. The antennæ are slender, and consist of highly elongated and almost cylindrical joints.

MEGASCELIS, *Dej., Lat.*

The eyes are somewhat emarginated. The mandibles are thick. The exterior maxillary lobe is narrow, cylindrical, and curved inwards. The labial palpi are almost as large as those of the maxillæ. These insects, which are peculiar to South America, appear, in some respects, to approach *Colapsis*, but their general form places them among the Eupoda\*.

FAMILY VI.

CYCLICA.

In our sixth family of the Tetramera, where the three first joints of the tarsi are still spongy, or furnished with pellets beneath, with the penultimate divided into two lobes, and where the antennæ are filiform or somewhat thicker towards the end, we observe a body usually rounded, and in those few where it is oblong, with the base of the thorax of the width of the clytra and maxillæ, whose exterior division, by its narrow, almost cylindrical form and darker colour, has the appearance of a palpus; the interior division is broader and destitute of the little squamous nail. The ligula is almost square or oval, entire or widely emarginated.

From the various anatomical researches of M. Leon Dufour, it appears that the alimentary canal is at least thrice the length of the body; that the esophagus is most usually inflated behind the crop, and that the chylific ventricle or stomach is commonly smooth, at least throughout a great part of its extent. The biliary apparatus resembles that of the Longicornes in the number, and double insertion of the vessels which compose it; they amount to six, two of which, those of the Cassidæ excepted, are generally slender and shorter. Each testis is formed by a single capsule.

All the larvæ known to us are furnished with six feet, have a soft, coloured body, and feed, as well as the perfect Insect, on the leaves of vegetables, to which they usually attach themselves by means of a viscid or adhesive humour. There also many of them become nymphs, at the posterior extremity of which is found the last exuviæ of the larva folded into a pellet. These chrysalides are frequently of various colours. Some of the larvæ penetrate into the earth.

These Insects are generally small, and are frequently ornamented

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\* The *Lema vittata*, *cuprea*, *nitidula*, *Fab.*



with brilliant and metallic colours; their body is smooth or destitute of hairs. They are mostly slow and timid, letting themselves fall to the ground the moment we attempt to seize them, or folding their antennæ and feet close to their body. Several species are good jumpers. The females are extremely prolific.

If we take into consideration the different habits of their larvæ, we will find that the Cyclica are divided into four principal sections:

1. Larvæ covering their bodies with their excrement.
2. Larvæ inhabiting tubes which they drag about with them.
3. Naked larvæ.

4. Larvæ concealed in the interior of leaves, and feeding on their parenchyma: the *Leaping Cyclica*.

Such are the principles on which we have proceeded in the arrangement of this family. We divide it into three tribes, according to the mode in which the antennæ are inserted.

In the first, or the *CASSIDARCÆ*, the antennæ are inserted in the superior part of the head, and are approximated, straight, short, filiform, and almost cylindrical, or gradually enlarged towards the extremity. The mouth, altogether underneath, and with short and almost filiform palpi, is sometimes arched (cintree), and sometimes partly received into the cavity of the præsternum. The eyes are ovoid or round. The legs are contractile and short, and the tarsi flattened; the lobes of the penultimate joint completely inclose the last.

The body being flat above, these Insects, owing to the disposition of their tarsi, are enabled to glue themselves to the surface of leaves, and to remain there without motion; besides this, the body is most commonly orbicular or oval, and overlapped all round by the thorax and elytra. The head is concealed under the thorax, or received into its anterior emargination. Their colours are various, and are prettily distributed in the form of spots, points, and streaks. Such of their larvæ as are known to us cover themselves with their fæces.

The Cassidariæ are composed of two genera. In the first, or

#### *HISPA, Lin.*

The body is oblong, the head is entirely exposed and free, and the thorax forms a trapezium. The mandibles have but two or three teeth; the exterior maxillary lobe is shorter than the inner one; the antennæ are filiform and pectinated anteriorly.

#### *ALURNUS, Fab.*

The alurni, which Olivier does not distinguish from his *Hispæ*, appear to differ from them only in the form of their mandibles, the superior extremity of which is prolonged into a stout and pointed tooth, and which, besides, exhibits a second but very short one on the inner side.

The ligula is corneous.



This subgenus comprises the largest species, most of which are peculiar to Guiana and Brazil. Among them is the

*Hispæ bordeé*, Règn. Anim. Ed. I, pl. xiii, f. 5. Blood-red; antennæ, thorax, the sides excepted, and elytra, black; suture and external margin of the elytra, colour of the body; their middle is marked, in a variety, by a transverse line also red. This Insect is not rare in Brazil\*.

#### HISPA, *Lin., Fab.*

The Hispæ, properly so called, have short mandibles terminated by two or three small and almost equal teeth. America produces a great number of species. In some the superior surface of the body, and even a portion of the antennæ are densely spinous. Such is the

*H. atra*, L.; Oliv., Col., VI, 95, 1, 9, called by Geoffroy the *Chataigne noire*, It is entirely black, extremely spinous, and a line and a half in length. In the environs of Paris, on the Grasses.

The southern departments of France produce another species—the *testacea*, Oliv., *Ib.*, 1, 7—closely allied to the preceding one, but fulvous. It is found on the Cisti.

#### CHALEPUS, *Thunb.*

The Chalepi, if we take the *H. spinipes*, of Fabricius, as their type, differ from the Hispæ proper in their long, slender, and arcuated legs, the two anterior of which are armed on the inner side, in the males, with a long spine. The third joint of the antennæ is also proportionally longer.

Some other Hispæ—*monoceros*, Oliv.; *porrecta*, Schœnh.; *rostratus*, Kirby, &c.—remarkable for a projection on their head, resembling a horn, may perhaps form another subgenus.

#### CASSIDA, *Lin. Fab.*

The Cassidæ are distinguished from the Hispæ by the following characters. The body is orbicular or almost ovoid, and in some few nearly square. The thorax, more or less semicircular, or forming the segment of a circle, entirely conceals and covers the head, or encloses it in an anterior emargination. The elytra, frequently elevated in the region of the scutellum, project beyond the body. The mandibles present four teeth at least, and the exterior maxillary lobe is at least as long as the inner one.

The IMATIDIA—*Imatidium*—of Fabricius, only differs from his Cassidæ in their head, which is exposed and fixed in the emargination of the thorax. In both the body is depressed, almost round, in the form of a shield or a little Tortoise, frequently elevated into a pyramid on the middle of the back, and overlapped all round by the sides of the thorax and elytra. The under surface is flat, so that these Insects seem as if glued to the spot to which they are attached.

\* See Fabricius and Olivier, Col., VI, 95, 1, 2.

*C. equestris*, Fab.; Oliv., Col., V, 97, i, 3. Closely allied to the following species, but rather larger, and only found in aquatic localities on Mint. It is green above and black beneath; margin of the abdomen and the feet yellowish.

*C. viridis*, L.; Oliv., Col., II, 29. Length one line and a half; it only differs from the *equestris* in the puncta of the elytra, which form regular lines near the suture; the thighs are most commonly black.

The larva lives on Thistles, and most commonly on the Artichoke. Its body is extremely flat, and the whole margin is covered with spines; it covers itself with its fæces, which it keeps suspended in a mass on a kind of fork situated near the orifice of the anus. The nymph is also much flattened, and has delicate and serrated appendages along its sides; its thorax is broad, rounded anteriorly, and conceals the head.

In the larva of a species found in St. Domingo—*C. ampulla*, Oliv.—the fæces are disposed in numerous and articulated threads, which resemble a sort of wig. The

*C. nobilis*, L.; Oliv., Ib., II, 24. Yellowish grey, with a golden-blue streak near the suture, which disappears with the death of the Insect\*.

In the second tribe, or the CHRYSOMELINÆ, the antennæ are remote, and inserted before the eyes, or near their internal extremity. These Insects never leap. With those of the following tribe, and some belonging to the preceding family, they compose the genus *Chrysomela* of Linnæus, which we have restricted by the admission of others, on account of its great extent.

Those species in which we find the above-mentioned characters, form, as in the earlier entomological works of Fabricius, two genera.

The first, or

#### CRYPTOCEPHALUS,

Is composed of Chrysomelinæ, in which the head is plunged vertically into an arched or hood-like thorax, in such a manner that the body, most commonly in the form of a short cylinder, or almost ovoid and narrowed anteriorly, when viewed from above, appears as if truncated at that extremity and destitute of a head. The antennæ of some are more or less serrated or pectinated; those of others are long and filiform. The last joint of the palpi is always ovoid.

Sometimes the antennæ are short, pectinated, or serrated from the fourth or fifth joint.

Here the exterior margin of the elytra is straight, or is but slightly emarginated; the posterior angles of the thorax are rounded and not arched, and the anterior ones are not bent underneath. The body is always in the form of a short cylinder; the antennæ are always free, and the eyes entire or but slightly emarginated. The males fre-

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\* For the other species, see Oliv., Ib.; Fab., Syst. Eleut.; Schœnh., Synon. Insect., II, p. 134, and 209.

quently have the head broader, the mandibles stronger and more salient, and the anterior legs longer.

CLYTHRA, *Leach, Fab.*—MELOLONTHA, *Geoff.*

*C. quadripunctata*; *Chrysomela quadripunctata*, L., Oliv., Col. VI, 96, i, 1. From four to five lines in length; black; elytra red, each marked with two black dots, the anterior of which is the largest.

The larva inhabits a coriaceous tube that it drags about with it, and which with the animal was sent to me by M. Waudoner, from Nantes\*.

There, the elytra, strongly dilated exteriorly at their origin, and then suddenly narrowed, present a deep emargination. The posterior angles of the thorax are acute, arched and form a roof; the anterior are strongly curved underneath. The antennæ are laid along its inferior sides, or are lodged under its edges. The eyes are evidently emarginated in several. The superior surface of the body in those, and they are the greatest number, where it is less short and convex, is usually very uneven.

These Chrysomelinæ are exclusively proper to the western continent.

CHLAMYS, *Knoch.*

Where the form of the body approaches that of a short cylinder or of a cube, with the thorax abruptly elevated, and as if hump-backed in the middle, and the middle of its posterior margin prolonged or unilobate. The body is in general extremely scabrous. In some the labial palpi are forked †.

LAMPROSOMA, *Kirb.*

Where the body is almost globular, extremely convex, very smooth, and the thorax very short, very broad, gradually raised and slightly lobate at the middle of its posterior margin. The five last and serrated joints of the antennæ are less dilated than in the preceding ones ‡.

Sometimes the antennæ, evidently longer than the head and thorax united, are simple and filiform, or thickest at the end, or even terminated in a club, in which case they are serrated, but only from the seventh joint. The body, in several, is ovoid and narrowed before. The last joint of the antennæ is appendiculated, so that their number seems to amount to twelve.

\* See Olivier and Fabricius, but abstract from the genus of the latter those species which belong to the following one.

† See Olivier, but more especially the excellent Monograph of M. Kollar, and that of Klüg. See also Knoch, New. Beytr. Insect., p. 122, and Lat., Gener. Crust. et Insect., III, p. 53.

‡ *Lamprosoma bicolor*, Kirb., Lin. Trans., XII, xxii, 15. See especially the Insect. Spec. Nov. Germ., p. 574, 575.

Here, the body is cylindrical, and the thorax as wide as the abdomen throughout.

CRYPTOCEPHALUS, *Geoff.*

Where the antennæ and palpi are the same thickness everywhere.

*C. sericeus*; *Chrysomela sericea*, L.; Oliv., Col., VI, 96, i, 5.

Three lines in length, and of a golden-green; antennæ black, with a green base. Very common on the semiflosculosæ\*.

CHORAGUS, *Kirb.*

Where the antennæ are terminated by three thicker joints forming a club, and the palpi are attenuated at the extremity †.

There, the body is narrowed anteriorly and is almost ovoid.

The five last joints of the antennæ are frequently larger, more or less compressed, and more or less dilated and serrated. The maxillary palpi are thicker at their extremity or almost terminated by an ovoid club, formed either by the last joint, or by that and the preceding one.

EURYOPE, *Dalm.*

Where the mandibles are very strong, and where the second joint of the antennæ is manifestly longer than the third ‡.

EUMOLPUS, *Klig. Fab.*

Where the mandibles are of the ordinary size, and the second joint of the antennæ is shorter than the following one.

*E. vitis*, Fab.; Panz., Faun. Insect. Germ., LXXXIX, 12.

Black, pubescent; elytra, base of the antennæ, and the legs reddish-brown; very injurious to the Vine.

This subgenus, through the Colaspes, and by an almost insensible transition, is connected with the genus

CHRYSOMELA,

When the body is usually ovoid or nearly oval, and the head salient, projecting, or simply inclined; where the antennæ are simple, about half the length of the body, and most frequently granose and insensibly enlarged towards the extremity.

Some, in which the body is always ovoid or oval and provided with wings, and the palpi terminate in a point, approach the Eumolpi, and are distinguished from the other following Chrysomelinæ by their filiform antennæ, which are longer than the half of the body, and consist of elongated and almost cylindrical joints, the eleventh or last of which is terminated by an appendix or false joint, the length of which is almost equal to that of the half of the preceding portion of that joint. Such are

COLASPIS, *Fab.*,

Where there is no sternal projection §.

\* For the other species, see Olivier, Fabricius, and Schœnherr.

† *Choragus Scheppardi*, Kirb., Lin. Trans., XII, xxii, 14.

‡ Dalm., Ephem. Entom., I, p. 17. The *E. rubra*, Lat., Gener. Crust. et I

I, ii, 6, is from Senegal and Abyssinia.

§ See Fabricius, Olivier, Schœnherr and Germar.

PODONTIA, *Dalm.*

Where the mesosternum projects in a short and conical point, the end of which is received into a posterior emargination of the præster-num\*.

The first and penultimate joint of the tarsi is very large and strongly dilated; the second is small. The last joint of the maxillary palpi is conical. The body is oblong, depressed, or but little elevated, while in *Colaspis* it is generally short and very convex.

In the following *Chrysomelinæ* of the same tribe, the antennæ are shorter and composed of obconical joints, or are more or less almost granose and gradually enlarge towards the extremity; the false joint or appendage terminating the last is very short or indistinct.

The maxillary palpi of some are thicker, and truncated at the extremity.

Of these there are some in which the two last joints of those palpi are united and form a truncated club; the last is shorter than the penultimate, and is either transversal or in the form of a very short and truncated cone.

PHYLLOCHARIS, *Dalm.*,

Where there is no mesosternal projection †.

DORYPHORA, *Illig.*,

Where the mesosternum, on the contrary, advances in a point, or in the manner of a horn. The species of this subgenus are proper to South America ‡; those of the preceding one inhabit New Holland and the Island of Java. These, of which there are but few, differ from the preceding in their more elongated and much less elevated body, and in their antennæ, the first joints of which are proportionally shorter, thicker, and more rounded at the extremity; the second is almost globular and scarcely shorter than the third.

Two species are found in Spain, which should form another subgenus—*Cyrtonus*, *Dalm.* As in *Phyllocharis*, there is no mesosternal projection, but the joints of the antennæ are proportionally longer and more obconical; the body is more convex, and the thorax higher transversely, and pulviniform, or rounded in the middle, whilst its surface is plane or on a level in the preceding subgenera §.

Another subgenus,

PAROPSIS, *Oliv.*—NOTOCLEA, *Marsh.*,

Of which all the species are exclusively proper to New Holland, is

\* *Dalm.*, *Ephem. Entom.*, I, 23. Of this number is the *Chrysomela 14-punctata*, *Fab.*; *Oliv. Col.*, V, 91, iv. 42.

† *Dalm.*, *Ephem. Entom.*, I, p. 20. The *Chrysomelæ cyanipes, cyanicornis, undulata*, of *Fabricius*. See *Olivier, Col.*, V, 91, iv, 50, 46, and vii, 99, 100.

‡ *Oliv.*, *Col.*, V, continuation of No. 91, *Doryphoræ*. See also the *Insect. Spec. Nov.*, *Germer.*

§ *Chrysomela rotundata*, *Dej.*, and another very analogous but striped species. I have received from *Dr. Leach* a *Chrysomela* allied to the *Doryphoræ*, in the male of which the antennæ present but eight joints, the two last forming a club. It constitutes his genus *Apamea*. The *Chrysomela badia* of *Germer* appears to form another.

distinguished from all the others of this family by the maxillary palpi, the last joint of which is much larger and securiform\*.

In the two following subgenera the same joint, also well separated from the preceding one, and quite as large or larger, is more or less semi-ovoid. These insects are more abundantly disseminated throughout the eastern continent, and Europe in particular.

*TIMARCHA, Meg., Dej.*

The Timarchæ, which were formerly placed among the Chrysomelæ, comprise those which are apterous. Their body is gibbous, the antennæ are granose, inferiorly in particular, the elytra united, and the tarsi usually much dilated, at least in the males.

These Chrysomelinæ are found on the ground in the woods, on grass, and along the edges of roads. Their gait is slow, and they emit a yellowish or reddish humour from the articulations of their legs. They are most common in the south of Europe and north of Africa.

Among those in which the thorax is narrowed posteriorly, and approaches to the form of a crescent, and generally the largest species, is placed,

*T. lævigata*; *Tenebrio lævigatus*, L.; Oliv., Col., V, 91, i, 11, From four to eight lines in length; black; thorax and elytra smooth, but finely punctured; antennæ and legs violet.

Its larvæ is greenish or violet, strongly inflated, and has a fulvous extremity. It feeds on the yellow Gallium, and undergoes its metamorphosis in the earth †.

*CHRYSOMELA, proper.*

This subgenus will comprise such of Olivier's species as are furnished with wings, and in which the maxillary palpi, according to our previously established subdivisions, have the last joint as large as the preceding ones, or larger, and in the form of a truncated, ovoid, or reversed cone. Such are

*C. sanguinolenta*, L.; Oliv., Ib., I, 8. About four lines in length; black, or bluish-black; sides of the thorax thickened and punctured; elytra deeply punctured and widely emarginated exteriorly with red. Found on the ground in fields, and along the borders of roads.

*C. cerealis*, L.; Oliv., Ib., VII, 104. Size of the preceding; cupreous-red above, with longitudinal, blue streaks, three on the thorax and seven on the elytra. Common in France.

*C. populi*, L.; Oliv., Ib., VII, 110. Length from five to six

\* See Oliv., Col., V, 92; but we must take away the *P. flavicans*—*Chrysomela flavicans*, Fab.—which is a true Chrysomela. See also the Monograph of the same genus, but under the name of *Notoleca*, published by M. Marsham in the Transactions of the Linnean Society.

† Add the following species of Olivier, *rugosa*, *scabra*, *latipes*, *coriaria*, *gattingsis*. See also the Catalogue, &c., of Count Dejean: but as I only distinguish the Timarchæ from the Chrysomelæ by the absence of wings, I am not sure that all the species he mentions are in this case.



lines; oval, oblong, and blue; elytra fulvous or red, and the inner angle of their extremity marked with a black dot. On the Willow and Poplar; its larvæ lives on the same trees, and frequently in society.

This species, and some others equally oblong, with a thorax narrower than the elytra, and forming a transversal square thickened on the sides, constitute the genus *Lima* of Megerle\*.

We will terminate this tribe with those Chrysomelinæ whose maxillary palpi are attenuated at the extremity and terminated in a point. They will form two subgenera.

PHÆDON,—COLAPHUS, *Meg.*,

Where the body is ovoid or orbicular †, and

PRASOCURIS, *Lat.*—HELODES, *Fab.*,

Where the body is narrower, more elongated, and almost a parallelepiped, and where the diameters of the thorax are nearly equal. The four or five last joints of the antennæ are dilated, and almost form a club ‡.

In the third and last tribe of the Cyclica, that of the GALERUCITÆ, we find antennæ always at least as long as the half of the body, of equal thickness throughout, or insensibly thicker towards their extremity, inserted between the eyes, at but little distance from the mouth, and usually approximated at base, and near a small longitudinal carina. The maxillary palpi, thickest about the middle, terminate in two joints, in the form of a cone, but opposed or united at base, the last short, and either truncated, or obtuse or pointed. The body is sometimes ovoid or oval, and sometimes almost hemispherical. In several, and particularly the smaller species, the posterior thighs are very stout, which enables them to leap.

This tribe is composed of the genus

GALERUCA,

Which we will divide into two principal sections; those which are destitute of the power of leaping, or the Isopoda, and the Jumpers or the Anisopoda.

Some species foreign to Europe, in which the penultimate joint of the maxillary palpi is dilated, and the last much shorter and truncated, form the genus

\* See the Catalogue, &c., of Dahl.

† See the Catalogue of Dahl, but add to it certain Chrysomelæ, such as the following: *raphani*, *vitellinæ*, *polygoni*, &c. The antennæ of the species called *armoriacæ*, *cochleariæ*, in the thickening of their terminal extremity, closely approach those of the Helodes.

‡ See *Lat.*, *Gener. Crust. et Insect.*, III, p. 57, Fabricius, Olivier, Schœnherr, and Gyllenhal. To the species quoted, add the *aucta*, *marginella*, *hannoverana*.



ADORIUM, *Fab.*—OIDES, *Web.*\*

Those in which the two last joints of the maxillary palpi differ but little as to size, and in which the antennæ, composed of cylindrical joints, are at least as long as the body, have been distinguished by the generic name of

LUPERUS, *Geoff.* †

The others, which, with similarly terminated palpi, have shorter antennæ, composed of obconical joints, form the true *Gallerucæ*, or the

GALERUCA, *Geoff.*

Such are the

*G. calmariensis*; *Chrysomela calmariensis*, L.; Oliv., Col: VI, 93, iii, 37. Three lines in length; yellowish or greenish above; three black spots on the thorax; another, with a stripe of the same colour, on each elytron.—This species, together with its larva, is found on the Elm; in certain seasons, when unusually abundant, it strips these trees of their foliage, and does as much mischief as certain caterpillars.

*G. tanaceti*; *Chrysomela tanaceti*, L.; Oliv., Ib., I, 1. Oval, oblong, very black, and but slightly glossy; elytra deeply punctured and without striæ. On Tansy ‡.

The jumping *Galerucitæ*, or those whose posterior thighs are inflated, and which are distributed by Fabricius among the genera *Chrysomela*, *Galeruca*, and *Crioceris*, are united in one, that of *Altica* or *Haltica*, in the systems of Geoffroy, Olivier, and Illiger. These Insects are very small, but are ornamented with various or brilliant colours; they jump with great quickness and to a very great height, and frequently destroy the leaves of those plants on which they feed. Their larvæ devour the parenchyma, and there undergo their metamorphosis. Certain species, those particularly which are commonly termed *garden fleas*, are very injurious in both states to our kitchen gardens. Of all countries, South America furnishes the greatest number. Illiger, in his *Entomological Magazine*, has published an excellent Monograph of these Insects, which he arranges in nine families, and some of which, in our opinion, should form separate subgenera. Those of the subgenus

OCTOGONOTES, *Drap.*§,

Are removed from all others by the form of their maxillary palpi. As in *Adorium*, the penultimate joint is thick and turbiniform, and the last very short and truncated; the termination of the labial palpi is acuminate or subulate, as in all the following subgenera; but here the maxillaries are similarly formed, or are also subulate at their ex-

\* *Web.*, *Observ. Entom.*; *Lat.*, *Gener. Crust. et Insect.*, III, p. 60, and I, xi, 9; *Oliv.*, *Col.*, V, 92, bis; *Schænh.*, *Ib.*, II, p. 230; *Fab.*, *Syst. Eleut.*

† *Oliv.*, *Col.*, IV, 75, bis; *Schænh.*, *Ib.*, p. 292, 294; *Germ. Insect. Spec. Nov.*, p. 598.

‡ See *Oliv.*, *Col.*, *Ib.*

§ *Ann. des Sc. Phys.*, III, p. 181.

tremity. The last joint of the posterior tarsi of the Octogonotes is abruptly inflated and rounded above, or ampullaceous, with the two terminal hooks inferior and small.

ÆDIONYCHIS, *Lat.*,

Is distinguished by this last character from the following subgenera. To this subgenus we refer the two first families of Illiger's Monograph.

But a single species is found in Europe—the *A. marginella*, Oliv., Col., VI, 93, *bis*, ii, 34—and even that is confined to Spain and Portugal\*.

In the remaining subgenera the last joint of the tarsi is elongated and gradually thickened, with the two hooks, of the ordinary size, situated as usual at its extremity, and in a longitudinal direction.

PSYLLIODES, *Lat.*

Where the first joint of the posterior tarsi is very long and inserted above the posterior extremity of the tibiæ; this extremity is prolonged in the manner of a conical, compressed, and hollow appendage, somewhat dentated along its edges, and terminated by a small tooth †.

DIBOLIA, *Lat.*—olim ALTITARSUS.

Where the greater part of the head is sunk in the thorax, and the posterior tibiæ are terminated by a forked spine ‡. In *Altica* proper, or

ALTICA, *Lat.*,

The head is salient, and the posterior tibiæ are truncated at their extremity, and without any particular prolongation or forked spine; the tarsus originates from this extremity, and its length is not equal to half that of the tibia.

*A. oleracea*; *Chrysomela oleracea*, L.; Oliv., Col., VI, 93, *bis*, iv, 66. About two lines in length; oval, elongated; green or bluish; a transverse impression on the thorax; elytra finely punctured. On vegetables. It is the largest of the European species.

*A. nitidula*; *Chrysomela nitidula*, L.; Oliv., Ib., V, 80. Green; head and thorax golden; legs fulvous. On the Willow §.

\* Add the *A. bicolor*, *thoracica*, *cincla*, *albicollis*, *lanata*, and some other species of Olivier.

† The ninth family, or the *Altitarsi*, Illig., comprising the following species of Gyllenhal: *chrysocephala*, *napi*, *hyosciami*, *dulcamara*, *affinis*.

Those which he calls *dentipes*, *aridella*, and some others in which the posterior tibiæ are dilated near the middle of their posterior side, in the form of a tooth, with a canal beneath, longitudinal and ciliated along the edges, might constitute a separate subgenus.

‡ The eighth family, the *A. Echii*, Oliv., and the *A. occultans*, Gyll.

§ The 3, 4, 5, 6, families of the same.

LONGITARSUS, *Lat.*

All the characters of *Altica* proper or of the preceding subgenus, but the posterior tarsi are at least as long as the tibiæ to which they are attached\*.

## FAMILY VII.

## CLAVIPALPI.

The Insects of our seventh and last family of the Tetramera are distinguished from all those of the same section, having, like them, the under part of the three first joints of the tarsi furnished with brushes and the penultimate bifid †, by their antennæ, which are terminated in a very distinct and perfoliated club, as well as by their maxillæ, armed on the inner side by a nail or corneous tooth. In some few the joints of the tarsi are entire, but they are removed from the other Tetramera with analogous tarsi, by their body, which is almost globular, and contracts into a ball.

Their body is most commonly of a rounded form, and frequently even, very convex, and hemispherical; the antennæ are shorter than the body, the mandibles emarginated or dentated at the extremity, and the palpi terminated by a large joint; the last joint of the maxillary palpi is very large, transversal, compressed, and almost lunate. The form of their organs of manducation shows them to be gnawers, and in fact the species indigenous to Europe are found in the *Boleti* which grow on the trunks of trees, under their bark, &c.

Some have the penultimate joint of the tarsi bilobate, and do not contract themselves into a ball.

They may be re-united in the single genus

EROTYLUS, *Fab.*

Here, the last joint of the maxillary palpi is transversal, and almost lunate or securiform.

EROTYLUS, *Fab.*

In the *Erotyli* properly so called, and from which the *Ægithi*, *Fab.*, do not appear to us to be essentially distinct, the intermediate joints of the antennæ are almost cylindrical, and the club, formed by the last ones, is oblong; the interior and corneous division of their maxillæ is terminated by two teeth.

They are peculiar to South America ‡.

\* The seventh, such as the *A. lurida*, *atricilla*, *quadripustulata*, *dorsalis*, *holsatica*, *parvula*, *anchusæ*, *atra*, of Olivier, Gyllenhal, &c.

† The last has a knot at base, a character also observed in the *Coccinellæ*.

‡ See Oliv., Col., V, 89; Schænh., *Synon. Insect.*, II, genera *Ægithus*, *Erotylus*; and the Monograph of this genus by M. Duponchel, who has continued the work of Godart on the Lepidoptera of France, inserted in the *Mémoires du Muséum d'His-*  
*toire Naturelle.*

TRIPLAX, TRITOMA, *Fab.*

These Insects differ from the Erotlyi in their antennæ, which are almost granose, and terminated in a shorter and ovoid club, and in their maxillæ, of which the interior division is membranous, with a single and small terminal tooth.

Those which are almost hemispherical or nearly round form the genus TRITOMA of Fabricius. Such is the

*T. bipustulatum*, Oliv., Col. 89, bis, I, 5. Black, with a large red spot at the base of each elytron. In the Boleti and Mushrooms\*.

Those which are oval or oblong form the genus TRIPLAX proper of the same naturalist †.

In the other the last joint of the maxillary palpi is elongated, and more or less oval.

LANGUIRA, *Lat.*, Oliv.—TROGOSITA, *Fab.*

Where the body is linear and the antennal club consists of five joints.

They are all foreign to Europe ‡.

PHALACRUS, *Payk.*—ANISTOMA, *Illig.*, *Fab.*—ANTHRIBUS, *Geoff.* Oliv.

Where the body is almost hemispherical and the club of the antennæ consists of but three joints §.

On flowers and under the bark of trees.

In the remaining Clavipalpi all the joints of the tarsi are simple, and the body is nearly globular. They form the genus

AGATHIDIUM, *Illig.*—ANISOTOMA, *Fab.* ||

In the fourth section of the Coleoptera, that of the TRIMERA, there are but three joints to all the tarsi. The Trimera form three families. Those of the two first are closely related to the last of the Tetramera. Their antennæ, always composed of eleven joints ¶, terminate in a club formed by the three last, which is compressed, and in the form of a reversed cone or triangle. The first joint of the tarsi is always very distinct; the penultimate is usually bilobate, and the last, which presents a knot at base, is always terminated by two hooks. The elytra entirely cover the abdomen, and are not truncated. The last of the Trimera, or those of the third family, in this character, as well

\* *Fab.*, Syst. Eleut.

† *Fab.*, Ib. See Oliv., Col., V, 89, bis, genus *Triplax*. The *Tritomæ*, Geoff., are Mycetophagi.

‡ *Lat.*, Gener. Crust. et Insect., III, p. 65, I, xi, 11; Oliv., Col., V, 88. Add the *Trogositæ elongata* and *filiformis*, *Fab.*

§ See Gyll., Insect. Succ., and Sturm, Faun. Germ., II, xxx, xxxii.

|| See the Faun. Germ., Sturm, and the Insect. Succ., Gyll., &c.

¶ In *Clypeaster* I counted but nine; the Insects, however, are so small that there may have been some mistake.

as in several others, approximate to the Pentamerous Brachelytra, and some other Coleoptera of the same section, such as the Mastigi and Scydmaeni; their habits are also very different from those of the other Trimeræ.

## FAMILY I.

### FUNGICOLÆ.

In our first family of this section we observe antennæ longer than the head and thorax united, an oval body, and a trapezoidal thorax. The maxillary palpi are filiform or a little thicker at the end, but are terminated by a very large and securiform joint. The penultimate joint of the tarsi is always deeply bilobate.

This family may be reduced to one great genus.

### EUMORPHUS.

In some the third joint of the antennæ is much longer than the preceding and following ones. Such are

EUMORPHUS, *Web. Fab.*,

Or the Eumorphi proper, where the club of the antennæ is abrupt, compact, strongly compressed, and in the form of a reversed triangle. The maxillary palpi are filiform, and the two last joints of the labials united form a triangular club.

They are all peculiar to America and the East Indies\*.

### DAPSA, Zieg.

Where the club of the antennæ is narrow, elongated, and composed of joints, laterally remote, the last of which is almost ovoid †.

In the others the third joint is but little longer than that of the preceding and following ones.

Several species are indigenous to Europe, and live in the Lycoperdons, or under the bark of the Birch and some other trees.

### ENDOMYCHUS, *Web. Fab.*

Where the four palpi are thickest at the extremity; the three last joints of the antennæ are separated laterally, are larger than the preceding ones, and compose a club in the form of a reversed triangle ‡.

### LYCOPERDINA, *Lat.*—ENDOMYCHUS, *Fab.*

Where the maxillary palpi are also filiform; the last joints of the labials is larger than the preceding ones, and almost ovoid; the

\* See *Fab.*, Oliv.—Col. VI, 99—Schænh., and *Lat.*—Gener. Crust. et Insect. III, p. 171—but, with the exception of the *E. Kirbyanus*, which, it appears to me, should be referred to *Dapsa*.

† See Catalogue, &c., *Dahl*. Add the *Eumorphus Kirbyanus*, *Lat.*, Gener. Crust. et Insect., I, xi, 12.

‡ See *Lat.*, Gener. Crust. et Insect., III, p. 72; *Gyllenh.*, Insect. Suec.; and the Catalogues of *Dahl* and *Dejean*.

fourth and following ones of the antennæ, to the ninth inclusively, are almost granose, and the two last in the form of a reversed triangle\*.

## FAMILY II.

### APHIDIPHAGI.

This family consists mostly of Insects which have an almost hemispherical body, and a very short, transversal, and almost lunate thorax. Their antennæ terminate in a compressed and obconical club, composed by the three last joints, and are shorter than the thorax. The last joint of the maxillary palpi is very large and securiform, and the penultimate joint of the tarsi is profoundly bilobate.

In the other Trimera of the same family, the joints of the tarsi are simple, and the penultimate at least is slightly bifid, which, with some other characters, distinguishes these Insects from the Fungicolæ.

Here, the body is more or less thick, and never much flattened in the manner of a shield; the thorax is transversal; the head is exposed; the antennæ consist of eleven distinct joints, the last of which form an obconical club.

These Insects compose the genus

### COCCINELLA.

#### LITHOPHILUS, *Frohl.*

Where the body is ovoid, the thorax strongly recurved laterally, and narrowed posteriorly, and the penultimate joint of the tarsi, as well as the preceding one, is very slightly bifid †. In

#### COCCINELLA, *Lin. Geoff. Fab. Oliv.,*

Or *Coccinella* proper, the body is almost hemispherical, the thorax very short, almost lunate, the margin not recurved or but very slightly, and the penultimate joint of the tarsi profoundly bilobate.

Various species of this genus are extremely common on the trees and plants of our gardens, and frequently in our houses; they are known by the names of the *Scarabées hemispheriques* or *Tortues*, *Bête à Dieu*, *Vache à Dieu*, *Cow-bug*, *Lady-bug*, &c. The figure of these Insects, which is frequently hemispherical, the number and arrangement of the spots on their elytra, that form a sort of mosaick on a fulvous, yellow or black ground, together with the vivacity of their motions, render them easily distinguishable. They are among the first that appear in spring. When seized, they fold their legs against their body, and like

\* See the above works, and the *Insect. Spec. Nov. of Germar.*

† *Lithophilus ruficollis*, *Dahl, Catal.*, p. 44; *Tritoma conatum*, *Fab.* This genus would, perhaps, be placed more naturally near *Triplax*, *Fab.*; but in the antennæ it also approaches the *Coccinellæ*. *Count Dejean* arranges it among the *Heteromera*.

the Chrysomelæ, Galerucæ, &c. expel a yellow mucilaginous humour of a penetrating and disagreeable odour, from the articulation of the thighs with the tibiæ. They feed on Aphides, their larvæ, which in form and their metamorphoses greatly resemble those of the Chrysomelæ, employing the same aliment. According to the observations of M. Leon Dufour, they are provided with salivary vessels.

Individuals, very different as to colour, are sometimes found in coitu—the result of this intercourse, however, has never been observed.

*C. 7-punctata*, L.; Oliv., Col. VI, 98, i, 1. Length, three lines; black; elytra red, with three black dots on each, and a seventh, common to both, underneath the scutellum. The most common species in France.

*C. 2-punctata*, L.; Oliv., Ib., vii, 104. All black, with a short, red, transverse band on the elytra\*.

There, the body is much flattened, in the form of a shield, and the head is concealed under an almost semicircular thorax. The antennæ present distinctly but nine joints, and terminate in an elongated club. The joints of the tarsi are entire. The præsternum forms a sort of chin-cloth anteriorly.

Such are the characters of the genus

CLYPEASTER, *Andersch.*—COSSYPHUS, *Gyll.*

They are found under the bark of trees, and under stones †.

### FAMILY III.

#### PSELAPHII ‡.

These Insects, which constitute our third and last family of the Trimera, in their short, and truncated elytra that only cover part of the abdomen, bear a certain resemblance to the Brachelytra, and particularly to the Aleocharæ. This last part of their body, however, is much shorter, wide, very obtuse and rounded posteriorly. The antennæ, terminated by a club, or, thicker towards the extremity, sometimes consist of but six joints. The maxillary palpi are usually very large, and all the joints of the tarsi are entire; the first, much shorter

\* For the other species, see Oliv., Ib.; Schœnh., Synon. Insect., II, p. 151, and Gyllenb., Insect. Succ. The genera *Scymnus* and *Cacidula*, separated from the preceding one, do not appear to me to be sufficiently distinct from it.

† See Schœnherr and Gyllenb. One species, the *C. pusillus*, Dej., is figured by Ahrens in his Faun. Insect. Europ., fascic., VIII, t. X.

‡ But few Insects are now so well known as these. For this knowledge we are chiefly indebted to the zeal and labours of MM. Reichenbach (Monog. Pselaph.), Muller (Mag. Entom. Germ.), Leach (Zoolog. Misc.), and Gyllenb.—Insect. Succ., IV.



than the following ones, is scarcely visible at the first glance, and the last is most commonly terminated by a simple hook.

They are found on the ground under the debris of vegetable matters; some inhabit certain ant-hills.

Those which have eleven joints in the antennæ form the genus

*PSELAPHUS*, *Herbst*.—*STAPHYLINUS*, *Lin.*—*ANTHICUS*, *Fab.*

In some few the tarsi are furnished with hooks.

*CHENNIUM*, *Lat.*

Where the ten first joints of the antennæ are almost equal and lenticular, and the eleventh or last is larger and nearly globular. The palpi do not project\*.

*DIONIX*, *Dej.*

Where the third joint of the antennæ and the four following ones are very small, transversal and granose; the eighth and three following ones are thicker than those which precede them, cylindrical, and as long as the first seven taken together; the two penultimates are conical and equal; the last is ovoid, elongated, pointed, and the thickest of all. The maxillary palpi are very salient—but shorter than the head and thorax united—and consist of four cylindrical joints. The labials are short, directed forwards, and consist of three joints with a point at the end †.

The others have but a single hook at the extremity of the tarsi.

Here, the maxillary palpi, flexed or geniculated, are at least as long as the head and thorax; their second and fourth joint are much elongated, narrowed at base, and terminated in a club.

Sometimes the antennæ, evidently longer than the head and thorax, terminate in a club formed by the three last joints, which are manifestly larger than the preceding ones, the last being almost ovoid or ovoido-conical.

*PSELAPHUS*, *proper.*—*PSELAPHUS*, *Herbst* ‡.

Sometimes the ninth and tenth joints of the antennæ, the length of which, at most, is equal to that of the head and thorax, are hardly larger than the preceding ones; the eleventh or last is alone much thicker, nearly spherical, and with an acicular point at the end.

*BITHYNUS*, *Leach.*

Where the second joint of the antennæ is much thicker than the first, and dilated on the inner side in the manner of a tooth §.

\* *Lat.*, *Gener. Crust. et Insect.* III, p. 77; a single species—*bituberculatum*—extremely well figured in the atlas of the *Dict. des Sc. Nat.*

† In this family, two of the palpi at least are thus terminated. For this genus, see *MM. Lepeletier and Serville, Encyc. Méthod., Entom.*, X, p. 221.

‡ The *Pselaphii* *Herbstii*, *Hiesii*, *longicollis*, *dresdensis*, &c. of Reichenbach or his first family of this genus; the thorax is elongated.

§ *Ps. securiger*, *EjUSD.* See *Leach, Zool. Miscell.*, III, page 80, 82, 83.

ARCOPAGUS, *Leach.*

Where, on the contrary, the second joint of the antennæ is much more slender than the first, and where the latter is even sometimes dilated\*.

There the maxillary palpi are shorter than the head and thorax taken together; the fourth joint at least is short or but slightly elongated, and ovoid or triangular.

CTENISTES, *Reich.*

These Insects are very distinct from all others of the same family, in the three last joints of the maxillary palpi, on the outer side of which we observe a point or tooth with a terminal seta; the second is very long, arcuated, and inflated and rounded at the end; the two following ones are almost globular. The last joint of the antennæ is much larger than the preceding ones, and somewhat oval. The thorax forms an elongated and truncated cone †.

BRYAXIS, *Leach.*—EUPLECTUS, TYCHUS, *EjUSD.*

Where no such characters are presented by the maxillary palpi; their last joint is elongated and conical or securiform. The thorax is short, hardly longer than wide, and rounded ‡.

In the last of the *Pselaphii* we observe this peculiarity—their antennæ consist of but six joints, or even one. They form the genus

## CLAVIGER.

CLAVIGER *proper,*

Where the antennæ consist of six distinct joints.

These Insects have no apparent eyes. The maxillary palpi are very short, without distinct articulations, and with two terminal hooks. The two first joints of the tarsi are very short; the third and last is very long, with a single hook at the extremity.

These *Pselaphii* are found under stones in barren localities, and even in the hills of certain small yellow Ants. An excellent Monograph of this genus has been published by M. Müller, in the third volume of the *Magasin der Entom.* of M. Germar §.

ARTICERUS, *Dalm.*

Where the antennæ appear to be composed of a single joint, forming a cylindrical and elongated club, truncated at the extremity. The eyes are distinct and the tarsi are terminated by two hooks ||.

\* *Ps. glabricollis*, Reich.; *EjUSD.*, *Ps. clavicornis*; Leach, *Ib.*, 80, 83, 84.

† Reich., *Monog.*, p. 75, et seq.

‡ See Leach, *Zool. Misc.* The form of the last joint of the maxillary palpi, as well as the relative proportions of those of the antennæ, may offer good characters for division, but they do not appear to me of sufficient importance to designate generic sections. See the article *Pselaphiens* of the *Encyclopédie Méthodique*.

§ See also Gyll., *Insect. Succ.*, IV, p. 240.

|| *Articerus armatus*, *Dalm.*, *Insects in Copal*, p. 21, tab. v, f. 12. According to this figure, the tarsi are provided with two hooks.

The tarsi of the *Dermestes atomarius* of De Geer having appeared to M. Leclerc de Laval to be composed of but one joint, with this Insect and some others we formerly established a new division of the Coleoptera, that of the MONOMERA, which has been adopted by M. Fischer in his *Entomographia Imperii Russici*, and who, with this Insect, has formed a new genus, which he names *Clambus*. But it appears—Gyllenh., *Insect. Succ.* IV, p. 292, 293—that M. Schuppel, who of all our entomologists has accustomed himself the most to minute and delicate observations, has made the same section under the name of *Ptilium*. M. Gyllenhal, had united the species with the Scaphidia, and, in fact, we think that the proper situation of this new genus will be found in the vicinity of the latter.

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## ORDER VI.

### ORTHOPTERA \*.

In the Insects of this order, partly confounded by Linnæus with the Hemiptera, and re-united by Geoffroy to the Coleoptera, but as a particular division, we find the body generally less indurated than in the latter. and soft, semi-membranous elytra, furnished with nervures which, in the greater number, do not join at the suture in a straight line. Their wings are folded longitudinally, most frequently in the manner of a fan, and divided by membranous nervures running in the same direction. The maxillæ are always terminated by a dentated and horny piece covered with a *galea*, an appendage corresponding to the exterior division of the maxillæ of the Coleoptera. They have also a sort of tongue or epiglottis.

The Orthoptera † undergo a semi-metamorphosis, of which all the mutations are reduced to the growth and development of the elytra and wings, that are always visible in a rudimental state in the nymph. As both this nymph and the larva are otherwise exactly similar to the perfect Insect, they walk and feed in the same way.

The mouth of the Orthoptera consists of a labrum, two mandibles, as many maxillæ, and four palpi; those of the jaws always have five joints; whilst the labials, as in the Coleoptera, present but three. The mandibles are always very strong and corneous, and the ligula is constantly divided into two or four thongs. The form of the antennæ varies less than in the Coleoptera, but they are usually composed of a greater number of joints. Several, besides their reticulated eyes, have two or three small simple ones. The inferior surface of the first

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\* The *Ulonata*, Fab.

† In this order and in those of the Lepidoptera, Hymenoptera, and Rhipiptera, as well as in the Apterous Hexapoda, there are no aquatic species.

joints of the tarsi is frequently fleshy or membranous\*. Many females are furnished with a true perforator formed of two blades, frequently inclosed in a common envelope, by means of which they deposit their eggs. The posterior extremity of the body, in most of them, is provided with appendages.

All Orthopterous Insects have a first membranous stomach or crop, followed by a muscular gizzard, armed internally with corneous scales or teeth, according to the species; round the pylorus, except in the Forficulæ, are two or more cæca, furnished at the bottom with several small biliary vessels. Other vessels of the same description are inserted in the intestine near the middle.

The intestines of the larva are similar to those of the perfect Insect †.

All the known Orthoptera, without exception, are terrestrial, even in their two first states of existence. Some are carnivorous or omnivorous, but the greater number feed on living plants. The species that belong to Europe produce but once a year; this takes place towards the end of the summer, which is also the period of their final transformation.

We will divide the Orthoptera into two great families ‡.

\* In the Acrydia, the under part of the first joint presents three pellets or divisions.

† M. Marcel de Serres professor of Mineralogy at Montpellier, has made the anatomy of these animals his special study. According to him the Orthoptera with cetaceous antennæ, such as the Blattæ, Mantes, Gryllo-talpæ, Grylli, and Locustæ, have only elastic or tubular tracheæ, which are of two kinds, arterial and pulmonary. The latter alone distribute air throughout the body, after having received it from the former. In Orthoptera with cylindrical or prismatic antennæ, such as the Acrydia and Truxales, the pulmonary tracheæ are replaced by those that are vesicular. They are furnished with cartilaginous hoops or movable ribs, and receive air from tubular or elastic tracheæ proceeding from the arterial tracheæ. The nutritive system is more or less developed and presents four principal modifications. The Grylli and Gryllo-talpæ have the advantage in this respect over the others. The crop is utriculiform and placed sideways, while in the others it is in the direction of the gizzard. Here the hepatic vessels are inserted separately: in the former, that insertion is effected through the medium of a common deferent canal. The Truxales and Acrydia, although approximated to the Locustæ by their digestive system, still differ from them in their superior hepatic vessels, the extremity of which is no longer furnished with secretory vessels, and which form cylindrical and elongated canals, but not widened sacs. The intestines of the Blattæ and Mantes present but two divisions; their nutritive system is otherwise the same. Whenever there is but a single testis, the female has but one ovary; this is the case in all those which have vesicular tracheæ. Those which only have elastic or tubular tracheæ, are furnished with two testes and two ovaries. The vesiculæ destined to lubricate the common spermatic canal are either double or single, according to the presence of one testis or two. The common oviduct of the females is also provided with a lubricating vesicle. The Forficulæ, on which he is silent, are removed from all other Insects of the same order, according to Baron Cuvier, by the absence of superior hepatic vessels. For the anatomy of these latter Insects we refer the reader to the Memoirs of MM. Posselt and Leon Dufour. With respect to the power of flight, it is evident that it is much greater in the Acrydia and Truxales, than in the other Orthoptera.

‡ Forming three sections in our Fam. Nat. du Règn. Anim. The first is divided

In those which compose the first, all the legs are similar, and only adapted for running,—they are the *Cursoria*, or runners. In those which constitute the second, the posterior pair of thighs are much larger than the others, thereby enabling them to leap. Besides this, the males produce a sharp or stridulous noise—they are the *Saltatoria* or jumpers.

## FAMILY I.

### CURSORIA.

In this family the posterior legs, as well as the others, are solely adapted for running.

Almost all these Insects have their elytra and wings laid horizontally on the body; the females are destitute of a corneous ovipositor.

They form three genera: in the first or the

#### FORFICULA, *Lin.*,

There are three joints in the tarsi; the wings are plaited like a fan, and folded transversely under very short and crustaceous elytra, with a straight suture; the body is linear, with two large, squamous, mobile pieces, which form a forceps at its posterior extremity.

The head is exposed.

The antennæ are filiform, inserted before the eyes, and composed of from twelve to thirty joints, according to the species. The galea is slender, elongated, and almost cylindrical. The ligula is forked. The thorax in the form of a scale.

The researches of MM. Randohr, Posselt, Marcel de Serres, and those of M. Leon Dufour in particular, have unveiled to us the internal organization of these Insects. The latter gentleman has discovered two salivary glands, each consisting in a vesicle, more or less ellipsoidal, situated in the prothorax or thorax, terminated posteriorly by an extremely tenuous thread, and anteriorly by a tubular, capillary neck, which is slightly inflated near the pharynx, and then unites with the corresponding portion of the other gland to form a common trunk opening into the mouth.

The digestive canal consists of an esophagus, a large elongated crop, and of a short gizzard furnished internally for trituration, with six longitudinal and almost callous columns, in the form of lancets, separated by as many grooves, and with a valve at its ventricular aperture; of a stomach or chylific ventricle, at the posterior extre-

into four families corresponding to the genera *Forficula*, *Blatta*, *Mantis*, and *Pasma*. The second comprises two families constituted by the genera *Acheta* and *Locusta*. The third section forms another family, having for its type the genera *Pneumora*, *Truxalis*, and that of *Gryllus*, Fab., or the *Acrydium*, Geoff. See also for further details on the Insects of this order, the Memoirs of the Academy of St. Petersburg, 1812.

This division into two great families is confirmed by their anatomy, the Insects of the first having tubular tracheæ only, and those of the second such as are vesicular.

mity of which are inserted numerous—thirty according to M. Dufour—hepatic vessels with a beak-like termination, a circumstance which removes these Insects from the Coleoptera, and approximates them to the other Orthoptera and to the Hymenoptera; and finally, of a small intestine, a cæcum, and a rectum. The rectum, like that of several Hymenoptera, presents well circumscribed, muscular eminences, on which, by the aid of the microscope, we can discern highly ramified expansions of the tracheæ. According to M. Dufour, the apparatus of the genital organs differs essentially in various points from that of the Coleoptera and Orthoptera. Thus, for instance, the vesiculæ seminales, instead of being arranged symmetrically in pairs, consist of a single reservoir. Each testis is composed of two elongated, and more or less contiguous seminal capsules. The form of the ovaries, considered in mass, varies greatly, according to the species. Sometimes they resemble two clusters of grapes, and sometimes two bundles. In those females which have never been fecundated, the ovigerous sheaths have successive strangulations, which give them the form of the beads of a rosary. We can pursue no further the observations of this savant, either in relation to the organs of respiration, which consist in tubular tracheæ, or to the apparatus of sensation, or to the splanchnic adipose pulp. It has been said, that the second joint of the tarsi was bilobate: he observes, that it is simply dilated beneath, near the extremity, in the form of a reversed heart, and without emargination. He marks the two species submitted to his scalpel by detailed and rigorous characters\*.

These Insects are very common in cool and damp places, frequently collect in troops under stones and the bark of trees, are very injurious to our cultivated fruits, devour even their dead congeners, and defend themselves with their pincers, which frequently vary in form, according to the sex. It has been thought that they insinuate themselves into the ear, and to this they owe their name.

*F. auricularia*, L.; De Geer, Mem. Insect., III, xxv, 16, 25. Length, half an inch; brown; head red; margin of the thorax greyish; legs an ochraceous yellow; fourteen joints in the antennæ.

The two sexes in coitu are united end to end. The female keeps careful watch over her eggs, and for some time over her young ones.

*F. minor*, L.; De Geer, Ib., pl. xxv, 26, 27. Two-thirds smaller than the *auricularia*; brown; head and thorax black; legs yellow; eleven joints in the antennæ. Found more particularly about dung-hills †.

\* For other details, see his Memoir in the Ann. des Sc. Nat. XIII, 337. According to the same naturalist, these Insects should form a particular order, which he calls that of the *Labidoures*. M. Kirby had previously established it under the denomination of *Dermaptera*. Doctor Leach divides the remaining Orthoptera into two other orders. Those in which the wings are plaited and longitudinal, and where the suture of the elytra is straight, form that of the Orthoptera proper. Those in which the elytra cross each other, the wings still remaining as usual, constitute that of the *Dictyoptera*.

† Add *F. bipunctata*, Fab.; Panz., Faun. Insect. Germ., LXXXVIII, 10;—*F.*



BLATTA, *Lin.*,

Where there are five joints to all the tarsi. The wings are only plaited longitudinally, the head is concealed under the plate of the thorax, and the body oval, orbicular, and flattened.

Their antennæ are setaceous, inserted into an internal emargination of the eyes, long, and composed of a great many joints. The palpi are long, the thorax has the form of a shield. The elytra are usually of the length of the abdomen, coriaceous or semi-membranous, and slightly cross each other at the suture. The posterior extremity of the abdomen presents two conical and articulated appendages. The tibiæ are furnished with small spines. Their crop is longitudinal, and their gizzard is provided internally with strong, hooked teeth. They have eight or ten cæca round the pylorus.

The Blattæ are very active nocturnal insects, some of which live in the interior of our houses, particularly the kitchen, in bake-houses and flour-mills; the others inhabit the country. They are extremely voracious, and consume all sorts of provisions. The species peculiar to the French colonies are termed there *Kakerlacs* or *Kakerlaques*, and are a source of continued irritation to the inhabitants, on account of the devastation they occasion. They not only devour our articles of food, but attack cloth, linen, silk, and even shoes. They also eat Insects. Certain species of *Sphex* are constantly at war with them.

*B. orientalis*, L.; De Geer, Mem. Insect., III, xxv, i, 7. Length ten lines; reddish chesnut-brown; wings of the male shorter than the abdomen; those of the female mere rudiments.

The eggs of the latter are inclosed symmetrically in an oval and compressed shell, first white, then brown, and serrated on one side. The insect carries it for some time at the anus, and then fixes it by means of a gummy matter to various bodies. This species is a scourge to the inhabitants of Russia and Finland. It is said to be originally from Asia, and, according to some authors, from South America.

*B. lapponica*, L.; De Geer, *Ib.*, 8, 9, 10. Blackish brown; margin of the thorax of a light grey; elytra of the same colour. It attacks the stock of dried fish, which the Laplanders use instead of bread. In Europe it inhabits the woods.

*B. americana*, De Geer, *Ib.*, xlv, 1, 2, 3. Reddish; thorax yellowish, with two brown spots and a margin of the same colour; abdomen reddish; very long antennæ.—America.

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*gigantea*, Fab.; Herbst., Archiv. Insect. XLIX, 1; see Palis. de Beauv., Insect. d'Afr. et d'Amer. The two species quoted, and all those which have not more than fourteen joints in the antennæ, compose my genus FORFICULA proper—Faun. Nat. du Règn. Anim. Those which have more, such as the *F. gigantea* and others, form my genus FORFICESILA. All these Insects are winged. Those which are apterous form a third genus, that of CHELIDOURA. Doctor Leach also divides the Dermaptera into three genera; 1. *Forficula*, with fourteen joints in the antennæ; 2. *Labi-doura*, with thirty; 3. *Labia*, with twelve. For further details respecting these Insects, as well as for others of the same order, see the *Horæ Entomologiæ* of M. Toussaint Charpentier.



M. Hummel, member of the Soc. Imp. Nat. Mosc., in the first number of his Entomological Essays, has given us various interesting observations on the history of the *B. germanica*, Fab., a species of a light reddish or fulvous colour, with two black lines on the thorax\*.

### MANTIS, *Lin.*,

Where we also find five joints in all the tarsi, and wings simply plaited longitudinally; but the head is exposed, and the body narrow and elongated.

They also differ from the Blattæ in their short palpi terminating in a point, and in their quadrifid ligula.

These insects, which are only found in southern and temperate climates, remain on plants or trees, frequently resemble their leaves and branches in the form and colour of the body, and are diurnal. Some of them are rapacious and others herbivorous. Their eggs are usually enclosed in a capsule formed of some gummy substance, which hardens by exposure to the air, and divided internally into several cells; it is sometimes in the form of an oval shell, and at others in that of a seed, with ridges and angles, and even bristled with little spines. The female glues it on a plant or other body raised above the earth. Their stomach resembles that of a Blatta, but their intestines are shorter in proportion †.

In some, the two anterior legs are larger and longer than the others, the coxæ and thighs stout, compressed, armed with spines underneath, and the tibiæ terminated by a strong hook. They have three simple, distinct eyes, approximated into a triangle. The first segment of the trunk is very large, and the four lobes of the ligula are almost equal in length. The antennæ are inserted between the eyes, and the head is triangular and vertical.

These species are carnivorous, and seize their prey with their fore legs, which they raise upwards or extend forwards, flexing the tibiæ with great quickness on the under part of the thigh. Their eggs, which are numerous, are enclosed in a corresponding number of cells, arranged in regular series, and united in an ovoid mass.

They form the subgenus

### MANTIS *proper.*

Those in which the front is prolonged into a sort of horn, and in which the antennæ of the male are pectinated, are the EMPUSÆ of Illiger. The extremity of their thighs is furnished with a rounded

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\* For the other species, see De Geer, *Ib.*; Fab.; Oliv., *Encyc. Méthod.*; Fuels., *Arch. Insect.*, tab. xlix, 2--11; Coqueb., *Illust. Icon. Insect.*, III, xxi, 1; *B. pacifica*, and Touss. Charpent., *Horæ Entomol.*, p. 71--78. As to the *Blatta acervorum* of Panzer, see the subgenus MYRMECOPHILA of the following family. Those Blattæ in which one of the sexes at least is destitute of wings, such as the *B. orientalis*, and the *B. limbata*, and *B. decipiens*, of Hummel, in our *Faun. Nat. du Règn. Anim.*, form the genus KAKERLAC.

† Excellent anatomical observations on these Insects are given by M. Marcel de Serres in the *Mem. du Mus. d'Hist. Naturelle*.

membranous appendage resembling a ruffle. The margin of the abdomen is festooned in several\*.

Those which have no horn on the head, and in which the antennæ are simple in both sexes, alone compose the genus *MANTIS* of the same naturalist.

*M. religiosa*, L.; Rœes., *Insect. II, Gryll., I, II*. So called from the position to which it raises its anterior legs or arms, which resembles that of supplication. The Turks entertain a religious respect for this animal, and another species is held in still greater veneration by the Hottentots.

The *M. religiosa*, very common in the southern parts of France and in Italy, is two inches long, of a light-green colour, sometimes brown and immaculate, the inner side of the anterior coxæ excepted, where we observe a yellow spot margined with black, a character which distinguishes it from an almost similar species from the Cape of Good Hope †.

In the others, the anterior legs resemble the following ones. The eyes are simple, very indistinct, or null; and the first segment of the trunk is shorter, or at most as long as the following one. The interior divisions of the ligula are shorter than the others. The antennæ are inserted before the eyes, and the head is almost ovoid, projects, and has thick mandibles and compressed palpi.

These Insects have singular forms, resembling twigs of trees or leaves. They appear to feed exclusively on vegetables, and like several *Grylli* are coloured like the plants on which they live. There is frequently a great difference between the sexes.

They form the subgenus

#### *SPECTRUM*, Stoll,

Which has been again divided into two others ‡.

\* Stoll, *Mant.*, viii, 30; ix, 34, 35; x, 40; xi, 44; xii, 47, 48, 50; xvi, 58, 59; xvii, 61; xx, 74; xxi, 79. The fig. 94, of pl. xxiv, is a larva very similar to that of the *Mantis pauperata* of Fabricius.

† For the other species, see Stoll, genus *Mantis*, or the *Walking leaves*, those excepted which are referable to the genus *Phyllium*. See also the *Monog. Mant.* of Lichtenst., *Lin. Trans.*, VI; Palisot de Beauv., *Insect. d'Afr. et d'Amer.*; *Herbst.*, *Arch. Insect.*, and Charpent., *Hor. Entom.*, p. 87—91.

‡ MM. Lepeletier and Serville—*Encyc. Méthod.*—have added some new genera to those indicated by me in my *Fam. Nat. du Règne Animal*. In some, the prothorax is much shorter than the mesothorax; the body and legs are long and linear. The elytra, when there are any, are very short in both sexes. Those which are apterous form two genera: *BACILLUS*, where the antennæ are very short, granose, and subulate; and *BACTERIA*, where they are much longer than the head, and setaceous. The second division comprehends species furnished with wings and elytra at least in one of the sexes. Here we find no simple eyes: such are the genera *CLADOXERUS*, where the legs are equally remote, and *CYPHOCRANA*, where the four last are more approximated. There (*PHASMA*) we observe simple eyes.

In the others, the body is more or less oval or oblong and flattened, but not linear. The legs are short or but slightly elongated and foliaceous. The length of the prothorax equals at least half that of the mesothorax. The abdomen is rhomboidal and in the form of a spatula. There are no simple eyes, and the females at least are furnished with elytra. This division comprises two genera: *PRISOPUS*, where the prothorax is shorter than the mesothorax, and where both sexes are pro-

Those species in which the body is filiform or linear, resembling a stick, are the

PHASMA, *Fab.*

Several are altogether apterous, or have but very short elytra.

Very large ones are found in the Moluccas and South America.

The South of France produces the

*Ph. rossia*, *Fab.*; *Ross.*, *Faun. Etrusc.*, II, viii, 1. Both sexes apterous; yellowish green or cinereous brown; antennæ very short, granose, and conical; legs ridged; a tooth near the extremity of the thighs\*.

Those in which the body, as well as the legs, is much flattened and membranous, compose the genus

PHYLLIUM, *Illig.*

Such for instance is the celebrated

*P. siccifolium*; *Mantis siccifolia*, *Lin. Fab.*; *Stoll, Spect.*, VIII, 24—26. Extremely flat; pale green, or yellowish; thorax short, with a dentated margin; dentated leaflets on the thighs. The female is furnished with very short antennæ and elytra as long as the abdomen, but is destitute of wings. The male is narrower and more elongated, with long setaceous antennæ, short elytra, and wings the length of the abdomen.

This species is bred by the inhabitants of the Sechelles as an object of commerce.

The male of another species is figured by *Stoll, Mantes*, pl. xxiii, 89.

FAMILY II.

SALTATORIA.

The posterior legs of the Insects which compose our second family of the Orthoptera, are remarkable for the largeness of their thighs, and for their spinous tibiæ, which are adapted for saltation.

The males summon their mates by a stridulous noise, vulgarly termed singing. This is sometimes produced by rapidly rubbing against its antagonist an interior and more membranous portion of

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vided with elytra and wings that cover the greater part of their abdomen; and PHYLLIUM, where the prothorax is almost as long as the mesothorax; the females are destitute of wings and have very short antennæ, while the males have long ones and are winged, but with very short elytra. These individuals having the prothorax very long, in a natural order we should reverse the series, and begin with Phyllium.

\* For the other species, see the figure of *Stoll*, genus *Spectrum*; *Lichtenst.*, *Monog. Mant.*; *Lin. Trans.*, VI, genus *Phasma*; *Lin. Trans.*, XIV; *Palis. de Beauv. Insect. d'Afr. et d'Amer.* See also *Charpent.*, *Hor. Entom.*, p. 93, 94. The two species of *Phasma*, described by the latter—*rossium* and *gallicum*—belong to the genus *Bacillus*, already mentioned.

each elytron, which resembles a piece of talc. It is sometimes excited by a similar motion of their posterior thighs upon the elytra and wings, acting like the bow of a violin.

The greater number of the females deposit their eggs in the earth. This family is composed of the genus

GRYLLUS, *Lin.*,

Which we will divide thus :

In some species where the musical instrument of the males consists of an interior portion of their clytra, resembling a mirror or head of a drum, and where the females frequently have an extremely salient ovipositor, in the form of a stylet or sabre, we find antennæ either more slender and minute at the extremity, or of equal thickness throughout, but very short and almost resembling a chaplet. The elytra and wings, in those few which have less than four joints to all the tarsi, are laid horizontally on the body. The ligula is always quadripartite, the two middle divisions being very small. The labrum is entire.

Sometimes the elytra and wings are horizontal; the wings, when at rest, form a kind of fillet or thong extended beyond the elytra, and the tarsi have but three joints, as in the genus

GRYLLUS, *Geoff. Oliv.*—ACHETA, (*GRYLLUS ACHTA, Lin.*) *Fab.*

They conceal themselves in holes, and usually feed on insects. Several of them are nocturnal. Their crop frequently forms a lateral pouch. Their pylorus has but two thick cæca. Their biliary vessels are inserted into the intestine by a common trunk.

They form four subgenera.

GRYLLO-TALPA, *Lat.*

Where the tibiæ and tarsi of the two anterior legs are wide, flat and dentated, resembling hands, or are adapted for digging. The other tarsi are of the ordinary form, and terminated by two hooks; the antennæ are more slender at the end, elongated and multiarticulated.

*G. vulgaris*; *Gryllus gryllo-talpa*, *L.*; *Rœes.*, *Insect.*, II, *Gryll.*, xiv, xv. Length one inch and a half; brown above, reddish-yellow beneath; anterior tibiæ with four teeth; wings double the length of the clytra. This species is but too well known by the mischief it effects in gardens and cultivated grounds. It lives in the earth, where its two anterior legs, which act like a saw and shovel, or like those of a mole, open a passage for it. It cuts and separates the roots of plants, but not so much for the purpose of eating them as to clear its road, for it feeds, as it appears, on Worms and Insects. The cry of the male, which is only heard at night, is soft and agreeable.

In June and July, the female digs a rounded, smooth, subterranean cavity, about six inches in depth, in which she deposits

from two to four hundred eggs; this nest, with the gallery that leads to it, resembles a bottle with a curved neck. The young remain together for some time. For other details, see the observations of M. Le Feburier, *Nouv. Cours d'Agriculture* \*.

TRIDACTYLUS, *Oliv.*—XYA, *Illig.*

These Insects also excavate the earth, but with the anterior legs only; in lieu of posterior tarsi, they are furnished with moveable, narrow, hooked appendages, resembling fingers. The antennæ are of equal thickness, very short, and consist of ten rounded joints.

*T. variegatus*; *Xya variegata*, *Illig.*; *Chapent.*, *Hor. Entom.*, II, p. 84, f. 2, 5. Very small; black, with numerous spots or dots of a yellowish-white; a great jumper. South of France, on the shores of rivers †.

GRYLLUS *proper*,

Where none of the legs are adapted for digging, and where the posterior extremity of the female abdomen is provided with a salient ovipositor.

Their antennæ are always elongated, smaller near the extremity, and terminate in a point. The simple eyes are less distinct than in the *Tridactyli* and *Gryllo-talpæ*.

*G. campestris*, *L.*; *Rœs.*, *Insect.*, II, *Gryll.*, xiii. Black; base of the elytra yellowish; head large; posterior thighs red beneath. It excavates deep holes by the roadside, in dry soils, and in situations exposed to the sun, where it remains in ambush, watching for the insects on which it preys. There also the female lays her eggs, which amount to three hundred. This species hunts the following one.

*G. domesticus*, *L.*; *Rœs.*, *Insect.*, II, *Gryll.*, xii. Pale-yellowish mixed with brown. It frequents those parts of houses in which fires are generally kept, and which furnish it with both shelter and food, as behind chimnies, ovens, &c. Such are also its breeding places. The male produces a shrill and disagreeable noise.

Spain and Barbary produce a very singular *Gryllus*, the *G. umbraculatus*, *L.* The forehead of the male is furnished with a membranous prolongation, which falls like a veil.

MM. Lefèvre and Bibron have brought from Sicily a new and large species, described by the former under the name of *megacephalus*; its stridulous noise is prolonged for half a minute, and may be heard at the distance of a mile.

The wings of the *G. monstrosus* form several spiral convolutions at the extremity ‡.

\* *Lat.*, *Gener. Crust. et Insect.*, III, p. 95.

† *Lat.*, *ib.*, p. 96, *T. paradoxus*, *Coqueb.*, *Illust. Icon. Insect.*, III, xxi, 3.

‡ Add *Gryllus pellucens*, *Panz.*, *Faun. Insect. Germ.*, XXII, 17, male of the *Acheta italica*, *Fab.* It lives on flowers;—*Acheta sylvestris*, *Fab.*; *Coqueb.*, *Illust. Icon.*, I, i, 2;—*A. umbraculata*, *Fab.*; *Coqueb.*, *ib.*, III, xxi, 2, and other species figured by *De Geer*, *Drury*, *Herbst.*, &c. See *Fabricius*.

MYRMECOPHILA.—SPHERIUM, *Charp.*

The Myrmecophilæ have no wings; and the body is oval. With respect to their antennæ, and the absence of simple eyes, they resemble the true Grylli. The posterior thighs are extremely large.

The only species known—*Blatta acervorum*, Panz. Faun. Insect. Germ., LXVIII, 24—lives in ant-hills\*.

Sometimes the elytra and wings are tectiform, and the tarsi are quadriarticulated. The antennæ are always very long and setaceous. The mandibles are less dentated, and the galea is wider than in the Grylli. The females always have a projecting ovipositor, compressed, and in the form of a sabre.

They have but two cæca, like the preceding Insects, but the biliary vessels surround the middle of the intestine, and are inserted directly into it.

These Orthoptera are herbivorous, and form the genus

LOCUSTA, *Geoff., Fab.*—GRYLLUS TETTIGONIA, *Lin.*

Such, for instance, are the

*L. viridissima*, Fab.; Rœs., Insect., II, Gryll., x, xi. Two inches long; green and immaculate; ovipositor of the female straight.

*L. verrucivora*, Fab.; Rœs., Ib., viii. An inch and a half long; brown; elytra spotted with brown or blackish; ovipositor of the female recurved. It bites with considerable severity, and it is said that the Swedish peasants are in the habit of making it bite the warts on their hands, and that in consequence of those excrescences receiving into the wound the black and bilious fluid poured into it by the Insect, they become desiccated and disappear.

Several species of this genus are apterous, or have but very short elytra. Such is the

*L. ephippiger*, Fab., Ross., Faun. Etrusc., II, viii, 3, 4 †.

\* It is the subject, if I mistake not, of a Memoir from the pen of M. Paul Savi.

† This species, and some others, in which both sexes are almost apterous, or present at most but very short elytra resembling rounded and arched scales, form the genus EPHIPPIGER of my Fam. Nat. du Règn. Anim. That of ANISOPTERA is composed of species, the males of which are winged, and the females apterous or merely furnished with very short elytra; such are the *L. dorsalis, brachyptera.*, of M. Toussaint Charpentier. The species provided with ordinary elytra and wings, in which the antennæ are simple, and the front is not elevated pyramidically, form the genus GRYLLUS proper. Such are the first two species above described. Add to them the *Locusta varia*, Fab.; Panz., Ib., XXXIII, 1;—*L. fusca* Ib., ii;—*L. clypeata*, Ib., iv;—*L. denticulata*, Ib., v. His *Gryllus proboscideus*, Ib., XXI, 18, is the *Panorpa hiemalis*.

See also De Geer, Herstein, Donovan and Stoll, *Santeralle à sabre*, pl. i—xii; Lat., Gener. Crust. et Insect. III, p. 100.

Those Grylli, in which the front is elevated in the manner of a pyramid or cone, have been generically distinguished by Thunberg, under the name of CONOCEPHA-



Those species in which the males produce their stridulation only by rubbing their thighs against the elytra or wings, and whose females are destitute of a salient ovipositor, are distinguished from the preceding ones by their antennæ, which are sometimes filiform and cylindrical, and sometimes ensiform or clavate, and always at least as long as the head and thorax; their elytra and wings are always tectiform or inclined, and their tarsi are triarticulated. They have five or six cæca, and their biliary vessels, as in most of the order, are directly inserted into the intestine.

The ligula of the greater number is merely bipartite. They all have three distinct simple eyes, the labrum emarginated, the mandibles multidentated, and the abdomen conical and compressed laterally. They leap better than the preceding ones, fly higher and longer, and feed voraciously on vegetables. They may be comprised in one single genus, that of

### ACRYDIUM, *Geoff.*,

Which may be subdivided as follows:

Some have the mouth exposed, the ligula bifid, and a membranous pellet between the terminal hooks of the tarsi. Such are

#### PNEUMORA, *Thunb.*—*partim* GRYLLUS BULLA, *Lin.*,

Distinguished from the following by the posterior legs, which are shorter than the body, and less adapted for leaping, and by their vesicular abdomen, at least in one of the sexes.

Their antennæ are filiform.

They are only found in the most southern part of Africa\*.

### PROSCOPIA, *Klüg.*

Apterous Insects, with a long and cylindrical body; their head destitute of ocelli, is prolonged anteriorly in the manner of a cone or point, bearing two filiform antennæ, shorter than itself, and composed of seven joints at most, the last pointed. Their posterior legs are large, long, and approximated to the intermediaries, which are more than usually remote from the anterior ones. These Orthoptera, peculiar to South America, form the subject of an excellent Monograph, published by M. Klüg.

#### TRUXALIS, *Fab.*—GRYLLUS ACRIDA, *Lin.*

The Truxales, by their compressed, prismatic, ensiform antennæ, and by their pyramidally raised head, are removed from all other Orthoptera †.

LUS. Finally, the SCAPHURÆ of M. Kirby—*Lin. Trans.*, *Encyc. Méthod.*—or my *Pennicornes*, resemble ordinary Grylli, but their antennæ are bearded inferiorly, and their oviduct is scaphoid.

For other genera, see Toussaint Charpentier, and the *Mem. of the Imper. Acad. of St. Petersburg*, where Thunberg has established new generic sections.

\* *Pneumora sexguttata*, *Thunb.*, *Act. Suec.*, 1775, vii, 3;—*Gryllus inanis*, *Fab.*;—*P. immaculata*, *Thunb.*, *Ib.*, vii, 1;—*G. papillosus*, *Fab.*;—*P. maculata*, *Thunb.*, *Ib.*, vii, 2;—*G. variolosus*, *Fab.*

† *Gryllus nasutus*, *L.*; *Rœs.*, *Insect.*, II, *Gryll.* iv, 1, 2. The antennæ are false;



Some species of the following subgenus, such as the *Gryllus carinatus* of Linnæus, and the *G. gallinaceus* of Fabricius, are intermediate, by their antennæ, between *Truxalis* and *Acrydium* proper, and form the genus *XIPHICERA*, Lat.—*Pamphagus*, Thunb.

*ACRYDIUM proper*.—*Gryllus*, Fab.—*Gryllus locusta*, and some *G. BULLA*, Lin.

The true *Acrydia* differ from the *Pneumoræ* in their posterior legs, which are longer than the body, and in their solid, non-vesicular abdomen, and from the *Truxales* in their ovoid head, and their antennæ, which are filiform or terminated by a button\*.

They fly by starts, and to a considerable height.

The wings are frequently very prettily coloured, particularly with red and blue, as observed in several species that inhabit France. The thorax, in some of those that are foreign to Europe, frequently exhibits crests and large warts, in a word, a singular variety of forms.

Certain species, called by travellers *Migratory Locusts*, sometimes unite in incalculable numbers and emigrate, resembling, in their passage through the air, a thick and heavy cloud; wherever they alight all signs of vegetation quickly disappear, and a desert is speedily created. Their death frequently forms another scourge, as the air becomes poisoned by the frightful mass of their decomposing bodies.

M. Miot, in his excellent translation of Herodotus, has given it as his opinion, that the heaps of bodies of winged Serpents which that historian states he saw in Egypt, were nothing more than masses of this species of *Acrydium*. In this I perfectly agree with him.

These Insects are eaten in various parts of Africa, where the inhabitants collect them for their own use and for commerce. They take away their elytra and wings and preserve them in brine.

A considerable part of Europe is frequently devastated by the

*A. migratorius*; *Gryllus migratorius*, L.; Rœs.; Insect, II, Gryl., xxiv. Length two inches and a half; usually green, with obscure spots; elytra light brown spotted with black; a low crest on the thorax. The eggs are enveloped in a frothy and glutinous flesh-coloured matter, forming a cocoon, which the Insect is said to glue to some plant. Common in Poland.

The south of Europe, Barbary, Egypt, &c., are frequently devastated in like manner by other species, some of which are rather larger—*G. ægyptius*, *tartaricus*, L.,—which differ but little from the *Gryllus lineolus* of Fabricius, found in the south of France—Herbst., Archiv. Insect., LIV, 2,—a species proper to the same countries, and which is the one that is prepared

Herbst., Ib., vii, 7, the male; 6, the female; Stoll, viii, b. 27—Drury, Insects, II, xl, 1.

\* In many species, on each side, and near the origin of the abdomen, is a large cavity, closed internally by a very thin membranous diaphragm, coloured like nacre. I have described this organ (*Mémoires du Muséum d'Histoire Naturelle*, VIII), which must necessarily have some influence on the stridulous noise of these Insects, as well as on their flight. I have compared it to a sort of drum.

and eaten in Barbary as above described. The natives of Senegal dry another, the body of which is yellow, spotted with black; they then, as I have been told by M. Savigny, reduce it to powder, and employ it as flour. It is figured by Shaw and Denon. These two species and several others have a conical projection of the præsternum, and compose my genus *ACRYDIUM*, properly so called. Of those which do not present this character, but have likewise filiform antennæ, some are furnished with wings and elytra in both sexes. They belong to the genus which I have named *ÆDIPODA*.

Of this number are the two following *Acrydia* of authors,

*Gryllus stridulus*, L.; Rœs., Ib., XXI., 1, 23. Deep brown or blackish; thorax raised into a carina; wings red, with the extremity black.

*Gryllus cærulescens*, L.; Rœs., Ib. XXI, 4. Wings blue, somewhat tinged with green, and marked with a black band\*.

In other *Acrydia*, also winged, and with filiform antennæ, the superior portion of the thorax is very elevated, strongly compressed, and forms an acute crest, rounded and prolonged posteriorly. Certain species foreign to Europe are very large. The south of Europe produces one that is smaller, the *Acrydium armatum*, Fisch., Entomog. Imp. Russ., I, Orthop., I. 1.

In the others, *G. pedester*—*Giornæ*, Charpent.—one at least of the two sexes has elytra and very short wings, not at all adapted for flight. They form my new genus *PODISMA*.

Those *Acrydia* in which the extremity of the antennæ is inflated in the form of a button, either in one sex or both, constitute the genus *GOMPHOCERUS*, Thunb. Such is the

*A. sibiricus*; *G. sibiricus*, Fab.; Panz., Faun. Insect. Germ., XXIII, 20. Anterior tibiæ of the males strongly inflated and clavate. Found in Siberia and St. Gothard.

In the second division of the genus of the *Acrydia* the præsternum receives a portion of the under part of the head into a cavity; the ligula is quadrifid; the tarsi have no pellet between their hooks.

The antennæ are composed of but thirteen or fourteen joints. The thorax is prolonged posteriorly in the form of a large scutellum, sometimes longer than the body, and the elytra are very small.

These Orthoptera form the genus

*TETRIX*, Lat.—*Acrydium* †, Fab.—partim *Gryllus-bulla*, Lin.

It consists of very small species.

\* Add *G. biguttulus*, Panz., Ib., XXXIII, 6;—*G. grossus*, Ib. 7;—*G. pedestris*, Ib., 8; *G. lineatus*, Ib., 9; and see De Geer—*Sauterelles de passage*, pl. i—xiii, with the exception of the figures quoted under *Truxalis*;—Olivier—article *Criquet* of the Encyc. Méthod.; and the other authors quoted by Fabricius, under his genus *Gryllus*, such as Schæffer, Herbst., Drury, Rœs., &c. See also Lat., Gen. Crust. et Insect., III, p. 104. These references, however, are only applicable to the genus *Acrydium* as originally established, or with the subtraction of those here indicated, and which may be considered simple divisions.

† *Acrydium subulatum*, Fab.; De Geer; Schæff., Icon. Insect., eliv, 9, 10, clxi, 2, 3;—*A. bipunctatum*, Panz., Ib. V, 18, var.;—*A. scutellatum*, De Geer, M. Insect., III, xxiii, 15. See also Herbst., Archiv. Insect., lii, 1—5.

## ORDER VII.

## HEMIPTERA\*.

The Hemiptera, according to our system, terminate the numerous division of Insects which are provided with elytra, and of all those, are the only ones which have neither mandibles nor maxillæ properly so called. A tubular, articulated, cylindrical, or conical appendage curved inferiorly, or directed along the pectus, having the appearance of a kind of rostrum, presents along its superior surface, when raised, a groove or canal from which may be protruded three rigid, scaly, extremely fine, and pointed setæ, covered at base by a ligula. These setæ, when united, form a sucker resembling a sting, sheathed in the tubular apparatus we have just described, where it is kept in situ by the superior ligula placed at its base. The inferior seta consists of two filaments, which are united into one at a little distance from their origin, so that in reality the sucker is composed of four pieces. The inference drawn from this by M. Savigny is, that the two superior setæ, or those which are separate, represent the mandibles of the triturating Insects, and that the two filaments of the inferior seta correspond to their maxillæ †; this once admitted, the labium is replaced by the sheath of the sucker, and the triangular piece at the base becomes a labium. A true ligula also exists, and under a form analogous to that of the preceding piece, but bifid at the extremity. The palpi are the only parts which have totally disappeared: vestiges of them, however, may be perceived in *Thrips*.

The mouth of Hemipterous Insects is then only adapted for extracting fluids by suction; the attenuated stylets of which the sucker is formed, pierce the vessels of plants and animals, and the nutritious fluid being successively compressed, is forced into the internal canal, and thus arrives at the esophagus. The sheath of this apparatus is at these times frequently bent into an angle, or becomes geniculate. These Insects, like other Suctoria, are furnished with salivary vessels ‡.

In most of the Insects which compose this order, the elytra are coriaceous or crustaceous, the posterior extremity being membranous and forming a sort of an appendage to them; they almost always decussate; those of the other Hemiptera are simply thicker and larger

\* *Ryngota*, Fab.

† Or rather, in my opinion, to their terminal lobe, or that superior portion which in the Bees and Lepidoptera is prolonged into a thread or attenuated lamina, and reaches beyond the insertion of the palpi.

‡ See in particular the anatomical observations of M. Leon Dufour, on the Cicadæ and Nepæ.

than the wings, semi-membranous, like the elytra of the Orthoptera, and sometimes opaque and coloured, sometimes transparent and veined. There are a few longitudinal plicæ in the wings.

The composition of the trunk begins to experience modifications which approximate it to that of the Insects of the following orders. Its first segment, hitherto designated by the name of thorax, has, in several, much less extent, and is incorporated with the second, which is equally exposed.

Several have simple eyes, of which, however, there are frequently but two.

The Hemiptera exhibit the same forms and habits in their three states. The only change they experience consists in the development and growth of the volume of the body. They usually have a stomach with firm and muscular parietes, a small intestine, followed by a large one divided into several inflations, and biliary vessels, few in number, and inserted at a distance from the pylorus. I divide this order into two sections\*.

In the first, that of the HETEROPTERA, Lat., the rostrum arises from the front; the elytra are membranous at the extremity, and the first segment of the trunk, much larger than the others, alone forms the thorax.

The elytra and wings are always horizontal or slightly inclined.

This section is composed of two families.

## FAMILY I.

### GEOCORISÆ.

In this family the antennæ are exposed, longer than the head, and inserted between the eyes, near their internal margin. There are three joints in the tarsi, the first of which is sometimes very short.

It forms the genus

#### CIMEX, *Lin.*

In some, or the *Longilabra*, the sheath of the sucker consists of four exposed and distinct joints, the labrum is much prolonged beyond the head, subulate, and striated superiorly.

The tarsi always consist of three distinct joints, the first of which is almost as long as the second, or longer. These species always diffuse a disagreeable odour, and suck the juices of various Insects.

Sometimes their antennæ, always filiform, are composed of five joints; the body is generally short, oval, or rounded.

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\* In the systems of Messrs. Kirby and Leach, they form two orders. Our *Heteroptera* are there termed *Hemiptera*, and our section of the *Homoptera* forms the second under the same name.

## SCUTELLERA, Lam.—TETYRA, Fab.

Where the scutellum covers the whole abdomen.

*S. lineata*; *Cimex lineatus*, L.; Wolf, Cimic., I, ii, 2. Length four lines; red, longitudinally striped with black above; black points arranged in lines on the venter. Environs of Paris and south of Europe, on flowers, the Umbelliferæ, particularly\*.

## PENTAMONA, Oliv.

Where the scutellum covers but a portion of the superior part of the abdomen. This genus of Olivier forms five in the system of the *Ryngota* of Fabricius; they are, however, as imperfectly characterized as they are badly arranged. His *Ælia*, and *Halys*, are Pentatomæ with a head more prolonged and projecting in the manner of a snout, and more or less triangular. Among the species which he refers to the first, that which he calls the *acuminata*, and which is the *Punaise à tête alongée* of Geoffroy, appears to be essentially removed from the Pentatomæ by the antennæ, which are covered at base by the anterior margin of the thorax, and separated from it underneath, and by its much larger scutellum, which approximates this Insect to the Scutelleræ. In his *Cydnus*, the head, viewed from above, is wide and semicircular; the thorax forms a transversal square, hardly narrower before than behind, and the tibiæ are frequently spinous. These species remain on the ground. Of this number is the *Punaise noire* of Geoffroy. We might also approximate to them, as has already been done by MM. Lepeletier and Serville—Encyc. Méthod.—certain species in which the sternum is neither carinated nor armed with a spine. Such are the two following:

*P. ornata*; *Cimex ornatus*, L.; Wolf, Cimic., II, 16. Length four lines and a half; figure of a rounded ovoid; red, multimaculate; head and wings black.—On the Cabbage and other Cruciferæ.

*P. oleracea*; *Cimex oleraceus* L.; Wolf, Ib., II, 16. Length three lines; ovoid; bluish-green with a thoracic line, a dot on the scutellum, and one on each elytron, white or red.

Other Pentatomæ in which the poststernum or mesosternum is raised into a carina, or presents a spiniform point, would be distinguished by the generic appellation of *EDESSA*, employed by Fabricius. Several of the species which he includes in that genus present this character. It is also visible in several of those which belong to his *Cimex*, such as the two following Pentatomæ:

*P. hæmorrhoidalis*; *Cimex hæmorrhoidalis*, L.; Wolf., Ib., I, 10. Length seven lines; ovoid; green above, yellowish beneath; posterior angles of the thorax extended into an obtuse point; a large brown spot on the elytra; back of the abdomen red, spotted with black.

\* For the other species see Fabricius, Syst. Ryngot., genus *Tetyra*. According to Dalman—Ephem. Entom., I.—his genus *Canopus* differs from the preceding one in the following characters: the body more inflated, slightly compressed, concave beneath, with the margin of the scutellum pendent over the sides; no simple eyes; legs unarmed.

The female of the *P. grisea*—*Cimex griseus*, L.—protects and leads her young ones just as a hen does her chickens\*.

We have thought it requisite to establish a new generic section, **HETEROSCELS**, for a *Pentatoma* peculiar to Cayenne, in which the head is cylindrical and the anterior tibiæ form a semi-oval palette.

Sometimes the antennæ have but four joints, and the body is generally oblong.

Here the antennæ are filiform or clavate.

Certain species foreign to Europe approach the preceding in the general form of their body, which is rather ovoid than oblong, and are distinguished from all the following ones, either because it is much flattened, membranous, and with a strongly dilated, slashed and angular margin, or because their thorax is prolonged posteriorly in the manner of a truncated lobe, and their sternum is horned—these latter form the subgenus

#### TESSERATOMA,

Established by MM. Lepeletier and Serville—Encyc. Méthod.—with the *Edessa papillosa* of Fabricius, and his *E. amehystina*.

Some other *Edessæ* of the same naturalist—the *obscura*, *mactans*, *viduata*—resembling ordinary *Pentatomæ*, without any posterior thoracic prolongation, but with quadriarticulated antennæ, might also form another subgenus—**DINIDOR**.

A species from Brazil, analogous by its flattened form to the *Aradus* of that naturalist, in which the edges of the body are dilated, slashed, and angular, and its anterior extremity forms a sort of clypeus truncated before, cleft in the middle, unidentated on each side behind, and concealing antennæ, geniculate near their middle, and seemingly formed of but three joints, because the first is very short, is the type of the subgenus

#### PHLEA, *Lepel.* and *Serv.* †

All the following *Geocorisæ* are generally oblong, besides which they present none of the other characters peculiar to the preceding subgenera.

Here the antennæ are inserted near the lateral and superior borders of the head, above an imaginary line drawn from the middle of the eyes to the origin of the labrum. The simple eyes are either approximated or separated by an interval about equal to that which is between each of them and the neighbouring eye.

Next come those in which the body is more or less oblong, without being filiform or linear.

#### COREUS, *Fab.*

Where the body is partly oval, the last joint of the antennæ ovoid or fusiform, frequently thicker than the preceding one, and usually shorter, and of equal length at most, in the others.

They could be separated into several sections, which might even

\* See Fabricius, genera ut sup.

† Encyc. Méthod.



be considered as subgenera, according to the relative proportions and forms of the joints of the antennæ\*.

*C. marginatus*; *Cimex marginatus*, L.; Wolf, Cimic., I, iii.

20. Length six lines, and of a cinnamon-red; second and third joint of the antennæ russet, the two others blackish; the two first longest of all; a small tooth at the internal base of the first; posterior sides of the thorax raised and rounded; abdomen dilated and turned up on the sides, with the middle of its superior surface red. On plants it diffuses a strong odour which resembles that of an apple.

The antennæ of the other Geocorisæ of the same subdivision terminate by an elongated, cylindrical, or filiform joint. They constitute a great portion of the genus *LYGÆUS* of Fabricius, and comprise besides, that which he calls *ALYDUS*. The posterior legs of the males are most frequently remarkable for the thickness of the thighs, and in a great number for the form of their tibiæ, which are sometimes compressed and have the edges dilated, as if membranous and winged, or foliaceous, and sometimes curved. Most of them are foreign to Europe.

To these Lygæi must be referred those species in which the simple eyes are separated from each other by an interval about equal to that which exists between each eye and its neighbour, and in which the thorax is much wider posteriorly than before, or forms a triangle with a truncated apex. The body is generally less narrow than in the opposite division, or that which is composed of the Alydi.

#### HOLHYMENIA, *Lepel. and Serv.*

Where the second and third joints of the antennæ are shaped like a palette †.

#### PACHYLIS, *Lepel. and Serv.*

Where the third only has that form ‡.

#### ANISOSCELI, *Lat.*

Where the antennæ are filiform and not dilated §.

\* *GONOCERUS*. The last joint of the antennæ shorter than the preceding one, and ovoid or oval; the latter and the second compressed, angular or dilated; the first, or at least the second, longest of all. The *C. sulcicornis*, *insidiator*, *antennator*, of Fabricius.

*SYROMASTES*. The last joint of the antennæ shorter than the preceding one, and bordering on an oval; the latter, filiform and simple. The *C. marginatus*, *scapha*, *spiniger*, *paradoxus*, *quadratus*, Fab., and his *Lygæus sanctus*.

*COREUS*. The last joint of the antennæ differing but little in length from the preceding one, and almost fusiform; the latter not compressed. The *C. dentator*, *hirticornis*, *clavicornis*, *acrydioides*, *capitatus*, Fab.

† *Encyc. Method., Insect., X*, p. 61. Add *Lygæus biclavatus*, Fab.

‡ *Encyc. Method., Ib.* p. 62.

§ Some have the posterior tibiæ edged with a membrane: the *L. mmebr anaceus*, *compressipes*, *phyllopus*, *gonagra*, *foliaceus*, *dilatatus* *tragus*, &c. Fab.

The others are destitute of that membrane; the *L. vulgus*, *grossipes*, *tenebrosus*, *fulvicornis*, *curvipes*, *profanus*, *phasianus*, *bellicosus*, &c. Fab.

Some species, with smaller antennæ, and of the length of the body, form the subgenus *NEMATOPUS* of my Fam. Nat. du Règ. Animal.



Certain *Geocorisæ* of the same division, with a narrow and elongated body, projecting eyes, the ocelli approximated, and the thorax merely a little narrower before than behind, and almost trapezoidal, form the subgenus

*ALYDUS*, *Fab.* \*.

Now come *Geocorisæ* with a very narrow, long, filiform, or linear body. The antennæ and legs are also proportionally smaller.

*LEPTOCORISA*, *Lat.*

Where the antennæ are straight †.

*NEIDES*, *Lat.*—*BERYTUS*, *Fab.*

Where those organs are geniculate ‡.

We now pass to *Geocorisæ* in which the antennæ, also filiform or thicker at the extremity and quadriarticulated, are inserted lower than the preceding ones, either on an imaginary line, drawn from the eyes to the origin of the labrum, or beneath it. The ocelli are approximated to the eyes, and the membranous appendages of the elytra frequently present but four or five nervures.

Here the head is not narrowed posteriorly in the manner of a neck.

*LYGÆUS*, *Fab.*

Where the head is narrower than the thorax, and where the latter is narrowed anteriorly and is trapezoidal.

*L. equestris*; *Cimex equestris*, *L.*; Wolf, *Cimic.*, I, iii, 24. Length five lines; red, with black spots; membranous portion of the elytra brown, spotted with white.

*L. apterus*; *Cimex apterus*, *L.*; Stoll, *Cimic.*, II, xv, 103. Length four lines; apterous; red; the head, a spot on the middle of the thorax and large dot on each elytron, black; extremity of the elytra truncated or without a membranous appendage. Very common in our gardens. It is sometimes, though very rarely, found with wings.

Those species in which the anterior thighs are inflated, form the genus *PACHYMERIA* of *MM.* Lepeletier and Serville, a name already employed, and which must be changed §.

*SALDA*, *Fab.*

Where the head, taken in its greatest breadth, is as wide as the thorax or wider, and has its posterior angles dilated, with large eyes, and where the thorax is always of equal width, and square ||.

There, the head is ovoid and narrowed posteriorly in the manner of a neck.

\* See the *Syst. Ryngator.*, *Fab.*, p. 248.

† The *Gerris* of Fabricius, with the exception of the *vagabundus*.

‡ See *Lat.*, *Gener. Crust. et Insect.*, III, p. 126; and *Oliv.*, *Encyclop. Méthodique*.

§ See *Fab.*, and *Lat.*, *Gener. Crust. et Insect.*, III, p. 121.

|| The *Saldæ*, *atra*, *albipennis*, *grylloides*, *Fab.*

MYODOCHA, *Lat.* \*

We have now arrived at *Longilabra*, in which the antennæ, composed of four joints, become gradually thinner towards the extremity, and frequently even abruptly so, or are setaceous.

In our *Fam. Nat. du Règ. Anim.*, we have formed the subgenus

## ASTEMMA,

With certain species in which the antennæ are gradually setaceous and where the second joint is of equal thickness and almost glabrous. The thorax is hardly narrower before than behind, and forms a transversal square, or is cylindrical; the head is as if incised perpendicularly or rounded at its origin †.

MIRIS, *Fab.*

Similar to *Astemma* in the antennæ, but removed from it by the thorax, which is much wider posteriorly than before, and trapezoidal ‡.

CAPSUS, *Fab.*

A similar and trapezoidal thorax, but the second joint of the antennæ is attenuated at base, and densely pilose, particularly towards the extremity, otherwise almost cylindrical and slender like the first §.

HETEROTOMA, *Lat.*

The *Heterotomæ* are very distinct from the preceding Insects, by the size and width of the two first joints of the antennæ, and of the second particularly, which forms an elongated palette; the two last are very short ||.

In the remaining Hemiptera of this family there are but two or three apparent joints ¶ in the sheath of the sucker; the labrum is short and without striæ. The first joint of the tarsi, and frequently even the second, is very short in the greater number.

Sometimes the legs are inserted in the middle of the pectus; they terminate by two distinct hooks which originate from the middle of the extremity of the tarsus; they can neither be used as oars, nor for running on the water.

We then separate those species in which the rostrum is always straight, sheathed at base or throughout its length; where the eyes are of an ordinary size, and where the head at its junction with the thorax exhibits no appearance of an abrupt neck or strangulation.

\* See *Lat.*, *Gener.*, &c., and *Encyc. Méthodique*.

† The *Saldæ pallicornis*, *flavipes*, *Fab.*, and some other species, but in which the body is much narrower and longer, and somewhat more analogous in the head to the *Myodochæ*.

‡ *Fab.*, *Syst. Ryng.*; *Lat.*, *Ib.* p. 124.

§ *Fab.*, *Syst. Ryng.*; *Lat. Gener.*, *Crust. et Insect.*, III, p. 123.

|| *Capsus spissicornis*, *Fab.*

¶ Four in the *Reduvii*, but the first is very short, almost null.

Their body is usually altogether, or in part, membranous, and most commonly much flattened \*. They compose the greater part of the primitive genus

ACANTHIA, *Fab.*,

Which that author afterwards divided as follows :

SYRTIS, *Fab.*—MACROCEPHALUS, *Swed. Lat.*—PHYMATA, *Lat.*

Where the anterior legs resemble the monodactyle claw of the Crustacea, and are used by these Insects to seize their prey †.

TINGIS, *Fab.*

Where the body is very flat, and the termination of the antennæ globuliform; the third joint is much longer than the others.

Most of the species live on plants, piercing their leaves or flowers, and sometimes producing false gall-nuts. The leaves of Pear-trees are frequently riddled by one of this genus, the *T. pyri*, *Fab.* ‡.

ARADUS, *Fab.*

Similar to Tingis, in the form of the body, but with cylindrical antennæ, of which the second joint is almost as large as the third, or is even longer.

They are found under the bark of trees, in the cracks of old wood, &c. §.

CIMEX, *Lat.*—ACANTHIA, *Fab.*

In Cimex proper the body is very flat, but the antennæ terminate abruptly in the form of a seta. We know but too well the

*C. lectularius*, *L.*; Wolf, *Cimic.*, IV, xii, 121. It is pretended that this Insect, vulgarly termed the *bed-bug*, did not exist in England previous to the fire of London in 1666, and that it was transported thither in timber from America. With respect to the continent of Europe, however, we find that it is mentioned by Dioscorides. It has also been asserted that this species sometimes acquires wings. It likewise harasses young pigeons, swallows, &c.; but that which lives on these latter birds appears to me to be a different species.

Various means of destroying these noxious Insects have been proposed; extreme vigilance, and great cleanliness however are the best.

\* These Insects, in our *Fam. Nat. du Règ. Anim.*, form the second tribe of the Geocorisæ, that which I have there designated by the term *membraneuse*.

† *Fab.*, *Syst. Ryngot.* In *Microcephalus*—*S. manicata*, *Fab.*—the antennæ, terminated by a very large joint, are not lodged in inferior cavities of the margin of the thorax; the scutellum is distinct, and covers a large part of the abdomen. In *Phymata*, the antennæ are received into peculiar cavities under the lateral edges of the thorax, which is prolonged into a scutellum, and only covers a portion of the abdomen. See *Lat.*, *Gen. Crust. et Insect*, III, p. 137, 138.

‡ *Fab.*, *Ib.*; *Lat.*, *Gener. Crust. et Insect*.

§ *Fab.*, *Ib.*; *Lat.*, *Ib.*

The remaining *Geocorisæ* of this subdivision\* have the rostrum exposed, arcuated, or sometimes straight; but their labrum is salient and their head abruptly strangulated behind or narrowed into a neck. Certain species have remarkably large eyes.

Those which do not present this character, and have their head supported by a neck, form the primitive genus

REDUVIUS, *Fab.*

Their rostrum is short but sharp, and can inflict a severe puncture, the painful effects of which are sensible for some time. Their antennæ are extremely slender near the end, or setaceous †. Several of the species make a noise similar to that which proceeds from the *Crioceræ*, *Cerambyci*, &c., but which is produced with more rapidity.

This genus has been thus divided :

HOLOPTILUS, *Lepel. and Serv.*

Where the antennæ have but three joints, the two last of which are furnished with long hairs, arranged in two rows, and verticillated on the last ‡.

In the other species the antennæ consist of four joints at least, and are glabrous, or simply pubescent.

REDUVIUS, *Fab.*

Or *Reduvii* properly so called. The body is an oblong oval, and the legs of a moderate length.

We may unite with them the *Nabis*, Lat. § and the *Petalochaires* of Palis. de Beauvois; the anterior tibiæ of the latter are clypeiform.

*R. personatus*; *Cimex personatus*, L.; *Punaïse mouche*, Geoff., I, ix, 3. Length eight lines; blackish-brown and immaculate. It inhabits the interior of houses, where it lives on flies and other insects, approaching its prey slowly till within a certain distance, and then darting upon it. Its stings kill it in an instant. The larva and nymph resemble a spider covered with dust and dirt ||.

ZELUS, *Fab.,*

Where the body is linear, and the legs very long, extremely slender, and alike ¶.

\* The *Nudicolles*, Fam. Nat. du Règn. Anim.

† The first joint is frequently united to the second, and the latter to the third, by a very small joint or rotula.

‡ Encyc. Méthod., Insect., X, p. 280.

§ The thorax in *Nabis* is not (or but very slightly) divided by that impressed and transverse line which we observe in *Reduvius*. Here, besides, the simple eyes are situated on an eminence or division of the posterior part of the head. This latter genus is susceptible of being separated into several subgenera.

|| *Fab.*, Syst. Ryng.; Lat., Gener. Crust. et Insect, III, p. 128. See particularly the Encyc. Méthod., article *Reduve*.

¶ *Fab.*, Syst. Ryngot.; Lat. Ib., p. 129.

## PLOIARIA, Scop.—EMESA. Fab.

Analogous to the preceding Insects in the linear form of the body, and the length and tenuity of the legs; but the two anterior ones have elongated coxæ, and are adapted, as in Mantis, for seizing their prey\*.

We now come to Geocorisæ, remarkable for their large eyes, and which have no apparent neck, but whose transversal head is separated from the thorax by a strangulation.

They live on the shores of ponds, &c. where they run with great swiftness, and frequently make little leaps.

Some have a short and arcuated rostrum, and setaceous antennæ. They form the

## LEPTOPUS, Lat. †.

In the others the rostrum is long and straight, the labrum projects from its sheath, and the antennæ are filiform or a little larger near the extremity. The simple eyes are situated on a tubercle. They are considered by Fabricius as Saldæ.

Latreille separates them into two divisions. His ACANTHIÆ—or part of the Saldæ, Fab. ‡—have salient antennæ, at least equal in length to half that of the body. Their form is oval. The simple eyes are closely approximated and sessile. In his PELAGONUS § the antennæ are much shorter and bent under the eyes. The body is shorter and more rounded, and there is a tolerably large scutellum. The simple eyes are remote. These Hemiptera approach the *Naucores*, and with the following appear to lead to them.

Sometimes the four posterior legs, very slender and extremely long, are inserted on the sides of the pectus, and are very remote from each other at base; the tarsial hooks are very small, but little distinct, and situated in a fissure of the lateral extremity of the tarsus ||. These legs are adapted for swimming or walking on water, and are peculiar to the genus

## HYDROMETRA, Fab. ¶,

Which Latreille divides into three subgenera :

## HYDROMETRA, Lat.,

Or Hydrometra properly so called, where the antennæ are setaceous, and the head is prolonged into a long snout, receiving the rostrum in a groove underneath\*\*.

\* Fab., Syst. Ryng.; *Gerris vagabundus*, Ejusd.; Lat., Ib.

† Lat., Consid. sur l'Ord. Nat. des Crust. et des Insect., p. 259.

‡ Fab., Ib. The Saldæ *zosteræ*, *striata*, *littoralis*: Lat., Ib.

§ Lat., Consid. sur l'Ord. Nat. des Crust. et des Insect., III, p. 142; Germ. Faun. Insect. Europ., XI, 23.

|| The prothorax is extended above the mesothorax, in the form of an elongated plate, narrowed and terminated in a point, representing the scutellum, under which the elytra originate. The mesothorax is greatly elongated.

¶ Fab., Syst. Ryngot.

\*\* Lat., Gener. Crust. et Insect. III, p. 131.

GERRIS, *Lat.*

Where the antennæ are filiform, the sheath of the sucker is triarticulated, and the second pair of legs are very remote from the first, and at least double the length of the body\*.

The two anterior legs, as well as in the following subgenus, act as pincers.

VELIA, *Lat.*

Where the antennæ are also filiform, but the sheath of the sucker has but two apparent joints, and the legs, much shorter, are inserted at nearly equal distances from each other †.

## FAMILY II.

## HYDROCORISÆ.

In our second family of the Hemiptera, the antennæ are inserted and concealed under the eyes; they are shorter than the head, or hardly as long.

All these Insects are aquatic, carnivorous, and seize others with their anterior legs, which flex on themselves and act as pincers.

They sting severely.

Their tarsi present but one or two joints. Their eyes are in general remarkably large.

Some—*Nepides*—have the two anterior legs in the form of pincers, composed of a thigh, either very thick or very long, with a groove underneath for the reception of the inferior edge of the tibiæ, and of a very short tarsus; or one that is even confounded with the tibia, and forming with it a large hook.

The body is oval and much depressed in some, and linear in others. They form the genus

NEPA, *Lin.*,

Or that of the Aquatic Scorpions, as they are commonly called, which is thus divided:

GALGULUS, *Lat.*,

Where all the tarsi are similar, cylindrical, and composed of two very distinct joints, the last with two terminal hooks. The antennæ appear to consist of but three joints, the last of which is the largest and ovoid ‡.

The antennæ of the following genera are quadriarticulated, and the anterior tarsi terminate simply in a point or hook.

\* *Lat.*, *Gener. Crust et Insect.*, III, p. 131.

† *Lat.* *Ib.*

‡ *Lat.* *Ib.*, p. 144; *Naucoris oculata*, *Fab.*

NAUCORIS, *Geoff., Fab.*

\*\* The labrum in Naucoris is not emarginated, as is the case in the following genus, but is exposed, large, triangular, and covers the base of the rostrum. The body is almost ovoid and depressed, and the head rounded; the eyes are very flat. The antennæ are simple, and without any projection in the form of a tooth. There is no salient appendage at the posterior extremity of the abdomen. The four last legs are ciliated, and their tarsi consist of two joints, with two hooks at the end of the last.

*N. cimicoides*; *Nepa cimicoides*, L.; Rœs., Insect., III, Cim. Aquat., xxxviii. Five or six lines long, and of a greenish brown, lighter on the head and thorax; margin of the abdomen serrated and projecting beyond the elytra\*.

In the three following subgenera, the labrum is sheathed, and the extremity of the abdomen presents two filaments.

BELOSTOMA, *Lat.*,

Where all the tarsi are biarticulated, and the antennæ are semi-pectinated†.

NEPA, *Lat.*,

Or *Nepa* proper, where the anterior tarsi have but one joint, and the four posterior ones two, and where the antennæ appear forked. The rostrum is curved beneath; the coxæ of the two anterior legs are short, and their thighs much wider than their other parts.

Their body is narrower and more elongated than in the preceding subgenera, and almost elliptical. Their abdomen is terminated by two setæ, which enable them to respire in the oozy and aquatic localities at the bottom of which they live. Their eggs resemble the seed of a plant in an oval figure, crowned with a tuft of hairs.

M. Leon Dufour, in the seventh volume of the *Animales Générales des Sciences Physiques*, has published some very curious observations on the anatomy of the *Ranatra linearis*, and of the *Nepa cinerea*. He has discovered in these Insects a peculiar organ, which he considers as a kind of pectoral trachea communicating with the ordinary tracheæ. In the first it forms a pair of beautiful tufts of a nacre-white, and is composed of numerous ramusculi, which are directed round a multiplex axis. It is situated in the midst of the muscular masses of the pectus. The pectoral tracheæ of the *Nepa cinerea* appeared to exhibit the vestiges of a pulmonary organ. They consist of two oblong bodies, situated immediately under the region of the scutellum, invested by a fine, smooth, satin-white membrane. They are almost as long as the pectus, and, except at the two ends, free. They are filled with a kind of tow, which, when examined under the microscope, presents a homogeneous tissue formed of vascular arbusculi. The nervous system appeared to him to consist of

\* *Fab., Syst. Ryng.; Lat., Gener. Crust. et Insect., III, p. 146.*

† *Lat., lb., p. 144; the Nepa grandis, annulata, rustica, Fab.*



two stout ganglions, one on the esophagus and the other in the pectus, between the first and second pair of legs, which give off two remarkable cords, divided at their extremity into two or three filaments. He could only perceive two biliary vessels. To this excellent Memoir we refer the reader both for these details and those relative to the organs of generation, and to the salivary apparatus discovered by its author in these Insects.

*N. cinerea*, L.; Rœs., Insect. Ib., xxii. About eight lines in length; cinereous; back of the abdomen red; tail rather shorter than the body\*.

#### RANATRA, Fab.

The Ranatræ only differ from the Nepæ in the linear form of their body, in their rostrum, which is directed forwards, and in their anterior legs, of which the coxæ and thighs are elongated and slender.

*R. linearis*; *Nepa linearis*, L.; Rœs., Ib., XXIII. An inch long; pale-cinereous, somewhat yellowish; tail as long as the body.

The tuft on its eggs consists of but two setæ †.

The others—*Notonectides*—have their two anterior legs simply curved underneath, with thighs of an ordinary size, and the tarsi pointed and densely ciliated, or similar to those of the posterior ones. Their body is almost cylindrical or ovoid, and tolerably thick or less depressed than in the preceding Insects. Their posterior legs are densely ciliated, resemble oars, and are terminated by two very small and rather indistinct hooks. They swim or row with great swiftness, and frequently while on their back. They compose the genus

#### NOTONECTA, Lin.,

Which has been divided in the following manner:

#### CORIXA, Geoff.—SIGARA, Fab.

Where the scutellum is wanting ‡; the rostrum is very short, triangular, and transversely striated; the elytra are horizontal; the anterior legs are very short, and their tarsi formed of a single compressed and ciliated joint; the other legs are elongated, and the two intermediate ones are terminated by two very long hooks.

*C. striata*; *Notonecta striata*, L.; Rœs., Ib., XXIX. The largest specimens are about five lines in length; dark brown above, with numerous yellowish dots or little stripes; head, legs, and all underneath, yellowish §.

\* Add *N. fusca*, *grossa*, *rubra*, *nigra*, *maculata*, Fab.

† For the remaining species see Fab., Syst. Ryng.

‡ The *Notonecta minutissima*, Fab., is the type of the genus *Sigara* of Leach—Lin. Trans., XII. The anterior tarsi, as in *Corixa*, consist of one joint, but this Insect is furnished with a scutellum. Its thorax is transversal, and body oval, and not linear or cylindrical.

§ For the other species see Fab., Syst. Ryng.

## NOTONECTA, Geoff., Fab.

Where the scutellum is very distinct, the rostrum forms an articulated and elongated cone, the wings are tectiform, and all the tarsi biarticulated. The four posterior legs are geniculate, and have simple, cylindrical tarsi, terminated by two hooks.

*N. glauca*, L., Rœs., Ib., XXVII. Six lines in length; yellowish above, with a russet tint on the elytra, the inner margin of which is spotted with blackish; scutellum black.

To seize its prey with more facility it swims on its back; it stings severely\*.

The second section of the Hemiptera, that of the HOMOPTERA, Lat., is distinguished from the preceding one by the following characters: the rostrum arises from the lowest portion of the head, near the pectus, or even from the interval between the two anterior legs: the elytra—almost always tectiform—are of the same consistence throughout and semimembranous, sometimes almost similar to the wings. The three segments of the trunk are united en masse, and the first is frequently shorter than the second.

All the Insects of this section feed exclusively on vegetable juices. The females are provided with a scaly ovipositor †, usually composed of three dentated blades, and lodged in a groove with two valves. They use it as a saw to produce openings in plants, in which they deposit their eggs. The last Insects of this section experience a sort of complete metamorphosis.

I will divide it into three families.

## FAMILY I.

## CICADARIÆ.

This family comprises those which have triarticulated tarsi, and usually very small, conical, or fusiform antennæ, composed of from three to six joints, the extremely attenuated seta which terminates

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\* Fab., Syst. Ryngot.; Lat., Gener. Crust. et Insect., III, p. 150. The genus *Plea*, Leach, which that gentleman establishes on the *Notonecta minutissima* of Linnaeus, and which must not be confounded with the one so styled by Fabricius and other entomologists, differs from *Notonecta*, inasmuch as the third joint of the antennæ is larger than the others, and because those of the anterior tarsi are almost of the same length, and the hooks of the posterior ones are large. The body is shorter, and the elytra entirely crustaceous, arched, and truncated at the exterior angle of their base. A piece is observed there, analogous to that remarked in the same place in the *Cetoniæ*.

† Called *oviscapte* by M. Marcel de Serres.

them included. The females are provided with a serrated ovipositor. MM. Randohr, Marcel de Serres, Leon Dufour, and Straus, have studied the anatomy of several Insects belonging to this family. The latter naturalist has not yet published the result of his investigations. The researches of M. Dufour are the most extensive and complete, at least so far as respects the digestive system and the organs of generation. A proof of this is readily obtained by referring to his Memoir entitled *Recherches Anatomiques sur les Cigales*, inserted in the fifth volume of the *Annales des Sciences Naturelles*. We will not follow this profound observer into the multitude of interesting details respecting their organization which he presents to us, and which he accompanies with excellent figures, but restrict ourselves to the description of an anatomical character which appears to be exclusively peculiar to these Insects.

In all of them, according to him, the chylic ventricle or stomach is remarkably long; it commences by a curved or straight, oblong dilatation, and always terminates in an intestiniform canal, which is flexed on itself in order to arrive at the origin of this same ventricle, into which it opens by the side of the insertion of the hepatic vessels, not far from the commencement of the intestine; they all have four biliary vessels. In the *Cicadæ* this ventricle has the figure of an ear, of which the right side is dilated into a large lateral and frequently plaited pouch; its upper extremity is tied to the esophagus by a superior ligament, and the other leads to this narrow, very long, tubular, reflected prolongation which has the form of an intestine, and which, after these circumvolutions, re-ascends to join that pouch near the insertion of the hepatic vessels. This singular disposition of the chylic ventricle, which, after several convolutions, empties into itself, in continuing a complete circle traversed by the alimentary liquid, is doubtless a difficult matter to explain physiologically, but it is not the less a well determined and constant fact, and one which forms the most characteristic trait in the anatomy of the *Cicada* and other *Cicadariæ*. In the *Ledra aurita* of Fabricius, or *Procigale Grand-diable* of Geoffroy, the inflated portion of the chylic ventricle is placed directly after the crop, and there is but a single cluster of salivary sacs on each side, a character also observed in the *Cercopis spumaria*, while in the *Cicadæ* there are four, two on each side. In the *Membracis cornutus* the duodenal ear-like sac is replaced by a large pouch, but also attached to the esophagus by a suspensory filament, a character exclusively peculiar to these Insects.

Some—*Cantatrices*—have antennæ composed of six joints, and

three simple eyes\*. They embrace the division of the Manniferæ of Linnæus, the genus *Tettigonia* of Fabricius, and form that of our Cicadæ proper.

CICADA, *Oliv.*—TETTIGONIA, *Fab.*

These Insects, of which the elytra are almost always transparent and veined, differ from the following ones, not only in the composition of their antennæ and the number of the ocelli, but in the absence of the faculty of leaping, and in the music of the males; which, in the heat of summer, the epoch of their appearance, produce that loud and monotonous sound which has induced authors to designate them by the name of Cantatrices or Singers.

The organs by which it is effected are situated on each side of the base of the abdomen; they are internal and each one is covered by a cartilaginous plate, which closes like a shutter †. The cavity which encloses this apparatus is divided into two cells by a squamous and triangular septum. When viewed from the side of the abdomen, each cell presents anteriorly a white and plaited membrane, and lower down, in the bottom, a tight, thin, transparent membrane, which Reaumur terms *le miroir*. If this part of the body be opened above, another plaited membrane is seen on each side, which is moved by an extremely powerful muscle composed of numerous straight and parallel fibres, and arising from the squamous septum. This membrane is the tymbal. The muscles, by rapidly contracting and relaxing, act on the tymbals, alternately tightening and restoring them to their original state. Such is the origin of these sounds, which can even be produced after the death of the Insect, by jerking the muscle.

The Cicadæ live on trees or shrubs, of which they suck the juices. The female, by means of an ovipositor enclosed in a bilaminated semitubular sheath, and composed of three narrow, elongated, squamous pieces, two of which terminate in the form of a file, pierces

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\* The mesothorax, viewed from above, is much more spacious than the prothorax, and is narrowed towards the extremity, which forms a sort of scutellum. We observe nearly the same disposition of parts in Fulgora, and other genera which are derived from it. The mesothorax has frequently the form of a reversed triangle, and the prothorax is generally very short and transversal. In the following Cicadariæ, such as the Membraces, Cicadellæ, &c., it is, on the contrary, longer than the other thoracic segments, greatly developed in one direction or another, and the mesothorax is only visible in the form of an ordinary and triangular scutellum. In all this family the metathorax is very short and concealed. Considered in its relation to other Insects, the head of the Cicadariæ, viewed anteriorly, presents a triangular space immediately above the labrum, corresponding to the epistoma or clypeus; then, still higher up, another space, frequently inflated and striated, termed by Fabricius the frons, but which is analogous to the face or interval between the eyes; above this comes the frons, and then the vertex.

† This piece is merely an inferior appendage of the metathorax. The tymbal occupying a particular cavity, sometimes exposed above, sometimes covered and only visible beneath, is a lateral prolongation of a skin which forms the anterior diaphragm of the two inferior cavities of the first segment of the abdomen. The opposite diaphragm, or the posterior of these cavities, constitutes the piece called the mirror, or miroir. It appears, that, like the other diaphragm, it is formed at the expense of the tracheal membranes.

the dead twigs to the medulla, in which she deposits her eggs. As the number of the latter is considerable, she makes several holes, indicated externally by as many elevations. The young larvæ, however, leave their asylum to penetrate into the earth, where they grow and experience their metamorphosis. Their anterior legs are short, have very stout thighs armed with teeth, and are adapted for digging. The Greeks ate the pupæ, which they called *Tettigometra*, and even the perfect Insect. Previous to coition they preferred the males, and when it had taken place the females were most sought for, as their abdomen is then filled with eggs.

The *C. orni*, by wounding the tree from which its specific name is derived, produces that peculiar honey-like and purgative juice called manna.

*C. orni*. L. Rœs., Insect. II, Locust. xxv, 1, 2; xxvi, 3, 5. About an inch long; yellowish; pale beneath, the same colour mixed with black above; margin of the abdominal segments, russet; two rows of blackish points on the elytra, those nearest their inner margin the smallest. South of France, Italy, &c.

*C. plebeia*, L.; *Tettigonia frazini*, Fab.; Rœs., lb. XXV, 4, 6, 7, 8. The largest species in France; black, with several spots on the first segment of the trunk; its posterior margin, the raised and arcuated portions of the scutellum, and several veins of the elytra, russet\*.

The other Cicadariæ—*Mutæ*—have but three distinct joints in the antennæ, and two small ocelli. Their legs are usually adapted for leaping. Neither of the sexes is provided with organs of sound.

The elytra are frequently coriaceous and opaque. Several females envelope their eggs with a white substance resembling cotton.

Some of them—*Fulgorellæ*—have the antennæ inserted immediately under their eyes, and the front frequently prolonged in the form of a snout, the figure of which varies according to the species. By this we distinguish the genus

### FULGORA, *Lin. Oliv.*

Those species in which the front projects, that have two simple eyes, and which present no appendage under the antennæ, are the *Fulgoræ*, properly so called, of Fabricius. Such is

*F. laternaria*, L.; Rœs., Insect. II., Locust., xxviii, xxix. A very large species, prettily variegated with yellow and russet; a large ocellated spot on each wing; snout strongly dilated, vesicular, broad, and rounded anteriorly. Travellers assure us that this Insect diffuses a strong light when in the dark.

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\* See Lat., Gener. Crust. et Insect., III, p. 154; Fab., Syst. Ryng., genus *Tettigonia*, and Oliv., Encyc. Méthod., article *Cigale*, where all the figures of Stoll, relative to the species of this genus, are given. Those in which the first abdominal segment presents a cleft above that exposes the tymbal, compose the genus *Tibicen* of my Fam. Nat. du Règn. Anim.; such are the *C. hamatoda* of Olivier, the *T. picta*, *hyalina*, *algira* of Fabricius, and his *T. orni*, which, in this respect, might form another genus.

The south of Europe produces a small species of the same genus. It is the

*F. europæ*, L.; Panz., Faun. Insect, Germ., XX, 16. Green, with a conical front, and transparent elytra and wings\*.

Other Cicadariæ with a projecting front, but destitute of simple eyes, and furnished with two little appendages under each antennæ representing those organs or palpi, form the genus

OTIOCERUS, *Kirb.*,

Or the *Cobax* of Germar, which hitherto seems to be peculiar to the western continent †.

Those, in which the head presents no remarkable projection, compose various genera of Fabricius, to which must be added some others established since the time of that naturalist.

Sometimes the antennæ are shorter than the head, and inserted out of the eyes, a character which is also common to the two preceding genera.

Here we distinguish two very apparent ocelli.

LYSTRA, *Fab.*

These Insects at the first glance resemble little Cicadæ, properly so called. The body and elytra are elongated. The second joint of the antennæ is almost globular and granose, as in the *Fulgoræ* ‡.

CIXIUS, *Lat.*

The *Cyxii* resemble the *Lystræ*, but the second joint of the antennæ is cylindrical and smooth §.

Under the generic appellation of

TETTIGOMETRA, *Lat.*,

I have separated certain Insects analogous to the preceding species, but in which the antennæ are lodged between the posterior and lateral angles of the head, and those of the anterior extremity of the thorax. The eyes are not prominent ||.

There, we observe no ocelli.

Those species that have large elytra, and in which the prothorax is sensibly shorter in its middle than the mesothorax, compose the subgenus

PÆCILOPTERA, *Lat.* Germ.—*FLATA*, *Fab.* ¶.

Those, in which it is at least as long as the mesothorax, and where

\* For the other species, see *Fab.*, *Ib.*, and *Oliv.*, *Encyc. Méthod.*, article *Fulgore*.

† *Lin. Trans.*, XII, *O. Coquebertii*, I, 14 and I, 8;—genus *Cobax*, *Germ.*, *Magas. der Entom.*, IV, p. 1, et seq.

‡ *Fab.*, *Syst. Ryngot.*, p. 56;—*Lat.*, *Gener. Crust. et Insect.*, III, p. 166.

§ *Lat.*, *Ib.* Fabricius places them among his *Flata*. The *Achili* of M. Kirby—*Lin. Trans.*, XII, xxii, 13—differ but little from the *Cixii*.

|| *Lat.*, *Gen. Crust. et Insect.*, III, p. 163;—*Germ.*, *Magas. der Entom.*, IV, 7. The *Calidiæ* of this author—*Ib.*, p. 75—seem to approach the *Tettigometræ*. They have the same port, and, according to him, their antennæ are inserted under the eyes.

¶ *Lat.*, *Ib.*, p. 165;—*Germ.*, *Magas. der Entom.*, III, p. 219;—IV, p. 103, 104.

the elytra, hardly longer than the abdomen, or shorter, are dilated at their base, and afterwards narrowed, form another subgenus, the

*ISSUS, Fab.\**

Sometimes the antennæ are at least as long as the head, and most frequently inserted into an inferior emargination of the eyes.

*ANOTIA, Kirb.,*

Which in a natural order comes near his *Otiocerus*, and approximates to *Issus* in the insertion of the antennæ †.

*ASIRACA, Lat.—DELPHAX, Fab.,*

Where the antennæ are inserted into an inferior emargination of the eyes, are as long as the head and thorax united, and have their first joint usually longer than the second, compressed and angular. There are no simple eyes ‡.

*DELPHAX, Fab.,*

Where the antennæ are inserted in a similar manner, but are never much longer than the head; the first joint is much shorter than the following one, and without ridges. The simple eyes are apparent §.

*DERBE, Fab.*

These Insects are unknown to me; I presume, however, that they approach those of the preceding subgenera, that of *Anotia* in particular.

In the last of the *Cicadariæ*, the antennæ are inserted between the eyes; they compose the genus

*CICADELLA.—CICADA RANATRA, Lin.,*

Which may be thus subdivided :

We will begin with those species, the *Ledrae* excepted, which formerly composed the genus *MEMBRACIS* of Fabricius. Their head is strongly inclined or lowered anteriorly, and prolonged into an obtuse point, or in the form of a clypeus, more or less semicircular. The antennæ are always very small, terminated by an articulated seta, and inserted into a cavity under the margin of the head. The prothorax is sometimes dilated and horned on each side, prolonged and narrowed posteriorly, into a point or spine, either simple or compound, sometimes elevated longitudinally along the back, compressed into a kind of edge or crest, and sometimes projecting and pointed anteriorly; the legs are scarcely spinous.

Some have no apparent or exposed scutellum, properly so called.

Here, the tibiæ, the anterior ones particularly, are strongly compressed and foliaceous. The top of the head always forms a sort of semicircular clypeus.

\* *Lat., Gen. Crust. et Insect., III, p. 166; Fab., Syst. Ryng., p. 199*

† *Lin. Trans., XIII, pl. i, fig. 9, 10, 11, 15.*

‡ *Lat., Ib., p. 167.*

§ *Lat., Gen. Crust. et Insect., III, p. 168.*



MEMBRACIS, *Fab.*

Where the prothorax is elevated, compressed and foliaceous along the middle of the back\*.

TRAGOPA, *Lat.*

Where that part of the body presents, on each side, a horn or pointed projection without any intermediate elevation, and is prolonged posteriorly into an arched point of the length of the abdomen, and replacing the scutellum †.

There, the tibiæ are of the ordinary form, or non-foliaceous.

DARNIS, *Fab.*

Where the posterior prolongation of the prothorax covers the top of the abdomen almost wholly or for the greater part, and the elytra form an elongated and arched triangle ‡.

BOCYDIUM, *Lat.*

Where the elytra are wholly or mostly exposed, the posterior and scutellar prolongation of the prothorax being narrow and more or less lanceolate or spiniform §.

In the others, the scutellum is at least partially exposed, although the prothorax may be prolonged; the posterior extremity of the prothorax presents a transverse suture, which distinguishes it from the scutellum.

CENTROTUS, *Fab.*

Such are the

*C. cornutus*; *Cicada cornuta*, L.; Panz., Faun. Insect. Germ., L., 19. Length four lines; thorax furnished with a horn on each side, and prolonged posteriorly into a point as long as the abdomen.—In the woods on Filices and other plants.

*C. genistæ*, Fab.; Panz., Ib., 20. But half the size of the cornutus, with its thorax simply prolonged posteriorly.—On the Genistæ ||.

We will now pass to those species in which the head is scarcely lower than the prothorax, or is level with it, and horizontal or but slightly inclined when seen from above; where the prothorax is neither raised in the middle nor prolonged posteriorly, and at most only presents lateral dilations; and where the mesothorax has the form of an ordinary sized and triangular scutellum. The elytra are always entirely exposed, and the posterior tibiæ at least, always spinous.

In several, such as the following, the thorax has the figure of an irregular hexagon; it is prolonged and narrowed posteriorly, and ter-

\* The *Membracis foliaceus*, Fab.

† Membraces from the Brazils, which appear to me to be analogous to the following species of Germar, *glabra*, *albimacula* and *xanthocephala*.

‡ See Fab., Syst. Ryngot.

§ The *Centrotus horridus*, *trifidus*, *globularis*, *clavatus*, *claviger*, Fab.

|| The *C. cornutus*, *scutellaris*, &c., Fab.

minates by a truncation, so as to serve as a point d'appui to the base of the scutellum, and even frequently receiving it, this truncated part being concave or emarginated.

*ÆTALION*, Lat.—*ÆTALIA*, Germ.

The Insects of this subgenus are distinguished from those of other subgenera of the same division by several characters. The head, viewed from above, merely presents a transversal edge; the front is abruptly inclined, and the ocelli are situated there between the ordinary eyes, and consequently inferiorly. The antennæ, very small and distant from the latter organs, are inserted beneath an ideal line drawn from one to the other. The space immediately under the front is flattened and smooth. The tibiæ are neither ciliated nor dentated\*.

In the three succeeding subgenera, the vertex is triangular and bears the ocelli. The antennæ are inserted in an ideal line drawn from one ordinary eye to the other or above it.

*LEDRA*, Fab.

Where the head is much flattened before the eyes, in the form of a transversal clypeus, arcuated, and terminated in the middle of the anterior margin by an obtuse angle. All the under part of the head is plane or on a level. The sides of the prothorax project in the manner of horns rounded at the extremity, or of pinions. The posterior tibiæ are strongly compressed and as if bordered externally by a dentated membrane. The

*L. aurita*; *Cicada aurita*, L.; *Cigale Grand-Diable*, Geoff., belongs to this subgenus †.

*CICCUS*, Lat.

Where the antennæ terminate directly after the second joint in a seta composed of five distinct, cylindrical, and elongated joints. The anterior extremity of the head usually projects ‡.

\* Lat., consid., sur l'Ord. des Crust. des Arach. et des Insect. and the Zool., and Anat. of MM. Humboldt and Bonpland. See Germar, Magas. der Entom., IV, p. 94.

† See Fab., Syst. Ryngot., and Lat., Gener. Crust. et Insect., III, p. 157. See also Encyc. Méthod., Insect., X, 600, article *Tettigone*, and also *Tettigonides*, Ib., where the editors, Messrs. Lepeletier and Serville, offer some new considerations and establish new genera, but with which I was unacquainted until I had terminated my work on this family, and consequently had no time to verify, on the Insects themselves, the characters which they assign to those sections. I will restrict myself to the following remark. The description of the *Eurymèle fenestrée* exactly agrees with a species figured by Donovan, in his splendid work on the Insects of New Holland, and consequently the editors of the article in question must have been deceived as to the habitat of this Insect, which they say is from Brazil. In case this synonyme be correct, the distinctive character of this new genus, the absence of simple eyes, would be false, for they exist on the superior part of the front, although, at first, they are not easily perceived. This species would then re-enter the subgenus *Jassus*.

‡ The *Cicada adspersa* and *marmorata*, Fab.; his *Fulgora adscendens*, &c. I presume that several other species of the genus *Cicada* of this author, and of the *Tettigonia* of M. Germar, should also be referred to it; my collection of them, however, not being sufficiently numerous, I content myself with these indicia.

CERCOPIS, *Fab. Germ.*—APHROPHORA, *Germ.*

Where the third joint of the antennæ is conical and terminated by an inarticulated seta.

*C. sanguinolenta*, Fab.; *Cigale à taches rouges*, Geoff., Insect., II, vii, 5. Four lines in length; black, with six red spots on the elytra.—In woods.

*C. spumaria*; *Cicada spumaria*, L.; Rœs., Insect., II, Locust., xxiii. Brown, with two white spots on the elytra near their exterior margin. Its larva lives on leaves in a spumous and white fluid, called *Ecume printanière*, *Crachat de Grenouille* \*.

In the other Cicadariæ that complete this family, and which in the early works of Fabricius composed his genus *Cicada*, the prothorax is not prolonged posteriorly (or hardly not) and terminates at the height of the origin of the elytra in a straight line, or in one that is nearly so, the length of which is almost equal to the width of the body. The scutellum, measured at base, occupies a large portion of this breadth.

Two very prominent eyes, a head projecting somewhat beyond those organs, but depressed anteriorly, and forming a sort of arch at the summit of the elevated portion of the face, situated directly beneath, two superior posterior ocelli, and, finally, by an exception in this division, legs destitute of spines or teeth, distinguish the

EULOPA, *Fab.*

To this subgenus belongs the species which he calls the

*E. obtecta*; *Cercopis ericæ*, Arh., Faun. Insect., III, 24. It is about one line in length; reddish and spotted with white; the elytra are marked with two oblique bands of the same colour, and numerous and projecting nervures. The head is broad and as if truncated anteriorly †.

EUPELIX, *Germ.*

Where the head is much flattened and forms an elongated triangle, with the ocelli situated before the ordinary eyes on its edges, which are prolonged over those organs and intersect them longitudinally throughout the greater portion of their extent ‡.

PENTHIMIA, *Germ.*

Where the antennæ are inserted in a large fossula, which narrows, more than is usual, the space comprised between the eyes.

The head, which viewed from above appears semicircular and gradually inclined anteriorly, is rounded, and its edges project above this

\* This species, and some other Cercopes of Fabricius form the genus *Aphrophora* of M. Germar. The posterior margin of the head is concave, and their simple eyes are more distant from each other than in *Cercopis* proper. See his *Magas. der Entom.*, IV.

† *Germ.*, *Magas. der Entom.*, IV, p. 54.

‡ *Ibid.*, p. 53; *Cicada cuspidata*, Fab.

fossula. The simple eyes are situated near the middle of the vertex. The body is short. These Insects at a first glance somewhat resemble the *Cercopes*, and in fact Fabricius confounds them\*.

Near this subgenus we should apparently place that of the *GYPONA*, Germar, of which however I have never seen a specimen †.

*JASSUS*, *Fab. Germ.*

Where the vertex or superior plane of the head comprised between the eyes is very short, transversal, and linear, or in the form of a bow, and projects but little beyond the eyes even in the middle. The laminae which support the sides of the clypeus are large. The antennæ are terminated by a long seta. The ocelli are situated near its anterior margin, and even under it ‡. In

*TETTIGONIA*, *Oliv. Germ.*—*CICADA*, *Lin. Fab.*,

Or the *Cicadellæ* or *Tettigoninæ*, properly so called, the head, viewed from above, is triangular, without however being much elongated or flattened; a character which distinguishes these Insects from the *Eupelices*. The eyes are not cut by its edges. The simple eyes are situated between them or laterally §, but not near the front.

These Insects are also closely allied to the *Jassi* by the extent of their laminae, situated along the sides of the hood, and the length of the terminal seta of the antennæ; it appears to be articulated at base as in the *Cicci*, from which they almost only differ in the form of the thorax ||.

## FAMILY II.

### APHIDII.

The second family of the homopterous Hemiptera, or the fourth of the order, is distinguished from the preceding one by the tarsi, which are composed of but two joints, and by the filiform or setaceous antennæ, which are longer than the head and have from six to eleven joints.

Those individuals which are winged always have two elytra and two wings.

These Insects are very small; their body is usually soft, and their elytra are nearly similar to the wings, or only differ from them in being larger and somewhat thick. They are astonishingly prolific.

\* The *C. atra*, *hemorrhœa*, *sanguinicollis*, Germ., *Magas. der Entom.*, IV, p. 47.

† Germ., *Ibid.*, p. 73.

‡ Germ., *Ibid.*, p. 80.

§ Some species, such as the *Cercopis grisea*, *transversa*, *striata*, &c., Fab., on account of their flattened head furnished near its edges with simple eyes, should apparently be formed into a separate subgenus.

|| Germar, *Magas. der Entom.*, IV, p. 58, genus *Tettigonia*, Fab., *Syst. Ryngot.*, p. 61.

Here the antennæ are composed of from ten to eleven joints, the last of which is terminated by two setæ.

They possess the faculty of leaping, and form the genus

PSYLLA, *Geoff.*—CHERMES, *Lin.*

These Hemiptera, also called pseudo-aphides, or faux-pucerons, live on the trees and plants from which they derive their nourishment; both sexes are furnished with wings. Their larvæ usually have a very flat body, broad head, and the abdomen rounded posteriorly. Their legs are terminated by a little membranous vesicle accompanied beneath with two hooks. Four wide and flat pieces, which are the sheaths of the elytra and wings, distinguish the nymph. Several in this state, as well as in the first, are covered with a white substance resembling cotton, arranged in flakes. Their fæces form threads or masses, of a gummy and saccharine nature.

Some species, by wounding plants in order to suck their juices, produce excrescences somewhat resembling gall-nuts, particularly on their leaves or buds. Of this number is the

*P. buxi*; *Chermes buxi*, L.; Reaum., Mem., Insect., III, xix, I, 14. Green, with brown-yellowish wings.

Other species are also found on the Alder, Fig tree, Nettle, &c.\*

A species which lives in the flowers of the rushes has been erected into a genus by Latreille, under the name of *LIVIA*. The antennæ are much thicker inferiorly than at their extremity †.

The remaining Aphidii have but six or eight joints in the antennæ; the last is not terminated by two setæ.

Sometimes the elytra and wings are linear, fringed with hairs, and extended horizontally on the body, which is almost cylindrical; the rostrum is very small or but little distinct. The tarsi are terminated by a vesicular joint without hooks. The antennæ consist of eight graniform joints. Such are the Insects which form the genus

THRIPS, *Lin.*

They are extremely agile, and seem to leap rather than fly. When we irritate them beyond a certain point they turn up the posterior extremity of their body in the manner of the Staphylini. They live on flowers, plants, and under the bark of trees. The largest species scarcely exceed one line in length ‡.

Sometimes the elytra and wings, oval or triangular, and without a fringe of hairs along the margin, are inclined or tectiform. The ros-

\* See Fab., Geoff., De Geer.

† Lat., Gen. Crust. et Insect., III, p. 170; Arh., Faun. Insect., VI, 21.

‡ See Lat., Ibid. p. ead. and the authors already quoted. In the organization of the mouth, I have detected characters which seem to distinguish it essentially from that of Insects of this order. M. Straus, who has studied it with admirable minuteness, thinks that Thrips belong to the order of the Orthoptera.

trum is very distinct. The tarsi are terminated by two hooks, and the antennæ have but six or seven joints. Such is the genus

APHIS, *Lin.*

Which we divide in the following manner :

APHIS,

Properly so called, where the antennæ are longer than the thorax and consist of seven joints, the third of which is elongated ; the eyes are entire, and there are two horns or mamillæ at the posterior extremity of the abdomen.

Almost all of them live in society on trees and plants, of which they suck the juices with their trunk. The two horns observed at the posterior extremity of the abdomen in a great number of species are hollow tubes from which little globules of a transparent, honey-like fluid frequently exude, on which the Ant eagerly feeds.

In each community, during the spring and summer, we find Aphides that are always apterous, and semi-nymphs whose wings are yet to be developed ; all these individuals are females, which produce living young ones that issue backwards from the venter of their mother, without previous copulation. The males, some of which are winged, and others apterous, only appear towards the end of summer or in autumn. They fecundify the last generation produced by the preceding individuals, which consists of unimpregnated apterous females. After coition the latter lay their eggs on branches of trees, where they remain during the winter, and from which, in the spring, proceed little Aphides, which soon multiply without the assistance of the males.

The influence of a first fecundation is also extended to seven successive generations. Bonnet, to whom we are indebted for most of these facts, by isolating the females, obtained nine generations in the space of three months.

The wounds inflicted on the leaves or tender twigs of plants, by Aphides, cause those parts of the vegetable to assume a variety of forms, as may be observed on the shoots of the Lime tree, the leaves of Gooseberry bushes, Apple trees, and particularly those of the Elm, Poplar, Pistachio, in which they produce vesicles or excrescences enclosing colonies of Aphides, and frequently an abundant saccharine fluid. Most of these Insects are covered with a farinaceous substance, or cotton-like filaments, sometimes arranged in bundles. The larvæ of the Hemerobii, those of several Diptera, and of Coccinellæ, destroy immense numbers of Aphides. M. A. Duvau has communicated to the Académie des Sciences, the interesting result of his researches on these Insects. His Memoir has been inserted in the *Annales du Muséum d'Histoire Naturelle*.

*A. quercus*, L. ; Reaum., *Insect.*, III, xxviii, 5, 10. Brown ; remarkable for its rostrum, which is at least thrice as long as the body.

*A. fagi*, L.; Reaum., Ib., xxvi, 1. Completely covered with white down resembling cotton\*.

ALEYRODES, Lat.—TINEA, Lin.

Where the antennæ are shorter and hexarticulated, and the eyes are emarginated.

*A. prolella*; *Tinea prolella*, L.; Reaum., Ib., II, xxv, 1, 7. Resembling a little *Phalæna*; white, with a blackish point and spot on each elytron. Under the leaves of the *Chelidonium majus*, Brassicæ, Oak, &c.

The larva is oval, much flattened, in the form of a little scale, and resembles that of the *Psyllæ*. The chrysalis is fixed and enclosed in an envelope, so that this Insect undergoes a complete metamorphosis.

### FAMILY III.

#### GALLINSECTA.

In this last family, of which De Geer makes a particular order, there are but five joints in the tarsi †, with a single hook at the extremity. The male is destitute of a rostrum, and has but two wings, which are laid horizontally on the body one over the other; the abdomen is terminated by two setæ. The female is apterous and provided with a rostrum. The antennæ are filiform or setaceous, and most commonly composed of eleven joints ‡.

They constitute the genus

*Coccus*, Lin.

The bark of various trees is frequently covered with a multitude of little oval or rounded bodies, in the form of fixed shields or scales, in which, at the first glance, no external organs indicative of an Insect are perceptible. These bodies are nevertheless animals of this class and belong to the genus *Coccus*. Some are females, and the remainder young males, the form of both being nearly similar. An

\* M. Blot, corresponding member of the Linnean Society of Caen, had published, in the *Mém. de la Soc. Lin. de Caen*, 1824, p. 114, some curious observations on a particular species which is very injurious to the Apple trees in the department of Calvados, by destroying their young shoots. He considers it as the type of a new genus, *Myzoxyle*. De Geer had previously described an *Aphis* of the same tree, but as Messrs. Lepelletier and Serville—*Encyc. Méthod.*, article *Puceron*—justly remark, that species, although also hurtful to the Apple tree, differs essentially from the preceding one. The abdomen of the other is not furnished with horns; its antennæ are shorter, and, according to M. Blot, present but five joints, of which the second is the longest. We suspect that it re-enters into our third division—Gener. Crust. et Insect.—of the genus *Aphis*. For the other species, see the works already quoted, and the *Faun. Bavar.*, Schrank.

† M. Dalman, Director of the Cabinet of Natural History of Stockholm, in a Memoir on certain species of *Coccus*, presumes that there are three of these joints.

‡ Nine in the males described in this Memoir.



epoch, however, soon arrives in which all these individuals experience singular changes. They then become fixed; the male larvæ for a determinate period, requisite for their ultimate metamorphosis, and the females for ever. If we observe the latter in the spring, we shall find that their body gradually increases to a great volume, and finally resembles a gall-nut, being sometimes spherical, and at others reniform or scaphoid. The skin of some is smooth and level, that of the remainder presents incisures or vestiges of segments. It is in this state that the females receive the embraces of their males, soon after which they produce a great number of eggs. They slip them between the skin of their venter, and a white down which covers the spot they occupy. Their body then becomes desiccated, and forms a solid crust or shell which covers their ova. Other females protect theirs by enveloping them with a white substance resembling cotton. Those which are spherical form a sort of box for them with their body. The young Cocci have an oval body much flattened and furnished with the same organs as that of the mother. They spread themselves over the leaves, and towards the end of autumn approach the branches, on which they fix themselves to pass the winter. The females prepare to become mothers on the return of spring, and the males to transform themselves into chrysalides under their own skin. These chrysalides have their two anterior legs directed forwards, and not backwards like their remaining four, and the whole six in those of the other sex. Having acquired their wings, these males issue backwards from the posterior extremity of their domicile, and proceed immediately in search of their females. They are much smaller than the latter. Their copulating apparatus forms a recurved kind of tail between the two terminal setæ of the abdomen. Reaumur saw two granules resembling simple eyes on that part of their head which corresponds to their mouth. I have distinguished on the head of the male, *C. ulmi*, ten similar bodies, and two species of halteres on the thorax. Geoffroy says the females have four white threads at the posterior extremity of their abdomen, which are only visible by so pressing that part of the body as to make them protrude.

Dorthez has observed a species on the Euphorbium characias which appears to differ in form and habits from the others. This induced his friend, the late M. Bosc, to convert that species into a genus which he named *Dorthesia*. The antennæ consist of nine joints, those of the male being longer and more slender than in the female. The latter continues to live and run about after laying her eggs. The posterior extremity of the male's abdomen is furnished with a tuft of white threads. This insect is consequently more nearly allied to the Aphides than to the Cocci\*.

The Gallinsecta appear to injure trees by a superabundant sudoresis through the punctures they make in them, and of course those who cultivate the Peach, Orange, Fig, and Olive, are particularly on their guard against them. Certain species fix themselves to the roots

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\* M. Carcel, a zealous and learned entomologist, has lately confirmed these observations by new investigations. See the *Nouv. Dict. d'Hist. Nat.*, 2d edit., article *Dorthés*.

of plants. Some are valuable for the rich red colour they furnish to the art of dyeing. Further researches on these Insects might eventuate in the discovery of others which would prove of similar utility.

Geoffroy divides the Gallinsecta into two genera, *Chermes* and *Coccus*. Reaumur designates the latter by the name of *Progall-Insecte*.

*C. adonidum*, L. Body almost rose-coloured and covered with a white farinaceous dust; wings and caudal setæ of the tail white; sides of the female furnished with appendages, the two last of which are the longest, and form a sort of tail. She envelops her ova with a white and cottony substance that serves for a nest. Naturalized in our green-houses, where it does much injury.

*C. cacti*, L.; Thier de Menouv., De la Cult. du Nop., et de la Cochen. Female of a deep brown covered with white dust, flat beneath, convex above and bordered; the annuli are tolerably distinct, but become obliterated at the epoch of production. The male is of a deep red, with white wings.

This Insect is cultivated in Mexico, on a species of *Opuntia*, and is distinguished by the name of *Mesteque*—fine cochineal, from another very analogous, but smaller and more cottony, or the *Sylvestre*. It is celebrated for the crimson dye it furnishes, which, by being combined with a solution of tin in nitro-muriatic acid, produces a scarlet. It is also from this Insect that we obtain carmine. It is one of the richest productions of Mexico\*.

*C. polonicus*, L.; Breyn., E, iv, c, 1731; Frisch, Insect., II, 5, p. 6. Female russet-brown, resembling a granule, and attached to the roots of the *Scleranthus perennis*, and some other plants. Previous to the introduction of cochineal, this Insect constituted an important object of commerce. The colour it produces is of the same tint, and almost as beautiful as that of the preceding species. It is still employed in Germany and Russia.

*C. ilicis*, L.; Reaum., Insect., IV, v. The female, both in size and shape, like a pea. It is of a dark violet or prune-colour, covered with white dust. Found on a species of Oak in Provence, Languedoc, and southern parts of Europe. It is used in dyeing crimson, particularly in the Levant and Barbary. Scarlet was also obtained from it previous to the general introduction of the cochineal from Mexico. It is still used in medicine †.

A certain species that inhabits the East Indies forms gum lac.

Another enters into the composition of a peculiar bougie employed in China ‡.

\* See Humboldt's Travels.

† For the other species see Reaumur, Linnæus, Geoffroy, De Geer, Latreille, and Olivier, Encyc. Méthod., article *Gochenille*. For the *C. cacti*, see a Literary Gazette, printed at Mexico, 5th February, 1794. M. Bory St. Vincent—Annal. des Sc. Nat., VIII, 105—informs us that experiments had been made at Malaga, in Spain, with a view to introduce the cultivation of this latter species, and that they succeeded.

‡ Doctor Virey, Journ. Complément. des Sc. Méd., X, has published some new observations respecting this production.

A male *Coccus* from Java, remarkable for its antennæ, which are composed of about twenty-two joints, granose, and densely pilose, and that has two tolerably thick and almost coriaceous wings, is the type of the genus *MONOPHLEBA* of Leach.

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## ORDER VIII.

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### NEUROPTERA\*.

The Neuroptera are distinguished from the three preceding orders by their two upper wings, which are membranous, generally naked, diaphanous, and similar to the under ones in texture and properties. They are distinguished from the eleventh and twelfth by the number of these organs, as well as by their mouth, fitted for mastication or furnished with mandibles and true maxillæ, or, in other words, organized as usual, a character which also removes this order from the tenth, or that of the Lepidoptera, where, besides, the four wings are farinaceous. The surface of these wings in the Neuroptera is finely reticulated, and the under ones are most commonly as large as those above them, but sometimes wider, and sometimes narrower and longer. Their maxillæ and the inferior portion of their labrum or the mentum are never tubular. The abdomen is destitute of a sting and rarely furnished with an ovipositor.

Their antennæ are usually setaceous, and composed of numerous joints. They have two or three simple eyes. The trunk is formed of three segments intimately united in a single body, distinct from the abdomen, and bearing the six legs; the first of these segments is usually very short, and in the form of a collar. The number of joints in the tarsi varies. The body is usually elongated, and with rather soft or but slightly squamous teguments; the abdomen is always sessile. Many of these Insects are carnivorous in their first state and in their last.

Some merely experience a semimetamorphosis, the rest a complete one; but the larvæ have six hooked feet, which they usually employ in seeking their food.

I will divide this order into three families, which will successively present to us the following natural affinities:

1. Carnivorous Insects, subject to a semimetamorphosis, with aquatic larvæ.

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\* The *Odonata* and most of the *Synistata* of Fabricius.

2. Carnivorous Insects, subject to a complete metamorphosis, with aquatic or terrestrial larvæ.

3. Carnivorous or omnivorous terrestrial Insects, subject to a semi-metamorphosis.

4. Herbivorous Insects, subject to a complete metamorphosis, with aquatic larvæ, which construct portable dwellings.

We will end with those species in which the wings are the least reticulated, and which resemble *Phalænæ* or *Tineites*.

## FAMILY I.

### SUBULICORNES, *Lat.\**

This family is composed of the order *Odonata* of Fabricius, and of the genus *Ephemera*. The antennæ are subulate, and hardly longer than the head; they are composed of seven joints at most, the last of which is cetaceous. The mandibles and the maxillæ are completely covered by the labrum and labium, or by the anterior and projecting extremity of the head.

The wings are always reticulated and distant, sometimes laid horizontally and sometimes placed perpendicularly; the inferior are as large as the superior, or sometimes very small, and even wanting. The ordinary eyes are very large and prominent in all of them; and they all have two or three ocelli situated between the former. The two first periods of their life are passed in the bosom of the waters, where they prey on living animals.

The larvæ and chrysalides, which approximates in form to the perfect Insect, respire by means of peculiar organs situated on the sides or extremity of the abdomen. They issue from the water to undergo their ultimate metamorphosis.

In some the mandibles and maxillæ are corneous, very strong, and covered by the two lips; the tarsi are triarticulated; the wings are equal, and the posterior extremity of the abdomen is simply terminated by hooks or laminiform or foliaceous appendages. They form the Fabrician order of the *Odonata*, or the genus

### LIBELLULA, *Lin. Geoff.*

The light and graceful figure of these Insects, the beautiful and variegated colours with which they are adorned, their large wings, resembling lustrous gauze, and the velocity with which they pursue the

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\* A section, divided into two families, the *LIBELLULINÆ*, in my *Fam. Nat. du Règn. Animal.*

Flies, &c. that constitute their food, attract our attention and enable us to recognize them with facility. Their head is large, rounded, or in the form of a broad triangle. They have two great lateral eyes \*, and three simple ones situated on the vertex; two antennæ, inserted into the forehead behind a vesicular prominence, composed of five or six joints, or at least of three, the last of which is compound and attenuated in the manner of a stylet; a semicircular arched labrum; two very strong, dentated, and squamous mandibles; maxillæ terminated by a piece of the same consistence, that is dentated, spinous, and ciliated on the inner side, with an unarticulated palpus laid on the back and representing the galea of the Orthoptera; a large, arched, trifoliate labium, of which the two lateral leaflets are palpi; a sort of epiglottis or vesicular and longitudinal tongue in the interior of their mouth; a thick and rounded thorax; a highly elongated abdomen, which is sometimes ensiform, and at others resembles a rod, terminated in the males by two lamellar appendages varying in form according to the species †, and, finally, short legs curved forwards.

The under part of the second annulus of the abdomen contains the sexual organs of the males, and as those of the females are situated on the last ring, the coition of these Insects is effected in a different manner from that of others. The male, first hovering over his female, seizes her by the neck with the hooks that terminate the posterior extremity of his abdomen, and flits away with her. After a shorter or longer period, the latter, yielding to his desires, curves her abdomen downwards, and approximates its extremity to the genitals of the male, whose body is then bent into the form of a buckle. This junction frequently occurs in the air, and sometimes on the bodies where they alight. To lay her eggs, the female places herself on some aquatic plant that is raised but little above the water, into which she plunges the posterior extremity of her abdomen.

The larvæ and the chrysalides inhabit the water until the period of the ultimate metamorphosis, and, with the exception of wings, are tolerably similar to the perfect Insect. Their head, however, on which the simple eyes are not perceptible, is remarkable for the singular form of the piece which replaces the lower lip. It is a kind of mask, that covers the mandibles, maxillæ, and almost the whole under part of the head. It is composed, 1. of a principal triangular piece that is sometimes arched and sometimes flat, called by Reaumur the *mentonnière* (chin-cloth), articulated by a hinge, with a pedicle or sort of handle annexed to the head; 2. of two other pieces inserted at the superior and lateral angles of the former, movable at base, transversal, and either in the form of wide and dentated laminæ, resembling shutters in their motion and the manner in which they close the mouth,

\* For their structure, see Cuv., *Mém. de la Soc. d'Hist. Nat. de Par.*, 4to. p. 41.

† MM. Van der Linden and Toussaint Charpentier have made a particular study of these appendages. The latter has carefully figured all these varieties in his *Horæ Entomologicae*. The genus *Petalaria*, Leach, *Zool. Miscel.*, being essentially established on characters drawn from these appendages, appears to me to be inadmissible, and for the simple reason, that if this ground of division be once received, we shall have to establish almost as many genera as there are species.

or in the form of hooks or little claws. To this part of the mask where the *mentonnière* is articulated with its pedicle, or the knee, and which appears to terminate it inferiorly when the mask is flexed upon itself, Reaumur applies the name of *mentum*. The Insect unfolds or extends it with great promptitude, and seizes its prey with the pincers of its superior portion. The posterior extremity of the abdomen sometimes presents five foliaceous and unequal appendages, which the animal can separate and approximate, in which case they form a sort of pyramidal tail; sometimes we observe the three elongated and pilose laminæ or a sort of fins. We see these Insects unfold them every moment, open their rectum, fill it with water, then close it, and shortly afterwards ejaculate that water mixed with large bubbles of air, a game which appears to facilitate their motions. The interior of the rectum \* presents to the naked eye twelve longitudinal ranges of little black spots, approximated by pairs, resembling the pinnated leaves of botanists. By the aid of the microscope we discern that each of these spots is composed of little conical tubes, organized like tracheæ, and from which originate small branches that proceed to six large trunks of the principal tracheæ, that traverse the whole length of the body.

Having attained the period of their ultimate metamorphosis, the nymphs issue from the water, climb along the stems of plants, fix there, and divest themselves of their skin.

M. Poe, who has paid particular attention to the Insects of the island of Cuba, informs me that at a certain season of the year the northern winds sweep an innumerable host of a species of this genus—specimens of which he had the kindness to send me—into Havana or its environs.

Fabricius, anticipated in this point by Reaumur, divides the *Libellulæ* into three genera.

#### LIBELLULA, *Fab.*,

Or *Libellula* proper, where the wings are extended horizontally when at rest. The head is almost globular, with very large, contiguous or closely approximated eyes, and a vesicular elevation on the vertex, with an ocellus on each side; the other or anterior ocellus is much larger. The middle division of the labium is much smaller than the lateral ones †, which unite beneath by a longitudinal suture, and close the mouth exactly. The abdomen is ensiform and flattened.

The larvæ and the nymphs have five appendages at the posterior extremity of the body, forming a pointed tail; their body is short, the *mentonnière* convex, in the form of a helmet, with the two pincers resembling shutters.

*L. depressa*, L.; Roes., *Insect. Aquat.*, VI, vii, 3. Brown, somewhat yellowish; base of the wings blackish; two yellow lines

\* Cuv. *Mém de la Soc. d'Hist. Nat.*, 4to., p. 48.

† These lateral divisions or palpi present a remarkable difference in the three subgenera.



on the thorax; abdomen ensiform, sometimes brown, and at others slate coloured, with yellowish sides\*.

*ÆSHNA, Fab.*

The *Æshnæ* resemble the *Libellulæ* proper in their mode of bearing their wings, and in the form of their head, but their two posterior ocelli are placed on a simple transverse elevation in the form of a carina. The intermediate lobe of the labium is also larger, and the two others are distant and armed with a very stout tooth and spiniform appendage. The abdomen is always narrow and elongated.

The body of the larvæ and the nymphs is also more elongated than that of the *Libellulæ* in the same states. The mask is flat, and the two pincers are narrow, and have a small movable nail at the extremity. The abdomen is terminated by five appendages, but one of them is truncated at the end.

*Æ. grandis; Libellula grandis, L.;* Rœs. Insect. Aquat., VI, iv. One of the largest species of this family, being nearly two inches and a half in length; fulvous-brown; two yellow lines on each side of the thorax; abdomen spotted with green or yellowish; wings iridescent. It darts with amazing rapidity over meadows, and along the shores of rivers, &c., pursuing flies in the manner of the Swallow †.

*AGRION, Fab.,*

Where the wings are elevated perpendicularly when at rest, the head is transversal, and the eyes are distant.

The form of the labium is analogous to that of the *Æshnæ*, but the intermediate lobe is divided in two, down to its base. The third joint of the lateral lobes is in the form of a membranous ligula. The antennæ seem to be composed of but four joints. The forehead presents no vesicle, and the simple eyes are almost equal, and arranged in a triangle on the vertex. The abdomen is very thin or even filiform, and sometimes very long. That of the females has its posterior extremity furnished with serrated laminae.

The body of these Insects, in their first and second states, is equally slender and elongated, and the abdomen terminated by three fin-like laminae. The mask is flat, the superior extremity of the mentonnière being raised into a point in some, and forked or sloped in others; the pincers are narrow, but terminated by several dentations, and resemble hands.

*A. virgo; Libellula virgo, L.;* Rœs., Insect. Aquat., VI, ix. Golden-green or green-blue; superior wings, sometimes either entirely blue or only in the middle, and sometimes of a yellow-

\* For the other species, see Fabricius, Entom. Syst., and Latreille, Hist. Gener. des Crust. et des Insect., XII, p. 10, et seq.; but particularly the Monographs of the Insects of this family, from the environs of Bologne, published in Latin by M. Van der Linden, that which he has since given on the species of Europe, and finally another Monograph of European *Libellulæ*, forming a part of the already quoted work of M. Toussaint Charpentier.

† See the same works. The *Æshna forcipata* might form another subgenus.



ish-brown. The mentonnière of the larvæ and nymph is sloped like a lozenge at the extremity, and terminated by two points.

*A. puella*; *Libellula puella*, L.; Rœs., *ib.*, x, xi. Very various as to colour; its abdomen is most commonly annulated with black, and the wings are colourless.

The superior extremity of the mentonnière of the larvæ and nymphs forms a salient angle\*.

The other Subulicornes have an entirely membranous or very soft mouth, composed of parts that are rather indistinct. Their tarsi consist of five joints; their inferior wings are much smaller than the superior, or even wanting, and their abdomen is terminated by two or three setæ.

They form the genus

### EPHEMERA, *Lin.*,

So called from their short term of life, in their perfect state. Their body is extremely soft, long, tapering, and terminated posteriorly by two or three long and articulated setæ. The antennæ are very small and composed of three joints, the last of which is very long, and in the form of a conical thread. The anterior part of their head projects in the manner of a clypeus, frequently carinated and emarginated, covers the mouth, the organs of which are so soft and exiguous that they cannot be distinguished. The wings of those Insects are always placed perpendicularly, or slightly inclined posteriorly, like those of an Agrion. The legs are very slender, and the tibiæ very short, and almost confounded with the tarsi, which frequently present but four joints, the first having nearly disappeared; the two hooks of the last one are strongly compressed into the form of a little palette; the two anterior legs, much shorter than the others, are inserted almost under the head, and directed forwards.

The Ephemerae usually appear at sunset, in fine weather, in summer and autumn, along the banks of rivers, lakes, &c., and sometimes in such innumerable hosts that after their death the surface of the ground is thickly covered with their bodies; in certain districts cart-loads of them are collected for manure.

The descent of a particular species—the *albipennis*—remarkable for the shortness of its wings, recalls to our minds a heavy fall of snow in winter.

These Insects collect in flocks in the air, flitting about and balancing themselves in the manner of the Tipulæ, with the terminal filaments of their tail divergent. There the sexes unite. The males are distinguished from the females by two articulated hooks at the extremity of their abdomen, with which they seize them. It also appears that their anterior legs and caudal filaments are longer than those of the females, and that their eyes are larger; some of them even have

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\* For the other species, see Fabricius, *Entom. Syst.*; Lat., *Hist. Gener. des Crust. et des Insect.*, XIII, p. 15; Olivier, *Encyc. Méthod.*, article *Libellule*; and especially the preceding Monographs, where the variety of species and of their sexual differences are carefully indicated—works that have greatly facilitated the disentangling of their synonymy.

four compound eyes, two of which are elevated and much larger than the others, called from their form *turban'd* or *columnar* eyes. The junction having been effected, the couples place themselves on trees or plants to complete their coitus, which lasts but for a moment. The female soon after deposits all her eggs in the water, collected in a bundle.

The propagation of their species is the only function these animals have to fulfil, for they take no nourishment, and frequently die on the day of their metamorphosis, or even within a few hours after that event. Those which fall into the water become food for Fishes, and are styled *Manna* by fishermen.

If however we trace them back to that period in which they existed as larvæ, we find their career to be much longer, extending from two to three years. In this state, as well as that of semi-nymphs, they live in water, frequently concealed, at least during the day, in the mud or under stones, sometimes in horizontal holes divided interiorly into two united canals, each with its proper opening. These habitations are always excavated in clay, bathed by water, which occupies its cavities; it is even supposed that the larvæ feed on this earth.

Although allied to the perfect Insect, when it has undergone its ultimate metamorphosis, in some respects they differ. The antennæ are longer; the ocelli are wanting; and the mouth presents two projections resembling horns, which are considered as mandibles. On each side of the abdomen is a range of laminae or leaflets, usually united at base by pairs, which are a sort of pseudo-branchiæ over which the tracheæ extend and ramify, and which not only enable them to respire but also to swim and move with greater facility; the tarsi have but one hook on their extremity. The posterior extremity of the body is terminated by the same number of setæ as that of the perfect Insect.

The seminymph only differs from the larva in the presence of the cases which enclose the wings. When the moment of their development has arrived, it leaves the water, and having changed its skin, appears under a new form—but, by a very singular exception, it has still to experience a second change of tegument, before it is prepared to propagate its species. The ultimate exuvium of these Insects is frequently found on trees and walls; they sometimes even leave them on the clothes of persons who may be walking in their vicinity.

With this genus and that of the Phryganææ, De Geer formed an order founded on the absence or extreme exiguity of the mandibles. In the "Tableau Élémentaire de l'Histoire Naturelle des Animaux" of the Baron Cuvier, they also constitute a separate family, that of the *Agnathes*, but still forming part of the order of the Neuroptera.

The number of wings and that of the filaments of the tail furnish the means of dividing the genus of the Ephemæræ.

*E. Swammerdiana*, Lat.; *E. longicauda*, Oliv., Swamm., Bib., Nat., II, xiii. 6, 8. The largest species known; four wings; two filaments to the tail twice or thrice the length of the body, which is of a russet-yellow; eyes black. Holland and Germany, along the great rivers.

*E. vulgata*, L. ; De Geer, Insect., II, xv, 9—15. Four wings; three filaments at the extremity of the abdomen; brown; abdomen deep yellow, marked with triangular black spots; wings spotted with brown.

*E. diptera*, L. But two wings; the male with four compound eyes, two of which are larger than the others and placed perpendicularly like two columns\*.

## FAMILY II.

### PLANIPENNES.

This family, which, with the third, forms the greater part of the order of the *Synistata* of Fabricius, comprises those Neuroptera in which the antennæ, always multiarticulated, are much longer than the head, without being subulate or styliform. Their mandibles are very distinct; their inferior wings almost equal to the superior ones, and extended or simply folded underneath at their anterior margin.

Their wings are almost always much reticulated and naked; their maxillary palpi are usually filiform or somewhat thicker at the extremity, shorter than the head, and composed of from four to five joints.

I will divide this family into five sections, which, by reason of the habits of the Insects that compose them, form as many small sub-families.

1. The PANORPATÆ of Latreille, which have five joints to all the tarsi, and the anterior extremity of their head prolonged and narrowed in the form of a rostrum or proboscis.

They constitute the genus

#### PANORPA, *Lin. Fab.*,

Where the antennæ are setaceous and inserted between the eyes; the clypeus is prolonged into a conical, corneous lamina, arched above to cover the mouth, and the mandibles, maxillæ and labium are almost linear. They have from four to six short, filiform palpi; in those of the maxillæ I could distinctly perceive but four joints.

Their body is elongated, the head vertical, the first segment of the trunk usually very small, in the form of a collar, and the abdomen conical or almost cylindrical.

There is much difference between the two sexes in several species. Their metamorphoses have not yet been observed.

In some, and the greater number, the naked or exposed portion of the thorax is formed of two segments, the first of which is the smallest.

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\* For the other species, see Olivier, Encyc. Méthod. ; Fabricius ; Latreille, Hist. Gener. des Crust. et des Insect., t. XIII, p. 93 ; and Lat. Gen. Crust. et Insect., III, p. 183.

Both sexes are winged, and the wings, are longer than the abdomen, adapted for flight, oval or linear, but not narrowed towards the extremity or subulate. Such are those which compose the

NEMOPTERA, *Lat. Oliv.*,

Where the superior wings are distant, almost oval, and very finely reticulated; the inferior ones are very long and linear; no simple eyes.

The abdomen is nearly similar in form in both sexes. They appear to have six palpi, and hitherto seem to have been only observed in the most southern parts of Europe, in Africa, and in the adjacent countries of Asia\*.

BITTACUS, *Lat.*,

Where the four wings are equal and laid horizontally on the body. They are furnished with simple eyes; the abdomen is almost similar in both sexes, and the legs are very long; the tarsi are terminated by a single hook, and are destitute of pellets †.

PANORPA, *Lat.*

The wings and simple eyes as in the preceding genus; but the abdomen of the males is terminated by an articulated tail, almost like that of the Scorpions, with a forceps at the extremity; that of the females end in a point. The legs of both sexes are of a moderate length, with two hooks and a pellet at the extremity of the tarsi.

*P. communis*. L.; De Geer, *Insect.*, II, xxiv, 34. From seven to eight lines in length; black; rostrum and extremity of the abdomen russet; wings spotted with black. On hedges and in woods ‡.

In others, the first segment of the thorax is large, and seems alone to form that part, the two following ones being covered by the wings in the males. The wings are subulate, recurved at the extremity, shorter than the abdomen, and wanting in the females where that part of the body is terminated by an acinaciform ovipositor.

BOREUS, *Lat.*

The only species of this genus known is the

*B. hiemalis*; *Panorpa hiemalis*, L.; *Gryllus proboscideus*, Panz., *Faun. Insect. Germ.*, XXII, 18. It is found in winter, under moss, in the north of Europe and in the Alps §.

2. The MYRMELEONIDES, which also have five joints in the tarsi, but their head is not prolonged anteriorly in the form of a rostrum or snout; their antennæ gradually enlarge or have a globuliform termination.

\* *Lat.*, *Gen. Crust. et Insect.*, III, p. 186; *Oliv.*, *Encyc. Méthod.*, article *Némoptère*. Doctor Leach calls it *Monopteryx*; he has figured two species, *lusitanica* and *africana*, in his *Zoological Miscellany*, lxxxv.

† *Lat.*, *Gen. Crust. et Insect.*

‡ For the other species, see *Lat.*, *Oliv.*, *Ib.*, article *Panorpe*, and Leach, *Zool. Miscell.*, xciv.

§ *Oliv.*, *Ib.*, article, *Ib.*

Their head is transverse, vertical, and merely presents the ordinary eyes, which are round and prominent; there are six palpi, those of the labium usually longer than the others, and inflated at the extremity. The palate of the mouth is elevated in the form of an epiglot-tis; the first segment of the thorax is small; the wings are equal, elongated, and tectiform; the abdomen is most frequently long and cylindrical, with two salient appendages at its extremity in the males. The legs are short.

They are found in the warm localities of the southern countries, clinging to plants, where they remain quiescent during the day. Most of them fly well. The nymph is inactive.

These Insects form the genus

### MYRMELEON, *Lin.*,

Of which Fabricius has made two.

### MYRMELEON, *Fab.*,

Or Myrmeleon proper, where the antennæ enlarge insensibly, are almost fusiform, are hooked at the extremity, and much shorter than the body; the abdomen is long and linear.

*M. formicarium*, L.; Rœs., Insect., III, xvii—xx. About an inch long; blackish spotted with yellowish; wings diaphanous, with black nervures picked in with white; some obscure spots, and one whitish, near the extremity of the anterior margin\*.

The number of ants destroyed by the larva of this species, which is the most common one in Europe, has obtained for it the name of *Formica-leo*, *Lion-ant*, or *Fourmilion*. Its abdomen is extremely voluminous in comparison to the rest of the body. Its head is very small, flattened, and armed with two long mandibles in the form of horns, dentated on the inner side and pointed at the extremity, which act at once as pincers and suckers. Its body is greyish or of the colour of the sand in which it lives. Although provided with six feet, it moves very slowly and almost always backwards. Thus, not being able to seize its prey by the celerity of its motions, it has recourse to stratagem, and lays a trap for it in a funnel-shaped cavity which it excavates in the finest sand, at the foot of a tree, old walls, or acclivities exposed to the south. It arrives at the intended scene of its operations by forming a ditch, and traces the area of the funnel, the size of which is in proportion to its growth; then, always moving backwards, and describing as it goes spiral convolutions, the diameter of which progressively diminishes, it loads its head with sand by means of one of its anterior feet, and jerks it to a

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\* For the other species, see Lat., Gen. Crust. et Insect., III, p. 190; Oliv., Encyc. Méthod., article *Myrmeleon*. See also, both for this and the following genus, the work of M. Toussaint Charpentier, already quoted.

distance. In this manner, and sometimes in the space of half an hour, it will remove a reversed cone of sand the base of which is equal in diameter to that of the area, and the height to about three-fourths of the same. Hidden and quiescent at the bottom of its retreat, with nothing visible but its mandibles, it awaits with patience till an Insect is precipitated into it; if it endeavour to escape, or be at too great a distance for it to seize, it showers upon it such a torrent of sand by means of its head and mandibles, as propels it, stunned and defenceless, to the bottom of the hole. Having exhausted its juices by suction, it drags away the carcass and leaves it at a distance from its domicil.

The nutritive matter it thus obtains is not converted into any perceptible excrement, neither is this larva—and such also is the case with several others—provided with an opening analogous to an anus. It can abstain from food for a long period without any apparent suffering.

When about to pass into the state of the chrysalis, it encloses itself in a perfectly round cocoon, formed of a silky substance, which it covers externally with grains of sand. Its fusi are situated at the posterior extremity of the body. The perfect Insect makes its appearance at the expiration of fifteen or twenty days, and leaves its exuvium at the aperture it has effected in its cocoon.

#### ASCALAPHUS, *Fab.*

Where the antennæ are long and terminate abruptly in a button; the abdomen forms an oblong oval, and is hardly longer than the thorax.

The wings are proportionally wider than those of the Myrmeleones, and not so long.

Bonnet has observed, in the environs of Geneva, a larva similar to that of the preceding subgenus, but which neither moves backwards nor excavates a funnel. The posterior extremity of its abdomen is furnished with a bifid plate truncated at the end\*. It is perhaps the larva of the *Ascalaphus italicus*, peculiar to the south of Europe, and which now begins to appear in the neighbourhood of Paris and Fontainebleau †.

3. The HEMEROBINI of Latreille, which are similar to the Myrmeleonides in the general form of their body and wings; but their antennæ are filiform, and they have but four palpi.

They form the genus

#### HEMEROBIUS, *Lin. Fab.*

In some, the first segment of the trunk is very small, and the wings

\* This larva has also been found in Dalmatia, by Count Dejean.

† The same works. For some species of New Holland, see Leach, Zool. Miscellany.



are tectiform; the last joint of the palpi is thickest, ovoid and pointed. The larvæ are terrestrial. They form the genus

HEMEROBIUS, *Lat.*,

Or Hemerobius, properly so called, also styled *Demoiselles terrestres*. Their body is soft, and the globular eyes are frequently ornamented with metallic colours; the wings are large, and their exterior border is widened. They fly slowly and heavily; several diffuse a strong faecal odour, with which the finger that has touched them remains for a long time impregnated.

The female deposits ten or twelve eggs on leaves; they are oval, white, and secured by a very long and capillary pedicle. Some authors have mistaken them for a species of mushroom. The larvæ bear a considerable resemblance to those of the preceding division; they are, however, more elongated and errant. Reaumur calls them *Lions des Pucerons* because they feed on Aphides. They seize them with their horn-like mandibles, and soon exhaust them by suction. Some form a thick case for themselves of their remains, which gives them a very singular appearance. The nymph is enclosed in a silken cocoon of an extremely close tissue, the volume of which is very small when compared with that of the Insect. The fusi of the larvæ are situated at the posterior extremity of the abdomen, like those of the larvæ of the Myrmeleonides.

*H. perla*, L.; Rœs., Insect., III, Suppl., xxi, 4, 5. Green-yellow; eyes golden; wings transparent, with entirely green nervures\*.

The *H. maculatus*, Fab., has three little ocelli, while in all the rest of the species they are wanting. It forms the genus

OSMYLUS, *Lat.* †

The same character is presented in the genus

NYMPHES, *Leach*,

Established on certain Insects from New Holland; but here the antennæ are filiform and shorter ‡.

In the others the first segment of the thorax is large, and the wings are laid horizontally on the body; the palpi are filiform, and the last joint is conical or almost cylindrical, and frequently shorter than the preceding one. The larvæ are aquatic.

Fabricius unites them with the species of the genus *Perla* of

\* Add *Hemerobius filosus* and the *albus*, *capitatus*, *phalenoïdes*, *nitidulus*, *hirtus*, *fuscatus*, *humuli*, *variegatus*, and *nervosus*, Fab. See Lat., Gen. Crust. et Insect., III, p. 196.

† Lat., Ibid.

‡ *Nymphes myrmeleonides*, Leach, Zool. Miscell., xlv. Perhaps it may have six palpi, and in that case it belongs to the preceding division.



Geoffroy, but which are removed from them by the number of joints in their tarsi, under the generic name of

*SEMBLIS, Fab.,*

Which is composed of the following subgenera :

*CORYDALIS, Lat.,*

Distinguished by the mandibles of the male, which are very large and resemble horns\*.

*CHAULIODES, Lat.,*

Where the antennæ are pectinated †.

*SIALIS, Lat.,*

Where the mandibles are moderate, as in the latter, and the antennæ simple as in *Corydalis*, and distinguished from the two preceding ones by the tectiform disposition of the wings. To this subgenus belongs the

*S. lutarius; Hemerobius lutarius, L.;* Rœs., Insect., II, Class II, Insect. Aquat., xiii. Dead-black; light-brown wings thickly intersected with black nervures.

The female produces a prodigious number of eggs, which terminate abruptly in a little point, on the leaves of plants or on other bodies situated near water. The ova are implanted close together, perpendicularly and symmetrically, and form large brown plates. The larva inhabits the water, in which it runs and swims with great swiftness. The sides of its abdomen, like those of the *Ephemera*, are provided with pseudo-branchiæ, and its last ring is elongated into a kind of tail, but it is metamorphosed into an immovable nymph.

4. A fourth division, that of the *TERMITINÆ*, will comprise Neuroptera, subject to a semimetamorphosis. They are all terrestrial, active, carnivorous, or gnawers, in all their states. With the exception of the *Mantispæ*, very distinct from all the Insects of this order, by the form of their anterior legs, which resemble those of a Mantis, the tarsi consist of four joints at most, which removes them from the preceding genera of the same family. The mandibles are always corneous and strong. The inferior wings are nearly as large as the superior ones, and without folds, or smaller.

Some have from five to three joints in the tarsi, and very distinct and salient labial palpi. Their antennæ are generally composed of more than ten joints, the prothorax is large, and the wings are equal and multireticulated.

\* Lat., Gen. Crust. et Insect., III. p. 199.

† Ibid., p. 198.

MANTISPA, *Illig.*—RHAPHIDIA, *Scop. Lin.*—MANTIS, *Fab. Pall. Oliv.*,

Where there are five joints to all the tarsi, and the two first legs are formed like those of a Mantis or adapted for prehension. The antennæ of these Insects are very short and granose, and their eyes large. The prothorax is very long, and thickened anteriorly, and the wings are tectiform\*.

RHAPHIDIA, *Lin. Fab.*,

Where the tarsi are composed of four joints and the wings are tectiform. The head is elongated and narrowed posteriorly, the thorax long, narrow, and almost cylindrical. The abdomen of the female terminates by a long external oviduct, formed of two laminae.

*R. ophiosis*, L.; De Geer, *Insect.*, II, xxv, 4—8. Half an inch long; black; abdomen marked with yellowish streaks; wings transparent, with a black spot near the extremity. In the woods.

The larva lives in the fissures of the bark of trees, and has the form of a little Serpent. It is very lively †.

TERMES, HEMEROBIUS, *Lin.*,

Where all the tarsi are likewise composed of four joints; but the wings are very long, and laid horizontally on the body; the head is rounded, and the thorax almost square or semicircular.

The body of these Insects is depressed, and their antennæ are short and formed like a chaplet. The mouth is almost similar to that of the Orthoptera, and the labium is quadrifid. They have three ocelli, one of which, on the forehead, is indistinct; the two others are situated, one on each side, near the inner margin of the ordinary eyes. Their wings are commonly somewhat diaphanous, coloured, furnished with extremely fine and crowded nervures, and not very distinctly reticulated. Their abdomen has two small, conical, biarticulated points at the extremity; the legs are short.

The Termites, peculiar to the countries situated between the tropics, or to those which are adjacent, are known by the name of *White Ants*, *Poux de bois*, *Caria*, &c. The appalling destruction caused by these Insects, particularly in the state of larvæ, in those parts of the world, is but too well known. These larvæ, the *working Termites* or *labourers*, bear a close resemblance to the perfect Insect; but their body is softer and apterous, and their head, which appears proportionally larger, is usually destitute of eyes, or has but very small ones. They live in society, and form communities so numerous as to defy all calculation, which live under cover in the ground, trees, and all sort of ligneous articles, such as tables, chairs,

\* Lat., Gen. Cruet. et *Insect.*, III, p. 93.

† Lat., *ib.*, p. 203; *Fab.*, *Entom. Syst.*, and Illiger's edit. of the *Fauna Etrusca* of Rossi.

furniture of all kinds, and the planks, timbers, &c. &c. which form parts of houses. There they excavate galleries, which form so many roads, all leading to the centre of their domicil, and these bodies thus mined, and retaining nothing but a superficial bark or covering, soon crumble into dust (a). If compelled by any insurmountable obstacle to leave their dwellings, they construct tubes or ways which still keep them from sight. The nests or domicils of several species are exterior, but have no visible opening. Sometimes they are raised above the surface of the ground, in the form of pyramids or turrets, occasionally surmounted with a capital or very solid roof, which by their height and number, resemble a little village. Sometimes they form a large globular mass on the branches of trees. Another sort of individuals, the *neuters*, also called *soldiers*, and which Fabricius erroneously considers as *nymphs*, defend the domicil. They are distinguished by their stouter and more elongated head, the mandibles of which are also longer, narrower, and considerably crossed. They are much less numerous than the others, and remain near the surface of the habitation, are the first that present themselves in case of an attack, and pinch with considerable strength. It is also said that they force the *labourers* to work. The seminymphs have rudiments of wings, and in other respects resemble the larvæ.

Having become perfect Insects, the Termites leave their original retreat, and fly off at evening or during the night in incalculable numbers. At sun-rise they lose their wings, which are dried up, fall to the ground, and are mostly devoured by Birds, Lizards, and the rest of their enemies. According to Smeathmann, the larvæ seize upon all the couples they can find, and shut them up in a large cell, a sort of nuptial prison, where they supply them with nourishment. I have reason to believe, however, that their coitus, like that of the Ant, takes place in the air, or beyond the precincts of their habitation, and that the females alone occupy the attention of the larvæ, with a view to the formation of a new colony. The abdomen of the female acquires an astonishing size, from the innumerable quantity of ova contained in it. The nuptial chamber is placed in the centre of the dwelling, and round it, symmetrically arranged, are the cells which contain the eggs and provisions.

The larvæ of certain Termites called *voyageurs* or *travellers*, are furnished with eyes, and appear to differ somewhat in their habits from the others, and in this respect to approximate more closely to our ants.

The Negroes and Hottentots consider these Insects as a great delicacy. They are destroyed with quick-lime, or more readily with arsenic, which is thrown into their habitations.

The two following species, found in the south of France, live in the interior of various trees.

*T. lucifugum* Ross., Faun. Etrusc., Mant. II, v, k. Glossy-black; wings brownish, somewhat diaphanous, with the rib more

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☞ (a) We saw a beautiful edifice in the Isle of France that was abandoned within a few months after it was completed, on this account. The whole building was a mere shell.—ENG. ED.

obscure; superior extremity of the antennæ, tibiæ, and tarsi, pale-russet.

Such has been its excessive multiplication in the work-shops and store-houses of the navy-yard at Rochefort, where it does much injury, that it is impossible to destroy it.

*T. flavicollis*, Fab. This species only differs from the lucifugum in the colour of its thorax. It is very injurious to the Olive, particularly in Spain.

Linnæus has placed the larvæ of this genus *Termes*, among the *Aptera*, and the winged individuals with the *Hemerobii*.

The species foreign to Europe have been but very imperfectly characterized. Linnæus confounds several under the name of *Termes fatale* \*.

In the remaining Termetinæ the tarsi are biarticulated, and the labial palpi indistinct and very short. The antennæ consist of about ten joints, the first segment of the trunk is very small, and the inferior wings are smaller than the others.

They form the genus

*Psocus*, Lat. Fab.—*TERMES*, *HEMEROBIUS*, Lin.,

And are very small Insects, with a short and extremely soft body that is frequently inflated, or as if hump-backed. Their head is large, their antennæ setaceous, and the maxillary palpi salient. Their wings are tectiform and but slightly reticulated or simply veined. They are extremely active, and live under the bark of trees, in wood, &c.

The following species is commonly found in books and collections of Insects and plants.

*P. pulsatorius*; *Termes pulsatorium*, L.; Schœff., Elem. Entom., cxxvi, 1, 2. Usually apterous; yellowish white; eyes and some small spots on the abdomen, russet. It was thought to produce that faint noise resembling the tick of a watch, frequently heard in our houses, and of which we have spoken while on the genus *Anobium*—thence the origin of its specific name †.

5. The *PERLIDES*, in which the tarsi are triarticulated and the mandibles almost always partly membranous and small. The inferior wings are wider than the others, and doubled at their inner margin.

\* See Lat., Gen. Crust. et Insect., III, p. 203, and the Nouv. Dict. d'Hist. Nat., article *Termès*.

Certain Insects from the Southern countries of Europe and of Africa, analogous to the Termites, but in which the head is wider than the thorax; where the tarsi are triarticulated, the wings hardly extend beyond the abdomen, or are wanting; where the legs are compressed, and the two anterior tibiæ are the widest; where the simple eyes are wanting, and the thorax is elongated, form the genus I have indicated in my Fam. Nat. du Reg. Anim., under the name of *EMBIA*; it is figured in the great work on Egypt.

† See Lat., Gen. Crust. et Insect., III, p. 207; Fab., Supp., Entom. Syst., and the Monograph of this genus in the *Illust. Icon, des Insect.*, dec. I, of Coquebert. In the fourth volume of the *Magasin der Entomologie* of M. Germar, we find some anatomical observations on the common species—*pulsatorius*.

They comprise the genus

PERLA, *Geoff.*

Their body is elongated, narrow, and flattened; the head is tolerably large, the antennæ are setaceous, and the maxillary palpi very salient. The first segment of their trunk is nearly square, and the wings are crossed and laid horizontally on the body; the abdomen terminates as usual by two articulated setæ.

Their larvæ are aquatic, and inhabit sheaths or cases, which they construct in the manner of those formed by the Insects of the ensuing family, and in which they pass into the state of nymphs. They undergo their ultimate metamorphosis in the commencement of spring.

NEUMORA, *Lat.*

The Nemouræ differ from the Perlæ proper in their very apparent labrum, corneous mandibles, the almost equal length of the joints of their tarsi, and in the setæ of the extremity of the abdomen, which are almost wanting\*.

*P. bicaudata*; *Phryganea bicaudata*, L.; *Geoff.*, *Insect.*, II, xiii, 2. Eight lines in length; of an obscure brown, with a yellow line along the middle of the head and thorax; nervures of the wings brown; setæ of the tail almost as long as the antennæ. Common in Europe in the spring, along the banks of rivers †.

FAMILY III.

PLICIPENNES †.

In this family the mandibles are wanting, and the inferior wings are usually wider than the others, and plaited longitudinally. It is formed of the genus

PHRYGANEA, *Lin. Fab.*

These Neuroptera, at a first glance, have the appearance of little Phalænxæ, and hence the name of *Mouches papillonacées* or papilionaceous flies, bestowed upon them by Reaumur. De Geer even observes that the internal organization of their larvæ bears the closest resemblance to that of caterpillars. Their head is small, and presents two cetaceous antennæ, usually very long and salient; rounded and salient eyes; two ocelli on the forehead; a curved or conical labrum; four palpi, those of the maxillæ commonly very long, filiform, or

\* See *Lat.*, *Gen. Crust. et Insect.*, III, p. 210; *Oliv.*, *Encyc. Méthod.*, article *Némoure*; *Phryganea nebulosa*, L., &c.

† *Geoff.* and *Lat.*, *Ibid.*

‡ In the systems of Messrs. Kirby and Leach, this family forms the order of the TRICHOPTERA, which would connect itself with that of the Lepidoptera, through the Tinæ. But as we naturally pass from the Plicipennes to the Perlæ, by following the series of mutual relations, we should be forced to terminate the Neuroptera with the Libellulæ and Ephemeræ, whose organization and habits differ greatly from those of the Hymenoptera, which according to this method follow the Neuroptera. The Libellulæ and other Neuroptera, which in our system come directly after, appear to us to be those which approximate most nearly to the Orthoptera.

almost setaceous, and composed of five joints, and the labials of three, the last of which is somewhat the thickest; maxillæ and a membranous labium united. The body is most frequently bristled with hairs, and, with the wings, forms an elongated triangle, like several of the Noctuæ and Pyrales. The first segment of the thorax is small. The wings are simply veined, usually coloured, or almost opaque, silky or pilose in several, and always strongly tectiform. The legs are elongated, are furnished with small spines, and have five joints in all the tarsi.

These Insects chiefly fly at night or during the evening, diffuse a disagreeable odour, frequently penetrate into houses, where they are attracted by the light, and are extremely quick and agile in all their motions. In coition they are joined end to end, and remain so a long time. The smaller species flit about in flocks, over ponds and rivers. Several females carry their eggs in a greenish bundle at the posterior extremity of their abdomen. De Geer saw some of these eggs which were inclosed in a glairy substance resembling the spawn of a Frog, and deposited on plants or other bodies on the banks of rivers, &c.

Their larvæ, called by some of the older naturalists *Ligniperdes*, and by others *Charrées*, always, like the Tineæ, inhabit tubes that are usually cylindrical, covered with various substances which they find in the water, such as blades of grass, bits of reeds, leaves, roots, seeds, grains of sand, and even little shells, and frequently arranged symmetrically. They connect these various bodies with silken threads, the source of which is contained in internal reservoirs, similar to those of Caterpillars, and that are also produced by fusi situated in the lip. The interior of the habitation forms a tube which is open at both ends, for the intromission of water. The larva always transports its domicil along with it, protrudes the anterior extremity of its body while progressing, never quits its dwelling, and when found to do so returns to it voluntarily, when left within its reach.

These larvæ are elongated and almost cylindrical; their head is squamous and furnished with stout mandibles, and a little eye on each side; they have six feet, the two anterior shorter and usually thicker than the others, which are elongated. Their body is composed of twelve rings, the fourth of which is furnished on each side with a conical mammilla; the last is terminated by two movable hooks. In most of them we also observe two ranges of white membranous and extremely flexible threads, which seem to be organs of respiration.

When about to become nymphs, they fix their tubes to different bodies, but always in water, and close the two orifices with a grating, the form of which, as well as that of the tube itself, varies according to the species.

In fixing their portable dwelling, they so manage it that the aperture, which is at the point d'appui, is never obstructed.

The nymph is furnished anteriorly with two hooks, which cross each other, and somewhat resemble a rostrum or snout. With it, when the period of its last metamorphosis has arrived, it perforates one of the grated septa in order to procure egress.

Hitherto immovable, it now walks or swims with agility, by means



of its four anterior feet, which are free, and furnished with thick fringes of hairs. The nymphs of the large species leave the water altogether, and climb on various bodies, where their final change is effected. The small ones simply rise to the surface, where they are transformed to winged Insects, in the manner of the Culices and various Tipulariæ; their exuvium serves them for a boat.

In some the inferior wings are evidently wider than the others, and plaited.

#### SERICOSTOMA, *La*

Where, in one of the sexes, the maxillary palpi are in the form of valvulæ, covering the mouth in the manner of a rounded snout, and triarticulated; under them is a thick and cotton-like down. Those of the other sex are are filiform, and consist of five joints\*.

#### PHRYGANEÆ *proper*,

Where the mouth is similar in both sexes, and the maxillary palpi are shorter than the head and thorax, and but scarcely pilose.

*P. grandis*; Rœs.; Insect., II, Ins. Aq. cl, 2, xvii. The largest species in France; antennæ as long as the body; superior wings greyish-brown, with cinereous spots, a longitudinal black stripe, and two or three white dots at their extremity.

The tube of its larva is invested with little pieces of bark, or ligneous matter arranged horizontally.

*P. striata*, L.; Geoff., Insect., II, xiii, 5. About an inch long; fulvous; eyes black; nervures somewhat darker than the rest of the wing.

*P. rhombica*; Rœs., Insect., II, Ins. Aq., cl, 2, xvi. Length seven lines, and of a brown yellow; a large, white rhomboidal, and lateral spot on the superior wings.

The tube of its larva is covered with little stones and fragments of shells †.

Certain species, such as the *filosa*, *quadrifasciata*, *longicornis*, *hirta*, *nigra*, have excessively long antennæ, and maxillary palpi also extremely long and densely pilose. They form the subgenus

#### MYSTACIDA, *Lat.*

In the others the four wings are narrow, lanceolate, almost equal, and without plicæ. To this division belongs the

#### HYDROPTILA, *Dalm.,*

Where the antennæ are short, almost granose, and of equal thickness ‡.

Another subgenus—*Psychomyia*—might be formed of Phryganææ with similar wings, but in which the antennæ are long and setaceous,

\* A genus established on a species from the environs of Aix, sent to me by M. Boyer de Fons-Colombe, and which has been also brought from the Levant by M. de Labillardière.

† For the other species, see Fabricius, De Geer, and Rœsel.

‡ Anal. Entom., p. 26.



as in almost all the others. We frequently observe in the gardens of France, on the leaves of various shrubs, a very small and active species, the body of which is fulvous brown, and the antennæ annulated with white; it appears to me to be new, or imperfectly described.

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## ORDER IX.

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### HYMENOPTERA\*.

In this family we still find four membranous and naked wings, and a mouth composed of mandibles, maxillæ, and two lips; but these wings, of which the superior are always largest, have fewer nervures than those of the Neuroptera, and are not veined; the abdomen of the females is terminated by an ovipositor or sting.

Besides their compound eyes they are all provided with three small simple ones. Their antennæ vary, not only according to the genus, but even in the sexes of the same species; generally, however, they are filiform or setaceous. The maxillæ and labium are usually narrow, elongated, and fixed in a deep cavity of the head by long muscles †, form a semitube inferiorly, are frequently folded up at their extremity, and better adapted for the transmission of nutritious fluids than for mastication; in several they form a proboscis. The ligula is membranous, either widened at its extremity, or long and filiform, having the pharynx at its anterior base, and being frequently covered by a sort of sub-labrum or epipharynx. They have four palpi, two maxillary, and two labial. The thorax consists of three united segments, of which the anterior is very short, and the two last are confounded in one ‡. The wings are laid horizontally on the body. The abdomen is most commonly suspended by a little thread or pedicle to the posterior extremity of the thorax. The tarsi consist of five entire joints, none of them being divided. The ovipositor and sting § are generally composed of three long and slender pieces,

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\* The *Piezala*, Fab.

† The mentum, here, participates in this general motion, while in the other triturating Insects it is fixed and immovable.

‡ The metathorax, properly so called, is very short, forms but a simple superior hoop, and is intimately united with the first segment of the abdomen, so that in truth, the thorax, viewed from above, is composed of four segments, the second and last of which are the largest; in a great number, the latter presents two very distinct stigmata. When the abdomen is pediculated, its second segment, always supposing the preceding one to belong to it, is apparently the first.

§ Both are formed on the same model. From the middle of the posterior and inferior extremity of the abdomen proceed two laminae, each composed of two pieces, sometimes valvular and serving as a sheath, and sometimes in the form of a stylet or of palpi. Between them are two other pieces united in one, which compose the ovi-

two of which serve as a sheath to the third, in those which are provided with an ovipositor; and one alone, the superior, has a groove underneath for lodging the two others. In those where this ovipositor is transformed into a sting, this offensive weapon and the oviduct are serrated at the extremity.

M. Jurine has discovered good auxiliary characters for the distinction of genera, in the articulation of the wings\*; to describe them, however, would not be in unison with the nature of this work, and could not remove the necessity of referring to his. We will merely observe that he chiefly employs those resulting from the presence or absence, number, form, and connexion of two sorts of cells situated near the external margin of the superior wings, which he styles *radial* and *cubital*. The middle of this margin most commonly presents a little callosity called the *wrist* or *carpus*. From the latter arises a nervure, which running towards the extremity of the wings, forms, in conjunction with this margin, the cell named *radial*, that is sometimes divided into two. Near this spot arises a second nervure, which also proceeds to the posterior margin, leaving a space between it and the preceding one—this space is that of the *cubital* cells, the number of which varies from one to four †.

The Hymenoptera undergo a complete metamorphosis. Most of their larvæ resemble worms, and are destitute of feet; such, for instance, are those of our second and following families. Those of the first have six hooked feet, and frequently from twelve to sixteen others that are simply membranous. These latter have been named pseudo-caterpillars. Both kinds have a squamous head provided with mandibles, maxillæ, and a lip; at the extremity of the latter is a fusus for the transmission of the silky material that is to be employed in constructing the cocoon of the nymph.

Some feed on vegetable substances, while others, always destitute of feet, devour the carcasses of Insects together with their larvæ, nymphs, and even eggs.

To remedy their want of locomotive powers, the mother furnishes them with provisions, sometimes by transporting aliment into the

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positor or sting. When they form a sting, the superior receives the other in an inferior canal or groove. In the Tenthredinetæ, the ovipositor consists of two pieces, resembling blades of knives, applied one against the other by the side; they are striated transversely, and dentated along the margin.

\* Nouv. Méth. de class. les Hymen. et les Dipt.

† See Encyc. Méthod., article *Radiale*, where this method is well described and perfected. Jurine has also published an excellent work on the organization of the wings in the Hymenoptera, in the Mem. Ac. Sc. Tur. We are also indebted to M. Chabrier, for his researches on this matter; they are, however, more general in their application. They are inscribed in the Mém. du Mus. d'Hist. Nat.

nests she has prepared for them, which are frequently constructed with so much art as to excite our wonder and surprise, and sometimes by depositing her eggs in the body of the larvæ and nymphs of Insects, on which her progeny are to feed.

Other larvæ of Hymenoptera, also destitute of feet, require more elaborated and frequently-renewed supplies of aliment, both vegetable and animal. These are reared in common by neuters forming communities, of which they have the sole care; their labours and mode of life will always continue to excite our admiration and astonishment.

Almost all Hymenopterous Insects, in their perfect state, live on flowers and are usually most abundant in southern climates. Their period of life, from their birth to their ultimate metamorphosis, is limited to a year.

M. Leon Dufour in his *Memoire sur l'Anatomie des Scolies*—*Journ. de Phys.*, Sept. 1828—remarks, that in all the Hymenoptera submitted to his scalpel, the tracheæ are a degree more perfect than those of the other orders of Insects; that instead of being formed by cylindrical and elastic vessels, the diameter of which decreases by their successive divisions, they present constant dilations, decided vesicles favourable to the greater or less permanence of air, and susceptible of extension and diminution, according to the quantity of that fluid admitted. On each side of the base of the abdomen may be found one of these vesicles; it is large, oval, and of a dead lacteous-white, giving off here and there vascular tracheæ which are distributed among the adjacent organs. In penetrating into the thorax it is strangulated, dilates again, and insensibly degenerates into a tube, the subdivisions of which are lost in the head. Behind these two abdominal vesicles, the organ of respiration continues on in two filiform tubes, giving off an infinity of ramous branches, and becoming confluent near the anus. In the *Xylocopæ* and *Bombi*, the anterior superior surface of each of the two great abdominal vesicles is furnished with a cylindrical, elastic, greyish body, but adhering throughout its length in the *Xylocopæ*, and free in the *Bombi*. M. Dufour thinks that this body, which is directed towards the insertion of the wing, has some part in the production of the humming noise made by these Insects, inasmuch as that sound may continue after the wings have been taken off.

I will divide this order into two sections.

The first, or that of the *TEREBRANTIA*, is characterized by the presence of an ovipositor in the females.

I divide this section into two great families.

## FAMILY I.

## SECURIFERA.

Our first family is distinguished from the following ones by a sessile abdomen, or the base of which is joined to the thorax throughout its whole thickness, that seems to be a continuation of it and to have no separate motion\*.

The females are provided with an ovipositor that is most commonly serrated, and which not only enables them to deposit their eggs, but likewise to prepare a place for their reception. The larvæ always have six squamous feet, and frequently others that are membranous.

This family is composed of two tribes.

In the first, that of the TENTHREDINETÆ, Lat., vulgarly termed *Mouches-a-scie*, or *Saw-flies*, we observe elongated and compressed mandibles; a trifold or sort of digitated ligula; an ovipositor formed of two serrated, pointed blades, united and lodged in a groove under the anus. The maxillary palpi are all composed of six joints, and the labials of four; the latter are always the shortest. The wings are always divided into numerous cells. This tribe forms the genus

TENTHREDO, *Lin.*

The cylindrical abdomen of these Insects, which is rounded posteriorly, composed of nine annuli, and so closely joined to the thorax that the two seem to be continuous, the ragged appearance of their wings, the two little rounded, granular, and usually coloured bodies situated behind the scutellum, together with their heavy port, cause them to be easily recognized. The form and composition of the antennæ vary. Their mandibles are strong and dentated. The extremity of their maxillæ is almost membranous, or less coriaceous than their stem. Their palpi are filiform or nearly setaceous, and consist of six joints. The ligula is straight, rounded, and divided into three doubled portions, the intermediate of which is the narrowest; its sheath is usually short, and its palpi, shorter than the maxillaries, consist of four joints, the last almost bordering on an oval. The abdomen of the female presents at its inferior extremity a double, movable, squamous ovipositor that is serrated, pointed, and lodged between two concave laminæ, forming its sheath or case.

It is by the alternate action of the teeth of this ovipositor, that the Insect makes a number of little holes in the branches, and various

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\* The segment, bearing the inferior wings, is separated from the following one or the first of the abdomen, by a transverse incisure or articulation. The other segments then follow uninterruptedly, and without any particular strangulation.

other parts of trees and plants, in each of which it first deposits an egg, and then a foaming liquid, the use of which, it is presumed, is to prevent the aperture from closing. The wounds made in this way become more and more convex by the increasing size of the egg. Sometimes these excrescences assume the form of a gall-nut, either ligenous or soft and pulpy, or resemble a little fruit, according to the nature of the parts of the plant that are affected by them. These tumours then form the domicile of the larvæ which inhabit them either solitarily or in society. There they undergo their metamorphosis, and issue from them through a circular opening made in their parietes by the teeth of the Insect. Generally speaking, however, these larvæ live exposed on the leaves of the trees and plants on which they feed. In the general form of the body, its colours, the exterior disposition of its dermis, and in the great number of feet, these larvæ closely resemble caterpillars, and have been called *false, pseudo-caterpillars*: but they are distinguished from the latter by having from eighteen to twenty-two feet, the number of these organs in the caterpillar being from ten to sixteen. Several of these pseudo-caterpillars roll themselves up spirally; in others the posterior portion of the body is arched. In order to become nymphs, they spin a cocoon, either in the earth, or on the plants where they have lived. There they pass several consecutive months, or even the whole winter, in their first state, and only pass into that of a nymph a few days previous to the one in which they appear as perfect Insects or Sawflies.

M. Dutrochet, corresponding member of the Académie des Sciences, has published some observations on the alimentary canal of these Insects in the *Journal Physique*.

In some, where the antennæ consist of but nine joints, and where the internal extremity of the two anterior tibiæ is furnished with two straight and divergent spines, the ovipositor does not project posteriorly.

Here the labrum is always apparent, and the middle of the inner side of the four posterior tibiæ is destitute of spines, or presents but one. The larvæ or pseudo-caterpillars have from twelve to sixteen membranous feet.

The antennæ, always short, sometimes terminate either in a thick inflation in the form of a reversed cone rounded at the extremity, or of a button, or in a large joint forming an elongated, prismatic or cylindrical club forked in some males; the number of the preceding joints is five at most.

Those species, in which these organs, similar in both sexes, are terminated by a globuliform inflation, or by one resembling a reversed cone rounded at the extremity\*, and preceded by from four to five joints, and where the two nervures of the superior wings forming the rib, as far as the callous point, are contiguous, or closely

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\* This inflation is formed by the fifth or sixth joint, but which, in several, presents vestiges of two or three annular divisions.

approximated and parallel, without a wide intermediate sulcus, form the genus

*CIMBEX, Oliv. Fab.—CRABRO, Geoff.*

The larvæ have but twenty-two feet. Some of them when irritated spurt a greenish liquor from the sides of their body to the distance of a foot.

Dr. Leach \*, by having recourse to the number of joints anterior to the club, their relative proportions and the arrangement of the cells of the wings, has divided the genus *Cimbex* into several others, one of which, *PERGA* †, is peculiar to New Holland, and is distinguished from all the others by the following characters. The four posterior tibiæ have a movable spine on the middle of their inferior side. The scutellum is large and square, with its posterior angles projecting in the form of teeth. The valves that sheath the ovipositor are covered externally with numerous short and frizzled hairs. The antennæ are very short, and have six joints, the last of which, or the club, is without any vestiges of annuli as in *SYZYGONIA*, a genus established by Klüg on some species from Brazil ‡. The radial cell is appendiculated, and there are four cubital cells, the second and third of which receive, each, a recurrent nervure—the transverse nervures of the disk.

M. Lepeletier de St. Fargeau, in an excellent Monograph of the Tenthredinetæ, only adopts the genus *Perga*, and in conjunction with him we will consider those of the English naturalist as simple divisions of *Cimbex*.

The two following species belong to that number in which the antennæ have five joints before before the club.

*C. lutea*; *Tenthredo lutea*, L.; De Geer, Insect., II, xxxiii, 8—16. About an inch in length; brown; antennæ yellow; abdomen yellow, with violet-black bands.

The larva, or pseudo-caterpillar, is of a deep yellow, with a blue stripe, edged with black along the back. On the Willow, Birch, &c.

*C. femoratu*; *Tenthredo femorata*, Lat.; De Geer, Insect., II, xxxiv, 1—6. Large; black; antennæ and ovipositor of a brown-yellow; blackish-brown spots on the posterior margin of the superior wings; posterior thighs very large, in one of the sexes at least.

The larva lives also on the Willow; it is green, with three

\* Zool. Miscel., III, p. 100, et seq.

† Ibid., 116, cxlviii; Lepel., Monog. Tenthred., p. 40.

‡ Monog. Entom., p. 177; in the same work, p. 171, he gives the characters of another genus *Pachylosticta*, also peculiar to Brazil. The antennæ consist of five joints. The superior wings are dilated near their extremity, and the callous point is semilunar. The second, third, and fourth joints of the posterior tarsi are very short. He mentions three species.

The genus *Perga*, on account of the cells of the wings and the spines of the posterior tibia, should come directly before *Hylotoma*.



stripes on the back, that in the middle bluish and those on the sides yellowish\*.

Those species, in which the antennæ present but three very distinct joints, the last of which forms an elongated, prismatic, or cylindrical club, more slender, ciliated, and sometimes forked in the males; and where the two costal nervures of the superior wings are very remote from each other, constitute the subgenus

*HYLOTOMA*, Lat. Fab.—*CRYPTUS*, Jur.

Some—*SCHYZOCERA*, Lat.; *Cryptus*, Leach, Lepel.—have four cubical cells, and the antennæ forked in the males. The middle of the tibiæ is destitute of spines †.

Others—*Hylotoma* properly so called—similar to the preceding in their wings, have their antennæ terminated in both sexes by a simple or undivided joint. Most of them—*Hylotomes*, Lepel.—have a spine in the middle of the four posterior tibiæ. The larvæ or pseudo-caterpillars have from eighteen to twenty feet.

*H. rosæ*; *Tenthredo rosæ*, L.; Roes., Insect., II, Vesp., II.

Four lines in length; head, top of the thorax, and exterior margin of the superior wings, black; remainder of the body saffron-yellow; tarsi annulated with black.

The larva is yellow, dotted with black; it gnaws the leaves of the Rose-tree.

M. Lepeletier re-unites to the *Cryptus*, Leach, certain species which only differ from the preceding ones in the absence of spines on the middle of the four posterior tibiæ.

Other *Hylotomæ*, distinguished by the same negative character, but which have but three cubital cells, form his genus *Ptilia* ‡.

Sometimes the antennæ have at least nine very distinct joints, and do not terminate suddenly in a club.

In some, and the greater number, the antennæ, always simple in both sexes, or at least in the females, have fourteen joints at most, and commonly but nine.

*TENTHREDO*, Lat. Fab.,

Or *Tenthredo* proper, where the antennæ consist of nine simple joints in both sexes.

The larvæ have from eighteen to twenty-two feet.

The number of dentations in the mandibles of the perfect Insect varies from two to four. The superior wings also differ in the number of their radial and cubital cells. These characters have been

\* For the other species, see Oliv., Encyc. Méthod., article *Cimbex*; Fab.; Lat., Gen. Crust. et Insect., III, p. 227; Jurine, genus *Tenthredo*; Panz., Hymen.; and the works already quoted.

† Leach, Zool. Miscell., III, p. 124; Lepel., Monog., Tenthred., p. 52.

‡ Lepel., Ib., p. 49. For the other species of *Hylotomæ*, see the same work, the preceding one of Dr. Leach, and the Monograph of the various genera of this family by Klüg.



used to establish several other subgenera, which we will unite with the present one. They are composed of the *Allantes*, *Doleres*, *Nemetes*, &c. of Jurine, and of the *Pristophose*, formed of the third family of the Pterones of that naturalist, with some others of Dr. Leach.

*T. scrophulariæ*, L.; Panz., Faun. Insect., Germ., C, 10, the male. Five lines in length; black; antennæ fulvous and somewhat thickest at the extremity; annuli of the abdomen, the second and third excepted, margined posteriorly with yellow; tibiæ and tarsi fulvous. It resembles a Wasp.

The larva has twenty-two feet; white, with black head and points. It feeds on the leaves of the Scrophulariæ.

*T. viridis*, L.; Panz., Faun. Insect., Germ., LXIV, 2. The same length; antennæ setaceous; body green; spots on the thorax and a band along the middle of the superior part of the abdomen, black. On the Birch\*.

De Geer has given us the description of a very singular species in its form of a larva, that which he calls *Mouche-à-scie* of the *larve-limace*, and to which he refers the *Tenthredo cerasi*, L. It is black, with blackish wings and brown feet. The larva is extremely common on the leaves of various fruit-trees in the gardens of France. On account of its form, Reaumur called it *Fausse Chemille Tétard*. It is entirely black, and covered with a glutinous humour, which has also caused it to be compared to a Snail.

M. Peck, an American botanist, has also furnished us with the complete history of another species, the larva of which is similar.

Others, in which the antennæ also consist of nine joints, differ from the preceding in those of the males, which are pectinated on one side.

#### CLADIUS, Klüy, Lat. †

Some others, with a short, thick body, like that of the *Hylotomæ*, and considered as such by Fabricius, have from ten to fourteen joints in the antennæ, which are simple in both sexes.

#### ATHALIA, Leach ‡.

The following species are remarkable for their antennæ, which are composed of sixteen joints at least, pectinated or flabelliform in the males, and serrated in the females. In this respect they lead us to the *Megalodontes*, the first subgenus of the ensuing subdivision.

\* For the other species, see the authors just quoted.

† Lepel., *Ibid.*, p. 57.

‡ Lepel., *Ibid.*, p. 21. In this genus, Dr. Leach only comprises those species which are furnished with ten joints. Klüg arranges them among his *Emphyti*.

PTERYGOPHORUS, *Klüg.*,

Where the antennæ have but a single range of teeth, and simply longer or pectinated in the males, and short and serrated in the females; here they are evidently enlarged at the extremity\*.

LOPHYRUS, *Lat.*,

Where the antennæ, in the males, have a double range of elongated teeth forming a large triangular panache, and are serrated in the females,

To this subgenus I refer the first family of the *Pterones* of M. Jurine, as well as the first division of the *Hylotomæ* of Fabricius. The larvæ or pseudo-caterpillars live in society, more particularly on the Pines. They are very injurious to the young plants †.

There, the labrum is concealed or but slightly salient. The inner side of the four posterior tibiæ, anterior to its extremity, presents two spines, and frequently even a third above the preceding pair. The antennæ are always multiarticulated, the head is large, square, placed on a little neck, and has strongly crossed mandibles. They appear in spring.

The larvæ of the greater number are destitute of membranous feet, and inhabit silken nests of their own spinning, formed round the leaves of various trees.

They constitute the genus *Cephalcia* of Jurine, which has been divided into two.

MEGALODONTES, *Lat.*—TARPA, *Fab.*,

Where the the antennæ are serrated or pectiniform ‡.

PAMPHILIUS, *Lat.*—LYDA, *Fab.*,

Where those organs are simple in both sexes.

Their larvæ are destitute of membranous feet, and the posterior extremity of their body is terminated by two horns. They feed on leaves, which they frequently double in order to remain concealed §.

In the last of the *Tenthredinetæ*, the ovipositor is prolonged beyond its groove and projects posteriorly. The inner extremity of the two anterior tibiæ presents distinctly but a single spine, curved and terminated by two teeth. The antennæ are always composed of a great number of simple joints.

XYELA, *Dalm.*—PINICOLA, *Breb.*—MASTIGOCERUS, *Klüg.*

The *Xyelæ* are very distinct by their geniculate antennæ forming a sort of whip, that are abruptly attenuated near their extremity, and consist of eleven joints, the third of which is very long; as well as by

\* See Klüg, Leach, and Lepeletier, *Ibid.*

† Lepelet., *Ibid.*, and the Monog. of this subgenus, published by Klüg, in the Mem. Nat. Cur. of Berlin.

‡ See the preceding works, and the Entom. Monog., Klüg, p. 183.

§ *Ibid.* Encyc. Méthod., article *Pamphilie*, and the Monograph of the genus *Lyda* of Klüg, in the Mem. Nat. Cur. of Berlin. See also the Monograph of M. Lepeletier.

their very long and equally flagelliform maxillary palpi. The thick or callous point of the superior wings is replaced by a cell. The laminæ of the ovipositor are smooth and entire.

The larvæ inhabit the interior of plants or old wood\*.

CEPHUS, *Lat. Fab.*—TRACHELUS, *Jur.*,

Where the antennæ are thickest near the end, and inserted near the front. According to certain observations published in the *Bullet. Univers.*, of Baron Férussac, the larva of the most common species *pygmæus*—lives in the interior of the stems of the wheat †.

XIPHYDRIA, *Lat. Fab.*—UROCERUS, *Jur.*,

Where the antennæ are inserted near the mouth, and more attenuated towards the extremity ‡.

The second tribe, that of the UROCERATA, *Lat.*, is distinguished from the preceding one by the following characters: the mandibles are short and thick; the ligula is entire; the ovipositor of the females is sometimes very salient and composed of three threads, and sometimes capillary and spirally convoluted in the interior of the abdomen.

This tribe is composed of the genus

SIREX, *Lin.*

The antennæ are filiform or setaceous, vibratile, and formed by from four to twenty-five joints. The head is rounded and almost globular; the labrum very small; the maxillary palpi are filiform, with from two to five joints, and the labials with three, the last of which is the thickest. The body is almost cylindrical. The anterior or posterior tarsi, and in several the colour of the abdomen, differ according to the sex. The female deposits her eggs in old trees, most commonly in Pines. Her ovipositor is lodged at base between two valves, forming a groove.

ORYSSUS, *Lat. Fab.*

Where the antennæ are inserted near the mouth, and consist of ten or eleven joints. The mandibles are edentated, and the maxillary palpi long and formed of five joints; the posterior extremity of the abdomen is almost rounded or but slightly prolonged, and the ovipositor capillary and spirally convoluted in the interior of the abdomen.

\* See *Dalm., Anal. Entom.*, p. 27. The number of joints is the same as in the preceding Insects, and in this respect that naturalist is mistaken. See also the *Nouv. Dict. d'Hist. Nat.*, 2d edit., article *Pinicole*, and the *Monograph of the Tenthredinidæ* of M. Lepeletier.

† See the work already quoted, and the *Monog. of the genus SIREX* of Klüg, *G. Astatus*.

‡ *Ibid.* and *Jurine*. Klüg designates this genus by the name of *Hybonotus*.

The two species known are found in Europe, on the trees only, in the spring. They are very active\*.

SIREX, *Lin.*—UROCERUS, *Geoff.*,

Or *Sirex* proper, where the antennæ are inserted near the front, and consist of from thirteen to twenty-five joints. The mandibles are dentated on the inner side, and the maxillary palpi very small, almost conical, and biarticulated. The extremity of the last segment of the abdomen is prolonged into a sort of tail or horn, and the ovipositor is salient and formed of three filaments.

These Insects, which are tolerably large, more particularly inhabit the Pine forests of cold and mountainous countries, produce in flying a humming like that of a *Bombus*, &c., and in certain seasons have appeared in such numbers as to strike the people with terror.

The larva has six feet, and the posterior extremity of its body terminates in a point. It lives in wood, where it spins a cocoon, and completes its metamorphosis.

*S. gigas*, *L.*, the female—*S. mariscus.*, *L.*, the male; *Rœs.*, *Insect.*, II, *Vesp.*, viii, ix. The female is above an inch in length, and black, with a spot behind each eye; the second ring of the abdomen and the three last, yellow. The abdomen of the female is fulvous-yellowish with a black extremity.

The *Tremex* of *Jurine* only differs from *Sirex* in the antennæ, which are shorter, less slender at the end, or filiform only, consisting of thirteen or fourteen joints, and in the superior wings, which have but two cubital cells †.

## FAMILY II.

### PUPIVORA.

In the second family of the Hymenoptera we find the abdomen attached to the thorax by a simple portion of its transversal diameter, and even most frequently by a very small thread or pedicle, in such a manner that its insertion is very distinct, and that it moves on that part of the body ‡. The females are provided with an ovipositor.

The larvæ are destitute of feet, and mostly parasitical and carnivorous.

I divide this family into six tribes.

In the first, that of the EVANIALES, *Lat.*, the wings are veined, and the superior ones, at least, are lobate; the antennæ filiform or setace-

\* See *Lat.*, *Gen. Crust. et Insect.*, III, p. 245, and *Encyc. Méthod.*, article *Orysse*.

† See *Lat.*, *Ibid.*, III, p. 238; the Monograph of this genus by *Klûg*; the work of *Jurine* and that of *Panzer* on the *Hymenoptera*.

‡ The first segment of the abdomen forms the posterior extremity of the thorax, and unites intimately with the metathorax, so that the second segment of the abdomen becomes the first.

ous, and composed of thirteen or fourteen joints; the mandibles dentated on the inner side; the maxillary palpi composed of six joints and, and the labials of four. The abdomen is implanted on the thorax, in several under the scutellum, and has an ovipositor usually salient and formed of three filaments.

This tribe appears to form but the single genus

FÆNUS.

Sometimes the ovipositor is concealed, or but very slightly salient, and resembles a little sting. The ligula is trifid, a character which approximates these Insects to the preceding Hymenoptera.

EVANIA, *Fab.*—SPHEX, *Lin.*,

Where the antennæ are geniculate, and the very small, compressed, triangular, or ovoid abdomen, abruptly pediculated at its origin, is inserted into the posterior and superior extremity of the thorax, under the scutellum\*.

PELECINUS, *Lat. Fab.*,

Where the abdomen, as in the following subgenus, inserted much lower, a little above the origin of the posterior legs, is elongated, sometimes filiform, very long and arcuated, and sometimes gradually narrowed towards its base, and terminated like a club. The posterior tibiæ are inflated. The antennæ are straight and very small †.

Sometimes the ovipositor projects greatly, and is formed of three distinct and equal threads.

In some, the abdomen and posterior tibiæ are clavate; the antennæ are filiform, and the ligula is entire or simply emarginated. Such is Fœnus proper, or

FÆNUS, *Fab.*—ICHNEUMON, *Lin.* ‡

The abdomen of the others is compressed, ellipsoidal, or falciform, and all their tibiæ are slender. The antennæ are cetaceous.

AULACUS, *Jur. Spin.*,

Where the abdomen is ellipsoidal §.

PAXYLLOMA, *Bréb.*,

Where the abdomen is falciform ||.

In the second tribe, that of the ICHNEUMONIDES, the wings are also veined, the superior ones always presenting complete or closed cells in their disk. The abdomen originates between the two posterior

\* See *Fab.*, *Jur.*, *Lat.*, *Gen. Crust. et Insect.*, III, p. 250.

† See the works already quoted, and *Encyc. Méthod.*, article *Pelecine*.

‡ See *Jurine*, *Hymenopt.*; *Lat.*, *Gen. Crust. et Insect.*, IV, 3; and *Panzer* on the *Hymenoptera*. See also *Spinol.*, *Insect Ligur.*

§ *Idem*.

|| See the *Nouv. Dict. d'Hist. Nat.* 2d edit.; a subgenus formed on a single species closely allied to the *Ophion*, *Fab.*

legs. The antennæ are generally filiform or setaceous, rarely clavate, vibratile, and multiarticulated, being composed of sixteen joints at least. In most of them the mandibles have no tooth on the inner side, and terminate in a bifid point. The maxillary palpi, always apparent or salient, consist most commonly of but five joints. The ovipositor is formed of three threads.

This tribe embraces almost the whole genus

ICHNEUMON, *Lin.\**

These Insects destroy the posterity of the Lepidoptera, so noxious to the agriculturalist under the form of caterpillars, just as the quadruped so called is said to destroy that of the Crocodile by breaking its eggs, and even by introducing itself into the body of the animal, in order to devour its entrails.

Some authors have called them *Mouches tripiles*, on account of the three setæ which compose their ovipositor, and *Mouches vibrantes*, because their antennæ are continually vibrating. These organs are frequently curled (contournées), and have a white or yellowish annular spot in the middle. Their maxillary palpi are elongated, almost setaceous, and consist of from five to six joints; the labials are shorter, filiform, and have but from three to four joints. The ligula is usually entire or simply emarginated. The body is most frequently narrow and elongated or linear, with the ovipositor sometimes exterior and resembling a tail, and sometimes very short and concealed in the interior of the abdomen, which then terminates in a point, whilst in those where the ovipositor is salient it is thicker, and as if clavate and truncated posteriorly. Of the three pieces which compose this instrument the intermediate is the only one that penetrates into the bodies in which these Insects deposit their eggs; its extremity is flattened, and sometimes resembles the nib of a pen.

The females, anxious to lay, are continually flying or walking about †, in order to discover the larvæ, nymphs, and eggs of Insects, and even Spiders, Aphides, &c., destined to receive their ova, and when hatched, to sustain their offspring. In this search they exhibit a wonderful degree of instinct, which reveals to them the most secret retreats of its objects. Those which are provided with a long ovipositor deposit the germs of their race in the fissures or holes of trees, or under their bark. In this operation the ovipositor proper is introduced almost perpendicularly, and is completely disengaged from its semi-scabards, which remain parallel to each other, and supported in the air, in the line of the body. Those females in which the ovi-

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\* This genus comprises upwards of twelve hundred species, and its study is extremely difficult. The labours of MM. Gravenhorst and Nées de Esenbeck have rendered it somewhat easier. The former of these gentlemen has lately published the prospectus of a complete work on these Insects, and we have every reason to believe that this interesting portion of entomology will be henceforward as well understood as the state of the science will allow.

† Some species are apterous or have but very short wings. They are the subject of a particular Monograph, published by M. Gravenhorst, who has also furnished us with another on the Ichneumons of Piemont.



positor is very short, and but slightly or not at all apparent, deposit their ova in the body of larvæ, caterpillars, and nymphs, which are exposed or very accessible.

The larvæ of the Ichneumonides, like all the others of the succeeding families, are destitute of feet. Those which, in the manner of intestinal worms, inhabit the bodies of larvæ or caterpillars, where they sometimes form communities, only attack the adipose substance—corps gras— or such of the internal parts as are not necessary to their existence. When about to become nymphs, however, they perforate their skin in order to open a passage, or put them to death, and there tranquilly undergo their ultimate metamorphosis. Such also are the habits of those which feed on nymphs or chrysalides. Nearly all of them spin a silken cocoon, in which they become nymphs. These cocoons are sometimes agglomerated, either naked, or enveloped in a sort of tow or cotton, in an oval mass, frequently found attached to the stems of plants. The symmetrical arrangement of the cocoons of one species forms an alveolar body, resembling the honeycomb of our domestic Bee. The silk of these cocoons is sometimes of a uniform yellow or white, and sometimes mixed with black or filaments of two colours. Those of some species are suspended to a leaf or twig, by means of a long thread. Reaumur has observed that when detached from the bodies to which they are fixed, they make repeated jumps to about the height of four inches, the larva enclosed in the cocoon approximating the two extremities of its body, and then suddenly returning to a straight line in the manner of various skipping larvæ of Dipterous Insects, found on old cheese. This family is extremely rich in species.

The difference in the number of joints found in the palpi may serve as a basis of three principal divisions.

The first will comprise those species in which the maxillary palpi have five joints, and the labials four. The second cubital cell is very small, and almost circular or null.

We will form a first subdivision with those in which the head is never prolonged anteriorly in the form of a snout or rostrum, in which the ligula is not deeply emarginated, and in which the maxillary palpi are much elongated, their last joints, in form and proportion, differing evidently from the preceding ones. The ovipositor is not covered at base by a large lamina in the form of a vomer.

Here, this ovipositor is extremely salient.

Some species are distinguished from the others by their almost globular head, their mandibles terminated in an entire or but slightly emarginated point, and by the elongation of their metathorax. The second cubital cell is frequently wanting. Such are those which form the

#### STEPHANUS, *Jur.*—PIMPLA, BRACON, *Fab.*,

Where the thorax is much thinned anteriorly, and on a level at its posterior extremity with the origin of the abdomen, so that this part of the body appears almost sessile and inserted in the posterior and superior extremity of the thorax as in the Evaniæ. The posterior



thighs are inflated, and several little tubercles are observable on the vertex\*.

XORIDES, *Lat.*—PIMPLA, CRYPTUS, *Fab.*,

Where the methorax is convex and rounded at its descent, so that the abdomen is inserted, as usual, at its inferior extremity, and presents a very distinct pedicle †.

Of those species in which the head is transverse, and the mandibles are very distinctly bifid or well emarginated at the point, some, such as form the

PIMPLA, *Fab.*,

Have a cylindrical and very briefly pediculated abdomen. We will cite the

*P. persuasoria*; *Ichneumon persuasorius*, L.; Panz., Faun. Insect. Germ., xix, 18. One of the largest species in Europe; black; spots on the thorax and the scutellum white; two white dots on each ring of the abdomen; legs fulvous; ovipositor as long as the body.

*P. manifestator*; *Ichneumon manifestator*, L.; Panz., Ibid., xix, 21. Black; scutellum of the same colour; legs fulvous. The

*P. ovivora*, Bullet. Univers. des Sc., of the Baron Férussac destroys the eggs of Spiders ‡.

In others, the abdomen almost borders on an oval, and has an elongated, slender, and arcuated pedicle. They form the

CRYPTUS, *Fab.*

Some species are known in which the females are apterous, and which by reason of this character and the form of the thorax, that is divided into two parts or knots, might constitute a separate subgenus. They are almost always found on the ground §.

There, the ovipositor of the females is concealed or but slightly prolonged beyond the anus.

Sometimes the abdomen is compressed and falciform, or clavate and truncated.

OPHION, *Fab.*,

Where the antennæ are filiform or setaceous, and where the abdomen is falciform and truncated at the extremity. The ovipositor is somewhat salient. The second cubical cell is very small or null.

*O. luteus*; *Ichneumon luteus*, L.; Schæff., Icon. Insect., I, 10. Russet-yellow, with green eyes.

The female deposits her ova on the skin of certain caterpillars, particularly on that called in France the *queue-fourchue*—

\* *Lat.*, Gener. Crust. et Insect., IX, 3; *Bracon serrator*, *Fab.*;—*Pimpla coronator*, *Fab.*, and some other undescribed species from America.

† *Lat.*, Gener. Crust. et Insect., IX, 4. The *Pimpla mediator*, *necator*, and *meliorator*, *Fab.*, are probably *Xorides*; his *Cryptus ruspator* should apparently form a separate subgenus, allied to the preceding one.

‡ *Fab.*, Syst. Piez.; and Encyc. Méthod., article *Pimple*.

§ *Fab.*, Ibid.

*Bombyx vinula*. They are attached to it by means of a long and slender pedicle. There the larvæ live and grow, with the posterior extremity of their body involved in the pellicle of the eggs from which they sprung, without preventing the Caterpillar from spinning its cocoon; but they finally kill it by consuming its internal substance, when they make their own cocoons, which are placed close together, and at length issue forth under the form of Ichneumons.

The larva of another species, the *O. moderator*, Fab., destroys that of another Ichneumon, the *Pimpla strobilellæ*, Fab.\*

#### BANCHUS, Fab.

Similar as to the antennæ, but the abdomen of the females is narrowed at the end and terminated in a point †.

#### HELWIGIA.

The port of the preceding Insects, but the antennæ thicker near the extremity ‡.

Sometimes the abdomen is rather flattened than compressed, being either somewhat oval, or almost cylindrical, or fusiform.

In these, the abdomen is considerably narrowed at base in the manner of a pedicle.

#### JOPPA, Fab.

The Joppa are removed from the following subgenera by their antennæ, which are widened or thickened anterior to the extremity, and then terminate in a point §.

#### ICHNEUMON *proper*,

Where the head is transversal and the abdomen somewhat oval, and almost equally narrowed at both ends.

Panzer has separated generically, under the name of *Trogus*, those species in which the scutellum forms a conical tubercle, and the abdomen presents deep transversal incisures ||.

#### ALOMYA, Fab.,

Where the head is narrower and more rounded, with the abdomen more widened near its posterior extremity.

An Ichneumon inhabiting France, and which appears to us nearly allied to the *femoralis* of Gravenhorst—Ichn. Pedem., No. 136—and otherwise closely approximated to the *Alomyæ*, is remarkable for its pyramidal head with an anterior elevation bearing the antennæ. It might form the type of another subgenus—*Hypsicera* ¶.

\* Fab., Syst. Piez.; and Encyc. Méthod., article *Ophion*.

† Fab., Ibid.

‡ See the Bullet. Univers. des Sc. of Baron Férussac.

§ Fab., Syst. Piez.

|| Fab., Ibid., and Panz. Hymenopt.

¶ The same works.

In those, the abdomen is connected with the thorax by the greater portion of its transversal diameter, is almost sessile, nearly cylindrical, and simply widened or thickened towards its posterior extremity. Such are the

PELTASTES, *Illig.*—METOPIUS, *Panz.*,

Where there is a circular elevation under the antennæ, and the lateral edges of the scutellum are turned up and sharp\*.

In the second and last division of those species in which the maxillary palpi are composed of five joints and the labials of four, we observe a profoundly emarginated or almost bifid ligula, and maxillary palpi, the joints of which differ but slightly, or change their figure very gradually. The ovipositor projects and is covered at base by a large lamina formed like a vomer. The posterior thighs are thick. The head in several projects in the manner of a snout.

ACÆNITUS, *Lat.*,

When the head presents no anterior projection in the form of a rostrum †.

AGATHIS, *Lat.*,

Where it terminates inferiorly in that manner. These Insects approach the following subgenera by their wings ‡.

Our second division of the Ichneumons only differs from the first with respect to the number of joints in the palpi, inasmuch as there is one less in the labials, which present but three. As in most of the species of the following division, the second cubital cell is most frequently as large as the first, and nearly square. The ovipositor projects. The point of the mandibles is emarginated or bifid.

Some present a remarkable hiatus between the mandibles and the clypeus. The maxillæ are prolonged inferiorly beneath the mandibles. The second cubital cell is square and tolerably large. The ovipositor is long. They form the genus

BRACON, *Fab. Jur.*,

From which we might separate, as was formerly done by me, under the generic denomination of VIPION, those species in which the antennæ are short and filiform; in which the maxillæ are proportionally longer, and with the labium form a sort of rostrum; and where the maxillary palpi are hardly longer than the labials.

The species with setaceous antennæ, at least as long as the body, in which the maxillary palpi are much longer than the labials, and where the maxillæ and labium form that sort of rostrum under the mandibles, would alone be Bracones §.

The others present no hiatus between the mandibles and clypeus.

\* *Ichneumon necatorius*, Fab.; *Panz.*, Faun. Insect. Germ., XLVII, 21;—*Ich. migratorius*, Fab.;—*Ich. amictorius* *Panz.*, *Ibid.*, LXXXV, 14;—*Ich. dissectorius*, *Panz.*, *Ibid.*, XCVIII, 14. See Encyc. Méthod., article *Peltaste*.

† *Lat.*, Gen. Crust. et Insect., IV, 9; Encyc. Méthod., Hist. Nat. Insect., X, 37.

‡ *Lat.*, *Ibid.*, 9; Encyc. Méthod., *Ibid.*, 38.

§ See *Lat.*, Gen. Crust. et Insect., IV, 9; and Encyc. Méthod., Hist. Nat. Insect., X, p. 35.

The maxillæ and labium are not prolonged. The second cubital cell is very small. The ovipositor, and even the abdomen are short.

MICROGASTER, *Lat.* \*

Our third and last division, corresponding to that of the *Bassus* of M. Néés d'Esenbeck, has, like the first, four joints in the labial palpi, but the maxillary palpi consist of more, that is to say of six. The abdomen is semi-sessile.

Here, the mandibles become gradually narrowed, and terminate as in the preceding Insects, by two teeth, or in an emarginated or bifid point.

HELCON, *Esenb.*,

Where the abdomen, viewed above, presents several annuli, terminates in a long ovipositor, and is not concave beneath †.

SIGALPHUS, *Lat.*,

Where the abdomen is concave inferiorly, presents but three segments above, and the ovipositor is contracted and resembles a sting ‡.

CHELONUS, *Jur.*,

Where that part of the body, § otherwise almost similarly formed, is inarticulated superiorly §.

There, the mandibles are almost square, with three teeth at the extremity, one in the middle, and the others formed by the projection of the angles of the terminal margin.

ALYSIA, *Lat.* ||

We have not yet been able to examine thoroughly, various other genera established by Messrs. Gravenhort and Néés d'Esenbeck, in their *Conspect. Gen. et Fam. Ichneum.*, and consequently have not thought it proper to speak of them. That called *Anomalon* by Jurine, must be suppressed. It is a sort of general receptacle, where he has placed all those Ichneumons in which the second cubital cell is wanting, without paying any attention to other organic differences.

In the second tribe, the *GALLICOLÆ*, *Diptolepariæ*, *Lat.*, we find but a single nervure in the inferior wings. The superior present some cells or areolæ, viz. two at their base, the brachials, but of which the inner one is usually incomplete and but slightly marked, another radial and triangular, and two or three cubitals, of which the second, where there are three, is always very small, and the third very large, triangular, and closed by the posterior margin of the wing. The antennæ are of equal thickness throughout, or gradually enlarge, but

\* *Lat.*, *Ibid.*

† Néés d'Esenb., *Conspect. Gener. et Famil. Ichneum.* p. 29.

‡ *Ibid.* ; *Lat.*, *Ibid.*

§ *Lat.*, *Ibid.* ; and the *Conspect.*, &c., of Néés d'Esenb.

|| *Lat.*, *Ibid.* This subgenus appears to connect itself with the *Gallicolæ* ; here the mandibles are always dentated on the inner side.

without forming a club, and consist of from thirteen to fifteen joints\*. The palpi are very long †. The ovipositor is convoluted spirally in the interior of the abdomen, and has its posterior extremity lodged in a groove of the venter.

The Gallicolæ form the genus

### CYNIPS, *Lin.*

Geoffroy distinguishes these Insects by the improper name of *Diplolepis*, and calls *Cynips* certain Insects of the following family comprised by Linnæus in his last division of the Ichneumons.

These Insects seem to be hump-backed, having a small head and a thick and elevated thorax. Their abdomen is compressed, carinated or trenchant inferiorly, and truncated obliquely, or obtuse, at the extremity. That of the females contains an ovipositor which seems to consist of a single, long, and extremely slender or capillary thread convoluted spirally near the base or towards the origin of the venter, and of which the terminal portion is lodged under the anus between two elongated valvulæ, each of which forms a semi-scabbard or sheath for it. The extremity of this ovipositor is grooved, and has lateral teeth resembling the barbs on the head of an arrow; with these the Insect widens the aperture it has effected in different parts of plants, for the purpose of receiving its eggs. The juices of those plants are diffused in the wounded spots and form excrescences or tumours called *galls*. The one most commonly known, or the *gall-nut*, *Aleppo gall*, is employed with a solution of the sulphate of iron to produce a black dye. The form and solidity of these protuberances vary according to the nature of the parts of the plants that have been wounded, such as the leaves, petioles, buds, bark, roots, &c. Most of them are spherical; some resemble fruits, such as the *galles en pomme*, *galles en groseilles*, *galles en pepin*, *galles en nêfle*, &c. Others are fibrous or hairy, like that called the *bedeguar*, *mousse chevelue*, &c., which is observed on the wild Rose-trees. Some of them resemble artichokes, others mushrooms, &c. &c. The eggs enclosed in these excrescences increase in size and consistence, and finally produce larvæ destitute of feet, but frequently provided with mammillæ in place of them. Sometimes they live there solitarily, and sometimes in society, feeding on their internal parietes without interfering with their development, and remaining five or six months in this condition. There also some undergo their metamorphosis, to effect which others issue forth and descend into the earth where they remain till their final change is completed. The round holes observed on the exterior of the gall intimates the exit of the Insect. Several Insects of the following family are also sometimes found in it, but this has been by destroying the natural inhabitants, of whose

\* According to the sex; thirteen in the female *Ibalix*, the same number in the female *Figites*, and fourteen in the males; fourteen in the female *Cynips*, and fifteen in their males.

† The maxillary palpi usually have four joints, and the labials three, of which the last is rather the thickest.

domicil they have taken possession, in the manner of the Ichneumons.

Certain species are apterous. One species deposits its ova in the pollen of the earliest of the wild Fig-trees. The modern Greeks, in pursuance of a method transmitted to them from antiquity, pierce several of these figs, and place them on their late bearing trees of the same genus; the *Cynips* soon leave their old dwelling and come out loaded with the fecundating dust, insinuate themselves into the eye of the fruit borne by the latter, fecundate its seeds, and accelerate the period of its maturity. This operation is termed caprification.

*IBALIA*, Lat. Illig.—*SAGARIS*, Panz.—*BANCHUS*, Fab.,

Where the abdomen is strongly compressed in all its height, and is formed like the blade of a knife; the antennæ are filiform. The radial cell is long and narrow; the two branchials are very distinct, and completely or entirely closed, and the two first cubitals are very small\*.

*FIGITES*, Lat. Jur.,

Where the abdomen is ovoid, thickened and rounded superiorly, or simply compressed and trenchant beneath; and where the antennæ are granular and gradually enlarge. There is but one complete brachial cell, the radial is very distant from the extremity of the wing, and the second cubital is wanting †.

*CYNIPS*, Lin.—*DIPLOLEPIS*, Geoff.,

Or *Cynips* proper, where the abdomen is similar, but the antennæ are filiform and not granular. There is also but one complete cell at the base of the superior wings; there are three cubitals, the first of which is proportionally larger than in the *Ibaliæ*; the radial is equally elongated.

*C. gallæ tinctoriæ*; *Diptolepis gallæ tinctoriæ*, Oliv., Voy. en Turq. Very pale fulvous; covered with a silky and whitish down, with a blackish-brown and glossy spot on the abdomen. In the round, hard, and tuberculous gall found on a species of Oak in the Levant, which is employed in commerce. By breaking this gall we may frequently obtain the perfect insect.

*C. quercus pendunculi*, L.; Reaum., Insect., III, xl, 1—6. Grey, with a linear cross on the wings. It pierces the blossoms of the male flowers of the Oak, producing round tumours which resemble little bunches of fruit.

*C. rosæ*, L.; Reaum., Insect., III, xlvi. 5—8; and xlvi, 1—4. Black; legs and abdomen, the extremity of the latter excepted, red ‡.

\* Lat., Gen. Crust. et Insect., IV, p. 17. The maxillary palpi, according to my former observations on this genus, have but five joints, whilst those of the *Figites* and *Cynips* have but four.

† Lat., Gen. Crust. et Insect., IV, p. 19, and Jurine.

‡ For the other species, see Linnæus; Oliv., Encyc. Méthod., article *Diptolépe*; Lat., Hist. Gen. des Crust. et des Insect., XIII., p. 206, and Gen. Crust. et Insect., IV, p. 18; Jurine and Panzer on the Hymenoptera.

Dr. Virey has published some new observations on the galls produced by these Insects, from a MS. memoir of the late M. Olivier.



The fourth tribe, that of the *CHALCIDÆ*, Spin., only differs essentially from the preceding one in the antennæ, which are geniculate, those of the *Euchares* alone excepted, and which, from the elbow, form an elongated or fusiform club, of which the first joint is frequently lodged in a groove. The palpi are very short. The radical cell is usually wanting; there is never more than one cubital cell, which is not closed. The number of joints of the antennæ, never exceeds twelve.

We may refer the various genera established in this tribe to the

*CHALCIS, Fab.*

These Insects are very small, and are decorated with extremely brilliant metallic colours; most of them enjoy the faculty of leaping. The ovipositor, like that of the *Ichneumons*, is salient and frequently composed of three threads; the larvæ are also parasitical. Some of them, on account of their extreme minuteness, live in the interior of the almost imperceptible ova of Insects. Others inhabit galls and the chrysalides of the *Lepidoptera*. I suspect that they do not spin a cocoon.

Some, in which the antennæ always present eleven or twelve joints, have the posterior thighs very large and lenticular, and their tibiæ arcuated.

Here the abdomen is ovoid or conical, pointed at its extremity, and pediculated; the ovipositor is straight, and rarely salient or external. The wings are extended.

Some are known in which the antennæ of the males are flabelliform.

*CHIROCERA, Lat.\**

Those of the others are simple in both sexes.

*CHALCIS, proper.—VESPA, SPHEX, Lin.*

Some have the abdominal pedicle elongated; such are those found in marshes, and called *sispes* and *clavipes* by Fabricius. They are both black. The posterior thighs of the first are yellow; those of the second are fulvous.

M. Dalman—*Anal. Entom.*, p. 29—has formed the new genus *DIRRHINUS*, with an African species of this division, that is remarkable for its deeply bifid head, which, as well as the mandibles, is prolonged anteriorly.

Two other species, inclosed in amber, where the antennæ suddenly terminate in a large ovoid and triarticulated club, and where the ovipositor is salient and as long as the body, seem to him to form a particular genus, which he calls *PALMON*. See his *Memoir on the Insects inclosed in Amber*, V, 21—24.

In the others, the pedicle of the abdomen is very short. Such are

*C. minuta*; *vespa minuta*, L. Very common on the flowers of umbelliferous plants; black, with yellow legs.

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\* *Chalcis pecticornis*, Lat., *Gen. Crust. et Insect.*, IV, 26.



*C. annulata*, Fab. Found in the nests of the *Vespa nidulans* of South America, and mistaken by Reaumur—Insect., VI, xx, 2, and xxi, 3, 4—for the female of that Wasp. It is black; point of the abdomen elongated; a white dot at the extremity of the posterior thighs; tibiæ white, picked in with white\*.

There the abdomen seems as if applied to the posterior extremity of the metathorax, or as if sessile; it is rounded or very obtuse at the end, and compressed laterally. The ovipositor curves over the back. The wings are doubled, and the superior ones present a radial cell.

#### LEUCOSPIS, Fab.

*L. dorsigera*, Fab., the female; *L. dispar*, the male; Panz., Faun. Insect. Germ., LVIII, 15, the male. Black; abdomen almost twice the length of the thorax, with three yellow bands and two little spots of the same colour. The female deposits her eggs in the nest of the *Abeilles Maçonnes* of Reaumur.

That of another species—*L. gigas*—lays in Wasps' nests †.

The others, in several of which the antennæ consists of but from five to nine joints, have the posterior thighs oblong, and their tibiæ straight.

Of those in which the antennæ, always simple in both sexes, are composed of from nine to twelve joints, we will first distinguish

#### EUCHARIS, Lat. Fab.—CHALCIS, Jur.

The only ones of this tribe in which those organs are straight or non-geniculate. The abdomen is pediculated. I could find no vestiges of palpi in several individuals submitted to my inspection ‡.

#### THORACANTA, Lat.

These Insects, collected in Brazil by M. de Saint-Hilaire, by the prolongation of their scutellum, which covers the wings, represent in Europe those Hemiptera called *Scutellera* by M. DeLarck.

The other subgenera with antennæ still consisting of at least nine simple joints, but which are geniculate, and in which the wings are not covered by the scutellum, may be divided into those where these antennæ are inserted near the middle of the anterior face of the head, or considerably distant from the mouth, and into those where they are inserted close to it.

In those where they are removed from it, some have almost an ovoidal abdomen, compressed on the sides, or higher than it is wide, and a usually salient and ascending ovipositor. Such are those which form the

#### AGAON, Dalm.

They are very remarkable for the magnitude and length of their head, and for their antennæ, of which the first joint is very large, and

\* See Lat., Gen. Crust. et Insect., IV, p. 25; Fab. Syst. Piez.; Oliv., Encyc. Méthod., article *Chalcis*.

† See the same works and the Monograph of this genus by Klüg, in the Mem. Nat. Cur. of Berlin. Swammerdam appears to have known one of these species.

‡ Lat., Gener. Crust. et Insect., IV, 20.

forms a triangular palette; the three last form an abrupt and elongated club. They are covered with hairs\*.

*EURYTOMA, Illig.,*

Where the antennæ are as if knotted, and furnished with whirls of hairs in the males. The ovipositor is short †.

*MISOCAMPE, Lat.—DIPLOLEPIS, Fab.,*

Where they are composed, in both sexes, of compact joints and are destitute of the whirls of hairs. The ovipositor is long.

The larva of one species inhabits the gall of the wild Rose tree, and devours that of the *Cynips*, which formed it ‡.

In the others the abdomen is flattened above, and either triangular and terminated in a long point in the females, or almost cordiform or nearly orbicular. The ovipositor is usually concealed, or but slightly salient.

Here the nervure of the superior wings, situated near the margin, is always curved, and unites with the callous point at the exterior edge. The two posterior legs are the longest. The inner spine of the intermediate tibiæ is small.

*PERILAMPUS, Lat.,*

Where the mandibles are strongly dentated; the club of the antennæ is short and thick; the abdomen short, cordiform, and not prolonged at the extremity, and the scutellum thick and salient §.

In the two following subgenera the abdomen of the females is prolonged into a conical point. The club of the antennæ is narrow and elongated.

*PTEROMALUS, Lat.—CLEPTES, Fab.,*

Where the thorax is short and not narrowed anteriorly ||.

*CLEONYMUS, Lat.,*

Where it is elongated and narrowed anteriorly. The abdomen is also proportionally longer, and the antennæ are inserted more inferiorly ¶.

There the nervure of the superior wings, situated near the margin, is sometimes straight, and unites at the callous point. The intermediate legs are the longest, and the inner side of their tibiæ is furnished with a stout spine.

The scutellum projects.

*EUPELMUS, Dalm.,*

Where the infra-costal nervure, as in the preceding Insects, is curved,

\* Dalm., Anal. Entom., 30; II, 1—6.  
 † Lat. Gener. Crust. et Insect., IV, 27.  
 ‡ Lat. Ibid., 29; genus *Cynips*,  
 § Lat. Ibid., 30.  
 || Lat., Ibid., 31.  
 ¶ Lat., Ibid., 29.

and unites at the exterior margin, before the callous point. The first joint of the intermediate tarsi is large, and ciliated beneath\*.

ENCRYPTUS, *Lat.*,

Where that nervure is straight and unites at the callous point, or rather at the branch which commences the cubital cell. The club of the antennæ is compressed and truncated at the end †.

SPALANGIA, *Lat.*,

Distinguished from the preceding by the generally longer antennæ, which are inserted close to the anterior margin of the head ‡.

EULOPHUS, *Geoff. Lat.*—ENTODON, *Dalm.*

But from five to eight joints in the antennæ; those of the males ramous §.

In the fifth tribe, that of the OXIURI, *Lat.*, we observe species similar to the preceding in the absence of nervures in the inferior wings, and in which the abdomen of the females is terminated by a tubular and conical ovipositor, sometimes internal, exertile, and protruding through the anus like a sting, and sometimes external, and forming a sort of tail or terminal point. The antennæ are composed of from ten to fifteen joints, and are either filiform or somewhat largest near the end, or clavate in the females. The maxillary palpi of several are long and pendent.

We reduce the various genera of which it is composed to one, the

BETHYLUS, *Lat. Fab.*

The habits of these Insects are probably those of the Chalcidix; but as most of them are found on the sand or low plants, I suspect that their larvæ live in the ground.

Some have brachial cells or nervures in the superior wings. Their maxillary palpi are always salient. Their antennæ are filiform, or simply and gradually enlarge in both sexes.

Here they are inserted near the mouth.

DRYINUS, *Lat.*—GONATOPUS, *Klüg.*,

Where the antennæ are straight, and consist of ten joints in the two sexes, the last ones somewhat thicker than the others. The thorax is divided into two knots. The anterior tarsi terminate by two large dentated hooks, one of which is flexed. Some of the females are apterous ||.

\* *Dalm.*, Monog. of the Pteromalini.

† *Lat.*, Gener. Crust. et Insect., IV, 31.

‡ *Lat. Ibid.*, 29.

§ *Lat. Ibid.*, 28; *Nouv. Dic. d'Hist. Nat.*, 2d edit., and *Lin. Trans.* XIV, p. 111. For these various subgenera, see *Mémoire sur les Diplolépaires*, by M. Maximilian Spinola, published in the *Ann. du Mus. d'Hist. Nat.*, as well as the excellent work of M. Dalman, on the Insects of this tribe.

|| *Lat. Gen. Crust. et Insect.*, IV, 39; *Dalm.*, *Annul. Entom.* 7.

ANTEON, *Jur.*,

Where the antennæ also consist of ten joints, at least in the males; but the thorax is continuous. All the tarsi are terminated by ordinary, simple, and straight hooks. The superior wings have a large cubital point\*.

BETHYLUS, *Lat. Fab.*—OMALUS, *Jur.*,

Where the antennæ are geniculate and consist of thirteen joints in both sexes; where the head is flattened, and the pro-thorax elongated and almost triangular †.

There, the antennæ, always composed of from thirteen to fifteen joints, are inserted near the middle of the anterior face of the head. Sometimes they are straight or nearly so.

PROCTOTRUPES, *Lat.*—CODRUS, *Jur.*,

Where they consist of thirteen joints in both sexes. The mandibles are arcuated and dentated on the inner side; the abdomen is briefly and insensibly pediculated, terminating, in the females, in a frequently long and horny point or tail forming the ovipositor; the second ring is very large ‡.

Sometimes the antennæ are very distinctly geniculate.

HELORUS, *Lat. Jur.*,

Where the antennæ consist of fifteen joints. The mandibles are dentated on their inner side. The first abdominal segment forms an abrupt, long, and cylindrical pedicle §.

BELYTA, CINETUS, *Jur.*,

Where the antennæ are composed of fourteen or fifteen joints; they are filiform in the males, more granose and thicker near the end in the females ||.

The other Oxiuri have neither cells, nor brachial, nor basilar nervures.

These have their antennæ inserted on the forehead.

DIAPRIA, *Lat.*—PSILUS, *Jur.*

No cell whatever in the wings. The maxillary palpi are salient, and the antennæ have fourteen joints in the males, or twelve in the females ¶.

In those they are inserted near the mouth.

CERAPHRON, *Jur. Lat.*

Wings furnished with a radial cell; the maxillary palpi salient;

\* *Jur.*, Hymenop.

† *Lat.*, *Ibid.*, 40.

‡ *Lat.*, *Ibid.*, 38.

§ *Lat.*, *Ibid.*, 38.

|| *Lat.*, *Ibid.*, 37.

¶ *Lat.*, *Ibid.*, 36.

the antennæ filiform in both sexes, and consisting of eleven joints; abdomen ovoido-conical\*.

SPARASION, *Lat.*

Similar to Ceraphron in the radial cell, and the projection of the maxillary palpi; but the antennæ have twelve joints in both sexes, are thickest at the extremity or clavate in the females, and the abdomen is flattened †.

Then follow two subgenera also provided with a radial cell, and in which the antennæ, as in Sparasion, are thickest at the end or clavate in the females, and where the abdomen is flattened; but the palpi are very short and do not project, or are not pendent.

TELEAS, *Lat.*,

Where the antennæ are composed of twelve joints ‡.

SCELION, *Lat.*,

Where those organs consist of but ten joints §.

In the last subgenus, or

PLATYGASTER, *Lat.*

The radial cell disappears. The antennæ of both sexes have but ten joints, of which the first and third are much elongated. The palpi are very short. The abdomen is flattened, and in the form of a spatula.

To this subgenus I refer the *Psile de Bosc* of Jurine, a singular Insect, in which the first ring of the abdomen gives origin to a solid horn which curves forwards to above the head, and which, according to the observations of an able naturalist, M. Leclerc de Laval, is the sheath of the ovipositor. This species is very small and entirely black ||.

In the sixth tribe, or the CHRYSIDES, *Lat.*, the inferior wings, as in the three preceding tribes, are not veined; but their ovipositor is formed by the last rings of the abdomen in the manner of the tubes of a spy-glass, and terminates in a little sting. The abdomen, which in the females appears to consist of but three or four rings, is concave or flat beneath; and can be flexed on the pectus, in which state the Insect is globular.

This tribe comprises the genus

CHRYSIS, *Lin.*

The lustre and richness of the colours which decorate these Insects may challenge a comparison with those of the Humming-birds, and

\* *Lat.*, Gener. Crust. et Insect., IV, 35. For some account of an American species of this Insect, the *destructor*, which deposits its ova in the bodies of the larvæ of the *Cecidomyia destructor*, or Hessian-Fly, see Say, Journ. Ac. Nat. Sc. of Philad. vol. I, part i, p. 47, 48.

† *Lat.*, *Ibid.*, 34.

‡ *Lat.*, *Ibid.*, 32.

§ *Lat.*, *Ibid.*, 32.

|| *Lat.* Gen. Crust. et Insect. IV, 32.

have entitled them to the common appellation of *Golden Wasps*, or *Guêpes dorées*. They are seen walking about in a continued state of agitation, and with hasty motions, on walls and fences exposed to the burning ardour of the sun. They are also found on flowers. Their body is elongated and covered with a firm tegument. Their antennæ are filiform, geniculate, vibratile, and composed of thirteen joints in both sexes. The mandibles are narrow, arcuated, and pointed. The maxillary palpi are filiform, usually longer than those of the labium, and composed of five unequal joints; the latter consist of three. The ligula is most frequently emarginated. The thorax is semi-cylindrical, and presents several sutures or impressed and transverse lines. The abdomen of the greater number forms a semi-oval truncated at base, and at the first glance seems suspended to the thorax by its whole width; the last ring is frequently marked by large punctures and terminates by dentations.

The Chrysidæ deposit their ova in the nests of the solitary Mason Bees, or in those of other Hymenoptera. Their larvæ devour those of the latter.

In some the maxillæ and labium are very long, forming a false proboscis that is bent underneath, and the very small palpi are biarticulated.

#### PARNOPE, *Lat.*

The *P. carnea* places its eggs in the nest of the *Bembex rostrata*, Fab.\*

The others are destitute of this false proboscis; their maxillary palpi are moderate or elongated, and composed of five joints; those of the labium have three.

Sometimes the thorax is not narrowed anteriorly; the abdomen is semi-oval, concave, and presents externally but three segments, as in *Chrysis* proper or

#### CHRYSIS, *Fab.*

Those, in which the four palpi are equal, and where the ligula is profoundly emarginate, form the genus

#### STILBUM, *Spinol.*

To which may be united the *Euchræus* of Latreille †.

Those, in which the maxillary palpi are much longer than the labial, the ligula is emarginated, and the abdomen rounded and entire at the extremity, have been generically distinguished by the name of

#### HEDYCHRUM.

Those which, similar to the *Hedychra* in the relative proportions of the palpi, have a rounded and entire ligula, from two genera. In the first or

#### ELAMPUS, *Spin.*,

The mandibles have two teeth on the inner side; the abdomen is

\* *Lat. Gen. Crust. et Insect.*, IV, p. 47, and the *Ann. du Mus. d'Hist. Nat.*

† Messrs. Lapeletier and Serville, *Encyc. Méthod.*, have given the generic appellation of *Pyria* to certain Insects closely allied, according to them, to *Stilbum*, but

entire and rounded at the end, and the posterior extremity of the thorax is furnished with a spine. In the second, or *CHRYSIS*, Spin., there is but a single dentation on the same edge; the abdomen is more elongated, truncated at the end, and frequently a transverse range of large punctures at the same extremity. In this subdivision comes the most common species in Europe.

*C. iguita*, L.; Panz., Faun. Insect. Germ., V, 22. Blue mixed with green; abdomen golden cupreous-red, and terminated by four dentations.

Sometimes the thorax is narrowed before; the abdomen is almost ovoidal without being arched, and presents four segments in the females and five in the males.

#### CLEPTES, Lat.,

Where the mandibles are short and dentated. The ligula is entire\*.

The second section of the Hymenoptera, that of the *ACULEATA*, differs from the first in the absence of the ovipositor. A concealed and retractile sting composed of three pieces usually supplies the place of it in the females, and in the neuters of species which form communities. Sometimes, as in certain Ants, this sting is wanting, and the Insect defends itself by the ejaculation of an acid liquid contained in special glandular reservoirs †.

The Hymenoptera of this section always have their antennæ simple, and composed of a constant number of joints, namely, of thirteen in the males, and twelve in the females. The palpi are generally filiform, those of the maxillæ, frequently the longest, having six joints, and those of the labium four. The mandibles are smaller, and frequently less dentated in the males than in the opposite sex. The abdomen, united to the thorax by a thread or pedicle, is composed of seven rings in the males, and of six in the females. The four wings are always veined, and present the various sorts of ordinary cells.

The larvæ are always destitute of feet, and feed on aliments presented to them by the females or neuters, consisting either of the bodies of Insects, the juices of fruits, or a mixture of pollen, stamina and honey.

This section is divided into four families.

in which the metathorax presents a scutelliform projection, the head offers no depression, and where the simple eyes are arranged in a triangle, those on the sides being considerably distant from the ordinary eyes.

\* For all these divisions, see Lat., Gen. Crust. et Insect., IV, p. 41, et seq.; Améd., Lepeletier, Ann. du Mus. d'Hist. Nat.; Max., Spinola, Insect. Ligur; Jurine and Panzer on the Hymenoptera.

† For details relative to the organs which produce this venomous fluid, see the *Mémoire sur les Abeilles* of Reaumur, and that of M. Leon Dufour, quoted in our general observations upon the Insects of this order.



## FAMILY I.

## HETEROGYNA.

The first family of our second section is composed of two or three kinds of individuals, the most common of which, the neuters and females, are apterous, and but rarely furnished with very distinct ocelli.

Their antennæ are always geniculate, and the ligula is small, rounded and concave, or cochleariform.

Some form communities, in which we find three kinds of individuals, of which the males and females are winged, and the neuters apterous. In the two last the antennæ gradually enlarge, and the length of their first joint is at least equal to that of the third of the whole organ; the second is almost as long as the third, and has the form of a reversed cone. The labrum of the neuters is large, corneous, and falls perpendicularly under the mandibles.

These Hymenoptera compose the genus

FORMICA, *Lin.* \*

Or that of the ants, so highly celebrated for their foresight, and so well known, some by their depredations in our houses, where they attack our sugar and preserved viands, communicating to them at the same time a musky and disagreeable odour, and others by the injury they do to our trees, by gnawing their interior in order to form domicils for their colonies.

The abdominal pedicle of these Insects is in the form of a scale or knot, either double or single, a character by which they are easily recognised. Their antennæ are geniculate, and usually somewhat largest near the extremity; the head is triangular, with oval or rounded and entire eyes, and the clypeus large; the mandibles are very strong in the greater number, but vary greatly as to form in the neuters; the maxillæ and labium are small; the palpi are filiform, and those of the maxillæ the longest; the thorax is compressed laterally, and the almost ovoidal abdomen furnished, in the females and neuters, sometimes with a sting, and sometimes with glands in the vicinity of the anus, that secrete a particular acid called *formic*.

They form communities, which are frequently extremely numerous. Each species consists of three kinds of individuals: *males* and *females*, which are furnished with long wings, less veined than those of the other Hymenoptera of this section, and very deciduous; and *neuters*, destitute of wings, which are merely females with imperfect ovaries. The males and females are merely found within the domicil in transitu. They leave it the moment their wings are de-

\* The tribe of the FORMICARIE, Lat., Fam. Nat. du Règn. Anim., 452.

veloped. The males, much inferior in size to the females, and with a proportionally smaller head and mandibles, fecundate them in the air, where they form numerous swarms and soon after perish without returning to their natal hill, where their presence is no longer requisite. The females, now ready to become mothers, wander to a distance from their birth-place, and having detached their wings by means of their feet, found a new colony. Some of those, however, which are in the vicinity of the ant-hills are arrested by the neuters, who force them to return to their domicil, tear off their wings, prevent them from leaving it, and force them to deposit their eggs there; it is thought, however, that they are violently expelled the moment that operation is effected.

The *neuters*, which are distinct, not only by the want of wings and ocelli, but also by the size of their head, the strength of their mandibles, their more compressed and frequently knotted thorax, and their proportionally longer legs, have the sole charge of all the economy of the habitation, and the rearing of the young. The nature and form of their nests or ant-hills vary according to the particular instinct of the species. They usually establish it in the ground; in its construction some only employ particles of earth, and almost entirely conceal it; others seize on fragments of various bodies, and with them raise conical or dome-like hillocks over the spot in which they are domiciliated. Some establish their dwelling in the trunks of old trees, the interior of which they perforate in every direction, in the manner of a labyrinth, in which the detached particles are also employed. Various and apparently irregular galleries lead to the particular residence of their young.

The neuters roam abroad in search of provisions, appear to inter-communicate the success of their labours by the senses of touch and smell, and to aid and assist each other. Fruit, Insects, or their larvæ, dead bodies of small quadrupeds and birds, &c., constitute their food. They feed the larvæ with their mouths, transport them in fine weather to the external superficies of the hill, in order that they may receive additional warmth, and take them down again on the approach of night or bad weather, defend them from their enemies, and look to their preservation with the greatest fidelity, particularly when the hill is disturbed. They pay equal attention to the nymphs, some of which are enclosed in a cocoon, and the others naked; they tear open the envelope of the former when the moment of their ultimate metamorphosis has arrived.

I have observed neuters in various ant-hills, remarkable for a head much larger than common, and for the unusual fewness of their number. M. Dupont de Nemours, without being a naturalist, had also previously noticed this difference\*. M. de la Cordaire, whom I have already mentioned, has given me a neuter allied to the *alta cephalotes* of Fabricius, and assures me that individuals of this kind were the defenders of their community, and apparently fulfilled the functions of Captains in their excursions, at which time they marched along the sides of the main body.

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\* See his Recherches sur les Fourmis Indigènes.

The name of *eggs* is vulgarly applied to the larvæ and nymphs; those of the *F. rufa* are eaten by young Pheasants. The neuters prevent the individuals with newly acquired wings from issuing forth until the proper moment has arrived, which is always determined by the heat of the atmosphere. They then open a passage for them and let them go.

Most ant-hills are wholly composed of individuals of the same species. Nature, however, has deviated from this plan with respect to the *F. roussatre* or Amazon-ant, and that which I have called the *sanguinea*. Their neuters, by open violence, procure auxiliaries of their own caste but of different species, which I have designated by the names of *noir-cendrée* and *mineuse*. When the heat of the day begins to lessen, and exactly at the same hour, at least for several days, the *Amazons* or *Legionnaires* quit their nest, advance in a solid column, more or less numerous or according to the extent of the population, and march upon the Ant-hill they wish to attack. They soon penetrate into it notwithstanding the opposition of the inhabitants, seize the larvæ and nymphs of the neuters peculiar to the invaded community, and transport them in the same warlike order to their own domicil, where they are attended to in common with the posterity of their conquerors, by other neuters of their own species in a perfect state, that have either been metamorphosed there, or torn from their original dwelling. Such is the composition of the *Mixed Ant-hills*. For these curious observations, which I have verified, we are indebted to M. Huber, Jun., who is so gloriously pursuing the career of his father.

It is well known that the Ant is extravagantly fond of a saccharine liquid that exudes from the bodies of the Aphides and Gallinsecta. Four or five species convey both these Aphides and their eggs, particularly in bad weather, to the bottom of their nests, and even fight for the right of possession. Some construct little galleries of earth, leading from the Ant-hill, which extend throughout the entire length of trees to the very branches that are loaded with these Insects. These interesting facts have also been observed by the naturalist just referred to\*.

Both males and females perish towards the close of autumn, or on the first approach of winter. The labourers pass the winter in their hill in a torpid state, and their so highly vaunted foresight in this respect has no other aim than that of augmenting and consolidating their habitation by all sorts of means, for provisions would be useless at a period when they are incapacitated from using them (a).

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\* See his *Recherches sur les Fourmis Indigènes*.

☞ (a) How will this reasoning apply to those that dwell in the interior of trees, &c., and whose habitations do not require this consolidation, or to those that inhabit tropical countries, where hibernation is out of the question, but where, at certain seasons, they are liable to be confined to their abodes for weeks in succession, by heavy rains? What is to become of the larvæ during this period of occlusion, if the nurses which feed them are themselves destitute of nourishment? Various Rodentia, that are known to pass the winter in a state of lethargy, lay by ample supplies, on which they feed early in the spring, or in the event of a fortuitous disturbance of their slumbers, and it is a fact worthy of notice, that the Ant, where-

The economy of the Ants foreign to Europe, and those of tropical countries particularly, is unknown to us. If these, called the *Fourmis de visite* by the French colonists, are sometimes of use to them by purging their dwellings of Rats, and a multitude of destructive or disagreeable Insects, other species induce them to curse their existence on account of the extent of their depredations, which it is impossible to prevent.

I divide the genus *Formica* in the following manner :

#### FORMICA,

Or Ants properly so called, in which the sting is wanting, and the antennæ are inserted near the front; their mandibles are triangular, dentated, and incisive. The pedicle of the abdomen never consists of more than one scale or knot.

*F. bispinosa*, Lat., Hist. Nat. des Fourm., p. 133, iv, 20. Black; two spines before the thorax; scale of the abdomen terminated in a long and sharp point. It forms its nest with a large quantity of down, apparently derived from a species of *Gossampinus*.—Inhabits Cayenne.

*F. rufa*, L. : Lat., Ibid., v, 28. The neuter about four lines in length, blackish; thorax, scale, and great part of the head, fulvous; thorax unequal; the ocelli somewhat apparent. It forms conical or dome-like and frequently large hills in the woods, composed of earth, ligneous fragments, &c. It produces formic acid. The winged individuals appear in the spring.

*F. sanguinea*, Lat., Ibid., v, 29. The male similar to the preceding ones, but of a blood-red colour; abdomen cinereous-black. It inhabits the woods, and is one of those denominated *Amazons* or *Legionnaires* by M. Huber.

*F. cunicularia*, Lat. Head and abdomen of the male black; vicinity of the mouth, under part of the head, thorax, legs, and first joint of the antennæ, pale fulvous. This and the following species are those captured by the Amazons, and transported to their hills, in order to aid and replace them in the rearing of their young.

*F. fusca*, L. ; *F. noir cendrée*, Lat., Ibid., vi, 32. The male cinereous-black and glossy; base of the antennæ and legs reddish; the scale large and almost triangular; three apparent ocelli.

#### POLYERGUS, Lat.,

Where the sting is still wanting, but where the antennæ are inserted near the mouth, and the mandibles are narrow, and arcuated or strongly hooked.

*F. roussâtre*, Lat., Ibid., vii, 38, is the species more particularly

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ever it is found—generally speaking, and always supposing its domicil to be completed—always prefers particles of sugar, animal matter, and of what may strictly be denominated *provisions*, to substances much more durable and better calculated for building.—ENG. ED.

called Amazon by M. Huber. See his *Recherches sur les Fourmis*, &c., p. 210—260, pl. ii, *F. roussâtre*. In all France.

PONERA, *Lat.*

The males and females armed with a sting; pedicle of the abdomen formed of a single scale or knot; antennæ of the individuals mentioned, thickest towards the end; mandibles triangular, and the head nearly so, without any remarkable emargination at its posterior extremity.

*F. contracta*, *Lat.*, *Ibid.*, vii, 40. The males are nearly destitute of eyes, and live under stones in trifling numbers. They are very small, black, and almost cylindrical; antennæ and legs yellowish-brown.

ODONTOMACHUS, *Lat.*,

Where the pedicle of the abdomen is also formed of a single knot, but terminates superiorly in the form of a spine. The antennæ of the males are very small and filiform; the head of these same individuals forms a long square, and is much emarginated posteriorly; their mandibles are long, narrow, parallel, and terminated by three teeth.

All the species are foreign to Europe\*.

MYRMICA, *Lat.*,

Also furnished with a sting, but where the pedicle of the abdomen is formed of two knots. The antennæ are exposed; the maxillary palpi long and composed of six joints; the mandibles are triangular. Such is the

*F. rouge*, *Lat.*, *Ibid.*, x, 62. The males are reddish and finely granulated, with a glossy and smooth abdomen; a spine under the first knot of the pedicle; the third ring somewhat brown. It stings severely. In woods.

ECITON, *Lat.* †

This subgenus consists of species entirely similar to the Myrmicæ, with the exception of their mandibles, which are linear.

ATTA, *Fab.* ‡

Only differing from Myrmica in the very short palpi; those of the maxillæ consist at least of six joints. The head of the neuters is usually very large.

*Atta cephalotes*, *Fab.*; *Fourmi de visite*, *Lat.*, *Ibid.*, ix, 57.

CRYPTOCERUS, *Lat.*,

Always provided with a sting, and the abdominal pedicle formed of two knots; but the head, very large and flattened, has a groove on each side for the reception of a portion of the antennæ.

The species are peculiar to South America §.

\* *Lat.*, *Gener. Crust. et Insect.*, IV, 128.

† *Lat.*, *Ibid.*, 130.

‡ *ŒCODOME* of the *Nouv. Dict. d'Hist. Nat.*, 2nd edition.

§ See *Lat.*, *Hist. Nat. des Fourmis*; *Gen. Crust. et Insect.*, IV, p. 124; Huber, *Recherches sur les Fourmis Indigènes*; Fabricius, &c.

The remaining Heterogyna are solitary Insects. Each species is composed of but two kinds of individuals, *winged males* and *apterous females*; the latter are always armed with a powerful sting. The antennæ are filiform or setaceous, and vibratile; their first and third joints are elongated, and the length of the first is never equal to the third of the total length of the whole organ.

They form the genus

MUTILLA, *Lin.\**

In some species, of which the males only have been observed, the antennæ are inserted near the mouth, the head is small, and the abdomen long and almost cylindrical, as in

DORYLUS, *Fab.*

Insects peculiar to Africa and India †.

LABIDUS, *Jur.*

Hymenoptera of South America, differing from the Doryli in their mandibles, which are shorter and narrower, and in their maxillary palpi, that are at least as long as those of the labium, and composed at least of four joints; in Dorylus, they are very small and at most biarticulated ‡.

In the others, the antennæ are inserted near the middle of the face of the head, which is larger than in the preceding Insects; the abdomen is sometimes conical, and sometimes ovoidal or elliptical. They form the genus

MUTILLA, *proper.*

These Insects are found in hot and sandy localities. The female runs with great quickness, and is always seen on the ground. The males frequently alight on flowers, but their mode of life is unknown.

The species, in the females of which the thorax is almost cubital, and without knots or appearance of divisions above, compose the genera APTEROGYNA §, PSAMMOTHERMA, and MUTILLA of Latreille. The abdomen of the Apterogynæ has the two first annuli in the form of knots, as in several Formicæ. The antennæ of the males are long, slender, and setaceous. Their superior wings only present brachial or basillary cells, and a single, small, rhomboidal, cubital cell. In the Psammothermæ || and the Mutillæ there are three, with two recurrent nervures. Besides this, the second segment of the abdomen is much larger than the preceding one, and forms no knot. The antennæ of the male Psammothermæ are pectinated, and those of the Mutillæ simple in both sexes.

\* Tribe of the MUTILLARIÆ, Lat., Fam. Nat. du Règne Animal, 452.

† See Fabricius; and Lat., Gen. Crust. et Insect., IV, p. 123.

‡ See Jurine and Lat., Ibid.

§ Lat., Gen. Crust. et Insect., IV, p. 121. See the Dict. Class. d'Hist. Nat.; Dalm., Anal. Entom., 100, where he gives the figure of the *Scolia globularis*, Fab., the male of another species of *Apterogyna*.

|| *Mutilla flabellata*, Fab.; the late M. Delalande brought a species of this genus from the Cape of Good Hope.



*M. europæa*, L.; *M. tricolore* Coqueb., *Illust. Icon. Insect.*, dec. II, xvi, 8. The female is black, with a red thorax and three white bands on the abdomen; the two last approximated. She is provided with a powerful sting. The male is bluish black with a red thorax and the abdomen as in the female\*.

Those species which, in both sexes, have the thorax equal above but divided into two distinct segments, with the abdomen conical in the females and elliptical and depressed in the males, compose the genus

MYRMOSA, *Lat. Jur.* †

Those, in which the thorax of the females is still oval above, but divided into three segments by sutures, where the maxillary palpi are very short, and the second joint of the antennæ is set in the first, form the genus

MYRMECODA, *Lat.* †

SCLERODERMA, *Klög.*,

Only differs from Myrmecoda in the elongation of the maxillary palpi and antennæ, of which the second joint is exposed §. In

METHOGA, *Lat.*,

The top of the thorax is as if knotted or articulated ||.

## FAMILY II.

### FOSSORES ¶.

The second family of this section comprises those Hymenoptera armed with a sting, in which all the individuals of both sexes are furnished with wings, and live solitarily; in which the legs are exclusively adapted for walking, and in several for digging. The ligula is always more or less widened at its extremity, and never filiform or setaceous. The wings are always extended.

They compose the genus

SPHEX, *Lin.*

Most females of this genus place beside their eggs, in the nests they have constructed, most commonly in the earth or in wood, various

\* *Mutilla flabellata*, Fab.; Oliv., *Encyc. Méthod.*, article *Mutille*; and Klög, *Entom.*, Brazil. Specim.

† *Lat.*, *Gen. Crust. et Insect.*, IV., p. 119, and Jurine on the Hymenoptera.

‡ *Lat.*, *Ibid.*, p. 118.

§ *Lat.*, *Ibid.*

|| *Lat.*, *Ibid.*

¶ M. Van der Linden, already quoted, has lately acquired a new title to our esteem, by the publication of the first part of a Monograph of the European Insects of this family. See *Observ. sur less Hymen. d'Eur.*, de la Fam. des Fouisseurs.

N.B. The divisions of the family of the Fossores form so many principal genera or subgenera. SCOLIA, SAPHGA, SPIEX, BEMBEX, LARRA, NYSSON, CRABRO, and PHILANTHUS.



Insects or their larvæ, and sometimes Arachnides, previously pierced with their sting, to serve as food for their young. The larvæ are always destitute of feet, resemble little worms, and undergo a metamorphosis in the cocoon they have spun previous to becoming nymphs. The perfect Insect is usually very active, and lives on flowers. The maxillæ and lip are elongated and in the form of a proboscis in many.

We will distribute the numerous subgenera derived from the primitive genus *Sphex* into seven principal sections.

In the two first the eyes are frequently emarginated; the body of the males is usually narrow, elongated, and terminated posteriorly, in a great many, by three points in the form of spines or dentations.

I. Those in which the first segment of the thorax is sometimes in the form of a bow, and prolonged laterally to the wings, and sometimes forms a transversal square, or resembles a knot or joint; in which the legs are short, thick, very spinous, or densely ciliated, with the thighs arcuated near the knee; and in which the antennæ of the females are evidently shorter than the head and thorax. These are the *SCOLIETÆ* of Latreille, so named from the genus

*SCOLIA* \*.

In some the maxillary palpi are long, and evidently composed of unequal joints; the first joint of the antennæ is almost conical. Such is

*TIPHIA*, *Fab.*

To which we may unite the *TENGYRA* of Latreille †.

In the others the maxillary palpi are short, and composed of almost similar joints; the first of the antennæ is elongated and almost cylindrical.

Sometimes this joint receives and conceals the following, as in

\* The *Scolietæ* may be divided thus :

- I. Palpi always very short. Ligula with three linear divisions. Anus of the male terminated by three spines. The thick or callous point of the superior wing replaced by a small cell.

*SCOLIA proper.*

- II. The maxillary palpi elongated in several. The ligula broad, and widened at the extremity. A recurved spine at the anus of the males. A thick distinct point in the superior wings.

- A. Second joint of the antennæ exposed. Two complete cubital cells, or three, but of which the intermediate is small and petiolate.
- a. No incomplete cubital cell closed by the posterior border of the wing. Radial cell null or open in the females.

*TIPHIA. MERIA.*

- b. An incomplete cubital cell, closed by the posterior border of the wing.

*TENGYRA.*

Second joint of the antennæ enclosed in the first. Four cubital cells, the last closed by the posterior border of the wing in the males, and neither of them petiolate.

*MYZINE.*

M. Leon Dufour—*Journ de Phys.*, Septemb. 1818—has published some curious observations on the anatomy of the *Scolie*.

† *Lat.*, *Gener. Crust. et Insect.*, IV, p. 116; *Fabricius*; *Jurine*; *Van der Linden*.

MYZINE, *Lat.*,

Where the mandibles are dentated \*.

MERIA, *Illig.*,

Where they are not dentated †.

Sometimes the second joint of the antennæ is exposed, as in *Scolia* proper, or

SCOLIA, *Fab.* ‡

2. Those Fossores in which the first segment of the thorax is formed as in the preceding ones, where the legs are still short, but slender, and neither spinous nor strongly ciliated, and where the antennæ in both sexes are at least as long as the head and thorax.

Their body is usually smooth, or but very slightly pubescent. This subdivision embraces the family of the *Sapygites* of Latreille, a name derived from that of the principal genus

## SAPYGA.

In some the antennæ are filiform or setaceous, as in

THYNNUS, *Fab.*,

Where the eyes are entire §.

POLOCHRUM, *Spin.*,

Where they are emarginated, and the mandibles, besides, multi-dentated ||.

In the others the antennæ are thickest at the extremity, or in some males even clavate. Their remaining characters are those of the *Polochra*. Such is *Sapyga* proper, or

SAPYGA, *Lat.*

These Insects flit about trees and walls, exposed to the heat of the sun, and appear to deposit their eggs there ¶.

The *Ceramii* of Latreille, according to the form of the first segment of the thorax and their extended or applicated wings, belong to this subdivision; but more important affinities place them in the family of the *Diptera*.

3. Fossores still allied to the preceding in the extent and form of the first segment of the thorax, but in which the posterior legs are at least as long as the head and trunk, and the antennæ are most frequently slender, formed of elongated, lax, or but slightly compact and strongly arcuated or curled joints, at least in the females.

\* *Lat.*, *Gener. Crust., et Insect.*, IV, 116. Van der Linden.

† *Lat.*, *Ibid.*; Van der Linden.

‡ *Lat.*, *Ibid.*; *Fab.* See also the Monograph of the Fossores by Van der Linden.

§ *Lat.*, *Ibid.* The *Scotana* of Klüg appears to me to differ but slightly from the *Thynni*; they have the same kind of antennæ, similar wings, the first cubital cell also traversed by a small line, &c. The anus of the males is slightly recurved, a character which approximates them to *Tengyra*, and various other divisions of the preceding division.

|| *Lat.*, *Ibid.*; Van der Linden.

¶ *Lat.*, *Gen. Crust. et Insect.*, IV, p. 116; Van der Lind.

They are united by Latreille in the family of the SPHEGIDES, a name derived from that of the dominant genus,

SPHEX.

In some the first segment of the thorax forms either a transversal or longitudinal square, and the abdomen is attached to the thorax by a very short pedicle; the inner side of the posterior tibiæ is usually furnished with a brush. The superior wings have two or three complete or closed cubital cells, and another imperfect and terminal.

They now form several subgenera.

PEPSIS, *Fab.*

To which I assign the following characters: labrum apparent; antennæ, at least of the males, almost straight and composed of compact or crowded joints; maxillary palpi hardly longer than the labial, projecting, and formed of but slightly unequal joints; three complete cubital cells, and the first recurrent nervure inserted near the anterior extremity of the second. The tibiæ and first joint of the posterior tarsi are compressed in the males.

All the species known are foreign to Europe, and most abundant in South America and the Antilles; they are large, and have coloured wings\*.

CEROPALES, *Lat., Fab.*

The labrum and antennæ of the Pepses; but the maxillary palpi are much longer than the labial, pendent, and with very unequal joints †.

POMPILUS, *Fab.*

The Pompili, in this latter respect, resemble the Ceropales, but the antennæ of both sexes are curled and composed of loose or but slightly compact joints; the labrum is concealed, or but little exposed.

According to Fabricius and the more recent systems, we must restrict this subgenus to those species in which there are three complete cubital cells, neither of them petiolate, the mandibles are unidentated on the inner side, and the thorax is slightly or moderately elongated in comparison with its width. These Insects lay up provisions for their larvæ, consisting of Arancides, which they first put to death with their sting, and then transport to the holes destined for the domicil of their young.

*P. viaticus*; *Sphex viatica*, L; Panz., Faun, Insect. Germ., LXV, 16. Deep black; abdomen red, intersected with black circles.

The second family of the genus *Misque* of Jurine is composed of true Pompili, but in which the third cubital cell is small and petiolate ‡.

That of *Salius*, Fabricius, was established on the males of certain species in which the prothorax and metathorax are proportionally

\* Lat., Gen. Crust. et Insect., IV, 61.

† Lat., Ibid., 62; Van der Lind., Observ. on the Hymen. of Eur., 76.

‡ See Jurine, Latreille, Van der Linden, and the Encyclopédie Méthodique.

longer than those of the Pompili, and the mandibles present no dentations\*.

*PLANICEPS, Lat., Van der Lind.*

Closely allied to *Salius* in the general form of the body; but the head is flat and its posterior margin concave; its ocelli are very small and distant, and the eyes elongated and occupying its sides. The antennæ are inserted near the anterior margin. The two anterior legs are distant from the others, short, curved underneath, and have large coxæ and thighs. There are but two complete cubital cells in the upper wings, the second of which receives the first recurrent nervure; the incomplete or terminal cell receives the other nervure at a short distance from its junction with the second cell.

A second species, besides the one on which this subgenus was founded †, has been discovered in Brazil by M. de la Cordaire, who was kind enough to give it to me, and whose name it will bear. In

*APORUS Spin.,*

There are also but two complete cubital cells; but the second receives the two recurrent nervures. The *Apori*, in all else, resemble the true Pompili ‡.

In the others the first segment of the thorax is narrowed before in the form of a joint or knot, and the first ring of the abdomen, sometimes even a part of the second, is narrowed into an elongated pedicle. Their superior wings always present three complete cubital cells and the commencement of a fourth.

Those in which the mandibles are dentated, the palpi filiform and almost equal, the maxillæ and ligula very long, in the form of a proboscis, and bent underneath, and in which the second cubital cell receives the two recurrent nervures, have been separated from them by M. Kirby, under the generic name of

*AMMOPHILUS, Kirby.*

To this division belongs the

*A. subulosus*; *Sphex subulosa*, L.; Panz., Faun. Insect. Germ., LXV, 12. Black; abdomen bluish-black, narrowed at base into a long, slender, and almost conical pedicle, the second ring, its base excepted, and the third, fulvous; a silvery and silken down on the front of the head in the male.

The female, with her feet, excavates a deep hole in the ground along the borders of roads, in which she deposits a caterpillar, killed or mortally wounded by her sting, laying an egg by the side of it; she then closes the hole with grains of sand, or even a small pebble. It would appear that she repeats the operation several times in succession in a similar manner, in the same nest.

*A. arenarius*; *Pepsis arenaria*, Fab; Panz., Ibid., LXV, 13,

\* See Fab., Lat., and Van der Linden.

† Lat., Ibid., divis. B; Van der Linden, and Dict. Class. d'Hist. Nat., article *Planiceps*.

‡ Lat., Ibid., p. 62; and Van der Linden.

is also an *Ammophilus*. Black and hairy; pedicle of the abdomen abruptly formed by its first ring, the second, third, and base of the fourth, red.

In some—the first family of *Miscus*, Jur.—the third cubital cell is petiolate superiorly\*.

Those species in which the mandibles and palpi still preserve a similar form, but where the maxillæ and labium are much shorter, and, at most, flexed at the extremity, are comprised by Latreille in the genera *SPHEX*, *PRONÆUS*, *CHLORION*. In

*PRONÆUS*, *Lat.*,

As in *Ammophilus*, the second cubital cell receives the two recurrent nervures †.

*SPHEX*, *proper.*

That cell only receives the first; the third is inserted under the other ‡. In

*CHLORION*, *Lat.*,

The first recurrent nervure is inserted under the first cubital cell, and the second under the third.

*C. Compressum*, Fab. Very common in the Isle of France, where it wages war against the Kakerlacs, provisioning its larvæ with their bodies. It is green; the four posterior thighs red.

*C. lobatum*. Entirely of a golden-green. In Bengal §.

Other species, in which the mandibles are still dentated, but where the maxillary palpi are much longer than those of the labium, and almost setiform, compose the genus

*DOLICHURUS*, *Lat.* ||

The last Fossores of this third division have no dentations in the mandibles, and are comprised in the genera *Pelopæus*, *Podium*, and *Ampulex*. These organs are striated.

*AMPULEX*, *Jur.*

Similar to *Chlorion* in the insertion of the recurrent nervure of the superior wings ¶.

In the two other subgenera, the second cubital cell receives these two nervures. The clypeus is usually dentated.

*PODIUM*, *Lat.*,

Where the antennæ are inserted beneath the middle of the anterior

\* *Lat.*, Gen. Crust. et Insect., IV, p. 53; and Van der Linden.

† *Lat.*, *Ibid.*, 56, 57.

‡ *Lat.*, *Ibid.*, p. 55.

§ *Ibid.*, p. 57. In this species, the first recurrent nervure is insulated at the junction of the first cubital cell with the second. For the habits of the *C. compressum*, Fab., see Sonnerat, *Voy. aux Indes Orientales*.

|| *Lat.*, *Ibid.*, 57, 387; each of the second and third cubital cells receives a recurrent nervure.

¶ *Jurine* on the Hymenoptera, &c.

face of the head, and where the maxillary palpi are hardly longer than those of the labium\*. Those of

*PELEOPÆUS, Lat. Fab.,*

Are evidently longer and consist of unequal joints. The insertion of the antennæ is higher up and on a level with the middle of the eyes.

The Peleopæi construct rounded or globular nests of earth in the interior of houses. They are formed like a spirally convoluted cord, presenting on their inferior side two or three ranges of holes, so that they resemble the instrument known in France by the name of a Tinker's whistle—sifflet de chaudronnier. The holes are passages to as many cells, in each of which the Insect places the body of a Spider, Fly, &c., along with an egg; it then closes the orifice with earth. To this division belongs the

*P. spirifex; Sphex spirifex, L.* Black; abdominal pedicel and legs yellow. In the South of France †.

4. In other Fossorees the first segment of the thorax merely forms a simple linear and transverse border, of which the two lateral extremities are remote from the origin of the superior wings. The legs are always short or of moderate length. The head viewed from above appears transversal, and the eyes extend to the posterior margin. The abdomen forms an elongated semi-cone, rounded on the sides near its base. The labrum is entirely exposed or very salient.

I have formed these Insects into a small family called BEMBECIDÆS, from the genus

*BEMBEX, Fab.,*

Of which it is constituted. In these Hymenoptera, peculiar to hot climates, the body is elongated, pointed posteriorly, almost always varied with black and yellow or russet, and glabrous; the antennæ are approximated at base, slightly geniculate at the second joint, and enlarging towards the extremity; the mandibles are narrow, elongated, dentated on the inner side and crossed; the tibiæ and tarsi are furnished with little spines or cilia, most remarkable on the anterior tarsi of the females. We frequently find one or two teeth under the abdomen of the males. Their motions are extremely rapid; they flit from flower to flower with a sharp and interrupted hum. Several diffuse an odour of roses. They only appear in summer.

Some of them have a false proboscis, bent underneath; their labrum forms an elongated triangle.

Sometimes the palpi are very short; those of the maxillæ have but four joints and the labials but two. Such is the

*B. rostrata; Apis rostrata, L.;* Panz., Faun. Insect. Germ., I, 10. The male large, black, with transversal bands of lemon-yellow on the abdomen, the first of which is interrupted, and the others undulated. The female, which has less yellow about the head than the male, forms deep holes in the sand, where she

\* Lat., Gen. Crust. et Insect., IV. 59.

† See Fab., Lat., and Van der Linden.



heaps up the bodies of various dipterous Insects, particularly Syrphi and Muscæ, and lays her eggs; she then closes the opening with earth. Throughout Europe\*.

Sometimes the maxillary palpi, which are tolerably elongated, consist of six joints, and the labials of four, as in

MONEDULA, *Lat.* †

The others have no false proboscis, and the labrum is short and rounded. Such is

STIZUS, *Lat. Jur.* ‡

5. Other Fossores, having nearly the same appearance as those of the preceding division, differ from them in the labrum, which is either totally or partially hidden; their mandibles present a deep notch in their interior side near their base, a character which distinguishes them both from the preceding and following Insects. They are our LARRATES.

Here the superior wings have three closed cubital cells, the second of which receives the two recurrent nervures.

PALARUS, *Lat.*—GONIUS, *Jur.*,

Where the antennæ are very short and gradually enlarge; the eyes are closely approximated posteriorly, and enclose the ocelli; the second cubital cell is petiolate §.

LYROPS, *Illig.*—LIRIS, *Fab.*—LARRA, *Jur.*,

Where the antennæ are filiform, where the third cubital cell is narrow, oblique, almost lunate, and the inner side of the mandibles offers a dentiform projection ||.

LARRA, *Fab.*,

Hardly differs from Lyrops except in the absence of teeth on the inner side of the mandibles, the equal distance between the eyes, and the evidently longer metathorax and abdomen ¶.

There, the superior wings have but two closed cubital cells, each of which receives a recurrent nervure.

DINETUS, *Jur.*,

Where the two cubital cells are sessile. The antennæ of the males are moniliform inferiorly, and then filiform. The mandibles are tridentated on the inner side, and the radial cell is furnished with an appendix \*\*.

MISCOPHUS, *Jur.*,

Where the second cubital cell is petiolate and the radial offers no ap-

\* See *Lat.*, *Gen. Crust. et Insect.*, IV, 97.

† *Lat.*, *Ibid.*; most of the genus *Bembex*, *Fab.*

‡ *Lat.*, *Ibid.*; most of the *Larræ*, *Fab.*, such as the *L. vespiiformis*, *erythrocephala*, *cinclæ*, *crassicornis*, *bifasciata analis*, *ruficornis*, *cingulata*, *rufifrons*, *bicolor*, *fasciata*.

§ See *Lat.*, *Gen. Crust. et Insect.*, IV, 97; and his *Consid. génér. sur l'ordre des Crust. des Arach. et des Insect.*

|| *Lat.*, *Ibid.*, 71.

¶ *Lat.*, *Ibid.*, 70.

\*\* *Lat.*, *Ibid.*, 72.



pendage. The antennæ are filiform in both sexes. The inner side of the mandibles presents, at most, a slight projection\*.

6. We now come to Fossores, in which the labrum is also completely or partially hidden, where the maxillæ and labium form no proboscis, where the inner side of the mandibles exhibits no emargination, where the head is of an ordinary size, the abdomen is triangular or ovoido-conical, and becoming gradually narrower towards its extremity, and never placed on a long pedicle. The antennæ are filiform and their first joint but slightly elongated. They are our NYSSONES.

In some the eyes are entire.

ASTATA, *Lat.*—DIMORPHA, *Jur.*,

Where there are three closed cubital cells, all sessile, the second of which receives the two recurrent nervures; the radial has an appendix, the extremity of the mandibles are bifid, and the eyes closely approximated superiorly †.

NYSSON, *Lat.*, *Jur.*,

Where the superior wings also have the same number of cubital cells, but where the second is petiolate, and where the radial has no appendix. The mandibles terminate in a simple point and the eyes are distant ‡.

OXYBELUS, *Lat.*, *Jur.*, *Oliv.*,

Where there is but one closed cubital cell, receiving a single recurrent nervure. The antennæ are short and contorted, and the second joint is much shorter than the third. The mandibles terminate in a simple point. The scutellum offers one or three dentiform points. The tibiæ are spinous, and the extremity of the tarsi presents a large pellet. The females make their nests in the sand, and provision their larvæ with the bodies of Muscides §.

NITELA, *Lat.*,

Likewise with but one closed cubital cell, but where the antennæ are longer, almost straight, and their second and third joints are of equal length. The mandibles terminate in two teeth; there are neither points on the scutellum nor spines on the tibiæ; the tarsial pellet is very small ||.

The eyes are emarginated in others, as in

PISON, *Spin.*, *Lat.*,

Three closed cubital cells in the superior wings, the second very small, petiolate, and receiving the two recurrent nervures, a character which approximates the subgenus to Nysson ¶.

7. The last division of the Fossores, that of the CRABRONITES, only differs from the preceding one, inasmuch as these Insects, which

\* *Lat.*, *Gen. Crust. et Insect.*, IV, 72.

† *Lat.*, *Ibid.* 67.

‡ *Lat.*, *Ibid.* 90.

§ *Lat.*, *Ibid.*, 77; *Encyc. Méthod.* article *Oxibèle*.

|| *Lat.*, *Gen. Crust. et Insect.*, IV, 77.

¶ *Lat.*, *Ibid.*, 75, genus *Tachybulus*; and 387, genus *Pison* of Spinola, and not of Jurine.

usually have a very large head, almost square, when viewed from above, and their antennæ frequently largest at the extremity or clavate, have an abdomen either oval or elliptical, and widest in the middle, or narrowed at base into an elongated pedicle, and as if terminated by a club.

In some, the antennæ are inserted below the middle of the anterior face of the head; the clypeus is short and wide.

Sometimes the eyes are emarginated.

TRYPOXYLON, *Lat., Fab.*—APIUS, *Jur.*—SPHEX, *Lin.*,

Where the mandibles are arcuated and dentated. The superior wings have but two closed cubital cells, each receiving a recurrent nervure; the second cell is small and less distinctly marked, as well as a third, that which is incomplete and almost reaches the tip of the wing. The abdomen is narrowed at base into a long pedicle.

*T. figulus*; *Sphex figulus*, *L.*; *Jur.*, *Hymenop.*, IX, 6—8.

Black and glossy; the clypeus covered with a silvery, silken down. The female takes advantage of the holes excavated in old wood by other Insects, and deposits her eggs there, along with the little spiders destined to nourish her larvæ. This done, she closes the orifice with moist earth\*.

Sometimes the eyes are entire.

Here, the mandibles are narrow and merely dentated at the extremity, or terminate in a simple point, with a single tooth beneath or on the inner side. The antennæ are approximated at base.

GORYTES *Lat.*—ARPACTUS, *Jur.*—MELLINUS, OXYBELUS, *Fab.*,

Where there are three complete, sessile and almost equal cubital cells, of which the second receives the two recurrent nervures. The mandibles are moderate and unidentated on the inner side; the antennæ are rather thickest near the extremity. The metathorax presents a kind of false, sulcated or waived scutellum. The anterior tarsi are frequently ciliated, and have the last joint inflated †. In

CRABRO, *Fab.*,

There is but a single closed cubital cell, and it receives the first recurrent nervure; the mandibles terminate in a bifid point. The antennæ are geniculate and filiform, fusiform or slightly serrated in some. Their palpi are short and almost equal; the ligula is entire. The clypeus is frequently golden or silvery, and very brilliant.

Some males are remarkable for the palette or trowel-like dilatation (even resembling a sieve) of the tibiæ, or of the first joint of their anterior feet.

The female of one species—*cibarius*—provisions her larvæ with a *Pyralis* that lives on the Oak. Those of others feed them with *Diptera*, which they amass in the holes where they lay their eggs ‡.

STIGMUS, *Jur.*,

These Insects are thus named from the largeness of the thick or

\* *Lat.*, *Gen. Crust. et Insect.*, IV, 75.

† *Lat.*, *Ibid.*, 88.

‡ *Lat.*, *Ibid.*, 80.

callous point of the rib of the superior wings, and which forms a little black spot. They have two closed cubital cells, the first of which alone receives a recurrent nervure. The antennæ are not geniculate, their first joint being slightly elongated, and in the form of a reversed cone. The mandibles are arcuated and terminated by two or three teeth\*.

There, the mandibles, at least in the females, are strong and bidentated on the inner side. The antennæ are remote at base.

PAMPHREDON, *Lat. Fab.*—CEMONUS, *Jur.*,

Where there are two complete sessile cubital cells, and another imperfect one closed by the posterior edge of the wing.

One species—the unicolor—feeds its larvæ with Aphides †.

MELLINUS, *Fab. Jur.*,

Where there are three complete cubital cells, all sessile, and frequently the beginning of a fourth, which does not however reach the extremity of the wing; the first and the third receive, each, a recurrent nervure. The abdomen is narrowed in the manner of a pedicle widened at its base. The tarsi are terminated by a large pellet ‡. In

ALYSON, *Jur.*—POMPILUS, *Fab.*,

We also perceive three complete cubital cells; but the second is petiolate, and receives the two recurrent nervures. The base of the abdomen is not particularly narrowed. The terminal pellet of the tarsi is small §.

The remaining Crabronites have their antennæ inserted higher or near the middle of the anterior face of the head; they are usually thickest at the extremity, or even clavate. They all have three complete cubital cells, and two recurrent nervures.

These Insects are connected by various characters with those of the following family.

Sometimes the clypeus is almost square. The abdomen is borne on an abrupt, long pedicle, formed by the first ring. The mandibles terminate by two teeth.

PSEN, *Lat. Jur.*—TRYPOXYLON, PELOPÆUS, *Fab.* ||

Sometimes the clypeus is as if trilobate. The first ring of the abdomen is at most narrowed in the manner of a knot. The mandibles terminate in a simple point. The eyes are frequently somewhat emarginated.

These Insects form the genus

PHILANTHUS, *Fab.*

The females make their nests in sand, and bury the bodies of Bees, Andrenetæ, and even Cucurlionites, for the nourishment of their larvæ.

\* *Lat., Gen. Crust. et Insect., IV, 84.*

† *Lat., Ibid., 83, divis. I. and II.*

‡ *Lat., Ibid., 85.*

§ *Lat., Ibid., 86.*

|| *Lat., Gen. Crust. et Insect., IV, 91.*

Other entomologists restrict this generic appellation to those species in which the antennæ are remote and abruptly inflated, in which the mandibles exhibit no projection on the inner side, and where all the cubital cells are sessile.

They are the true Philanthi, or

PHILANTHUS, *Lat.*—SIMBLEPHILUS, *Jur.* \*

Those, in which the antennæ are approximated, much longer than the head, and gradually enlarge; where the inner side of the mandibles presents a dentiform projection, and the second cubital cell is petiolate, form the subgenus

CERCERIS, *Lat.*—PHILANTHUS, *Jur.* †

### FAMILY III.

#### DIPLOPTERA.

The third family of the Aculeata is the only one of that section, in which, with but few exceptions (*Ceramius*), we find the superior wings folded longitudinally. The antennæ are usually geniculate and clavate, or thickest at the end. The eyes are emarginated. The prothorax is prolonged behind, on each side, to the margin of the wings. In the superior of the latter organs are three or two closed cubital cells, the second of which receives the two recurrent nervures. The body is glabrous or nearly so, and black, more or less maculated with yellow, or fulvous.

Many of these Insects form temporary communities composed of three sorts of individuals, males, females, and neuters or mules. Such of the females as survive the severity of the winter, commence the nest and take care of the larvæ. They are subsequently assisted by the neuters.

We will divide the Diploptera into two tribes.

The type of the first, that of the MASARIDES, *Lat.*, is the genus

MASARIS, *Fab.*

The antennæ at the first glance seem to be composed of but eight joints, the eighth, with the following ones, forming an almost indistinctly articulated club, rounded or very obtuse at the end. The ligula is terminated by two threads which can be withdrawn into a tube formed by its base. There are but two complete cubital cells in

\* *Lat.*, *Ibid.*, 95. The genus *Trachypus*, Klüg, differs but little from this one. The first ring of the abdomen is proportionally more elongated, narrower, and almost forms a pedicle, as in *Psen*.

† *Lat.*, *Ibid.*, 93. In the *Ann. d'Agricult.*, LIII., Bosc has published some observations on the habits of certain species of this subgenus.

the superior wings. The middle of the anterior margin of the clypeus is emarginated and receives the labrum in the notch.

MASARIS, *proper*,

Where the antennæ are rather longer than the head and thorax, and have their first joint elongated, and the eighth forming an obconical club rounded at the end. The abdomen is long.\*

CLEONITES, *Lat.*—MASARIS, *Fab. Jur.*,

Where the antennæ are hardly longer than the head, and have their two first joints much shorter than the third, and the eighth and following ones forming an almost globular body. The abdomen is hardly longer than the thorax.†

A species figured in the great work on Egypt appears to form an intermediate subgenus.

The second tribe of the Diploptera, that of the VESPARIÆ, is composed of the genus

VESPA, *Lin.*,

Where the antennæ always present thirteen distinct joints in the males, and terminate in an elongated, pointed, and sometimes, in the males, hooked extremity: they are always geniculate, at least in the females and neuters. The ligula is sometimes divided into four plumose filaments, and sometimes bilobate, with four glandular points at the end, one on each lateral lobe, and the remaining two on the intermediate one, which is larger, widened, and emarginated or bifid at its extremity. The mandibles are strong and dentated. The clypeus is large. Underneath the labrum is a little piece in the form of a ligula, analagous to that observed by Reaumur in the Bombi, and which M. Savigny styles the *epipharynx*. With the exception of a very few species, the superior wings have three complete cubital cells. The females and neuters are armed with an extremely powerful and venomous sting. Several of them form communities composed of the three sorts of individuals.

The larvæ are vermiform, destitute of feet, and enclosed separately in a cell, where they sometimes live on the bodies of Insects placed there by the mother at the time she deposited the egg, and sometimes on the nectar of flowers, juices of fruits, and animal matters, elaborated in the stomach of the mother or that of the neuters, who feed them daily.

M. de Saint-Hilaire brought a species from the southern provinces of Brazil, which amasses a considerable store of honey, that is sometimes poisonous, like that of our common Bee.‡

A first subgenus,

CERAMUS, *Lat. Klüg*,

Which has been the subject of a Monograph by one of our most celebrated entomologists, Doctor Klüg, forms an exception to the

\* *Lat., Gener. Crust. et Insect., IV, 144.*

† *Lat., Ibid., 144.*

‡ *Mem. du Mus. d'Hist. Nat.*

general characters of this tribe, in the superior wings, which are extended, and in the number of their cubital cells, of which there are but two. In addition to this, the labial palpi are longer than those of the maxillæ.

But four species are yet known, two of which are from the Cape of Good Hope, and the remainder from the south of Europe; one of these latter—the *lusitanicus*—appears to us to be allied by its natural affinities to *Masaris*\*.

In all the following subgenera the superior wings are folded, and present three complete cubital cells.

Sometimes the mandibles are much longer than broad, and approximated anteriorly in the form of a rostrum. The ligula is narrow and elongated; the clypeus is almost cordiform or oval, with the point anterior and more or less truncated.

They are all solitary, and each species consists of *males* and *females*. The females provide for their young before they are hatched, and for the whole time that they are to remain in the state of larvæ. The nests of the latter are usually formed of earth and sometimes hidden in holes of walls, in the ground, or old wood, and sometimes exposed on plants. Each of them contains caterpillars or other larvæ, killed by the sting of the mother, who heaps them up in a circle for the use of her descendants.

*SYNAGRIS, Lat. Fab.,*

Where the ligula is divided into four long and plumose threads, without glanular points at their extremity. The mandibles of some males are very large, and resemble horns.

But few species are known, and all peculiar to Africa. †

*EUMENES, Lat. Fab.,*

Where the ligula is divided into three pieces, glandular at the extremity, the intermediate one the largest, widened at the end, cordiform, and emarginated or bifid.

In some the abdomen is ovoid or conical, and thickest at base. Such are

*PTEROCHILE, Klüg,*

Remarkable for very long lips, and maxillæ forming a sort of proboscis bent underneath, and also distinguished by the labial palpi, which are bristled with long hairs, and consist of but three distinct joints. ‡

*ODYNERUS, Lat.,*

To which we may re-unite the *Rygchiæ* of M. Spinola, where these parts of the mouth are much shorter, and where the labial palpi are almost glabrous, with four apparent divisions.

The female of a species of this division—*Vespa muraria*, L.; Reaum., Mem. VI, xxvi, 1—10, makes a hole in the sand or

\* Lat., Consid. Gener. sur l'Ordre des Crust., des Arach., et des Insect., 329; Klüg, Entom. Monog. 219, et seq.

† *Synagris cornuta*, Lat., Gener. Crust. et Insect., IV, p. 135; Fab., Syst. Piezat.; Drury, Insect., II, xlvi, 3, the male;—*Vespa valida*, L.;—*V. hæmorrhoidalis*, Fab.

‡ Panz., Hymen., p. 146; *Vesp. phalarata*, Faun. Insect. Germ. XLVII, 21.



mortar in walls, some inches in depth, at the orifice of which she forms an exterior tube, at first straight and then recurved, composed of an earthy paste, arranged in thick, contorted threads. In the cavity of the interior cell she places from eight to twelve little green larvæ of a similar age, resembling caterpillars, but without feet, arranging them in circular layers. Having laid an egg in it, she closes the orifice and destroys the scaffolding without\*.

In the others, the first ring of the abdomen is narrow, elongated, and pyriform, and the second campanulate, as in

*EUMENES, proper,*

To which we may re-unite the *Zethi*† of Fabricius, and the *Discalis*‡ of Latrielle.

*E. coarctata*, Fab.; Panz., Faun. Insect. Germ., LXIII, 12, the male. Five lines in length; black, with yellow spots; posterior margin of the abdominal annuli of the same colour; first ring of the abdomen elongated and pyriform, with two yellow dots; an oblique band of yellow on each side of the second, which is the largest of all, and campanulate.

The female constructs a spherical nest of very fine earth on the stems of plants, which, according to Geoffroy, she fills with honey, and then deposits an egg §.

Sometimes the mandibles are hardly longer than they are wide, and are broadly and obliquely truncated at the extremity; the ligula is short or but slightly elongated, and the clypeus nearly square.

These species constitute the subgenus of the Wasps, properly so called, or

*VESPA, POLISTES, Lat.*

These Insects unite in numerous societies, composed of *males*, *females*, and *neuters*. The two last detach particles of old wood or bark with their mandibles, moisten and reduce them into a pultaceous mass resembling that of paper or pasteboard, and construct combs or nests with it, that are usually horizontal, and suspended above by one or more pedicles; on the inferior side is a range of vertical cells in the form of hexagonal and truncated pyramids. These cells are appropriated exclusively to the use of the larvæ and nymphs—a cell to each. The number of combs that compose this nest varies. It is sometimes exposed, and at others surrounded by an envelope,

\* See Lat., Gener. Crust. et Insect., IV, pp. 135, 136; several *Vespæ* of Fabricius.

† Lat., Ibid. In *EUMENES*, the clypeus is longitudinal, and prolonged into a point anteriorly; the united mandibles form a long, narrow, and pointed rostrum; they are proportionally shorter, and merely form an open angle in *ZETHUS*; here also the clypeus is as broad as it is long, or broader, and has no anterior prolongation. The second cubital cell is perfectly triangular. The maxillary palpi do not extend beyond the extremity of the jaws. They are longer in *DISCÆLIUS*, which resembles *Zethus* in the form of the mandibles and clypeus. We should observe, that most of the Insects placed by Fabricius in this last genus are *Polistes*, in which, however, the abdomen differs from that of the ordinary species, and approximates to that of an *Eumenes*.

‡ Lat., Ibid.

§ Lat., Ibid.



pierced with a common and almost always central opening, which sometimes corresponds to a series of holes which communicate with the interior; the combs adhere to the parietes of the envelope, whether they be in the open air or concealed in the earth or hollows of trees. The figure of these structures varies according to the species.

The females commence the business alone, and lay eggs that produce neuters or labourers, which assist in enlarging the nest and taking care of the succeeding young ones. The community is solely composed of these two kinds of individuals, until the beginning of autumn, at which period the young males and females make their appearance. All the larvæ and nymphs which cannot complete their ultimate metamorphosis before the month of November, are put to death and dragged from their cells by the labourers, which perish along with the males on the approach of winter. Some of the females survive, and in the spring become the founders of a new colony.

Wasps feed on Insects, viands of various sorts, or fruit, and nourish their larvæ with the juices of these substances. The latter, which on account of the inferior situation of the mouths of their cells, are placed with their head downwards, shut themselves up and spin a cocoon, when about to become nymphs. The males never work.

In several species, that portion of the internal margin of the mandibles which is beyond the angle and terminates it, is shorter than that which precedes the angle; the middle of the anterior part of the clypeus projects in a point. These species form the subgenus

#### POLISTES, Lat., Fab.\*

Sometimes the abdomen resembles that of Eumenes, properly so called, in the form of its two first annuli. Such is

*P. morio*, Fab.; *G. Tatua*, Cuv., *Bullet. de la Soc. Philom.*, No. VIII; *Lat., Gen. Crust. et Insect.*, I, xiv, 5. Entirely black and glossy. Its nest forms a truncated cone like that of the *nidulans*, but it is larger, the bottom is flat, and perforated at one of its sides, and the material is coarser. It inhabits Cayenne.

Sometimes the abdomen is elliptical, or borders on an oval. Such is the

*P. gallica*; *Vespa Gallica*, L.; *Panz., Faun. Insect. Germ.*, XLIX, 22. Rather smaller than the *Vespa vulgaris*; black; the clypeus, two dots on the thorax, six lines on the scutellum, two spots on the first and second rings of the abdomen, and their superior margin, as well as that of all the others, yellow; abdomen bordering on an oval, and with a short pedicle. Its nest has the form of a little tapering bouquet, and contains from

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\* *Lat., Gen. Crust. et Insect.*, IV, p. 141. Those species, in which the abdomen is oval or elliptical, narrowed at base, and sometimes even placed on a long pedicle, are true *Polistes*. Those, in which its second ring is much larger than the others, and campanulate, and where the preceding frequently forms a clavate pedicle, are *Epipones*. The *G. Tatua* belongs to this division, as well as the honey-gathering species from Brazil, previously mentioned, and the *V. nidulans*.

twenty to thirty cells, those on the sides being the smallest. It is usually attached to the branch of a shrub.

Sometimes again the abdomen is ovoid or conical, as in

*P. nidulans*; *Vespa nidulans*, Fab.; *Guêpe cartonnière*, Reaum., Insect., VI, xx, 1, 3, 4; xxi, 1; xxii—xxiv. Small, of a silken black with yellow spots; posterior margin of the abdominal annuli of the same colour. Its nest, which is suspended to branches of trees by a ring, is composed of a fine material, and has the form of a truncated cone. The combs, of which the number augments in proportion to the population, and sometimes gives a considerable size to the nest, are circular, but concave above and convex underneath, or infundibuliform and perforated with a circular hole. They are fixed to the internal parietes of the envelope throughout the whole of their circumference. The lower one is smooth beneath or destitute of cells; its opening is the door of the nest. As fast as the population increases, these Wasps form a new floor, and furnish the inferior surface of the old one with cells.

In the remaining Wasps, the superior portion of the internal margin of their mandibles, that which comes after the angle, is as long as the other part, or longer. The middle of the anterior margin of their clypeus is widely truncated, and has a tooth on each side. The abdomen is always ovoidal or conical. They comprise the genus *Vespa* proper of Latreille.

#### VESPA, Lat.\*

*V. crabo*, L.; *Guêpe frelon*, Reaum., Insect., VI, xviii. Length one inch; head fulvous, with a yellow front; thorax black, spotted with fulvous; rings of the abdomen blackish brown, marked with a yellow band dotted with two or three black points on its posterior margin.

It builds its nest in sheltered localities, such as garrets, barns, holes in walls, and hollow trees. The nest is rounded, formed of a coarse material, and of the colour of a dead leaf. The combs, of which there are usually but few, are connected with each other by pillars or columns, the middle one much the thickest. The envelope is usually thick and friable. This species devours other Insects, particularly Bees, and robs the latter of their honey.

*V. vulgaris*; *G. commune*, Reaum., Ibid., XIV, 1, 7. About eight lines in length; black; front of the head yellow, with a black point in the middle; several yellow spots on the thorax, and four on the scutellum; a yellow band with three black spots on the posterior margin of the rings of the abdomen.

It constructs in the earth a nest analogous to that of the *crabo*, but composed of a finer substance, and with more numerous combs. The columns which support them are equal. Its envelope consists of several laminæ, arranged in bands, which overlap each other's edges.

\* Lat., Gen. Crust. t Insect., IV, p. 142.

*V. media*, Lat., intermediate as to size between the two preceding ones; constructs a similar nest, but attaches it to the branches of trees.

*V. holsatica*, Fab. This species constructs a very singularly formed nest. It is almost globular, open at top, and inclosed inferiorly in a kind of saucer. It is sometimes observed in barns, or attached to the timbers in garrets, &c., and even in hives\*.

## FAMILY IV.

### ANTHOPHILA, Lat.

The fourth and last family of the Aculeata, in the faculty of collecting the pollen of flowers†, usually possessed by the two posterior legs, presents a peculiar character which distinguishes it from all other families of Insects. The first joint of the tarsi of those legs is very large, strongly compressed, and forms a square palette or a reversed triangle.

The maxillæ and lips are most commonly very long, and compose a sort of proboscis. The ligula is most frequently shaped like the head of a lance, or resembles a very long thread, the extremity of which is downy or hairy. The larvæ feed exclusively on honey and the pollen or fecundating dust of flowers. The perfect Insect feeds on the honey of the latter only.

These Hymenoptera embrace the genus

#### APIS, Lin.,

Which I will divide into two sections.

In the first, or that of the *ANDRENETÆ*, Lat., the intermediate division of the ligula is cordiform or lanceolate, shorter than its sheath, and bent underneath in some, and almost straight in others. It is composed of the genus *PRO-ABEILLES*, Reaumur and De Geer, or the *ANDRENE*, Fab., and the *MELITES* of Kirby‡.

These Insects live solitarily, and consist of but two kinds of individuals, males and females. Their mandibles are simple, or at most are terminated by two dentations; the labial palpi resemble the others, which always have six joints. The ligula is divided into three pieces, the two lateral of which are very short, and in the form of auricles. Most of the females collect the pollen of flowers with the hairs of their posterior legs, and with the aid of a little honey form it into a paste (bee-bread), with which they feed their larvæ. They excavate deep holes, and frequently in hard ground, along the borders of roads,

\* Lat., Ann. du Mus. d'Hist, Nat.

† The parasitical species are not possessed of this faculty, but the form of their legs is essentially the same. They are merely destitute of hairs or brushes.

‡ Monographia Apum Angliæ, a work that has immortalized its author.

or in the fields, in which they place this paste along with an egg; they then close the aperture with earth.

In some the middle division of the ligula is enlarged at its extremity, almost cordiform, and folded when at rest.

HYLÆUS, *Fab.* PROSOPIS, *Jur.*

Sometimes the body is glabrous, and the second and third joints of the antennæ are almost of the same length. The superior wings present but two complete cubital cells. These Insects, being destitute of hairs, collect no pollen, and appear to deposit their ova in the nests of other Hymenoptera of this family. They are the HYLÆUS proper of Latreille and Fabricius\*.

The others have a hairy body, and the third joint of the antennæ longer than the second. The superior wings have three complete cubital cells. The females collect their stores from flowers. I distinguish them by the generic name of

COLLETES, *Lat.*

Such, for instance, is the

*C. glutineux*; *Apis succincta*, L.; or the *Abeille dont le nid est fait d'espèces de membranes soyeuses* of Reaumur, Insect., VI, xii. Small; black, with whitish hairs; those on the thorax, russet; abdomen ovoid, and the posterior margin of its annuli covered with a white down, forming bands. The male—*Evodia calendarum*, Panz.—has longer antennæ. The female makes a cylindrical hole in the ground, and smears its parietes with a gummy fluid, which may be compared to the viscid and glossy slime of a Snail. In this she piles a series of cells composed of the same material, resembling a thimble in shape, each containing an egg and some of the paste before mentioned †.

The other Andrenetæ are distinguished from the preceding ones by the lanceolate figure of the ligula.

In some this ligula is folded against the superior side of its sheath, as in ANDRENA ‡, and DASYPODA, Lat. §. The first joint of the posterior tarsi of the females of the latter subgenus is very long, and covered with long hairs in the manner of a little feather. The superior wings in these two subgenera have but two cubital cells.

*A. flessæ*, Panz., Faun. Insect. Germ. LXXXV, 15; *Andrène des murs*, Reaum., Insect., VI, vi, viii, 2. Six lines in length, and with white hairs on the head, thorax, lateral margins of the last abdominal annuli, and legs; abdomen bluish-black; wings black, with a tinge of violet.

The female excavates holes in tenacious sand, at the bottom of

\* Lat., Gen. Crust. et Insect., IV, p. 149.

† Lat., Ibid.

‡ Lat., Gener. Crust. et Insect., IV, 150. The species which in my Gener. Crust. et Insect., p. 151, I have called *lagopus*, and three others from the Cape of Good Hope, being removed from the Ordinary Andrenæ by the number of their complete cubital cells, which is but two instead of three, as well as by some other characters, have been erected by MM. Lepelletier and Serville—Encyc. Méthod.—into a new genus, to which they have given the name of SCRAPTER.

§ Lat., Ibid.

which she deposits a portion of honey, of the colour and consistence of a black and oily grease; it has a narcotic odour. Common in the environs of Paris.

In the others the ligula is straight, or slightly bent under at its extremity. Such are *SPHECODES* \*, *HALICTUS* †, and *NOMIA*, Lat. ‡ Here also the maxillæ are more strongly geniculate than in the *Andrenæ*. There are always three closed cubital cells.

The male *Sphecodes* have knotted antennæ; their ligula, as well as that of the females, is almost straight, and its divisions are nearly equal in length; that in the middle is much longer in *Halictus* and *Nomia*. The female *Halicti* have a longitudinal cleft at the posterior extremity of the abdomen. The thighs and tibiæ are inflated or dilated in the male *Nomiæ*.

The second section of the *Anthophila*, that of the *APIARIÆ*, Lat., comprises those species in which the mediate division of the ligula is at least as long as the mentum or its tubular shield, and is filiform or setaceous. The maxillæ and labium are much elongated, and form a sort of proboscis which, when at rest, is geniculate and bent under.

The two first joints of the labial palpi most frequently resemble a squamous and compressed seta that embraces the sides of the ligula; the two others are very small; the third is generally inserted near the exterior extremity of the preceding one, which terminates in a point.

The *Apiariæ* either live solitarily or form communities.

The former never consist of more than the ordinary number of individuals, and each female provides singly for her young. The posterior legs of their females are neither furnished with a brush on the inner side of the first joint of the tarsi, nor with a particular depression on the exterior side of their tibiæ; this side, as well as the same of the first joint of the tarsi, is most commonly and densely covered with hairs.

A first division of these solitary Bees is composed of those species in which the second joint of the posterior tarsi of the females is inserted in the middle of the extremity of the preceding one; the exterior and terminal angle of the latter does not appear to be dilated or to project more than in the interior, in the following subgenera.

We may also abstract from this group certain species—*André-*

\* Lat., *Gener. Crust. et Insect.*, IV, 150. MM. Lapeletier and Serville have formed a new genus—*Encyc. Méthod.*—allied to *Sphecodes*, under the denomination of *RHATHYMUS*—formerly *Colax*—but differing from it in the projection of the scutellum, and in the third cubital cell, which receives the two recurrent nervures. Besides this, the hooks of the tarsi are entire. They quote but one species, which is found at Cayenne.

† Lat., *Ibid.* For the habits of these Insects, see the excellent Memoir of M. Walckenaer, quoted under the article *Meloe*.

‡ Lat., *Ibid.* See *Encyc. Méthod.*, article *Nomie*.

The tenth volume of the part relative to Insects, of this important work, also contains several other articles by MM. Lapeletier and Serville, respecting the Insects of this family. We would particularly notice that of the *Parasites*. Some of them go to establish new genera, but as we have not been able to compare their characters with sufficient care, we are compelled to omit or barely mention them.

*noides*—which approximates to those of the last of the preceding subgenera in their labial palpi, composed of six slender, linear joints placed end to end, and almost precisely similar to those of the maxillary palpi. The labrum is always short. The abdomen of the females is destitute of a brush; but their posterior legs are pilose or furnished with tufts of hairs, which enable them to collect the pollen of flowers.

Some have narrow mandibles, contracted near the extremity, and, as well as the labrum, smooth and terminated in a point.

SYSTROPHA, *Illig.*,

Where the mandibles have one dentation under the point, where there are three complete cubital cells, and the extremity of the antennæ is curled in the males\*.

ROPHITES, *Spin.*,

Where the mandibles are also dentated, but in which we find but two complete cubital cells; the antennæ are not contorted in both sexes †.

PANURGUS, *Panz.*,

Where the mandibles are not dentated. The stem of the antennæ, from the third joint, in the females, forms a sort of fusiform or elongated and almost cylindrical club, thinned at base. But two cubital cells in the superior wings ‡.

The mandibles of the females, in the others, are almost in the form of the bowl of a spoon, very obtuse, carinated or sulcated, and bidentated at the extremity. The labrum is extremely hard and ciliated superiorly. The antennæ are strongly geniculate and filiform. The superior wings have three complete cubital cells, the first intersected by a little transparent line, the second triangular, and the third the largest, and receiving the two recurrent nervures.

XYLOCOPE, *Lat. Fab.*,

Commonly called *Abeilles perce-bois*, *Menuisières*, &c. The *Xylocopæ* are related in many points to the *Megachiles*, and more particularly to the *Osmiæ*. They resemble large *Bombi*. Their body is usually black, sometimes partially covered with a yellow down; the wings are frequently violet, cupreous, or green, and brilliant. The male, in several species, differs considerably from the female. Their eyes are large and approximated superiorly. Their anterior legs are dilated and ciliated.

*X. violacea*, L.; *Reaum.*, *Insect.*, VI, v, vi. About one inch in length; black, with violet-black wings; a russet ring round the antennæ of the male. The female bores a long vertical hole in the body she has selected, usually old dry wood exposed to the sun, and parallel to its surface. It is divided into several cells by horizontal septa, formed with agglutinated raspings of wood. She then, commencing with the lowest, deposits an egg and some

\* *Lat.*, *Gener. Crust. et Insect.*, IV, 156.

† *Lat.*, *Ibid.*, 161; and the *Nouv. Dict. d'Hist. Nat.* 2nd edit.

‡ *Lat.*, *Ibid.*, 157; and *Encyc. Method.*, article *Panurge*.



paste in each of them. She sometimes bores three canals in the same piece of wood.

They are peculiar to warm climates\*.

The labial palpi of the other *Apiariæ* are in the form of squamous setæ; the two first joints, compared with the two last, are very large, compressed, scaly, and have a membranous or transparent margin. The maxillary palpi are always very short, and frequently consist of less than six joints. The labrum, in a great number, is elongated and inclined on the mandibles, sometimes forming a long square and sometimes an elongated triangle.

The *Apiariæ*, which in our work on the natural families of the animal kingdom we have collectively designated by the name of *Dasygastræ*, are remarkable—as intimated by that name—for the numerous, short, crowded hairs, forming a silky brush, that almost always † covers the abdomen of the females. The labrum is as long as it is wide or longer, and square. The mandibles of the females are strong, incisive, triangular and dentated. The paraglossæ are always very short, squamous, and pointed at the extremity.

Of all the subgenera of this little group, that which appears to us to approximate most closely to the *Xylocopæ*, and which alone presents maxillary palpi consisting of six joints, and wings furnished with three complete cubital cells, is the

*CERATINA, Lat. Spin. Jur.—MEGILLA, PROSOPIS, Fab.*

The body is narrow and oblong; the antennæ are inserted in little fossulæ, and terminated almost in an elongated club; the mandibles are sulcated and tridentated at the extremity; the abdomen approaches to an oval, and is destitute of a silky brush. The labrum is proportionally shorter than in the following subgenera, where it forms an elongated quadrilateral. According to the curious observations of M. Maximilian Spinola—Ann. du Mus. d'Hist. Nat.—the habits of the females are the same as these of the *Xylocopæ* ‡.

All the remaining *Dasygastræ* have four joints at most in their maxillary palpi, and two complete cubital cells.

We first remark those species in which the under part of the abdomen is evidently furnished with a silky brush.

*CHELOSTOMA, Lat.,*

Where the body is elongated, and almost cylindrical; the mandibles project, are narrow, arcuated, and forked or emarginated at the end; the maxillary palpi are triarticulated §.

\* Lat., Gener. Crust. et Insect., IV, 158. To this subgenus, until we have further examined it, we refer the genus *Lestis* of MM. Lepeletier and Serville—x, 795.

† The *Ceratinæ*, *Stelides* and *Cœlioxydes*, although destitute of a ventral scopa, should make part of this group, on account of the form of the labrum and mandibles, and other general characters.

‡ Lat., Gener. Crust. et Insect., IV, 160. See also the article *Cératine* of the second edition of the *Nouv. Dict. d'Hist. Nat.*

§ Lat., *Ibid.*, 162.



HERIADES, *Spin.*,

Where the body is also elongated and almost cylindrical, but where the mandibles are triangular; the maxillary palpi consist of but two joints, and the second of the labial is much shorter than that of the others. These Insects, like the *Chelostomæ*, make their nests in holes of old trees \*. In the four following subgenera, the abdomen is shorter and almost triangular or forms a semi-oval. These *Apiariæ* are the *Abeilles maçannes* and the *Abeilles coupeuses de feuilles* of Reaumur.

MEGACHILE, *Lat.*—ANTHOPHORA, †XYLOCOPA, *Fab.*—TRACHUSA, *Jur.*,

Where the maxillary palpi consist of two joints; the abdomen is plane above and susceptible of being elevated posteriorly, thereby enabling the females to employ their sting over their body.

*M. murarium*; *Xylocopa muraria*, *Fab.*; *Reaum.*, *Insect.*, VI, vii, viii, 1—8. One of the largest species of the genus. The female is black, with violet-black wings. The male is covered with russet hairs, and the last of his abdominal annuli are black. The female constructs her nest of very fine earth, which she forms into a kind of mortar, applying it against walls or stones, with a south exposure. It becomes extremely hard, and resembles a clod of earth. It contains from twelve to fifteen cells, in each of which is deposited some bee-bread and an egg. The perfect Insect appears in the spring of the next year.

Another species, closely allied to the preceding one—*Apissicula*, *Ross.*—forms its nest into a ball and places it on the branches of plants.

Others, *Megachiles*, called by Reaumur *Abeilles coupeuses du feuilles*, in the construction of their nests, employ perfectly oval or circular portions of leaves, which they cut out by means of their mandibles, with as much quickness as dexterity. These pieces are transported by them into straight and cylindrical holes, previously excavated in the ground, and sometimes in walls or the decayed trunk of an old tree. They line the bottom of the cavity with these leaves, and form a cell, shaped like a thimble, in which they deposit the honied provision on which the larva is to feed, and an egg; they then close the cell with a flat or slightly concave lid, also formed of a portion of a leaf. A second cell is subsequently formed above the first; that is followed by a third, and so on until the hole is filled. Of this number is the

*M. rosæ*; *Apis centuncularis*, *L.*; *Reaum.*, *Insect.*, VI, x. About six lines in length; black, with a fulvous-grey down; small white and transverse spots on the superior sides of the abdomen; inferior surface of the latter covered with fulvous hairs. The male is described by Linnæus as another species, under the name of *lagopoda*.

\* *Lat. Gener. Crust. et Insect.*, IV, 162.

Other analogous species attack the leaves of the Oak, Elm, &c., for a similar purpose\*.

LITHURGUS, *Lat.*,

Where there are four joints in the maxillary palpi, as in the following subgenus, but the abdomen is depressed superiorly. All the joints of the labial palpi are placed end to end †, and the palpi themselves resemble long squamous setæ, terminating in a point. The mandibles are narrow in both sexes, and their extremity is emarginated in the middle or bidentated. The females have a rounded projection in the middle of their head ‡.

OSMIA, *Panz.*—ANTHOPHORA, *Fab.*—TRACHUSA, *Jur.*,

Where the maxillary palpi are formed of four joints, or at least of three very distinct ones, and the abdomen is convex above. Some are *masons*, and frequently have two or three horns on the clypeus, which appear to be of use to them in the construction of their nests. They conceal the latter in the ground, holes in walls, doors and old wood, and sometimes even in the shells of *Helices*, employing an earthy mortar for their construction. They are generally pilose, and appear early in the spring. The antennæ of the males are usually long. Others employ the petals of flowers, and form cells with the cut portions, in the manner of the leaf-cutters. The *Abeille tapisserie* of Reaumur forms its cells with the petals of the wild Poppy, and sometimes of the Rape §. Others again form their nests in the galls of trees ||.

ANTHIDIUM, *Fab.*,

Where the abdomen is also convex; but the maxillary palpi are unarticulated. The females form their nests with the down of plants ¶.

The two last subgenera of the *Dasygastræ* approach the following ones in the absence of a silken brush, a fact which would lead us to suppose that these Insects are equally parasitical; but their labrum is parallelogramical, and their mandibles are triangular and dentated. The maxillary palpi are very short and biarticulated.

STELIS, *Panz.*

The scutellum destitute both of spines and teeth. The abdomen is nearly semi-cylindrical, convex above, and curved at the extremity\*\*.

CÆLIOXYS, *Lat.*,

Where the scutellum has two teeth or spines, and the abdomen is

\* *Lat.*, Gen. Crust. et Insect., IV, p. 165.

† The third joint is usually inserted on the outer side of the second, anterior to its point, and with the second forms a little oblique and lateral stem.

‡ *Centris cornuta*, *Fab.*, and an undescribed species from the Isle of France.

§ This species, with all those in which the mandibles are tridentated, forms the genus *ANTHOPHORA* of M. Lepeletier. See *Encyc. Méthod.*, article *Rophyte*. The *Osmiæ*, properly so called, have but two teeth in each mandible.

|| *Lat.*, Gen. Crust. et Insect., IV, 164; and the *Encyc. Méthod.*, article *Osmie*.

¶ *Lat.*, *Ann. du Mus. d'Hist. Nat.*, XIII.

\*\* *Lat.*, Gen. Crust. et Insect., IV, 163. See particularly the *Encyc. Méthod.*, article *Stélide*.

triangular, plane above, prolonged into a point at the extremity, in the females, and usually dentated in the males.

These Insects approach the *Megachilæ*, whilst the *Stelides* are connected with the *Anthidia* \*.

Other *Apiariæ*, the *Cuculinæ*, similar to the preceding ones in their posterior tarsi, and in which, as in the latter subgenera, the labial palpi have the form of squamous setæ, and the abdomen is destitute of a brush in both sexes, that are parasitical, like the *Cœlioxydes* and *Stelides*, sometimes almost glabrous and similar in colour to Wasps, and sometimes pilose in patches, have an elongated and truncated, or short and almost semicircular labrum, and narrow, pointed mandibles, unidentated at most on the inner side. The paraglossæ are frequently long, narrow, and setaceous. The scutellum in several is emarginate or bidentated; in others it is tuberculous. They are the *Nomadæ* of Fabricius. Several of these Insects appear early in the spring, flitting near the earth or about walls exposed to the sun, in order to deposit their eggs in the nests of other *Apiariæ*. It is this habit, analogous to that of the Cuckoo, which induced me to name them *Cuculinæ*.

In some, almost always glabrous, the paraglossæ are much shorter than the labial palpi.

Sometimes the labrum forms an elongated triangle, truncated at the end, and inclined above the mandibles. There are never more than two complete cubital cells.

*AMMOBATES, Lat.,*

Where the maxillary palpi are formed of six joints †.

*PHILEREMUS, Lat.—EPEOLUS, Fab.,*

Where these organs have but two joints ‡.

Sometimes the labrum is short, and almost semicircular or semi-oval.

*EPEOLUS, Lat., Fab.*

Three complete cubital cells, and the maxillary palpi uniarticulated §.

*NOMADA, Fab.*

The same number of cubital cells, but the maxillary palpi are formed of six joints ||.

*PASITES, Jur.—NOMADA, Fab.*

But two complete cubital cells. Their maxillary palpi are quadriarticulated ¶.

The other *Cuculinæ*, in which the body is densely pilose in patches, the scutellum is often spinous, and where there are always three complete cubital cells, are removed from the preceding *Apiariæ*, and

\* Lat. Gener. Crust. et Insect., IV, 166.

† Lat. Ibid., 169.

‡ Lat., Ibid., Idem.

§ Lat., Ibid., 171.

|| Lat., Ibid., 169.

¶ Lat., Ibid., 170.

approximated to the following ones by the length of their paraglossæ, or lateral divisions of the labium, which almost equals that of the labial palpi.

MELECTA, *Lat.*—CROCISA, *Jur.*,

Where the maxillary palpi have five or six distinct joints\*.

CROCISA, *Jur.*,

Where they have but three, and where the scutellum is prolonged and emarginated †.

OXÆA, *Klug*,

Where the labrum forms a long square, and is not semi-oval, as in the preceding subgenera, and where the maxillary palpi are wanting, or at least reduced to one very small joint ‡.

The last of the solitary Apiariæ have the first joint of their posterior tarsi dilated inferiorly on the outer side, so that the following joint is inserted nearer the inner angle of the extremity of the preceding one than to the opposite angle. The outer side of this first joint, as well as that of the tibiæ, is densely crowded with thick hairs forming a sort of brush or tuft, particularly in certain species foreign to Europe; and thence the term *Scopulipedes*, which in my *Fam. Nat. du Règn. Anim.*, I have given to this last division of the solitary Apiariæ. The under part of their abdomen is naked, or at least destitute of a silken brush. The number of cubital cells, with the exception of a few species, is three, of which each of the two last receives a recurrent nervure.

Sometimes the maxillary palpi consist of from four to six joints.

In these, the mandibles exhibit one tooth at most on the inner side. They fly with a hum from flower to flower, and with great rapidity. Several males have a bundle of hairs on the first and last joint of the intermediate tarsi. Others are distinguished from their females either by their long antennæ, or by a more remarkable thickening of the two thighs of the second pair of legs, or by that of the two last. The anterior extremity of their head is frequently coloured with yellow or white. The outer side of the tibiæ and of the first tarsial joint of the posterior legs, in the females, is often densely pilose. They construct their nests either in the ground or in the cracks and holes in old walls. Several prefer grounds cut perpendicularly and exposed to the sun. The cells, in which they deposit their eggs, are formed of earth and shaped like a thimble, or like those of the *Megachiles*, and extremely smooth internally. They close the opening with the same material.

\* *Lat.*, *Gen. Crust. et Insect.*, IV, 171. For some other analogous genera, see the *Encyc. Méthod.*, articles *Parasites* and *Philérème*.

† *Lat.*, *Ibid.*, 172.

‡ *Lat.*, *Ibid.*, 172; *Encyc. Méthod.*, article *Oxyée*.

The genus described by MM. Lepeletier and Serville, under the name of *Monæca*, belongs to the division of the solitary *brush-footed* Apiariæ, but I have not yet been able to verify its characters. The mandibles are narrow, pointed, and bidentated. The radial cell is appendiculated. Each of the second and third cubitals receives a recurrent nervure. The posterior tibiæ are terminated by two spines, the inner one serrated. This subgenus approaches *Macrocera* and *Epipicharis*.

Those species, in which the two lateral divisions of the ligula are as long as the labial palpi and setaceous, and where the males have long antennæ, form the subgenus *Eucera* proper. M. Spinola, under the generic name of *MACROCERA*, has separated from it certain species in which the maxillary palpi have but five distinct joints, and the superior wings but two cubital cells.

The *MELISSODES*, Lat., are American *Eucera* with but four joints in their maxillary palpi. They have three cubital cells.

*E. longicornis*; *Apis longicornis*, L.; Panz., Faun. Insect. Germ., fascic., LXIV, 21, the male; LXVIII, 19, and LXIV, 16, the female. The male is black; labrum and anterior extremity of the head yellow; its superior portion, thorax, and two first abdominal annuli are covered with a russet-down; antennæ black and somewhat longer than the body. The antennæ of the female are short; the maxillæ and labrum project slightly at base, the abdomen is marked with grey stripes, and the anus is russet. She appears in the very beginning of spring\*.

In the other *Apiariæ* of this subdivision, the paraglossæ are much shorter than the ligula; they always exhibit three cubital cells.

In some, the maxillary palpi evidently consist of six joints, as in

*MELITTURGA*, Lat.,

Where the antennæ are short and terminated in a club in the males. All the joints of the palpi are continuous and in the same direction †.

*ANTHOPHORA*, Lat.—*MEGILLA*, CENTRIS, Fab.,

Where the antennæ are filiform in both sexes, and the two last joints of the labial palpi form a little oblique stem. The

*A. parietine*, Ann. du Mus. d'Hist. Nat., III, builds her nest in walls, and constructs a perpendicular and slightly curved tube at its entrance, of grains of earth. Having deposited her eggs, she destroys it, or perhaps employs it in closing up the entrance ‡.

In others, the maxillary palpi consist of but five joints, and those of the labial palpi are continuous. This is what distinguishes the

*SARAPODA*, Lat. §

Finally, others have but four joints in their maxillary palpi. The first joint of the posterior tarsi of the males is very large, curved, and arched or concave at its internal extremity. A stout, dentated spine is observable at the same end of the posterior tibiæ of the females.

*ANCYLOSCELIS*, Lat. ||

In those, the mandibles are pluridentated on the inner side; the maxillary palpi, as in the preceding subgenus, consist of but four joints.

\* Lat., Gen. Crust. et Insect., IV, p. 173.

† Lat., Ibid., 173.

‡ Lat., Ibid., 173.

§ Lat., Ibid., 173.

|| Insects brought from Brazil by M. de Saint-Hilaire. My genus *Melittome*, Fam. Nat. du Règn. Anim., originally formed with female *Ancyloscelides*, must be suppressed. That of the *Tetrapedia*, Klüg, perhaps re-enters the preceding one.

CENTRIS, *Fab*

The species of this subgenus are only found in America\*.

Sometimes the maxillary palpi have but a single and very small joint, which in some even becomes invisible. The paraglossæ are very short, and the mandibles dentated.

EPICHRIS, *Klüg.*—CENTRIS, *Fab.*,

Where the last joints of the labial palpi are in the same direction as the preceding ones, but rather indistinct and form the point of those organs which resemble very elongated setæ. The second and third cubital cells receive, each, a recurrent nervure †.

ACANTHOPUS, *Klüg.*—XYLOCOPA, *Fab.*,

Where the two last joints of the labial palpi form a small, oblique, and lateral stem; the third cubital cell receives the two recurrent nervures.

The internal extremity of the two posterior tibiæ presents two strong dentated spines ‡.

The last of the *Apiariæ* form communities composed of *males* and *females*, and a considerable number of *neuters* or *labourers*. In the internal face of the posterior tibiæ—*la palette*—of these latter individuals is a smooth depression—*la corbeille*—in which they place the pellet of pollen collected with the silken down or brush attached to the inner side of the first joint of the tarsi—*la pièce carée*—of the same leg. The maxillary palpi are very small and formed of a single joint. The antennæ are geniculate.

Sometimes the posterior tibiæ are terminated by two spines, as in

EUGLOSSA, *Lat. Fab.*,

Where the labrum is square, and the pseudo-proboscis is as long as the body; the labial palpi terminate in a point §, formed by the two last joints.

BOMBUS, *Lat. Fab.*,

Where the labrum is transversal, the pseudo-proboscis is much shorter than the body, and the second joint of the labial palpi terminates in a point, bearing the two others on its outer side.

The vulgar name of these Insects, or Bourdons, is applied (in France) to the males of the domestic Bee, but the Insects of which we are now speaking are much larger, more rounded, and covered with hairs frequently arranged in variously coloured bands. They

\* *Lat.*, *Ibid.*, 177. According to MM. Lepeletier and Serville, the *Ptilotopi*, *Klüg.*, are true *Centres*.

† *Lat.*, *Ibid.*, 178.

‡ *Lat.*, *Ibid.*, 178.

§ Even in those species where the body is almost glabrous, such as the *dentata*, *cordata*, &c., the posterior face of the first joint of the two last tarsi is still furnished with a brush. The habits of these Insects are unknown to us. Some individuals differ from others by the anterior convexity or thickening of their posterior tibiæ, where we also remark, near the outer margin, a cleft or narrow and longitudinal fossula. The genus *AGLÆ* of Lepeletier and Serville—*Encyc. Méthod.*, *Insect.*, X, 105—appears to have been established on similar individuals. See *Lat.*, *Ibid.* These *Apiariæ* are peculiar to South America.



are known to children, who frequently put them to death in order to obtain the honey contained within their body. They inhabit subterranean nests in communities of fifty or sixty, and sometimes of two or three hundred individuals. The society is dissolved on the approach of winter. It is composed of *males* distinguished by their small size, reduced head, narrow mandibles, bearded, and terminated by two teeth, and frequently by a difference of colours; of *females*, which are larger than the others, furnished with mandibles formed like a spoon, as is also the case with those of the *neuters* or *labourers*; the latter, as to size, are intermediate between the males and females; Reaumur however says that there are two varieties; the first, stronger and of a moderate size, and the second, smaller, which appeared to him to be the most lively and active. Huber, Jun., has verified this fact. According to him, several of the labourers which are hatched in the spring copulate with the males that have proceeded from their common mother, and lay soon after, but producing males only, which are to fecundate the ordinary females, or those which appear late in the season, and are destined to establish a new colony in the spring of the ensuing year. All the others, the little females not excepted, perish.

Some of the ordinary females which have escaped the severity of the winter take advantage of the first fine weather to construct their nests. One species—*Apis lapidaria*—establishes itself on the surface of the earth under stones, but all the others form their habitation in it, frequently descending to a depth of one or two feet, in the way we are about to describe. Dry plains, fields, and hills are the localities they select. These subterranean cavities, which are of considerable extent and wider than high, have the figure of a dome. The ceiling is constructed with earth and with moss, carded by these Insects, which they transport there, fibre by fibre, entering the cavity backwards. A coating of coarse wax is laid over its walls. Sometimes a simple opening, designedly left at the bottom of the nest, serves for an entrance, and then again a winding passage covered with moss, and a foot or two long, leads to the domicil. The bottom of the cavity is lined with a layer of leaves, for the accommodation of the brood. The females first place brown, irregular, mammiliform masses of wax there, called *patée* by Reaumur, and which, on account of their shape and colour, he compares to truffles. Their internal cavities are destined to enclose the eggs and larvæ. There the latter live in society until the moment has arrived when they are to become nymphs; they then separate and spin ovoid and silken cocoons, laid vertically against each other. In this state the Insect is always reversed, or, like the female nymphs of the common Bee, with the head downwards; we always find these cocoons perforated inferiorly, when the perfect Insects have left them. Reaumur says that the larvæ feed on the wax which forms their dwelling; according to Huber, it merely protects them from cold and wet, their aliment consisting of a tolerably large quantity of pollen moistened with honey, with which the labourers carefully supply them; when it is consumed they perforate the cover of their cells, furnish them with more, and shut them up again. They even enlarge them when the



increased growth of the larvæ causes them to be too much confined. We also find in these nests three or four small bodies composed of brown wax, or the same matter as the patée, and shaped like tumblers or almost cylindrical pots, always open, and more or less filled with good honey. These reservoirs of the honey are not always placed in the same situation. It has been asserted that the labourers employed the empty cocoons for a similar use, but this I doubt, as they are of a silken material and perforated inferiorly.

The larvæ are hatched in four or five days after the eggs have been laid, and complete their metamorphosis in the months of June and July. The labourers remove the wax that clogs their cocoon, to facilitate their issue. It was formerly supposed that they produced labourers only, but we have already seen that some males are among them, whose functions have been indicated. These labourers assist the female in her work. The number of cells which serve as habitations to the larvæ and nymphs increases, and they form irregular combs placed in stories, on the edges of which we particularly observe the brown patée of Reaumur. According to Huber, the labourers are extremely fond of the ova of the female, and sometimes, in her absence, even break open the cells in which they are deposited, in order to suck the milky fluid they contain! a most extraordinary fact, which seems to belie the known attachment of the labourers for the germs of that race of which they are the protectors and guardians. The wax produced by them, according to this same naturalist, has the same origin as that of our domestic Bee, or is merely elaborated honey that also transudes through the intervals of some of the abdominal annuli. Several females live amicably together under one roof and exhibit no symptoms of aversion for each other. They copulate abroad, either in the air or on plants, where I have seen them thus united. The females are much less prolific than those of our domestic Bee.

The following species are common in the environs of Paris.

*B. muscorum*; *Apis muscorum*, L.; Reaum., Insect., VI, ii, 1, 2, 3, yellowish; hairs of the thorax fulvous. The same colours in all the individuals.

*B. lapidarius*; *Apis lapidaria*, L.; Reaum., Ibid., I, i, 4. The female is black, with reddish anus and colourless wings. The male—*Bombus arbustorum*, Fab.—has the front of the head and the two extremities of the thorax yellow. The anus is red, as in the female. This species make its nest under piles of stones.

*B. terrestris*; *Apis terrestris*, L.; *B. souterain*, Reaum., Ibid., III, i. Black; posterior extremity of the thorax and base of the abdomen yellow; anus white\*.

Sometimes the social *Apiariæ* have no spines at the extremity of their posterior tibiæ.

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\* For the other species, see the Memoir of M. Huber, Lin. Trans., VI; Jurine on the Hymenoptera, genus *Breme*, and Panzer on the same order of Insects. With respect to their male organs of generation, see the Memoir of Lachat and Audouin.

They form two subgenera :

*APIS, Lat.,*

Or that of Bees properly so called, where the first joint of the posterior tarsi of the labourers form a long square, and is furnished on the inner side with a silken down, divided into transverse or striated bands.

*Apis mellifica*, L.; Reaum., Insect., V, xxi—xxviii. Blackish; scutellum and abdomen of the same colour; a transverse greyish band, formed of down, at the base of the third and following abdominal annuli.

Bees proper are much smaller and more oblong than the Bombi. Their body is merely furnished with down in particular places, and its colours vary but little. Their communities consist of *labourers* or *neuters*, usually from fifteen to twenty thousand in number, and sometimes extending to thirty thousand; of from six to eight hundred *males*, and in some hives of a thousand and more, called *bourdons* by the French Apiarists (*a*), and *faux-bourdons* by Reaumur; and commonly of a single *female*, considered by the ancients as the king or head of the community, and styled a queen by us.

The *labourers*, smaller than the others, have their antennæ composed of twelve joints, and the abdomen of six annuli; the first joint of the posterior tarsi, or the *square piece*, (*piece carrée*), is dilated in the form of a pointed palette, at the exterior angle of their base, and densely covered on its inner side with short, fine, silky down; they are armed with a sting. The *female* presents the same characters, but the abdomen of the labourers is shorter. Their mandibles are spoon-shaped, and not dentated. In the outer side of their posterior tibiæ is that smooth depression, edged with hairs, called the *corbeille*, or basket; the silky brush of the first joint of the tarsi of the same legs has seven or eight transverse striæ.

The males and females are the largest; their mandibles are hairy and emarginated under the point; the proboscis is shorter, particularly in the males. These latter differ from the former and from the labourers in their antennæ, which consist of thirteen joints; in their more rounded head and larger eyes, elongated and united above; in their smaller and more hairy mandibles, in the absence of a sting, in the four short anterior legs, of which the two first are arcuated, and finally in the *piece carrée* which has neither palette nor silken brush. Their sexual organs resemble two horns, partly of a reddish yellow, accompanied by a penis terminated en palette, and some other parts. If these organs be forcibly protruded the Insect dies instantly.

The interior of the abdominal cavity of the females and labourers presents two stomachs, the intestines and poison sac. A tolerably large aperture situated at the superior base of the proboscis, under the labrum, and closed by a little triangular piece called *langue* by Reaumur, the *epipharynx* of Savigny, transmits the aliment, and leads to a slender esophagus that tra-

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☞ (*a*) It is the American Drone.—ENG. ED.

verses the interior of the thorax, and thence passes to the anterior stomach, or rather crop, which contains the honey. The following stomach, according to Reaumur, contains the pollen or wax-like matter, and has its surface marked by annular and transverse rugæ, in the manner of hoops. This abdominal cavity in the females contains two large ovaries composed of numerous sacculi, each of which encloses from sixteen to seventeen eggs. Each ovary terminates at the anus, near which it dilates into a pouch, where the egg is arrested, and receives a viscid humour furnished by a neighbouring gland. According to the observations of Huber, Jun., the inferior semi-annuli of the abdomen of the labourers, the first and last excepted, have each, on their internal surface, two pouches, in which the wax is secreted and moulded into laminae, that afterwards ooze out through the intervals between the rings. Under these pouches is a particular membrane, formed of a very small network, with hexagonal meshes, that unites to the lining membrane of the abdominal cavity.

These observations on the internal anatomy of the Bee, with the exception of some few modifications, will apply to the Bombi properly so called\*. Wax, according to the experiments of the same naturalist, is nothing more than elaborated honey, and the pollen mixed with a little of that substance only serves as food for these Insects and their larvæ.

M. Huber distinguishes two kinds of labourers or working Bees. The first, which he calls *cirières*, collect provisions and all the materials requisite for building, and employ the same. The second, or the *nourrices* (*nurses*), smaller and weaker, are formed for retirement, and their functions are almost reduced to the rearing of the young, and the internal economy of the hive.

We have seen that the labourers or working bees resemble the females in several particulars. Certain curious experiments have proved that they are of one sex, and that they may become mothers, if, when in their state of larvæ and three days after they are hatched, they receive a peculiar kind of aliment, or that which is given to the queen-larvæ. But even then they can only acquire all the faculties of the latter by being placed in a larger cell, or one similar to that of the larvæ of the female proper, the royal cell. If fed in this way in their own cell, they can only produce males, and differ from the females proper by being smaller. The labourers, then, are merely females whose ovaries have not been developed, in consequence of the nature of the food given to them while in the state of larvæ.

The substance of which their combs are composed, being ill adapted to resist the effects of the weather, and as they do not construct a nest or general envelope, these Insects can only establish their colonies in cavities where their work finds a natural shelter. The labourers, which are alone charged with the work, form those laminae composed of two opposing rows of

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\* I have also verified this fact. See my Memoir on this subject in the *Ann. du Mus. d'Hist. Nat.*

hexagonal alveoli with a pyramidal base formed of three rhombs. These alveoli have received the name of *cells*, and each lamina that of *comb*. They are always perpendicular, parallel, fixed at top, or by one of the edges, and separated by spaces which allow the Bees to pass between them. The cells are thus placed horizontally. Distinguished geometricians have demonstrated that their form is the most economical with respect to the expenditure of wax, and the most advantageous as to the extent of the space contained in each cell. Bees, however, know how to modify this form according to circumstances. They cut away and fit their faces piece by piece. These cells, with the exception of that proper to the larva and nymph of the female, are almost equal; some contain the brood, and the remainder, the honey and pollen of flowers. Some of the cells containing honey are open, and the remainder, or those held in reserve, are sealed up with a flat or slightly convex lid. The royal cells, which vary in number from two to forty, are much larger, almost cylindrical, somewhat narrower at the end, and have little cavities on their external surface. They usually hang from the margin of the combs, in the manner of stalactites, so that the larvæ contained in them are in a reversed position. Some of them weigh as much as one hundred and fifty of the ordinary cells. The cells of the males are of an intermediate size between those of the preceding and those of the labourers, and placed here and there. Bees always continue their combs from above downwards. They stop the little chinks and apertures of their domicil with a species of mastich, which they collect from different trees, called *propolis*.

Copulation takes place in the beginning of summer out of the hive, and, according to M. Huber, the female returns to it with the genital organs of the male attached to the extremity of her abdomen. It is thought that this single fecundation vivifies all the eggs she may lay in the course of two years, and perhaps during the whole of her life. She produces the different batches in rapid succession, and does not cease laying till autumn. Reaumur estimates the number laid by a female in the spring, during the space of twenty days, at twelve thousand. Guided unerringly by her instinct, she makes no mistake in selecting their appropriate cells. Sometimes, however, as where the total number is not sufficient, she places several eggs in one. The labourers subsequently make a selection. All those which she lays in the ensuing spring produce labourers and are hatched in four or five days.

Bees take care to furnish their larvæ with patée in quantities proportioned to their age, and on which they cling with their bodies curved into an arc. Six or seven days after they are hatched, they prepare to undergo their metamorphosis. Shut up in their cells by the labourers, who close the orifice with a convex lid, they line the parietes of their domicil with a tissue of silk, spin a cocoon, become nymphs, and, at the expiration of about twelve days, issue forth in their perfect state. The la-

bourers immediately clean out the vacant cells, in order that they may be prepared for the reception of another egg. This is not the case, however, with the royal cells; they are destroyed and new ones constructed, if necessary. The eggs containing males are produced two months later, and those of the female soon after the latter.

This succession of generations forms so many particular communities, prepared to form new colonies, and known by the name of *swarms*. A single hive sometimes produces three or four; but the last are always small. Those which weigh from six to eight pounds are the best. Finding themselves too much confined in their habitation, they frequently leave their natal locality. Particular signs intimate to the owner the loss with which he is menaced; he endeavours to prevent it, or to profit by the emigration.

Dreadful combats sometimes take place among Bees. At a particular epoch in which the males become useless, the females having been fecundated—from the month of June to that of July—the labourers put them to death, extending the carnage even to the larvæ and nymph of that sex.

Bees have enemies both external and internal, and are subject to various diseases.

The intelligent apiarist bestows particular attention on these animals, carefully selects, among the different kinds of hives that have been invented, that which is the least expensive in its construction, and the best adapted to preserve and rear them; he studies their habits, foresees the accidents with which they are threatened, and never has occasion to regret his labour and trouble. The origin of the attention bestowed upon Bees is lost in the remotest antiquity. With the ancient Egyptians the Bee was the hieroglyphic emblem of royalty.

The true Bees are only found in the eastern continent; and those of southern and eastern Europe, and of Egypt, differ from those that inhabit France, which have been transported to America and other places where they are now naturalized.

The species found in the Isle of France and in Madagascar—*A. unicolor*, Lat.—produces honey called *vert*, or green, that is held in high estimation\*.

The last subgenus of the social *Apiariæ*, or

*MELIPONA*, Illig. Lat.—*TRIGONA*, Jur.,

Is distinguished from the preceding one by the form of the first joint of the posterior tarsi, which is narrowed at base, or has the figure of a reversed triangle, and is destitute of striæ on the silken brush of its inner side. There are but two complete cubital cells in the superior wings, while in the Bees there are three, the last linear and oblique †.

\* For the other species, see Lat., in the *Obs. Zool. et Anal.* of Messrs. Humboldt and Bonpland.

† Those species, in which the mandibles are not dentated, are the *MELIPONÆ*, properly so called. Those, in which they are, form the genus *TRIGONA*. See my *Gener. Crust. et Insect.*, IV, 182.



These Hymenoptera are found in South America. They construct their nests on the tops of trees, or in their hollows.

That of the *M. amalthée* is shaped like a bagpipe. The honey it produces is sweet, and very agreeable to the palate, but extremely liquid, and is soon decomposed. The Indians extract a spirit from it of which they are extravagantly fond.

M. Cordier, of the Ac. Roy. des Sc., and professor of geology to the Jardin du Roi, has in his possession a fragment of amber containing an individual of this species. It appears that other Meliponæ—*Trigonæ*, Lat.—are found in the island of Sumatra.

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## ORDER X.

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### LEPIDOPTERA\*.

The tenth order of Insects terminates the series of those which are furnished with four wings, and presents characters exclusively peculiar to it.

Both sides of the wings are covered with small coloured scales, resembling farinaceous dust, that are removed by merely coming in contact with the finger. A proboscis, to which the name of *lingua* † or tongue has been affixed, rolled spirally between two palpi, covered with scales or hairs, forms the most important part of the mouth, and is the instrument with which these Insects extract the nectar from flowers, their only aliment. In our general observations upon this class of Insects, we have seen that this proboscis or trunk is composed of two tubular threads, representing the maxillæ, each bearing, near its external base, a very small (*superior*) palpus in the form of a tubercle. The aparent (*inferior*) palpi, those which form a sort of sheath to the proboscis, replace the labial palpi of the triturating Insects; they are cylindrical or conical, usually turned up, composed of three joints, and inserted in a fixed labium, which forms the paries of the portion of the buccal cavity, inferior to the proboscis. Two little and scarcely distinct, corneous, and more or less ciliated pieces, situated, one on each side, on the anterior and superior margin of the front of the head, near the eyes, seem to be vestiges of mandibles. Finally, we observe, and in equally exiguous proportions, the labrum or upper lip.

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\* The *Glossata*, Fab.

† The *spiritalompe*, according to the nomenclature of Latreille.

The antennæ vary and are always multiarticulated. Two ocelli are observable in several species, but concealed between the scales\*. The three segments of which the trunk of the hexapoda is composed, are united in one single body; the first is very short, and the two others are confounded together. The scutellum is triangular, but the apex is directed towards the head. The wings are simply veined, and vary in size, figure, and position; in several, the inferior ones are plaited longitudinally near their inner margin. At the base of each of the superior wings is a kind of epualette, prolonged posteriorly, that corresponds to the piece called *tegula* in the Hymenoptera. As it is more developed here, I will call it *pterygoda*. The abdomen, composed of from six to seven annuli, is attached to the thorax by a very small portion of its diameter, and presents neither sting nor ovipositor analogous to that of the Hymenoptera. In several females, however, as in *Cossus*, the last rings become narrowed, and extended to form an oviduct resembling a pointed and retractile tail. The tarsi always have five joints. There are never more than two kinds of individuals, males and females. The abdomen of the former is terminated by a kind of flat forceps which contains the penis.

The females usually deposit their ova, frequently very numerous, on the vegetable surfaces which are to nourish their larvæ, and soon after perish.

The larvæ of Lepidopterous Insects are well known by the name of *caterpillars*. They have six squamous or hooked feet, which correspond to the legs of the perfect Insect, and from four to ten additional membranous ones, the two last of which are situated at the posterior extremity of the body, near the anus; those which have but ten or twelve in all, have been called, from their mode of progression, *geometræ*. They cling to the plane of position with their squamous feet, and then, elevating the intermediate segments of the body in the form of a ring or buckle, approximate the two hind feet to the preceding ones, disengage the latter, hold on with the last feet, and move their body forwards to recommence the same operation. Several of these geometræ, when at rest, remain fixed to the branches of plants by the hind feet alone, where, in the form, colour and direction of their body they resemble a twig; they can support themselves in this position for a long time, without exhibiting the slightest symptom of life. So fatiguing an attitude must require prodigious muscular force, and in fact Lyonet counted *four thousand and forty-one muscles* in the caterpillar of the *Cossus ligniperda*.

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\* According to an observation made by Dalman, they do not exist in the Diurnæ.



Some caterpillars with fourteen or sixteen feet, but of which some of the intermediate membranous ones are shorter than the others, have been called *pseudo-geometræ*. The membranous feet are frequently terminated by a more or less complete crown of little hooks.

The body of these larvæ are generally elongated, almost cylindrical, soft, variously coloured, sometimes naked, and sometimes covered with hairs, tubercles and spines. It is composed of twelve segments or annuli, exclusive of the head, with nine stigmata on each side. Their head is invested with a corneous or squamous dermis, and presents on each side six shining granules, which appear to be ocelli; it is also furnished with two very short and conical antennæ, and a mouth composed of strong mandibles, two maxillæ, a labium, and four small palpi. The silk they employ is elaborated in two long and tortuous internal vessels, of which the attenuated superior extremities terminate in the lip. A tubular and conical mamilla is the spindle through which the threads are spun.

Most caterpillars feed on the leaves of plants; some gnaw their flowers, roots, buds, and seeds; others attack the ligneous or hardest part of trees, softening it by means of a fluid which they disgorge. Certain species attack our woollens and furs, thereby doing us much injury: even our leather, bacon, wax, and lard are not spared by them. Several confine themselves exclusively to a single article of diet; others are less delicate, and devour all sorts of matters\*.

Some of them form societies, and frequently live under a silken tent, spun by them in common, which even shelters them during the winter. Several construct sheaths for themselves, either fixed or portable. Others make their abode in the parenchyma of leaves, where they form galleries. The greater number are diurnal. The others never issue forth but at night. The severity of winter, so fatal to almost all Insects, does not affect certain Phalænæ, which only appear in that season.

Caterpillars usually change their skin four times, previously to passing into the state of a nyuph or chrysalis. Most of them spin a cocoon in which they enclose themselves. A frequently reddish liquor or sort of meconium, which Lepidopterous Insects eject per anum, at the moment of their metamorphosis, softens or weakens the extremity of the cocoon, and facilitates their exit; one of these extremities also is generally thinner than the other, or presents a favourable issue, by the peculiar disposition of the fibres. Other

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\* One of the most evident proofs of the Divine Providence is the perfect coincidence of the appearance of the caterpillar with that of the plant on which it is to feed.

caterpillars are contented with connecting leaves, particles of earth, or of the substances on which they have lived, and thus forming a rude cocoon. The chrysalides of the Diurnal Lepidoptera, ornamented with golden spots, whence the term chrysalis, are naked, and fixed by the posterior extremity of the body. The nymphs of the Lepidoptera present a special character, of which we have spoken in our general observations on the class of Insects. They are *swathed* or resemble *mummies* \*. Those of several Insects of this order, particularly of the Diurnæ, undergo their metamorphosis in a few days; they even frequently produce two generations in the course of the year. The caterpillars or chrysalides of others, however, remain during the winter in one of those states, and only appear as perfect Insects in the spring or summer of the following year. Generally speaking, the eggs laid in the fall are not hatched till the ensuing spring. The Lepidoptera issue from their envelope in the usual manner, or through a slit which is effected on the back of the thorax.

The intestine of caterpillars consists of a large tube without flexures, of which the anterior portion is sometimes slightly separated in the manner of a stomach, and the posterior forms a wrinkled cloaca; their four biliary vessels are very long and inserted very far back.

In the perfect Insect, we find a first lateral stomach or crop, a second inflated or turgid stomach, and a tolerably long small intestine, with a cæcum near the cloaca †.

The larvæ of the Ichneumonides and Chalcidites deliver us from a great portion of these destructive animals.

We will divide this order into three families, which correspond to the three genera of which it is composed in the system of Linnæus.

## FAMILY I.

### DIURNA.

¶ This family ‡ is the only one in which the exterior margin of the inferior wings does not present a rigid, squamous seta or kind of bridle for retaining the two superior ones. These latter, and even

\* The sheaths of the legs and antennæ are fixed, a character peculiar to this sort of metamorphosis.

† For the anatomy of the caterpillar, see the admirable work of Lyonet; and for the development of the organs in the chrysalis and butterfly, that of Herold, entitled *History of the development of Butterflies*, in German, Cassel and Marburg, 1815.

‡ Some of the Nocturna excepted.

For the genera of the Diurnal Lepidoptera, see the first numbers of the Descriptive Catalogue of the Lepidoptera in the Museum of the East India Company, of M. Horsfield.

most frequently the former, are raised perpendicularly when the Insect is at rest. The antennæ are sometimes terminated by a globuliform inflation or little club, and are sometimes almost of equal thickness throughout, or even more slender, and form a hooked point at the extremity.

This family comprises the genus

### PAPILIO *Lin.*

The larvæ always have sixteen feet. The Chrysalides are almost always naked, are attached by the tail, and most commonly angular. The perfect Insect, always provided with a proboscis or trunk, flies during the day only, and the colours which ornament the under part of the wings do not yield in beauty to those which decorate their superior surface.

We will divide these Insects into two sections.

Those of the first have but a single pair of spurs or spines to their tibiæ, which are found on their posterior extremity. Their four wings are raised perpendicularly when at rest. Their antennæ are sometimes inflated at the extremity, globuliform, or in a little club truncated and rounded at the summit, and sometimes almost filiform.

This section includes the genus *PAPILIO* and the *HESPERIÆ ruricolæ* of the system of Fabricius.

We may divide this section, extremely rich in species, in the following manner.

1. Those in which the third joint of the inferior palpi is sometimes almost wanting, and sometimes very distinct, but as well furnished with scales as the preceding one, and in which the hooks of the tarsi are very apparent or salient.

Their caterpillars are elongated and almost cylindrical. Their chrysalides are almost always angular, sometimes smooth, but enclosed in a rude cocoon.

Of these, there are some—the *Hexapoda*—in which all the feet are adapted for walking, and are almost identical in both sexes\*. Their chrysalis, in addition to the ordinary posterior attachment, is fixed by a silken thread over its body. That of some is enclosed in a rude cocoon. The central cell of the lower wing is closed inferiorly†.

\* The *Papilios* properly so called, or those belonging to the Linnæan division of the *Equites*, are connected by one extremity of the series with the mottled *Danaides*, and by the other with the *Parnassii*. From the latter we pass to *Thais*, and thence to *Pieris*. The preceding *Danaides* connect themselves with the *Heliconii*. From this it follows that we should begin the series of the diurnal *Lepidoptera* with the *Tetrapoda* such as *Satyrus*, *Pavonia*, *Morpho* and *Nymphalis*, in order to reach the *Heliconii* through *Argynnis* and *Cethosia*. The *Diurnæ* would be divided into two great sections; those whose chrysalids are suspended vertically, and simply attached by the extremity of their tail, and those where they are not only fixed by that extremity, but also by a silken band surrounding the body like a sling. The first are always tetrapodous. We would begin with those of which the caterpillars are naked or nearly so, and generally bifid at the posterior extremity; then would come those where they are spinous.

† I employed this character in my *Gener. Crust. et Insect.*; Dalman and Godart have generalized its application in relation to this family.

Here the internal margin of these wings is concave or plaited.

*PAPILIO proper.*—*P. EQUITES*, *Lin.*,

Where the inferior palpi are very short, scarcely reaching the clypeus with their superior extremity, and their third joint is indistinct.

The caterpillars, when alarmed, protrude from the superior part of their neck a soft, forked horn, that usually diffuses a penetrating and disagreeable odour. Their skin is naked. The chrysalis is attached with a silken band, and exposed.

The species of this subgenus are remarkable for their size and varied colouring. They are more particularly abundant in the tropical countries of both hemispheres. Those with red spots on the breast form the division of the *Equites Troes* or *Trojan Knights* of Linnæus. Those which are destitute of these marks in that place, he styles *Achivi* or *Greeks*. The inferior wings of several are prolonged into a sort of tail. Such is the

*P. machaon*, *Lin.*; *P. grand-porte-queue*, *Godart*, *Hist. Nat. des Lépid. de France*, I, 1, 2. Wings yellow, spotted and striped with black; inferior wings prolonged into a tail and with blue spots near the posterior margin, one of them ocelliform; some red on the internal angle. France.

The caterpillar is green with black rings dotted with red. It feeds on the leaves of the carrot, fennel, &c.

Two other tailed Papilios are found in France, the *P. podalirius*, *Godart*, *Ibid.*, I, 1, 2; and the *P. Alexanor* \*.

*ZELIMA*, *Fab.*

This subgenus only differs from *Papilio proper* in the club of the antennæ, which is shorter and more rounded.

I know two species, one from Senegal, the other from Guinea, both of which are in the splendid collection of Count De-jean.

*PARNASSIUS*, *Lat.*—*DORITIS*, *Fab.*,

Where the inferior palpi evidently extend above the clypeus, taper to a point, and are distinctly triarticulated. The terminal button of their antennæ is short, almost ovoid and straight. The females have a kind of cornecus boat-shaped sac at the posterior extremity of their abdomen.

The caterpillars also have a retractile tentaculum in the neck, like those of the true *Papilio*, but the cocoon in which they become chrysalides is formed of leaves connected by filaments of silk.

The species are exclusively proper to the Alpine and sub-alpine regions of Europe and the north of Asia. Such for instance is the

*P. Apollo*; *Papilio Apollo*, *L.*; *Godart*, *Hist. Nat. des Lépid. de France*, II, B. ii, 1. White, spotted with black; four ocel-

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\* For the remaining species, see *Godart*, *Ibid.*, and the *Encyc. Méthod.*, article *Papillon*, genus *Papillon*. See also, for European species, the excellent work of *Ochsenheimer*, continued by *M. Treitschke*.

lated spots, bordered with a red circle and a black one, on the inferior wings.

The caterpillar lives on the *Sedum telephium*, on the *Saxifraga*, &c. It is of a velvet-black with a series of red dots on each side, and another on the back. The chrysalis is rounded, of a blackish green sprinkled with white or bluish\*.

#### THAIS, Fab.

The palpi of the Parnassii, but the terminal button of the antennæ elongated and curved; no corneous pouch at the posterior extremity of the abdomen of the female.

The caterpillars, as it appears, have no retractile tentaculum.

The species are peculiar to the south of Europe, and some of them to the mountains †.

There, the inferior wings project under the abdomen, forming a groove for it.

The caterpillars have no tentaculum. Several live on the Cruciferae.

These Lepidoptera—*P. Danai candidi*, L.—form two subgenera.

#### PIERIS, Schr.—PONTIA, Fab.,

Where the inferior palpi are almost cylindrical, and slightly compressed, with the last at least almost as long as the preceding; the club of the antennæ is ovoid ‡.

#### COLIAS, Fab.,

Where that club forms an elongated and reversed cone, and the inferior palpi are strongly compressed, with the last joint much shorter than the preceding one §.

In the other Papilio of the same division—*Tetrapodo*—the two anterior legs are much shorter than the others, folded, non-ambulatory in both sexes, and sometimes in the males only. The chrysalis is simply suspended vertically by the posterior extremity.

Sometimes the anterior legs, though folded and smaller than the others, differ from them but little. The inferior wings, of which the central cell is always closed posteriorly, but slightly clasp the abdomen in most of them. The inferior palpi are distant, slender, cylindrical, and generally very short. All the subgenera of this subdivision are foreign to Europe.

We distinguish the Danaïdes—DANAIS; *Euploea*, Fab.; part of the *P. danai festivi*, L.—by their triangular wings and their antennæ terminated by a kind of elongated and curved button ||; the Ideae—IDEA, Fab.—by their almost oval and elongated wings, and nearly

\* See Godart, Ibid., and Encyc. Méthod., article *Papillon*, genus *Parnassien*.

† The *P. hysipyle, rumina*, Fab. See also the works before quoted.

‡ Here comes the Lepidoptera, designated by the general name of Brassicariae, such as the *P. brassicae*, L., *P. rapae*, L., *P. napi*, L., *P. daphnidiae*, L., *P. sinapis*, L., *P. cardamines*, L., &c., nearly all of which appear early in the spring.

§ *P. Hyale*, L.;—*P. rhamnii*, L.;—*P. Cleopatra*, &c. See the works already quoted.

|| Lat., Gener. Crust. et Insect., IV, 201; Encyc. Méthod., Insect. IX, article *Papilion*, genus *Danaïde*.



filiform antennæ \*. In these two subgenera the inferior palpi hardly reach above the clypeus, and their second joint is scarcely twice as long as the first.

In the two following subgenera, where the wings resemble those of the preceding subgenus, but are usually narrower and more elongated, and where the abdomen is also proportionally longer than that of most of the preceding ones, that joint is much longer than the first, and its extremity evidently extends beyond the clypeus. In the *Heliconii*—*HELICONIUS*, Lat.; *Mechanitis*, Fab.; *P. peliconii*, Lin.—the antennæ are twice the length of the head and thorax, and insensibly enlarged towards the extremity †. Those of the *Acreeæ*—*ACRÆA*, Fab.—are shortly and abruptly globuliform ‡.

Sometimes—*P. nymphalis*, L.—the two anterior legs are strongly folded, either apparent and very hairy, or small and concealed. The inferior wings, of which the central cell is open in several, evidently embrace the abdomen beneath. The inferior palpi are proportionally longer, and frequently thicker and more approximated.

Here, the central cell of the inferior wing is open.

Those in which the inferior palpi are but slightly compressed, distant throughout their length, or at least at their extremity, and abruptly terminated by a slender and acicular joint; where the under surface of the wings frequently presents silvery or yellow spots on a fulvous ground; and the caterpillars of which are always covered with spines or fleshy and hairy tubercles, compose the subgenera *CETHOSIA*, Fab., and *ARGYNNIS*, *MELITÆA*, Fab. In the first, several species of which have elevated and elongated wings, the inferior palpi are distant throughout their whole length, the hooks of the tarsi are simple, and the club of the antennæ is oblong §. In the second it is short and abrupt; the hooks of the tarsi are unidentated, and the inferior palpi are only distant at their extremity. The inferior wings are frequently round.

Some—*Argynnis*—Fab.—have nacre spots on the under part of their wings. Their caterpillars are furnished with spines, two on the neck longer than the rest. Those of the others—*Melitæa*, Fab.—have little hairy tubercles; the wings are spotted like a chess-board, and the nacre is replaced by yellow, a circumstance which sometimes occurs in the preceding ones ||.

Those in which the inferior palpi are contiguous throughout their whole length, terminated almost insensibly in a point, and strongly compressed, form five other subgenera.

#### VANESSA, Fab.

The *Vanessæ* are removed from the following ones by their antennæ, abruptly terminated by a short turbinated or ovoid button. Their caterpillars are densely spinous.

\* Lat., Gen. Crust. et Insect., IV, 201; Encyc. Méthod., Ibid., genus *Idea*.

† Lat., Gen. Crust. et Insect., IV, 201; Encyc. Méthod, article *Papilion*, genus *Heliconie*.

‡ Lat., Ibid., Idem; Encyc. Méthod., Ibid., genus *Acrée*.

§ See the works already quoted,

|| Idem,

*V. morio*; *Papilio Antiopa*, L.; Godart, Hist. Nat. des Lépid de France, I, 5, 1. Wings angular, of a deep purple-black, with a yellowish or whitish band on the posterior margin, and a suite of blue spots above.

Its caterpillar is blackish, spinous, and has a range of red, square, divided spots along the back. It feeds on the leaves of the Birch, Poplar and willow, where it lives in society. It appears at two periods.

*V. Io*; *papilio Io*, L.; Godart, Ibid., I, 5, 2. Wings angular and dentated, reddish-fulvous above, with a large ocellated spot on each; that of the superior wings reddish in the centre and surrounded with a yellowish circle; the one on the inferior blackish, surrounded by a grey circle, and enclosing bluish spots; under surface of the wings blackish.

Its caterpillar is black, dotted with white, and covered with hairy spines. On the Nettle.

*V. cardui*, *Papilio cardui*, L.; Godart, Ibid., I, 5, sect 2. Wings dentated; above red, and varied with black and white; beneath marbled with grey, yellow, and brown; five ocellated and bluish spots on their margin.

The caterpillar lives solitary on the Thistle. It is sometimes brownish with yellow stripes, and sometimes russet with transverse yellow bands. It is spinous. The perfect Insect only appears towards the close of the summer.

*V. Atalanta*; *Papilio Atalanta*, L.; *V. Vulcain*, Godart, Ibid. I, 6, 1. Wings dentated, somewhat angular; above black, traversed by a beautiful red band, and with white spots on the superior ones; marbled with various colours beneath.

The caterpillar is black, spinous, and has a suite of lemon-coloured lines on each side. It lives on the Nettle, prefers the seeds, and remains hidden on the top of the plant among the leaves, which it rolls up and secures with silk.

The same division includes various other species, very common in France, such as the *V. polychloros* (*Papilio polychloros*, L.), the *V. urticæ*, (*P. urticæ*, L.), the *V. c. album* (*P. c. album*, L.). The Chrysalis of the latter bears a rude resemblance to a human face or the mask of a Satyr\*.

In the four following subgenera the antennæ terminate in an elongated club, or are almost filiform.

The caterpillars are naked, or present but few spines.

#### LIBYTHEA, Fab.,

Where the males only have the two anterior legs very short and resembling a sort of tippet. The inferior palpi project considerably, in the manner of a rostrum. The superior wings are very angular †.

#### BIBLIS.—MELANITIS, Fab.,

Where those palpi are also longer than the head, but more obtuse

\* For the other species, see Godart, Ibid., and the Encyc. Méthod., article *Papillon*, genus *Vanesse*.

† See the works already quoted.



and slightly curved at their extremity; where the two anterior legs are short and folded in both sexes, and the antennæ terminate in a much smaller club. The wings are also proportionally wider and simply dentated. It has been observed that the nerves of the superior ones are strongly inflated at their origin\*.

NYMPHALIS, Lat.,

Similar to *Biblis* in the legs, but with shorter inferior palpi. It is only by the elongation of the club of the antennæ that this subgenus is distinguished from *Vanessa*. The caterpillars, however, are different; independently of their having but few spines or fleshy prominences, they are somewhat attenuated towards their posterior extremity, which is slightly forked.

These Lepidoptera are usually very highly ornamented, and their flight is elevated and rapid.

Several beautiful species inhabit France. Such are those designated in small groups by amateurs, by the names of *Sylvains* and *Mars*; the males of the latter are decorated with changeable colours. To this subgenus belongs another beautiful species, also indigenous to France, called the Jason—*Papilio Jason*, L. The form and size of the club of the antennæ vary a little, as well as the relative proportions of the wings; this has caused the formation of some other subgenera, but their characters are very equivocal. The species which approximate most to *Biblis*, one of which is the *Sylvain cænobite* of Engrammelle, form the genus *Neptis* of Fabricius. Of those which are most removed from the preceding ones, either by their antennæ or the inferior wings, and which present tails like certain species of the *Equites* of Linnæus, we will mention the *Jason* already quoted †.

MORPHO, Fab.,

Differing from *Nymphalis* in the almost filiform antennæ, slightly and gradually enlarged towards the extremity.

All the species are peculiar to South America, and are remarkable for their size, colours, and the ocellated spots on the inferior surface of their wings. Linnæus placed several of them among his Greeks ‡.

Godart has separated from them, by the generic name of

PAVONIA,

Those species in which the central cell of the inferior wings is closed, and where the most internal nerve of the superior is curved into an S, instead of being straight or but slightly arcuated. A species peculiar to the East Indies, in which the anal angle of the inferior wings is extended in the manner of a tail, the *P. phidippus*, is the type of the genus *AMATHUSIA* of Fabricius. All the others are from the western continent. The edge of the second joint of the inferior

\* See the works already quoted.

† See Godart, *Hist. Nat. des Lépid. de France*, and his article *Papillon* of the *Encyc. Méthod.*, genus *Nymphale*.

‡ See the works already quoted.

palpi in Pavonia, Morpho, and the other preceding subgenera, is tolerably wide; these palpi are not strongly compressed, as is the case in Satyrus, a subgenus very analogous to the two preceding ones.

In the following subgenera the discoidal cell of the inferior wings is also closed posteriorly.

BRASSOLIS, *Fab.*,

Where the antennæ are abruptly terminated by a thickened obconical club, and the inferior palpi are short and do not extend beyond the clypeus. Near the inner margin of the inferior wings of the males is a longitudinal fissure covered with hairs\*.

EUMENIA, *Godart*,

Where the inferior palpi are longer, and where the antennæ, at a short distance from their origin, become gradually thicker, and form an extremely elongated club †. The

EURYBIA, *Illig.*,

Approaches Brassolis in the shortness of the inferior palpi; but they are proportionally thicker, and the club of the antennæ is fusiform, elongated, and slightly curved ‡.

SATYRUS, *Lat.*,

Where the inferior palpi, as usual, extend beyond the clypeus, are strongly compressed, and have a sharp, densely pilose edge; where the antennæ are terminated by a little globuliform inflation, or an elongated and slender club. Godart has remarked that the two or three first nervures of the superior wings are strongly inflated at their origin.

The caterpillars are naked, or nearly so, and the posterior extremity of their body is narrowed into a forked point. The chrysalides are bifid anteriorly, and present dorsal tubercles §.

We will terminate this first section of the Diurnal Lepidoptera with those in which the inferior palpi have three distinct joints, but the last almost naked, or much less thickly covered with scales than the preceding ones, and where the hooks of the tarsi are very small, and not at all, or scarcely, salient. The discoidal cell of the inferior wings is open posteriorly.

Their caterpillars are oval, or have the form of Onisci. The chrysalides are short, contracted, smooth, and always fixed by a silken band that traverses the body, like those of Papilio proper, the Pierides, &c. ||

Linnæus placed them among his *Plebei*, in the division of the *Ru-*

\* See Encyc. Méthod., article *Papillon*, genus *Brassolide*.

† Encyc. Méthod., Insect., IX, 826. The only specimens in the possession of Godart had lost their antennæ. M. Poë has sent me some that are perfectly entire, captured by him in Havana.

‡ See Encyc. Méthod., same article.

§ See Hist. Nat. des Lépid. de Fr., and Encyc. Méthod., same article, genus *Satyre*.

|| According to this view of the subject, these subgenera ought to terminate this section, which should begin with Satyrus. Such was the arrangement we originally adopted.

*ricolæ*, and Fabricius—Entom. Syst.—in a homonymous section of his *Hesperia*. They form the genus *Argus* of M. de Lamarck. Fabricius ultimately—Syst. Gloss.—divided it into several genera, the characters of which demand revision.

Sometimes the antennæ terminate, as usual, in a solid globuliform, or clavate inflation.

In some, or at least their males, the two anterior legs are much shorter than the others. They compose the subgenus

ERYCINA, Lat.,

And are peculiar to America\*.

In the others all the legs are alike in both sexes.

MYRINA, Fab.

The Myrinæ are distinguished from the following subgenera by the remarkable elongation and projection of their inferior palpi †.

Those species in which these organs do not extend considerably beyond the clypeus, form the subgenus

POLYOMMATUS,

So called because the wings of most of them are marked with small ocellated spots.

Several species have been collectively designated by the name of *Petits porte-queue*. The most common in the environs of Paris is the

*P. Alexis*; *Papilio Alexis*, Hübn., LX, 292—294; *Argus bleu*, Geoff.; Godart, Hist. Nat. des Lépid., &c., I, ii, sect. 3. Superior surface of the wings of the male azure blue, changing to a delicate violet, with a small black streak along the posterior margin, and a very white fringe; that of the female brown, with a range of fulvous spots near the posterior margin, and a black line on the middle of the superior ones. The inferior surface of the wings is nearly the same in the two sexes; it is grey, with a range of fulvous spots enclosed between two lines of black points and streaks near the posterior margin; we may also observe some black points margined with white.

Its caterpillar lives on the *Onobrychys*, Broom, &c. Its colours are various ‡.

Other Lepidoptera of the same division present antennæ of a truly insulated form. Those of one of the sexes of the *BARBICORNIS*, Godart, are setaceous and plumous §. Those of the *ZEPHYRIUS*, Dalm., are terminated by ten or twelve globular joints separated like the beads of a rosary ||.

\* Encyc. Méthod., article *Papillon*, genus *Erycine*.

† Ibid. Fabricius has established several other genera in this division, which I have not yet sufficiently examined. Certain species from South America resemble *Pyrales* in their superior wings, which are arcuated exteriorly at base. The club of the antennæ also presents various modifications which may serve as a ground of division; but we should have a great number of species, and be particularly well acquainted with their metamorphoses.

‡ For the other species indigenous to France, see Lat., Nouv. Dict. d'Hist. Nat., XVII., p. 79, *Pap. plebéiens*; Godart, Hist. Nat. des Lépid. de France, his Tableau Méthodique, accompanying that work; and Encyc. Méthod., article *Papillon*.

§ Encyc. Méthod., Insect., IX, p. 705, a genus perhaps established on false antennæ.

|| Dalm., Anal. Etom., 102.

2. The second section of the Diurnal Lepidoptera is composed of species in which the posterior tibiæ have two pairs of spines, one at their extremity, and the other above; such also is the case in the two following families. The inferior wings are usually horizontal when at rest, and the extremity of their antennæ very often forms a strongly hooked point.

Their caterpillars, of which however but few are yet known, bend leaves together, and spin an extremely thin cocoon of silk (in the cavity), in which they become chrysalides; the latter are smooth or without angular elevations.

These Lepidoptera form the *Plebei*, *Urbicolæ* of Linnæus, or the *Papillons estropiés* of Geoffroy. Fabricius united them to *Argus* by the generic name of *Hesperia*, but we must also refer to this section certain exotic Lepidoptera, called *pages* by the amateurs, of which the original habitat had not hitherto been well ascertained: such are the *Urania* of Fabricius. These various Lepidoptera lead to our second family.

They compose two subgenera:

#### HESPERIA *Fab.*,

Or the *P. plebei urbicolæ* of Linnæus, in which the termination of the antennæ is distinctly globuliform or clavate, and the inferior palpi are short, broad, and densely covered with scales anteriorly.

*H. malvæ*, *Fab.*; *Rœs.*, *Insect. CL*, 2, x. Wings dentated, blackish-brown above, spotted and speckled with white, the posterior margin marked with spots of the latter colour; inferior surface of the wings greenish-grey, with irregular and similar spots.

The caterpillar is elongated, grey, with a black head, and four yellow points on the neck or first ring, which is narrowed: a character peculiar to the larvæ of this subgenus. It lives on the Malvaceæ, bends their leaves together, and there undergoes its metamorphosis. The chrysalis is black, but sprinkled with bluish\*.

#### URANIA, *Fab.*,

Where the antennæ, at first filiform, become attenuated or setaceous at the extremity, and where the inferior palpi are elongated and slender, with the second joint strongly compressed, and the last much smaller, almost cylindrical and naked †.

## FAMILY II.

### CREPUSCULARIA.

In this family, near the origin of the external margin of their inferior wings, we observe a rigid squamous seta, in the form of a

\* For the other species, see *Fab.*, *Entom. Syst.*, division of the *Urbicolæ*; *Encyc. Méthod.*, article *Papillon*, genus *Hespérie*; and the *Hist. Nat. des Lépid. de France* of Godart.

† The *Pap. riphæus*, *leilus*, *Lavinia*, *Orontes*, *Fab.*; *Noctua Patroclus*, *Ejusd.* The *Urania* compose the genera *Cydimon*, *Nyctalamon*, and *Sematara* of Dalman. See his *Prodromus of the Monograph of the genus Castnia*, p. 26.

spine or bristle, which passes into a hook on the under surface of the superior wings, maintaining them, when at rest, in a horizontal or inclined position\*. This character is also visible in the ensuing family, but the *Crepuscularia* are distinguished from the latter by their antennæ, which form an elongated club, either prismatic or fusiform.

The caterpillars have always sixteen feet. The chrysalides are destitute of the points or angles observed in most of those of the Diurnal Lepidoptera, and are usually enclosed in a cocoon, or concealed either in the earth or under some body. These Lepidoptera frequently appear only in the morning or evening.

They compose the genus,

SPHINX, *Lin.*—PAPILLONS-BOURDONS, *De Geer*,

So named from the attitude of several of the caterpillars, which resembles that of the fabled monster so called. They have received that of *Papillons-Bourbons* from the humming noise they frequently produce while on the wing.

I will divide this subgenus into four sections, corresponding in a similar order to the genera, *Castnia* and *Sphinx*, of Fabricius, and to those which he first called *Sesia* and *Zygæna*.

The first, or that of the HESPERI-SPHINGES †, consists of Lepidoptera, which evidently connect the Hesperia with *Sphinx* proper. The antennæ are always simple, thickened in the middle or at the extremity, which forms a hook, narrowed into a point at the end, and without a tuft of scales. They all have a very distinct proboscis; the inferior palpi are composed of three very apparent joints. In some, the second is elongated and strongly compressed, the third slender, almost cylindrical and nearly naked; these palpi resemble those of the *Urania*; in others, they are shorter but wider, almost cylindrical, and well furnished with scales. The antennæ of the latter are only inflated at the extremity.

Those, in which the inferior palpi are elongated, with the second joint strongly compressed, and the last slender and almost naked, in which the antennæ are simple, gradually thickened near the middle, and then become narrowed and terminate in an elongated hook, form the subgenus

AGARISTA, *Leach* ‡.

Those, in which the inferior palpi are similarly formed, but where

\* In certain *Smerinthi*, however, according to Godart, they are wanting.

† In this section, at least for the present, I will arrange the genus *HECATESIA*, established by M. Bois-Duval, in his lately published interesting Monograph, with which he terminates the first part of another work, that will be highly useful to amateurs, entitled *Europæorum Lepidopterorum Index Methodicus*. He thus characterizes the above genus: antennæ rough and fusiform, as in *Nymphalis*, the joints distinct to the club; palpi densely pilose, with indistinct joints, and not extending beyond the clypeus; proboscis corneous, and rolled up spirally; thorax very hairy; wings laid on the body. The only species known, the *H. fenestrata*, is found in New Holland.

‡ See *Encyc. Méthod.*, article *Papillon*, genus *Agariste*. Near this genus comes

the antennæ are terminated abruptly in a club with a short terminal hook, compose the subgenus

*CORONIS, Lat.\**

Finally, those in which the antennæ are similar to those of the *Agaristæ*, but where the palpi are shorter, wide, and cylindrical, form the

*CASTNIA, Fab.*

All the species belong to the eastern continent †.

Those of our second section, or the *SPHINGIDES*, always have the antennæ terminated by a little fluke of scales; the inferior palpi broad, or compressed transversely, densely covered with scales, and the third joint usually indistinct.

Most of the caterpillars have an elongated, smooth body, thickest at the posterior extremity, which is furnished with a horn, and its sides striped obliquely or longitudinally. They live on leaves, and are metamorphosed in the earth without spinning a cocoon.

*SPHINX, proper,*

Where the antennæ, commencing from the middle, form a prismatic club, simply ciliated, or transversely striated on one side, in the manner of a rasp. They have a very distinct proboscis, and fly with great velocity, hovering over flowers with a humming noise. In the chrysalides of some species the sheath of the proboscis projects in the manner of a snout (a).

*S. euphorbiæ, L.;* Rœs., Insect., I, cl., 1, Pap. Noct., III. Superior surface of the upper wings reddish-grey, with three green spots, and a broad band of the same colour; that of the lower wings red, with a black band and a white spot. Antennæ white. The body olive-green above; abdomen conical, sharply pointed, and without a terminal brush.

The caterpillar is black, with yellow spots and points; a line along the back, tail and feet red.

*S. Atropos; L.;* Rœs., Insect. III, I. Superior wings variegated with deep and yellowish-brown, and light-yellowish; inferior wings yellow, with two brown bands; a yellowish spot, with two black dots on the thorax; abdomen yellowish, with black annuli, and without a terminal brush. This is the largest species in France. The spot on the thorax resembling a death's head, and the sharp sound it produces (attributed by Reaumur to its rubbing the palpi against its proboscis ‡, and by M. Lorey to

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that of *Cocytia* of M. Bois-Duval; the wings are marked with square transparent spots; a character which seems to approximate them to *Sesia*; but the palpi are those of *Urania*, and the antennæ are as in *Agarista*.

\* Founded on a species from Brazil, now in the cabinet of Count Dejean, and which I believe is undescribed.

† See Encyc. Méthod., article *Papillon*, genus *Agariste*, and the already quoted Monograph of Dalman.

‡ It is proportionally shorter than in the other *Sphinges*. It is probably from

↳ (a) Curving downwards, and the extremity laid on the pectus, resembling the handle of a vase.—ENG. ED.



the rapid escape of air from two particular cavities of the venter), have frequently produced considerable alarm among the people in certain years when it was unusually abundant\*.

The caterpillar is yellow, with blue stripes on the side, and the tail recurved and zig-zag. It feeds on the Potato-vine, Jasmin, &c., and becomes a chrysalis near the end of August. The perfect Insect appears in September.

The caterpillars of certain species, all remarkable for their beautiful colours—the *celerio*, *nerii*, *Elpenor*, *porcellus*—have the anterior extremity of the body strongly attenuated in the manner of a Hog's snout, whence their French name of *Cochonnes*, and susceptible of being retracted within the third ring. The sides are marked with some ocellated spots. These species, in this respect, form a very natural division.

In others, as in the *Sesiæ*, the abdomen is terminated by a brush of scales. Scopoli formed a separate genus with them, his *MACROGLOSSUM*; and Fabricius at first united them with his *Sesiæ*. He afterwards—System. Glossat.—separated them, leaving that generic appellation to this group, and giving the name of *ÆGERIA* to the primitive *Sesiæ*. But the *Lepidoptera* he now calls *SESIE*, have the essential characters of *Sphinx*; such is the *stellatarum*, L.; and those he calls *fuciformis*, *bombylifformis*, &c. The wings of the two latter are mostly diaphanous †.

#### SMERINTHUS, Lat.,

Where the antennæ are serrated and there is no distinct tongue.

The *S. tiliæ*, much more common however on the Elm, the *S. demi-paon*, *S. populi*, *S. querci*, &c., compose this subgenus. They are heavy Insects, and the inferior wings project beyond the superior, as in several of the genus *Bombyx* ‡.

Our third division, that of the *SESIADES*, comprises those in which the antennæ are always simple, fusiform, and elongated, and frequently terminated, as in the preceding subgenera, by a little bundle of setæ or scales; in which the inferior palpi, slender and narrow, have three very distinct joints, the last tapering to a point; and where the extremity of the posterior tibiæ is armed with very stout spines. The abdomen in most of them is terminated by a sort of brush.

The caterpillars feed on the internal part of the stems or roots of plants, like those of the *Hepiali* and *Cossi*, are naked, without a posterior horn, and construct their cocoons in these stems with the debris of the substance on which they have fed.

this character that the *Atropos*, and another very analogous species from Java, have been made to form the genus *Acherontia*.

\* According to M. Passerini—Ann. des Sc. Nat., XIII, 332—the organ that produces this noise is seated in the head.

† For the other species, see Fabricius, loc. cit.; Godart's Hist. Nat. des Lépid. de France; and a Memoir of Bois-Duval, in the Mem. de la Soc. Lin. de Paris. M. Lefébure de Cerisy, naval engineer, has prepared a most excellent Monograph of this genus, accompanied with good figures, which circumstances have not yet allowed him to publish.

‡ See Encyc. Méthod., article *Smerinthe*; and Godart, op. cit.



## SESIÆ,

Where the antennæ are terminated by a little tuft of scales. The wings are horizontal and marked with transparent spots. The scales of the posterior extremity of the abdomen form a brush. Several of these Insects bear a close resemblance to Wasps or other Hymenoptera, to Diptera, &c. \*

THYRIS, *Hoff. Illig.*

The Thyrides resemble the Sesiæ, but their antennæ are much more slender, almost setaceous, and destitute of the terminal tuft. Their wings are angular and dentated. Their abdomen terminates in a point.

M. Bois-Duval, whose knowledge of Lepidoptera in general, and of those in Europe particularly, is not inferior to that of our most celebrated entomologists, and who is about to publish a Monograph of the Zygænidæ, that has received the approbation of the Royal Academy of Sciences, has observed the metamorphosis of the most known species †.

ÆGOCERA, *Lat.*,

Where the antennæ are also destitute of the tuft of scales, but evidently thickened in their middle, and fusiform; the second joint of the inferior palpi is furnished with a bunch of hairs, projecting in the form of a rostrum. The abdomen terminates in a simple point. The wings are tectiform and entirely covered with scales. Their metamorphosis are unknown ‡.

The fourth and last section of the Sphingæ, that of the ZYGÆNIDÆ, is composed of Lepidoptera, in which the antennæ, always terminated in a point destitute of a tuft, are sometimes simple in both sexes, fusiform or resembling a ram's horn, and sometimes but slightly thickened in the middle, almost setaceous, pectinated in both sexes, or at least in the males, and where the inferior palpi are of a moderate size or small, almost cylindrical, and always formed of three distinct joints. The wings are almost tectiform, and exhibit transparent spots in many. There is no terminal brush to the abdomen. The spurs of the posterior extremity are generally small.

The caterpillars live exposed on various leguminous plants. They are cylindrical, usually pilose, without a posterior horn, similar to those of different species of Bombyx, and form a fusiform or ovoid cocoon of silk, which they attach to the stems of plants. The habits of these Insects have been well described by M. Bois-Duval, in the work I have just mentioned. These Lepidoptera have been distinguished in France by the names of *Sphinx-béliers*, *Papillons-phalènes*, &c.

\* See the Monographs of the Sesiæ, by Laspeyres, Hübner, Godart, &c.

† *Sphinx fenestrina*, Fab.; Lat., Ibid.

‡ *Bombyx venulia*, Fab. See Lat., Gen. Crust. et Insect., IV, p. 211; Dalm., Anal. Entom., p. 49; it would, perhaps, be more in conformity with the natural order, if this subgenus were placed near Agarista.

## ZYGÆNA.

The Zygænæ are not found in the western continent. Their antennæ are simple in both sexes, and terminate abruptly in a fusiform club, or one resembling a ram's horn; their inferior palpi extend beyond the clypeus, and are pointed at the extremity.

*Z. filipendulæ*; *Sphinx filipendulæ*, L.; Roes., Insect., I, Class II, Pap. Noct., lvii. Black or bluish-green; six red spots on the superior wings; the inferior ones red, with their posterior margin the colour of the body.

The caterpillar is lemon-yellow, slightly pilose, with five series of black spots along the body. It spins a straw-coloured, glossy, elongated, and fusiform cocoon on the stems of plants. Its surface is wrinkled or plaited. The perfect Insect appears in July\*.

## SYNTOMIS, Illig.,

Only differing from Zygæna in the antennæ, which are not so thick, and insensibly fusiform and slender. The inferior palpi are shorter and obtuse †.

## ATYCHIA, Hoff., Illig.,

Where the antennæ are simple (in the females), or bipectinate (in the males), according to the sex; the inferior palpi are densely pilose and extend considerably beyond the clypeus. The wings are short, and the extremity of the posterior tibiæ is furnished with very strong spines ‡. The

## PROCRIS, Fab.,

Approaches Atychia in the antennæ; but the inferior palpi are shorter and not hairy. The wings are long, and the spurs of the posterior tibiæ are small.

*P. statices*; *Sphinx statices*, L.; *P. turquoise*, De Geer, Insect., II, p. 255, iii, 8—10. Body glossy green, as if gilt; inferior wings brown; antennæ of the male with two series of black setæ, those of the females somewhat serrated.

In the other Lepidoptera of this division, the antennæ of both sexes are bipectinated or furnished with a double row of elongated teeth. Those which have a distinct proboscis form the subgenus GLAUCOPIS of Fabricius §, and those in which that organ is wanting, or is not distinct, that of AGLAOPE ||.

\* Lat., Gen. Crust. et Insect., IV, 211; see also the Hist. Nat. des Lépid. de France.

† See the same works.

Near the Syntomides comes the genus PSICOTHOE, established by M. Bois-Duval, in his Europ. Lepid. Index Méthod., and, according to him, distinct from all other Zygænides in its moniliform antennæ and immaculate wings. It comprises but a single species, *P. Duvancelli*, found in Bengal, by M. Diard and the late M. Duvanel.

‡ Lat., Ibid., IV, 214.

§ Lat., Gen. Crust. et Insect., IV, 214; it is the genus *Charidea* of Dalman.

|| Lat., Ibid., Idem; see also Godart, Hist. des Lépid. de France.

There are numerous species of these two subgenera. They seem to connect themselves with the Callimorphæ.

We should remark that the genus *Stygia*, which was placed in this tribe, belongs to that of the *Hepialites*.

M. de Villiers—Ann. de la Soc. Lin. de Par., V, 473—who has given us some new observations on the *S. australia* accompanied with good figures, considers it as intermediate between the *Sesiæ* and the *Zygænæ*; but it has no proboscis. Its palpi are those of a *Cossus*. The antennæ are short, nowise fusiform, and more analogous to those of certain species of *Bombyx* than to those of the *Sesiæ* and *Zygænæ*. This Insect, even in the arrangement of the colours of the superior wings, approximates much more to *Cossus* and *Zeuzera* than to the preceding subgenera.

### FAMILY III.

#### NOCTURNA.

In the third family of the Lepidoptera, with some few exceptions, we also find the wings bridled, when at rest, by a bristle or bundle of setæ arising from the exterior margin of the lower ones, and passing into a ring or groove in the under part of the upper ones. The wings are horizontal or inclined, and sometimes rolled round the body. The antennæ gradually diminish in thickness from base to point, or are setaceous.

This family, according to the system of Linnæus, forms but the single genus

#### PHALÆNE, *Lin.*

These Lepidoptera seldom fly but at night or after sunset. Several have no proboscis. Some of the females are destitute of wings, or have but very small ones. The caterpillars most commonly spin a cocoon; the number of their feet varies from ten to sixteen\*. The chrysalides are always rounded, or without angular elevations or points.

The classification of this family is very embarrassing, and with respect to it our systems are as yet merely imperfect essays or rude sketches †. We divide it into ten sections. The first nine are composed of those species in which the wings are perfectly entire, or with-

\* De Geer, in one species, counted eighteen, all membranous, II, p. 245, and I, xxx, 20; xxxi, 13—16.

† We are frequently compelled to borrow characters taken from the caterpillar. If this be disregarded, we shall be compelled to suppress a great number of genera. I will mention, for instance, that of *Phalæna* proper, or *Geometra*. If we consider only the perfect Insect, it is impossible to distinguish generically several species, such as the *prodomaria betularia* and *hirtaria*, from *Bombyx*; it is also evident that we could not separate from them *Platypteria*, and other genera.

out digitations. All those that in their caterpillar state live almost exposed, or in fixed domicils, several of which have at least sixteen feet, and which, in their perfect state, have their superior palpi very small, or entirely concealed, the wings more or less triangular, horizontal or tectiform, and not folding round the body, will compose the first eight. The last of these latter, or the eighth, is the only one in which the caterpillars have fourteen feet, two of them anal. If the same number be found in some others, then the two last are wanting.

The two divisions, *Attacus* and *Bombyx* of the genus *Phalæna* of Linnæus correspond to the four first sections. The proboscis is most frequently rudimental, or very small, and its two threads are not united. The inferior palpi, those of a small number excepted, are small and almost cylindrical. The antennæ, at least in the males, are pectinated or serrated. The wings are horizontal or tectiform, and in several the inferior ones project beyond the others when at rest, and sometimes are also destitute of that bristle or bridle which connects them with the latter. The thorax is always smooth, as well as the abdomen, and woolly. The latter is usually very voluminous in the females. The cocoon of the chrysalis is usually well felted and solid.

Although the nocturna of the fourth section are closely allied to those of the preceding ones, we find a character in their caterpillars perfectly unique in this order: the anal feet are wanting, while all those of the three preceding sections have sixteen.

The type of the first section, that of the **HEPIALITES**, is the genus *Hepialus*, (*Hepiolus* of some authors) of Fabricius, and the *Cossus* of the same. The caterpillars are rare, and remain concealed in the heart of the plants on which they feed; their cocoon is mostly formed of particles of the matter that nourishes them. The margin of the abdominal annuli of the chrysalis is dentated or spinous. The antennæ of the perfect insect are always short, and most frequently present but one sort of small, short, rounded, and crowded teeth. Those of the four others are always terminated by a simple thread; but they are furnished inferiorly in the males with a double line of setæ. The proboscis is always very short, and but slightly apparent. The wings are tectiform and usually elongated. The last abdominal annuli of the females form an elongated oviduct, or sort of tail. The caterpillars of these Insects are very injurious to several kinds of trees and other useful vegetable productions.

Sometimes the antennæ, almost similarly formed in both sexes, have but very short teeth, arranged in one or two lines.

#### HEPIALUS, *Fab.*,

Distinguished by their almost granular antennæ, which are much shorter than the thorax. The inferior wings are usually destitute of a bridle.

The caterpillars live in the ground, and feed on the roots of plants.

*H. humuli*, *Fab.*; *Harr.*, *Exp.*, of *Eng. Ins.*, IV, a—d. The superior wings of the males are silver-white and immaculate; those of the female yellow with red spots,

The caterpillar devours the root of the Hop, and is extremely noxious in those districts where that plant is extensively cultivated\*.

*Cossus, Fab.*,

Where the antennæ, at least as long as the thorax, present on their inner side a range of small, lamellated teeth, short and rounded at the end.

The caterpillars live in the interior of trees, on which they feed; the cut fragments enter into the composition of their cocoon. The chrysalis, at the moment the Insect is about to be developed, advances to the mouth of the aperture through which it is to issue.

*C. ligniperda*, Fab., Ræs., Insect. I, class II, Pap. Noct. XVIII. Rather more than an inch in length; cinereous-grey, with numerous small black lines on the upper wings, forming little veins, mixed with white; posterior extremity of the thorax yellowish with a black line.

The caterpillar, which is found in the spring, resembles a thick worm; it is reddish, with transverse bands of blood-red. It lives in the heart of the Willow and Oak, but particularly in the Elm. It disgorges an acrid and fetid humour, contained in spacious internal reservoirs, which it uses apparently to soften the wood †.

*STYGIA, Drap.—BOMBYX, Hüb.*,

Where the antennæ are furnished throughout their whole length with a double series of short narrow teeth, dilated and rounded at the end ‡.

Sometimes the antennæ vary greatly—according to the sex; those of the males are furnished inferiorly with a double range of hairs, and terminated by a thread: those of the females are entirely simple, but cottony at base.

*ZEUZERA, Lat.—COSSUS, Fab.*

The caterpillar of a beautiful species—*Cossus æsculi*, Fab.—with a white body, blue rings on the abdomen, and numerous points of the same colour on the superior wings, lives in the Apple and Pear trees, &c., and frequently in their very heart §.

Our second section, that of the BOMBYCITES, is distinguished from the preceding one and the third by the following characters: the proboscis always very short, and merely rudimental; wings either extended and horizontal or tectiform, but the lower ones extending laterally beyond the others; antennæ of the males entirely pectinated.

\* For the other species see Fabricius, Esper, Engramelle, Hübner, Godart, Donovan, &c.

† Add *Cossus teretra*, Fab.;—*Phalæna strix*, Cramer; *Cossus lituratus*, Donovan;—*C. nebulosus*, Donovan.

‡ *Stygia australis*, Lat., Gener. Crust. et Insect., IV, 215; Godart, Hist. Nat. des Lépid. de France, III, 169, xxii, 19. See also the Memoir of Villiers, already mentioned, in the Ann. de la Soc. Lin. de Par., V. North America produces another species. The antennæ differ from those of a *Cossus*, so that this subgenus may be retained; the abdomen terminates in a little brush.

§ Ræs., Insect., III, xlvi. 5, 6;—*Cossus pyrinus*, Fab.; *C. scalaris*, Ejusd.; *Phalæna scalaris*, Donovan;—*P. mineus*, Ejusd.

The caterpillars live in the open air, and feed on the tender parts of plants. Most of them form a cocoon of pure silk. The margin of the abdominal annuli is not dentated in the chrysalis.

We will form a first subgenus with those species in which the wings are extended and horizontal, or the *Phalænæ attacus* of Linnæus, retaining the name

SATURNIA, *Schr.*,

Given to it by M. Schrank, uniting with it *Aglia* (*Bombyx tau*., Fab.) of Ochsenheimer. It comprises the largest species, the wings of which are frequently fenestrate, or marked with diaphanous spots. Such are the

*S. Atlas* of China, the *B. hesperida*, *B. cecropia*, the *B. luna*, where the inferior wings are prolonged into a sort of tail, &c. The silk of two other species of the same division, the *Bombyx mylitta* of Fabricius, and the *Phalæna cynthia* of Drury—Insect. II, vi, 2 \*, has been employed in Bengal from time immemorial. I have satisfied myself by a Chinese MS. on this subject, sent to me by M. Huzard, that the caterpillars of these Bombycites were the *wild silk-worms of China*. I suspect that part of the silks procured by the ancients in their maritime commerce with the inhabitants of India, proceeded from the silk of these caterpillars.

But five species of this subgenus † are found in Europe. The most common is the

*S. pavonia major*; *B. pavonia major*, Fab.; Roes., Insect. IV, xv, xvii. The largest species found in France. It is five inches in width; wings extended; body brown, with a whitish spot at the anterior extremity of the thorax; wings round, sprinkled with grey; a large, black, ocellated spot, traversed by a transparent line, surrounded by an obscure fulvous circle, by a white semicircle, by a second that is reddish, and by another black circle, on the middle of each wing.

The caterpillar, that lives on leaves of different trees, is green, with blue tubercles, arranged in rings, from which issue long clavate hairs. In the month of August it spins an oval cocoon, narrowed into a blunt point, with a double neck, the interior of which is partly formed of elastic and convergent threads, that facilitate the egress of the Insect, but prevent the ingress of enemies. The silk is very strong and adhesive. The perfect insect appears in the May of the following year ‡.

The superior wings of the other Bombycites are tectiform, and the exterior margin of the inferior ones project almost horizontally—*alæ reversæ*—beyond them.

Sometimes their palpi project in the manner of a rostrum, and their inferior wings are frequently dentated. The Insect resembles a bundle of dead leaves. These species form the genus

\* Trans. Lin. Soc., VII, p. 35.

† Authors mention but four; a fifth has lately been discovered, now in the collection of M. Bois-Duval, that is perfectly distinct.

‡ For the other species, see Fab., Syst. Entom., first division of *Bombyx*; and Oliv., Encyc. Méthod., first division of the same genus.



## LASIOCAMPA\*.

Those, in which the inferior palpi are not remarkably salient, compose the subgenus,

BOMBYX *proper* †.

*B. mori*, L.; Rœs., Insect., III, vii, ix. Whitish, with two or three obscure and transverse streaks; a lunated spot on the superior wings.

The caterpillar is well known by the name of *Silk-worm*. It feeds on the leaves of the Mulberry, and spins an oval cocoon of a close tissue, with very fine silk, usually of a yellow colour, and sometimes white. A variety is now preferred, which always yields the latter.

The Bombyx which produces it, is originally from the northern provinces of China. According to Latreille, the city of Turfan, in Little Bucharia, was for a long time the rendezvous of the western caravans, and the chief entrepot of the Chinese silks. It was the metropolis of the Seres of Upper Asia, or of the Serica of Ptolemy (a). Driven from their country by the Huns, the Seres established themselves in Great Bucharia, and in India. It was from one of their colonies, Ser-hend (*Ser-indi*), that Greek missionaries, in the reign of Justinian, carried the eggs of the silk-worm to Constantinople. At the period of the first crusades, the cultivation of silk was introduced into the kingdom of Naples from the Morca; and, several centuries afterwards, under the administration of Sully particularly, into France. Silks were also procured by the ancients, either by sea or land, from Pegu and Ava, or the Oriental Seres, those most commonly mentioned by the earlier geographers. Some of the northern Seres settled in Great Bucharia, according to a passage of Dionysius the historian, seem to have made it their particular business. It is well known that silk was formerly sold for its weight in gold, and that it is now a source of great wealth to France.

*B. neustria*, Fab.; Rœs., Insect., I, Class II, Pap. Noct., vi. Yellowish, with a band of two transverse, fulvous-brown stripes on the middle of the superior wings. The female deposits her eggs round branches of trees in the manner of a ring or bracelet.

\* The *B. quercifolia*, *populifolia*, *betulifolia*, *illicifolia*, *potatoria*, of Fabricius. This subgenus forms part of the genus, *Gastropacha*, of Ochsenheimer.

M. Banon, of Toulon, to whose friendship I am indebted for many Insects collected by him in Cayenne and the Levant, has given me a Lepidopterous Insect, having all the characters of a *Lasiocampa*, but furnished with a very distinct proboscis. It seems to form the passage from this subgenus to the *Calyptra* of Ochsenheimer.

† This generic appellation has been improperly suppressed by Ochsenheimer. We will apply it generically to all the species of his genus, *Gastropacha*, in which the inferior palpi do not project in the manner of a rostrum.

☞ (a) Between the Ganges and the Eastern Ocean, according to that author. It was this circumstance that induced the Romans to name silk, *Sericum*. Hence their *serica vestis*.—ENG. ED.



The caterpillar is striped longitudinally with white, blue, and reddish, whence its French specific name of *livrée*. It lives in society, and is very injurious to fruit trees. It forms a very thin cocoon, intermixed with a whitish farina.

*B. processionea*, Fab.; Reaum., Insect., II, x, xi. Cinereous; wings of the same colour; two obscure stripes near the base of the upper ones, and a third, blackish, a little beyond their middle, all transverse.

The body of the caterpillars is obscure-cinereous, with a blackish back, and some yellowish tubercles. They live in society on the Oak, spin in common, when young, a tent, beneath which they are sheltered, change their domicil frequently, until after their third change of tegument, when they become stationary, and form a new dwelling in the same manner, resembling a sort of sac and divided internally into several cells. They usually issue from it, in the evening, in procession. One of them is at the head and acts as a guide, then come two, in the next line three, then four, and so on, each line regularly increasing by a unit. They all follow the course of the leader. Each one spins a cocoon, which is placed in contact with that of its neighbour, and mingles the hairs of its body in its tissue. These hairs, as well as those of several other species, are very small and fine, penetrate into the skin, and occasion violent itchings and swellings. The

*B. pythio-campa* is a species analogous to the processionea.

The inhabitants of Madagascar employ the silk of a caterpillar, which also forms large communities. The nest is sometimes three feet in height, and so closely are the cocoons packed in it, that there is no hiatus to be found. A single nest yields five hundred cocoons\*.

The third section of the Nocturna, that of the PSEUDO-BOMBYCES, is composed of Lepidoptera, in which, as well as in the following ones, the inferior wings are furnished with a bridle which fixes them to the superior, when at rest. They are then entirely covered by the latter, both being tectiform or horizontal, but with the inner margin overlapped. The proboscis, towards the latter end of the tribe, begins to lengthen, and in the last subgenera, even scarcely differs from that of other Lepidoptera, except in being somewhat shorter. The antennæ are entirely pectinated or serrated, at least in the males. All their caterpillars live on the exterior parts of plants.

We will first separate those species in which the proboscis is very short, and nowise adapted for suction.

The caterpillars of some, and the greater number, live exposed and do not construct portable dwellings.

Of these, some are elongated, furnished with ordinary feet well adapted for walking; the annuli of the body are not soldered above.

Sometimes both sexes are provided with wings adapted for flight.

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\* It belongs to the subgenus *Sericaria*.

SERICARIA, *Lat.*,

Where the superior wings present no dentations in their inner margin.

*S. dispar*; *B. dispar*, Fab.; Rœs., Insect., I, Class II, Pap. Noct. iii. The male much smaller than the female, his upper wings brown, with undulating blackish stripes; the female whitish, with black spots and streaks on the same wings. She covers her eggs with the numerous hairs on the extremity of her abdomen. The caterpillar is very often injurious to fruit-trees\*.

NOTODONTA, *Ochs.*,

Where the inner margin of the superior wing is dentated.

This subgenus connects itself with certain Noctuæ †.

Sometimes the females are almost apterous, as in

ORGYIA, *Ochs.*

The caterpillars are furnished with crests and pencils of hairs.

*O. antiqua*; *B. antiqua*, Fab.; Rœs., *Ibid.*, xxxix, the female; iii, Class II, Pap. Noct., xiii, the male. Superior wings of the male fulvous, with two transverse blackish stripes, and a white spot near the inner angle. The abdomen of the female is very voluminous ‡.

We now come to Pseudo-Bombyces, whose caterpillars are compelled to crawl, their feet being short, and even the squamous one being retractile. Their body is oval, resembling that of an Oniscus, and its skin is soldered above from the second ring, so that it forms an arch under which the head is withdrawn.

These species form the subgenus

LIMACODES, *Lat.*

Their caterpillars seem to represent, in this division, those of certain Diurnal Lepidoptera, such as the Polyommata §.

The last of the Pseudo-Bombyces, without an apparent or at least useful proboscis, also present another anomaly in their first state. Their caterpillars, like those of several Tineites, live in portable dwellings consisting of a silken tube, on which they fix fragments of stems or twigs of various plants, forming little rods laid one over the

\* The *Bombyx versicolor*, *bucephala*, *coryli*, *pudibunda*, *abietis*, *anachoreta*, of Fabricius, or the genera *Endromis*, *Liparis*, *Pygæra*, and several species belonging to that of the *Orgyia* of Ochsensheimer.

† The Notodontæ of the same, with the exception, however, of the species called *palpina*, which on account of its large and compressed palpi, and spirally rolled proboscis, should form a separate subgenus, connecting the Notodontæ of that savant with his *Calyptræ*, and which I place at the head of the Noctuæ, in order to proceed thence to *Xylena*, *Cuculia*, &c.; some of the Notodontæ have the thorax and crest, a character which appears more peculiar to this latter section. There are some of them in which the inferior palpi are strongly compressed. See our general observations on that division of the Nocturnæ.

‡ Add *O. gnostigma*, Ochs. The others will be Sericariæ.

§ The *Hepialus testudo*, *asellus*, *bufo*, Fab. See Godard, *Lépid. de France*, IV, 2791, xxviii, 1, 2.

other. These habitations resemble those of the larvæ of certain Phryganeæ. Very remarkable ones are found in the East Indies and Senegal.

These Lepidoptera, united by Hübner with the Tineæ, compose the subgenus

PSYCHE, *Schr.*\*

The last Pseudo-Bombyces, which, by the disposition of their colours seem to represent the Diurna called *damiens*, are furnished with a very distinct proboscis which, when unrolled, extends far beyond the head, as in

CHELONIA, *Godart.*—ARCTIA, *Schr.*—EYPREPPIA, *Ochs.*,

Where the wings are tectiform, the antennæ of the males pectinated, the inferior palpi densely pilose, and the proboscis is short.

*C. chrysorrhæa*; *Bombyx chrysorrhæa*, *Fab.*; *Rœs.*, *Insect. I.*, *Class II.*, *Pap. Noct.*, xxii. Wings white and immaculate; posterior extremity of the abdomen fulvous-brown.

In certain years the caterpillar of this species strips whole woods of their leaves.

*E. caja*; *Bombyx caja*, *Fab.*; *Rœs.*, *Ibid.*, i. Head and thorax brown; superior wings of the same colour, with irregular white streaks; inferior wings and back of the abdomen red, with bluish-black spots.

The caterpillar which lives on the Nettle, Lettuce, Elm, &c., has received the name of *hedge-hog*, or *bear*, on account of its long and numerous hairs. It is blackish-brown with rings of blue tubercles †.

CALLIMORPHA, *Lat.*—EYPREPPIA, *Ochs.*,

Where the wings are also tectiform, but the antennæ, at most, ciliated in the males; the inferior palpi are merely covered with small scales, and the proboscis is long.

*C. Jacobæ*; *Bombyx Jacobæ*, *Fab.*, *Rœs.*, *Insect.*, *Class II.*, *Noct. Pap.*, xlix. A very common species in France. Black; superior wings with a line and two points of carmine; the inferior ones, carmine margined with black.

The caterpillar is yellow, with black antennæ; it lives on the Groundsel ‡.

LITHOSIA, *Fab.*,

Where the wings are laid horizontally on the body §,

The fourth section of the Nocturna, that of the APOSURA ||, is removed, as we have observed in the general divisions of this family, by a unique character, viz. the absence of the anal feet of the animal

\* See *Ochs.*, *Godart.*, &c.

† For the other species, see *Lat.*, *Gener. Crust. et Insect.*, IV, p. 220; *Ochsenhiemer* and *Godart.*, *Hist. Nat. des Lépid. de France.*

‡ See the same works.

§ *Idem.*

|| Anus without feet, a character peculiar to the caterpillars of this tribe, which forms a lateral branch leading to the *Phalænites*.

in its larva state. The posterior extremity of the body terminates in a point, which in several is forked, or even presents two long, articulated, and movable appendages, forming a sort of tail. With respect to their proboscis, palpi, and antennæ, these Insects are but slightly removed from the preceding ones. Some, such as the

DICRANOURA, *Godart.*—CERURA, *Schr.*—HARPYIA, *Ochs.*,

Have the external appearance of the Sericariæ and Chelonix; the antennæ of the males terminate in a simple and curved thread. The posterior extremity of the body of the caterpillars is forked\*.

Some others, such as the

PLATYPTERIX, *Lasp.*—DREPANA, *Schr.*,

Closely resemble the true Phalænæ. Their wings are broad, and the superior angle of the posterior extremity of the upper ones is salient or falcated. The body is slender. That of the caterpillars terminates in a simple and truncated point. They bend the edges of the leaves on which they live and feed, and fix them in that position by means of silk. Their cocoon is very slight, and, in a word, these Lepidoptera are connected with the Dicranoura in their larvæ state, and with the Phalænites as perfect Insects †.

Those which compose the fifth section of the nocturnal Lepidoptera, that of the NOCTUÆLITES, *Lat.*, are similar to the preceding Insects in the figure and relative size of the wings, and in their position when at rest, but present the two following distinguishing characters: a horny and most commonly long, spirally rolled proboscis; inferior palpi, abruptly terminated by a very small or much more slender joint than the preceding one; the latter much wider, and strongly compressed.

The body of the Noctuælites is more covered with scales than with a woolly down. Their antennæ are usually simple. The back of the thorax is frequently tufted, and the abdomen forms an elongated cone; they fly with great rapidity. Some of them appear during the day.

Their caterpillars have usually sixteen feet; the others have two or four less, but the two posterior, or anals, are never absent, and in those which present but twelve, the anterior pair of the membranous ones are as large as the next. Most of these caterpillars enclose themselves in a cocoon to complete metamorphosis.

This section embraces the Noctuæ of Linnæus.

All the generic sections made in modern times, the characters of which are rather taken from the Insect in its larva state than when perfect, belong to the two following subgenera.

\* See Oechsenheimer, Godart, Hübner; and Fischer, *Entom. Imp. Russ.*

† The *Phalæna falcataria*, *Ph. lacertinaria* Fab., and his *Bombyx compressa*. I at first intended to form a particular section with this subgenus, which would have been intermediate between the Pseudo-Bombyces and the Phalænites. Oechsenheimer places it at the end of the Noctuæ, to pass from the Enclidix to the preceding section; but the Platyptericæ appear to us more nearly allied, in their caterpillar state, to the Harpyix of that naturalist, than to the Enclidix and other Noctuæ, whose caterpillars are pseudo-geometrix.

## EREBUS, Lat.—THYSANIA, Dalm.—NOCTUA, Fab.,

Where the wings are always extended and horizontal, and the last joint of the inferior palpi is long, slender, and naked.

They are the largest Lepidoptera of this tribe, and with the exception of one species peculiar to Spain—the *Ophiusa scapulosa*, Ochs.—are all foreign to Europe\*.

## NOCTUA, Fab.,

Where the last joint of the inferior palpi is very short, and covered with scales, as in the preceding Insects †.

Among his Noctuæ proper, the caterpillars of some, and the greater number, have sixteen feet. Of these we will notice the

*N. Sponsa*, Fab., Rœs., Insect., IV, xix. Cinereous grey; thorax crested; wings lapping: upper surface of the superior ones obscure grey, with strongly undulated black streaks, and a whitish spot divided by several black lines; that of the inferior bright red, with two black bands; abdomen entirely cinereous.

The caterpillar lives on the Oak; it is grey, with some obscure and irregular spots, and little tubercles; a bump on the fifth ring, surmounted by a yellow plate. This species and some others

\* Lat., Gen. Crust. et Insect., IV, 225; Consid. Gén. sur les Crust., &c. The males of some species have pectinated antennæ, and might constitute a particular subgenus.

† The genus *Noctua* of Fabricius, in Ochseneimer's History of the Lepidoptera of Europe, is divided into forty-two, from *Acrionicta* to *Euclidia* inclusively. They are, for the most part, the divisions established in the Systematic Catalogue of the Lepidoptera of Vienna, transformed into genera which the nature of our work forbids us to describe. That of *Noctua*, the *Erebi* being detached, appears to us to divide itself into two great parallel series, one of which is connected with these latter Lepidoptera, and the other with the *Notodontæ*. The first is composed of those *Noctuæ* whose caterpillars walk in the manner of *Geometra*. Some have sixteen feet, of which the two or four anterior, of the intermediate membranous ones, are the shortest; the others have but twelve: such are the *Plusiæ* and the *Chrysoptera*, a genus distinguished from the preceding by the size of the inferior palpi, which bend over the head. The second series will commence with species in which the palpi are proportionally larger, the antennæ pectinated, and the proboscis is small; such are the *Notodonta palpina* (*Odonptera palpinus*) Lat., and the *Calyptra* of Ochseneimer, or *Calpes* of Treitschke. Then will follow the genera *Xylena*, *Cuculia*, those *Noctuæ* in which the posterior margin of the superior wings is angular or dentated, those where the antennæ are pectinated, and then those in which they are simple. We will terminate these latter species with such as have a smooth thorax, some of which, of the genus *Erastia*, Id., appear to lead to *Pyralis*. All the caterpillars of this second series have sixteen feet, and the intermediate membranous ones of equal size; they move in a straight line. The *Chroptera*—*Plusia concha*, Fisch., Entomog. Imp. Russ. I, Lepid., IV—with which we terminate the other series, are allied to *Herminia* and *Pyralis*. Thus the two series seem to converge and end in this large section. The *Licheniæ* or *Cotocala* of Ochseneimer are large species, with almost horizontal wings, that appear naturally approximated, as well as *Ophius*, *Brephos*, &c. to *Erebus*. If we place them in the other series they destroy its harmony.

The *Bombyx cyllopoda*, Dalm., Analect. Entom., 102, should form a new subgenus. It is very remarkable, inasmuch as the two posterior legs are shorter than the others, unarmed and almost useless for the purpose of locomotion. This Insect, on account of its pectinated antennæ, distinct proboscis, and antennæ which are twice the length of the head, should be placed near the genus *Calyptra* of Ochseneimer, or our *Herminiæ*.

are called *Lichinées*, on account of their colour, which resembles that of a Lichen. Their four anterior membranous feet are the shortest, and they walk in the manner of the *Geometræ*.

*N. pacta*, Fab. Distinguished from the others by the red colour of the under part of its abdomen. It is only found in the north of Europe\*.

The caterpillars of some have but twelve feet. The superior wings of the perfect Insect are frequently ornamented with golden or silver spots. Such are the two following species †.

*N. gamma*, Fab., Roes., Ins. I, Class III, Pap. Noct., V. The thorax crested; superior surface of the upper wings brown, with lighter shades of the same colour, and a golden spot forming a lambda or gamma, laid on the side, in the middle. By pressure, two tufts of hairs may be made to protrude from the extremity of the male's abdomen. The caterpillar lives on various culinary vegetables.

*N. Chrysitis*, Fab.; Esp., Noct., cix, fig. 1—5. Superior wings light brown, traversed by two bands of the colour of polished brass.

Some caterpillars, like those of the *N. Verbasci*, *N. Artemisiæ*, *N. Absinthii*, &c., have the habit of feeding on the flowers of plants peculiar to them ‡.

Other species of Noctuæ have pectinated antennæ, like the *N. graminis*—*P. graminis*, L.—whose caterpillar sometimes ravages the fields of Sweden.

The sixth section of Nocturnal Lepidoptera, or that of the *PHALÈNE TORTRICES*, L., is closely allied to the two preceding ones. The superior wings, of which the exterior margin is arcuated at base and then narrowed, their short and wide figure forming a truncated oval, give a very peculiar appearance to these Insects. They are called in France, *Phalènes à larges épaules*, and *Phalènes à chappe*. They have a distinct proboscis, and their inferior palpi are usually almost similar to those of the Noctuæ, but somewhat salient.

They are small and prettily coloured; their wings are tectiform, but flattened almost horizontally, and always laid on the body. In this case the upper ones are slightly crossed along the inner margin.

Their caterpillars have sixteen feet, and their body is closely shorn, or but slightly pilose. They twist and roll up leaves of trees, connecting various points of their surface at different times by layers of silken threads running in one direction, and thus form a tube, in which they reside, and feed in tranquillity on their parenchyma. Others form a nest by connecting several leaves or flowers with silk. Some of them inhabit fruits.

\* These two species belong to the genus *Catocola*, Ochseneimer.

† Genus *Plusia* of the same.

‡ They belong to the genus *Cucullia* of Schrank and other Lepidopterologists. For the other species see Olivier, Encyc. Méthod., art *Noctuelle*; Lat. Gener. Crust. et Insect., IV, p. 224, and in particular Ochseneimer's work on the Lepidoptera of Europe, and the *Hist Nat. des Lépid. de France* of Godart, now continued by M. Duponchell, well known to entomologists by his interesting Monograph of the genus *Erotylus* already quoted, and other Memoirs.



The posterior extremity of the body is narrow in several; they are styled by Reaumur "*chenilles en forme de poisson*." Their cocoon has the figure of a bateau, and is sometimes of pure silk, and at others mixed with foreign matters,

The Tortrices compose the subgenus.

PYRALIS, *Fab.\**

*P. pomana*, *Fab.*; *Rœs.*, *Insect.*, I, Class IV, Pap. Noct. xiii. Cincereous-grey; superior surface of the upper wings finely striped with brown and yellowish, with a large spot of golden-red.

The caterpillar feeds on the seeds of the apple, and the female deposits her eggs on their germ.

*P. vitis*, *Bosc.*, *Mem. de la Soc. d'Agric.*, II, iv, 6. Superior wings deep greenish, with three oblique, blackish bands, the last terminal.

Its caterpillar is very injurious in vineyards.

*P. prasinaria*, *Fab.*; *Rœs.*, *Insect.*, IV, x. The largest species known; superior surface of the upper wings light green, with two oblique white lines.

On the Oak, &c. Its caterpillar is one of those that Reaumur compares to a fish. Its cocoon has the form of a bateau †.

The seventh section of the Nocturna, that of the GEOMETRÆ—*Phalænites*, *Lat.*; *P. geometræ*, *L.*—comprises Lepidoptera in which the body is usually slender, the proboscis either nearly wanting, or generally but slightly elongated, and almost membranous. The inferior palpi are small, and almost cylindrical. The wings are ample, extended, or tectiform, and flattened. The antennæ of several males are pectinated. The thorax is always smooth. The caterpillars usually have but ten feet; the others present two more, and those at the anus always exist. Their peculiar mode of progression has caused them to be styled *Arpenteuses*, *Geometræ*, or *Measurers*. When about to advance, they first cling with their anterior or squamous feet, then elevate their body so as to form a ring, in order to

\* Certain divisions established in our *Gen. Crust. et Insect.*, IV, 230, divis. 2 and 11, & has appeared to us—*Fam. Nat. du Règ. Anim.*, 476—might be formed into separate subgenera.

Those species—*Tortrix dentana* *Hübner*.—in which the wings have a peculiar appearance, the upper ones being somewhat raised at the exterior margin, and inclined on the opposite one, and of which the caterpillars have membranous feet of a peculiar form, compared by Reaumur to wooden legs, compose the subgenus XYLOPODA. Others—*Pyralis rutana*, *umbellana*, *heracleana*—in which the inferior palpi curve over the head like horns, and terminate in a point, form that of the Volucræ—VOLUCRÆ.

Finally, others again in which the wings are narrow and elongated, and the inferior palpi longer and salient, species which closely resemble the Crambi of Fabricius, near which they must probably be placed, constitute a third subgenus, PROCERATA, of which the *Syrulis saldonana*, *Fab.*, is the type.

For the other species, see Fabricius and Hübner.

† MM. Lefebvire and Serville, with the *Pyralis Godarti*, previously described by them, have formed the new genus MATRONULA, differing from others of this division in the following characters; the labial palpi shorter than the head, with rather indistinct and almost glabrous joints; anterior coxæ strongly compressed, and at least as long as the thighs.



approximate the posterior extremity of the body to the anterior, or that which is fixed; they cling with the anal feet, disengage the first, and move the body forwards, when they recommence the same operation. Their attitude when at rest is singular. Fixed to a branch of some plant by the anal feet only, their body remains extended in a straight line in the air, and absolutely motionless. So closely does the skin resemble the branch in its colour and inequalities, that it is easy to confound them. In this way and at an angle of forty-five degrees, or more, with the limb to which they are attached, these animals remain for hours and even days.

The chrysalides are almost naked, or their cocoon is extremely thin, and poorly furnished with silk.

This section, exclusive of the caterpillars, contains but one subgenus, or

*Phalæna proper.*

The caterpillar of the *Phalæna margaritaria*, Fab., has twelve feet\*; the others have but ten.

*P. sambucaria*, L.; Rœs., Insect. I, Class III, Pap. Noct., VI. One of the largest that inhabits France; sulphur-coloured; wings extended and marked with brown, transverse stripes; the inferior prolonged at the external angle in the manner of a tail, where two small blackish spots may be observed.

The caterpillar is brown, resembling a little stick both in form and colour. The head is flat and oval. With this species and some others, of which the inferior wings have a similar shape, Dr. Leach has formed the genus *Ouropteryx*.

*P. syringaria*, L.; Rœs., Ibid., X, where the antennæ are pectinated in the male, whose wings are *jaspered* by a mixture of yellowish, brown, and reddish.

The caterpillar has four stout tubercles on its back, in addition to smaller ones, and a horn or hook on the eighth ring.

*P. grossularia*, Rœs., Ibid., II. Wings white, spotted with black; two bands of pale yellow on the upper ones, one near the base, and the other a little beyond the middle.

The caterpillar is bluish-grey above, spotted with black; inferior side and venter yellow, dotted with black.

The female of the *Ph. brumata*, L., as well as those of some analogous species, have mere rudiments of wings. They only appear in winter †.

De Geer describes a species (*Ph. à six ailes*), the male of which appears to have six wings, the inferior ones with a little appendage which is laid on them ‡.

The eighth section of the Nocturna, that of the DELTOIDES, Lat. §, consists of species very analogous to true *Phalænae*, but

\* The type of my subgenus METROCAMPE.

† They form my subgenus HYBERNIA.

‡ For the other species, see Fabricius and Hübner.

§ In the first edition of this work, this section comprised all the *Phalæna pyralides* of Linnæus. A complication of characters, however, was the result, which disappears by merely including the *Herminæ*. That of the *Tinæites* will then consist exclusively of the *Tinææ*, and *Pseudo-Tinææ* of Reaumur.

whose caterpillars have fourteen legs, and roll up leaves. In the perfect Insect the inferior palpi are elongated and recurved. Its wings and body, on the sides of which the former are extended horizontally, form a sort of delta, marked by a re-entering angle in the posterior side, or appearing to be forked. The antennæ are usually pectinated or ciliated.

The *Deltoides* form the subgenus

HERMINIA, *Lat.*,

Which belongs to the division of the *Pyrallides* of Linnæus, and is composed of the genus *Hyblæa*, Fab., and of several of his *Crambi*\*.

The ninth section of the nocturnal Lepidoptera, that of the *TINEITES*—*Tineites*, *Lat.*; *Phalæna tineæ*, *L.*, and most of his *P. pyrallides*—comprises the smallest species of this order. Their caterpillars are always closely shorn, furnished with sixteen feet at least, and rectigrade, living concealed in dwellings fabricated by themselves, either fixed or movable. Here the wings form a sort of elongated and almost flattened triangle, terminated by a re-entering angle; such are the *Pyrallides* of Linnæus†; they have four distinct and usually exposed palpi. There, the superior wings are long and narrow, sometimes moulded on the body, and forming a sort of rounded roof to it, sometimes almost perpendicularly decumbent and laid on the sides, and frequently raised or ascending posteriorly like the tail of a cock. In both cases the inferior wings are always wide and plaited. These species also frequently have the four palpi exposed.

All the caterpillars, whose habitations (sheaths) are fixed or immovable, are the *Pseudo-Tineæ* of Reaumur; those which construct portable ones, which they transport with them, are true *Tineæ*.

The substances on which they feed, or on which they reside, furnish the materials of the structure.

Of those sheaths which are composed of vegetable matters, many are very singular. Some, like those of the *Adelæ*, are covered exteriorly with portions of leaves laid one over the other and forming a sort of flounce: others are in the form of a bat, and sometimes dentated along one of their sides. The material of some of them is diaphanous, and as if cellular or divided by scales.

The caterpillars of the true *Tineæ*, commonly called *Moths*, clothe themselves with particles of woollen stuffs, which they cut with their jaws and on which they feed, hairs of furs, and those of the skins of animals in zoological collections, united by silk. They know how to lengthen their sheath, or to increase its diameter by slitting it and adding a new piece. In these tubes they undergo their metamorphoses, after closing the orifices with silk.

Those who wish to become well acquainted with the manner in which they construct these habitations, and to acquire a knowledge of their various forms and materials, must have recourse to the *Memoirs* of Reaumur, Roesel, and De Geer.

\* *Lat.*, *Gener. Crust. et Insect.*, IV, 228.

† They might form a separate section.

The Pseudo-Tineæ content themselves with mining the interior of the vegetable and animal substance on which they feed, and forming simple galleries, or if they construct sheaths either with those matters or silk, they are always fixed, and are mere places of retreat.

These caterpillars which perforate in various directions the parenchyma of the leaves on which they feed, have been called *Mineuses* or *Miners*. They produce those desiccated spaces in the form of spots and undulating lines, frequently observed on leaves. Buds, fruits, and seeds of plants, frequently those of wheat, and even the resinous galls of certain Coniferæ, serve for aliment and habitations to others. These Insects are frequently ornamented with the most brilliant colours. In several species the superior wings are decorated with golden or silver spots, sometimes even in relieve.

Some, in which the four palpi are always distinct\*, exposed, or merely partly concealed (the superior ones) by the scales of the clypeus, salient, and of a moderate size, resemble Phalænæ—*P. pyralides*, L.;—their tectiform wings most frequently flattened, or but slightly raised, form an elongated triangle or sort of delta.

Sometimes the proboscis is very apparent, and serves for its ordinary use. The caterpillars of these species live on various plants.

#### BOTYS, Lat.

These caterpillars are leaf-rollers and do not differ externally from the others, as to their organs of respiration.

*B. urticata*; *P. urticata* L.; Rœs., Insect., I, Phal. XIV. Thorax and extremity of the abdomen yellow; wings white, with blackish spots, forming bands.

Its caterpillar folds the leaf of the Nettle, and remains nine months in its cocoon before it becomes a nymph; it is naked and green, with a deeper stripe of the same colour along the back.

The same plant nourishes the caterpillar of another species—the *P. verticalis*, L.—Rœs., Ibid. I, Phal., 4, iv. The perfect Insect is pale-yellowish, glossy, with some obscure transverse lines most apparent underneath †.

#### HYDROCAMPE, Lat.

This subgenus is composed of species very analogous to the preceding ones, but their caterpillars are aquatic, and usually furnished with appendages resembling long hairs, inside of which are tracheæ.

\* The Yponomeutæ, one or two excepted, Cœphoræ and Adelæ are almost the only Tineites whose maxillary palpi are not very apparent; but as they may be concealed by the inferior ones, and as it is very difficult to establish in this respect a fixed and rigorous line of demarcation, we have not thought proper to divide the Tineites according to the number of those organs. M. Savigny, in his Memoirs on the invertebrate animals, has published some figures in which they have various proportions. The new genera, which he merely mentions, are unknown to us.

† The Phalænæ *forficulis*, *purpuraria*, *margaritalis*, *alpinalis*, *sanguinalis*, &c. of Fabricius.

They construct tubes with various sorts of leaves, in which they are sheltered.\*

Sometimes the proboscis is wanting, or nearly so, as in

AGLOSSA, *Lat.*,

Where the four palpi are exposed, and the wings form a flattened triangle; there is no emargination in the extremity of the upper one.

*A. pinguinalis*; *P. pinguinalis*, L.; De Geer, *Insect.*, II, vi, 4, 12<sup>l</sup>; Reaum., *Insect.*, III, xx, 5, 11. Superior wings agate-grey with blackish stripes and spots. Found in houses on the walls.

Its caterpillar is naked, blackish-brown, glossy, and feeds on fatty or butyraceous substances. Reaumur called it the *Fausse-teigne-des cuirs*, because it also feeds on leather and the covers of books. It constructs a tube which it places against the body on which it feeds, and covers it with granules, most of which are taken from its excrement. According to Linnæus, it is found, though rarely, in the human stomach, where it produces more alarming symptoms than those caused by worms. I have received caterpillars of this species, from an intelligent physician whose veracity I cannot question, that were ejected from the stomach of a young female by vomiting.

That of another Aglossa—the *P. farinalis*, L.—lives on flour. The perfect Insect is also frequently found on walls, where it remains motionless with the abdomen raised. The base of its upper wings is reddish, margined with white posteriorly; the posterior extremity is also reddish, but forming an angular spot, and margined above by a white stripe also angular; the space comprised between these spots, or centre, is yellowish.

GALLERIA, *Fab.*,

Where the scales of the clypeus form a projection that covers the palpi; and the superior wings, proportionally narrower than in Aglossa, and emarginated in the posterior edge, are, as well as the inferior ones, strongly inclined and turned up posteriorly like the tail of a cock, as in many species of the following subgenera.

*G. cereana*, Fab.; Hübn., *Tin.*, iv, 25. About five lines in length; cinereous; head and thorax paler, and little brown spots along the internal margin of the superior wings.

Reaumur designates its caterpillar by the name of *fausse-teigne de la cire*. It ravages hives by penetrating into the combs, constructing, as it progresses, a silken tube covered with its feces which are fomed of the wax on which it feeds. The cocoons of their chrysalides are sometimes found collected in piles.

*G. alvearia* of Fabricius approximates more closely to *Tinea* than to this subgenus.

His *Crambus erigatus* and the *Tinea tribunella* and *Colonella* of Hübner approach the preceding *Tineites* in the extent and disposition of their wings; but their inferior palpi are much longer, and these Insects, in this respect, are more nearly allied to *Crambus*. They might form particular subgenera.

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\* *P. potamogata*, *stratiolata*, *paludata*, *lemnata*, *nympheata*, &c.

The others, in which the superior palpi are not always very distinct, have the upper wings long, narrow, sometimes moulded on the body, and sometimes laid perpendicularly against its sides. In this state the form of the insect is always narrow and elongated, approaching that of a cylinder or cone.

Here the inferior palpi, always large, are directed forwards; the last joint at most is turned up. The superior palpi are apparent.

CRAMBUS, *Fab.*,

Where there is a distinct proboscis, the inferior palpi advance to the end in the manner of a straight rostrum. Found in dry pastures on various plants\*.

ALUCITA, *Lat.*—YPSOLAPHUS, *Fab.*,

Where there is also a distinct proboscis; but the last joint of the inferior palpi is turned up. The antennæ are simple †.

EUPLOCAMUS, *Lat.*—PHYCIS, *Fab.*,

Where the proboscis is very short, and but slightly apparent; the last joint of the inferior palpi is turned up, and the scales of the preceding one form a fascis. The antennæ of the males have a double range of barbulae ‡.

PHYCIS, *Fab.*,

Entirely similar to Euplocamus, except in the antennæ, which at most are ciliated §.

There the inferior palpi are entirely raised, and in several, even curved over the head.

Sometimes the inferior palpi are very apparent, and of a moderate size. The antennæ and the eyes are distant.

In the two following subgenera, the inferior palpi scarcely extend beyond the front.

TINEA.,

Where the proboscis is very short, and formed of two little membranous and separated threads. The head is crested.

*P. tapezana*, *Fab.*; *Reaum.*, *Insect.* III, xx, 2—4. Upper wings black; their posterior extremity as well as the head, white.

The caterpillar attacks cloth, and other woollen stuffs, on which it lies concealed in a semi-tubular sheath, formed of their particles, which it lengthens as it advances. It is one of the *Pseudo-Tineæ* of *Reaumur* ||.

*T. sarcitellæ*, *Fab.*; *Reaum.*, *Ins.*, III, vi, 9, 10. Silver-grey; a white dot on each side of the thorax.

\* *Fab.*, *Entom. Syst.*, *Supp.*; and *Lat.*, *Gener. Crust. et Insect.* IV, 232. See *Hübner*, *Tin.*, V—VIII. The *Crambus carnellus* belongs to another subgenus, LITHYIA.

† *Lat.*, *Ibid.*, 233, refer to the same subgenus, the *Crambi* of *divis.*, II, 2, p. 232.

‡ *Lat.*, *Gener. Crust. et Insect.*, IV, 233.

§ *Phycis boleti*, *Fab.*

|| It approaches the *Volucræ* (p. 208) in its palpi and appearance, and perhaps forms a new subgenus.

The caterpillar lives on cloth, and other woollens, weaving with their detached particles mixed with silk, a portable tube; it lengthens it at one end in proportion as it grows, and slits it to increase its diameter, by adding another piece. Its fæces have the colour of the wool on which it feeds.

*T. pellionella*, Fab.; Reaum., Insect., III, vi, 12—16. Upper wings silver grey, with one or two black dots on each.

The caterpillar inhabits a felted tube on furs; it cuts the hairs at base, and rapidly destroys them. The

*T. flavifrontella*, Fab., ravages cabinets of natural history in the same way\*.

*T. granella*, Fab.; Rœs., Ins. I, Class IV, Pap. Noct., xii. Its upper wings are marbled with grey, brown and black, and turned up posteriorly.

The caterpillar—*fausse-teigne des blés*—connects several grains of wheat with silk, and forms a tube, from which it occasionally issues to feed upon those seeds. It is very noxious.

#### ILITHYIA, Lat.—CRAMBUS, Fab.,

Where the proboscis is very distinct, and of an ordinary size, and the last joint of the inferior palpi is manifestly shorter than the preceding one †.

#### YPONOMEUTA, Lat.,

Where the proboscis is also very distinct, and of an ordinary size; but the last joint of the inferior palpi is at least almost as long as the preceding.

These Insects seem to be connected with the Lithosiæ.

*Y. evonymella*; *Tinea evonymella*, Fab.; Rœs., Ins., I, Class IV, Pap. Noct., viii. Superior wings glossy-white, with numerous black points; inferior ones blackish.

*Y. padella*; *Tinea padella*, Fab.; Rœs., Ibid., viii. Superior wings lead-grey, with about twenty black dots.

The caterpillar, like that of the *evonymella*, lives in society, forming a numerous community under a web. It is sometimes so abundant on the fruit trees in Europe, the leaves of which it devours, that the branches seem to be covered with crape ‡.

In the following subgenus, or the

#### ŒCOPHORA, Lat.,

The inferior palpi are covered over the head like horns, taper to a point, and even extend to the back of the thorax.

The *Teigne des blés*, which is so destructive in the southern departments of France, and of a uniform brownish cream-colour, belongs to this subgenus.

\* All the authors who have described or figured Tineites, and other analogous Lepidoptera, having paid but little attention to exactness, we find it impossible to refer most of the species mentioned by them to our various subgenera.

† *Crambus carneus*, Fab., and some other species. The antennæ of the males are marked inferiorly by a knot-like inflation.

‡ See Lat., Gen. Crust et Insect., IV, 222; and the Hist. Nat. des Lépid. de Fr., of Godart.



I also refer to it the *T. harisella*, whose caterpillar, according to the observations of Hubert, Jun. forms a sort of hammock\*.

Sometimes the inferior palpi are very small, and hairy. The antennæ are almost always very long, and the eyes are closely approximated.

ADELA, Lat.—ALUCITA, Fab.

These Insects are found in the woods, and several species appear with the first budding of the Oak. Their wings are usually brilliant.

*A. Degeerella*; *Alucita Degeerella*, Fab.; De Geer, Insect., I, xxxii, 13. The antennæ thrice the length of the body, and whitish, the inferior portion black; superior wings golden-yellow, on a black ground, forming longitudinal streaks, with a broad, golden-yellow, transverse band, margined with violet.

*A. Reaumurella*; *Alucita Reaumurella*, Fab. Black; superior wings golden, and immaculate †.

The tenth and last section of the Nocturnal Lepidoptera, that of the FISSIPENNÆ (*Pterophorites*, Lat.), is closely related to the preceding one, so far as relates to the narrow and elongated form of the body and upper wings, but is removed from it, as well as from all others of this order by the four wings, or at least two, being split longitudinally, in the manner of branches or fingers with fringed edges, and resembling feathers. The wings resemble those of Birds.

Linnæus comprised these Lepidoptera in his division of the *Phalænæ alucitæ*; De Geer calls them *halanæ-tipulæ*.

With us, as with Geoffroy and Fabricius, they constitute the subgenus

PTEROPHORUS.

The caterpillars have sixteen feet, and live on leaves or flowers, without constructing a tube.

Sometimes the inferior palpi are recurved from their origin, are entirely covered with little scales, and not longer than the head. They form the genus *Pterophorus* proper of Latreille. Their chrysalides are exposed, covered with hairs, or little tubercles, sometimes suspended by a thread, and sometimes fixed to a bed of silk on leaves, &c., by means of the terminal hooks of the abdomen.

*P. pentadactylus*, Fab.; Rœs. Insect., I, Class IV, Pap. Noct., v. Snow-white wings; the superior divided into two slips, and the inferior into three ‡.

Sometimes the inferior palpi project, are longer than the head, and have the second joint densely covered with scales, and the last

\* The *Tinea majorella*, *Geoffroyella*, *rufimitrella*, &c. of Hübner. For this and the preceding subgenus, see the Monograph of the genus, *Phycis*, in the Magas. der Entom., III, of Germar.

† See Fab., Entom. Syst., Supp.; Lat., Gener. Crust. et Insect., IV, 223; and Hübner, Tinæ, XIX.

‡ The other Pterophori of Fabricius, the *hexadactylus* excepted. See also Hübner and De Geer.



almost naked and turned up. The chrysalis is enclosed in a cocoon of silk. Latreille distinguishes these species by the generic appellation of *ORNEODES* \*.

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## ORDER XI.

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### RHIPIPTERA.

This order was established by M. Kirby under the name of *Strepsiptera* (twisted wings), on certain Insects remarkable for their anomalous form and irregular habits.

From the two sides of the anterior extremity of the trunk, near the neck and the exterior base of the two first legs, are inserted two small, crustaceous, moveable bodies, in the form of little elytra, directed backwards, that are narrow, elongated, clavate, curved at the extremity, and terminate at the origin of the wings †. As elytra, properly so call, always cover the whole or the base of the latter organs and arise from the second segment of the trunk, these bodies are not true wing-cases, but parts analogous to those (*pterygoda*) we have already observed at the base of the wings in *Lepidoptera*. The wings of the *Rhipiptera* are large, membranous, divided by longitudinal and radiating nervures, and fold longitudinally in the manner of a fan. The mouth consists of four pieces, two of which, the shortest, appear to be so many biarticulated palpi; the others inserted near the internal base of the preceding ones, resemble little linear laminæ, which are pointed and crossed at their extremity like the mandibles of various Insects; they bear a greater similitude to the lancets of the sucker of the *Diptera* than to true mandibles ‡. The head is also furnished with two hemispherical, slightly pediculated, and granular eyes; two almost filiform and short antennæ, approximated at base on a common elevation, consisting of three joints, the two first of which are very short, and the third very long, and divided down to its origin into two long, compressed, lanceolate branches, laid one against the other. The ocelli are wanting. The form and divisions of the trunk are very similar to those of several *Cicadariæ Psyllæ*, and chrysidæ. The abdomen is almost cylindrical, consists of eight or nine segments, and is terminated by pieces also

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\* *P. hexadactylus*, Fab.; the *Ptérophore en éventail* of Geoffroy. See Lat., Gen. Crust. et Insect., IV, p. 234 and 235.

† The *prebalanciers*, Lat.

‡ According to Savigny, their mouth consists of a labrum, two mandibles two maxillæ, each bearing a very small unarticulated palpus and of a labium without palpi.

analogous to those observed at the anus of the above mentioned Hemiptera. The six legs are almost membranous, compressed, nearly equal, and terminated by filiform tarsi composed of four membranous joints with, as it were, vesicular extremities; the last is somewhat larger than the others and presents no hooks. The four anterior legs are closely approximated, and the two others thrown behind. The space on the pectus comprised between these latter is very considerable, and divided by a longitudinal furrow. The posterior extremity of the metathorax is prolonged over the abdomen in the manner of a large scutellum. The sides of that metathorax, which give insertion to this last pair of legs, are strongly dilated behind, and form a sort of inflated shield that defends the exterior and lateral base of the abdomen.

These Insects, in their larvæ state, live between the abdominal scales of several species of *Andrenæ* and wasps of the subgenus *Polistes*. They frisk about with a simultaneous motion of the wings and halteres. Although they appear to be removed in several respects from the Hymenoptera, I still think it is to some of those Insects such as the *Eulophi*, that they are most nearly allied.

M. Peck has observed one of the larvæ—*Xenos Peckii*—which is found on Wasps. It forms an oblong oval, is destitute of feet, and annulated or plaited; the anterior extremity is dilated in the form of a head, and the mouth consists of three tubercles. These larvæ become nymphs in the same place, and, as it appeared to me when examining the nymphs of the *Xenos Rossi*, another Insect of the same order, within their own skin, and without changing their form\*.

Nature has perhaps furnished the Rhipiptera with the two false elytra, of which we have spoken, to enable them to disengage themselves from between the abdominal scales of the Insects on which they have lived.

They are a sort of *Æstri* to Insects, and we shall soon find a species of *Conops* that undergoes its metamorphosis in the abdomen of the *Bombi*.

The Rhipiptera form two genera.

#### STYLOPS, *Kirb.*

The first one observed and instituted by M. Kirby. The superior branch of the last segment of the antennæ is composed of three little joints. The abdomen is retractile and fleshy.

But a single species is known; it lives on the *Andrenæ*.

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\* For some observations on this Insect, see a very good Memoir of M. Jurine, Sen.

XENOS, *Ross.*

Here the two branches of the antennæ are inarticulated. The abdomen, with the exception of the anus, which is fleshy and retractile, is corneous.

Two species of this genus are known, one of which lives on the Wasp, called *gallica*, and the other on an analogous Wasp of North America, the *Polistes fucata*, Fab.\*

## ORDER XII.

## DIPTERA †.

The distinguishing characters of dipterous Insects consist in six feet; two membranous, extended wings, with, almost always, two movable bodies above them called *halteres* ‡; a sucker composed of squamous, setaceous pieces, varying in number from two to six, and either enclosed in the superior groove of a probosciform sheath terminated by two lips, or covered by one or two inarticulated laminæ, which form a sheath for it §.

Their body, like that of other Hexapoda, is composed of three principal parts. The number of ocelli, when they are present, is always three. The antennæ are usually inserted on the front, and approximated at base; those of the Diptera of our first family resemble those of the Nocturnal Lepidoptera in form and compo-

\* See the Memoir of M. Kirby. Lin. Trans., XI.

† *Anthiata*, Fab.

‡ In order to be convinced that these organs do not represent the second wings, we must compare the thorax of a large *Tipula* with that of some Hymenopterous Insect, and particularly of a female *Cryptocerus*, where the posterior stigmata are very apparent. Here, as in all the Hymenoptera, the segment bearing the second pair of wings is but very slightly developed, or incomplete, and merely follows a small, very narrow, transverse, linear, and extremely short piece, immediately under the scutellum. Next follows the metathorax, which forms that semi-segment, which in my Memoir on the articulated appendages of Insects I have called *mediate*. On each side of it is a spine with two stigmata, more exterior than the spines, and situated at but a little distance from them. The thorax of these *Tipulæ* exhibits the same disposition, except that the semi-segment, which in the Hymenoptera gives insertion to the second wings, is here somewhat less distinct, and that no trace of wings can be perceived at either of the ends. The halteres (*balanciers*) occupy the precise situation of the spines, and the stigmata, in like manner, are exterior. It is evident, then, that this posterior extremity of the thorax bearing the halteres, corresponds to the mediate segment, that in which the musical organs of the male *Cicadæ* are placed, and which in several *Acrydia* of the same sex presents analogous peculiarities.

§ This proboscis is elongated, in several species of the same family, in the manner of a long siphon.

sition, and frequently in their appendages; but in the following and greater number of families they consist of but two or three joints, the last of which is fusiform, or shaped like a lenticular or prismatic palette, furnished either with a little styliform appendage, or a thick hair or seta, sometimes simple and sometimes hairy. Their mouth is only adapted for extracting and transmitting fluids. When these nutritive substances are contained in particular vessels, with permeable parietes, the appendages of the sucker act as lancets, pierce the envelope, and open a passage to the fluid, which, by their pressure, is forced to ascend the internal canal to the pharynx, situated at the base of the sucker. The sheath of the latter, or the external part of the proboscis, merely serves to maintain the lancets in situ, and when they are to be employed it is bent back. This sheath appears to represent the inferior lip of the triturating Insects, just as the appendages of the sucker, at least in those genera where it is most complete, seem to be analogous to the other parts of the mouth, such as the labrum, mandibles, and maxillæ\*. The base of the proboscis frequently bears two filiform or clavate palpi, composed, in some, of five joints, but in the greater number of one or two. The wings are simply veined, and most frequently horizontal †.

The use of the halteres is not yet well known; the Insect moves them very rapidly. In many species, those of the last families particularly, and above the halteres, are two membranous appendages, resembling the valves of a shell, and connected by one of their sides, called (*ailerons* or *cuillerons*) *alulæ*. One of these pieces is united to the wing, and participates in all its motions, but then the two parts are nearly in the same plane. The size of these *alulæ* is in an inverse ratio to that of the halteres. The prothorax is always very short, and frequently we can merely discover its lateral portions. In some, such as the *Scenopini*, certain *Culices*, and *Psychodæ*, they are prominent and tuberculous. The greater part of the trunk or thorax is composed of the mesothorax. Before, on each side, or behind the prothorax are two stigmata; two others may be observed near the origin of the halteres; those of the mesothorax, as in the *Hymenoptera*, are concealed or obliterated.

The abdomen is frequently attached to the thorax by a portion only of its transversal diameter. It is composed of from five to nine apparent annuli, and usually terminates in a point in the females;

\* This anterior part of the head, called *clypeus* (my *epistoma*), is here represented by that superior portion of the proboscis that precedes the sucker and palpi.

† These organs, like those of the *Hymenoptera*, furnish good, secondary, divisional characters. I was the first who employed them. See the works of *Fallen*, *Kirby*, *Meigen*, *Macquart*, &c.

in those where the number of annuli is less, the last ones frequently form a sort of ovipositor, presenting a succession of little tubes sliding into each other like the joints of a spy-glass. The sexual organs of the males are exterior in many species, and bent under the abdomen. Their usually long and slender legs are terminated by a tarsus of five joints, the last of which has two hooks, and very often two or three vesicular or membranous pellets.

All the Diptera dissected by M. Leon Dufour were provided with salivary glands, a character, according to him, common to all Insects furnished with a sucker; their structure, however, varies according to the genus\*.

Many of these Insects are noxious, both by sucking our blood, and that of our domestic animals, by depositing their eggs on their bodies, in order that their larvæ may feed on them, and by infecting our preserved meats and cerealia. Others, in return, are highly useful to us, by devouring noxious Insects, and consuming dead bodies and animal substances left on the surface of the earth, that poison the air we breathe, and by accelerating the dissipation of stagnant and putrid water.

The term of life assigned to the perfect Aptera is very short. They all undergo a perfect metamorphosis, modified in two principal ways. The larvæ of several change their skins to become nymphs. Some even spin a cocoon, but others never change their tegument, which becomes sufficiently solid to form a case for the nymph, resembling a seed or an egg. The body of the larva is first detached from it, leaving on its internal parietes the external organs peculiar to it, such as the hooks of the mouth, &c. It soon assumes the form of a soft or gelatinous mass, on which none of the parts which characterize the perfect Insect can be seen. After the lapse of a few days, those organs become defined, and the Insect is a true nymph. It extricates itself from confinement by separating the anterior extremity of its case, which comes off like a cap.

The larvæ of the Diptera are destitute of feet, though appendages that resemble them are observable in some. This order of Insects is the only one in which we find larvæ with a soft and variable head. This character is almost exclusively peculiar to the larvæ of those which are metamorphosed under their skin. Their mouth is usually furnished with two hooks, that enable them to stir up alimentary substances. The principal orifices of respiration, in most of the larvæ of the same order, are situated at the posterior extremity of their

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\* See his "Recherches Anatomiques sur l'Hippobosque des Chevaux," Ann. des Sc. Nat., VI, 301.

body. Several of them, besides, present two stigmata on the first ring, that which immediately follows the head, or replaces it.

Messrs. Fallen, Meigen, Wiedemann, and Macquart, have lately rendered great service to this part of entomological science, by establishing various new genera, by describing a vast number of new species, and by rectifying errors relative to several of those previously known. They have also employed the characters presented by the disposition of the nervures of the wings, to which I first resorted, with a corresponding nomenclature in my *Genera*. M. Macquart, in particular, has well described them, and his work on the Diptera of the north of France, published in the *Mem. de la Soc. des Sc. de l'Agricult. et des Arts, de Lille*, of which he is one of the most distinguished members, surpasses, in my opinion, every thing hitherto published on this order of Insects.

We will divide the Diptera into two principal sections, which in various systems of the English savans, even form as many particular orders.

In those which compose the first, the head is always distinct from the thorax, the sucker is enclosed in a sheath, and the hooks of the tarsi are simple or dentated. The metamorphosis of the larvæ into nymphs is always effected after they have left the mother.

In the first subdivision we find Diptera whose antennæ are multi-articulated.

## FAMILY I.

### NEMOCERA.

In this family the antennæ usually consist of from fourteen to sixteen joints, and from six, or nine, to twelve, in the others. They are either filiform or setaceous, frequently hairy, particularly in the males, and much longer than the head. The body is elongated, the head small and rounded, the eyes large, the proboscis salient, and either short and terminated by two large lips, or prolonged into a siphon-like rostrum, with two exterior palpi inserted at its base, usually filiform or setaceous, and composed of four or five joints. The thorax is thick and elevated; the wings are oblong; the halteres are entirely exposed, and apparently unaccompanied with alulæ. The abdomen is elongated, and most commonly formed of nine annuli; it terminates in a point in the female, but is thicker at the end and furnished with hooks in the males. The legs are very long and slender, and are frequently used by these Insects to balance themselves. Several, particularly the smaller ones, collect in the air in numerous swarms, and as they flit about form a sort of dance. They are found



at almost every season of the year. In coitu they are united end to end, and frequently fly in that position. Some of the females commit their ova to the water; others deposit them in the earth or on plants.

The larvæ, always elongated and resembling worms, have a squamous head, always of the same shape, the mouth of which is furnished with parts analogous to maxillæ and lips. They always change their skin to become nymphs. The latter, sometimes naked, and sometimes enclosed in cocoons constructed by the larvæ, approximate in their figure to the perfect Insect, present their external organs, and complete their metamorphosis in the usual manner. They have frequently, near the head or on the thorax, two organs of respiration, resembling tubes. This family is composed of the genera *Culex*, and *Tipula* of Linnæus.

Some, in which the antennæ are always filiform, as long as the thorax, densely pilose, and composed of fourteen joints, have a long, projecting, filiform proboscis, containing a piercing sucker, consisting of five setæ\*. They constitute the genus

*CULEX, Lin.—CULICIDES, Lat.,*

Or the Mosquitoes, where the body and legs are elongated and airy; the antennæ densely pilose, the hairs forming tufts in the males; the eyes large and closely approximated or convergent at their posterior extremity; the palpi projecting, filiform, hairy, as long as the proboscis, and composed of five joints in the males, shorter and apparently with fewer articulations in the females. The proboscis is composed of a membranous, cylindrical tube, terminated by two lips, forming a little button or inflation, and of a sucker consisting of five squamous threads, which produce the effect of a sting. The wings are laid horizontally, one over the other, on the body, with little scales.

The torment we experience from these Insects, particularly in the vicinity of low grounds and water, where they are most abundant, is well known. Thirsting for our blood, they pursue us everywhere, penetrate into our dwellings, particularly in the evening, announce their presence by a peculiarly sharp hum, and pierce our skin with the fine setæ (dentated at the extremity) of their sucker; in proportion as they sink them into the flesh, the sheath bends towards the pectus, and forms an elbow. They distil a venomous fluid into the wound, which is the cause of the irritation and swelling experienced from their attacks. It has been remarked that we are only persecuted by the females. In America, where they are known by the names of

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\* They have been well represented by Reaumur and Roffredi. The figure given by M. Robineau Desvoidy, in his *Essai sur la tribu des Culicides*—*Mém. de la Soc. d'Hist. Nat.*, III, 390—conveys a wrong idea of the disposition of these setæ. This writer has promulgated an opinion relative to the correspondence of these parts with their sheath, almost diametrically the reverse of that which is generally received. Had he reflected that two of these setæ, in the Syrphi and other Diptera, are annexed to the palpi, he would not have taken them for mandibles, but considered them as analogous to jaws.



*Marangouins* and *Moustiques*, or *Musquetoës*, the inhabitants, as in other countries, defend themselves from them by surrounding their beds with gauze, or a Mosquetoe-bar. The Laplanders remove them by fire, and rubbing the exposed parts of their body with grease. These Insects also feed on the nectar of flowers.

The female deposits her eggs on the surface of the water, and crossing her posterior legs near the anus, and slowly separating them as the ova are extruded, places them side by side, in a perpendicular direction; the entire mass resembles a little bateau floating on that element. Each female lays about three hundred eggs in the course of the year. These Insects frequently survive the most intense cold. Their larvæ swarm in the green and stagnant waters of ponds and ditches, particularly in spring, the period at which those females lay their eggs who have passed through the winter. They suspend themselves on the surface of the water, in order to respire, with their heads downwards. They have a distinct rounded head, furnished with two (species of) antennæ and ciliated organs, by the motion of which they draw alimentary matters within their reach; a thorax with tufts of hair; an almost cylindrical and elongated abdomen, much narrower than the anterior part of the body, divided into ten rings, of which the antepenultimate bears (above) the respiratory organ, and the last is terminated by radiating setæ and appendages. These larvæ are very lively, swim with considerable velocity, and dive from time to time, but soon return to the surface. After some changes of tegument, they then become nymphs, which still continue to move by means of their tail and its two terminal fins. These nymphs also remain on the surface of the water, but in a different position from that of the larvæ, their respiratory organs being placed on the thorax; they consist of two tubular horns. It is in the water also that the perfect Insect is developed. Its exuviae form a sort of board or resting place, which keeps it from submersion. All these metamorphoses occur in the space of three or four weeks, and several generations are produced in the course of the year.

In the excellent work of M. Meigen on the Diptera of Europe, the genus *Culex* of the preceding authors is divided into three. The species, in which the palpi of the males are longer than the proboscis and those of the females are very short, form that of

*CULEX proper.*

*C. pipiens*, L.; De Geer, Insect., VI, xvii. Cinereous; abdomen annulated with brown; wings immaculate\*.

Those in which the palpi of the males are as long as the proboscis form another subgenus,

ANOPHELES †.

Those in which they are very short in both sexes compose another, the

ÆDES, Hoff. ‡

\* For the other species, see Meigen, Dipt., I, 1; Macq., Dipt. du nord de la Fr., Tipulaires, p. 153.

† Ibid., I, 10; Macq., Ibid., 162.

‡ Ibid., I, 13.

M. Robineau Desvoidy, in his "Essai sur la tribu des Cuculides," has added three others.

The species in which the palpi (labial, according to his theory) are shorter than the proboscis, and where the intermediate tibiæ and tarsi are dilated and densely ciliated are designated collectively by the generic appellation of *SABETHES* \*. Those in which the proboscis is elongated and recurved at the end, and where the palpi, also short, have the first joint thickest, the other shortest, and the three others cylindrical, form the genus *MEGARHINUS* †. According to the same author, the *Culex ciliatus* of Fabricius should form another, his *PSOROPHORA* ‡. The ocelli are very distinct, and the legs of the female are ciliated; but the principal character consists in the presence of two little appendages situated on the prothorax, one on each side. They appeared to us to be formed by the dilatation of the lateral extremities of the segment. M. Desvoidy, in relation to this subject, quotes a similar observation made on a species of *Psychoda* by M. Leon Dufour, communicated to him by me. But he is mistaken in saying that it had never been published—we noticed it in the first edition of this work, in the article *Rhipiptera*, and in that of *Psychoda*.

In the other *Nemocera*, the proboscis is either very short and terminated by two large lips, or in the form of a siphon or rostrum, but directed perpendicularly or curved on the pectus. The palpi are bent underneath, or turned up, but in that case, from one to two joints only.

Linnæus comprised them in his genus

TAPULA.—TIPULARIÆ, *Lat.*,

Which we will divide in the following manner :

We form a first section with those species in which the antennæ are evidently longer than the head, at least in the males, slender, filiform or setaceous, and composed of more than twelve joints in the greater number, and where the legs are long and slender.

Of these, some always furnished with wings, never present ocelli. The palpi are always short. The head is not (or but very slightly) prolonged anteriorly. The wings are laid flat, or tectiform, and have generally but few nervures that are longitudinal, divergent, and free posteriorly. The eyes are lunate, and the tibiæ without spines.

This subdivision consists of small species, which, while larvæ and nymphs, inhabit the water, or vegetable galls.

Sometimes the antennæ are entirely covered with hairs, longest in the males, and forming a triangular tuft.

Most of their larvæ live in the water, and are allied to those of the *Culices*. Some have false feet. Others, besides, have appen-

\* *Mém. de la Soc. d'Hist. Nat. de Par.*, III, 411.

† *Ibid.*, 412.

‡ *Ibid.*, 412.

dages at the posterior extremity of their body, resembling strings or arms; Reaumur calls them *vers polyopes*. Their usual colour is red. The nymphs inhabit the same element, and respire by means of two exterior tubes, situated at the anterior extremity of the body. Some of them possess the faculty of swimming.

These Insects are analogous to the Culices, and have been designated by authors under the name of *Tipulæ culiciformes*.

Those in which the antennæ of both sexes consist of fourteen (somewhat) oval joints, the last differing but little from the preceding ones, and where the wings are laid horizontally one over the other, compose the subgenus

CORETHRA, Meig.

*Tipula culiciformis*, De Geer, Insect., VI, xxii, 10, 11. A brown body; legs and abdomen grey; nervures of the wings hairy\*.

Those in which the wings are inclined, and the antennæ are formed of thirteen joints in the males and six in the females, furnished with short hairs, and the last, as in the preceding sex, very long, constitute the subgenus

CHIRONOMUS, Meig.

To which belongs the *Tipule annulaire* of the same author, Ibid., XIX, 14, 15, which is of a brownish-grey, with transverse black bands on the abdomen, and a black point on the wing †.

TANYPUS, Meig.,

Where the wings are also pendent; but the antennæ consist of fourteen joints in both sexes, the penultimate very long in the males; all the others, like those of the antennæ of the females, almost globular; the last somewhat thicker than the preceding ones. To this subgenus we refer the

*Tipule bigarree*, Id., 1b., XXIV, 19, which is cinereous; whitish, spotted with blackish; antennæ of the females terminating in a button. The larva of the latter sex has four false feet, two near the head, and the rest at the posterior extremity of the body ‡.

Sometimes the antennæ, always composed of at least thirteen joints in both sexes, and for the most part granose, are merely furnished with short setæ, or at most, and in the males only, with a bundle of hairs at base. They form our *Tipules gallicotes*.

CERATOPOGON, Meig.—CERATOPOGON, CULICOIDES, Lat.,

Where the antennæ are simply furnished with a bundle of hairs at base.

Their proboscis, as in the two following subgenera, resembles a

\* For the other species, see Meigen on the Diptera, and Lat., Gen. Crust. et Insect., IV, p. 247, et seq.

† The same works, and Fab. Syst. Antl.

‡ The same, and the Monograph of M. Fallen.

pointed rostrum. The wings are incumbent. The larvæ live in vegetable galls\*.

PSYCHODA, *Lat., Meig.,*

Without any tuft or bundle of hairs on the antennæ; wings tectiform and furnished with numerous nervures.

The front of the thorax, in one species of this subgenus, has two appendages which appear to us to be formed by the lateral extremities of its first segment †.

CECIDONYIA, *Meig.,*

Where the antennæ, like those of the Psychodæ, are granose and simply furnished with short, verticillated hairs, but where the wings are incumbent on the body, and present but three nervures ‡.

Other species, still of the same division with those in which the antennæ are slender, and manifestly longer than the head, are also destitute of ocelli; but the eyes are entire, and oval or round. The wings, distant in several, always present membranous nervures united transversely, at least in part, and closed, discoidal cells. The anterior extremity of the head is narrowed and prolonged in the manner of a rostrum, and frequently exhibits a pointed projection underneath. The palpi are usually long. The extremity of the tibiæ is spinous.

Several of the larvæ live in mould, decomposed trees, &c., and have no distinct thorax, nor false feet, but present two more apparent openings for respiration at the superior extremity of the body. The nymphs are naked, with two respiratory tubes near the head; the margin of the abdominal annuli is spinous.

This subdivision comprises the largest species of Tipulæ, those called *couturières, tailleurs, &c.*, or our *Tipulaires terricoles*.

In several the wings are always extended, the antennæ of the males are usually bearded, pectinated or serrated; the palpi are composed of five joints, the last of which, extremely long, seems to consist of several smaller ones, or to be knotted. Such are the following subgenera.

CTENOPHORA, *Meig.,*

Where the antennæ are filiform, pectinated in the males, granose or serrated in the females.

*C. pectinicornis*; *Tipula pectinicornis*, Fab. The abdomen fulvous, with black spots on the back, and yellow streaks on the sides; wings marked with a black spot §.

\* *Lat.*, and *Meig.*, and the Monograph of M. Fallén.

† *Lat.*, and *Meig.*, *Ibid.*

‡ *Meig.*, *Dipt.*, I, 93. See also the *Jour. Ac. Nat. Sc. of Philad.*, Oct. 1817. M. Macquart—*Dipt. du nord de la France*—places his new genus *LESTREMIA* directly after *Cecidomyia*. The antennæ are hairy, curved forwards, not quite so long as the body, and composed of fifteen globular joints, pediculated in the males. The legs are long and slender, and the first joint of the tarsi is elongated. The *Cecidomyia destructor*, described and figured in the above journal, may, very probably, belong to this new subgenus, as the antennæ seem to indicate. The *Macropezæ* are also closely allied to these *Diptera*.

§ *Lat.*, *Gen. Crust. et Insect.*, IV, 254; *Meig.*, *Dipt.*, I, 155.

PEDICIA, *Lat.*,

Where they are almost setaceous and simple, with the two first joints largest and elongated, the three following ones turbinated, the next three globular, and the seven last slender and almost cylindrical\*.

TIPULA, *Lat.*,

Where the antennæ are short, setaceous, and simple, but where all the joints, the second one excepted, which is almost globular, are nearly cylindrical; the first is the largest, the third elongated.

*T. oleracea*, L.; De Geer, *Insect.*, VI, xvi, 12, 13. Antennæ simple; body greyish-brown, and immaculate; wings light-brown, darker on the external margin. Very common in meadows on the grass. The larva feeds on the roots of decomposed plants †.

NEPHROTOMA, *Meig.*,

Where the antennæ are still simple, and almost setaceous, with the first and third joints elongated and cylindrical, and the following ones arcuated; those of the males consist of eighteen, the females have but fifteen. This number is never exceeded in the preceding subgenera, even in the males ‡.

PTYCHOPTERA, *Meig.*,

Where those organs are always simple, and nearly setaceous, consisting of sixteen joints, the third of which is much longer than the others, and the following ones oblong. The lips of the proboscis are inclined, and very long §.

In all the following subgenera the last joint of the palpi is hardly longer than the others, and presents no appearance of annular divisions. The wings are frequently incumbent, one on the other.

Here the antennæ have more than ten joints.

Those in which they are mostly granose, of equal thickness, or hardly smaller at the extremity, and frequently furnished with whorls of hairs, according to Meigen, form various genera.

RHIPIDIA, *Meig.*

The only Tipulariæ of this subdivision in which the antennæ of the males are pectinated ||.

ERIOPTERA, *Meig.*

Several nervures in the wings, as in those of the preceding Tipulæ, but covered with hairs ¶.

LASIOPTERA, *Meig.*,

Where the wings are also hairy, but present only two nervures\*\*.

\* *Lat.*, *Gen. Crust. et Insect.* IV, 254; *Meig.*, *Dipt.* I, 155. Meigen improperly unites them with the Limnobiæ. See *Encyc. Méthod.*, article *Pédicie*.

† *Lat.*, *Ibid.*; *Meig.*, *Ibid.*

‡ *Meig.*, *Ibid.*

§ See *Meig.*, *Ibid.*; *Lat.*, *Gen. Crust. et Insect.*, IV, 254.

|| *Idem.*

¶ *Idem.*

\*\* *Idem.*

LIMNOBIA, *Meig.*,

Where the wings are glabrous, and the antennæ simple in both sexes\*.

The POLYMERA of M. Wiedemann—Dipt. Exot., p. 40—appear to be distinguished from the Limnobiæ by their antennæ, which consist of twenty-eight joints, instead of from fifteen to seventeen.

In the other subgenera, the antennæ are terminated by several joints, evidently more slender, and almost cylindrical.

TRICHOCERA, *Meig.*

The first joints of the antennæ almost bordering on an oval, the following ones more slender, long, and pubescent.

The *Tipule d'hiver* of De Geer, which resembles a *Calex*, belongs to this subgenus †.

MACROPEZA, *Meig.*

The Macropezæ are distinguished by the extraordinary length of their posterior legs. Their antennæ, to a little more than half their length, are densely pilose ‡.

DIXA, *Meig.*

The Dixæ are apparently closely allied to the Trichocera, but the first joint of their antennæ is very short, the second is almost globular, and the following ones are proportionally more slender. The last joint of the palpi is also more elongated than in Trichocera §.

There the antennæ have but ten or six joints.

Those, in which they consist of ten, form the genus

MÆKISTOCERA, *Wied.*,

Where the wings are distant ||.

Those in which they are composed of six form the

HEXATOMA, *Lat.*,

Which will comprise the *Anisomera* and *Nematocera* of Meigen, which only differ from the Hexatomæ by the third joint of the antennæ being there longer than the second: in this respect it differs but slightly from the others ¶.

Other Tipulariæ, analogous to the preceding ones in the absence of ocelli, and the rounded figure of their eyes, exhibit a rare anomaly in this order of Insects: they are destitute of wings, and hence the origin of the term *Aptera*, which we apply to this subdivision. The antennæ are filiform, but somewhat more slender towards the extremity, and but slightly pilose. The legs are long, and the tibiæ unarmed. The abdomen of the females terminates in a point formed by a bivalve ovipositor.

This subdivision comprises the genus

\* See *Meig.*, Dipt. I, 155.; *Lat.*, Gen. Crust. et Insect., IV, 254; but after removing the *Pediciæ*.

† See *Meig.*, *Ibid.*

‡ *Idem.*

§ *Meig.*, *Ibid.*, and *Macq.*, Dipt. du nord de la France.

|| Dipt. Exot., p. 41.

¶ *Lat.*, Gen. Crust. et Insect., IV, 260; *Meig.*, *Ibid.*



CHIONEA, *Dalm.*

*C. aroneoides*. The only species known; it is found in winter on snow and Ice\*.

A second subgenus might be formed with the *Tipule atome* of De Geer—Mem. Ins. VIII, 602, XLIV, 27—which is always apterous, but whose antennæ have at least fifteen joints, whereas *M. Dalman* allows but ten to the preceding Insect. De Geer found this species running very rapidly across his table. They are both very small.

Another division of our Tipulariæ, that of the *Fungivora*, is distinguished from the preceding ones by the presence of two or three ocelli. The antennæ also are much longer than the head, slender, composed of fifteen or sixteen joints, a circumstance which removes these Insects from the succeeding division. The eyes are entire or emarginated. There is no division in the last joint of the palpi. The wings are always incumbent and horizontal on the body, and their nervures, longitudinal as well as transverse, are usually much less numerous than those of the preceding Tibulariæ. The legs are always long and slender, and the extremities of the tibiæ spinous.

In some the palpi are curved, and composed of at least four very apparent joints. The antennæ are filiform or setaceous.

Of these, some have the anterior extremity of the head prolonged into a rostrum or proboscis, and in those where this elytron is less considerable, the head is almost entirely occupied by the eyes. There are always three ocelli. The antennæ are short, and their joints but slightly elongated.

Those species, in which the eyes occupy almost the whole of the head, where the ocelli are of equal size, and placed on a common eminence, and where the rostrum projects and is not longer than the head, form the subgenus

RYPHUS, *Lat.*†

Those, in which the eyes only occupy the sides of the head, where the ocelli are not situated on a common tubercle, and where the anterior are smaller than the two posterior, and the rostrum is prolonged under the pectus in the manner of a proboscis, compose the subgenus

## ASINDULUM ‡.

The subgenus

GNORISTA, *Meig.*,

Only appears to differ from *Asindulum* in the insertion of the palpi, which, according to his figures, is near the extremity of the proboscis, and not near its base. This remark was communicated to me by M. Carcel §.

In no one of the following subgenera do we find the anterior part of the head projecting in the manner of a rostrum or proboscis. The eyes are always lateral.

Sometimes the antennæ, in the males at least, are longer than the

\* *Dalm.*, Anal. Entom., p. 35.

† *Lat.*, Gener. Crust. et Insect., IV, 251; *Meig. Dipt. I*, 155.

‡ *Lat.*, *Ibid.*, *Meig.*, *Ibid.*

§ *Meig.*, *Ibid.*



thorax, and setaceous, with the two first joints thickest. There are always three ocelli, the anterior or intermediate of which is the smallest.

*BOLITOPHILA*, Hoffm. Meig.,

Where they are arranged in a transverse line.

M. Guerin has published a detailed description of a species of this subgenus, in the *Am. des Sc. Nat.*, X. Its larvæ lives in the mushroom\*.

*MACROCERA*, Meig.,

Where the ocelli form a triangle †.

Sometimes the antennæ, even of the males, are, at most, as long as the head and thorax.

Some subgenera, in which the eyes are always entire, are removed from the others by their four posterior tibiæ, all furnished exteriorly with small spines, as in

*MYCETOPHILA*, Meig.,

Where there are but two ocelli, very small and distant ‡, and in

*LEIA*, Meig.,

Differing from *Mycetophila* in their three approximated ocelli, the anterior of which is the smallest §.

*SCIOPHILA*, Meig.

The *Sciophilæ* have the joints of their antennæ less crowded, or more distinct than those of the *Leia*, and they are also hairy. Besides the closed cell which extends from the base to the middle, their wings present another complete cell, which is small, and corresponds to the first of those termed cubital in the *Hymenoptera* ||.

From the subgenera in which the outer margin of the tibiæ is destitute of spines, and where there are always three approximated ocelli, we will first separate those in which the antennæ are composed of sixteen joints.

Here the eyes are entire, and without any remarkable emargination ¶.

*PLATYURA*, Meig.

To which he improperly unites the *Ceraplatei*. These Insects, in their wings and carriage, greatly resemble the *Sciophilæ*; but their first cubital cell is much larger; their antennæ seem to be proportionally thicker and more compressed than those of the last subgenera, and even slightly perfoliate. The abdomen of the females is widest near the end\*\*.

*SYNAPHA*, Meig.,

Where the wings present but a single cubital cell, closed by their

\* Meig., *Dipt.* I, 155.

† Meig., *Ibid.*

‡ Meig., *Ibid.*

§ Lat., Meig., Macq., and the *Encyc. Method.*,

|| Meig., *Ibid.*

¶ Meig., *Ibid.*, and Macq., *Dipt. du nord de la France.*

\*\* Meig., *Ibid.* See Macq., *Dipt. du nord de la France, Tipulaires*, p. 45.

posterior margin. The nervure in the middle, which traverses them longitudinally, bifurcates near the centre of their disk, and forms a complete or closed oval cell. With the exception of their tibix, these Diptera are closely allied to the Leixæ\*.

There the eyes are evidently emarginated on the inner side.

*MYCETOBIA, Meig.,*

Where the antennæ consist of sixteen joints, and the wings present a large closed cell, extending from the base to the middle †.

*MOLOBRUS, Lat.—SCIARA, Meig. Macq.,*

With similar antennæ, and where the middle of the wing presents a cell extending from the base to the posterior margin, and only closed by the latter ‡.

*CAMPYLOMYZA, Weig. Meig.,*

Where the antennæ consists of but fourteen joints, at least in the females, and also distinguished from the preceding by the wings, which are hairy and destitute of nervures at their internal margin. The eyes are entire §.

Our last Tipulariæ are fungivorous.

*CEROPLATEUS, Bosc. Fab.,*

Where the palpi are turned up, appear to consist of but one joint, and are ovoid; the antennæ are fusiform and compressed ||.

Our last general division of the Tipulariæ, that which I call the *Floralis*, is composed of species in which the antennæ, hardly longer than the head in both sexes, are generally thick, consist of from eight to twelve joints, in the form of a perfoliate club, nearly cylindrical in most of them, fusiform in some, and terminated in others by a thicker and ovoid joint. The body is short and thick. The head of the males is almost entirely occupied by the eyes. These Insects approach the fungivorous Tipulariæ in the nervures of their wings and the palpi. Such particularly are those which form the

*CORDYLA, Meig.,*

Removed from all the following ones by their fusiform antennæ composed of twelve joints. Their eyes are round, entire, distant, and the ocelli are wanting. Their legs are long, and their tibix spinous at the extremity ¶.

We will now pass to subgenera in which the antennæ are composed of eleven joints, forming an almost cylindrical club. The

\* Meig., Dipt. I, 155.

† Meig., and Macq.

‡ Meig., and Macq. The only difference between this and the preceding subgenus appears to me to consist in the wings, and these characters are so slightly defined that the two subgenera might be united. Olivier, in one of his first Memoirs on certain Insects which attack the cerealia, has described three species of Sciarae and figured two.

§ See Meigen.

|| See Lat., Gen. Crust. Insect., IV, 262. See also Fab., Meig., genus *Platyura*, Macq., and Dalm., Anal. Entom., 98.

¶ Meig. Dipt., I, 274.

eyes of the males are always very large and approximated or contiguous.

Here, as in the preceding subgenus, the head is destitute of ocelli; the eyes of the females are emarginated on the inner side, in the form of a crescent.

*SIMULIUM*, *Lat. Meig.*—*CULEX*, *Lin.*—*RHAGIO*, *Fab.*,

Where the antennæ are somewhat hooked at the end, and hence the name of *Atractocera*, first given to this subgenus by Meigen. They are very small Insects, frequent low, wet woods, and annoy us by the severity of their bite. They sometimes penetrate into the genital organs of cattle and kill them. They, as well as the Culices, have been called *Musquetoës* \*.

There, the three ocelli are distinct.

One single subgenus approaches *Simulium* in the lunated eyes of the females, and is distinguished from all others of this division by its very small palpi, that present but one distinct joint. It is the

*SCATHOPSE*, *Geoff., Meig., Illig.*

One species of this subgenus, the

*S. latrinarum*; *Tipula latrinarum*, De Geer, is very common in privies, particularly in autumn †.

*PENTHETRIA*, *Meig.*,

Where the eyes are entire and separated in both sexes. The legs are long and destitute of spines ‡.

*DILOPHUS*, *Meig.*—*HIRTEA*, *Fab.*,

Formerly confounded with the *Bibiones*; the eyes are contiguous in the males, and occupy nearly the whole head. A range of small spines crowns the extremity of their anterior tibiæ §.

Finally, the last of the floral *Tipulariæ* have but eight or nine joints in their antennæ. Those species, in which they consist of nine, forming an almost cylindrical and perfoliate club, compose the subgenus

*BIBIO*, *Geoff., Meig.*—*HIRTEA*, *Fab.*

The *Bibiones* are heavy Insects, fly but seldom, and remain a long time in coitu. Some, very common in the gardens of France, have received names which indicate the time of their appearance; such are the *Mouches de St. Marc*, *Mouches de St. Jean*. The two sexes very often differ greatly as to colour, as is observed in the

*B. hortulana*; *Tipula hortulana*, L., the female; *F. marci*, L., the male; *Geoff., Ins.*, II, xix, 3. The male is all black; the thorax of the female is a cherry-red, her abdomen yellowish-red, and the rest of her body black. Very common on flowers in the spring.

It is thought that these Insects gnaw the buds of plants. Their

\* *Lat.*, *Gen. Crust. Insect.*, IV, 262.

† *Lat.*, *Meig.*, *Fab.*

‡ See *Meigen.*

§ *Meig.*, *Ibid.*

larvæ inhabit cow-dung, earth, and dung-hills, and have little ranges of hairs on their annuli. Their pupæ are not enclosed in cocoons\*.

ASPISTES, *Hoff., Meig.*

The only Insects of this division which have but eight joints in the antennæ, the last forming an ovoid club †.

All the following Diptera, a small number excepted, have their antennæ composed of three joints, the first of which is so short, that it may be excluded from the supputation; the last is annulated transversely, but without distinct divisions. It is frequently accompanied with a seta, usually lateral, and situated on the summit in others, presenting two joints at base, sometimes simple, and sometimes silky. When this seta is terminal, it frequently happens that its length diminishes and its thickness increases, so that it has the form of a stilet. Although this piece may be considered as a continuation of the antennæ, yet as it is separated from them, and appears to constitute an appendage, to deviate from the course generally adopted, by adding to the ordinary number of the antennæ those of the seta, would only disturb the harmony of our nomenclature. The palpi never have more than two joints.

Some, a few excepted, whose larvæ divest themselves of their skin previous to becoming pupæ, always have a sucker composed of six or four pieces; the proboscis, or at least its extremity, that is to say, its lips, is always salient. The palpi, when they exist, are exterior, and inserted near the margin of the oval cavity, close to which arises the sucker.

The larvæ, even of those in which the skin forms a cocoon for the pupa (*Stratiomis*), retain their primitive form.

This subdivision will comprise three families.

## FAMILY II.

### TANYSTOMA.

The Diptera of this family are distinguished from those of the two following ones by the last joint of the antennæ, which, exclusive of the seta which may terminate it, presents no transverse division; the sucker is composed of four pieces.

Their larvæ resemble long and almost cylindrical worms, with a constant and squamous head, always provided with hooks or retractile

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\* See Meigen.

† Idem.

appendages, by which they are enabled to gnaw or suck the alimentary matters on which they feed. They change their skin to undergo their second metamorphosis. The nymphs are naked, and exhibit several of the external parts of the perfect Insect, which issues from its exuviae, through a slit in the back.

In our first division we find species whose proboscis, always entirely (or nearly) salient, with the exterior envelope or the sheath of the sucker solid or almost corneous, projects more or less in the form of a tube or siphon, sometimes cylindrical or conical, and sometimes filiform, and terminates without any remarkable enlargement, the lips being small or confounded with the sheath. The palpi are small.

Some, that are rapacious, have an oblong body, the thorax narrowed before, and the wings incumbent; their proboscis is most commonly short or but slightly elongated, and forms a sort of rostrum. The antennæ are always approximated, and the palpi apparent.

#### ASILUS, *Lin.*,

Where the proboscis is directed forwards.

They fly with a humming noise, are carnivorous, voracious, and according to their size and power, seize on Flies, Tipulæ, Bombi, or Coleopterae, which they then exhaust by suction. Their larvæ have a small squamous head, armed with two movable hooks, live in the earth, and there become nymphs, whose thorax is furnished with dentated hocks, and the abdomen with small spines.

In some—*Asilici*, Lat.—the head is transverse; the eyes are lateral and distant, even in the males, and the proboscis is at least as long as the head. The wings have a complete cubital cell, forming an elongated triangle near the internal margin—the last of all—and terminating at the posterior edge. The epistoma is always bearded.

Sometimes the tarsi terminate by two hooks, with as many intermediate pellets.

Here, the terminal stilet of the antennæ is but slightly apparent, or when it is very distinct, its second and last joint is not prolonged in the form of a seta.

There are some of these in which the antennæ are hardly longer than the head; their stilet is barely visible or very short, conical and pointed; the part of the head from which they arise is not prominent, or but slightly so.

#### LAPHRIA, *Meig., Fab.*,

Where the stilet of the last joint of the antennæ, which is either fusiform or resembles a small obtuse head, is not (or barely) visible and where the proboscis is straight\*.

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\* See Lat., Gen. Crust. et Insect, IV, 298; Meig., Fab., Wied., and Macq.

ANCILORHYNCHUS, *Lat.*,

Where the stilet of the antennæ is hardly salient and pointed, and where the proboscis has the form of a compressed, arcuated, and hooked rostrum\*.

DASYPOGON, *Meig. Fab.*,

Where that stilet is very distinct and conical, and the proboscis is straight †.

In the two following subgenera the antennæ are manifestly longer than the head, and frequently placed on a common pedicle; the stilet is elongated and of the same thickness as the antennæ, at the end of which it forms two joints, the second longest, almost cylindrical or ovoid, and terminating in an obtuse point. In

CERATURGUS, *Wied.*,

The antennæ are not implanted on a common tubercle, and their first joint is shorter than the second ‡. In

DIOCTRIA, *Meig. Fab.*

These organs are situated on a common peduncle and their first joint is longer than the following one §.

There, the terminal stilet of the antennæ is prolonged in the form of a seta.

Those in which this seta is simple form the subgenus

*ASILUS proper.*

In Europe towards the close of summer we frequently find the

*A. crabroniformis*, L; De Geer, *Ins.*, VI, xiv. 3. It is about an inch long, and of an ochre-yellow; three first abdominal annuli of a velvet-black, the rest fulvous-yellow; wings russet. The metamorphosis of this species as well as that of the *A. forcipatus*, Lin., has been carefully observed ||.

Those, in which the seta of the antennæ is plumous, form the subgenus

OMMATIUS, *Illig. Weid.* ¶

Sometimes the tarsi are terminated by three hooks, the intermediate of which replaces the two pellets.

\* Two species collected by Count Dejean in Dalmatia, and another in the East Indies.

† See the authors already quoted.

‡ Ibid., *Anal. Entom.*, pl. i. 5.

§ The same authors.

|| For the other species and these various subgenera, see Latreille, Meigen, Fabricius, Wiedemann, and Macquart. I presumed that the genus *Cyrtoma* of Meigen should not be arranged with the Platypezinae, but with the Empides, according to the opinion of Fallen. M. Macquart has in fact lately referred them to the latter. This subgenus is distinguished from all those of this division, furnished like it with biarticulated antennæ, and in which the palpi are incumbent on the trunk, by the elongated and conical form of the last joint of the antennæ, by the wings, and by the smallness of the palpi. For other details, see Macquart's work, *Dipt. du nord de la France*.

¶ *Wied.*, *Dip.*, *Exot.*, 213.

GONYPUS, *Lat.*—LEPTOGASTER, *Meig.*

The stilet terminates in a short seta. The abdomen is long and almost linear, and the tarsi are arcuated\*.

In the others, *Hybotini*, *Lat.*, the head is more rounded, almost entirely occupied by the eyes, in the males, and its epistoma frequently naked, or but slightly pilose. The probosis is very short. The wings present fewer nervures than those of the preceding ones, and their inner portion is destitute of that complete triangular cell, whose point rests upon the posterior margin, or at least it is merely rudimental.

Sometimes the last joint of the antennæ is large, fusiform, elongated, and terminated by a very small stilet.

(EDALEA, *Meig.*

Sometimes the last joint is ovoid, short, or conical, and with a long seta †.

HYBOS, *Meig. Fab.*—DAMALIS, *Fab.*,

Where the posterior thighs are large and inflated ‡.

OCYDROMIA, *Hoffm. Meig.*,

Where they are of an ordinary size §.

EMPIS *Lin.*—EMPIDES, *Lat.*,

Closely allied to *Asilus* in the form of the body and the position of the wings, but with the proboscis perpendicular or directed backwards. The head is rounded and almost globular; the eyes very large.

These Insects are small and live on prey and the nectar of flowers. The last joint of their antennæ is always terminated by a biarticulated or short stilet, or by a seta. The males of some species—*Hilaria*—have the first joint of the anterior tarsi strongly dilated.

Some have triarticulated antennæ.

Sometimes the last joint forms an elongated cone.

Here the proboscis is much longer than the head; the biarticulated stilet terminating the antennæ is always short. The palpi are always turned up.

EMPIS, *proper.*

Such in Europe is the

*E. pennipes*, *Fab.*; *Panz., Faun. Ins., LXXIV, 18.* Black, with obscure wings; posterior legs of the female furnished with hairs resembling feathers.

\* See the authors just quoted.

† *Idem.* M. Macquart, *Dipt. du nord de la France*, has established two new genera in this division; *MICROPHORA*, similar to *Cedalea* in the elongation of the third joint of the antennæ, but with an elongated stilet; and *LEMTOPEZA*, closely allied to *Ocydromia*, but with the stilet entirely terminal, whilst in the latter it is inserted in the back of the third joint, a little beneath its extremity.

‡ See the same works.

§ *Idem*



RAMPHOMYIA, *Meig.*,

Only differing from *Empis* by the absence of a little transverse nerve in the end of the wing\*.

There, the proboscis is hardly longer than the head.

HILARIA, *Meig.*,

Where the antennæ are terminated by a little biarticulated stilet †.

BRACHYSTOMA, *Meig.*,

Where the stilet is extended into a long seta ‡.

Sometimes the last joint, also terminated by a seta, forms, with the preceding one, a spherical body, as in

GLOMA, *Meig.*,

Where the proboscis is also very short §.

The others present distinctly but two joints in their antennæ. The last is ovoid or almost globular, and terminated by the seta, forming, as in the preceding Insects, the second joint of the stilet. The proboscis is generally short, and the palpi are incumbent on it.

HEMERODROMIA, *Hoffm. Meig.*

Remarkable for the length of the coxæ of the two anterior legs ||.

SICUS. *Lat. TACHYDROMIA, Meig.*,

Distinguished by the inflation of the thighs of the first or second pair of legs ¶.

DRAPETIS, *Meig.*,

Where the last joint of the antennæ is almost globular and the proboscis scarcely salient\*\*.

M. Macquart, by applying the method of Jurine to the Diptera, and paying more attention to other parts, has established several new subgenera which our limits prevent us from describing ††.

The remaining *Tanystomæ* of our first division usually have a short, wide body, the head applied directly to the thorax, the wings distant and the abdomen triangular. In a word, their general appearance is that of our domestic Fly. Their proboscis is frequently long.

CRYPTUS, *Lat.*,

Intermediate between *Empis* and *Bombylius*. The wings are inclined on each side of the body; and the alulæ very large and covering the halteres; the head is small and globular, the thorax very high or gibbous, the abdomen vesicular and rounded, or almost cubical;

\* See *Lat. Meig.*, *Fab.*; *Macq.*, F. II.

† *Meig.*, *Macq.*

‡ *Meigen.*

§ *Idem.*

|| *Meig.* and *Macq.*

¶ *Idem.*

\*\* *Meig.*

†† *Macq.*

the antennæ are closely approximated, and the proboscis is directed backwards, or wanting.

Those which have the proboscis prolonged backwards form two subgenera. In the first,

CYRTUS, *Lat.*,

Or *Cyrtus* properly so called, the antennæ are very small and consist of two joints, the last with a terminal seta. In the second, or

PANOPS, *Lam.*,

The antennæ are longer than the head, almost cylindrical, triarticulated, and without a terminal seta.

In the remaining *Cyrti* the proboscis is not remarkable.

ASTOMELLA, *Dufour.*,

Distinguished by the antennæ, composed of three joints, the last of which forms an elongated and compressed button without a seta.

HENOPS, *Illig.*—OGCODES, *Lat.*

The antennæ very small, biarticulated, with a terminal seta and inserted in front of the head.

ACROCERA, *Meig.*

Similar antennæ inserted on the anterior part of the head\*.

BOMBYLIUS, *Lin.*—BOMBYLIERS, *Lat.*,

Where the wings are extended horizontally on each side of the body, and the halteres are exposed. The thorax is higher than the head, or gibbous as in *Cyrtus*; the antennæ are closely approximated, and the abdomen is triangular or conical; the proboscis is directed forwards.

Their antennæ always consist of three joints, the last elongated, almost fusiform and compressed, truncated or obtuse, usually terminated by a very short stilet, and never by an elongated seta. The palpi are small, slender, and filiform. The proboscis is generally very long and most slender at the extremity. Their legs are long and attenuated. They fly with great velocity, hover over flowers without alighting on them, introduce their trunk into their calyx to obtain their nectar, and produce a sharp humming sound. I suspect that their larvæ are parasitical as well as those of the following genus.

In some the proboscis is evidently longer than the head, very slender, and tapers to a point.

TOXOPHORA, *Meig.*

Removed from all the others by the antennæ, which are as long as the head and thorax, projecting, filiform, and terminating in a point, and of which the first joint is much longer than the rest. The body is elongated †.

\* See *Lam.*, *Ann. du Mus. d'Hist. Nat.*, III, p. 263, xxii, 3; *Lat.*, *Gen. Crust. et Insect.*, IV, p. 315, et seq.; the *Encyc. Méthod.*, articles *Ogcodes* and *Panops*; *Meigen* and *Fabricius*. For the genus *Astomella*, see the *Diet. Class. d'Hist. Nat.*

† See *Meigen*; his *T. maculatus* had been described and figured by *Villers*, in his *Entom. d'Europ.* III., x, 31. *Asilus fasciculatus*. See also *Wied.*, *Dipt. Exot.*

Of those in which the antennæ are much shorter, the

*XESTOMYZA*, *Wied.*.

Approximates to *Toxophora* in the length of the first joint of those organs, which is considerably greater than that of the others; it is almost fusiform, as well as the third or last\*.

*APATOMYZA*, *Wied.*,

Is another subgenus in which the first joint of the antennæ is also very long; but here that joint is cylindrical †.

In the following subgenera of the same division, or of those whose proboscis is long and setaceous, or filiform, the last is the longest.

Sometimes the two first joints of the antennæ are short and almost of equal length.

*LASIUS*, *Wied.*,

Where the head, in one of the sexes, is almost entirely occupied by the eyes, and the last joint of the antennæ is very long, almost linear, compressed, and without any apparent terminal seta. The abdomen is voluminous. The labrum is large, gibbous at base, and truncated at the end.

In one specimen, for which I am indebted to the kindness of M. de Lacordaire, the proboscis extends along the under part of the body and projects beyond its posterior extremity. This character, with some others, would seem to indicate that this subgenus naturally belongs to the tribe of the *Vesicularia*, and comes near *Panops* ‡.

*USIA*, *Lat.*—*VOLUCELLA*, *Fab.*,

Where the last joint of the antennæ is ovoido-conical, obtuse or truncated at the end, and terminated by a stilet. The palpi are not apparent.

The species are peculiar to the southern countries of Europe and to Africa §.

*PHTHIRIA*, *Meig.*

Similar to *Usia* in the antennæ, but the palpi are distinct ||.

Sometimes the second joint is evidently shorter than the first; the last is long, generally almost cylindrical, and terminated in a point, as in

*BOMBYLIUS*, *proper*,

Where the palpi are very apparent.

These Insects are densely covered with a woolly down, which colours it. The most common species in the environs of Paris is the

*B. major*, L.; *B. bichon*, De Geer, *Insect.*, VI, xv, 10, 11.

From four to five lines in length, and entirely covered with yellowish-grey hairs; proboscis long and black; external half of the wings blackish, the remainder diaphanous; legs fulvous.

\* *Wied.*, *Dipt.*, *Exot.*, 153, I, 11.

† *Id.*, *Ibid.*, III. I have never seen a species of this genus.

‡ *Wied.*, *Anal. Entom.*, I, 3.

§ *Lat.*, *Gener. Crust. et Insect.*, IV, 314. See also *Fab.* and *Meig.*

|| The same works.

Geoffroy has confounded the above genus with *Asilus* \*.

•  
*GERON, Meig.*

This genus appears to be distinguished from *Bombylius* only by the more remarkable elongation of the last joint of the antennæ and its subulate termination, and by the wings, which have one transverse nervure less near the posterior margin, so that the number of the closed cells of that margin is less †.

The genus *Thlipsormyza* of Wiedemann—Dipt. Exot., I, iv—appears to approximate to the preceding Insects and to *Phthiria*. That called *Amictus*, I presume, also approaches them; in both the first joint of the antennæ is longer than the second, and cylindrical, a character which approximates them to *Geron*. The wings in *Amictus*, however, are somewhat different from those of the preceding genera.

In the other species the proboscis is, at most, as long as the head, and inflated at the end; the first joint of their antennæ is the largest of all. Those, in which it is much larger than in the following ones, form the genus

*PLOAS, CONOPHORUS, Meig. ‡,*

And those in which it is simply larger, without any remarkable increase of thickness, the

*CYLLENIA §,*

Where the abdomen is more elonged and almost conical.

*ANTHRAX, Scop., Fab.—MUSCA, Lin.—ANTHRACII, Lat.,*

Similar to *Bombylius*; but where the body is depressed, or but slightly elevated and not gibbous, with the head as high and as broad as itself. The antennæ are always short, and, in the *Stygides* alone excepted, distinct from each other, and always terminated by a subulate or punch-like joint. The proboscis, except in a small number, is generally short, extending but little beyond the head, frequently even withdrawn into its oral cavity, and terminated by a little inflation formed by the lips. The palpi are usually concealed, small, filiform, and each, at least in several, adhering to one of the threads of the sucker. The abdomen is less triangular than that of the *Bombylii*, and partly square. These Insects are generally hairy. Their habits are very analogous to those last mentioned. They frequently alight on the ground, on walls exposed to the sun, and on leaves.

Some approximate to the *Bombylii* in their antennæ, which are

\* Lat., Gener. Crust. et Insect., IV, 314. See also Latreille, Meigen, Fabricius, Macquart, and Olivier, article *Bombille*. The genera *Corsomyza* and *Tomomyza* of Wiedemann—Dipt. Exot.—are unknown to me. In the first, the last joint of the antennæ is twice the length of the preceding ones, and compressed and dilated at the end. The second appears to approach *Cyllenias* and *Mulion*.

† See Meigen.

‡ Lat., Gener., IV, 312; Fab., Meig., Macq.

§ Lat., Ibid., and Meig.

closely approximated at base. Their proboscis projects but very little beyond the oral cavity, as in

STYRIDES, *Lat.*—STYRIA, *Meig.*\*

In the others the antennæ are distant.

Here, the head is almost globular; the proboscis is never long; the palpi are always concealed, and the extremity of the wings does not exhibit numerous areolæ forming a net-work.

ANTHRAX, *Meig.*,

Or Anthrax, properly so called, where the three ocelli are closely approximated.

*A. morio*; *Musca morio*; Panz., Faun. Ins. Germ., xxxiii, 18; *A. semiatra*, *Meig.* Entirely black, with russet hairs on the thorax and sides of the abdomen. The wings, from their base to a little beyond the half of their length, are black, which colour, in terminating, forms four almost equal dentations. It is one of the most common species in the environs of Paris †.

HERMONEURA, *Wied., Meig.*,

Where one of the three ocelli, the anterior, is distant from the two others, which are posterior; the proboscis is concealed. The wings exhibits more nervures than those of the preceding subgenus ‡.

There, the head is proportionally shorter, almost hemispherical, and compressed transversely; the antennæ are very distant; the trunk is longer than the head; the palpi are sometimes exterior, and the extremity of the wings frequently exhibits a reticulation analogous to that of the same organs in the Neuroptera.

Those, in which they are always reticulated in the usual manner, where the proboscis is merely a little longer than the head, and the palpi are not apparent, where the first joint of the antennæ is cylindrical, somewhat longer than the preceding one, and the last forms an elongated cone, compose the subgenus

MULIO, *Lat., Meig.*—CYTHEREA, *Fab.* §

Those in which the summit of the wings is most frequently reticulated, like those of the Neuroptera, and the proboscis is much longer than the head, with the palpi external, in which the two first joints of the antennæ are very short, nearly equal in size, almost granose, and the last forming a very short cone, with an abrupt and almost setaceous stilet at the extremity, constitute the subgenus

NEMESTRINA, *Lat. Oliv. Wied.*,

Where the tarsi are furnished with three pellets, whilst in the preceding subgenera there are only two, and frequently but slightly apparent ||.

\* See Meigen and Macquart. The name of *Stygia* had already been appropriated to a genus of the Lepidoptera.

† This subgenus is designated in the Encyc. Méthod., X, 676, by the name of *Lomatia*.

‡ See Meigen.

§ *Lat., Meig., Fab., Wied.*

|| The *Hermoneuræ* should be excepted, according to a figure of one of the tarsi given by Meigen.

Two species, one of which—*Cytherea fasciata*, Fab.—is found in Italy and in ci-devant Provence, differ but little as to the reticulation of their wings from the Anthraces. They form the genus *FALLENIA* of MM. Meigen and Wiedemann. According to them, the proboscis is susceptible of being curved beneath and along the pectus\*.

The genus *COLAX* of Wiedemann—Anal. Entom., xviii, fig. 8—in general appearance, antennæ and wings, appears to us to approximate in the last mentioned Anthraces, but according to that gentleman the oral cavity is closed as in *Æstrus*, and the ocelli are wanting.

Our second general division of the Tanystoma is characterized by a membranous proboscis, usually with a short stem, projecting but slightly and terminated by two very distinct and raised or ascending lips.

The form of the head in the larvæ of the last Diptera of this division is variable.

In some—*Leptides*—the wings are distinct, and exhibit several complete cells. The antennæ are not terminated en palette. The palpi are filiform or conical.

Sometimes these palpi are withdrawn into the oral cavity. The antennæ have a fusiform termination or one resembling an elongated cone, with a little articulated stilet at the end †.

#### *THEREVA Lat., Meig. — BIBIO, Fab.,*

To which belongs the following species.

*T. plebeia*; *Bibio plebeia*, Fab. Black, with cinereous hairs; abdominal annuli margined with white. On plants.

The larva of a species of this genus—*Nemotelus hirtus*, De Geer—lives in the ground and resembles a little serpent. Its body is white and pointed at both ends. It changes the whole of its skin when about to become a pupa ‡.

Sometimes the palpi are exterior. The last joint of the antennæ is either almost globular or reniform, or nearly ovoid or conical and terminated by a long seta.

The tarsi are furnished with three pellets. They form the genus

#### *LEPTIS,*

Which is divided into several subgenera.

#### *ATHERIX, Meig., Fab.,*

Where the first joint of the antennæ, larger than the second, is thick,

\* See the authors already quoted, and the Encyc. Méthod., article *Némestrine*.

† This subdivision corresponds to the family of the *Xylotoma* of MM. Meigen and Macquart.

‡ Lat.; Ibid., Fab., Meig. and Macquart. In the collection of Faujas, I saw a piece of schist that exhibited the impression of a species of this genus.

at least in one of the sexes, and the third is lenticular and transversal.

The palpi project\*.

*LEPTIS*, *Fab. Meig.*—*olim RHAGIO*, *Fab.*,

Where the last joint of the antennæ is almost globular or ovoid, always terminated in a point, and never transversal.

In some, the antennæ are shorter than the head, and their three joints are nearly of equal length.

Here, the palpi project.

Such are the *Leptis*, *Macq.* where the third joint of the antennæ is ovoid or pyriform.

*L. scolopacea*; *Musca scolopacea*, *L.*; *Némotèle becasse*, *De Geer*, *Insect.*, VI, ix, 6. Thorax black; abdomen fulvous, with a range of black spots on the back; legs yellow; wings maculated with brown. Very common in woods.

There, the palpi are raised vertically, forming the *Chrysophilus* of that naturalist, and united to *Atherix* by Fabricius.

In the others, the antennæ are as long as the head, the first joint elongated and cylindrical, the second short, and the third conical; the palpi are turned up. The posterior thicker than in the preceding subgenera. The abdomen is linear.

*L. vermileo*; *Musca vermileo*, *L.*; *Némotèle ver-lion*, *De Geer*, *Ibid.*, x. Resembling a *Tipula*; yellow; four black streaks on the thorax; the abdomen elongated, with five ranges of black spots; wings immaculate.

The larva is almost cylindrical; its anterior portion is much the smallest, and there are four mandibles on the opposite extremity. It resembles a stick-like geometra (caterpillar), and is equally rigid when withdrawn from its domicil. It bends its body in every direction, advances and moves about in the sand, and excavates there an infundibuliform cavity, at the bottom of which it secretes itself either entirely or partially. If an Insect be precipitated into the trap it rises suddenly, clasps it with its body, pierces it with the stings or hooks of its head, and sucks it. It flings away the carcass as well as the sand, by bending its body, and then suddenly relaxing it, like a bow.

The pupa is covered with a layer of sand.

M. de Romand, paymaster-general at Tours, who makes a particular study of the Insects in his vicinity, has again observed the metamorphoses of this Insect, and sent me several living larvæ, some of which I preserved in that state for three years †.

The *Clinoceræ*—*CLINOCERA*—of Meigen, by their wings, seem to belong to the following division.

The other *Tanystoma* of our second division have their wings incumbent on the body, and exhibit at most but two complete or closed cells. The antennæ terminate in a palette, almost always accom-

\* See the works just quoted.

† For the other species, see Fabricius, Meigen, and Macquart.



panied by a seta \*. The palpi of the greater number are flattened or laminiform, and laid on the proboscis.

These characters—a body compressed on the sides, a triangular head, slightly projecting in the manner of a snout, the abdomen curved underneath, and long slender legs furnished with little spines, particularly distinguish the genus

*DOLICHOPUS, Lat. Fab.,*

Which now forms a small tribe—*DOLICHOPODES*—arranged by M. Macquart, in a very natural order, which we adopt, with the exception of one alteration, which will place *Dolichopus* proper and *Ortochile*, with which he finishes, at the beginning.

The male organs of generation, in some, present laminiform appendages.

Here the proboscis is elongated, and forms a little rostrum.

*ORTOCHILE, Lat., Meig., Macq. †*

There, as in all the other *Dolichopi*, the proboscis is very short, or almost non-salient.

*DOLICHOPUS proper,*

Where the third joint of the antennæ is almost triangular, but slightly elongated, with a seta of moderate length, uninflated, and in the form of a joint between its middle and extremity.

These Insects are frequently green or cupreous. The legs are long and very slender. They are found on walls, trunks of trees, &c. Some of them run along the surface of the water with great celerity. The sexual organs of the male are almost always external, large, complex, and folded up under the venter.

*D. unguatus*, Fab.; *Némotèle bronzée*, De Geer, Insect., VI, xi, 19, 20. Antennæ but half the length of the head; body bronze-green, glossy; eyes golden; legs pale yellow; wings immaculate.

Its larva lives in the ground; it is long, cylindrical, and furnished with two points in the form of recurved hooks. On the front of the thorax of the nymph are two long horns directed forwards, and bent into the figure of an S ‡.

*SYBISTROMA, Meig.,*

Where the last joint of the antennæ is almost in the form of the blade of a knife, with a very long seta, inflated like a knot, anterior to its extremity §.

The male organs of generation in the others are furnished with filiform appendages.

\* In several, the last joint of the antennæ differs but little from that of the preceding Diptera, but the relative position of their wings and their reticulation present distinctive characters.

† Lat., Gen. Crust. et Insect., IV, 289. See also Meigen and Macquart.

‡ For the remaining species, and some others of the following subgenera, see a Memoir of the Baron Cuvier, in the Journ. d'Hist. Nat. et de Phys., II, p. 253. See also Meigen and Macquart.

§ Meig. and Macquart.

Here, the third joint of the antennæ either borders on an oval or is triangular, or is very long and narrow, and almost lanceolate, as in

RAPHIUM, *Meig.* \*

In the following, or

PORPHYROPS, *Meig.* †,

It is securiform or triangular, and with a hairy seta; the first joint is very short or indistinct. In

MEDETERUS, *Fisc., Meig.*,

This seta is simple, with the first joint distinct and elongated. The last joint of the antennæ, or the palette, is nearly oval.

M. Macquart has formed a genus—*Hydrophorus*—with those species in which the seta is altogether terminal. Those in which the insertion is dorsal, alone compose the genus *Medeterus* ‡.

There, the third joint of the antennæ is almost globular. The seta is always hairy. If it be terminal, we have the genus *Chrysotus*; if it be inserted a little underneath, that of *Psilopus*; and, finally, if it arise lower down or near the base, *Diaphorus*, which genus, by the almost spherical head, nearly entirely occupied by the eyes, in the males, appears to us to lead to the family of the *Platypezina* of Meigen. The wings, ocelli, and some other characters drawn from the parts of the head, confirm those we have described. We cannot, however, enter into similar details here §.

The *Platypezina* of M. Meigen, from which Macquart has very properly removed the genus *Cyrtoma*, and to which we unite that of *Scenopina*, and his family of the *MEGACEPHALI* ||, consist of Diptera very analogous in their proboscis, antennæ and wings, to the *Dolichopi*; but the body is depressed, the head hemispherical and almost entirely occupied by the eyes, at least in the males. The palpi are turned up or withdrawn, cylindrical or clavate, and resembles those of the *Notocanthi*. The legs are short and spineless, and the posterior tarsi frequently broad and flattened.

These Diptera are very small. M. Macquart has furnished us with various interesting observations on the habits of several species.

Some have a seta on the last joint of the antennæ.

Those, in which that seta is terminal, whose eyes are contiguous in the males, and the three first joints of whose posterior tarsi, or the first at least, are wide and flattened, form the subgenera

CALLOMYIA, *Meig.*,

Where the first joint alone of the posterior tarsi is dilated, but is as long as all the others taken together.

\* *Meig.* and *Macquart.*

† *Idem.*

‡ *Idem.*

§ *Meig.* and *Macquart.* The genus *Lonchoptera*, arranged by Meigen with the preceding genera, is greatly removed from them. See the tribe of the *Muscides*.

|| We form them into a small tribe, under the denomination of *CEPHALOPSIDES*.

PLATYPEZA, *Meig.*,

Where the four first joints of the posterior tarsi are dilated.

Those, in which the seta is inserted on the back of that joint, near its junction with the preceding one, whose tarsi are not dilated, and whose eyes are separated in both sexes, compose the genus

PIPUNCULUS, *Lat.*—CEPHALOPS, *Phallen.*,

Where the head is almost globular.

The others have no seta on the last joint of the antennæ. It is narrower and longer than in the preceding Insects.

SCENOPINUS, *Lat.*, *Meig.*—MUSCA, *Lin.*,

To which belongs the following species :

*S. fenestralis*; *Musca fenestralis*, *L.*; Schell., *Dipt.* XIII, 1. the female; 2. the male. Head and thorax obscure bronze; abdomen black, transversely striate, streaked with white in the male; legs fulvous; tarsi obscure. Very common on the glass in windows\*.

## FAMILY III.

## TABANIDES.

Our second family of the Diptera is characterized by a salient proboscis, usually terminated by two lips with projecting palpi, by the last joint of the antennæ being annulated, and by a sucker composed of six pieces: it comprises the genus

TABANUS, *Lin.*†

These Diptera are very similar to large Flies, and well known by the torment they occasion to cattle, by piercing their skin in order to suck their blood. Their body is usually but slightly pilose. Their head is as wide as the thorax, almost hemispherical, and with the exception of a small space, particularly in the males, occupied by two eyes, generally of a golden-green, with purple spots or streaks. Their antennæ are about the length of the head, and are composed of three joints, the last of which is the longest, terminates in a point, has neither seta nor stilet at the end, is frequently lunate above its base, and with from three to seven transverse and superficial divisions. The proboscis of the greater number is almost membranous, perpendicular, of the length of the head or somewhat shorter, almost cylindrical, and terminated by two elongated lips. The two palpi, usually

\* For all these subgenera, see the authors already quoted.

† This family is not connected with the preceding one. It appears to me to form a particular series with the following, leading the Nemocera to the Atericera. The preceding family would form another which would also lead to them, so that the last of this one would be approximated to the last of the Notacanthi. The Culicides and Tabanides are the only Diptera whose sucker is composed of six pieces.

incumbent on it, are thick, pilose, conical, compressed and biarticulated. The sucker inclosed in the proboscis is composed of six small pieces, in the form of lancets, which, by their number and relative situation, correspond to the parts of the mouth in the Coleoptera. The wings are extended horizontally on each side of the body. The alulæ almost completely cover the halteres. The abdomen is triangular and depressed. \*The tarsi are furnished with three pellets.

These Insects begin to appear towards the close of spring, are very common in the woods and pastures, and produce a humming noise when on the wing. They even pursue Man in order to suck his blood. Beasts of burden, having no means of repulsing them, are most exposed to their attacks, and are sometimes seen covered with blood from the wounds they inflict. The Insect mentioned by Bruce, under the name of *Tsalsalya*, which is dreaded even by the Lion, may possibly belong to this genus.

In some, the proboscis is much longer than the head, slender, siphoniform, squamous, and usually terminated in a point, with the palpi very short in proportion to its length. The last joint of the antennæ is divided into eight annuli. They form the subgenus

*PANGONIA*, Lat., Fab.—*TANYGLOSSA*, Meig.

These Insects are only found in hot climates, and feed on the nectar of flowers like the *Bombylii* \*.

In the others the proboscis is shorter, or hardly longer than the head, membranous, and terminated by two large lips; the length of the palpi is at least equal to half that of the proboscis, and the last joint of the antennæ is divided into five or four rings.

Sometimes the antennæ are hardly longer than the head; the last joint, which is somewhat lunate and subulate, is divided into five rings, the first very large with a tooth superiorly. They constitute the subgenus

*TABANUS proper*,

To which belongs that well-known species,

*T. bovinus*, L.; De Geer, Insect, VI, xii, 10, 11. An inch long; body brown above, grey beneath; eyes green; tibiæ yellow; transverse lines and triangular spots of pale yellow on the abdomen; wings transparent, with russet-brown nervures.

The larva lives in the ground. It is elongated, cylindrical, and attenuated towards the head, which is armed with two hooks. The annuli of the body (twelve) are marked with raised cords. The nymph is naked, almost cylindrical, with two tubercles on the front, cilia on the margin of the annuli, and six

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\* Encyc. Méthod., article *Pangonie*. See also Meigen and Wiedemann.

Some species are destitute of ocelli, and form the genus *PHILOLICHE* of Count Hoffmannsegg, Wied., Dipt., Exot., 54. Others in which the proboscis projects, as in *Pangonia*, but ascends, where the palpi consist of three joints instead of two, and the antennæ resemble those of *Tabanus proper*, compose the genus *RHINOMYIA*, Wied., Ib., 69.

Those, which he calls *RAPHIORHYNCHUS* and *ACANTHOMERA* placed by him between the preceding genus and *Tabanus*, according to our method, belong to the family of the *Notacanthi*.

points at the posterior extremity. It ascends to the surface of the soil when about to divest itself of its skin, in order to assume the form of a *Tabanus*, and protrudes the half of its body above it. Very common near Paris.

*T. maroccanus*, Fab. Black, with golden-yellow spots on the abdomen.—The scourge of Camels, which, according to M. Desfontaines, are sometimes completely covered with these Insects\*.

Sometimes the antennæ are very evidently longer than the head and terminated by a joint forming an elongated cone, or almost cylindrical, frequently presenting but four rings. The ocelli are wanting in several.

Some, in which the last joint of the antennæ is always subulate and divided into five rings, have three ocelli.

Those, in which the first joint is manifestly longer than the following one, and cylindrical; and where the latter is very short, and resembles a cup, form the subgenus

SYLVIUS, *Meig.* †.

Those in which the two first joints are cylindrical, and almost equal in size, compose the subgenus

CHRYSOPS, *Meig.*

To this belongs the

*C. cæcutiens*, Fab.; De Geer, *Insect.*, VI, xiii, 3, 5. Eyes golden, with purple points; thorax yellowish-grey, streaked with black; abdomen yellowish above, with a broad black spot, forked at the end, on the two first annuli; two others, elongated, and of the same colour on each of the following ones, and three blackish-brown and transversal ones on the wings. They are constantly persecuting the Horse ‡.

The others are destitute of ocelli; the last joint of their antennæ, sometimes cylindrical, presents but four rings.

Here, as in

HEMATOPOTA, *Meig.*,

It is subulate, and the first is thick, and almost borders on an oval in the males §.

There, as in

HEXATOMA, olim HEPTATOMA, *Meig.*,

The antennæ, longer than in the preceding ones, are cylindrical; the last joint is much elongated ||.

\* For the remaining species of this subgenus, see Lat., Fab., Meig., Palis de Beauv., Macq., Fallen and Wiedemann.

† See Meigen. He quotes but a single species, the *Tabanus vituli*, Fab., and to which he refers his *T. italicus*.

‡ See Fab., Lat., Meig., Fall., Wied., Macq., &c.

§ The same authors.

|| Idem.

## FAMILY IV.

## NOTACANTHA.

The fourth family of the Diptera, as well as the preceding one, presents antennæ of which the third and last joint is divided transversely in the manner of a ring, or which are even composed of five very distinct joints; but the sucker is formed of only four pieces, and the proboscis, the stem of which is usually very short, is almost entirely retracted within the oral cavity. The membranous nature of that organ and its turned up lips, its similarly raised and clavate palpi, the relative disposition of the wings which are usually crossed, the form of the abdomen which is rather oval or orbicular than triangular, and finally the scutellum which is frequently armed with teeth or spines, also distinguish the Notacantha from the Tabanides.

But few of their larvæ have been observed. Such as have been discovered are described and figured by Swammerdam, Reaumur and Roesel, are aquatic, and approximate to those of the Athericera in their soft head, varying in form, and in their habit of becoming pupæ under their own skin; but they retain their primitive form and proportions, thus differing from those of the latter.

Other larvæ of the Notacantha—*Xylophagus*—live in the carious and diseased parts of trees.

We divide the Notacantha into three principal sections.

Those of the first—*Mydasii*,—Lat.—never have teeth or spines in the scutellum. Their body is oblong, and the abdomen forms an elongated and conical triangle. The wings are distant. Their antennæ, from which we draw their most distinguishing character, are sometimes composed of five distinct joints, the two last of which form a club in some, and the extremity of a cylindrical stem with a subulate termination in others, and sometimes of three joints, the last of which is largest, almost cylindrical, tapers to a point, and is divided into three annuli; thus these organs are always divided into five. With the exception of *Mydas* in which the vestige of a very small stilet is perceptible, neither that appendage nor the seta which replaces it can be found in any of the Notacantha of this section; it is possible that the two last joints may represent them.

In some the antennæ are much longer than the head, consist of five joints, are terminated in an elongated club formed by the two last, with an umbilicus at the end from which issues a very short seta.

The posterior thighs are stout, and dentated or spinous on the inner side. The Tarsi have but two pellets. The posterior cells of the wings are complete or closed before the margin, and narrow or elongated, oblique or transverse.

These Insects compose the genus

MYDAS,

Which is divided into two subgenera.

CEPHALOCERA, *Lat.*,

Where the proboscis is in the form of a long and projecting siphon\*.

MYDAS, *Fab.*,

Or Mydas proper, where that or an, as is usual in this family, terminates by two large lips †.

In the others, the antennæ are scarcely longer than the head, cylindrical, and tapering to a point at their extremity. The tarsi are furnished with three pellets. The posterior cells of the wings are longitudinal and closed by their posterior margin.

CHIROMYZA, *Wied.*,

Where the antennæ are composed of five well separated joints, the two last of which are the smallest ‡.

PACHYSTOMUS, *Lat.*,

Where the antennæ are composed of three joints the last of which is divided into as many rings §.

In the second section, that of the *Decatoma*, *Lat.*, we find antennæ always composed of three joints, the last of which, the longest, without stilet or seta, and divided into eight rings, is clavate in some, and almost cylindrical or in the form of an elongated cone in the others. The wings are usually incumbent on the body. The tarsi are furnished with three pellets.

These Insects may be united in one generic section.

XYLOPHAGUS.

In some, the antennæ are much longer than the head, with the two first joints very short and the third very long, compressed, forming

\* A subgenus established on an Insect from the Cape.

† See *Fab.*, *Lat.*, and particularly *Dalm.*, *Dipt. Exot.*, 115, who describes several species. This subgenus and the preceding one appear to form a particular division, which, in a natural order, should perhaps be placed higher. The wings have some affinity with those of the *Pangonia*.

‡ *Wied.*, *Dipt. Exot.*, I, viii.

§ *Lat.*, *Gener. Crust. et Insect.*, IV, 286; *Encyc. Méthod.*, article *Pachystome*. The larva of the *P. syrphoïde*; *Panz.*, *Fauv. Insect. Germ.*, lxxvii, 9, the female; lives under the bark of the Pine; its pupa resembles that of a *Tabanus*.



a strangulated club, slightly geniculate in the middle, the inferior portion resembling an elongated cone, and the other an oval palette. The scutellum is unarmed.

HERMETIA, *Lat., Fab.* \*

The antennæ of the others are never much longer than the head, and terminate by an almost cylindrical or elongated and conical joint.

Here, the scutellum is spineless.

XYLOPHAGUS, *Meig., Fab., Lat.,*

Or *Xylophagus* proper, where the body is narrow and elongated, and the antennæ are evidently somewhat longer than the head, and terminated by an almost cylindrical joint. The head is short, transversal, and without any particular elevation anteriorly.

*X. ater*, *Lat., Gen. Crust., et Insect., I, xvi, 9, 10.* Elongated; black; the mouth, a line on each side of the thorax, scutellum and legs, yellow. Found in the month of May, in the wounds, &c. of the Elm †.

ACANTHOMERA, *Weig.,*

Where the antennæ, as long as the head at most, terminate by a joint, forming an elongated cone, or almost resembling a punch, and compressed, of which the first ring is larger than the others; in this respect it bears some analogy to that of *Tabanus*. The head is hemispherical and the eyes are very large. The abdomen is broad and flattened, and the interocular space presents inferiorly a projection in the form of a horn or pointed rostrum. The two joints of the palpi are of equal length.

In another genus

RAPHIORHYNCHUS, *Wied.,*

The first joint of these palpi is very short, and the second, much longer, terminates in a point. The remaining characters are identical with those of *Acanthomera*. The species of both these genera belong to South America ‡.

There, the scutellum is armed with spines.

In these, the antennæ are simple.

CÆNOMYIA, *Lat., Meig.—Sicus, Fab.*

They are closely allied to the two preceding subgenera. The antennæ are hardly longer than the head, with the third joint conical or in the form of a punch; the first is evidently longer than the following one. The palpi are very apparent and cylindrical, terminate in a point and consist of two equal joints. The scutellum is armed with two spines.

*C. ferruginea*; *Sicus ferrugineus*, *Fab., Meig., Dipt., II, xii, 16, 25.* Russet, with yellow or whitish spots or streaks on the abdomen. It sometimes varics, the thorax being occasionally

\* See *Lat.* and *Fab.*

† The same works. *Meig., Macq.,* family of the *Xylophagi*, and *Wied.*

‡ *Wied., Dipt. Exot., II, 1, 1.*

brown, and the abdomen maculated with the same colour. It is very rare in the environs of Paris, but common in the department of Calvados. It is the *Mouche armée odorante* (*Stratolens*) of the *Tableau Élémentaire de l'Histoire Naturelle des Animaux*. It diffuses a strong odour of Melliot sometimes even after death\*.

BERIS, *Lat., Meig.*,<sup>2</sup>

Where the antennæ are a little longer than the head, with their two first joints of equal length, and the third forming an elongated cone. The scutellum exhibits from four to six spines †.

CYPHOMYIA, *Wied.*,

Where the antennæ are still more elongated, with the third joint longer than the second; the third is linear and compressed. The scutellum has two spines †.

Those have antennæ which throw out on each side, near the middle, three or four linear, hairy threads, the superior ones silky; they are almost setaceous near the extremity. The scutellum has four teeth.

PTILODACTYLUS, *Wied.*

They have the general appearance of a Beris and a Cyphomyia §.

In the third section—*Stratiomydes*, *Lat.*—we also find antennæ consisting of three joints, the last of which, exclusive of the stilet or seta, presents at most five or six rings. This stilet, or that seta, exists in almost all of them, and in those where they are wanting, the third joint is elongated and fusiform, and always divided into five or six rings. The wings are always incumbent one on the other. In several of those species where the antennæ terminate in a somewhat oval and globular club, and always furnished with a stilet or a seta, the scutellum is not spinous.

This section comprises the genus

STRATIOMYS, *Geoff.*

In some, the third joint of the antennæ is elongated, fusiform or conical, without a seta at the end, and almost always terminated by a biarticulated stilet. The scutellum, in most of them, is armed with two spines or teeth.

Here the proboscis is very short. The anterior portion of the head does not project in the manner of a rostrum, receiving that organ

\* See *Lat., Fab., Meig., and Macq.*

† See the same authors.

‡ *Wied., Anal. Entom., 13, fig. 4.*

The genus *Platyna* of this naturalist, established and figured in the same work, is wholly unknown to me. The Insect, on which he has formed it, has the port of a Beris and a Cyphomyia. The antennæ are equally long and filiform, with the two first joints elongated and cylindrical, and the last, judging from his figure of one of those organs, without rings. The scutellum has but one spine.

§ *Stratiomys quadridentata*, *Fab.*

inferiorly, and bearing the antennæ above. The latter are inserted in the front, as usual.

*STRATIOMYS, Fab.,*

Or *Stratiomys*, properly so called, where the antennæ are much longer than the head, the first and last joint being greatly elongated; the latter is fusiform, or resembles a narrow and elongated club, narrowed at both ends, consisting of at least five distinct rings\*, without an abrupt stilet at the extremity. The two rings that compose it are not distinguished from the others by any sudden contraction.

The body of the larvæ is long, flattened, invested by a coriaceous or firm skin, and divided into annuli, of which the three last form a tail terminated by numerous plumous hairs which radiate from the extremity. The head is squamous, small, oblong, and furnished with a great number of little hooks and appendages with which they agitate the water that constitutes their domicil. They respire by keeping their tail on the surface of the water, an orifice situated between the hairs at its extremity affording a passage to the air. Their skin becomes the cocoon of the pupa. They do not change their form, but become rigid, and incapable of moving or bending their body; their tail is frequently at an angle with the trunk, and thus they float upon the water. The pupa only occupies one of the extremities of its cocoon, and the perfect Insect issues from it through a fissure which is effected in its second ring, and remains on its exuvix, where its body becomes firm, and its development is completed.

A common species in France is the

*S. chamæleon*, Fab.; Rœs., Insect. II, Musc. v. Six lines in length; black; extremity of the scutellum yellow, and armed with two spines; three lemon-coloured spots on each side of the superior part of the abdomen †.

*ODONTOMYIA, Meig.,*

Where the antennæ are hardly longer than the head, with the two first joints short, and almost equal in length; the third forms a highly elongated slender cone, composed of at least five distinct rings, the last conical, abruptly compressed and curved inwards, represents the extremity of the stilet; otherwise similar to the others ‡.

*EPHIPPIUM, Lat.—CLITELLARIA, Meig.,*

Where also the antennæ are hardly longer than the head, and the two first joints short, but the third forms a shorter and thicker cone, with the fourth ring conical, truncated, abruptly attenuated at the extremity, and terminated by a stilet of two joints, the last of which is much the longest and slightly arcuated.

*E. vulgaris; Stratiomys ephippium*, Fab.; Schœff., Monog.,

\* There are six of these rings, as in the following Insects, but the fifth is very short and indistinct. The two last are converted into a stilet or a seta.

† For the other species, see Latreille, Meigen, and Macquart.

‡ Idem. M. Meigen now unites this genus with the preceding one.

1753. Deep black; thorax satin-red with a spine on each side and two on the scutellum. On the trunks of old Oaks\*.

OXYCERA, Meig.

The Oxyceræ resemble the Ephippia in the shortness of their antennæ, which are also provided with a stilet; but the third joint is shorter, and not abruptly narrowed at the end; if we look at the profile of the antennæ we observe that the stilet, longer and more slender than in the preceding subgenus, and approximating more to the form of a seta, is not terminal, but inserted on the back near the summit.

*O. hypoleon*; *Strat. hypoleon*, Fab.; Panz., Faun. Insect. Germ., I, 14. Variegated with black and yellow; scutellum yellow, and with two spines †.

There, the proboscis is long, slender, siphoniform, geniculate at base, and lodged in the inferior cavity of a rostrum-like projection of the anterior part of the head, bearing the antennæ, of which the form and proportions are similar to those of the Ephippia.

NEMOTELUS, Geoff., Fab. †

In the others, the fourth joint of the antennæ, together with the third, forms an ovoid or globular club, terminated by a long seta. The scutellum is rarely spinous.

CHRYSOCHLORA, Lat.—SARGUS, Fab.,

Where the third joint of the antennæ is conical, and terminated by the seta §.

SARGUS, Fab.,

Where the same joint is almost ovoid, or nearly globular, rounded or obtuse at the summit, with the seta inserted on the back, near the junction of the fourth || ring with the preceding one; the first joint is almost cylindrical.

The scutellum is rarely spinous. The body is frequently elongated, green or cupreous, and brilliant.

*S. cuprarius*; *Musca cupraria*, L.; Reaum., Insect., IV, xxii, 7, 8; De Geer, Insect., VI, xii, 14. Golden-green; abdomen cupreous-violet; legs black, with a white ring; wings long, with a brown spot.

The larva lives in cow-dung; the body forms an oblong oval, narrowed and pointed anteriorly, furnished with a squamous head provided with two hooks. The body is interspersed with hairs. It becomes a pupa under its own skin, and without any material change of form. The perfect Insect issues from its

\* See Latreille, Meigen, and Macquar.

† Idem.

‡ Idem.

§ *Sargus amethystinus*, Fab.

|| The *Sargi*, whatever Meigen may say to the contrary, have the third joint divided into four rings.

prison by driving off the anterior portion. See Reaumur, Insect., IV, Mem., IV and I.

*S. Reaumurii*, Meig. Differing from the cuprarius in the abdomen, most of which, or at least the base, is of a blood-red, or a brighter tint of the same colour\*.

VAPPO, *Lat., Fab.*—PACHYGASTER, *Meig.*

Only differing from *Sargus* in the antennæ, which are still shorter, with the two first joints shorter or wider, or altogether transversal †.

Our second general division of the Diptera, which are provided with a sucker enclosed in the sheath, and whose antennæ consist of but three or two joints, comprises those whose proboscis, usually bilabiate, long, geniculate, and bearing the palpi a little above the elbow, is most commonly entirely contained in the oral cavity, and when, always salient, has a sucker composed of only two pieces. The last joint of the antennæ, always accompanied by a stilet or seta, never exhibits annular divisions. The palpi, when at rest, are concealed.

This division will form our fifth family.

## FAMILY V.

### ATHERICERA,

Where the proboscis is usually terminated by two large lips. The sucker is never composed of more than four pieces, and frequently presents but two.

The larvæ have a very soft, extremely contractile, annulated body, narrowest and most pointed anteriorly. The head varies as to figure, and its external organs consist of one or two hooks, accompanied in some genera by mammillæ, and probably in all by a sort of tongue destined to receive the nutritious juices on which they feed. They usually have four stigmata, two situated on the first ring, one on each side, and the two others on as many circular, squamous plates, at the posterior extremity of the body. It has been observed that these latter, at least in several, were formed of three smaller and closely approximated stigmata. The larva has the faculty of enveloping these parts with the marginal skin, which forms a sort of purse. They never change their skin. That which invests them when first hatched becomes indurated, and thus forms a sort of cocoon for

\* See the same authors.

Wiedememann, in his "Analecta Entomologica," has figured a Brazilian species, the *S. furcifer*, remarkable for the scutellum being armed with a long spine, forked at the extremity.

† See the same authors.

the pupa. It becomes shortened, assumes an ovoidal or globular figure, and the anterior portion, which in the larva was the narrowest, increases in diameter, or is sometimes even thicker than the opposite extremity. Traces of the annuli, and frequently vestiges of the stigmata are observed on it, although the latter no longer serve for respiration. The body is gradually detached from the skin or cocoon, assumes the figure of an elongated and extremely soft ball, on which none of its parts are perceptible, and soon passes into the state of a pupa. The Insect issues from its shell, by removing with its head the anterior extremity, which flies off like a cap, that part of the cocoon being so disposed as to facilitate this result.

But few of the *Athericera* are carnivorous in their perfect state.

They are generally found on trees, leaves, and flowers, and sometimes on the faces of animals.

This family comprises the genera *Conops* and *Æstrus* of Linnæus, and most of his genus *Musca*.

We must naturally separate from the last those numerous species in which the sucker is composed of four pieces, and not of two, as in all the other *Athericera*. They will form our first tribe, that of the *SYRPHIDÆ*.

Their proboscis is always long, membranous, geniculate near the base, terminated by two large lips, and encloses the sucker in a superior groove. The upper piece of this sucker, which is inserted near the elbow, is broad, arched, and emarginated at its extremity; the three others are linear and pointed, or setaceous; to each of the two lateral ones, representing the maxillæ, is annexed a little membranous, narrow palpus, slightly widened and rounded at the end; the inferior seta is analogous to the ligula. The head is hemispherical, and mostly occupied by the eyes, that of the males particularly. Its anterior extremity is frequently prolonged in the manner of a snout or rostrum, receiving the proboscis underneath when it is doubled. Several species resemble *Bombi* and other Wasps. M. Lepeletier de Saint-Fargeau has communicated to the Academie Royale des Sciences, some curious observations on the unnatural coition of some of these Insects, or to use his own words, on their "marriages adultérins," the result of which, however, he was unable to follow.

This tribe will comprise but the single genus

#### SYRPHUS.

A first general division will consist of all those species in which the proboscis is shorter than the head and thorax. The snout, in those where it is distinct, is perpendicular and short.



Then comes Syrphidæ, in which the fore-part of the head, a little above the superior margin of the oral cavity, or near the origin of the snout, presents a prominence.

At the beginning of these species we will place those whose antennæ, always shorter than the head, are furnished with a plumous seta.

Their body is short, and frequently pilose, and the wings are distant. At the first glance these Insects resemble Bombi, and as the larvæ of several inhabit the nest of those Hymenoptera, it seems as if the Author of nature clothed them in a similar manner, in order that they might penetrate into their habitations without danger.

The Syrphidæ compose three subgenera.

*VOLUCELLA, Geoff., Lat., Meig., Fab.,*

Where the third joint of the antennæ or the palette is oblong; its contour forms a curvilinear and elongated triangle.

*V. mystacea; Musca mystacea, L.; V. bourdon, De Geer, Insect. VI. viii, 2.* Black, and densely pilose; thorax and extremity of the abdomen covered with fulvous hairs; origin of the wings fulvous.

The larva inhabits the nests of Bombi. Its body is widened from before posteriorly, is transversely rugose, has little points on the sides, six membranous radiating threads at the posterior extremity, and presents above, two stigmata and six pairs of mammillæ, each furnished with three long hooks, which enable it to crawl. Here also comes the

*M. à zones, Geoff.; Syrphus inanis, Fab.; Panz., Faun. Insect. Germ., II, 6.* Eight lines long; but slightly pilose; fulvous.; head yellow; two black bands on the abdomen. Its larvæ also lives in the nest of the Bombi\*.

*SERICOMYIA, Meig., Lat.—SYRPHUS, Fab.,*

Where the palette of the antennæ is semi-orbicular †.

*ERISTALIS, Meig., Fab.,*

Which (restricting the subgenus to those species where the seta of the antennæ is evidently hairy) only differs from Sericomomyia in the wings. Here the exterior and closed cell of the posterior margin, that which is situated near the angle of the summit, has a deep rounded emargination in the external side; in the preceding subgenus it is straight ‡.

To these succeed other subgenera very analogous by the short form of the body, the triangular abdomen and by the antennæ, much shorter than the head, but where the seta is simple or without very apparent hairs.

In some, as in Eristalis, the external margin of the last external

\* For the other species, see Lat., Meig., and Fallen.

† The same authors.

‡ The *E. intricarius, similis, alpinus, Meig.*



cell of the wings is strongly unisinate. The body is generally hairy. The antennæ are closely approximated at base.

MALLOTA, *Meig.*—ERISTALIS, *Fab.*,

Where the last joint of the antennæ forms a species of transversal trapezium, the widest side of which is before, and presenting, when dilated an elliptical facet bordered all round\*.

HELOPHILUS, *Meig.*—ERISTALIS, *Meig., Fab.*,

Where the palette of the antennæ forms a semi-oval. The body is generally less hairy than in the preceding subgenera.

The body of several of the larvæ is terminated by a long tail, whence their vulgar appellation of *vers à queue de rat*, or rat-tailed worms. They elongate and raise it perpendicularly to the surface of the water, or cloacæ in which they live, in order to respire through the aperture in its extremity. They are furnished internally with two large and extremely brilliant trachæ, which, near the origin of the tail, form numerous plexus that are constantly in motion.

Reservoirs of rain-water contain numbers of these larvæ. Their tail may easily be mistaken for filaments of roots. See Reaum., *Ins.*, IV, xxx.

*H. tenax*; *Musca tenax*, L.; *H. abeilliforme*, Reaum., *Ins.*, IV, xx, 7. About the size of the male of the common Bee, and at the first glance resembles it in colours. The body is brown, covered with fine, yellowish-grey hairs, with a black streak on the front; from two to four fulvous-yellow spots on each side of the abdomen.

The larva inhabits muddy water, privies, and gutters, and is one of those called *vers à queue de rat*. It is said to be so tenacious of life that no pressure can destroy it †.

Other Syrphidæ differ from the last in the exterior and closed cell of the posterior margin; its external side being straight or but slightly sinuous. The antennæ are elevated at base and advance almost parallel with each other; their last joint is almost ovoid, or nearly orbicular. The anterior projection of the head is very short. The abdomen is generally narrower and more elongated than in the preceding subgenera. The wings, in those where it is shortest, are generally distant.

SYRPHUS, *Lat, Meig.*—SCÆVA, *Fab.*,

Or Syrphus, properly so called, where the abdomen is gradually narrowed from base to point.

\* See Meigen.

† The Helophili of Meigen, and most of his Eristales, those in which the seta of the antennæ is simple, such as the *sepulchralis*, *aneus*, *tenax*, *cryptarum*, *memorum*, *arbustorum*, &c.

We might pass from the Helophili to the Calliceræ, Ceriæ, Chrysotoxa, Paragi, Syrphi, terminate the division of those with a nasal prominence, by the Bacchæ, and begin the division of those in which that elevation is wanting, with the Ascicæ and Spheginæ, Insects closely allied to the Bacchæ. Then would come Aphritis, Merodon, &c. This series would, perhaps, be more natural.

The larvæ feed exclusively on Aphides of all kinds, frequently holding them in the air and soon exhausting them by suction. Their body forms a sort of elongated cone, and is very uneven, or even spinous. When about to become pupæ, they fix themselves to leaves, &c. with a kind of a glue. The body is shortened, and its anterior portion, which was previously the most slender, then becomes the thickest.

*S. ribesii*; *Scæva ribesii*, Fab.; De Geer, Insect., VI, vi, 8. Somewhat smaller than the *Musca vomitoria*; head yellow; thorax bronzed, with yellow hairs; scutellum of the same colour; four yellow bands on the abdomen, the first interrupted\*.

BACCHA, Meig., Fab.

Another subgenus closely allied to the preceding, only differing in the abdomen, which is proportionally longer, narrowed at base, and terminated in the manner of an elongated club.

To this subgenus, in my opinion, should be referred the *Syrphus* (*Scæva*, Fab.) *conopseus* of Meigen, although the palette of the antennæ is less orbicular than in *Baccha* †.

We now pass to other subgenera, similar to the preceding ones, as to the form of the snout and the seta of the antennæ, but in which the length of these organs is at least equal to that of the face of the head.

Here, the antennæ are not placed on a common pedicle, and their length does not surpass that of the head.

PARAGUS, Lat., Meig.—MULIO, Fab. ‡

Here, they arise from a common eminence, and are longer than the head.

Sometimes the seta is lateral.

SPHECOMYIA, Lat.,

Where it is inserted on the second joint; the last is much shorter than the two others, than the first in particular, and almost ovoid; the latter and the second are long and cylindrical.

I have established this subgenus on an Insect taken in Carolina by the late M. Bosc.

PSARUS, Lat., Fab., Meig.,

Where the seta of the antennæ is inserted on the back of the third joint, near its extremity; this joint almost borders on an oval, and is nearly of equal length with the second: the first is much shorter. The common peduncle is proportionally higher than in the analogous subgenera. The wings are incumbent §.

\* Lat., Ibid. See Meigen. The *Chrysogaster*, Meig., appears to us to differ but slightly from *Syrphus*; the wings are incumbent on the body, a character which also belongs to several species of the preceding subgenus. The antennæ are almost identical in both; but in *Chrysogaster* the front of the females is canaliculated on each side, the nasal eminence is larger, and forms a small rounded lump, with an abrupt descent.

† Meig., Ibid.

‡ See Latreille and Meigen.

§ Idem.

CHRYSOTOXUM, *Meig.*—MULIO, *Fab.*,

Where the seta is also inserted on the third joint, but near its base; this joint is the longest of all, and forms a narrow and elongated triangle; the two others are almost of equal length. The wings are distant\*.

Sometimes the seta, always thick and in the form of a stilet, terminates the antennæ.

CERIA, *Fab.*

Where the body is oval, elongated, and resembles that of a Wasp; the second joint of the antennæ is of equal length with the last, and forms with it a fusiform club with a very short stilet. The abdomen is long and cylindrical. The wings are very remote, and the exterior cell of the posterior margin has a well-marked re-entering angle in the outer edge †.

CALLICERA, *Meig.*,

Where the body, shorter, wider and silky, has the general appearance of that of the common Fly. The second joint of the antennæ, shorter than the last, forms with it an elongated, compressed, fusiform and slightly arcuated club; the seta is in the form of an elongated stilet; the first joint is longer than the following one. The exterior cell of the posterior margin exhibits no emargination in its sides ‡.

The nasal tubercle which distinguishes the preceding Syrphidæ, disappears in the following ones. The seta of the antennæ is almost always simple. The wings are incumbent, one on the other.

The first are connected with the preceding ones by the length of their antennæ. Those organs are closely approximated at base; the second joints, the shortest of all, forms, with the third, a narrow and elongated club; the seta is simple and inserted near the base of the latter.

CERATOPHYA, *Wied.*

Scutellum unarmed; third joint of the antennæ nearly twice the length of the first §.

APHRITIS, *Lat.*—MULIO, *Fab.*—MICRODON, *Meig.*,

Where the scutellum presents two teeth; the first joint of the antennæ is almost as long as the two following ones taken together.

In this and the preceding subgenus, as in *Ascia*, the two first closed cells of the posterior edge are terminated in the manner of an angle ||.

The antennæ of the following Syrphidæ are shorter than the head.

The posterior legs are often large, particularly in one of the sexes.

Sometimes the pallet of the antennæ is oblong and almost in the form of an elongated triangle. The posterior thighs are thick and dentated. The wings are incumbent, one on the other.

\* See Latreille and Meigen.

† See *Fab.*, *Lat.*, *Meig.*, and *Wiedemann.*

‡ See *Lat.*, *Meig.*

§ *Wied.*, *Anal.*, *Entom.*, fig. 9.

|| See *Lat.*, *Gen. Crust. et Insect.*, IV, 329; *Meig.* and *Fallen.*

MERODON, *Meig., Fab.*—MILEZIA, *Eristalis, Lat.*—SYRPHUS, *Fab.*,

Where the abdomen is triangular or conical, without being narrowed at base, and where the external cell of the posterior edge of the wings is deeply emarginated exteriorly.

*M. narcissi*; *Eristalis narcissi*, *Fab.*; *Reaum., Insect. IV, xxx.* Obscure-bronze, but covered with fulvous down; legs black; inner side of the posterior legs tuberculous.

The larva feeds on the interior of the bulb of the *Narcissus* \*.

ASCIA, *Meig., Meig.*,

Where the abdomen is narrowed at base and clavate. The two first closed cells of the posterior edge of the wings terminate in an angle; the exterior side of the first is straight †.

Sometimes the palette of the antennæ is short, or moderately elongated, and either almost orbicular or nearly ovoid.

Here, as in the last subgenus, the abdomen is narrowed at base and clavate.

SPHEGINA, *Meig.*,

Where the palette of the antennæ is orbicular. The posterior thighs are clavate and spinous underneath ‡.

There, the abdomen is either triangular or conical, or almost cylindrical.

In some, the wings hardly extend beyond the abdomen, which is frequently narrow and elongated.

We will separate those whose posterior thighs are strongly inflated, with the inner side armed with small spines. The closed cells of the posterior border of the wings are sinuous posteriorly.

EUMERUS, *Meig.*,

To which we unite his *Zygotæ*, where the abdomen is merely narrower and almost linear, and which we formerly placed among the *Milesiæ*. Such is the

*E. pipiens*; *Musca pipiens*, *L.*; *Panz.; Faun. Insect. Germ. XXXII, 20.* About four lines in length; black; each side of the abdomen spotted with white. The humming it produces while on the wing is mingled with a sharp sound resembling the note of a young chicken §.

In the two following subgenera, the posterior thighs sometimes differ but little from those of the preceding ones, and are sometimes thicker, but unidentate at most.

MILEZIA, *Lat., Fab., Meig.*—TREPIDIA, *Meig.*,

Where the two posterior legs are abruptly larger than the others, with thick and unidentate thighs in several. The body is elon-

\* See Meigen.

† Idem.

‡ Idem.

§ See Meigen, genera *Eumerus* and *Xyloa*.

gated, and the abdomen conical, or almost cylindrical and convex\*.

PIPIZA, *Meig.*—PSILOTA, *Meig.*—ERISTALIS, *Fab.*—MILESIA, *Lat.*,

Where the posterior legs are merely somewhat larger than the others, and the abdomen is depressed, semi-elliptical and rounded at the end. The eyes are pubescent. These Insects are closely allied to Syrphus, and particularly to Chrysogaster, *Meig.* †

BRACHYOPA, *Hoff., Meig.*,

Distinguished from all the preceding subgenera by the wings, which extend considerably beyond the abdomen. These Diptera closely resemble the Milesiæ, and appear to lead to Rhingia, the last subgenus of this tribe. According to Meigen the seta of the antennæ is pilose at base, but I never could discover those hairs in any of the specimens I obtained. To this subgenus the same naturalist refers the *Oscinis olivæ* of Fabricius, which most certainly belongs to the Muscides ‡.

In those Syrphidæ, of which we have hitherto spoken, the proboscis is shorter than the head and thorax, and the projection forms a short and perpendicular rostrum. We now proceed to others in which that proboscis is evidently longer and almost linear, and the anterior projection of the head is proportionally more elongated, and directed forwards in the manner of a pointed rostrum. These Insects, in their wings, which are incumbent on the body, and in the form of their antennæ, closely resemble the Brachyopæ and Milesiæ. The thighs are simple. They form the

RHINGIA, *Scop., Fab., Meig.* §

The genus

PELECOCERA, *Hoffmanseg.*

Figured by Meigen, is unknown to us, but it is easily distinguished from all those whose antennæ are shorter than the head, by the seta of the same organs, which is short, thick, slightly silky, cylindrical, and divided into three joints, the last of which is somewhat the longest. The palette almost forms a reversed triangle.

The sucker of all the remaining Athericera consists of but two setæ, the superior representing the labrum, and the inferior the ligula.

They form three other small tribes which will correspond to the genera *Æstrus* and *Conops* of Linnæus, and to the *Musca*, *Fab.* as originally composed.

As Stomoxys and Bucentes are connected with this last genus, we will begin with the tribe of the *ÆSTRIDES* consisting of the genus

\* See Meigen, genera *Mylesia*, *Tropidia*. The palette of the antennæ of the *Tropidiæ* is proportionally wide, and as if truncated, or very obtuse.

† Idem, genera *Pipiza* and *Psilota*.

‡ See Meigen.

§ *Fab., Lat., Meig., &c.*



ŒSTRUS, *Lin.*,

Which is very distinct, as in place of the mouth we find but three tubercles, or slight rudiments of the proboscis and palpi.

These Insects resemble large and densely pilose flies, and their hairs are frequently coloured in bands like those of the Bombi. Their antennæ are very short; each one is inserted in a fossula over the front, and terminated by a rounded palette with a simple seta on the back, near its origin. Their wings are usually remote; the alulæ are large and conceal the halteres. The tarsi are terminated by two hooks and two pellets.

These Insects are rarely found in their perfect state, the time of their appearance and the localities they inhabit being very limited. As they deposit their eggs on the body of various herbivorous quadrupeds, it is in woods and pastures that we must look for them. Each species of Œstrus is usually a parasite of one same species of some mammiferous animal, and selects for the location of its eggs the only part of its body that is suitable for its larvæ, whether they are to remain there, or pass from thence to the spot suited for development. The Ox, Horse, Ass, Rein-deer, Stag, Antelope, Camel, Sheep and Hare are the only quadrupeds yet known, which are subject to be inhabited by the larvæ of the Œstri. They seem to have an extraordinary dread of the Insect when it is buzzing about them for the purpose of depositing its eggs.

The domicil of the larvæ is of three kinds; we may distinguish them by the names of *cutaneous*, *cervical*, and *gastric*, as some live in the lumps or tumours formed on the skin, others in some part of the interior of the head, and the rest in the stomach of the animal destined to support them. The eggs that produce the first are deposited by the mother under the skin, by means of a squamous ovipositor composed of four tubes fitting one within the other, armed at the end with three hooks and two other appendages. This instrument is formed by the last annuli of the abdomen. These larvæ, called *taons* by the farmers, are not compelled to change their domicil, finding themselves, when hatched, in the midst of the purulent matter on which they feed. The ova of the others are simply deposited and glued to various parts of the skin, either in the vicinity or the natural cavities into which the larvæ are to penetrate and take up their abode, or on those spots which the animal is in the habit of licking, in order that the larvæ may be transported on its tongue into its mouth, where they can proceed to their destined dwelling. Thus, the female *Œstrus ovis* places her eggs on the internal margin of the nostrils of the Sheep, which is no sooner aware of it, than it becomes agitated, strikes the earth with its feet, and flies with its head to the ground. The larvæ insinuates itself into the maxillary and frontal sinuses, and clings to their lining membrane by means of the two stout hooks with which its mouth is armed. It is thus also that the *Œstrus equi* deposits her eggs at intervals, without alighting, and by balancing her body in the air, on the inner side of the legs of the Horse, on the side of the shoulders, and rarely on the withers. The *Œ. hæmorrhoidalis*, whose larvæ also inhabit the stomach of the same animal, places her

eggs on his lips. The larvæ cling to his tongue, and descend through the esophagus into the stomach, where they feed on the humour secreted by its lining membrane. They are usually found round the pylorus, and rarely in the intestines. They are frequently suspended there, in clusters, in great numbers. M. Clark however is of opinion, that they are rather useful to the animal than injurious.

The larvæ of the *Æstri* are usually conical and destitute of feet. Their body, exclusive of the mouth, is composed of eleven annuli, covered with little tubercles and small spines, frequently arranged like cords, that facilitate its progression. The principal organs of respiration are situated on a squamous plane of the posterior extremity of body, which is the largest. It appears that their number and disposition are different in the gastric larvæ. It also seems that the mouth of the cutaneous larvæ is only composed of mammillæ, whilst that of the internal ones is always armed with two stout hooks.

Both kinds, having acquired their growth, leave their abode and fall to the ground, in which they concealed themselves, in order to become pupæ, under their own skin, like other Diptera of this family. Those which inhabit the stomach follow the track of the intestines, and aided perhaps by the fœcal discharge of the animal, escape per anum. These metamorphoses usually occur in June and July.

M. de Humboldt met with Indians in South America, whose abdomen was covered with little tumours, produced, as he presumed, by the larvæ of an *Æstrus*. More recent observations seem to corroborate this opinion. They perhaps belong to some species of the genus *CUTEREBRA* of M. Clark, whose larvæ live under the skin of certain Mammalia.

It would also appear, that larvæ, analogous to those of the *Æstrus*, have been withdrawn from the maxillary or frontal sinuses of Man; but these observations have not been sufficiently prosecuted\*.

\* In the second edition of the *Nouv. Dict. d'Hist. Nat.*, article *Æstre*, I have published a new systematic arrangement of these Insects.

Some have a very distinct and retractile proboscis: the genus *CUTEREBRA* of M. Clark, and the *CEPHENEMYIA*, Lat. In the first, the seta of the antennæ is plumous, and the palpi are not apparent. The *Æstrus buccatus* of Fabricius belongs to this genus. M. Clark has described another species, the *cuniculi*, and I have published a third, the *ephippium*; they are all from America. The seta of the antennæ is simple in the *Cephenemyiæ*, and the palpi are apparent. The *Æstrus trompe*, Fab., is the type of the genus.

The others are destitute of a proboscis: the seta of the antennæ is always simple. Two palpi are still visible in the *ÆDEMAGENA*, a genus established on the *Æst. tarandi*.

In the three following genera they disappear.

The *Hypodermæ*—*HYPODERMA*—have a small oval slit in the form of a Y. Such is the character of the *Æstrus bovi*. The *Cephalemyiæ*—*CEPHALEMYIA*—have two very small, punctiform tubercles, which are vestiges of the palpi. The wings are distant, and the alulæ cover the halteres—*Æstrus ovis*. In the [*Æstri*—*ÆSTRUS*—these two tubercles also exist, but the wings are crossed on their inner margin, and the alulæ only cover a portion of the halteres—*Æstrus equi*, Fab., and some others. M. Meigen calls this last genus *Gastrus*; it is the *Gasterophilus* of Dr. Leach. All the others, according to these gentlemen, form the single genus *Æstrus*. Here, the posterior cells are closed by transverse nerves, before they reach the posterior margin; in *Gastrus*, they are closed by that margin. We have described these and some other characters in the *Nouv. Dict. d'Hist. Nat.*, article *Æstre*.



*Æ. bovis*, De Geer; Clarck., Lin. Trans., III, xiii, 1, 6.

From six to seven lines in length, and densely pilose; thorax yellow, with a black band; abdomen white at base, with a fulvous extremity; wings somewhat obscure.

The female deposits her eggs under the hide of healthy Oxen and Cows, of not more than two or three years of age. The consequence of this operation are tumours or lumps, on the internal pus of which the larvæ feed. Horses also are subject to them.

The Rein-Deer, Antelope, Hare, &c., also nourish various larvæ of *Æstri*, but of a different species.

*Æ. ovis*, L.; Clarck, Lin. Trans., III, xxxii, 16, 17. Five lines in length, and but slightly pilose; head greyish; thorax cinereous, with elevated black points; abdomen yellowish, finely spotted with brown or black; legs pale-brown; wings transparent.

The larvæ inhabits the frontal sinus of the Sheep. That of the species called *trompe*, Fab., is found in the same parts in the Rein-Deer.

*Æ. equi*, Lat.; Clarck, Ibid., xxxiii, 8, 9. But slightly pilose, and of a fulvous-brown; abdomen paler; two points and a band on the wings, black.

The female deposits her ova on the legs and shoulders of Horses; the larvæ inhabit their stomach.

*Æ. hæmorrhoidalis*, L.; Clarck, Ibid., 12, 13. Densely pilose; thorax black, with a pale yellow scutellum; abdomen white at base, black in the middle, and fulvous at the end; wings immaculate.

The female deposits her eggs on the lips of Horses, and the larvæ live in their stomach.

*Æ. veterinus*, Clarck, Ibid., 18, 19. Completely covered with russet hairs; those on the sides of the thorax and base of the abdomen, white; wings immaculate.

The larva inhabits the stomach and intestines of the same animal. It is possible that the female may deposit her ova on the margin of the anus.

The third tribe of the Athericera, that of the *CONOPSARIÆ*, is the only one of that family in which the proboscis is either always salient and siphoniform, cylindrical or conical, or setaceous. The reticulation of the wings is the same as in our first division of the Muscides.

Most of these Insects are found on plants. They form the genus

### CONOPS, Lin.

In some the body is narrow and elongated, the abdomen clavate, curved underneath, and with the male organs of generation salient. The second joint of the antennæ is at least almost as long as the

third, which, either alone, or most commonly conjointly with it, forms a fusiform, or ovoid and compressed club.

Here, the proboscis projects and is only geniculate near its origin.

Sometimes the antennæ are much longer than the head, and terminated in a fusiform club. The wings are distant.

*SYSTROPUS*, Wied.—*CEPHENES*, Lat.,

Where the last joint of the antennæ alone forms the club, and is destitute of a stilet. The abdomen is long and slender. These Insects, peculiar to North America, resemble little Spheges. Their antennæ are longer in proportion than those of *Conops*, and their proboscis slightly ascends\*.

*CONOPS*, Fab., Lat., Meig.,

Or *Conops*, properly so called, where the two last joints of the antennæ formed a club, with a terminal stilet.

*C. macrocephala*, Fab. Black, antennæ and legs fulvous; head yellow, with a black streak; four annuli of the abdomen margined with yellow; edge of the wings black.

*C. rufipes*, Fab. Black; abdominal annuli edged with white; base of the abdomen and legs, fulvous; edge of the wings black.

It undergoes its metamorphosis in the abdomen of living *Bombi*, and issues from between the rings of the abdomen. A footless larva found in the *B. lapidaria*—*Apis lapidaria*, L.—and perhaps that of this species of *Conops*, has furnished the late M. Lachat and M. Audouin with a subject for some excellent anatomical observations †.

Sometimes the antennæ are shorter than the head, and terminate in an ovoid club. The wings are crossed on the body.

*ZODION*, Lat., Meig. ‡

There, the proboscis is geniculate near the base, and again about the middle, with its extremity bent underneath. The antennæ are shorter than the head, and terminate in a palette with a stilet.

*MYOPA*, Fab.,

To which belongs the

*M. ferruginea*, Fab. Russet, with a yellow front and blackish wings §.

The others, *Stomoxydæ*, Meig., in their general form, disposition of their wings, their palette-terminated antennæ shorter than the head and accompanied by a seta, and in their triangular or conical abdomen without external appendages, resemble common Flies.

\* Wiedemann, Dipt. Exot., I, vii.

† See Fab., Lat., Meig., &c., and the first volume of the *Mém. de la Soc. d'Hist. Nat. de Par.*, &c.

‡ Lat., *Gener. Crust. et Insect.*, IV, 336; Meig. Dipt. xxxvii, 1, 7.

§ See Fab., Lat., Meig., Fall., &c.

STOMOXYS, *Geoff., Fab.\**,

Where the proboscis is only geniculate near its base, and then advances directly forwards.

*C. calcitrans*, L.; De Geer, *Insect.*, VI, iv. 12, 13. Seta of the antennæ pilose; body cinereous-grey spotted with black; proboscis shorter than the body. It bites our legs severely, particularly on the approach of rain †.

BUCENTES, *Lat.*—STOMOXYS, *Fab.*—SIPHONA, *Meig.*,

Where the proboscis is bi-geniculate as in *Myopa* †.

The genus *Carnus* of professor Nitzsch—*Insect. Epiz.*, *Magas der Entom.*, of Germar—which he refers to our family of the *Coposariæ* is distinguished from the preceding ones in the presence of rudiments of wings. The species which serves as its type is figured by M. Germar in his *Faun.*, *Insect. Eur.*, fasc. IX, tap. 24.

The direction of its proboscis, the form of its antennæ, and that of its body, seem to indicate its proximity to *Stomoxys*.

Our fourth and last tribe, that of the *MUSCIDES*, is distinguished from the three preceding ones by a very apparent, always membranous and bilabiate proboscis, usually bearing two palpi (the *Phoræ* alone excepted), susceptible of being entirely retracted within the oral cavity; and by a sucker composed of two pieces. The antennæ always terminate en palette with a lateral seta. These *Athericera* embrace the old genus *Musca* of Fabricius, which the labours of Messrs. Fallen and Meigen, without mentioning our own, have greatly modified. All the difficulties however which beset its study are far from being removed; for although those gentlemen have established a great number of new genera, there are still some, *Tachina* and *Anthomyia*, for instance, which can only be considered as general repositories. In the work of Meigen, which is wholly restricted to the *Diptera* of Europe, the first of these genera is composed of three hundred and fifteen species, and the second of two hundred and thirteen. Dr. Robineau Desvoidy, wishing to complete these researches, and to meet the demands of the science, has devoted himself with much zeal to the special of the *Muscides*, which he calls *Miodares*; and the Memoir on this subject, which he presented to the Royal Academy of Sciences, has been deemed worthy of insertion among those of that institution; but as that paper is not completed, and as we are only acquainted with

\* MM. Lepeletier and Serville—*Encyc. Méthod.*, X, 500—have formed a new genus *PROSENA*, which they have separated from the preceding one, on account of its much longer proboscis—four times the length of the head—and the seta of the antennæ, which is bearded on both sides.

† *Fab.*, *Lat.*, *Meig.*, *Fall.*, &c.

‡ *Lat.*, *Gener. Crust. et Insect.*, IV, 359; *Meig.*, *Dipt.*, xxxvii, 18, 25.

its general divisions as given by M. de Blainville in his report to the Academy, we are unable to profit by it. Independently of this, we should have been compelled to pass beyond our prescribed limits, and perhaps have terrified the young naturalist, by an exposition of the multitude of new genera he has established in this tribe, several of which, even in the opinion of the reporter, appear to differ but little from each other. We even think that the work of M. Meigen, with the exception of the revision of the two genera above mentioned, is amply sufficient for the actual wants of the science.

Dr. Desvoidy has employed but very few characters of his own in designating these groups. There are even some which he might have used to advantage, such as the disposition of the nervures of the wings, which he has neglected, at least in the work presented to the Academy. His first family, that of the *Calypterees*, is identical with the one I call *Creophiles* in my "Familles Naturelles du Règne Animal," and which, besides, was already established in my preceding works. According to the analysis of his Memoir given by M. de Blainville, it is evident that the characters of the nine other families of the Myodaires are generally founded on the mere diversity of their mode of habitation, their colours, and on some other vague considerations.

We will endeavour to arrange the genera of Messrs. Wiedemann and Fallen which we have been able to study, in our former method, but with some modifications which the observations of these celebrated naturalists, and others of my own, render necessary.

This tribe will comprise the genus

MUSCA, *Lin.*

Antennæ inserted near the front, palpi placed on the proboscis, and retiring with it into the oral cavity, and tranverse nervures in the wings, characterize a first section of the winged Muscides, which will include eight principal groups or sub-tribes.

Those of our first division, CREOPHILÆ, have large alulæ, which almost completely cover the halteres. The wings are almost always distant, with the two terminal and exterior cells of the posterior edge\* closed by a transverse nervure.

Of the species which always present these characters, we will dis-

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\* The most external one is situated under a narrow, elongated cell, closed by the posterior margin, which may be considered as a sort of cubital cell. In the following divisions, this exterior cell is not closed by a transverse nervure. The second, or that which adjoins the inner side of the preceding one, is also closed in the last of the Muscides; but it is no longer terminal, and frequently it is even shorter; the longitudinal nervures which form the sides are prolonged to the posterior margin, thereby forming another cell, which becomes terminal and incomplete. In the *Creophilæ* the two nervures are not (or but very slightly) prolonged beyond the closed cell.

tinguish those whose epistoma does not project in the manner of a rostrum, and the sides of whose head are not prolonged in the form of horns.

In some, the seta of the antennæ is simple or without any very apparent hairs.

In one single subgenus, -

*ECHINOMYIA*, Dum.—*TACHINA*, Fab., Meig.,

The second joint of the antennæ is the longest of all. The last or the palette is widest, compressed, almost in the form of a reversed triangle or trapezoidal. The seta is biarticulated inferiorly.

*E. grossa*; *Musca grossa*, L.; De Geer, Insect., VI, 1, 12.

The largest species known, and almost of the size of a *Bombus*; black, bristled with thick hairs; head yellow; eyes brown; origin of the wings russet. It hums loudly while on the wing, alights on flowers, in the woods, and frequently on cow-dung.

The larva lives in the latter substance; its body is yellowish, glossy and conical, furnished with a single hook and two small fleshy horns at its anterior extremity or the point; the opposite end is terminated by a circular plane on which are two stigmata, each formed of a lenticular and brown plate raised in the middle. The second annulus of the body, the head counted as one, also presents a stigma on each side. The posterior extremity of the cocoon of the pupa, which is also conical, presents two more distinct stigmata; its contour is formed by a nine-sided lamina. See Reaum., Insect., IV, xii, 11, 12; and XXVI, 6—10\*.

In the other *Creophilæ*, the third joint of the antennæ is longer than the preceding one, or at least is never shorter.

Sometimes the anterior face of the head is almost smooth, or presents but very short hairs, arranged as usual in two longitudinal rows, none of which are much larger than the others.

Here the abdomen is always convex, with very distinct, and more or less triangular annuli.

In these, the seta of the antennæ, of which the second joint is much elongated, is geniculate, and forms an angle near its middle, at the junction of that joint with the following one, or the last division of the seta.

*GONIA*, Meig†.

In those, as in the other *Creophilæ*, the seta of the antennæ is not geniculate near its middle.

*MILTOGRAMMA*, Meig.,

Where the third joint of the antennæ is much longer than the preceding one ‡.

\* Division A of the genus *Tachina*, Meig. The species called *ferox* has its palpi dilated in the form of a spatula, and constitutes the genus *Fabricia* of M. Robineau. The *Stomoxys bombilans*, Fab., has the facies of the *Echinomyiæ*, and the proboscis of the *Bucentes*.

† Meigen.

‡ Idem.

TRIXA, *Meig.*,

Where its length but little exceeds that of the second \*.

There the abdomen is sometimes strongly inflated, and, as if vesicular, with the divisions of the annuli but slightly marked; sometimes it is much flattened. The wings in the last case are very distant, and frequently somewhat arcuated exteriorly.

GYMNOSOMIA *Meig.*—TACHINA, *Fab.*,

Where the abdomen is inflated, as if vesicular or ovoid, with the separation of the annuli rather indistinct; the antennæ are as long as the face of the head, the second and third joints of almost equal length, and the latter linear †.

CISTOGASTER, *Lat.*,

Where the form of the abdomen is the same; but the antennæ are much shorter, with the third joint longer than the preceding one, almost square, somewhat larger, and rounded at the end ‡.

PHASIA, *Meig.*—THEREVA, *Fab.*,

Where the abdomen is strongly flattened, and almost semicircular; the tibiæ are simply furnished with little hairs §.

TRICHIPODA, *Lat.*—TACHINA, *Fab.*,

Where the abdomen is also flattened, but oblong, and the two posterior tibiæ are provided exteriorly with a fringe of lamelliform cilia ||.

Sometimes the anterior face of the head presents two ranges of long hairs, forming a sort of mustachios, two of which are usually the longest, and situated at the superior extremity of the buccal cavity, one on each side.

In some, the wings are vibratile, and the abdomen is narrow, elongated, almost cylindrical, or forming an elongated cone. They form three subgenera.

In the wings of the two first, as in those of the preceding ones, and most of the others, the two external and closed cells of the posterior extremity are almost equally prolonged backwards; the outer one extends somewhat beyond the other, and its posterior angles are acute. The antennæ are as long as the face of the head, or hardly shorter.

LOPOSIA, *Meig.*,

Where the last joint of the antennæ forms a very large triangular palette ¶.

OCYPTERA, *Meig.*, *Fab.*,

Where the same joint of those organs, hardly wider than the penultimate, resembles a linear palette, or one forming a long square.

\* Meigen.

† Idem.

‡ Confounded with the preceding subgenus.

§ *Lat.*, *Gen. Crust. et Insect.*, IV, 344; see also *Fab.* and *Meigen.*

¶ The *Thereva plumipes*, *lanipes*, *Fab.*, and various undescribed species, all from America.

|| See *Meigen.*



In a "Mémoire pour servir a l'Histoire du genre *Ocyptera*,"—Ann. des Sc. Nat., X, 248, 11—M. Leon Dufour has described the larvæ of two species; the *O. cassidæ* and the *O. bicolor*. That of the first species lives in the visceral cavity of the *Cassida bicolor*, and that of the second in the same situation in the *Pentatoma grisea*. Both of them feed exclusively on the epiploon or corps grasieux of their hosts. Their body is oblong, soft, whitish, perfectly glabrous, rugose and contractile.

Its anterior extremity presents two mammillæ, each furnished with two little cylindrical bodies terminated in the manner of a button umbilicated in the centre, and with as many strong, horny pieces, each provided exteriorly with one or two large hooks, which gives them the appearance of being forked, and their convex sides placed back to back. From the figure given by this naturalist, it would seem that there is one for each mammillæ, and that they are internal. He considers them as mandibles, and the species of palpi, of which we have just spoken, the disk of which is perforated in the centre, as a sort of foot-palpi, acting like a cup or organs of touch. The body of these larvæ terminates by a sort of siphon, about one-third as long as the body, of a more solid consistence and constant form, that becomes gradually narrowed, and with the appearance of two hooks at the end. The posterior extremity of this siphon occupying one of the metathoracic stigmata, and being in contact with the air, enables the larva to respire. Neither antennæ nor eyes can be perceived. It is in this same abode that the larvæ passes into the state of a pupa. The latter is ovoid, exhibits no trace of annuli, and presents at one extremity four (*O. cassidæ*) or six (*O. bicolor*) tubercles. It leaves its domicil previously to attaining its perfect condition, sometimes while the Insect in which the larva resided is still living, and sometimes at the expense of its life. These larvæ have two salivary vessels, four biliary vessels, and tubular tracheæ without a naced aspect, or transverse striæ, arranged in two principal trunks, and giving off numerous ramifying branches. These trunks appear to empty into a unique orifice at the base of the caudal siphon. The alimentary canal is about four times the length of the body, and presents a capillary esophagus, a crop resembling a turbinated bowl of a pipe, which insensibly degenerates into a tubular, doubled stomach, followed by a flexuous intestine, a slightly apparent rectum, and terminated by an oblong cæcum\*.

In the following subgenus, or

#### MELANOPHORA, *Meig.*,

Which he suppresses and unites to *Tachina*, the antennæ are much shorter, their extremity, when they are inclined, scarcely extending beyond half the length of the face of the head. The most exterior of the two complete cells, which terminate the wing, is much more prolonged posteriorly than the other, and the internal angle of its extremity is obtuse †.

\* See Meigen, and the Encyc. Méthod., article *Ocypète*.

† Lat., Gener., Crust. et Insect., IV, 346.



The abdomen of the other *Creophilæ* is but slightly elongated and triangular; the wings do not vibrate.

*PHANIA, Meig.,*

Where the posterior extremity of the abdomen is elongated, narrowed and bent underneath. The third joint of the antennæ is elongated and linear. The wings, according to the figures of Meigen, closely resemble those of the preceding subgenus. According to the same author, the abdomen, as in the *Lophosiæ* and *Ocypteræ*, presents but four apparent annuli\*. In the subgenus

*XYSTA, Meig.,*

There are from five to six. The antennæ are short, and their two last joints nearly of an equal length. The posterior tibiæ are slightly arcuated, compressed and ciliated.

This subgenus appears to us to constitute the transition from the *Gymnosomiæ* to the *Phasiæ*, and also to approach the *Trichiopoda*. The equivocal nature of the character drawn from the presence or absence of hairs on the face of the head, employed by M. Meigen, is easily perceived. Certain species of *Trichiopoda* are ambiguous in this very respect †.

*TACHINA, Fab., Meig.,*

Where the abdomen is not curved underneath at its posterior extremity, and exhibits externally but four annuli. The antennæ are as long as the head or nearly so, and terminated by a joint longer than the penultimate.

Certain species, forming a particular section, in their larva state inhabit the body of various caterpillars, which they destroy ‡.

We now pass to *Creophilæ* in which the seta of the antennæ is evidently pilose or plumous. Their third joint always forms an elongated palette, longer than the preceding one.

*DEXIA, Meig.*

The *Dexiæ* have the general appearance of the *Ocypteræ*, their abdomen being narrow and elongated, particularly in the males §.

*MUSCA, Lin., Fab., Meig.—MESEMBRINA, Meig.*

In *Musca*, properly so called, or the true *Fly*, the abdomen is triangular, and the eyes are contiguous posteriorly, or closely approximated in the males.

Here come most of those Flies whose larvæ feed on carrion, meat, &c.; others of the same subgenus inhabit dung. They all resemble soft, whitish worms without feet, thickest and truncated at the posterior extremity, and becoming gradually smaller towards the opposite one, which terminates in a point furnished with two hooks, with

\* See Meigen.

† Idem.

‡ This genus also is in great confusion in the work of Meigen, and consists of species with very different antennæ and wings, as is evident from his figures. We have removed the *Echinomyiæ* and the *Melanophoræ*: until the work of Dr. Desvoidy is published we will leave the other species in the genus *Tachina*.

§ See Meigen.

which they divide their aliment, and accelerate its decomposition. The metamorphosis of these Insects is effected in a few days. The posterior extremity of the abdomen of the females is narrowed and prolonged in the manner of a tube or ovipositor, by which she can insert her eggs.

*M. vomitoria*, L.; Rœs., Insect., II, Musc., et Cul., ix, x. A large species; front fulvous; thorax black; abdomen glossy-blue with black streaks.

This Insect enjoys the sense of smell to a high degree, announces its presence in our dwellings by a loud humming, and deposits its ova on meat. Deceived by the cadaverous odour arising from the *Arum dracunculus*, L., when in flower, it also leaves its eggs there. When the larva is about to become a pupa, it abandons the putrescent matters in which it has lived, which might then prove injurious to it, and penetrates, if possible, into the earth, or is metamorphosed in some dry and retired spot.

*M. cæsar*, L. Body, a glossy golden-green; legs black. The female deposits her eggs on carrion.

*M. domestica*, L.; De Geer, Insect., VI, iv, 1—11. The thorax of the *Common Fly* is of a cinereous-grey, with four black streaks; abdomen blackish-brown, spotted with black, and yellowish-brown above. The five last abdominal annuli of the female form a long and fleshy tube, which she introduces, in coitu, into a slit situated between the pieces furnished with hooks, that terminate the abdomen of the male, and characterize his sex. The larva lives in warm and moist dung\*.

SARCOPHAGA, Meig.—MUSCA, Lin. Fab.,

Only differing from *Musca* proper by the eyes being remarkably distant in both sexes. The ova are sometimes hatched in the venter of the mother—these species are called *viviparous*.

*S. carnaria*; *Musca carnaria*, L.; *Mouche vivipare*, De Geer, Insect., VI, iii, 3—18. Rather larger and more elongated than the *vomitoria*; body cinereous; eyes red; streaks on the thorax, and square spots on the abdomen, black.

The female is viviparous and deposits her larvæ, which fill the cavity of her abdomen, on meat, carrion, and sometimes in wounds in the human body. By strongly pressing the abdomen of the male, a bowel-like body of a transparent white may be made to protrude, which has a vermicular motion that is continued even after the Insect has been cut in two†.

We will terminate the *Creophila* with genera which form a contrast with the preceding ones, either in certain peculiarities of the head, or by the situation of the wings, or the cells of their posterior extremity.

The setæ of the antennæ is pilose in most of them.

\* See Meigen: certain species that are more hairy form his genus *Mesembrina*.

† See Meigen.

In some, such as the two following subgenera, the wings terminate in the same manner as in the preceding ones, or present two complete cells between the middle and the edge.

*ACHIAS, Fab.,*

Remarkable for the horn-like prolongations of the sides of the head, and approximating in this respect to *Diopsis*; but their antennæ are inserted high on the front, and similar in form and proportions of the joints to those of the *Muscæ*; the wings are distant\*.

*IDIA, Meig., Wied.,*

Where the anterior extremity of the head projects in the manner of a horny rostrum; the wings are incumbent on the body†.

In the other two and last subgenera of the *Creophilæ*, the terminal cells of the wings are closed by the posterior margin. The eyes are very remote. The abdomen is flattened.

*LISPE, Lat., Fab., Meig.—MUSCA, De Geer.,*

Where the body is oblong, the antennæ inserted near the front, almost as long as the face of the head, with the last joint much longer than the preceding ones, linear, and furnished with a plumous seta.

The wings are incumbent one on the other. The palpi are strongly dilated superiorly, in the form of a spatula, and somewhat exterior.

These Insects are usually found along the banks of rivers, &c.‡

*ARGYRITIS, Lat.,*

Which, in the short form of the body, strongly flattened and almost semicircular abdomen, short, broad head, and distant wings, resemble the *Phasiæ*. The antennæ, inserted below the front, are very short, with the last joint a little larger than the penultimate, almost orbicular, and furnished with a simple and geniculate seta, like that of the antennæ of the *Goniæ*. The palpi terminate in a short, but almost ovoid and pointed club.

I have established this genus on two species of *Diptera* sent to me by M. Marcel de Serres, and captured by him in the environs of Montpellier. They are small, and furnished with a silvery down, which, in one, covers the whole abdomen.

Certain species of *Tachina*, Meig., those, for instance, the type of whose wings, given in fig. 32 of pl. 41, and some of his *Anthomiæ* with large alulæ covering the greater portion of the halteres, will re-enter the last division of the *Creophilæ*.

In all the other *Muscides* of which we are about to speak, the alulæ are small or almost wanting, the halteres are exposed, and the principal longitudinal nervures of the wings extend to the posterior margin, which, except in a very small number, closes the posterior cells, and even some others that originate near the opposite extremity. The wings, in most of them, are incumbent, one on the other.

\* *Fab., Syst. Antl.*

† See Meig. and Wied., *Anal. Entom.* I know two species, one from the Isle of France and the other from the environs of Paris. We should also refer to this genus the *Musca felina* of Fabricius, which is found in the south of France.

‡ See Lat., *Gener., Crust. et Insect., IV. 347*; Dej., *Fall., and Meigen.*

A second general division of the Muscides, that of the ANTHOMYZIDES, is composed of species resembling common Flies, in which the wings are most frequently incumbent and do not vibrate, and where the antennæ are inserted near the front, are always shorter than the head, terminated by a linear palette or one forming a long square, longer than the preceding joint, and with the seta most commonly plumous. The head is hemispherical, furnished with hairs anteriorly, and the eyes are closely approximated or contiguous posteriorly in the males. The legs are of an ordinary size, and the abdomen is composed exteriorly of four annuli.

In some, the antennæ are almost as long as the face of the head, and the seta is plumous.

Sometimes the abdomen of both sexes is gradually narrowed, and terminates in a point.

ANTHOMIA Meig.—MUSCA, Lin., Fab.,

Where the eyes are separated in both sexes; the proboscis does not terminate in the manner of a hook, or by an abrupt and very open angle.

*A. pluvialis*; *Musca pluvialis*, L., Cinereous, with black spots on the thorax, and nine triangular ones of the same colour on the abdomen. Very common in France\*.

DRYMEIA, Meig.,

Where the proboscis presents the above character, and the eyes are contiguous posteriorly in the males †.

Sometimes the abdomen of these individuals is inflated at the end, and clavate.

CENOSIA, Meig.—MUSCA, De Geer.

De Geer has given us the history of a species of this subgenus—*Musca fungorum*, Insect., VI, 89, v, 2—7. Its larva lives in mushrooms, and most commonly in those which are edible. He also observed that these larvæ devour each other, a rare circumstance among Insects of this order ‡.

In the others, the antennæ are shorter, and have a simple seta.

The eyes are contiguous posteriorly in the males. The mouth is densely pilose.

ERIPHIA, Meig. §

Our third division, that of the HYDROMYZIDES, is characterized as follows: an almost triangular head with very prominent eyes; an inflated convex snout or muzzle: a little arched lamina bordering the top of the buccal cavity, which is very large; a very thick proboscis, and the sides of the face destitute of setæ. The antennæ are inserted near the front, inclined, and very short, with the seta most commonly plumous. The wings are incumbent, one on the other. The legs are large, with the thighs, at least the anterior ones, inflated in several.

All the species indigenous to France inhabit aquatic localities.

\* See Meigen.

† Idem.

‡ See Meigen.

§ Idem.

In some, all the thighs, or at least the anterior ones, are inflated; the seta of the antennæ is always pilose\*.

ROPALOMERA, *Wied.*,

Where all the thighs are inflated, and the face presents a prominence or tubercle anteriorly †.

OCHTERA, *Lat.*—MUSCA, *De Geer.*—TEPHRITIS, *Fab.*—MACROCHIRA, *Meig.*,

Where the two anterior thighs are very large, compressed, and dentated beneath, and the tibiæ are arcuated, capable of being flexed on the inferior edge of the thighs, and terminated by a strong spine ‡.

The thighs of the other Hydromyzides are not inflated.

EPHYDRA, *Fall.*

The Ephydræ resemble the Ochteræ in the prominence of their eyes, which project posteriorly beyond the head, and in their thick snout; but the seta of their antennæ is simple, and merely thickened inferiorly; the palette is rounded at the end. There is a little tubercle or prominence on the posterior part of the vertex §.

NOTIPHILA, *Fall.*,

Where the head is more rounded, and without any anterior prolongation in the form of a snout; the eyes are less protuberant, and do not project beyond the posterior margin of the head. The seta of the antennæ is plumous; the palette is proportionally more elongated than in Ephydra and less rounded; no tubercle or prominence on the vertex.

We have followed the system of M. Fallen in placing this subgenus here, although we think it would be more proper to arrange it in the ensuing division, near the Heleomyzæ, from which it scarcely differs. The

*N. cellaria*, *Panz.*, *Faun. Insect., Germ., XVII, 24*, which deposits its eggs in vessels containing vinous liquors, belongs to this subgenus. We formerly referred it to *Mosillus* ||.

The Muscides of the three following divisions have an oblong body; the wings are incumbent and non-vibratile; the head, either rounded or almost spherical, or nearly pyramidal, or bordering on an oval, is plane above, prolonged and narrowed into a point, usually truncated or obtuse at its anterior superior extremity; and the face is covered with a white membrane, furrowed longitudinally on each side. The head is frequently compressed below the antennæ, and its inferior or oral extremity projects in the manner of a truncated snout; in others, the face forms a strongly inclined plane, which is not (or

\* The wings also are somewhat different.

† *Wied.*, *Anal. Entom.*

‡ *Lat.*, *Gener., Crust. et Insect., IV, 347.*

§ *Fall.*, *Dipt.*, and *Wied.*, *Ibid.*

|| It may perhaps be a *Fiophyla*, *Fall.*, a genus in which is placed the *M. casei*, *L.*, whose body is very black and glossy; epistoma, front and legs, fulvous; anterior legs and posterior thighs with a black ring.



almost not) turned up inferiorly. The antennæ are inserted on the top of the front, and sometimes even received in fossulæ, but they most commonly project, are straight and distant, and in several as long as the head, or longer. In all the other Muscides they are always shorter than the head.

The Muscides of the fourth division, that of the SCATOMYZIDES, as well as those of the fifth, are distinguished from the species of the sixth by the following characters: the head, viewed from above, is never longer than it is broad, its form being nearly spherical or triangular; the posterior legs are never much longer than the body, nor very slender, and the body, though sometimes narrow and elongated, is not filiform.

Here, the Scatomyzides are distinguished from the Muscides of the following division, or the *Dolichocera*, by their antennæ, of which the third joint is evidently longer than the preceding one; with the exception of a single genus, *Loxocera*, they are always shorter than the head. The anterior and superior extremity of this latter part of the body rarely projects beyond the eyes, and when viewed from beneath usually appears almost hemispherical, and rather wider than it is long.

Sometimes the posterior legs are large and distant, their thighs are thick or compressed, and the joints of their tarsi dilated or widened. The antennæ are always very short, with the last joint lenticular or nearly globular, and furnished with a simple seta. The sides of the face are pilose and silky.

THYREOPHORA, *Lat.*, *Meig.*—MUSCA, *Panz.*,

Where the antennæ are received into a sub-frontal cavity, with a lenticular, but not transverse, palette; the head gradually inclines from its summit to the mouth; the posterior thighs are thick, and the second and following joints of the tarsi are almost similar.

All the terminal cells of the wings are closed by their posterior edge. The palpi are much widened at the end in the manner of a spatula.

*T. cynophila*, *Panz.*, *Faun. Insect. Germ.* XXXIV, 32. Deep blue; head reddish-yellow; two black points on each wing; scutellum terminated by two spines. Found on dead dogs, and always in autumn. According to an observation communicated to me by one of our most learned and zealous entomologists, M. Percheron, Jun., this Insect is sometimes phosphorescent, a peculiarity that struck one of his friends who witnessed it in his chamber at night, and induced him to capture it\*.

SPHÆROCERA, *Lat.*—BORBORUS, *Meig.*—COPROMYZA, *Fall.*,

Where the antennæ are salient, with the palette almost hemispherical and transversal; the head is abruptly concave below the front and turned up near the oral cavity, of which the superior extremity is bordered; the posterior thighs are compressed, and the two first joints of their tarsi are evidently wider than the following ones.

The second cell of the posterior extremity of the wing—the last

\* *Lat.*, *Gener. Crust. et Insect.*, IV, 358; and *Meigen*.

of those which occupy the middle of their length—is closed before the posterior edge. The proboscis is very thick, and the body is depressed.

These Diptera are almost always found in the vicinity of dung-hills, which is most probably the abode of their larvæ\*.

Sometimes the posterior legs scarcely differ from the others. The antennæ of several are almost as long as the face of the head, and their seta is frequently pilose. The sides of the face are occasionally glabrous.

In some, the antennæ are almost as long as the face, inclined, generally approximated, and terminated by a narrow and elongated palette, with the seta always pilose. The abdomen, at least that of the male, is elongated, almost cylindrical, terminated by a club in some, and a stilet in others.

In these, the sides of the face are furnished with hairs or mustachios.

Here, the abdomen presents externally but four segments. The seta of the antennæ is simple.

#### DIALYTA, Meig.†

There, it offers five rings at least.

#### CORDYLURA, Fall., Meig.—OCYPTERA, Fab.,

Where the wings extend but little, or not at all, beyond the abdomen, which terminates in a club in the males‡.

#### SCATOPHAGA, Lat., Meig.—MUSCA, Lin., Fab.,

Where the wings are much longer, and the abdomen is not inflated at the posterior extremity in either sex.

*S. stercoraria*; *Musca stercoraria*, L.; Reaum., Insect., IV. xxviii. Densely pilose and of a greyish-yellow; front russet; a brown point on the wings; seta of the palette bearded. Very common on fæcal matters, those of man particularly, where the female deposits her eggs, which are retained on the surface by two appendages resembling little wings§.

These are destitute of mustachios.

The body is always long, narrow, cylindrical, and linear.

#### LOXOCERA, Lat., Fab., Meig.,

Where the antennæ are much longer than the head. The *Loxocera* resemble little Ichneumons||.

#### CHYLIZA, Fall., Meig.,

Where they are rather shorter than the head, with the seta thick, and in the form of a stilet¶.

The antennæ of the others are always much shorter than the head,

\* Lat., Ibid., IV, 359; Wied., Anal. Entom., under the name of *Copromyza*.

† See Meigen.

‡ Idem.

§ Meig., and Lat., Gener., Crust. et Insect., IV, 358.

|| Lat., Fab., Meigen.

¶ Meigen.



and usually projecting and distant; the palette, never much longer than it is wide, is sometimes almost ovoid, or bordering on an oval, and sometimes nearly globular.

Some, in which the seta of the antennæ is usually pilose, have the narrow and elongated body of the preceding ones; the abdomen of several also terminates in a point or stilet.

Of these Muscides, some have a naked face, and the palette of their antennæ more or less ovoid or oval.

Such are the two following subgenera:

LISSA, *Meig.*,

Where the top of the head presents a prominence, and the almost linear abdomen is not terminated by an articulated stilet\*.

PSILOMYIA, *Lat.*—PSILA, *Meig.*,

Where the body is proportionally less elongated and cylindrical and the abdomen of the females terminates in an articulated stilet †.

To this subgenus may be united the *Geomyzæ* of Fallen ‡.

The *Tetanura* and *Tanypeza* of M. Meigen appear to approach the preceding subgenera. In both, however, the legs seem to be proportionally longer and more slender. The abdomen of the *Tetanuræ* is obtuse and thickened at the end.

The first exterior nervure of the wings is simple, and does not produce a stigmatiform cell; the exterior terminal cells are distant §.

The abdomen of the female *Tanypeza* is terminated by a point or stilet. The first terminal cell, that which comes after the cubital, is almost closed at the end, or forms a narrow, elongated, and truncated triangle. I suspect that this subgenus belongs to the division of the *Dolichopoda* ||.

In others, the sides of the face are furnished with hairs; the first joint of their antennæ is much more slender than the following ones, almost cylindrical, and somewhat thickened at the end; the two following ones form a small rounded club.

LONCHOPTERA., *Meig.*—DIPSA, *Fall.*,

Where the ocelli are placed on an eminence. The wings are long and exhibit no transverse nervure beyond their base; the third longitudinal, nervure, from the exterior margin, is bifurcated. This subgenus is far removed from the *Dolichopoda*, near which Meigen has placed it ¶.

The body of the other *Scatomyzides* is thicker and less oblong, approaching more to the form of that of the common Fly.

One single subgenus, as the

HELEOMYZA, *Fall.*,

Presents mustachios \*\*.

\* Meigen.

† See Meigen. I have changed the name of *Psila*, because it too nearly resembles that already given to a genus of the Hemiptera.

‡ Fall., Dipt.

§ Meigen.

|| Idem. For the genus of *Tetanops*, which in some respects seems to belong to this division, see that of the *Carpophila*.

¶ See Meigen.

\*\* Fall., Dipt. : thè *Mouche des lutrines* (*Musca serrata*, L.) of De Geer, which is

Two other subgenera are removed from the last of the division by the pilose or plumous setæ of their antennæ.

DRYOMYZA, *Fall., Meig.,*

Where the face is concave beneath the antennæ, and terminates inferiorly, or at the oral cavity, by a short, truncated snout, as in *Scatophaga*, and in most of the *Dolichocera*\*.

SAPROMYZA, *Fall., Meig.,*

Where the face is straight, and does not project inferiorly †.

The last of the *Scatomyzides* have the seta of the antennæ simple ‡; these organs are always very short, distant, and straight, with the last joint semi-ovoid or forming a short triangle obtuse at the end. These Insects are very small, almost glabrous, black or cinereous, and more or less varied with yellow; the legs are strong and the eyes large. The summit of the head is flat and frequently presents, at its posterior extremity, a triangular brown space, on which are placed the ocelli. The two ordinary transverse nervures of the wings are approximated near the middle. These *Diptera* are found on flowers.

Several of the larvæ attack the interior of different plants, and some of them are very injurious to the agriculturist, by destroying various cerealia previous to their fructification. Those of one species—*Musca. frit.*, L.—in Sweden sometimes destroy the tenth of the crop of barley, the total loss thereby occasioned being estimated at one hundred thousand golden ducats. The larvæ of some other species—the *Oscina pumilionis*, and *O. lineata*, Fab.—are also highly noxious. For further details on those Insects which attack our cerealia, see the Memoir of the late M. Olivier §.

These *Scatomyzides* compose our genus

OSCINIS, *Lat., Fab.,*

To which we refer the *Chlorops* of Meigen. A species that I have received from Germany under the name of *brevipennis*, might however form a separate subgenus on account of the seta of its antennæ, which is thick, almost in the form of a stilet, and geniculate. The anterior and superior extremity of the head is sometimes truncated, and sometimes pointed. Another dipterous Insect which was also sent to me from Germany, and marked *Piophila vulgaris* || is in the same case

referred by Fallen to this subgenus, differs from the other species in the seta of the antennæ, which is simple. The palette also is larger and more orbicular. This insect, which has a cinereous body with a fulvous abdomen, is very common in the interior of our houses. The setæ and dentations of the exterior margin of the wings form no peculiar character—it is common to several other *Scatomyzides*. The *Mouche bossue* of De Geer—*Insect.*, VI, ii, 5—quoted in the first edition of this work, whose larva, that feeds on Aphides, has two horns posteriorly, is not an *Oscina*, but rather a *Heleomyza*.

\* Meigen.

† Meigen.

‡ It is thickened at its base.

§ Certain species in which the seta of the antennæ is plumous, and referred by him to the genus *Tephritis*, are perhaps *Sapromyzæ*.

|| The *P. scutellaris* of Fallen and Meigen. The face is but very slightly silky. The top of the head and thorax is pilose in the *Heleomyzæ*, a subgenus that is easily

as the first, but does not appear to me to be sufficiently removed from the Oscini\*.

The fifth division, that of the *DOLICHOCERA*, and which embraces the genus called *Tetanocera* by M. Duméril, closely approaches the fourth; but the length of the second joint of the antennæ which is here equal to that of the third, or the palette, and most frequently surpasses it, serves to distinguish them. These organs, always distant and projecting, are, with but few exceptions, as long as the head or longer, and terminated in a point. The superior plane of the head forms an obtuse triangle, or one truncated at the apex. The face is smooth or but slightly silky.

In some the antennæ are shorter than the head.

#### OTITES, Lat.,

Where the seta of the antennæ is simple and the inferior extremity of the head, or its oral portion, does not project †.

#### EUTHYCERA, Lat.,

Where the second joint of the antennæ is larger than the following one, almost square, and the latter is triangular and pointed, with a plumous seta. The inferior extremity of the head projects in the manner of a truncated snout ‡.

The antennæ of the others are manifestly as long as the head, or longer.

#### SEPEDON, Lat.—BACCHA, Fab.,

Where the antennæ are considerably longer than the head, with the second joint much longer than the last and cylindrical; the latter forms an elongated, pointed triangle, furnished with simple setæ §.

#### TETANOCERA, Dum., Lat.—SCATOPHAGA, Fab.,

Where the antennæ are as long as the head, or a little longer, with their second joint compressed, forming a long and narrow square, as long as the third, or only a little longer; the third joint is similar

confounded with the preceding one. In Oscinis or Piophila and Chlorops, the summit of the head, as we have already stated, presents posteriorly a triangular space sometimes even slightly prominent, and usually brown and glossy, on which the ocelli are situated. The antennæ are always distant, and the seta is simple. The body alone is pubescent. The legs are proportionally more robust than those of the Heleomyzæ, and it is evident that these Insects approach the Tetanocera. Messrs. Fallen and Meigen have not sufficiently compared the characters of the genera they have established, nor endeavoured to approximate them in a natural series, which makes it a difficult matter to discern the difference between several of them. I have frequently been embarrassed with genera, from which I could have been relieved by the work of the latter, but it is not yet published.

\* See the Nouv. Dict. d'Hist. Nat. 2d edit., article *Oscine*, divis. II, and Lat., Gener. Crust. et Insect., IV., 361; *Oscinis lineata*, and the following species. See also with respect to *Piophila*, Fallen, Meigen, and Wiedemann—Analect. Entom.

† Lat., Hist. Nat. des Crust. et des Insect.; the second edition of the Nouv. Dict. d'Hist. Nat. article *Oscine*, divis. I; and Lat., Gener. Crust. et Insect., IV, 351; to this subgenus I also refer the *Oscinis umbraculata*, Fab.

‡ *Scatophaga chærophylli*, Fab.; and some species of Tetanocera.

§ Lat., Gener. Crust. et Insect., IV, 349.

to that of the preceding subgenus, but the seta is sometimes plumous\*.

The sixth division, that of the *LEPTOPODITES*, is remarkable for the length and tenuity of the legs, the two last being at least twice the length of the body, which is also slender and filiform; the two first are distant from the others; all the tarsi are short. The head is spherical or ellipsoidal, and terminates in a point; its length equals or surpasses its transverse diameter. The termination of the abdomen is pointed in the females, and clavate in the males. The antennæ are very small, and are inserted on the front. These Muscides are found on plants, and several frequent aquatic localities. In the

*MICROPEZA, Meig.,*

Which I formerly distinguished by the name of *Calobates*, the head is ellipsoidal and terminates in a point; the last joint of the antennæ semi-orbicular, and the seta simple. The space which separates the anterior legs from the others is more apparent here than in the following subgenus.

*M. filiformis; Calobata filiformis*, Fab.; Schell., Dipt., VI, 1. Blackish; abdominal annuli margined above with whitish; legs fulvous, with a black ring round the posterior thighs. In the woods about Paris. To this species M. Meigen refers the *Musca corrigiolata* of Linnæus, which is also a Fabrician *Calobata*†.

In

*CALOBATA, Meig., Fab.,*

Or my *Micropeza*, the head is spheroidal, and the last joint of the antennæ, more elongated than in the preceding subgenus, is almost triangular and rounded at the end; the seta is frequently plumous ‡.

Our seventh division of the Muscides, that of the *CARPOMYZÆ*, so called because the larvæ of several species feed on fruits and seeds, in the germ in which the mother had deposited her eggs, is characterized as follows: wings turned up or distant when at rest, and susceptible in that state of a reiterated vibratile motion, or of being alternately raised and depressed, and spotted or dotted with black or yellowish; a port generally analogous to that of the common Fly; but the eyes are always distant, and the halteres exposed; the abdomen exhibits from four to five rings exteriorly, and frequently terminates, in the females, in a hard, cylindrical, or conical point, which acts as

\* Lat., Gener. Crust. Insect., IV, 349. This subgenus should be re-examined. Some of the species may be referred to *Sepedon*.—*S. rufa, rufipes*, Fab.—and others will form separate subgenera. Some of them are connected with *Oscinis* and *Dryomyza*.

† Lat., Ibid., 352; Meig. Dipt. According to the figure given by M. Wiedemann, of a species of *Nerius (fuscus*, Aual. Entom., 1), Fab., these Insects must have a general resemblance to the *Micropezæ*, but are removed from them by their antennæ, almost as long as the head, of which the second joint is at least as long as the third; the latter is almost orbicular, a little longer than it is wide. It is evident then, that this genus is connected with *Tetanocera*, just as the *Calobata* of Meigen lead to *Sepsis*, which I had united to the preceding ones under the common name of *Micropeza*. Here the wings are vibratile, which leads us to the *Cephalia, Ortalis* and *Trypeta* of Meigen, that present the same characters.

‡ See Meigen.

an ovipositor; the antennæ are always short, en palette, and their seta is rarely pilose.

Several species approach those of the last subgenera in the narrow and elongated form of their body, the length of their legs, their head more globular or elongated than in the other *Carpomyzæ*, where its form is hemispherical. These elongated species constitute these subgenera\*.

*DIOPSIS, Lin., Fab.,*

Also called *Mouches à lunettes*, on account of their eyes being placed at the extremity of two lateral, distant, and cylindrical prolongations of the head; the antennæ are inserted beneath. The scutellum is terminated by two spines. These singular Diptera, of which M. Dalman has given us a good Monograph—Anal. Entom. I—are foreign to Europe.

But few species are known; one of them is red with a black thorax, and a spot of the latter colour at the extremity of the wings; it is found in Guinea and Senegal. I have received a specimen of this species from the liberality of my friend Count Tousselin, who obtained it from Senegal. M. Dalman, who describes five of them, calls it *apicalis*.

*CEPHALIA, Meig.,*

Where the palette of the antennæ is narrow, elongated, and almost linear, with a pubescent seta; the fore-part of the head is considerably prolonged and without setæ; the palpi are strongly dilated in the manner of a spatula †.

*SEPSIS, Fall., Meig. — TEPHRITIS, Fab. — MICROPEZA, Lat.,*

Where that palette is much shorter and semi-elliptical, and has a simple seta; the anterior part of the head projects but little and is covered with setæ; the palpi are almost filiform, and simply and gradually increase in thickness.

*S. cynipsea; Musca cynipsea, L.* Very small; cupreous-black and glossy; head black; coxæ and anterior legs fulvous; a black point near the extremity of the wings. It diffuses a strong odour of Balm, and is found in great numbers on leaves and flowers; its wings are constantly but slowly vibrating ‡.

The other *Capromyzæ* have the port of common flies, a short hemispherical head, triangular or conical abdomen, and moderate legs.

Sometimes the superior plane of the head is almost horizontal or slightly inclined, so that the antennæ, when viewed in profile, appear to be inserted almost on a level with that plane, or near the front. The palpi and the proboscis are retracted within the oral cavity. The wings are turned up when at rest, and the abdomen exhibits five annuli exteriorly.

\* According to Meigen, two of these subgenera, *Cephalia* and *Sepsis*, have but four apparent abdominal annuli, whilst the following subgenera, *Platysoma* excepted, exhibit five.

† Meig., Dipt., XLVII, 10—16. See the genus *Calobata*, Fab.

‡ For the other species, see Meigen.



ORTALIS, *Fall.*—SCATOPHAGA, TEPHRITIS, DICTYA, *Fab.*—  
TEPHRITIS, *Lat.*,

Where the abdomen is not terminated in the females by an always external prolongation, in the form of a tail or stilet, serving as an ovipositor\*.

The body of several species is somewhat more elongated than in the following subgenus, and these Diptera, in this respect, are intermediate between the latter and the preceding ones.

The palette of the antennæ is sometimes long and linear as in the *O. paludum*, *Fall.*; and sometimes short and wide, as in the *O. vibrans*—*Musca vibrans*, *Lin.*—*De Geer*, *Insect.*, VI, 1, 19, 20, the body of which is black, and the head red, with a white streak on the inner margin of each eye; a black spot may be observed at the extremity of the wings, and the first exterior nervure of their base becomes thickened where it unites with the edge, presenting the appearance of a black stigma.

To this subgenus *M. Fallen* refers the *Musca cerasi*, *L.*, or the one whose larva feeds more particularly on the red and white-heart cherry; when about to become a pupa, it leaves the fruit and enters the ground where its metamorphosis is completed. The perfect Insect is very black and glossy, with four transverse blackish bands on the wings, united by pairs in opposite directions†.

TETANOPS, *Meig.*,

Where the abdomen of the females terminates by an always projecting, tubular oviduct, resembling a tail; the head seen from above appears to be almost triangular, and as long as it is wide‡.

TEPHRITIS, *Lat.*, *Fab.*, *Fall.*—TRYPETA, *Meig.*—DACUS, *Fab.*,

Where the abdomen is similarly terminated; but the head, seen from above, is rather transversal than longitudinal, and rounded.

The species in which the palette is more elongated, form the genus *Dacus* of Fabricius. Of this number is the one that usually attacks the Olive, which he however places among his Oscini. It is reddish, with the top of the thorax, some streaks on the back and scutellum excepted, blackish; the sides of the superior part of the abdomen are also spotted with blackish. The scutellum is salient. Coquebert has figured it in his *Illust. Icon. des Insect.* XXIV, 16.

*T. cardui*; *Musca cardui*, *L.*; *Reaum.*, *Insect.* III, xiv, 12—

14. Black; head and legs fulvous-brown; a zigzag brown line on the wings. The female perforates the stem of the *Carduus hæmorrhoidalis*, in order to deposit her eggs there, and a gall-like excrescence soon forms, which serves for food and shelter to the larvæ.

The inhabitants of the Isle of France can scarcely obtain per-

\* According to Meigen the hypostoma is arched or rather carinated in the middle, whilst it is plane in Trypeta. But this carina, although smaller, appears to me to exist in several species of the last genus.

† See Meigen.

‡ Idem. A subgenus approximating to those of the Dolichocera in the pyramidal form of the head, and to the Tephrites in their other characters, particularly in the abdomen, which is terminated in a truncated tube.

fectly sound and ripe lemons, on account of the abundance of a dipterous Insect of the same genus, which deposits its eggs in them\*.

Sometimes the head is most compressed transversely, so that its superior plane is more inclined than in the preceding species, and the antennæ, when viewed in profile, appear to be inserted near the middle of the face. The proboscis is very thick and partly salient. The wings are separated horizontally, and the abdomen presents exteriorly but four segments.

PLATYSTOMA, Meig.—DICTYA, Fab.†

This last subgenus manifestly leads us to the *Timiæ* of Wiedemann, closely approximating itself to our *Mosillus* and *Lauxania*, and to some other subgenera of M. Meigen.

They will close our eight division, that of the GYMNOZYDES. These Muscides are small, with a short, thick, arcuated and almost glabrous body of a glossy-black colour. Their head is strongly compressed transversely, like that of the *Platystomæ*, is of a uniform colour, generally that of the body, without any projection inferiorly, and with a large oval aperture. The wings are incumbent on the body, and extend beyond it posteriorly; the scutellum projects; the abdomen is depressed, short, and terminated in some by a little point in the form of a stilet; the legs are almost glabrous or but scarcely pilose.

In some, the antennæ are almost as long as the head, and distant.

CELYPHUS, Dalm.

Easily distinguished from all other Diptera by the scutellum, which covers the whole back of the abdomen, as in *Scutellera*.

*C. obtectus*, Dalm., Anal. Entom. The only species known.

From Java.

LAUXANIA, Lat., Fab., Meig.,

Where the scutellum is of an ordinary size, and the antennæ have a plumous seta‡.

The others have antennæ shorter than the head.

Here, they are always very short, inserted beneath a sort of arch that traverses the face, and very distant; the first cell of the posterior edge of the wings, or that which directly follows the cubital, is most frequently closed. The antennæ are lodged in fossulæ, and the space between them is elevated. The front is frequently punctured.

Those species, in which the first cell of the posterior edge is almost closed, form, in the system of Meigen, two genera. His *Timiæ* (*Timia*), in which, according to him, the abdomen exhibits six annuli, and the palette of the antennæ is short and almost semi-ovoid; and his *Ulidia* (*Ulidia*), where it is more elongated, almost elliptical, and where the abdomen presents but five rings. M. Fallen had

\* See Meigen.

† Idem.

‡ Lat. Gener. Crust. et Insect., IV, 357; Fab., and Meigen. The latter unites some species with it, in which the antennæ are shorter, that might form a separate subgenus.



designated this last genus by the name of *Chrosomyza*. We will unite these two genera in the single subgenus

*MOSILLUS, Lat.*

I have often found numbers of the *M. arcuatus* on the dust of old walls\*.

Those species, in which the first cells of the posterior edge of the wings are entirely open and longitudinal, composed, in the work of Meigen, two other genera:

*HOMALURA*, where the abdomen presents five segments, and *ACTORA*, where it exhibits six. The head is still more compressed than in the preceding subgenera. The seta, according to him, is naked, but I have seen it plumous in some specimens†.

There, the antennæ are almost contiguous; the cells of the posterior edge of the wings are always open.

Those *Gymnomyzides* in which the antennæ are very short, and inserted, as in the last subgenus, under a sort of arch and near the middle of the face, form the genus *Gymnomyza* of Fallen‡. Those in which these organs are inserted higher up, without any distinct appearance of an arch at their origin, and that terminate in an elongated palette, compose the genus *Lonchæa* of Fallen and Meigen. According to the latter the front is narrower in the males than in the females, and we see by their character that these Insects are connected in some respects with various species of *Anthomyzæ*§. The antennæ of the *Celyphi* and *Lanxaniæ* are also inserted higher than in the other *Gymnomyzæ*.

Our second section of the *Muscides*, which will form our ninth and last sub-tribe or general division, that of the *HYPOCERA*, comprises but a single subgenus, very distinct from the preceding ones in several characters. The palpi are always exterior; the antennæ inserted near the oral cavity are very short, and terminated by a thick and almost globular joint, with a very long seta. The wings, whose edge is densely ciliate superiorly, present near the base a stout oblique nervure, which extends to the margin where this stigma is placed in the *Hymenoptera*, and from this nervure proceed three others which run almost parallel with each other, in a longitudinal direction; hence the origin of the name *Trineura*, given to this subgenus by M. Meigen. The body is arcuated, the legs stout and spinous, and their thighs large and compressed, the posterior ones particularly. These Insects are extremely vivacious, and form in our "Genera" the genus

*PHORA, Lat.—TRINEURA, Meig.*

In the *Diptera* of which we have hitherto spoken, we have found a sucker received into the superior canal of a tubular sheath, more or less membranous, geniculate at base, most frequently terminated by

\* See Lat., Gen. Crust. et Insect, IV, 357; Meig., et Fallen.

† See Meigen.

‡ Fallen, Dipt.

§ Fall. and Meigen.

two lips, and accompanied by palpi. The antennæ, except in the last subgenus or *Phora*, have always appeared to be inserted near the front. The larvæ of these Diptera, although susceptible of being hatched in the venter of the mother, live abroad and feed on various substances, vegetable or animal. These Insects have formed our first general section, which is divided into five families. Those of the second differ in all these respects and in some others that are less general, and this dissimilarity has even induced Doctor Leach to form the latter into a particular order, or that of *OMALOPTERA*. Those which terminate it, and which are destitute of wings and halteres, have a certain affinity with the Hexapoda and Aptera that compose our order of the Parisita or the genus *Pediculus* of Linnæus.

The second section will form our last family of the Diptera.

## FAMILY VI.

### PUPIPARA.

These Insects, at least the Hippoboscæ, where distinguished by Reaumur, under the analogous appellation of *Nymphipara*.

Their head, viewed from above, is divided into two distinct areas or parts. One posterior, and more particularly composing the head, gives origin to the eyes and receives the other part in an anterior emargination. The latter is also divided into two portions, the posterior large and coriaceous, bearing the antennæ on its sides, and the other constituting the apparatus of manducation. The inferior and oral cavity of the head is occupied by a membrane; from its extremity issues a sucker arising from a little bulb or projecting pedicle, composed of two closely approximated threads or setæ, and covered by two coriaceous, narrow, elongated, and pilose laminae which form its sheath. Whether these laminae or valvulae represent (as I presume) the palpi of other Diptera, or whether they be parts of a true sheath, as is the opinion of M. Dufour in speaking of a species of *Ornithomyia*—Ann. des Sc. Nat., X, 243, XI, 1—where he has discovered two little bodies which he considers as palpi\*, it is not less a fact that the proboscis of these Insects evidently differs from that of the preceding Diptera, and that the sheath, in this case, would be more analogous to the proboscis of the Flea, from which however it is removed by the absence of articulations.

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\* In the Melophagi, the base of the laminae of the sucker is covered by two little coriaceous, triangular, and united pieces, forming a sort of labrum. They seem to form a miniature representation of the two pieces that cover the base of the proboscis of the Flea.

The body is short, tolerably broad, flattened and defended by a solid skin almost of the consistence of leather. The head is more intimately united to the thorax than in the preceding families. The antennæ, always situated at the lateral and anterior extremities of the head, sometimes form a tubercle bearing three setæ, and sometimes little hairy laminæ. The eyes vary as to size; in some species they are very small.

M. Leon Dufour, in his description of the *Ornithomyie bilobee*, has observed, that although this genus has had ocelli attributed to it, he has not been able to discover them. A fresh examination of such species as I could procure has in fact convinced me that we were mistaken\*, and it may be considered as a general rule that the Pupipara are destitute of those organs. The thorax presents four stigmata, two anterior and two posterior. The learned entomologist just referred to, in the *Hippobosca equina* of which he has described the Anatomy—Ann. des Sc. Nat., VI, 299, et seq.—could only find the two first, those which are situated on the lateral and anterior extremities of the mesothorax; but I have discovered the two others in the same Insect. They are situated, as in other Diptera, near the origin of the halteres. The abdomen of the *Hippobosca ovina*—see *Melophagus*—presents ten, in the form of little round, corneous, umbilicated tubercles, the four last being approximated to the anus. Those of the thorax, always four, are very apparent. According to the same observer, the interior of this part of the body in the *H. equina* presents both utricular and tubular trachæ; but those of the abdomen are all of the latter description and very numerous.

The wings are always distant and accompanied by halteres. Their edge is more or less fringed with cilia. The superior nervures which are in its vicinity are strong and very distinct; but those which then extend to the posterior margin are but slightly marked and are not united transversely. In the last Diptera of this family, these organs are wanting or are merely rudimental. The halteres also disappear. The legs are very distant and terminated by two robust nails with one or two teeth beneath, which makes them appear double or triple. The skin of the abdomen is formed of a continuous membrane, so that this part of the body is susceptible of being distended and of acquiring a considerable volume, as necessarily happens in those female Hippoboscæ, where the larvæ are hatched and continue to reside until the period of their transformation into pupæ. At this epoch the larvæ issue from the venter of the mother in the form of a soft, white egg, almost as bulky as the maternal abdomen; the skin hardens and be-

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\* Dr. Leach, however, admits that they exist in certain species.

comes a firm shell, at first brown, then black, round, and frequently emarginated at one end, and presenting a glossy plate or operculum which is finally detached in the manner of a cap, to allow the egress of the perfect Insect. This shell has no annuli or transverse incisions, a character which distinguishes it from the other pupæ of Diptera, and from those of the Athericera particularly, to which it approximates the most.

It is to the splendid Memoirs relative to these Insects by Reaumur, De Geer, and M. Leon Dufour, all accompanied by detailed figures, that we must recur, in order to obtain a profound knowledge of these transformations, and an explanation of the changes which take place in the female at the moment of depositing her larvæ. The latter, in particular, has surpassed his predecessors by anatomical investigations which have unveiled some highly interesting and curious facts, such as the existence of salivary glands, of a sort of matrix \* consisting of a large, musculo-membranous pouch, adapted for gestation and analogous to the uterus of woman, and of ovaries entirely different from those of other Insects. These ovaries consist of two obtuse, ovoid bodies filled with a white homogeneous pulp free and rounded at one extremity and terminating at the other in a peculiar duct. According to this anatomist these ovaries closely approximate to those of woman in their form and position; Reaumur had a glimpse of them. The matrix, which at first is very small, by the progress of gestation becomes enormously dilated, pushes back the viscera, and finally invades the whole cavity of the abdomen, which is thus rendered very large. The memoir of this able observer presents other interesting facts, which, as they differ but little, if at all, from the ordinary laws, we shall not stop to analyze.

These Insects, which have been called by some authors *Mouches-Araignees*, live exclusively on Quadrupeds or Birds, run very fast, and frequently sideways.

Some—*Coriaces*, Lat. † — have a very distinct head articulated with the anterior extremity of the thorax. They form the genus

### HIPPOBOSCA, *Lin., Fab.*

#### HIPPOBOSCA, *proper.*

Furnished with wings; very distinct eyes occupying all the sides of the head; antennæ in the form of tubercles, with three setæ on the back.

\* Professor Nitzsch, who, in his Memoir on Epizotic Insects, treats of various genera of Pupipara, mentions two ovaries and four biliary vessels in Hippobosca, but he neither alludes to this matrix nor to the salivary glands.

† Dr. Leach has published a Monograph of these Insects, enriched with excellent figures, beautifully engraved.

*H. equina*, L.; De Geer, Insect, VI, xvi, 1—20. Brown mixed with yellowish. Found on Horses and Oxen, usually under their tail and near the anus\*.

ORNITHOMYIA, Lat.,

Only differing from Hippobosca in the antennæ, which project, are laminiform and pilose, and in the wings, which are furnished posteriorly with strongly marked longitudinal nervures that extend to the posterior margin.

These Insects, in the Monograph of the Diptera, published by Dr. Leach, form four genera. 1. FERONIA—NIRMOMYIA, Nitzsch—distinguished from the following ones by the tubercular form of the antennæ, and by the nails of the tarsi having but two teeth in lieu of three. 2. ORNITHOMYIA, in which, as in the three following subgenera, there are ocelli and tridentated nails, and, as in the two which succeed, laminiform antennæ, but where the wings are almost equally wide and rounded. 3. STENEPTERYX, similar to Feroniæ, with the exception of the wings, which are narrow and very acute. 4. OXYPTERUM, where the wings are equally acute; but the antennæ are dentiform, the eyes are small, and the ocelli are wanting, as in Hippobosca and Feronia.

They live on various birds, such as the Swallows, Titmouse, and even on the Vulture.

*O. verte*; *Hippobosca avicularia*, L.; De Geer, Insect., VI, xvi, 21—24. Green; top of the thorax black; proboscis projecting; wings almost oval. On the Sparrow, &c. †

STREBLA, Dalm.,

Differing from Ornithomyia in the wings, which are crossed on the body, and of which some of the longitudinal nervures are united by small transversal ones. The eyes are very small and situated on the posterior angles of the head. On a Bat of South America ‡.

MELOPHAGUS.—MELOPHILA, Nitz.,

Destitute of wings, and where the eyes are rather indistinct.

*M. vulgaris*; *Hippobosca ovina*, L.; Panz., Faun. Insect. Germ., LXI, 14. Reddish. It conceals itself in the wool on Sheep. Another species is found on the Stag §.

A species of Melophagus that lives on the Stag, that presents rudiments of wings, and whose thorax is rather wider than the head, forms the subgenus LIPOTENA of Professor Nitzsch. Near the Melophagi should probably be placed his genus BRAULA—Germ., Magus. der Entom.—of which the only known species lives on the domestic Bee. It is figured by M. Germar, Faun.

\* See Lat., Gen. Crust. et Insect., IV, p. 362; Leach, Dufour, &c.

† Lat., Ibid.; Encyc. Méthod., article *Ornithomyie*, Leach. The eyes of the *Ornithomyiæ* appear to me to be somewhat smaller than in *Hippobosca*. The sides of the thorax terminate anteriorly in a point. The sucker originates from a little piece emarginated like a heart, which is not exposed in *Hippobosca*.

‡ Dalm., Anal. Entom.

§ Lat., Ibid., and Leach.

Insect. Eur., VI, 25, and is entirely blind. Its thorax is divided into two transversal portions. The under part of the last joint of the tarsi is furnished with a transverse range of spines forming a comb. Long before this, Reaumer had observed an analogous parasitical animal (if it be not the same), provided with a proboscis, on the Bee. He has figured it in his Memoirs, V, pl. xxxviii, fig. 1—4.

The head of the others Pupipara—*Phthiromyies*, Lat.—is very small or almost wanting. It forms a minute, vertical body near the anterior and dorsal extremity of the thorax.

They constitute the genus

MYCTERIBIA, Lat.—PHTHIRIDIUM, *Herm.*

These Insects have neither wings nor halteres, and resemble spiders still more than the preceding ones. They live on Bats. Linnæus arranged one species, and the only one he knew, with the Pediculi\*.

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\* Lat., Ibid.; and the Encyc. Mèthod., article *Nyctéribie*, and the same article of the Nouv. Dict. d'Hist. Nat., 2nd edition. See also the Memoir of Professor Nitzsch on Epizotic Insects.





FOURTH  
GREAT DIVISION  
OF THE  
ANIMAL KINGDOM.



ANIMALIA RADIATA.

THE RADIATED ANIMALS, ZOOPHYTA, or ZOOPHYTES\* (*a*), as they are termed, include a number of beings whose organization, always evidently more simple than that of the three preceding divisions, also presents a greater variety of degrees than is observed in either of them, and seems to agree in but one point, viz. their parts are arranged round an axis, and on one or several radii, or on one or several lines extending from one pole to the other. Even the Entozoa or Intestinal Worms have at least two tendinous lines, or two nervous threads proceeding from a collar round the mouth, and several of them have four suckers situated round a probosciform elevation. In a word, notwithstanding some irregularities, and some very few exceptions—those of the Planaria and most of the Infusoria—traces of the radiating form are always to be found, which are strongly marked in the greater number, and particularly in Asterias, Echinus, the Acalepha, and the innumerable host of the Polypi.

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\* Neither of these denominations should be construed literally. There are some genera in this division in which the radiation is but slightly marked, or even totally wanting, and it is only among the Polypi that we find that constancy and form of flowers which has caused them to receive the name of Zoophytes. These appellations, however, indicate our having reached the lowest part of the animal series, and that we have arrived at beings, most of which remind us more or less of the vegetable kingdom, even in their external forms—it is in this sense that I employ them.

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{  $\text{Z}$  (*a*) We here return to Baron Cuvier;—the portion of the work written by M. Latreille, which commenced with the Crustacea, in our third volume, having terminated with the Dipterous Insects.—ENG. ED.

The nervous system is never very evident, and when traces of it have been apparently visible, it was also arranged in radii; most frequently, however, there is no appearance of it whatever.

There is never any true circulating system. The *Holothuria* are provided with a double vascular apparatus, one portion of it being attached to the intestines and corresponding to the organs of respiration, and the other merely serving to inflate the organs which supply the want of feet. The latter is only distinctly visible in *Ursinus* and *Asterias*. Through the gelatinous substance of the *Medusæ* we can see more or less complicated canals arising from the intestinal cavity; all this precludes the possibility of a general circulation, and in the great number of *Zoophytes* it is easily proved that there are no vessels whatever.

In some genera, such as *Holothuria*, *Ursinus*, and in several of the *Entozoa*, we observe a mouth and anus, with a distinct intestinal canal. Others have an intestinal sac, but with a single opening serving both for a mouth and anus. In the greater number there is merely a cavity excavated in the substance of the body, which sometimes opens by several suckers; and, finally, there are some in which there is no mouth visible, and which can only be nourished by porous absorption.

The sexes of several of the *Entozoa* or Intestinal Worms can be distinguished. The greater number of the other *Radiata* are hermaphroditical and oviparous; some have no genital organs, and are reproduced by buds or division.

The compound animals, of which we have already seen some examples in the last of the *Mollusca*, are greatly multiplied in certain orders of the *Radiata*, and their aggregation produces trunks and expansions forming all sorts of figures. It is to this circumstance, together with the simple nature of the organization in most of the species, and the radiating disposition of their organs, which reminds us of the petals of flowers, that they owe their name of *Zoophytes* or *Animal-plants*, by which we merely mean to express this apparent affinity, for as *Zoophytes* enjoy the sense of touch and the power of voluntary motion, mostly feed on matters which they have swallowed or sucked, and digest them in an internal cavity, they are certainly animals in every point of view.

The greater or less degree of complication in *Zoophytes* has occasioned their division into classes; but as all the parts of their organization are not yet well known, those sections cannot be characterized with as much precision as those of the preceding divisions.

In *Asterias* and *Ursinus*, called *ECHINODERMES* by Brugiere on ac-

count of their spines, we find a distinct intestine floating in a large cavity, and accompanied by other organs, for generation, respiration, and a partial circulation. The *Holothoriæ* were necessarily united to them on account of the analogy of their internal organization, which is perhaps still more complex, although they have no movable spines on the skin.

The *ENTOZOA* or Intestinal Worms, which form the second class, have no very evident vessels in which a distinct circulation is carried on, nor separate organs of respiration. Their body is usually elongated or depressed, and their organs arranged longitudinally. The difference in their system of digestion will hereafter probably cause them to be divided into two classes, a circumstance already indicated by our establishing two orders. In some we find an alimentary canal suspended in a true abdominal cavity, which is wanting in the others.

The third class comprises the *ACALEPHA* or Sea Nettles. They have neither true circulating vessels nor organs of respiration. Their form is usually circular and radiating, and their mouth is almost always their anus. They only differ from *Polypi* in the greater development of the tissue of their organs. The *Acalepha Hydrostatica*, which we place at the end of this class, when better known, will perhaps form a separate one; as yet however we only conjecture the functions of their singular organs.

The *POLYPI*, which compose the fourth class, are those little gelatinous animals whose mouth, surrounded with tentacula, leads to a stomach sometimes simple and sometimes followed by intestines in the form of vessels. To this class belong those innumerable compound animals with a fixed and solid stem, which were considered as marine plants.

The *Thethyïæ* and Sponges are usually placed at the end of this class, although *Polypi* have not yet been discovered in them.

The *INFUSORIA*, or the fifth and last class of the *Zoophyta*, are those minute beings whose existence we have only discovered by means of the microscope, and which swarm in stagnant waters. Most of them have merely a gelatinous body destitute of viscera, although we commence the series with more compound species possessed of visible organs of locomotion and a stomach: these also may hereafter constitute a separate class.

## CLASS I.

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### ECHINODERMATA \*.

The Echinodermata are the most complicated animals of this division. Invested with a well organized skin, frequently supported by a sort of skeleton, and armed with points, or movable and articulated spines, they have an internal cavity in which distinct and floating viscera may be perceived. A sort of vascular system, which it is true does not extend throughout the body, keeps up a communication with various parts of the intestine, and with the organs of respiration, which are generally distinct. Threads are also seen in several, which may act as nerves, but which are never arranged with the regularity and fixed order of those in the animals of the two preceding divisions of the Invertebrata.

We divide the Echinodermata into two orders: those furnished with feet or at least with vesicular organs, so called on account of their fulfilling similar functions; and those in which they are wanting.

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### ORDER I.

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#### PEDICELLATA.

The Pedicellata are distinguished by organs of motion exclusively peculiar to them. Their skin is pierced with a number of little holes, arranged in very regular series, through which pass cylindrical and membranous tentacula, each one terminated by a little disk which acts like a cupping-glass. That portion of these tentacula which remains within the body is vesicular; a humour is effused through their entire cavity, and is either propelled at the will of the animal into the exterior and cylindrical portion, which it distends, or returns to the interior vesicle, when the former sinks and becomes relaxed. It is by thus elongating and shortening their hundreds of little feet or tentacula and by fixing them by their cup-like extremities, that these animals effect their progressive motions. Vessels proceeding from these feet extend to trunks which correspond to their ranges,

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\* The Radaires Echinodermes of M. de Lamarck.

and which terminate near the mouth. They form a system distinct from that of the intestinal vessels observed in some species\*.

Linnæus divided them into three very natural, but numerous genera, and composed of such various species, that they may be considered as forming three families. The

#### ASTERIAS, *Lin.*,

Or Starfish, have been so called because their body is divided into rays (generally five), in the centre of which, and underneath, is the mouth, that is also the anus.

The framework of their body is composed of small osseous pieces, variously combined, the arrangement of which merits examination. Their power of reproduction is very great, as they not only reproduce the rays which have been separately removed, but a single one with the central ray remaining will reproduce all the others; for this reason their figure is frequently irregular. In the

#### ASTERIAS, *Lam.*,

Or Asterias properly so called, each ray has a longitudinal groove above, the sides of which are perforated by the little holes before-mentioned, for the transmission of the feet. The rest of the inferior surface is furnished with small and movable spines. The whole surface is also pierced by pores, which allow a passage to tubes much smaller than the feet, that probably serve to absorb water, and convey it into the general cavity for a sort of respiration. On the middle of the body, and a little on one side, is a stony plate, with a corresponding internal canal, filled with a calcareous matter, which is thought to serve for the growth of the solid parts. Internally we find a large stomach, immediately on the mouth, from which two caca proceed to each ray, ramifying like trees, and suspended (each) to a sort of mesentery. There are also two ovaries in each ray, and it appears to us that they possess the faculty of self-impregnation. A particular system of vessels is connected with their intestines, and another with their feet.

M. Tiedemann thinks that their nervous system consists in a very fine thread which surrounds the mouth, and sends a branch to each foot, which runs between those organs exteriorly, and gives off two twigs internally.

The osseous framework of each ray consists of a sort of column extending along the inferior surface, and composed of vertebræ articulated with each other, from which proceed the cartilaginous branches that support the exterior envelope. Between the roots of these branches are the holes that transmit the feet. Other osseous pieces, frequently furnished with movable spines, are observed on the lateral edges of the branches in many species.

Some of this genus have the figure of a pentagon with rectilinear

\* For details respecting the organization of the Star-fish, Ursini and Holuturiæ, see the splendid anatomical Monograph of Tiedemann, Landshut, 1816, in folio.

sides, rather than that of a star. The radiation is only marked externally by the groove of the feet\*.

In others there is a slight re-entering angle in each side of the pentagon †.

The sides of some are concave, which approximates them to a stelled figure ‡.

In these various species the cæca and the ovaries are not so elongated as in most of those which have their rays elongated and separated by strongly marked re-entering angles. Such are

*A. rubens*, L.; Encyc., CXIII, 1, 2. Extremely common on the whole coast of France, so much so, that in some districts they are employed to manure the soil.

*A. glacialis*, L.; Link., XXXVIII, 69; Encyc. CVII and CVIII. This species is frequently more than a foot in diameter. The spines which invest the superior part of its body are surrounded by a multitude of fleshy tubes which compose a sort of cushion round their base.

*A. aurantiaca*, L.; Link., VI, VII, XXIII; Encyc. CX: Egypt. Echin., pl. iv, 1. The largest species of the European seas; the edges of its rays are furnished with pieces arranged like paving stones, on which strong and movable spines are articulated. The whole of the superior surface is covered with little spines, terminated by a truncated and bristly head §.

Some species have more than five rays ||. Their cæca and ovaries are very short.

We should separate those species in which the rays are destitute of the longitudinal groove underneath for receiving the feet; generally, these rays are not hollow, and the stomach is not prolonged into them in the form of cæca, but its prominences remain in their intervals. Locomotion is principally effected by the curves and motions of the rays, and not by the feet, which are too few for that purpose.

Those, which have five non-ramous rays round a central disk, form the OPHIURÆ of M. Delamarck; but we should also distinguish

Those in which these rays are furnished on each side with movable

\* *Asterias discoidea*, Lam., Encyc. Méthod., Vers. XCVII, XCVIII;—*As. tessellata*, var., A, Lam.; Link., XIII, 22; Encyc., XCVI.

† *Asterias membranacea*, Link., 1, 2;—*A. rosacea*, Lam.; Encyc. XCIX, 2, 3.

‡ *Asterias tessellata*, var. C and D, Lam.; Link., XXIII, 37, XXIV, 39; Encyc., 97 and 98, 1, 2;—*A. equestris*, L. and Lam.; Link., XXXIII, 53; Encyc., CI, CII;—*A. reticulata*, Lam.; Link., XLI, XLII; Encyc., C, 6, 7;—*A. militaris*, Müll., Zool. Dan., CXXXI;—*A. minuta*, Seb., III, v, 14, 15; Encyc., C, 1, 3;—*A. nodosa*, Link., II, III, VII; Encyc., CV, CVI.

§ Add *A. rosea*, Müll., Zool. Dan., LXVII; *A. violacea*, Ib., LXVI;—*A. echiniphora*, Lam.; Link., IV, 7; Encyc., CXIX, 2, 3;—*A. variolata*, Lam.; Link., VIII, 10; Encyc., Ibid., 4, 5;—*A. levigata*, Link., XXVIII, 47; Encyc., CXX;—*A. seposita*, Link., IX, 16; Encyc. CXII, 1, 2.

|| *Ast. paposa*, Link., XVII, 28, XXXIV, 54; Encyc., CVII, 3, 4, 6, 7;—*A. echinites*, Lam.; Solander and Ellis, Coral., LX—LXII; Encyc., CVII, A—C;—*A. helianthus*, Lam.; Encyc., CVIII and CIX.



spines; the little fleshy feet also issue from each side between the origin of those spines \*; and

Those in which there are none of these lateral spines, but where the rays are covered with imbricated scales, and resemble tails of serpents. The central disk, in each interval of its rays, and on the side where the mouth is placed, is marked by four holes which extend into the interior of the animal, serving perhaps for respiration, or, according to the others, for the issue of the ova. Their only feet are in five short grooves, which form a star round the mouth †.

The GORGONOCEPHALÆ, Leach ‡, called EURYALES by M. de Lamarck, are those in which the rays are dichotomously divided. In some this division commences at the base of the rays, presenting the appearance of a bundle of serpents—they are commonly called *Medusa's Head* §. There are two preceding holes at the base of each ray.

In others, however, this division only commences at the end of the rays, and is not often repeated ||.

We should also separate the

ALECTO of Leach, called COMATULA by M. de Lamarck. They have five large articulated rays, each of which is divided into two or three, bearing two ranges of articulated threads; these five rays are attached to a petrous disk, also furnished, on the side opposite to the mouth, with one, two, or three ranges of articulated threads without branches, shorter and more slender than the large rays, and by which the animal is said to fix itself. The sac which contains the viscera is situated in the centre of the large rays, opening by a stellated mouth and a second and tubular orifice which may be the anus ¶.

It is in the vicinity of the COMATULÆ that we must place the

### ENCIRNUS, Guett. \*\*,

Which might be defined †† as Comatulæ with a prolonged disk and a multiarticulated stem. The branches themselves are articulated and dichotomously ramose, bearing ranges of articulated threads; the stem being furnished with smaller ones at different heights; the mouth is in the centre of the rays, and the anus on one side.

\* *Ast. nigra*, Müll., Zool. Dan., d, XCIII;—*A. tricolor*, Ib., XCVII; *A. fragilis*, Ib., XCVIII;—*A. filiformis?* Ib., LIX;—*A. aculeata*, Link., XXVI, 42; Müll., Zool. Dan., XCIX;—*Ophiura echinata*, Lam.; Encyc., CXXIV, 2, 3;—*Oph. ciliaris*, Ib., 4, 5;—*Oph. lumbricalis*, Ib., 1.

† *Asterias ophiura*, L.; *Ophiura lacerta*, Lam., Encyc. CXXIII, 1, CXXII;—*Oph. texturata*, Id.; Link., II., 4; Encyc. CXXIII, 2, 3;—*Oph. cuspidifera*, Lam.? Encyc., CXXII, 5—8.

‡ Zool. Miscel., No. 16, p. 51.

§ *Asterias caput Medusæ* L.; (*Euryale asperum*) Lam.; Link., XX, 32; Encyc. CXXVII;—*Euryale muricatum*, Ib., CXXVIII and CXXIX;—*Asterias euryale*, Gm. (*Euryale costosum*) Ib., CXXX; Link., XXIX and XXX.

|| *Euryale palmiferum*, Lam., Encyc., CXXVI.

¶ *Asterias multiradiata*, Zool. Miscel., loc. cit., L.; Link. XX, 33, XXII, 34; Encyc. CXXV;—*Ast. pectinata*, L.; Link., XXXVII, 66; Encyc. CXXIV, 6, Egypt. Echin. I, 1, 2, &c.

\*\* Acad. des Sc., 1755, p. 224.

†† See Schweigger, Hist. Moll. et Zooph., p. 528.



But one very small species—*Pentacrinus europæus*, Thoms., Monog.—is found in the seas of Europe; it attaches itself to various Lithophyta.

The seas of hot climates produce larger and more complicated ones, such as the *Encr. asterias*, Blum.; *Isis aster*, L.

Fossil Encrinites however are very numerous, and so various, that they have been divided into several subgenera, according to the composition of the central body placed on the summit of the stem, and from which the large rays proceed.

This body may be formed of pieces articulated with the stem, and bearing the rays by similar articulations. In this case, and if the stem be round and inflated above, we have the APOCRINITES, Miller;

If it be round, but not inflated, ENCRINITES;

If pentagonal, PENTACRINUS.

Or this body may be formed of angular plates united at the edges, and forming several ranges. Of these

The PLATYCRINITES have but two ranges one of three plates, the other of five;

The POTERICRINITES have three ranges, each consisting of five plates;

The CYATHOCRINITES also three, and each of five, but the last is furnished with intercalated plates which may increase it to ten;

The ACTINOCRINITES have several ranges, the first of three, the second of five, and the others more numerous. The two first are marked with radiating ridges;

The RHODOCRINITES also have several ranges, the first of three, the second of five, and third of ten, all the three with ridges; the others are more numerous.

Finally, the central body may be formed of one piece, which appears, however, to consist of five pieces soldered together: here we have the EUGENIACRINITES\*.

The fossil productions, known by the names of *Entrochites*, are portions of the stem and branches of animals belonging to this genus.

### ECHINUS, Lin.

The Echini, or Sea-Urchins, as they are termed, have the body invested by a shell or calcareous crust, composed of angular pieces which join each other exactly, and perforated by innumerable holes, for the transmission of the membranous feet, disposed in several very regular ranges. The surface of this crust is armed with spines, articulated on little tubercles, that move at the will of the animal, whose motions, conjointly with the feet situated between them, they effect. Other membranous tubes, much finer and frequently divided at the extremity, probably serve to convey water into the interior

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\* No one has so carefully studied these productions, or described them so exactly as M. J. Miller, in his *Nat. Hist. of the Crinoidea*, Bristol, 1821, in 4to. It is to this work that we are indebted for our article. Excellent figures of the same are also given by M. George Cumberland, in his *Reliquiæ Conservatæ*, Bristol, 1826.

of their shell, and then to remove it. The mouth is provided with five teeth, set in an extremely complex, calcareous framework, resembling a pentagonal lantern, furnished with various muscles, and suspended in a large aperture of the shell. These teeth, which resemble long ribands, become indented inferiorly as fast as they are worn away at the point\*. The intestine is very long, and attached, spirally, to the interior parietes of the shell by a mesentery. A double vascular system extends along this canal, and partly on the mesentery; there are also particular vessels for the feet. Five ovaries, situated round the anus, empty themselves by separate orifices; they form the edible portion of these animals.

The Echini chiefly feed on small shell-fish, which they seize with their feet. Their motions are very slow. Shells of Echini are very abundant in the ancient strata, principally those of chalk, where they are usually filled with silex.

The Echini should be divided into regular and irregular.

In the first,

ECHINUS, Lam. — SIDARIS, Klein.,

Or Echinus properly so called, the shell is generally spheroidal, the mouth in the middle of the inferior surface, and the anus diametrically opposite. The little foramina are arranged in ten bands, approximated by pairs, that extend regularly from the mouth to the anus, like the meridian lines of a globe.

Certain species are furnished with large and stout spines of various forms, placed on large tubercles on their shell, the bases of which are surrounded by other but smaller spines †.

It is among these species, as ascertained by M. Deluc, that we must place those whose olive-like spines are often found petrified in chalk, and other ancient formations, called *pierres judaiques* ‡.

The most common species, and particularly those of the coast of France, are merely furnished with slender spines, articulated on small tubercles that are much the most numerous. Such is the

*E. esculentus*, L.; Klein., Lesk., I, A, B; Encyc. 132. The common Echinus is of the form and size of an apple, completely covered with short, radiating, and usually violet spines. Its ovaries, which are reddish, and of an agreeable flavour, are edible in the spring.

The neighbouring species are distinguished with difficulty, by the

\* See my *Leçons d'Anat. Comp.*, IV, and the work of Tiedemann, already quoted.

† *Echinus mammillatus*, L.; Seb., III, xiii, 1—4; Encyc., pl. 138, 139, and the naked shell, *Ib.*, 138, 3, 4.—The different species approximated under the name of *Ech. Sidaris*, Scill., *Corp. Mar. Tab.*, xxii; Seb., III, xiii, 8, &c.;—*Ech. verticillatus*, Lam.; Encyc., 136, 2, 3;—*Ech. tribuloides*, *Id. Encyc.*, *Ib.*, 4, 5;—*Ech. pistillaris*, *Id.*, Encyc., 137;—*Ech. stellatus*, L.; Seb., III, xiii, 7;—*Ech. aranéiformis*, *Id.*, *Ib.*, 6;—*Ech. saxatilis*, *Id.*, *Ib.*, 10;—*Ech. calamarius*, Pall.; *Spicil. Zool.*, X, ii, 1—7.

‡ See the Letters from Switzerland of Andreae, pl. XV, and the Memoir of M. Deluc, *Mém. des Sav. Etrang.*, IV, 467.

N. B. The naked shells are distinguished with difficulty; such are the *Ech. excavatus*, L.; Scill., *Corp. Mar.*, xxii, 2, D;—*Ech. ovarius*, Bourguet., *Petrif.*, LII, 344, 347, 348.

greater or less approximation of the bands of holes, the equality or inequality of the tubercles, &c. \*

The regularity of certain round and depressed Echini is diminished by a wide furrow on one side †.

Some of these Echini, where the mouth is opposite to the anus, instead of having a spheroidal form on a circular plane, are transversely oval, that is to say, one of their horizontal diameters is greater than the other ‡.

They also differ among themselves by the equality or inequality of the spines, and the relative proportions of the tubercles.

We should distinguish one species—*Echinus atratus*, L.; Encyc., 140, 1—4—in which the widened spines, truncated and angular at the extremity, touch each other like stones in a pavement. Those of the margin are long and flattened.

We call all those Echini irregular, in which the anus is not opposite to the mouth. It appears that they are merely furnished with short and slender spines, almost like hairs. Of these, some still have the mouth in the middle of the base. They may be subdivided according to the extent of the bands of holes that transmit the feet; sometimes, as in the preceding ones, they extend from the mouth to a point directly opposite, where, after having clasped the whole shell, they re-unite.

#### ECHINONEUS, *Phels., Leske.*

Where we observe the round or oval form of certain regular Echini, the mouth in the middle of the base, and the anus between the mouth and the margin, or near the latter, but underneath §.

#### NUCLEOLITES, *Lam.*

The same characters, with the anus near the margin, but above.

The species known are all fossil ||. Others again,

\* *Ech. miliaris*, Kl., II, A, B; Encyc., 133, 1, 2;—*Ech. hemisphericus*, Kl., II, E; Encyc., lb., 4;—*Ech. angulosus*, Kl., II, A, B, F; Encyc., lb., 5, 6, 7;—*Ech. excavatus*, Kl., XLIV, 3, 4; Encyc., lb., 8, 9, very different from Scill., XXII, 2, D, which belongs to the preceding section;—*Ech. saxatilis*, Kl., V, A, B; Encyc., 134, 5, 6; *Ech saxatilis*, B, Seb., III, xiii, 10, is very different, and belongs to the preceding section;—*Ech. fenestratus*, Kl., IV, A, B;—*Ech. subangularis*, Id., III, C, D; Encyc., 134, 1, 2;—*Ech. diadema*, Kl., XXXVII, 1; Encyc., 133, 10;—*Ech. radiatus*, Seb., III, xiv, 1, 2; Encyc. 140, 5, 6;—*Ech. circinnatus*, Kl., XLV, 10;—*Ech. coronalis*, Kl., VIII, A, B; Encyc., 140, 7, 8;—*Ech. asterisans*, Kl., VIII, F; Encyc., 140, 9;—*Ech. sardicus*, Kl., IX, A, B; Encyc., 141, 1, 2;—*Ech. flammeus*, Kl., X, A; Encyc., 141, 3;—*Ech. variegatus*, Kl., X, B, C; Encyc., 141, 4, 5;—*Ech. granulatus*, Kl., XI, F; Encyc., 142, 1, 2;—*Ech. toreumaticus*, Kl., X, D, E, Encyc. 142, 4, 5, &c.; I do not however pretend to answer for all the synonyms, or to assert that there are no repetitions.

† *Ech. sinuatus*, Kl., VIII, A; Encyc., 142, 7, 8.

‡ *Ech. lucunter*, Kl., II, E, F; Seb., X, 16, and the species figured in Seb., lb., 17 and 8.

§ Oval species; *Echinus cyclostomus*, Müll., Zool. Dan., XCI, 5, 6; Encyc., 153, 19, 20;—*Ech. semilunaris*, Seb., III, x, 7; Encyc., 153, 21, 22;—*Ech. scutiformis*, Scill., Corp. Mar., XI, No. ii, fig. 1, 2.

Round species: E, Encyc., 153, 1, 2; *Ech. depressus*, Walck., II, E, ii, 6, 7; Encyc., 152, 7, 8;—*Ech. subuculus*, Kl., XIV, L—O; Encyc., 153, 14, 17.

|| *Spatangus depressus*, Leske, ap. Klein, LI, fig. 1, 2; Encyc., 157, 5, 6.

GALERITES, Lam.—CONULUS, Kl.,

Have a flat base, from which their body rises in a cone or semi-ellipsoid. The mouth is in the middle of the base, and the anus near its margin.

They are very common in the stony strata, but no living ones are known.

The most common species is the *Ech. vulgaris*, L.; Encyc., 153, 6, 7; Klein, Fr. edit., VII, D. G.\*

The number of bands in some is not quinary†.

SCUTELLA, Lam.,

Where the anus is between the mouth and the margin, the shell extremely depressed, flat underneath, and approaching to an orbicular form.

In some the shell is entire without any other openings than the series of pores visible in all the Echini‡.

The shell is also without large orifices in others, but is bi-emarginated§.

In some again it is entire and traversed by large holes which do not penetrate into its cavity||.

In others it is both traversed by these large holes, and emarginated¶.

Finally, in the ROTULA, Kl., part of the posterior margin is festooned like a dentated wheel; the Rotulæ are also divided into those which are traversed by large holes\*\*, and those in which they are wanting ††.

CASSIDULUS, Lam.

The Cassiduli are oval, with the anus situated above the margin as in the Nucleolites, but are distinguished by their incomplete bands of pores, that is, they do not extend from one pole to the other in the figure of a star ††.

In other irregular Echini the mouth is not in the centre of their base, but on one side, opening transversely and placed obliquely; the anus is on the opposite side. They are also subdivided according to the extent of the ranges of holes.

\* Add *Ech. albo-galerus*, L.; Bourg., Petrif., LIII, 361; Encyc., 152, 5, 6.

† *Ech. quadrifasciatus*, Walch., Monum., Dil. Supplem., IX, d, 3, and IX, g, 7—9; Encyc., 153, f. 10, 11;—*Ech. sexfasciatus*, Walch., Supplem., IX, g, 4, 6; Encyc., 153, f. 12 and 13.

‡ *Ech.*, Encyc. 146, 4, 5.

§ *Echinus auritus*, Seb., III, xv, 1, 2; Encyc., 151, 5, 6;—*Ech. inauritus*, Seb., III, xv, 3, 4; Encyc., 152, 1, 2.

|| *Echinus hexaporus*, Seb., III, xv, 7, 8; Encyc., 149, 1, 2;—*Ech. pentaporus*, Kl., Fr. Ed., XI, C; Encyc., 149, 3, 4;—*Ech. biforis*, Encyc., 149, 7, 8;—*Ech. emarginatus*, Encyc., 150, 1, 2.

¶ *Ech. tetraporus*, Seb., XV, 5, 6; Encyc. 148.

\*\* *Ech. decadactylus*, Encyc., 150, 5—6;—*Ech. octodactylus*, Ib., 3, 4.

†† *Ech. orbiculus*, Encyc., 151, 1—4.

‡‡ *Cassidulus caribæorum*, Lam., Encyc., 143, 8, 10;—*Ech. lapis cancri*, Kl., XLIX, 10, 11; Encyc., 143, 6, 7;—*Ech. patellaris*, Kl., LIII, 5, 6, 7.

Thus the ANANCHITES, Lam.—GALLEÆ, Kl.—are nearly similar in form to the Galerites, and have their complete bands; they chiefly differ in the position of their mouth. They are all fossil.

Such is the *Echinus ovatus*, L.; Cuv., et Brongn., Envir. de Par., 2d edit., f. V, 7, A, B, C, D. Very abundant in the chalk in the environs of Paris\*.

The bands in some are quaternary †.

We might form a separate subgenus of certain species in which the four lateral bands are arranged by pairs, and do not meet at the same point ‡.

Sometimes these irregular Echini with a central mouth have bands of pores which do not extend as far as the mouth, but form a sort of rosette on their back, as in

CLYPEASTER, Lam.—ECHINANTHUS, Kl.,

Where the anus is near the margin, and the body is depressed, with an oval base concave underneath. The contour is sometimes slightly angular §.

Sometimes the middle of the back is elevated ||.

There are some also in which the contour is not angular ¶.

And others in which it is almost orbicular—LAGANUM, Kl. \*\* In

FIBULARIA, Lam.—ECHINOCYAMUS, Leske,

We observe the rosette of Clypeaster, an almost globular body, with the mouth and anus appropriated beneath. The Fibulariæ are generally very small ††. In

SPATANGUS, Lam., Kl.,

On the contrary, we find the lateral mouth of the Ananchites, and incomplete bands of pores forming a rosette on the back. There are usually but four of them; the one that extends towards the mouth is obliterated.

Some—BRISSOIDES, Kl.—have an oval shell without furrows †††.

\* *Ech. scutatus*, Walch., Mon. Dil., II, E., i, 3, 4;—*Ech. pustulosus*, Kl., XVI, A, B; Encyc. 154, 16, 17;—*Ech. papillosus*, Kl., XVI, C, D; Encyc., 155, 2, 3.

† *Ech. quadriradiatus*, Kl., LIV, 1; Encyc., 155, 1.

‡ *Ech. bicordatus*, Kl.;—*Ech. ovalis*, Kl., XLI, 5; Encyc., 159, 13, 14;—*Ech. carinatus*, Kl., LI, 3, 4; Encyc. 158, 1, 2.

§ *Ech. rosaceus*, and its varieties, Encyc., 143, 1—6; 144, 7, 8; 147, 3, 4, taken from Klein, &c.

|| *Ech. altus*, Scill., Corp. Mar., IX, 1, 2.

¶ *Ech. oriformis*, Seb., III, x, 23; Encyc. 144, 1, 2;—*Ech. reticulatus*, Seb., XV, 23, 24, 35—38; Encyc., 141, 5, 6;—*Ech. pyriformis*, Kl., LI, 56; Encyc. 159, 11, 12?

\*\* *Echinus orbiculatus*, Bourg., Petrif., LIII, 352;—*Ech. laganum*, Seb., XV, 25, 26;—*Ech. subrotundus?* Scill., Corp. Mar., VIII, 1, 3; *Ech. orbicularis*, Gualt., Test., CX, B;—*Ech. corollatus*, Walch., Mon. Diluv., II, E, ii, 8.

†† *Ech. nucleus*, Kl., XLVIII, 2, a, e; Encyc., 153, 24—28;—*Ech. lathyrus*, Kl., XLVIII, 1, a, e; Encyc., 154, 6, 10;—*Ech. craniolaris*, Pall., Spicil. Zool., IX, 1, 2; Encyc., 154, 1—5, &c.

††† *Ech. teres*, Seb., III, xiv, 3, 4, 5, 6, X, 22, ab. 19; Encyc., 158, 7—11, 159, 1, 2, 3, &c.; *Ech. brissoides*, Kl., XXVII, B; Encyc., 259, 4;—*Ech. anygdala*, Kl., XXIV, h, i; Encyc., 159, 8, 10.

Others have a furrow, more or less strongly marked, in the direction of the obliterated band\*. When they are oval they constitute the *BRISSES*, Kl.; but sometimes this furrow is deep and the shell is widened, assuming the figure of a heart †.

Species of these two last forms are found in European seas. Their mouth is surrounded with ramous tentacula like that of the *Holothuriæ*.

### HOLOTHURIA, *Lin.*

The *Holothuriæ* have an oblong coriaceous body open at each end. At the anterior extremity is the mouth, surrounded with complicated tentacula susceptible of being entirely retracted. At the opposite end is the aperture of a cloaca, in which the rectum and organ of respiration terminate, the latter in the form of an extremely ramified hollow tree, which is filled with water, or emptied, at the will of the animal. The mouth is edentate, or merely furnished with a circle of bony pieces; it receives saliva from certain sac-like appendages. The intestine is very long, variously flexed, and attached to the sides of the body by a mesentery; there is a sort of partial circulation in an extremely complex and double system of vessels, entirely restricted to the intestinal canal, and in a portion of the meshes with which one of the two arborescent organs above mentioned is intertwined. There also appears to be a very attenuated nervous cord round the esophagus. The ovary is composed of a multitude of blind and partly ramous vessels, all terminating in the mouth by a small common oviduct; at the period of gestation they become enormously distended, and are filled with a red and grumous substance that appears to be the ova. Excessively extensible strings, inserted near the anus, appear to constitute the male organs of generation, and, consequently, these animals are hermaphrodites. When disturbed, it frequently happens that they contract so violently as to rupture and protrude their intestines ‡.

The *Holothuriæ* may be divided according to the arrangement of their feet.

In some, they are all situated in the middle of the under part of the body, that forms a softer disk on which the animal crawls turning up the two extremities, in which are the head and anus, that are narrower than the middle. The anus, in particular, terminates almost in a point. Their tentacula, when developed, are very large.

*H. phantopus*, L.; Müll., *Zool. Dan.*, CXXII., CXXIII., *Stockh. Mem.*, 1767. The envelope almost squamous; the feet of its ventral disk arranged in three series. From the seas of Europe.

In others, the inferior surface is altogether flat, soft, and furnished

\* *Ech. spatangus*, Seb., III, xiv, 3, 4, 5, 6, X, 22, ab. 19; *Encyc.*, 158, 7—11, 159, 1, 2, 3, &c.;—*Ech. radiatus*, Kl., XXV; *Encyc.*, 156, 9, 10;—*Spat. suborbicularis*, Cuv., and Brong., *Envir. de Par.*, 2d edition, v, 5;—*Spat. ornatus*, Ib., 6.

† *Ech. purpureus*, Müll., *Zool. Dan.*, VI;—*Ech. flavescens*, Id., XCI, to which we should probably refer several of the shells united under *Ech. lacunosus*, such as Seb., III, x, 21; *Encyc.*, 156, 7, 8.

‡ For the anatomy of the *Holothuriæ* see the excellent work of M. Tiedemann already quoted.



with a multitude of feet; the superior is convex, even supported by osseous scales, and perforated anteriorly by a stellate orifice, or the mouth, from which proceed the tentacula, and posteriorly by a round hole, which is the anus.

*H. squamata*, Müll., Zool. Dan., X, 1, 2, 3. A small species inhabiting European seas; those of hot climates produce larger ones\*.

Here, the body is cartilaginous, horizontally flattened, and trenchant at the edges; the mouth and feet are situated on the inferior surface, and the anus is placed at the posterior extremity.

*H. regalis*, Cuv.; *Pudendum regale*, Fab., Colum., Aquat., XXVI., 1. More than a foot in length, and from three to four inches wide; crenulated all round. From the Mediterranean.

There, the body is cylindrical, and susceptible of being inflated in every direction by the absorption of water; the whole of the inferior surface is furnished with feet, and the remainder variously roughened.

*H. tremula*, Gm.; Bohatsch., Anim. Mar., VI., VII. Blackish, and when completely extended, more than a foot long; its back is bristled with soft and conical points, and its mouth provided with twenty ramous tentacula. This species is very common in European seas, the Mediterranean particularly †.

There are some whose feet are arranged in five series that extend from the mouth to the anus like the ribs of a melon, whence their vulgar name of *Sea Cucumbers*. Such is

*H. frondosa*, L.; Gunner., Stockh. Mem., 1767, pl. iv., fig. 1, 2; *Pentacta*, Abildg., Zool. Dan., CVIII., 1, 2, and CXXIV. More than a foot in length, with a brown body. The European seas ‡.

Finally, there are some in which the body is equally furnished with feet all round §.

\* Those which Péron calls the CUVIERIES.

† Add *Holothuria elegans*, Müll., Zool. Dan., I and II. which is the *Hol. tremula* of Gunner, Stockh. Mem., 1767, pl. iv, f. 3, of the 12th edition. These authors, however, do not describe it as being furnished with feet underneath;—*Fleurilarde*, Diquemare, Journ. de Phys., 1778, Octob., pl. 1, f. 1.

‡ The other figures quoted under *Hol. pentactes*, viz. Zool., Dan., XXXI, 8; the *Echimus coriaceus*, Planc., Conch., Min. Not. App. VI, D, E; *Cucumis marinus*, Rondel., Insect., et Zooph., 131, are probably different species. The *Fleurilarde*, Diquem., even belongs to another section of the genus.

Add *Hol. inhærens*, Zool., Dan., XXXI, 1—7;—*Hol. pellucida*, Ib., CXXXV, 1;—*Hol. læris*, Fab., Groenl., No. 345;—*Hol. minuta*, Ib., No. 346. Perhaps the *Hol. dotiolum*, Pall., Misc. Zool., pl. xi, f. 10.

§ *Hol. papillosa*, Zool. Dan., CVIII, 5;—*Hol. fusus*, Ib., X, 5, 6;—*Hol. impatiens*, Forsk., Ic., XXXIX, B? Eg. Echin., IX, 6.

N.B. It is impossible to class the *Hol. vittata*, Forsk., XXXVIII, E, and the *Hol. reciprocans*, Ib., A, for want of sufficient descriptions. The last is improperly quoted under *inhærens* by Gmelin;—the *Hol. maculata*, Chamiss., Act. Nat. Cur., X, 1, xxv, which closely approaches it, should be particularly examined on account of its excessive length;—the *Hol. thalia*, *caudata*, *denulata*, and *zonaria* are Biphoræ;—the *Hol. physalus* is the genus *PHYSALUS*;—the *Hol. spirans*, the genus *VELELLA*;—the *Hol. nuda*, the genus *PORPITA*;—the *Hol. priapus*, the genus *PRIAPULA*. I suspect the *Hol. forcipata*, Fab., Groen., No. 349, to be a mutilated *Thalassema*.



## ORDER II.

## APODA.

Our second order of the Echinodermata, or the Apoda, comprises but a small number of animals closely related to the Holothuriæ, but which want the vesicular feet of the preceding order. Their body is invested with a coriaceous unarmed skin. Several points of their internal structure are not well understood. In

MOLPADIA, *Cuv.*,

As in Holothuria, we find a coriaceous body forming a thick cylinder open at both ends, and a tolerably similar internal organization; but independently of the want of feet, the mouth is destitute of tentacula, and is provided with an apparatus of bony parts, but less complicated than that of the Echini.

*M. holothurioides*, *Cuv.* The only species that I know in the Atlantic Ocean. The anal extremity terminates in a point.

MINYAS, *Cuv.*,

Where the body is also destitute of feet and open at both extremities; but its form is that of a spheroid depressed at the poles, and furrowed like a melon. I can find no armature about the mouth.

*M. cyanea*, *Cuv.*, *Régn., Anim., IV*, pl. xv, f. 8\*. A beautiful species of a deep-blue colour that inhabits the Atlantic ocean\*.

PRIAPULUS, *Lam.*,

Where the body is cylindrical and transversely marked with deep annular rugæ, terminated anteriorly by an elliptical mass slightly wrinkled longitudinally, perforated by the mouth, and posteriorly by the annus, from which issues a thick bundle of filaments which may be organs of generation. The interior of the mouth is provided with a great number of extremely sharp and horny teeth arranged in quincunx, and directed backwards; the intestine proceeds in a straight line from the mouth to the anus. The muscular system resembles that of the Holothuriæ.

*P. vulgaris; Holothuria priapus*, *Müll., Zool. Dan., XCVI*, 1. It is from two to three inches in length, inhabits northern seas, and is the only species known.

LITHODERMIS, *Cuv.*,

Where the body is oval and compressed posteriorly; its surface has the appearance of being covered with a layer of stony granules, which form an extremely indurated crust. The mouth is surrounded with

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\* Taken to France by M. Péron.

tentacula, and the intestines seem to be analogous to those of the Holothuriæ. They have no anus that I can perceive.

*L. cuneus*, Cuv. Blackish, and two inches in length. From the seas of India, and the only species known. In

#### SIPUNCULUS, Gm.,

The body is cylindrical and elongated, the skin thick and wrinkled in both directions. The mouth is provided with a sort of proboscis, susceptible of retraction and protrusion by the action of large internal muscles, and anus is more or less approximated to the base of that organ. The intestine proceeds from the mouth to near the opposite extremity, and then returns, twining spirally round itself. The only matters found in it are sand and fragments of shells. Numerous vessels appear to unite it with the external envelope, besides which, a thread extends along one of its sides, which may possibly be nervous. Two long bursæ, situated anteriorly, open exteriorly a little below the anus, and near this last orifice, internally, we sometimes find a bundle of ramous vessels, which may be organs of respiration.

These animals are found in the sands of the sea, like the *Arenicolæ* and *Thalassemæ*, and like them are used as bait by the fishermen.

*S. edulis*, Cuv.; *Lumbricus edulis*, Gm.; Pall., Spicil., Zool., X, 1, 7. This species is eaten by the Chinese inhabitants of Java, who procure it from the sands by means of slender bamboo prepared for the purpose\*.

Other and rather small species—*Sp. lævis*, *Sip. verrucosus* Cuv.—perforate submarine rocks and live in their cavities.

#### BONELLIA, Rolando.

Here the body is oval and furnished with a proboscis formed of a double lamina susceptible of great elongation and forked at the extremity. The anus is at the opposite extremity of the body. The intestine is very long and frequently flexed, and near the anus we observe two ramified organs, which may serve for respiration. The ova are contained in an oblong sac opening near the base of the proboscis. The *Bonellæ* live at a considerable depth in sand, extending their proboscis to the water, and even to the air above its surface, when the tide is low.

*B. viridis*, Rol., Acad. of Tur., XXVI, pl. xiv. It inhabits the Mediterranean†.

#### THALASSEMA, Cuv.,

Where the body is oval or oblong and the proboscis in the form of a doubled lamina or bowl of a spoon, but not forked. The intestinal

\* I cannot perceive where this species differs from the *Vermis macrorhynchoeros*, Rondel, of the salt-ponds of Languedoc, which is the *Sipunculus nudus* of Linnæus.

The *Sipunculus saccatus* appears to be a specimen divested of its epidermis.

In one species the epidermis is pilose, in another the skin is entirely coriaceous; neither of them is mentioned by authors.

The seas of India produce one that is nearly two feet in length.

† In Rolando's description, the mouth is converted into the anus, and vice versa.

canal resembles that of the Bonellia. They have but one addominal thread.

The *Thalassemae* are divided into

*THALASSEMA, proper,*

Where these two hooks are placed far forwards, and the posterior extremity is destitute of setæ\*; and

*ECHIURUS,*

Where the posterior extremity is furnished with transverse ranges of setæ.

*E. vulgaris*; *Lumbricus echiurus*, Gm.; Pall., Miscel., Zool., XI, 1—6. Found along the coast of France in sandy bottoms. It is used as bait by fishermen.

*STERNASPIS, Otto,*

Where, in addition to the setæ of the Echiuri, we observe anteriorly a slightly corneous disk surrounded with cilia †.

## CLASS II.

### ENTOZOA, *Rud.*

The Entozoa or Intestinal Worms are remarkable, because the greater number inhabit the interior of other animals, and there only can propagate. There is scarcely a single animal that is not the domicil of several kinds, and those which are observed in one species are rarely found in many others. They not only inhabit the alimentary canal and the ducts that empty into it, such as the hepatic vessels, but even the cellular tissue, and the parenchyma of the most completely invested viscera, such as the liver and brain.

The difficulty of conceiving how they get there, added to the fact of their never having been seen out of living bodies, has induced some naturalists to believe that they are spontaneously engendered. We now know that most of them not only evidently produce ova or living young ones, but that in many, the sexes are separate, and

\* *Thalassema Neptuni*, Gert., or *Lumbricus thalassema*, Pall. Spicil. Zool., fasc. X, tab. I, fig. 6;—*Thalassema mutatorium*, Montag., Lin. Trans., XI, v, 26, may not differ from the preceding one.

† *Thalassema scutatum*, Ranzan., Dec. I, pl. 1, f. 10—12, or *Sternaspis thalassemoides*, Otto, Monog.

A late examination of the *Thalassemae* has proved to me that this is their proper place.

coition ensues as among other animals. We are then compelled to believe, that they propagate their race by germs sufficiently minute to be transmitted through the narrowest passages, and that frequently those germs are contained in animals at birth.

In the Intestinal worms we find neither tracheæ, nor any other organ of respiration, and they must receive the influence of oxygen through the medium of the animal they inhabit. They present no trace of a true circulation, and we merely perceive vestiges of nerves so extremely obscure, that many naturalists have doubted their existence\*.

When those characters are found united in an animal with a form similar to that of this class, we place it here, although it may not inhabit the interior of another species.

The injury caused by worms to animals, in which they become excessively multiplied, is well known. The most efficacious agent for destroying those of the alimentary canal seems to be animal oil mixed with spirits of turpentine †.

We will divide the Entozoa into two orders, which are perhaps sufficiently different in organization to form two classes, if we had the observations requisite to determine their limits. These orders are the

#### ENTOZOA NEMATOIDEA, *Rud.*,

Which have an intestinal canal floating in a distinct abdominal cavity, a mouth and anus; and the

#### ENTOZOA PARENCHYMATA ‡,

Where the parenchyma of the body contains obscurely terminated viscera, most commonly resembling vascular ramifications, and sometimes not visible.

### ORDER I.

#### NEMATOIDEA, *Rud.*§

This order comprises those whose external skin, more or less furnished with muscular fibres, and usually striated transversely, contains an abdominal cavity in which is a distinct intestinal canal, extending

\* For the anatomy of these Worms, besides the Entozoa of Rudolphi, see the Mem. of M. Otto, Soc. Nat. Berl., 1816, and the work of M. J. Cloquet.

† See Chabert, *Traité des Maladies Vermineuses*, and Rudolphi, I, p. 493.

‡ They comprise the four last orders of Rudolphi.

§ This order, with the exception of two the last genera, constitutes the ENTOMOZAIRES APODES OXYCEPHALES of M. de Blainville.

from the mouth to the anus, and where we generally observe distinct organs in each of the sexes. The intestine is connected with the neighbouring parts, and the general envelope of the body by numerous threads, considered by some writers as vessels for the conveyance of the nutritious fluid, and by others as tracheæ, but without any proof of the fact. It is impossible to detect any true circulation in these animals, but in several there appear to be one or two nervous cords arising from a ring which surrounds the mouth, and extending the whole length of the body along the internal surface of the envelope.

The intestine is generally straight, and tolerably wide; the esophagus is frequently smaller, and in some species we remark a larger and more vigorous stomach. The internal organs of generation consist of extremely long vessels, containing the semen or the ova, which open at different points, according to the genus.

#### FILARIA, *Lin.*,

Where the body is elongated, slender, filiform, and perforated at the anterior extremity by a round oral aperture. The Filariæ in their external appearance are very similar to the Gordii. They are chiefly found in those cavities of animals which do not open externally, such as the cellular membrane, and even in the thickness of the membranes and the parenchyma of the viscera; there we sometimes find them in bundles and countless numbers, enveloped in species of capsules. They are found in Insects and their larvæ, and even in the visceral cavity of several Mollusca. The most celebrated species of this genus,

*F. medinensis*, Gm.; Encyc. XXXIX, 3 (The Guinea Worm), is very common in hot climates, insinuates itself under the skin of man, generally that of the leg, where, if credence be given to the reports of certain authors, it acquires a length of ten feet and more, may remain there several years without producing violent pain, or cause intense agony and excite convulsions, according to the nature of the part it attacks. When it shows itself externally, it is seized and extracted very slowly, for fear of breaking it. It is about as thick as the barrel of a Pigeon's quill. Its pointed and hooked tail constitutes its distinguishing character\*.

#### TRICHOCEPHALUS,

Where the body is round, thickest posteriorly, and as slender as a thread anteriorly. This slender part is terminated by a round mouth. The most common species is the

*T. dispar*, Rud.; Gœtz., VI, 1, 5; Encyc., XXXIII, 1, 4.  
From one to two inches in length, of which the thickest portion

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\* For the other Filariæ, see Rud., Hist., II, 57, Syn. p. 1.

N.B. Rudolphi, in his Synopsis, has suppressed the genus HÄMULARIA, which was characterized by two little oval filaments. On examination, they were found to be the male organs of generation, placed at the posterior extremity.

forms but the third. This part, in the male, is spirally convoluted, and a little penis projects near the tail. It is straighter in the female, and simply perforated at the extremity.

It is one of the most common Worms in the great intestines of Man, where, in certain diseases, it becomes prodigiously multiplied\*.

Naturalists have distinguished from the preceding the

TRICHOSTOMA, *Rud.*—CAPILLARIA, *Zeder*,

Where the anterior portion of the body is but gradually attenuated †.

OXYURIS, *Rud.*,

Where the posterior part of the body is attenuated in the manner of a thread.

*O. curvula*, *Rud.*; *Gœtz.*, VI, 8; *Encyc.*, XXXIII, 5. From one to three inches in length. It inhabits the cæcum of the Horse ‡.

CUCULLANUS,

Where the body is round, and most slender posteriorly. The head is obtuse and invested with a sort of hood that is frequently striated; the mouth is round.

They have hitherto been found in Fish only. The most common species is that which inhabits the Perch—*C. lacustris*, *Gm.*; *Gœtz.*, IX, A, 3; *Encyc.* XXXI, 6—and also infests the Pike, &c. It is vivaporous, about an inch long, as thick as a thread, and of a red colour, owing to the blood with which its intestine is usually filled §.

OPHIOSTOMA,

The same kind of body as the preceding, but distinguished by a transversely cleft mouth, and consequently furnished with two lips.

*O. cystidicola*, *Rud.*; *Cystidicola*, *Fischer*, *Monog.* It is found in the notatory bladder of certain Fishes ||.

ASCARIS, *Lin.* ¶

The *Ascarides* have a round body, attenuated at each extremity, and a mouth furnished with three fleshy papillæ, between which an extremely short tube occasionally projects. This genus is very numerous in species, which are found in all kinds of animals. Those which have been dissected presented a straight intestinal canal, and the females, by far the greater number, exhibited an ovary with two branches, several times the length of the body, opening externally by a single oviduct, near the anterior fourth of the total length of the animal. The males have but a single seminal vessel, also much

\* For the Tricocephali of animals, see *Rud.*, *Ent.*, II, 86, and *Syn.*, p. 16.

† See *Rud.*, *Syn.*, 13.

‡ Add. *Ox. alata* and *Ox. ambigua*, *Rud.*, *Syn.*, 19.

§ For the other species, see *Rud.*, *Hist.*, II, 102, and *Syn.*, 19.

|| *Rud.*, *Hist.*, II, 117. and *Synop.*, 60.

¶ 'Ασκαρίς, the name of the small species that is found in Man, is derived from ασκαρίζω, to leap, to move.



longer than the body, which communicates with a (sometimes double) penis that protrudes through the anus. The latter opens under the extremity of the tail.

Two white threads, one of which extends along the back, and the other along the belly, are considered by Messrs Otto and Cloquet as the nervous system of these animals; two other and thicker threads, one on the right and the other on the left, are considered by some as muscular, and by others as vascular, or even as tracheæ.

In some, the head is destitute of lateral membranes. The most common species.

*A. lumbricoïdes*, L., is found without any essential difference in Man, the Horse, Ass, Zebra, Hemiona, Ox and Hog. It has been seen more than fifteen inches in length. Its natural colour is white, and it sometimes multiplies excessively, occasioning disease and death, particularly in children, or when it ascends into the stomach.

Other species are furnished with a little membrane on each side of the head. Such is

*A. vermicularis*, L.; Gœtz., V, 1—6; Encyc. Méthod., Vers, XXX, pl. x, 1. Very common in children, and in adults afflicted with certain diseases, in which it causes an insupportable itching at the anus. It is not more than five lines in length, and is thickest anteriorly\*.

#### STRONGYLUS, Müll.†,

Where the body is round, and the anus of the male is enveloped by a sort of bursa, variously shaped, from which issues a little thread that appears to be an organ of generation. These two last characters are wanting in the female, which has sometimes caused her to be taken for an *Ascaris*.

In some of these *Strongyli* the mouth is ciliate or dentated. Such is

*S. equinus*, Gm.; *Str. armatus*, Rud.; Müll., Zool. Dan., II, xlii; Encyc. Méthod., XXXVI, 7—15. Two inches in length; head hard and spherical, and the mouth surrounded by small, soft spines; bursa of the male trifoliate. Of all the Worms that infest the Horse, this is the most common; it even penetrates into the arteries, where it occasions aneurisms. It is also found in the Ass and Mule.

The mouth of others is merely surrounded by tubercles or papillæ. Such particularly is the

*S. gigas*, Rud.; *Ascaris viceralis* and *Asc. renalis*, Gm.; Redi., An. Viv. in An. Viv., pl. VIII and IX; Le DICTOPHYME, Collet-Meygret, Journ. de Phys., LV, p. 458. The most voluminous of all known intestinal Worms; it is upwards of two or three feet in length, and as thick as the little finger. The most singular circumstance attending this *Strongylus* is that it is most usually developed in one of the kidneys of various animals, such as the

\* For the remaining species of *Ascarides* that infest animals, see Rud., Hist., II, 128, et seq. and Synop., p. 37, et seq.

† Στρογγυλος, round.



Wolf, Dog, Mink, and even Man, where it lies doubled up, distending that organ, destroying its parenchyma, and probably occasioning the most excruciating agony to the animal in which it resides. It has been occasionally known to pass off with the urine, while yet small. It sometimes inhabits other viscera. Its usual colour is a beautiful red; the mouth is surrounded with six papillæ; the intestine is straight and transversely rugose, the ovary simple, three or four times the length of the body, communicating exteriorly by a hole a little distance posterior to the mouth, and, as it appears, by the other extremity, with the anus. An extremely attenuated white thread that extends along the abdomen is considered by M. Otto as the nervous system\*.

Naturalists have lately separated from the *Ascarides* and *Strongyli* the

#### SPIROPTERA,

Where the body terminates spirally, and is surrounded by two wings, from between which issues the penis †.

One species is said to be occasionally found in the human bladder. Another, the

*Sp. strumosa*, Nitsch, inhabits the Mole. It penetrates into a ring which it forms in the villous coat of the stomach, and attaches itself there by a small tubercle ‡.

#### PHYSALOPTERA,

Where the posterior extremity is provided with a bladder between two little wings, and a tubercle from which the penis originates §.

#### SCLEROSTOMA, *Blainv.*,

Where the mouth is furnished with six small dentated scales.

They are found in the Horse and in the Hog.

#### LIORHYNCHUS, *Rud.*,

Where the mouth is in the form of a little proboscis ||.

#### PENTASTOMA, *Rud.*,

Where the body is depressed and trenchant on the sides, and the transversal rugæ are marked by numerous crenulations. The skin is thin and slight; the head broad and flattened; and the mouth beneath; on each side of the latter are two small longitudinal clefts, from which issue little hooks. The intestine is straight and the genital vessels are long and tortuous. Both the former and latter open externally at the posterior extremity. Near the mouth are two cæca, as in *Echinorhynchus*. A white thread encircles the mouth and gives off two descending trunks, in which I think I have recognized the appearance of a nervous system.

\* Otto, Magas., of the Soc. Nat. Berl., 1816, p. 225, pl. v.

† Rud., Syn., p. 22.

‡ Nitsch, Monog., Gm., Hal. Sax., 1829.

§ Rud., Syn., 29.

|| Rud., Hist. II, 247, et seq.

This genus connects the Nematodea with the Parenchymata.

One species is known—*Tænia lanceolé*, Chabert; *Polystoma tænioides*, Rud., Hist., II, xii, 8, 12; *Pentastoma tænioides*, Id. Syn., 123—which attains a length of more than six inches. It is found in the frontal sinus of the Horse and Dog\*.

This is probably the place for the

#### PRIONODERMA, Rud.,

Where the body and intestines are very similar, but where the mouth is at the anterior extremity, simple, and armed with two little hooks.

But one species is known, the *Cucullanus ascaroides*, Gœtz., pl. viii, f. ii, iii; Rud., Hist., II, xii; it inhabits the Siluri †.

The following genus, which, when we are furnished with more complete details of its economy, will have to be divided into several genera, we think should be placed after the Intestinal Worms of this order, but as a different family.

#### LERNÆA, Lin.,

Where the internal and external organization of the body is nearly the same as in the Nematodea; but it is prolonged anteriorly by a corneous neck, at the extremity of which is a mouth variously armed and surrounded, or followed by productions of different forms. This mouth and its appendages are insinuated into the skin of the gills of fishes, and fix the animal there. The Lernææ are also distinguished by two cords, sometimes moderate, and at others very long, or even much doubled, that are pendent from the sides of the tail, and which may possibly be ovaries ‡.

#### LERNÆA proper,

Where the body is oblong, furnished with a long and slender neck, and a sort of horns round the head.

*L. branchialis*, L.; Encyc. Vers, LXXVIII, 2. The most known species; it attacks the Codfish and other Gadi, and is from one to two inches in length. Its mouth is surrounded by three ramous horns, which, as well as the neck, are of a deep brown. Its more inflated body is bent into an S, and the two cords are contorted in a thousand different ways. Its horns become rooted as it were, in the gills of fishes. Another, the

\* The mouth of the LINGUATULÆ, Froelich, is exactly similar to that of this Pentastoma. I consequently presume that they belong to the same genus, although I could not examine their intestines on account of their minuteness. Such are the *Tænia caprina*, Gm., or the *Polyst. denticulatum*, Rud., Zool. Dan., III, ex, 4, 5;—*Linguatula serrata*, Gr.; *Pol. serratum*, Rud.; Froel., Nat. Forsch., XXIV, iv, 14, 15; the same as the TETRAGULA, Bosc., Bullet des Sc., May 1811, pl. ii. f. 1. These Worms now constitute the genus PENTASTOMA of Rudolphi, Syn., 123. M. de Blainville prefers the name of LINGUATULÆ. The *Porocephalus crotali*, Humb. Obs. Zool., pl. 26, probably belongs to the same genus.

† These two genera form the order ENTOMOZOAIRES APODES ONCHOCEPHALES of M. de Blainville.

‡ M. Surrirey found ova in these cords of a Lernæa, which (ova) appeared to him to contain an animal, analogous to one of the Crustacea, and very different from the

*L. ocularis*, Cuv., fastens itself to the eyes of Herrings and other fishes; its horns are simple and short, two larger and two smaller; the body is slender, and its cords long and not doubled\*.

*L. multicornis*, Cuv., is another with very numerous, small, and unequal horns, found on the gills of a Serranus in the East Indies.

In another group,

PENNELLA, Oken,

The head is inflated, the nape furnished with two small horns, and the neck corneous; the body is long, transversely rugose, and provided posteriorly with little filaments arranged like the laminae of a feather. The two very long filaments arise from the commencement of this plumous portion.

*P. filosa*; *Pennatula filosa*, Gmel.; Boccone, Mus., 286; Ellis, Phil. Trans., LXIII, xx, 15. From seven to eight inches in length; it penetrates into the flesh of the Xiphias, Thynnus, and Orthogoriscus, tormenting them horribly. It is found in the Mediterranean †.

In a third group,

SPHYRION, Cuv.,

The head is widened on each side like a hammer, and the mouth is furnished with hooks; the neck is slender, and followed by a depressed and cordiform body, which, besides the two long cords, is provided with a thick bundle of hairs ‡.

In a fourth,

ANCHORELLA, Cuv.,

The animal is only fixed to the gills by a single production, which originates underneath the body, and is directed posteriorly §.

In a fifth,

BRACHELLELLA, Cuv.,

We observe two prominences somewhat similar to two arms, which unite in one corneous body, by which the animal fastens itself to the gills ||.

In a sixth,

Lernæa itself. This fact, added to the observations of Messrs. Audouin and Milne Edwards, relative to the *Nicot hoe astaci*, has inclined those naturalists to the opinion that most of these Lernææ may be Crustacea that have become monstrous subsequent to being fixed, and that the males remain free; which, according to them, explains the circumstance of our being able to find females only.—Ann. des. Sc. Nat., IX, 345, pl. xlix. Before this idea can be received as definitive, we must be able to find these males.

\* Add *L. cyprinacea*, L.; Faun. Suec. 1st edit., fig. 1282; Encyc., Vers. LXXVIII, 6;—*L. surrirensis*, Blainv.;—*L. lote*, Herm., Nat. Forsch., XIX, 1, 6?—*L. cyclopterina*.

This group is called LERNEOCERES by M. de Blainville.

† Add *Lernæa cirrhosa*, la Martin., Journ. de Phys., Sept. 1787, ii, 6;—*Pennella diodontis*, Chamiss., and Eisenhardt, Act. Nat. Cur., pars II, pl. xxiv. f. 3.

‡ The *Chondracanthé lisse*, Quoy and Gaym., Voy de Freycia., Zool. pl. LXXXVI, f. 10.

§ *Lernæa adunca*, Stroem., Sondmoer, pl. i., f. 7, 8; common on several Gadi.

|| *Brachiella thynni*, Cuv. Règn. Anim., pl. xv, f. 5;—*Lernæa salmonæa*, Gislér;

CLAVELLA, *Oken*,

We find none of those appendages, the animal merely fastening itself by the mouth\*.

In these three last groupes the hooks of the mouth are well marked; their strings are but slightly elongated, and sometimes the posterior portion of the body is provided with other appendages.

In consequence of a recent examination, I place here the

CHONDRACANTHUS, *Laroch.*,

Where the mouth is also furnished with hooks, and the sides of the body with appendages, so extremely various as to form and number, that in process of time we shall have to subdivide them.

Thus, in some, we observe on each side two sorts of arms more or less elongated †.

In others there are several pairs partly forked ‡, or even more ramous §.

Some again have a slender neck, and a wide body slashed on the edges ||.

At the end of this order I also place an animal which approaches it in several respects, but which may one day serve as the type of a new one. It forms a genus which I have named

NEMERTES, *Cuv.*

It is an extremely soft and elongated worm, smooth, slender, flattened and terminated at one extremity by a blunt point, pierced by a hole; the other end, by which it fastens to its prey, is widened and very open. Its intestine traverses the whole length of the body. A second canal, probably connected with the process of generation, serpentine along its parietes and terminates in a tubercle on the margin of the wide opening. Messrs d'Orbigny and de Blainville, who saw the animal while alive, assure us that the wide aperture is its mouth.

*N. Borlassi*, *Cuv.*; *Borl.*, *Cornw.*, XXVI, 12, is more than

*Act. Suec.*, 1751, and *Encyc. Méthod.*, *Vers*, pl. LXXVIII, f. 13, 18;—*L. Pernet-tiana*, *Blainv.*; *Pernetti*, *Voy. aux Malouines*, I, pl. i, f. 5, 6—two badly figured species. The *L. huchonis*, *Schrank.*, *Trav. in Bav.* pl. I, f. A, D, is still worse. There are several others.

I think that this and the preceding group will re-enter the *LERNEOMYZÆ*, *Blainv.*; which in that case must be differently defined.

\* *Lernæa uncinata*, *Müll.*, *Zool. Dan.*, I, xxxiii, 2;—*L. clavata*, *Id.*, *Ib.*, i. These *CLAVELLÆ* of *Oken* form the *LERNEÆA* proper of *M. de Blainville*.

† *Lernæa radiata*, *Müll.*, *Zool. Dan.*, XXXIII, 4;—*L. gobina*, *Id.*, *Ib.*, 3. The first is the type of the genus *ANONES*, *Oken*.

‡ *Lernæa cornuta*, *Id.*, *Ib.*, 6, and several new species.

§ *Chondracanthus zeii*, *Laroché*, *Bullet. des Sc.*, May 1811, pl. 2, f. 2.

|| *Lernæa triglæ*, *Blainv.*, *Dict. des Sc. Nat.*, xxvi, p. 325; *Cuv. Règn. Anim.*, pl. xv.

*N. B.* *M. de Blainville* arranges my *Chondracanthi* in his genera *LERNEENTOME*, *LERNACANTHE* and *LERNANTHROPE*.

*N. B.* The *Lernæa pectoralis*, *Müll.*, *Zool. Dan.* XXXIII, f. 1, is a *Calygus*, and the *L. asellina*, *It. West. Goth.*, III, 4, also seems to be one of the same, but disfigured.

four feet in length. It remains buried in the sand, and, it is said, attacks the Anomiæ, which it sucks in their shell\*.

In the vicinity of Nemertes should probably be placed the

*TUBULARIA, Renieri,*

Equally large and extremely elongated, but furnished with a small mouth opening under the anterior extremity.

*OPHIOCEPHALUS, Quoy, Gaym.,*

With the same form, but the extremity of the mouth cleft.

*CEREBRATULA, Renieri,*

Which seems only to differ in the greater shortness of the body †.

## ORDER II.

### PARENCHYMATA.

The second order of the Entozoa comprises those species in which the body is filled with a cellular substance, or even with a continuous parenchyma, the only alimentary organ it contains being ramified canals, which distribute nourishment to its different points, and which, in most of them, originate from suckers visible externally. The ovaries are also enveloped in this parenchyma or that cellulosity. There is no abdominal cavity, nor intestine properly so called; the anus is wanting, and if we except some equivocal vestiges in the first families, there is nothing to be found which bears a resemblance to nerves.

We may divide this order into four families

#### FAMILY I.

##### ACANTHOCEPHALA.

The Parenchymata of this family attach themselves to the intestines by a prominence armed with recurved spines, which also appears to act as a proboscis. They form the single genus

*ECHINORHYNCHUS, Gm.,*

Where the body is round, sometimes elongated, and sometimes in the form of a sac, provided anteriorly with a prominence in the form of

\* For this singular worm, which is mentioned by Borlasse only, I am indebted to M. Dumeril, who found it near Brest. It is the genus *BORLASIA* of Oken; M. Sowerby had previously called it *LINEUS*.

† We have neither seen the *Tubularia* nor *Cerebratula*. The names of *Tubularia* and *Ophiocephalus*, being already applied to other genera, cannot subsist.

a proboscis, armed with little hooks bent posteriorly, and susceptible of being retracted or protruded by the action of particular muscles. At its extremity we sometimes observe a papilla or pore which may be an organ of absorption, but it is certain that if the animal be plunged into water it becomes universally distended, and absorbs that liquid through the whole surface, on which it is thought we can discover a network of absorbent vessels. No other parts that can be compared to intestines are visible internally, than two slightly elongated cæca attached to the base of the tubiform prominence; a vessel extends throughout its length on each side. A thread that runs along the inferior face of the animal is considered by M. de Blainville as its nervous system; but neither Rudolphi nor Cloquet coincide with him. Certain species have a distinct oviduct; in others the ova are disseminated throughout the cellulosity or parenchyma of the body. The males are provided with a little bladder at the end of the tail, and very distinct internal vesiculæ seminales. We may believe that they fecundate the ova after they are extruded.

These worms cling to the intestines by means of their proboscis, and frequently penetrate through them, so that individuals are sometimes found in the thickness of their tunics, and even in the abdomen, adhering to their external parietes.

*E. gigās*, Gm.; Gœtz., X, 1—6; Encyc. XXXVII, 2—7. The largest species known; it inhabits the intestines of the Hog and Wild Boar, where the females attain a length of fifteen inches\*.

Certain species, in addition to the prickles on their proboscis, are armed with them in some other part of the body.

#### HÆRUCA, Gm.,

Only differing from *Echinorhynchus* in the prominence, which is reduced to a single crown of spines, terminated by double hooks.

*H. muris*, Gm.; *Echinorhynchus hæruca*, Rud.; Gœtz., IX, B., 12; Encyc., Vers, XXXVII, 1 †. It inhabits the liver of Rats.

### FAMILY II.

#### TREMADOTEÆ, Rud.

Our second family comprises those which are furnished underneath the body, or at its extremity, with organs resembling cupping-glasses, by which they adhere to the viscera.

They may all be united in one genus, or the

#### FASCIOLA, Lin.,

Which may be subdivided in the following manner, according to the number and position of their organs of adhesion.

\* For the other species see Rud., Hist. II, 251, and Syn., p. 63.

† Id., Ib., 292, et seq.



FESTUCARIA, *Schr.*—MONOSTOMA, *Zed.*,

Where there is but one of those organs, sometimes at the anterior extremity and sometimes underneath the same end. Found in various Birds and Fishes\*.

STRIGEA, *Abild.*—AMPHISTOMA, *Rud.*,

Where there is a cup at each extremity. Found in various Quadrupeds, Birds, &c. †

To this subgenus we must probably approximate the

CARYOPHYLLÆUS, *Bl.*,

Where the head is dilated, fringed and furnished underneath with a bilabiate sucker, not easily perceived. A second and similar sucker has been occasionally seen underneath the tail.

One species is known, which inhabits various fresh-water Fishes, and particularly the Bream ‡.

DISTOMA, *Retz.*, *Zed.*,

Where there is a sucker at the anterior extremity of the mouth, and a cup, a little posterior to it, on the venter.

The species are very numerous, and some are found even in the plaited membrane of the eyes of certain Birds. Others, however, appear to inhabit fresh and salt water. The most celebrated is

*D. hepatica; Fasciola hepatica*, L.; Schœff., *Monog.*, copied *Encyc.*, *Vers.*, pl. lxxx, 1—11. It is very common in the hepatic vessels of Sheep, but is also found in those of various other Ruminantia, and of the Hog, Horse, and even of Man. Its form is that of a small oval leaf, pointed posteriorly, with a narrowed portion anteriorly, at the end of which is the first sucker, which communicates with a sort of esophagus, from which arise canals that ramify throughout the body, conveying the bile on which this animal feeds. Behind the sucker is a little retractile tentaculum, which is the penis, and posterior to that, the second sucker; extremely flexuous vesiculæ seminales fill up the centres of the leaf. The ovary, which is found in every individual, is set in the intervals of the intestines, and the ova issue through a flexuous canal that opens exteriorly by a small hole by the side of the penis. These animals enjoy a mutual coitus.

The species that infest Sheep become greatly multiplied when they graze in low and wet grounds, rendering them drowsical, and finally killing them §.

\* *Rud.*, *Hist.*, II, p. 325, and *Syn.* 82; the *HYPOSTOMA*, *Blainv.*, are a division of the same, with a depressed body, and cups placed under the anterior extremity. *Van Hasselt* and *Kuhl* have discovered two new species in the *Chelonia midas*, *Bullet.* of *Féruss.*, 1824, vol. II, p. 311.

† *Rud.*, *Hist.*, p. 340, and *Syn.*, p. 87.

‡ *Id.*, *Hist.*, pars II, 9, and *Syn.*, p. 127.

§ For the other species see *Rud.*, *Hist.*, II, pars I, p. 357, and *Syn.*, 92. For their organization see *Observationes Anat. de Distomate hepatico et lanceolato* of *Ed. Mehlis*, *Gotting.*, 1825, in folio.



M. Rudolphi, under the name of ECHINOSTOMA, makes a division of those species which have a slight tubercle or swelling, anteriorly armed with hooks\*.

#### HOLOSTOMA, Nitz.,

Where one half of the body is concave, and so arranged as to act altogether like a cup. Their orifices appear to be similar to those of Distoma.

They inhabit certain Birds. One species is found in the Fox. In

#### POLYSTOMA, Zed.,

Or rather Hexastoma; the body is depressed, smooth, and furnished with six cups, arranged in a transverse line under the posterior margin. The mouth appears to be at the opposite extremity.

They have been found in the urinary bladder of Frogs, in the ovary of Woman, on the branchiæ of some Fishes †, and in the nasal cavity of certain Tortoises.

#### CYCLOCOTYLE, Otto,

Where there are eight cups, forming an almost complete circle under the hind part of the body, which is broad; there is a small proboscis anteriorly.

*C. belone*, Otto, Ac. Nat. Cur. XI, part II, pl. xli, f. 2. The only species known; it is very small, and was taken on the back of the *Belone vulgaris*.

There is another subgenus that approximates to *Fasciola*, which I have named

#### TRISTOMA, Cuv.

The body forms a broad and flat disk; on the posterior part of its inferior surface is a large cartilaginous sucker, which is only connected with the body by a short pedicle, and under its anterior margin are two small ones, between which, and somewhat posteriorly, is the mouth. A circular ramified vessel, the nature of which it is difficult to determine, is observable in the parenchyma of the body.

*T. coccineum*, Cuv., a species more than an inch wide, and of a bright red colour, that attaches itself to the branchiæ of various fishes of the Mediterranean, such as the *Orthogoriscus*, *Xiphias*, &c. †

\* The genus ECHINOSTOMA of Blainville.

† *Polyst. integerrimum*, Rud., pl. vi, 1—6, genus HEXATHIREDA, Trentler;—*P. pinguicola*;—*P. thynni*, Laroche, Nouv. Bull. de Sc., May 1811, pl. ii, f. 3, genus HEXACOTYLE of Blainville;—*Pol. midas*, Kuhl and Van Hasselt, Allg. Koust. en Latterbode, No. 6, and the Bullet. des Sc. Nat. de Féruss., 1824, vol. II, p. 310.

‡ Lamartinière found a similar but grey one on a *Diodon* near Nootka-Sound. It formed the genus CASPALA, Bosc, Nouv. Bullet. des Sc., 1811, and that of PHYL-LINE, Oken, Zool., pl. x. See Journ. de Phys., Sept. 1787, pl. ii, f. 4, 5. We may unite to it the *Tristoma elongatum*, Nitzsch, or NITSCHIA, Bær., Ac. Nat. Cur., XIII, pars II, tab. XXXII, f. 1—5. The AXINE of the *Belone*, Abild., Soc. Nat. Hist. Copenh., III, p. 2, pl. vi, f. 3, appears to be a *Tristoma*, with an extremely elongated body, very large posterior suckers, and very small anterior ones.

One of the most extraordinary genera of this family is the

### HECTOCOTYLE, *Cuv.*

Long worms, thickest and compressed at the anterior extremity, in which is the mouth, whose inferior surface is completely covered with numerous suckers arranged in pairs, to the number of sixty or a hundred; there is a sac on the posterior extremity with the folds of the oviduct.

*H. octopodis*, *Cuv.*, *Ann. des Sc. Nat.*, XVIII, pl. xi. From four to five inches long, and with a hundred and four suckers or cups; it lives on the *Octopus rugosus*—*Sepia rugosa*, *Bosc.*—and penetrates into its flesh. The Mediterranean.

*H. argonautæ*; *Trichocephalus acetabularis*, *Delle Chiaie Mem.*, p. ii, pl. 16, f. 1, 2. Smaller, and with but seventy suckers. It lives on the Argonaut.

Here, perhaps, should come the genus

### ASPIDOGASTER, *Bær.*,

Where the venter is furnished with a lamina, excavated by four ranges of fossulæ.

*A. conchicola*, *Bær.*, *Ac. Nat. Cur.* XIII, p. ii, pl. xxviii. It is very small, and lives on Muscles.

I cannot help thinking that we should also approximate to *Fasciola* most of the animals contained in the genus

### PLANARIA, *Mull.\**,

Although they do not inhabit other animals, but merely live in salt or fresh water. Their body is depressed, parenchymatous, and without a distinct abdominal cavity. The oral orifice, placed under the middle of the body, or more posteriorly, and dilated into a little proboscis, leads, as in *Fasciola*, to an intestine whose numerous ramifications are formed in the thickness of the body. A vascular network occupies the sides, and behind the alimentary orifice is a double system of genital organs. They also enjoy a reciprocal coitus. Small black points are observable, which probably are eyes.

These animals are extremely voracious, and do not even spare their own species. They not only multiply in the ordinary manner, but are reproduced with great facility by division. They even experience spontaneous divisions.

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\* At the period of my first edition, it was by conjecture only that I placed the genus *Planaria* here, having no sufficient anatomical data to give me an idea of its natural affinities. Since then the observations of MM. R. Johnson, *Phil. Trans.*, Dallyell, *Monog.*, *Bær.*, *Ac. Nat. Cur.*, XIII, Dugés, *Ann. des Sc. Nat.*, XV, and those made by myself, appear to confirm this classification, which has been adopted by M. de Lamarck.

Several species inhabit the fresh waters in France\*.

Others, and larger ones, are very abundant on the sea-coast of the same country †.

The surface of some seems pilose ‡.

Several are furnished anteriorly with two tentacula §.

M. Dugés separates from them the

#### PROSTOMA,

Where the anterior extremity is provided with an orifice, and the posterior with another.

#### DEROSTOMA,

Where the oral orifice is underneath, but nearer to the anterior extremity.

It is to the first that I approximate the *PHÆNICURUS*, Rud., or *VERTUMNUS*, Otto, in which there is but one orifice at the anterior extremity.

But one species is known—*V. thethidicola*, Otto, Ac. Nat. Cur., XI, part II, pl. xli, f. 2—a parasite of the *Thethys fimbria*; it is marbled, and frequently has a forked tail, so shaped by being torn ||.

### FAMILY III.

#### TÆNIOIDEA.

In our third family of parenchymatous Intestinal Worms, we place all those species in which the head is provided with two or four suckers placed around its middle, which is itself sometimes marked with a pore, and sometimes furnished with a little proboscis, naked or armed with spines. Sometimes there are four little trunks thus armed.

The most numerous genus is

#### TÆNIA, Lin.

The body of the *Tape-worm* is often excessively elongated, flat, composed of joints more or less distinctly marked, and narrowed anteriorly, where we generally find a square head hollowed by four small suckers.

Observers have thought that they could perceive canals which arose from these suckers, and crept along the margin of the joints of

\* *Planaria lactea*, Zool. Dan., CIX, 1, 2;—*Pl. nigra*, Ib., 3, 4, and the other species described by M. Dugés, Ann. des Sc. Nat., XV. pl. iv. We find in Gmelin the long catalogue of this genus, which Müller particularly has enriched; part of this savant's figures are copied in the Encyc. Méthodique.

† *Pl. aurantiaca*, Cuv.

‡ *Pl. brocchii*, Risso.

§ *Pl. cornuta*, Müll., Zool. Dan., XXXII, 5, 7. Some of them are formed by tearing the tentacula, under the eye of the spectator. The *Planocères*, Blainv., belong to this division.

|| For its anatomy see Delle Chiaie, Memor., I, pl. ii, f. 9, 5.

the body. Each of the latter has one or two pores differently situated, according to the species, which appear to be the orifices of ovaries that are placed in the thickness of the joints, where they are sometimes simple, and at others ramous. The *Tæniæ* are among the most cruel enemies of the animals in which they are developed, and which are apparently exhausted by them.

In some, there is no projecting part in the four suckers. Such in Man is the

*T. lata*, Rud.; *T. vulgaris*, Gm.; Gœtz., XLI, 5—9. (The Common Tape-worm.) The joints are broad, short, and furnished with a double pore in the middle of each side. It is very frequently twenty feet in length, and it has been found upwards of a hundred. The large ones are nearly an inch wide, but the head and anterior portion of the body are always very slender. This species is extremely injurious and tenacious. The most violent remedies frequently fail to expel it.

In others, the prominence between the suckers is armed with little radiating points. Such as the

*T. solium*, L.; Gœtz., XXI, 1—7; Encyc., XL, 15—22, and XLI, 1—7; *Ver solitaire* of the French. Its joints, the anterior ones excepted, are longer than they are wide, and have the pore placed alternately on one of their edges. It is usually from four to ten feet in length, but much larger ones are sometimes met with. The vulgar idea that but one of these animals is found at a time in the same individual is very far from being true. Its detached joints are styled *cucurbitini*. It is one of the most dangerous of the intestinal worms, and the most difficult to expel\*.

From these ordinary *Tæniæ*, on account of the form of their head, are distinguished the

#### TRICUSPIDARIA, Rud.,

Now called *Trianophora* by the same author, where the head, divided as it were into two lips or lobes, instead of suckers, has two tri-pointed spinuli or strings, on each side.

But a single species is known, the *Tænia nodulosa*, Gm. Gœtz., XXXIV, 5, 6; Encyc., XLIX, 12—15. It inhabits various fishes, the Pike, Perch, &c. †

#### BOTHRYOCEPHALUS, Rud.,

Where the only suckers possessed by the head are two longitudinal fossulæ placed opposite to each other.

They are found in different Fishes and in certain Birds ‡.

\* For the other species, see Rud., Hist., II, 77, and Syn., 144.

† Rud. Hist., II, part II, 32, and Synop. 135.

‡ Rud., Hist., II, p. ii, 37, and El., 136. For the genus *Bothryocephalus* and its subdivisions, see the *Zoological Fragments* of F. S. Leuckardt, No. 1, Helmstedt, 1819.

From the *Bothryocephali* themselves should be distinguished the

DIBOTHRYORHYNCHUS, *Blainv.*,

Where the summit of the head is provided with two little trunks or tentacula bristled with hooks.

But a single species is known; it has a short body and inhabits the *Lepidopus*, *Blainv.*, App. ad *Brens.*, pl. ii, f. 8.

FLORICEPS, *Cuv.*,

Where there are four little trunks or tentacula armed with recurved spines, by means of which they penetrate into the viscera.

Certain species—*RHYNCHOBOTHRUM*, *Blainv.*—have a long, articulated body destitute of a bladder.

One species is common in the Rays—*Bothryocephalus corollatus*, *Rud.*, IX, 12—that is some inches in length. Its head is the exact resemblance of a flower.

In others again—*FLORICEPS* proper\*—the body is terminated by a bladder, into which it withdraws and is concealed.

TETRARHYNCHUS, *Rud.*

The *Tetrarhynchi* merely appear to be *Floriceps* naturally reduced to the head and two joints, instead of having an elongated and pluri-articulated body.

*T. lingualis*, *Cuv.* Very common in the tongue of the *Turbot*, and of several other fishes †.

TENTACULARIA, *Bosc.*,

Only differ in consequence of the tentacula being unarmed.

Naturalists have also distinguished from the ordinary *Tæniæ* those which, with a similar head, that is, one with four suckers, have the body terminated posteriorly by a bladder. Their joints are not as distinctly marked as in the preceding ones. The genus

CYSTICERCUS *Rud.*,

Vulgarly termed *Hydatids*, is composed of those in which the bladder supports but a single body and one head. They are particularly developed in the membranes and cellulosity of animals.

*C. globosus*; *Tænia ferarum*, *T. caprina*, *T. ovilla*, *T. vervecina*, *T. bovina*, *T. apri*, *T. globosa*, *Gm.*; *Gœtz.*, XXII, A, B; *Encyc.*, XXXIX, 1, 5. This species is found in a great number of Quadrupeds, the Ruminantia especially.

*C. pisiformis*; *Tænia cordata*, *T. pisiformis*, *T. utricularis*, *Gm.*; *Gœtz.*, XVIII, A, B; *Encyc.*, XXXIX, 6, 8. Very common in the Hare and Rabbit.

*C. cellulosa*; *Tænia cellulosa*, *T. finna*, *Gm.*; *Blumenb.*, Abb., fascic. IV, pl. 39. This species is the most celebrated

\* *M. Rudolphi* has changed this name to *ANTHOCEPHALUS*, *El.*, 177.

† For this genus, See *Rud.*, *Hist.*, II, 318, and *Syn.*, 129.

of the whole number, and lives between the fibres of the muscles of the Hog, producing the disease called *measles*. It is small, and multiplies prodigiously in this disgusting disease, penetrating into the heart, eyes, &c. Similar animals have, it appears, been observed in certain Monkeys and even in Man, but they are said to be never found in the Wild Boar\*.

The *ACROSTOMA*, Le Sauvage, Ann. des Sc. Nat. is closely allied to this genus. The animal inhabits the amnios of the Cow.

#### CÆNURUS, Rud.

Here we find several bodies and heads adhering to the same bladder.

*C. cerebralis*; *Tania cerebralis*, Gm.; Gœtz., XX, A, B; Encyc., XL, 1—8. This celebrated species is developed in the brain of Sheep, destroys a portion of its substance, and produces a disease called the Staggers (*touris*), because it compels them to turn on that side as if affected with vertigo. The same species has been observed in the Ox and other Ruminantia, where it produces similar effects. Its bladder is sometimes as large as an egg, and its parietes are thin, fibrous, and exhibit evident contractions. The little worms are hardly half a line in length, and re-enter the bladder by contraction †.

#### SCOLEX, Mull.

Where the body is round, pointed behind, extremely contractile, and terminated before by a sort of variable head, round which are two or four suckers, sometimes resembling ears or ligulæ. Those that are known are very small, and inhabit fishes ‡. I have seen a large one.

*S. gigas*, Cuv.; *Gymnorhynchus reptans*, Rud., Syn., 129, which penetrates into the flesh of the *Sparus raii*, L. The middle of its body is inflated into a bladder, which, during the life of the animal, alternately widens and contracts in the middle.

### FAMILY IV.

#### CESTOIDEA.

The fourth family comprises those which are destitute of external suckers.

But one genus is known.

#### LIGULA, Bloch.

Of all the Entozoa, these appear to be the most simply organized. Their body resembles a long riband; it is flat, obtuse before, marked with a longitudinal stria, and finely striated transversely. No external organ whatever is perceptible, and internally we find nothing but the ova, variously distributed in the length of the parenchyma.

\* For the remaining species, see Rud., Ent., II, p. ii, p. 215, and El., 179.

† Here should probably come the genus *ECHINOCOCCUS*, Rud., II. p. ii. 247, but I have not seen it, and have no idea of it sufficiently clear to enable me to class it.

‡ See Rud., Hist., II, p. 3, and Syn., 128.



They inhabit the abdomen of certain Birds, and particularly of various fresh-water Fishes, enveloping and constricting their intestines to such a degree as to destroy them. At certain periods they even perforate the parietes of their abdomen, to leave it. One of them,

*L. abdominalis*, Gm.; *L. cingulum*, Rud.; Gœtz., XVI, 4—6, inhabits the Bream \*. In some parts of Italy these worms are considered agreeable food.

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## CLASS III.

### ACALEPHA.

Our third class comprises Zoophyta which swim in the waters of the ocean, and in whose organization we can still perceive vessels, which, it is true, are generally mere productions of the intestines excavated in the parenchyma of the body.

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### ORDER I.

#### SIMPLICIA.

The simple Acalepha float and swim in the ocean by the alternate contractions and dilatations of their body, although their substance is gelatinous and without any apparent fibres. The species of vessels observed in some of them are hollowed out of their gelatinous substance; they frequently and evidently originate from the stomach, and do not occasion a true circulation.

#### MEDUSA, *Lin*

The Medusæ are furnished superiorly with a disk more or less convex, resembling the head of a mushroom, and called the *umbella*. Its contractions and dilatations assist the locomotion of the animal. The edges of this umbella, as well as the mouth, or the suckers more or less prolonged into pedicles which supply the want of it, in the middle of the inferior surface, are furnished with tentacula of various

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\* For the others, see Rud., Hist., II, p. II, p. 12, and Syn., 132.

N.B. In the intestines of Seals, and of Birds that prey on Fishes, we find Worms very similar to the *Ligulæ*, but with genital organs, and even a head analogous to that of the *Bothryocephali*. M. Rudolphi supposes that these Worms of Birds are the same as the *Ligulæ* of Fishes, which can only acquire their full development after they have passed from the abdomen of the latter into the intestines of the former.



forms and very different sizes. These various degrees of complication have given rise to numerous divisions\*.

We will designate by the general name of

#### MEDUSA,

Or Medusa proper, those which have a true mouth in the middle of the inferior surface, either simply open at the surface or prolonged into a pedicle.

Under the name of

#### ÆQUOREA,

We may re-unite those in which this mouth is simple and not prolonged, nor furnished with arms.

When there are no tentacula round the umbella they constitute the PHORCYNIA of Lamarck †.

When the circumference of the umbella is furnished with tentacula we have the ÆQUOREA proper—ÆQUOREA of Péron—one of the most numerous of all the subgenera, particularly in the seas of hot climates ‡.

Certain species are remarkable for having their inferior surface covered with laminae, and others—FOVEOLIA, Péron—for little foveolæ, which are placed round the circumference of the umbella §.

We might also unite under the name of

#### PELAGIA,

Those in which the mouth is prolonged into a peduncle or is divided into arms ||.

In all these subgenera there are no lateral cavities, but in a much greater number of these Medusæ with a simple mouth, we find, in the thickness of the umbella, four organs formed of a plaited membrane, which at certain seasons are filled with an opaque substance, and which appear to be ovaries. They are usually placed in as many cavities opening on the inferior surface, or on the sides of the pedicle, and which have been erroneously (in my opinion) taken for mouths, because little animals are sometimes entangled in them ¶.

\* For this genus, see the Prodomus of Péron and Lesueur, Ann. du Mus., XIV, and XV; it is well to remember that their genera are frequently founded on bad figures, such as those of Baster and Borlasse, and without having seen the animals; and that they have increased the number of species beyond all bounds.

† The *Phorcini* and *Eulimenes* of Péron.

‡ *Medusa æquorea*, Gm.; Forsk., XXXI; Encyc., Vers, XCV, 1; *Æquorea mesonema*, Péron; Forsk., XXVIII. B.;—*Med. mucilaginoso*, Chamiss., and Eisenh., Ac. Nat. Cur. X, part I. pl. xxx, f. 2, and the species engraved by M. Lesueur and indicated by Péron, Ann. du Mus., XV, and by M. de Lamarck, Hist., des Anim. sans vert., II, 498, et seq. It is to be regretted that these plates are not to be purchased. I also add to them the PEGASIA, and MELITEA of Péron.

§ *Medusa mollicina*, Forsk., XXXIII, C; Encyc., XCV, 1, 2;—*Medusa perla*, the genus MELICERTE Péron.

|| *Pelagia panopyra*, Péron, Voy. aux Terres Aust., XXXI, 2; the CALLIRHOE and EVAGORA, Pér., should also be united to it.

¶ This opinion of Baster and Müller induced Péron to divide a portion of these Medusæ into Monostoma and Polystoma.

Others consider them as organs of respiration\*, but that function is most probably exercised by the edges of the umbrella. The tentacula, whether situated on the margin of the umbrella or round the mouth, vary, not only according to the species, but the age of the animal †.

We will unite, under the name of

CYANÆA, *Cuv.*,

All the Medusæ with a central mouth and four lateral ovaries.

*C. aurita*; *Medusa aurita*, L.; Müll., Zool. Dan. LXXXVI, and LXVII. One of the most commonly disseminated species, acquiring with age four long arms; the whole circumference of its umbrella is finely ciliated; reddish branching vessels proceed from the stomach to its circumference. In the

*C. chrysaora*; *Med. chrysaora*, Cuv., the edges are furnished with long tentacula or fulvous or brown lines or spots arranged in radii on its convexity. This species also is extremely common, and varies greatly as to the spots ‡.

We have given the general name of RHIZOSTOMA to that portion of the great genus Medusa which comprises species that have no mouth opening in the centre, and that appear to live by the suction exercised by their pedicles or tentacula. They have four or more ovaries.

RHIZOSTOMA, *proper*,

Includes those which are furnished with a central pedicle more or less ramified according to the species.

The vessels arising from the small ramifications of the pedicles unite in a cavity of its base, whence branches proceed to all parts of the umbrella.

The most common species is the *Rhizostome bleu*, Cuv., Journ. de Phys., XLIX, p. 436; Reaum., Ac. des Sc., 1710, pl. XI, f. 27, 28. It is found along the French coast at low water, and its umbrella is sometimes almost two feet in width. Its pedicle is divided into four pairs of arms almost infinitely forked and dentated, each one being furnished at base with two auricles that are also dentated; a fine network of vessels extends round the umbrella in the thickness of its margin §.

According to the observations of Messrs. Audouin and Milne Edwards, these Medusæ live in society, or at least are always

\* Eisenh., on the *Rhizostoma*, &c.

† See Müll., Zool. Dan., II, p. 51.

‡ Most of the *Chrysaora* of Péron are mere varieties of this species.—Add *Aurelia crenata*, Chamiss., and Eisenh., Ac. Nat. Cur., Y., p. I, pl. xxix.

Besides the *Chrysaora*, we refer to this genus the *AURELIA*, *CYANÆA*, *OBELIA* and *OCEANIA* of Péron: we also include in it *Medusa hemispherica*, Müll., VII. 5; Encyc., 93, 8, 11;—*M. cymbaloïdes*, Slaber., Encyc., Ib., 2—4, if we may trust to the characters of such small individuals;—*Callirhoe basteriana*, Pér.; Baster, Op. Subs., II, v, 2, 3; Encyc., XCIV, 4, 5;—the *Cyanée bleu*, Pér.; Diquemare, Journ. de Phys., 1784, Dec. 1;—the species or varieties figured, but rudely, by Borlasse, Nat. His. of Cornw., pl. xxv, f. 7—12, which are referable to our *Chrysaora*, and to which should be approximated the *Med. hysocella*, Gm.;—*M. tyrrhena*, Gm., &c.

§ It is the *Pulmo marinus*, Mathiol., Aldrov., Zooph., lib. IV, p. 575, the *Medusa*

met with collected in great numbers and swimming in the same direction, with their body inclined obliquely.

The *CERHERE*, Pér., are only distinguished from the other *Rhizostoma* by having filaments intermixed with the dentations of the pedicle\*.

The *CASSIOPEE* have no pedicle, properly so called; their (usually eight) arms, which are sometimes ramous, arise directly from the inferior surface †.

In other species, without a central mouth, we find none of those numerous ramifications in the pedicle, nor open cavities for lodging the ovaries. They might be united under the name of

#### ASTOMA.

Some, however—*LYMNOREA* and *FAYONIA*, Pér.—still have a large pedicle furnished on each side with fibrous, filaments which may act as suckers.

Others—*GERYONIA*, proper, Pér.—are even destitute of these filaments, but have an infundibuliform membrane at the extremity of the pedicle, from the bottom of which vessels seem to arise that ascend into the pedicle and spread out through the umbella.

One of them is found in the Mediterranean, the *Med. proboscidalis*, Forsk., XXXVI, 1 ‡.

#### ORITHYIA, Pér.,

Where that membrane is wanting §.

#### BERENIX, Pér. ||,

Where there is no pedicle whatever, but where the inferior surface appears to be provided with little suckers along the track of the vessels ¶.

*pulmo*, Gm., Macri, Polm. Mar. I, B; Borlasse, XXV, 15. See Eisenh., Ac. Nat. Cur. X, part II, p. 377.

The *Potta marina*, Aldrov., Ib., p. 576, is perhaps another species.

I suspect that the *EPHIRA*, Pér.,—*Medusa simplex*, Pennant; Borlasse, Cornw., XXV, 13, 14—is merely a *Rhizostoma* deprived of its pedicle.

The *Medusa pileata*, Forsk., of which Péron makes an *Oceania*, has the ramous pedicle of *Rhizostoma* proper, but enclosed under a campanulate umbella, furnished at the margin with tentacula.

\* *Medusa cephea*, Forsk., XXIX; Encyc., XCII, 3, 4;—*Med. octostyla*, Id., XXX, Encyc., Ib., 4;—*Med. ocellata*, Modeer., Nov. Act. Holm., 1791.

† *Med. frondosa*, Pall., Spic., X, ii, 1, 3;—*Med. octopus*, Gm.; Borlasse, XXV, 16, 17;—*Med. andromeda*, Forsk., XXXI?—*Med. corona*, Id., p. 107?—*Rhizostoma leptopus*, Chamiss. and Eisenhardt, Ac. Nat. Cur., X, p. 1, pl. xxviii, f. 1;—*Cass. borbonica*, Delle Chiaie, Mem., I, tab. 3, 4.

‡ Add *Dianée Gabert*, Zool., Freycin, pl. 84, f. 2; *Geryonia tetraphylla*, Chamiss. and Eisenh., loc. cit. f. 2.

§ *Medusa minima*, Baster, Op. Subs., II;—*Dianée dubaul*, Zool., Freycin., pl. 84, f. 3, which is the *Geryonie dinéme*, Pér. It is possible that mutilated *Geryoniae* (which are often in that condition) may have been taken for *Orythyiae*.

|| *Cuvieria carisochroma*, Pér., Voy. aux Terres Aust., XXX, 2.

¶ *Medusa marsupialis*, Gm., Plancus, Conch., Min. Not., IV, 5;—*Carybdea periphylla*, Péron.

EUDORA, *Pér.*,

Where not even suckers are visible, but where the two surfaces are smooth, and without any apparent organs.

One species is found in the Mediterranean—*Eudora moneta*, Cuv.—about the size of a five-franc piece, and so called by the people.

When these simple animals become more concave, their inferior surface becomes an interior one, and may be considered as a true stomach. They form the

CARYBDEA, *Pér.*

Those, in which no traces of vessels can be perceived internally, only differ from *Hydra* in size.

We should separate from the Medusæ, certain genera united with them by Linnæus, from insufficient affinities.

BEROE, *Müll.*,

Where the oval or globular body is furnished with salient ribs covered with filaments or a sort of lace, extending from one pole to the other, and in which ramifications of vessels are perceptible, and a kind of motion resembling that of a fluid. The mouth is at one extremity; in those that have been examined they lead into a stomach that occupies the axis of the body, and on the sides of which are two organs probably analogous to those we have styled ovaries in the Medusæ. Such is the

*B. pileus*; *Medusa pileus*, Gm.; Baster, I, III, xiv, 6, 7; Encyc. XC, 3, 4. Body spherical and with eight ribs; two ciliated tentacula susceptible of great elongation issuing from its inferior extremity\*. It is very common in northern seas, and even in the British channel; the Whale is said to feed on it †.

Naturalists have referred to the same genus, simple species—

\* According to Messrs. Audouin and Milne Edwards, there exists, in the axis of these animals, a cavity extending from one pole to the other, and communicating externally by means of an inferior opening, which may be considered as an anterior mouth. In the superior third of this cavity is contained, and, as it were, suspended, a sort of straight and cylindrical intestinal tube, whose exterior orifice is exactly at the superior pole, bearing two granular strings—the ovaries?—on each side. The cavity is filled with a liquid in motion, which may be seen passing into two lateral tubes, that are soon divided into four branches, and reach the surface of the body, by opening into longitudinal canals which conduct the fluid into the cilia, that are constantly in motion, and appear to be organs of respiration. Finally, from the lateral parts of each of these eight costal canals, arise an infinity of little transverse vessels and sinuses, which establish a communication between them, and dip into the surrounding parenchyma.

On each side of the spheroid, and internally, are two small masses, each of which occupies the bottom of a cavity or cul-de-sac, and gives rise to a long contractile filament; these two filaments issue through two circular openings, situated near the inferior third of the body. They are afterwards divided into numerous branches.

† Add *Beroë novem-costatus*, Brug.; Bast., loc. cit., f. 5, and Encyc., XC, 2.

The *Beroë ovum*, Fab., Groenl., 362, does not seem to differ from the *pileus*.

IDYA, Oken—which are merely in the form of a sac, furnished with ciliated ribs and open at both ends\*.

Some—*DOLIOLUM*, Otto—are even destitute of ribs, their form resembling that of a barrel without a bottom †.

The *CALLIANIRÆ*, Pér., only seem to differ from *Beroë* by having much more projecting ribs united in pairs, forming two species of wings. Their internal organization is not yet well known ‡.

The *TANIRÆ*, Oken, appear to approximate to *Callianira*, but they are figured, on each side, with three long ciliated ribs, and two long ramous filaments §.

The *ALCINOES*, Rang., have a cylindrical body, open at one extremity and furnished at the other with two large wings, which, when folded over, completely envelope it. Its cylindrical portion is flanked with four projecting ribs terminating in a point and marked by five lines of cilia ||.

The *OCYROES*, Rang., have a similar body, with four ranges of cilia, but without ribs, and similar wings, each furnished at base with two ciliated points ¶.

It is also near the *Beroës* that we must place the

#### *CESTUM*, Lesueur,

A very long gelatinous riband, one of whose margins is furnished with a double row of cilia; they are also apparent on the inferior edge, but are smaller and less numerous. It is in the middle of the inferior margin that we find the mouth, a wide aperture opening into a stomach placed transversely in the thickness of the riband, and terminating by a very small anus. From the anal extremity arise vessels which traverse both extremities of the riband. Two sacs, probably ovaries, open on the sides of the mouth. This animal may be compared to a *Callianira* with two ribs, and excessively elongated wings. The only species known is the

*C. veneris*, Lesueur, *Nouv. Bullet. des Sc.*, June 1813, pl. v. f. 1. Its length, or rather width, exceeds five feet, and it is two inches in height. It inhabits the Mediterranean, and is very difficult to preserve entire\*\*.

The two following genera, which were formerly joined with the

\* The *Beroë ovatus*, Brug., or *Medusa infundibulum*, Gm.; *Brown, Jam.*, XLIII, 2, and *Encyc.*, XC, 1;—*Beroë macrostomus*, Pér., *Voy.*, pl. xxxi, f. 1;—*Beroë ovata*, *capensis*, *punctata* and *constricta*, *Chamiss. and Eisenh., Ac. Nat. Cur.*, X, p. i, pl. xxx and xxxi.

N.B. The animal of Martens, Spitzb., pl. P. f. b, which is considered as identical with that of Brown, should rather be approximated to the first subgenus.

† *Doliolum mediterraneum*, Otto, *Ac. Nat. Cur.*, XI, p. II, pl. xlii, f. 4.

‡ *Callianira didiploptera*, Pér.: *Ann. du Mus.*, XV, pl. ii, f. 16.

§ *Beroë hexagone*, Brug.; *Encyc. Vers.*, pl. 90, f. 6.

|| *Alcinœ vermiculata*, Rang., *Mem. de la Soc. d'Hist. Nat. de Par.*, IV. xix 1, 2.

¶ *Ocyroë maculata*, Id. *Ib.*, xx, 1, 2;—*Oc. fusca*, *Ib.* 3;—*Oc. crystallina*, *Ib.*, 4.

The *Callianira heteroptera*, *Chamiss. and Eisenh.*, *Ac. Nat. Cur.*, X, p. II, pl. xxxi, f. 3, will probably form another subgenus.

\*\* The *Lemnisque*, *Quoy and Gaym.*, *Zool. de Freycin.*, pl. 86, f. 1, is perhaps a fragment of a *Cestum*.

Medusæ might also constitute a small family in this order, on account of the internal cartilage which supports the gelatinous substance of the body.

#### PORPITA, Lam.,

Where this cartilage is circular, and its surface marked with concentric striæ crossed by radiating striæ. The superior surface is merely invested with a thin membrane that projects beyond it; the inferior is covered with a great number of tentacula, the exterior of which are the longest, and furnished with little cilia each terminated by a globule. They sometimes contain air; those in the middle are the shortest, simplest and most fleshy. In the centre of all these tentacula is the mouth, in the form of a little salient proboscis. It leads to a simple stomach surrounded by a sort of glandular substance.

One species is known of a beautiful blue colour, that inhabits the Mediterranean, and seas of hot climates\*.

#### VELELLA, Lam.,

Where, as in *Porpita*, there is a mouth in the inferior surface in the form of a proboscis, surrounded with innumerable tentacula, the exterior of which is the longest, but the latter are not ciliated, and a still more important character is, that the cartilage, which is oval, has on its superior surface a vertical and tolerably elevated crest. This cartilage is diaphanous, and is merely marked with concentric striæ.

A species of this genus also is known, of the same colour as the *Porpita*, and inhabiting the same seas. It is eaten fried †.

## ORDER II.

### HYDROSTATICA.

The Hydrostatic Acalepha are known by one or more bladders usually filled with air, by means of which they suspend themselves in their liquid element. Excessively numerous and variously shaped appendages, some of which probably serve as suckers, and the others

\* It is the *Med. umbella*, Müll., Natur. of Berl., Besch., II, ix, 2, 3; *Holothuria nuda*, Gm.; Forsk., XXVI, 1, i; and Encyc., XC, 6, 7; *Porpita gigantea*, Pér., Voy., XXXI, 6.

The *Medusa porpita*, L., is merely its cartilage divested of the gelatine and tentacula.

The *Porpita appendiculée*, Bosc., Vers, II, xviii, 5, 6, if not an altered individual of the same, should constitute a separate subgenus. It is the genus *POLYBRACHIONIA*, Guilding., Zool. Journ., XI.

† It is the *Medusa velella* and the *Holothuria spirans*, Gm.; Forsk., XXVI, k; Encyc., XC, 1, 2. The *Velella scaphidia*, Pér. Voy., XXX, 6, is nowise generically different; it appears that there are several species, such as the *V. oblonga*, *V. sinistra*, *V. lata*, Chamiss. and Eisenh., Ac. Cur. Nat., X, p. I, pl. xxxii.



perhaps as ovaries, and some longer than the rest as tentacula, are attached to these vesicles and compose the whole apparent organization of these animals. They have no apparent mouth, or one which can be decidedly considered as such.

### PHYSALIA, *Lam.*

The Physaliæ resemble an extremely large oblong bladder elevated superiorly into an oblique and wrinkled crest, and furnished beneath, near one of its extremities, with numerous, cylindrical, fleshy productions, variously terminated, that communicate with the bladder. Those in the middle give origin to more or less numerous groups of little filaments; the lateral ones are merely divided into two threads, one of which is frequently very long. There appears to be an extremely small orifice in one of the extremities of the bladder, but internally no other intestine is found, but another bladder with thinner parietes, and cæca that partly extend into the cavities of the crest. There is no nervous, circulating, nor glandular system\*. The animal swims on the surface of the sea when it is calm, employing its crest as a sail. When living, it is also furnished with extremely long filaments, more slender than the others, which are sprinkled, as it were, with pearls or drops. Its touch is said to sting and burn like that of the Sea-nettle.

They are found in all the seas of hot climates †.

### PHYSSOPHORA, *Forsk.*

These Acalepha are evidently allied to the Physaliæ, but their bladder is proportionally much smaller, has no crest, and is frequently accompanied by lateral bladders; their various and numerous tentacula are suspended vertically under the bladder, like a garland or cluster. In

### PHYSSOPHORA, *Pér.*,

Or Physosphora properly so called, between the superior bladder and the tentacula are other bladders placed side by side, or one on another, sometimes of an irregular figure, and sometimes polyedrous, forming, by their union, prisms or cylinders. The tentacula, partly conical, partly cylindrical, and partly formed by groups of threads or

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\* I have satisfied myself of this total absence of internal and complicated organs in many large individuals, so that I cannot admit the recent idea that the Physalia may be one of the Mollusca.

† *Holothuria physalis*, L.; Amœn., Ac., IV, iii, 6; Sloane, Jam., I, iv, 5;—*Medusa utriculus*, Gm., Lamartinière, Journ. de Phys., Nov. 1787, II, 13, 14;—*Medusa caravella*, Müll., Nat. of Berl., Besch., II, 9, 2, are Physaliæ, but which do not appear to be sufficiently described to enable us to unite or distinguish them specifically. I will say the same of the *Physal. pelagica*, Bosc., Vers, II, xix, 1, 2, and the *Physalie mégaliste*, Pér., Voy., I, xxix, 1. This observation will even apply to those of Tilesius, Voy. of Krusenst. and Lesson, Voy. de Duperr., Zooph., pl. 4 and 5, although better characterized, until we have more accurate observations of the changes which age or other circumstances may produce in the number of the tentacula.



globules, and finally, partly filiform and susceptible of considerable elongation, form a cluster or garland at the inferior extremity\*.

#### HIPPOPUS, *Quoy and Gaym.*,

Where there are merely lateral vesicles, almost semi-circular, or shaped like the foot of a horse, and crowded into two ranges, thus forming a sort of spike comparable to that of certain grasses, from which also depends a kind of garland that crosses all the preceding parts. The united contraction of these vesicles enable the animal to move rapidly †. In

#### CUPULITA,

The vesicles are regularly attached to the two sides of a frequently very long axis ‡.

#### RACEMIDA, *Cuv.*,

Where all the vesicles are globular and small; each one is furnished with a little membrane, and they are united in an oval mass which moves by their joint contractions §.

#### RHIZOPHYZA, *Pér.*,

Where there are no lateral vesicles, but merely a superior bladder and an elongated stem, along which the tentacula are suspended, some conical and the others filiform||. The

#### STEPHANOMIA, *Pér.*,

Appears to be a third combination, where the lateral bladders, which, in *Physophora* proper, adhere to the top of the stem above the tentacula, extend along its length and intermingle with tentacula of various forms¶.

It is directly after these hydrostatic *Acalepha* that we may place the

#### DIPHYES, *Cuv.*,

A very singular genus, where two different individuals are always found together, one encased in a cavity of the other, but susceptible of being separated without destroying the life of either. They are ge-

\* Such is the *Physophora hydrostatica*, Gm. The individual named *Phys. musonema*, by Pér., Voy. XXIX, 4, is well preserved; that of Forskahl, Ic., XXXIII, E, e, 1, e, 2; Encyc., LXXXIX, 7, 9, appears to be the same species, but deprived of a portion of its tentacula, which are easily removed. I also think that the *Physophora rosacea*, Forsk., XLIII, B, b, 2, and Encyc., LXXXIX, 10, 11, is a mutilated specimen of another species.

‡ Add *Rhizophyza Chamissonis*, Eisenh., Medus., Ac. Nat. Cur. X, pl. 35, f. 3;—*Rhiz. helianthus*, and *Rhiz. melo*, Quoy and Gaym., Ann. des Sc. Nat., X., pl. 5, and many other undescribed species.

† Quoy and Gaym., An. des Sc. Nat. X, pl. 10, 4, A, f. 1—12.

‡ N.B. The *Glebe* of Otto, Ac. Nat. Cur., XI, p. II, pl. 42, f. 3, is merely a vesicle of a Hippopus.

§ Voy. de Freycin., Zool., pl. 87, f. 15.

¶ A new genus from the Mediterranean.

|| *Physophora filiformis*, Forsk., XXXIII, F; Encyc., LXXXIX, 12; the same as the *Rhizophyza planestoma*, Pér., Voy., XXIX, 3. MM. Quoy and Gaymard, however, think that these *Rhizophyzae* are merely *Physophoræ* which have lost their lateral bladders.

¶ *Stephanomia Amphitritis*, Péron, Voy., XXIX, 5. The *Stephanomia uvaria*, Lesueur, appears to me to approximate nearer to *Physophora* proper.

latinous, diaphanous, and move nearly in the manner of a Medusa. The *receiver* produces from the bottom of its cavity a chaplet which traverses a semi-canal in the *received*, and appears to be composed of ovaries, tentacula, and suckers, like those of the preceding genera.

This genus has been divided by Messrs. Quoy and Gaymard according to the relative form and proportions of the two individuals.

Thus in

DIPHYES, *proper*,

The two individuals are almost similar and pyramidal, with some points round their aperture, which is at the base of the pyramid\*.

In CALPES the received is still pyramidal, but the receiver is very small and square.

In ABYLES the received is oblong or oval, and the receiver somewhat small and bell-shaped.

In CUBOIDES the received is small and bell-shaped, the receiver much larger and square.

In NAVICULA the received is bell-shaped; the receiver is large, but has the figure of a wooden shoe †.

There are several other combinations.

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## CLASS IV.

### POLYPI (*a*).

Our fourth class of the Radiata or Zoophytes has been thus named because the tentacula which surround their mouth give them a slight resemblance to an Octopus called *Polypus* by the ancients. The number and form of these tentacula vary. The body is always cylindrical or conical, frequently without any other viscous than its cavity; and frequently also with a visible stomach, to which adhere intestines, or rather vessels excavated in the substance of the body, like those of the Medusæ; in this latter case we usually find ovaries also. Most of these animals are capable of forming compound beings, by shooting out new individuals, like buds. They also, however, propagate by ova.

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\* Bory Saint Vincent, Voy. aux Isles d'Afrique.

† See the Mem. of MM. Quoy and Gaym., Ann. des Sc. Nat., X.

☞ (*a*) This class of animals, although nearly at the end of the series, is one of the largest, and certainly the most singular of the whole. Such is the enormous accumulation of the stony envelopes formed by them in certain seas, that islands are produced, coasts extended, and harbours blocked up by them. The late lamented M. de Lamarck has even hazarded the idea, that the calcareous strata of the globe may have been produced by them. Polyphi were formerly considered as stony plants. Imperati (1699) was the first who doubted their vegetable nature, and Trembley's observations on the Hydra (1740) put the question at rest. Since that period, our knowledge of them has been considerably increased by the labours of Ellis, Boecone, Cavolini, Lamouroux, &c. &c.—ENG. ED.

## ORDER I.

## CARNOSI.

The first order comprises fleshy animals that usually fix themselves by their base, several of which, however, have the power of crawling on that base, or even of detaching it altogether, and swimming or suffering themselves to be carried away by the current. Most commonly however they merely expand the oral aperture, which is also the anus. It is surrounded with a greater or less number of tentacula, and opens into a stomach en cul-de-sac. Between this internal sac and the external skin we find a tolerably complex, but still obscure organization, chiefly consisting of fibrous and vertical leaflets, to which the ovaries, that resemble tangled threads, are attached. The intervals of these leaflets communicate with the interior of the tentacula, and it appears that water penetrates into and issues from them by small orifices in the circumference of the mouth; the Actiniæ, at least, sometimes ejaculate it in this manner\*.

ACTINIA, *Lin.*

The fleshy body of these Polypi is frequently ornamented with bright colours, and exhibits numerous tentacula placed round the mouth in several ranges, like the petals of a double flower, and hence their common name of *Sea-Anemones*. They are extremely sensible to the influence of the light, and expand or close in proportion to the fineness of the day. When they retract their tentacula, the opening through which those organs pass contracts and closes over them like the mouth of a purse.

Their power of reproduction is scarcely inferior to that of the Hydræ; parts that have been amputated shoot out again, and the animal may be multiplied by division. Their usual mode of generation is viviparous. The little Actiniæ pass from the ovary into the stomach and issue from the mouth. These Zoophytes, when hungry, dilate their mouth to a great extent. They devour all sorts of animals, especially Crustacea, Shell-fish, and small Fishes, which they capture with their tentacula and soon digest †.

ACTINIA, *proper.*

The true Actiniæ fix themselves by a broad and flat base.

The species most common on the coast of France are

\* See Spix, Ann. du Mus., XIII, xxxiii, f. 1—5.

† See Diquemare, Journ. de Phys., 1776, June, p. 515, and the Memoir on the *Polypi* and *Actiniæ*, by M. Rapp; Weimar, 1829, 4to.

*A. senilis*, L.\* Three inches wide, with a coriaceous, uneven, orange-coloured envelope, and two ranges of moderately long tentacula, marked with a rosy ring. It is generally found on the sand, into which it soon sinks if disturbed.

*A. equina*, L.† The skin soft and finely striated, usually of a fine purple colour frequently spotted with green; it is smaller than the *senilis*, with longer and more numerous tentacula. This species covers all the rocks on the French coast of the British channel, ornamenting them as if with the most splendid flowers.

*A. plumosa*, Cuv.‡ White, and more than four inches wide; the edges of its mouth are expanded into lobes, all loaded with innumerable little tentacula; there is an inner range of larger ones.

*A. effæta*; Rond., lib., XVII, cap. xviii; Bast. xiv, 2§. A light-brown, longitudinally streaked with whitish; its form is usually elongated and frequently narrowest below; skin smooth; tentacula numerous. When it contracts, long filaments arising from the ovaries are frequently protruded through the mouth. It usually fixes itself on shells, and is extremely common in the Mediterranean ||.

The THALASSIANTHA, Ruppel, are Actiniæ with ramified tentacula ¶.

The DISCOSOMA, Rupp., are Actiniæ in which the tentacula are almost reduced to nothing by their shortness\*\*.

#### ZOANTHUS, Cuv,

The same fleshy tissue and arrangement of the mouth and tentacula as in the Actiniæ, and a nearly similar organization; but these

\* It is the *Actinia senilis*, Gm., Diquemare, Phil. Trans., LXIII, pl. xvi. f. 10, and pl. xvii, f. 11; the *Actinia crassicornis*, Baster, XIII, 1; the *Act. digitata*, Zool. Dan., CXXXIII; and the *Act. holsatica*, Ib., CXXXIX.

† It is the *Actinia equina*, L., Diquem., Philos. Trans., LXIII, xvi, 1, 2, 3, and the *Hydra mesembrianthemum*, Gm., Gært., Phil., Trans. LII, 1—5.

‡ We have no good figure of this species, but I think that of Baster, XIII, 2, must represent it. The *Hydra dianthus*, Gm., Ellis, Phil. Trans., LVII, xix, 8, and Encyc., LXXI, 5, is also closely allied to it, and perhaps even the *Hydra anemone*, Phil. Trans., Ib., 4, 5, Encyc., Ib., 5, 6.

§ I also believe it to be the *Act. felina*, Diquem., Phil. Trans., LXIII, xvi, 13, referred by Gmelin to his *Actinia truncata*.

It is necessary to remark, that the variation in the form and colours of the Actiniæ renders them extremely difficult to determine, and that we are not to trust to the characters established by observers, and still less to the approximations proposed by compilers.

|| Add of nearly certain species, *Hydra cereus*, Gm.; Gært., Phil. Trans. LII, i, 1; Encyc., LXXIII, 1, 2;—*Hydra bellis*, Phil. Trans. Ib., 2; Encyc. Ib. 4;—*Hydra helianthus*, Ellis, Phil. Trans., LVII, xix, 6, 7; Encyc., LXXI, 1, 2;—*Hydra aster*, Ellis., Phil. Trans., LVII, xix, 3; Encyc. LXXI, 3;—*Actinia varians*, Zool. Dan., CXXIX;—*Act. candida*, Ib., CXV;—*Act. plumosa*, Ib., LXXXVIII;—*Act. coccineo*, Ib., LXIII, 1, 3;—*Act. viridis*, Forsk., XXVII, B; *Act. rubra*, Brug.; Forsk., Ib., A;—*Act. maculata*, Brug.; Forsk., Ib., C;—*Actinia quadricolor*, Ruppel, Voy., Moll., pl. i, f. 3, &c.

¶ *Thal. aster*, Ruppel, Moll., pl. i, f. 2.

\*\* *Disc. nummiforme*, Id. Ib., f. 1.

animals are united in more or less considerable number on a common base, sometimes in the form of a creeping stem\*, and sometimes having a broad surface†.

### LUCERNARIA, Müll.

The Lucernariæ should apparently be approximated to the Actiniæ, but their substance is softer; they fix themselves to fuci and other marine bodies by a slender pedicle, and their superior portion dilates like a parasol, in the centre of which is the mouth. Numerous tentacula united in bundles are arranged round its edges. Between the mouth and these same edges are eight organs resembling cæca, proceeding from the stomach and containing a red and granulated substance. In the

*S. quadricornis*, Müll., Zool. Dan., XXXIX, 1, 6, the edge is divided into four forked branches, each of which bears two groups of tentacula. In the

*L. auricula*, Ibid., CLII, the eight groups are equally distributed round an octagonal margin‡.

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## ORDER II.

### GELATINOSI.

The gelatinous Polypi, unlike the preceding ones, are not invested with a firm envelope, neither is there a ligneous, fleshy, nor corneous axis in the interior of their mass. Their body is gelatinous and more or less conical; its cavity supplies the want of a stomach.

### HYDRA, Lin.

Of all the animals of this class, these are reduced to the greatest degree of simplicity. A little gelatinous horn, whose edges are provided with filaments that act as tentacula, constitutes their whole apparent organization. The microscope discovers nothing in their substance but a diaphanous parenchyma filled with more opaque granules. Notwithstanding this, they swim, crawl, and even walk by alternately fixing their two extremities in the manner of Leeches or of the caterpillars called Geometræ. They agitate their tentacula and use them for seizing their prey, which can be seen being digested

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\* *Hydra sociata*, Gm.; Ell. and Soll., Corall., I, i; Encyc., LXX, 1.

† *Alcyonium mammillosum*, Ell. and Sol., loc. cit., 4;—*Alc. digitatum*, Id. Ib., 6.

These last form the genus PLYTHOE of Lamouroux, and lead to the Alcyoniæ. This genus appears to have been characterized from desiccated specimens. See the great work on Egypt, Zool., Polyp., pl. ii, f. 1—4.

‡ Add *Lucer. fascicularis*, Fleming., Werner. Soc., II, xviii, 1, 2;—*Luc. campanula*, Lamouroux, Mém. du Mus., II, xvi. The *Lucernaria phrygia*, Fab.; Faun. Groenl., 345, should, apparently, form another genus. See the Memoir of M. Lamouroux on these Zoophytes, in the Mém. du Mus., II.

in the cavity of their body. They are sensible to the action of light, and seek it, but their most wonderful property is that of being constantly reproduced by the indefinite excision of their parts, so that we can multiply them at will by means of division. Their natural increase is by shoots which push out from various points of the body of the adult, and at first resemble branches.

Five or six species, all differing in colour and the number and proportion of the tentacula, are found in stagnant waters in France. One of them,

*H. viridis*, Trembl., Pol., I, 1; Rœs., III, lxxxviii; Encyc., LXVI, is of a beautiful light-green. It is particularly common under the leaves of the Lemnæ, and has been rendered celebrated as the first species on which the experiments relative to the reproductive power of the genus were essayed. The

*H. fusca*, Trembl., Pol., I, 3, 4; Rœs., III, lxxxiv; Encyc., LXIX, is more rare, and of a grey colour. Its body is not above an inch long, and its arms are more than ten\*.

#### CORINE, Gært.

The Corines have a fixed stem terminated by an oval body, of a firmer consistence than that of the Hydræ, open at the summit and completely covered with little tentacula. Some of them carry their ova at the inferior part of the body †.

#### CRISTATELLA, Cur.,

Where there is a double range of numerous tentacula on the mouth, curved into a half moon, forming a plume of that figure, which attracts the nutritious molecules by their regular motion. These mouths are placed on short necks attached to a common gelatinous body which progresses in the manner of a Hydra. These animals are found in stagnant waters in France. To the naked eye they seem to be small spots of mould ‡.

#### VORTICELLA,

Where the stem is fixed, frequently ramous and much divided, each branch terminating by a body shaped like a bell or horn. From the aperture project two opposing groups of filaments which are constantly in motion, and that attract nutritious molecules. The species

\* Add *Hyd. grisea*, Trembl., 1, 2; Rœs., III, lxxviii—lxxxiii; Encyc., LXVII;—*Hyd. pallens*, Rœs.; III, lxxvi, lxxvii; Encyc., LXVIII;—*Hyd. gelatinosa*, Zool. Dan., CXV, 1, 2.

N.B. The ten first Hydræ of Gmelin are Actinæ, and the eleventh—*H. dotololum*—a Holothuria.

† *Tubularia coryna*, Gm.; or *Coryne pusilla*, Gært., App. Pall. Spieil, X, iv, 8; Encyc., LXIX, 15, 16;—*Tubularia affinis*, Gm.; Pall., Ib., 9; Encyc., Ib., 14;—*Hydra multicornis*, Forsk., XXVI, B. b; Encyc., Ib., 12, 13;—*Hyd. squamata*, Müll., Zool. Dan., IV; Encyc., Ib., 10, 11;—and the species sketched by Bosc., Hist. des Vers, II, pl. xxii, f. 3, 6, 7, 8.

N.B. The genus Corine, which I have not observed myself, appears to merit re-examination.

‡ *Cristatella mucedo*, Cuv.; Rœs., III, xci.

are very numerous in fresh water, and are generally too small to be perceived without a microscope. They form bushes, arbuscles, plumes, &c. &c. \*.

### PEDICELLARIA.

The Pedicellariæ are found between the spines of the Echini, and are considered by various authors as organs of these animals; most probably however they are Polypi, which there seek an asylum. They consist of a long slender stem, which terminates by a horn, furnished at its extremity with tentacula, sometimes filiform and sometimes foliaceous †.

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## ORDER III.

### CORALLIFERI (a).

The Coralliferi constitute that numerous suite of species which were long considered as marine plants, and of which the individuals are in fact united in great numbers to constitute compound animals, mostly fixed like plants, either forming a stem or simple expansions, by means of a solid internal substance. The individual animals, more or less analogous to the Actiniæ or Hydræ, are all connected by a common body, and are nourished in common, so that what is eaten by one goes to the nutrition of the general body, and of the other Polypi. Their volition is even in common, at least it is certainly so in the free species, such as the Pennatulæ, which are seen swimming by the contractions of their stems, and the combined motions of their Polypi.

The name of *Polypiers* has been given to the common parts of these compound animals; they are always formed by deposition, and in layers like the ivory of teeth, but are sometimes on the surface, and sometimes in the interior of the compound animal. This difference of position has given rise to the following families.

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\* The only species I refer to this genus are those figured in the Encyc., pl. XXIV and XXVI. They are closely united by strong affinities with certain species placed among the microscopical animals.

† Müll., Zool. Dan., XVI, copied Encyc., LXVI.

☞ (a) The POLYPES A POLYPIERS of our author. Here is another instance of the many difficulties we have had to encounter in the course of this work, and of the impropriety of the attempts to establish the use of French terms in the Sciences, now being made, notwithstanding the inconvenience, confusion, and error they are sure to produce.

The term *polypier*, for which we have no adequate word, has lately been coined to express the common part of these compound animals, or the substance we usually denominate Coral—*Corallium*—and as it is an excretion, we have ventured to render *Polypes à Polypiers* by *Polypi coralliferi*, and the term *Polypiers* by the word *coral*.—ENG. ED.



## FAMILY I.

## TUBULARII.

Those of the first inhabit tubes of which the common gelatinous body traverses the axis, like the medulla of a tree, and that are open, either on the summit or sides, to allow the passage of the Polypi.

Their more simple Polypi appear to be chiefly analogous to the Hydræ and Cristatellæ (a).

TUBIPORA, *Lin.*

Simple tubes of a stony substance, each containing a Polypus. These tubes are parallel, and united from space to space by transverse laminae, which has caused them to be compared to the pipes of an organ. The most common species,

*T. musica*, L.; Seb., III, ex, 89, is of a beautiful red; its polypi are green, and formed like Hydræ. Very abundant in the archipelago of India\*.

It appears that we must approximate to the Tubipora certain fossil Coralliferi (*Polypiers*) also composed of simple tubes, such as the CATENIPORA, Lam., where the tubes are deposited in lines that intercept vacant meshes †; the FAVOSITES, id. ‡, composed of crowded hexagonal tubes, &c.

TUBULARIA, *Lin.*

Simple or branched tubes of a horny substance, from the extremities of which issue the Polypi.

The Polypi of the fresh water Tubulariæ—Plumatella, Bosc. §—seem to be closely approximated to the Cristatellæ by the disposition of their Tentacula.

Certain species are found in France, that creep over the plants of stagnant waters ||.

## TUBULARIA MARINA.

The Polypi of those that inhabit salt water have two ranges of tentacula, the outer one forming radii, and the inner turning up into a tuft. One Species,

\* The other Tubiporæ of Gmelin do not belong to this genus; some of them, those of Fab., Groenl., in particular, are perhaps tubes of Annelides, but the supposition that the above animal belongs to this last-mentioned class is erroneous. It is a true Polypus. See Quoy and Gaym., Zool., de Freycin., pl. 88.

† *Tubipora catenulata*, Gm., Linn., Amœn., Ac., I, iv, 20.

‡ *Corallium gothlandicum*, Amœn., Ac., I, iv, 27 :—*Far. commune*, Lamouroux, Ac., Sol., and Ell., pl. 75, f. 1, 2.

§ Lamouroux has changed this name to NAISA.

|| *Tubularia campanulata*, Rœs., II, lxxiii—lxxv. ;—*Tub. Sultana*, Blumenb., Man., Fr. Trans., II, pl. of p. 10. f. 9; *Tub. lucifuga*, Vaucher, Bullet. des Sc., Trim., An. 12, pl. xix, f. 6, 7.

☞ (a) This order is the POLYPES A TUYAUX of our author. ENG. ED.

*T. indivisa*, Lam.; Ellis, Corall., XVI, c, is found on the coast of France; its tubes are simple and two or three inches high, resembling pieces of straw\*.

TIBIANA, Lamour.,

Zigzag tubes presenting a small open branch at each angle †.

CORNULARIA, Lam.,

Where the tubes are conical, from each of which issues a Polypus with eight dentated arms, like those of the Alcyoniæ, Gorgoniæ, &c. ‡ In

ANGUAINRIA, Lam.,

The tubes are small, cylindrical, and adhere to a creeping stem, each one opening laterally, and near the extremity, for the passage of a Polypus §. In

CAMPANULARIA, Lam.,

The extremities of the branches through which the Polypi pass are widened and bell-shaped.

Lamouroux separates them into CLYTIA where the stems are sanded || :

And LAOMEDEA where they are not; the bells also are smaller and the branches shorter ¶.

SERTULARIA, Lin.

The Sertulariæ have a corneous stem, sometimes simple, sometimes ramous, on the sides of which are cells, extremely various in form, that are occupied by the Polypi, all connected with a gelatinous stem that traverses the axis, like the medulla of a tree. They propagate by ova or buds, which are developed in cells larger than the rest, and of a different form.

The various directions of their cells have caused them to be subdivided.

AGLAOPHENIA, Lamour.—PLUMULARIA, Lam.,

Where the little cells are arranged on one side only of the branches\*\*.

\* Add *Tub. ramosa*, Ellis, Corall., XVII, a;—*Tub. muscoides*, Id., XVI, b;—*Tub. Trichoïdes*, Id., Ib., a;—*Tub. solitaria*, Rapp., Ac. Nat. Cur. XIV, xxxviii, 2.

† *Tibiana fasciculata*, Lamour., Polyp. Flex., pl. vii, f. 3, a.

Here, Lamouroux places LIAGORES, TELESTIO and NEOMERIS, subgenera which perhaps would be as well arranged in the vicinity of the hollow Corallinæ.

‡ *Tubularia cornucopia*. N. B. The pretended Tubulariæ of Esper, pl. xi—xxvi, merely represent the envelopes of ova of some Mollusca Gasteropoda, the eighteenth excepted, which is a Galaxaura.

§ *Sertularia anguina*, Ell., Corall., XXII, ii. c. C, D. Lamouroux has changed this name to AETEA.

|| *Sertularia verticillata*, Ell., Corall., XIII, a;—*Sert. volubilis*, Id., XIV, a;—*Sert. ura*, Id., XV, 6;—*Sert. rugosa*, Id., XV, a, A.

¶ *Sertularia dichotoma*, Gm., Ell., Corall. XII, a, C;—*Sert. spinosa*, Id., Ib., XI, b, d;—*Sert. geniculata*, Ib., 6;—*Sert. muricata*, Sol. and Ell., Cor., VII, 3, 4,

\*\* *Sertularia myriophyllum*, Gm., Ell., Corall., VIII, a, A;—*S. pennatula*, Sol. and Ell., VII, 1, 2;—*S. pluma*, Ell., Cor., VII, b, B, 3;—*S. setacea*, Ib., xxviii, 4, D, T;—*Ol. pinnata*, Ib., XI, a, A; *S. frutescens*, Soll. and Ell. VI, a, A; *S. falcata*, Ell., Corall., VII, a, A; and xxxviii, 5, f;—*Aglaoph. cyprès*, Zool. de Freycin., pl. xci, 1—3;—*Agf. Godard*, Ib., xcv, 9, 10.

## AMATIA, Lamour.—SERRIALARIA, Lam.,

Where they are united, in certain places, like the pipes of an organ\*.

We might distinguish those species in which the cells, thus disposed, form a spiral line round the stem.

## ANTENNULARIA, Lam.—CALLIANYRA, Lamour,

Where the cells form horizontal rings round the stem †.

Thus the name of

SERTULARIA *proper*,

Becomes restricted to those in which the cells are placed on both sides of the stem, either oppositely ‡, or alternately §. The first are even again separated by Lamouroux under the name of *Dynamenes*.

Where the cells are extremely small we have his genus *THOEA* ||.

## FAMILY II.

CELLULARII (*a*).

Where each Polypus is adherent in a corneous or calcareous cell with thin parietes and only communicates with the others by an extremely tenuous external tunic or by the minute pores which traverse the parietes of the cells. These Polypi bear a general resemblance to the *Hydræ*.

CELLULARIA, *Lin.*

Where these cells are so arranged as to form branching stems in the manner of the *Sertulariæ*, but without a tube of communication in the axis. Their substance also is more calcareous.

\* *Sertularia lentigera*, Ell., Cor., XV, b, B.

† Lamouroux has since changed this name to NEMERTESIA;—*Sertularia antenna*, Gm., Ell., Cor., IX, a, A, B, C;—*Nemert. ramosa*, Lamour., Ell., Ib., b.

‡ *Sertularia abietina*, Gm., Ell., Corall., I, b, B;—*S. tamarindus*, Ib., a, A;—*S. filicula*, Soll. and Ell., c, C;—*S. polyzonias*, Ell., Cor., II, a, b, A, B;—*S. cupressina*, Ib., III, a, A; *S. argentea*, Ib., II, c, C;—*S. thuya*, Ib., V, b, B;—*S. cupressoides*, Lepech., Act. Petrop., 1780, IX, 3, 4;—*S. lichenastrum*, Ell., Cor., VI, a, A;—*S. racemosa*, Cavol., Pol. Mar. III, vi, 1, 2;—*S. fuscescens*, Bast., Op. subs., 1, 6;—*S. obsoleta*, Lepech., Act. Petrop., 1778, pars II, VII, B;—*S. pinus*, Id., 1780, p. I., IX, 1, 2;—*S. cuscuta*, Ell., Cor., xiv, c, C.

§ *Sertularia operculata*, Ell., Coral. III, b, B;—*S. pinastrum*, Sol. and Ell., vi, b, B;—*S. rosacea*, Ell., Cor., iv, a, A, B, C;—*S. pumila*, Ib., V, a, A;—*S. disticha*, Bose, Vers., III, xxix, 2;—*S. plesgica*, Id., Ib., 3;—*Dinam crisioides*, Zool. de Freycin., pl. xc, f. 12.

|| *Sertularia halecina*, Gm., Ell., Cor., X, a, A, B, C. For other subgenera established in this family by Lamouroux—PASYPHEA, SALACIA, CYMODOCEA—see his *Hist. des Polyp. flexibles*, 8vo., 1816, and his *Expos. Méthod., des genres des Polyp.* 4to., 1821.

Lamouroux separates from them

CRISIA,

Where the cells, placed in two (usually alternate) ranges, open on the same face\*.

ACAMARCHIS †.

Where, with the same arrangement we find a vesicle at each opening †.

LORICULA,

Where each articulation consist of two cells placed back to back, of which the opposite orifices are near the top that is widened ‡.

EUCRATEA,

Where each articulation has but a single cell with an oblique aperture §. We may approximate to them the

ELECTRA, Lamour,

Where each articulation is composed of several cells, arranged in a ring ||.

We should separate from them

SALICORNARIA, Cuv. ¶,

Where the cylindrical joints are hollow internally, with their entire surface occupied by cells, arranged in quincunx: they lead to Flustra, and perhaps to Corallina. In

FLUSTRA, Lin. \*\*,

We find a great number of cells united like honey-combs, sometimes covering various bodies, and sometimes forming stems or leaves, of which, in certain species, one side only is furnished with cells, and in others, both; their substance is more less corneous ††.

\* *Sertularia eburnea*, Gm., Ell., Corall., XXI, a, A;—*S. scruposa*, Id., XX, c, C;—*S. reptans*, Ib., b, B, E, F;—*S. fastigiata*, Ib., XVIII, a, A.

† *Sertularia neritina*, Gm., Ell., Corall., XIX, a, A, B, C.

‡ *Sertularia loricata*, Ell., Cor., XXI, b, B. Lamouroux calls them LORICARIE, but that name has long been devoted to a Fish of the family of the Siluridæ.

§ *Certularia chelata*, Gm., Ell., Corall., XXII, b, B; *S. cornuta*, Id., XXI, c, C.

Here come the less numerous genera, LAFOEA, ALECTO, HIPPOTHEA, for which see Lamouroux, op. cit. As to his MENIPPEÆ (*Sertularia flabellum*, Gm. Sol. and Ell., IV, c, c, 1, C, C, 1; and *S. crispa*, Ib., I, D, D), I doubt whether they belong to this group.

|| *Flustra verticillata*, Gm., Sol. and Ell., IV, a, A.

¶ *Cellularia salicornia*, Ellis, Corall., XXIII;—*Cell. cereoides*, Ell. and Sol., V, b, B, C, &c.;—*Cell. cirrata*, Sol. and Ell., IV, d, D;—*Cell. flabellum*, Ib. c, C.

\*\* N.B. According to the observations of Spallanzani, Messrs. Audouin, M. Edwards, and de Blainville, certain Flustra are inhabited by animals belonging to the group of the Ascidiæ, but, according to those of MM. Quoy and Gaynard, there are some which are very certainly inhabited by true Polypi. It is of consequence to know what species belong to the one and to the other.

†† *Flustra foliacea*, Gm.; Ell., Corall., XXIX, a, A;—*Fl. truncata*, Id., XXVIII, a, A;—*Fl. bombicina*, Sol. and Ell., IV, b, B;—*Fl. carbasea*, Id., III, 6, 7;—*Fl. pilosa*, Ell., Corall., XXXI, a, A, b;—*Fl. tomentosa*, Müll, Zool. Dan., III, xc, 1, 2;—*Fl. compressa*, Moll., Esch., C, 9; *Fl. membranacea*, Zool. Dan., CXVII, 1, 2;—*Fl. papiracea*, Moll., Esch., 8;—*Fl. tubulosa*, Bosc, XXVII, III, xxx, 2;—*Fl. den-*

CELLEPORA, *Fab.*

Masses of small calcareous vesicles or cells, crowded one against the other, and each perforated by a little hole\*.

TUBULIPORA, *Lam.*

Masses of little tubes, of which the aperture is as wide as the bottom, or wider†.

Bodies exist in the ocean that resemble the Corals (Polypiers) of which we have been speaking, both in substance and their general form, but in which Polypi have not yet been discovered. Their nature is consequently doubtful, and great naturalists, such as Pallas and others, have considered them as plants; others, however, considered them as having very small cells, and as being inhabited by coralliferous Polypi. In this case they belong to the present order. Those, in which the interior is filled with corneous threads, still present some analogy to the Ceratophyta. In the

CORALLINA, *Lin.*,

We observe articulated stems placed on species of roots, and divided into branches, also articulated, on the surface of which no pores can be seen, and in which no Polypi have hitherto been discovered.

They are divided as follows.

CORALLINA, *proper*,

Where the calcareous joints have a homogeneous appearance, and are without any apparent bark.

*C. officinalis*. L.; Ell., Corall., XXIV, a, A, b, B. The bottom of the sea on certain coasts is completely covered with this coral, the joints of which are oboval and the ramusculi arranged like pinnate leaves, bearing other branches similarly disposed. It is

*tata*, Ell., Corall., XXIX, C, D, D;—*Fl. quadrata*, Desmar. and Less., *Bullet. Philom.*, 1814, X, v;—*Fl. depressa*, Moll., f. 21;—*Fl. épineuse*,—*Fl. à diadème*;—*Fl. à collier*;—*Fl. globifère*. The whole four of Zool. de Freycin., pl. 89;—*Fl. à petit vase*, Ib. 91;—*Fl. gentille*;—*Fl. margaritifera*, Ib., 92;—*Fl. à grande ouverture* Ib., pl. 93, f. 6, 7;—*Fl. à petits sillons*;—*Fl. à gibecière*;—*Fl. à petits nids*, Ib., 95, and the new species figured in the great work on Egypt, Zool. Zooph., p. 7—10. To this genus also are attached the PHERUSÆ of Lamouroux—*Fl. tubulosa*, Esper, IX, 1, 2;—his BERENICES, Lamour., Sol. and Ell., pl. LXXX, f. 1—6;—his ELSERINÆ, Ib., LXIV, 15 and 16, and other subgenera, for which see his work.

\* *Cellepora hyalina*, Gm., *Cavol. Pol. Mar.*, III, ix, 8, 9;—*C. magnerville*, Lamour., *Polyp. Flex.*, pl. i, f. 3;—*C. megastoma*, Desmar., and the *Bullet. Philom.*, 1814, II, 5;—*C. globulosa*, Ib., 7;—*C. annulans*, Moll., Esc., 4;—*C. pumicosa*, Ell., Corall., XXVII, F, and XXX, d, D;—*C. rubra*, Müll., Zool. Dan., CXLVI, 1, 2;—*C. radiata*, Moll., Esc., 17, A, I;—*C. sedecimdentata*, Id., 16, A, C;—*C. bimucronata*, Id., 18, A, C;—*C. vulgaris*, Id., 10, A, B;—*C. borniana*, Id., 14, A, C;—*C. Otto-Mulleriana*, Id., 15, A, C.

† *Millepora tubulosa*, Gm., Ell., Corall., XXVII, e, E.

white, reddish, or greenish. It was formerly employed in pharmacy on account of its calcareous nature\*.

Lamouroux also distinguishes, but for trivial reasons,

#### AMPHIROEA,

Where the articulations are elongated †.

#### JANIA,

Where the branches are merely more slender and the articulations less cretaceous ‡.

#### CYMOPOLIA,

Where the articulations are separated from each other § by corneous intervals; the pores on their surface are more decidedly marked.

M. de Lamarek had already separated

#### PENICILLA, Lam.—NESEA, Lamour,

Where the stem is simple and composed internally of corneous fibres woven, and as it were, felted together; it is encrusted by a calcareous covering, and terminated by a bundle of articulated branches analogous to those of the ordinary Corallinæ ||.

#### HALYMEDES, Lamour,

Where the stems are articulated and divided as in Corallina; but the substance of their joints, which are very wide, is penetrated internally by corneous threads, from which the calcareous crust is easily detached by acids ¶.

#### FLABELLARIA, Lam.,

Where there are no distinct articulations; they consist of large foliaceous expansions formed like the joints of the Halymedes and the stem of the Penicillæ, of corneous threads enveloped with a calcareous crust\*\*.

\* Add *Corallina elongata*, Gm., Ell., Corall., XXIV, 3;—*C. cupressina*, Esper., Zooph., VII, 1, 2;—*C. squammata*, Ell., XXIV, c, C;—*C. granifera*, Sol. and Ell., XXI, c, C;—*C. subulata*, Id., Ib., b;—*C. Turneri*, Lamour., Pol. Flex., X, 2;—*C. crispata*, Id., Ib., 3;—*C. simplex*, Id., Ib., 4;—*C. calvadosii*, Sol. and Ell., XXIII, 14;—*C. palmata*, Id., XXI, a, A;—*C. sagittata*, Zool. de Freycin., pl. 95, f. 11 and 12.

† *Corallina rigens*, Sol. and Ellis, XXI, d;—*C. tribulus*, Id., Ib., c;—*C. cuspidata*, Id., f;—*Amph. fucoides*, Lamour., Polyp. Flex., XI, 2;—*Amph. gailloni*, Id., Ib., 3;—*A. verrucosa*, Id., Ib., 5;—*A. jubata*, Id., 6.

‡ *Corallina rubens*, Ell., Corall., XXIV, f. F;—*Jania micrarthrodia*, Lamour., Pol. Flex., I, 69, f. 5, and Sol. and Ell., pl. 69, f. 7 and 8;—*J. crassa*, Id., pl. 69, f. 9, 10;—*J. compressa*, Zool. de Freycin., pl. 90, f. 8, 9, 10.

§ *Corallina barbata*, Gm., Ell., Corall., XXV, c, C;—*C. rosarium*, Sol. and Ell., XXI, b, H.

|| *Corallina penicillum*;—*C. peniculum*;—*C. phoenix*;—*Nesaea nudulosa*. Zool. de Freyc., pl. 91, f. 8, 9.

¶ *Corallina tuna*, Soll. and Ell., XX, e;—*C. opuntia*, Id., Ib., b;—*C. incrassata*, Id., Ib., d. It is the second division of the Flabellarie of Lamarek.

\*\* *Corallina conglutinata*, Sol. and Ell., XXV, 7;—*C. flabellum*, Id., XXIV, C; and *C. paronia*, Esper., Corall., VIII, IX—the first division of the Flabellarie of Lamarek. Lamouroux has changed this name to UDOTEA.

GALAXAURA, *Lamour*,

Where the stems are dichotomous, but their branches hollow\*.

LIAGORA, *Lamour*,

Where the stems are hollow and dichotomous, but are without articulations †.

It is perhaps directly after the *Corallinæ* that should come the

ANADIOMENE, *Lamour*,

Vulgarly termed *Corsican Moss*, and which is so useful as a verni-fuge.

It is composed of articulations, regularly ramous, and consists of a somewhat corneous substance invested with a gelatinous covering ‡.

Of all these productions without apparent *Polypi*, which are conjecturally referred to the *Coralliferi*, few are more singular than the *Acetabula*, or

ACETABULUM, *Lam.*,

Where we find a slender and hollow stem supporting a round thin plate, like a parasol, with radiating striæ, cranulated at the edge and having a little smooth disk surrounded with pores in the centre. No *Polypi* can be discovered in them. The rays of the disk are hollow and contain greenish granules, a circumstance which led *Cavolini* to consider them as plants §.

One of them—*Tubularia acetabulum*, Gm.—*Donat.*, *Adri.*, III; *Tournef.*, *Ins.* CCCXVIII ||, is found in the Mediterranean.

POLYPHYSA, *Lam.*,

Where, as in the preceding, we find a hollow and slender stem, but which bears on its summit a bundle of little closed vesicles in place of a disk formed of tubes ¶.

\* *Corallina obtusata*, Sol. and Ell., XXII, 2;—*C. lapidescens*, Id., Ib., 9;—*Tubularia fragilis*, L.; Sloane, *Jam.*, XXX, 10;—*Tubul. umbellata*, Esper, *Tubul.*, XVII;—*Corallina marginata*, Sol. and Ell., XXII, 6;—*Corall. fruticulosa*, Ib., 5;—*Galaxaure roide*, *Zool. de Freycin.*, pl. 91, f. 10, 11.

† *Corallina marginata*, Sol. and Ell., XXII, 6;—*C. fruticulosa*, Id., Ib., 5.

‡ *Anadiomene flabellata*, *Lamour*; *Poll. Flex.*, XIV, f. 3, and *Sol. and Ell.*, *App.*, pl. 69, f. 15, 16.

N.B. The *Galaxauræ* and *Liagoræ* form the genus *DICHOTOMARIA* of *Lamarck*, but are not, as that naturalist thought, vaginiform *Coralliferi*, for there are no *Polypi* in the tube.

§ I cannot find the openings round the circumference mentioned by M. de *Lamarck*. The tubes which form the rays are closed. The pretended pentacula described by *Donati* were foreign bodies. Neither the *Acetabula* nor *Polyphysa* are vaginiform *Polypi*.

N.B. Since the first edition of this work, M. *Rafeneau*, of *Lille*, has presented a *Memoir* to the *Academy*, in which he considers the *Acetabulum* as a plant, belonging to the family of the *Confervæ*.

|| Add the *Acetabule petit godet*, *Zool. de Freycin.*, pl. xc, f. 6, 7.

¶ *Pol. aspergillum*, *Lamour*; *Sol. and Ell.*, *App.*, pl. 69, f. 2—6, or *Fucus peniculus*, *D. Turner*, *Fuc.*, IV, pl. 228.



## FAMILY III.

## CORTICATI.

This family comprises genera in which all the Polypi are connected by a common, thick, fleshy or gelatinous substance, in the cavities of which they are received, and which envelopes an axis varying in form and substance. The Polypi of those that have been observed are somewhat more complex than the preceding ones, and approximate more closely to the Actiniae. Internally we observe a stomach from which eight intestines originate, two that are prolonged into the common mass, and two that are shorter, and seem to supply the place of ovaries\*.

They are subdivided into four tribes.

In the first, that of the

## CERATOPHYTA,

The internal axis has the appearance of wood or horn, and is fixed. Two genera of them are known, and both extremely numerous.

ANTIPATHES, *Lin.*,

Commonly termed *Black Coral*, where the ramous and ligenous-like substance of the axis is enveloped with a bark so soft, that it becomes destroyed after death, when it resembles branches of dry wood †.

GORGONIA, *L.*,

Where, on the contrary, this horny or ligneous substance of the axis is enveloped by a bark the thickness of which is so penetrated by calcareous granules, that it dries on the axis, retaining its colours, which are frequently extremely vivid and beautiful; it is soluble in acids. The Polypi of several species have been observed; each one is furnished with eight denticulated arms, a stomach, &c. like those of *Corallina* and *Aleyonium* ‡.

M. Lamouroux separates from them

\* M. Savigny has published some observations on these animals, not less interesting than those on the compound *Ascidia*.

† *Ant. spiralis*, Sol. and Ell., pl. XIX, f. 1, 6; and the other species indicated by Lamarck, *Anim. sans Vert.*, II, p. 305, et seq.

‡ *Gorgonia pinnata*, Gm.;—*G. americana*;—*G. setosa*;—*G. sanguinolenta*, which Lamouroux considers as varieties of a single species;—*G. petechians*, Sal. and Ell., XVI;—*G. patula*, Sol. and Ell., XV, f. 3, 4;—*G. palma*, Sol. and Ell., XI;—*G. verriculata*, Id. XVII;—*G. umbraculum*, Id., X;—*G. exserta*, Id., XV, 1, 2;—*G. ceratophyta*, Id., II, 1, 2, 3; IX, 5, 6, 7, 8; XII, 2, 3; *G. riminalis*, Id., XII, 1;—*G. verticillaris*, Id., II, 4, 5;—*G. Briareus*, Id., XIV, 1, 2, &c.

## PLEXAURES,

Of which the thick bark, with non-salient cells, effervesces but slightly in acids\*.

## EUNICEA,

Where the bark, organized like that of the Plexaures, is furnished with projecting mammillæ, from which the Polypi protrude †.

## MURICEA,

Where the moderately thick bark is provided with projecting mammillæ, covered with imbricated and rough scales ‡.

## PRIMNOA,

Where the elongated mammillæ become imbricated by hanging one over the other§.

In the second tribe, that of the

## LITHOPHYTA,

The internal axis is of a strong substance and fixed. In

ISIS, *Lin.*,

This axis is ramous, and has no cells or cavities on its surface. The animal bark which envelopes it is mixed with calcareous granules, as in the Gorgoniæ. In the

CORALLIUM, *Lam.*,

The axis is without articulations, and is merely striated on its surface. It is to this subgenus that belongs the

*Isis nobilis*, L.; Esp., I, VII. or Coral of commerce, so celebrated for the beautiful red colour of its stony axis, and for the high polish of which it is susceptible. It constitutes the object of a lucrative fishery in several parts of the Mediterranean. Its bark is reddish and cretaceous. The Polypi, as in many other genera, have eight denticulated arms.

MELITÆA, *Lam.*,

Where the stony substance of the axis is interrupted by knots filled with a matter resembling cork ||. In

ISIS, *Lam.*,

Or Isis properly so called, it is interrupted by strangulations, of which

\* *Gorgonia crassa*, Gm., Ac. des Sc., 1700, pl. ii;—*G. suberosa*, Ell., Corall., XXVI, f. p, q, r;—*G. friabilis*, Lamour., Sol. and Ell., XVIII, f. 3.

† *Gorgonia antipathes*, Seb.; III, civ, 2, cvii, 4;—*Eun. limiformis*, Lamour., Sol. and Ell., XVIII, f. 1;—*Eun. clavaria*, Id., Ib., 2;—*Eun. mammosa*, Lamour., add to Sol. and Ell., LXX, f. 3.

‡ *M. spicifera*, Lamour., or *Gorg. muricata*, Gm.; App. to Sol. and Ell., LXXI, f. 1, 2;—*M. elongata*, Lamour., Id. f. 3, 4.

§ *Gorg. reseda*, Gm.; Sol. and Ell., XIII, f. 1, 2.

|| *Isis ocracea*, Esper., I, iv;—*Is. coccinea*, Id., III, A, 5.

the substance resembles horn. The thick and soft bark falls more easily than that of the preceding ones\*.

M. Lamouroux also distinguishes from *Isis* proper,

MOPSEA,

Where the bark is thinner and more durable †.

MADREPORA, *Lin.*

The stony portion of Madreporæ is either ramous, or forms rounded mosses, or leaves, but is always furnished with lamellæ, which unite concentrically in points where they represent stars, or which terminate in lines more or less serpentine. While alive, this stony portion is covered with a living bark, soft, gelatinous, and completely covered with rosettes of tentacula which are the Polypi, or rather the Actiniæ, for they usually have several circles of tentacula and the lamellæ of the stars correspond in some respects to the membranous laminæ of the body of the Actiniæ. The bark and Polypi contract on the slightest touch.

The diversity of their general form, and of the figures which result from the combination of their lamellæ, has given rise to various subdivisions, several of which however re-enter others. It will be impossible to establish them definitively until the relation of the Polypi with those forms are known.

When there is but a single star, circular or in an elongated line, with very numerous laminæ, we have the FUNGIA, Lam. ‡. The animal exactly represents a single Actinia, with large and numerous tentacula, and of which the mouth corresponds to the depressed part in which all the laminæ terminate.

Stony corals with a single star, that appear to have been perfectly free from adhesion, are found among fossils, and constitute the TURBINOLIA, Lam. §, CYCLOLITHUS ||, and TURBINOLOPSIS, Lamouroux ¶.

When the Madreporæ is ramous, and the stars are confined to the extremity of each branch, it becomes the CARYOPHYLLIA, Lam. The branches are striated. At each star is a mouth surrounded with numerous tentacula\*\*.

\* *Isis hippuris*, L.; Sol. and Ell., Zooph., III; Esper, I, 1;—*Is. elongata*, Esper, I, vi.

† *Isis dichotoma*, Seb., III, cvi, 4;—*Is. encrinula*, Lam., or *Is. verticillata*, Lamour., Pol. Flex., XVIII, f. 2, and App. to Sol. and Ell., LXX, f. 4.

‡ *Mad. fungites*, L., or *Fungiu agariciformis*, Lam., Sol. and Ell., pl. XXXVIII, f. 5, 6;—*M. patella*, or *F. patellaris*, Lam., Id., Ib., 1, 2, 3, 4;—*M. pileus* or *Fung. limacina*, Lam., Id., pl. XLV; Seb. III, cxi, 3, 5;—*F. talpa*, Lam.; Seb., cxi, 6, and cxii, 31.

§ *Mad. turbinata*, L.; Am. Ac., I, iv, 1, 2, 3, 7;—*Turb. crispa*, Lamour., App. to Sol. and Ell., LXXIV, f. 14—17;—*T. cristata*, Ib., f. 18, 21;—*T. compressa*, Ib., 22, 23.

|| *Mad. porpita*, L., Am. Ac. I, iv, 5; *Cycl. elliptica*, Guett., Mem., III, xxi, 17, 18.

¶ *Turbinolopsis ocracea* Lamour., App. Sol. and Ell., pl. LXXXII, f. 4, &c.

\*\* *Madr. cyathus*, Sol. and Ell., XXVIII, f. 7;—*M. calicularis*, Gm., Esper, I, pl. xvi;—*M. fasciculata*, Sol. and Ell., XXX;—*M. flexuosa*, Sol. and Ell., XXXII, 1;—

## OCULINA, Lam.

The Oculinæ have very short lateral ramusculi, giving them the appearance of having stars along the branches as well as at the end\*. In

## MADREPORA, Lam.,

Or his Madrepores proper, the whole surface is roughened by little stars with projecting edges †.

In his POCILLOPORA we observe little impressed stars with pores in the intervals ‡.

In his SERIALOPORA, these little stars are disposed in linear ranges §.

## ASTREA, Lam.,

A broad surface, usually convex and excavated by crowded stars, each containing a polypus furnished with numerous arms, but on a single range, in the centre of which is the mouth ||.

When it is a plane surface, or forms broad laminæ covered with stars on one side, it becomes an EXPLANARIA ¶.

The PORITES are a sort of ramous Astreæ \*\*.

When this surface is marked with elongated lines, like little valleys separated by transversely furrowed hills, we have the MEANDRINA, Lam.

In each valley, and from space to space, we find mouths; and the tentacula, instead of forming rosettes round them, form a range along the sides of the valley. In some species they are totally wanting, the margin of each mouth being merely festooned ††.

If the hills which separate these valleys are raised in leaves or crests, sulcated on both sides, it is a PAVONIA. Mouths, usually without tentacula, are found at the bottom of the valleys ††.

When these hills are conical or like projecting stars, we have the HYDNOPHORA of Fischer, and the MONTICULARIA of Lamarck. They should be distinguished according to the situation of their Polypii,

*M. ramea* Sol. and Ell., XXXVIII;—*M. fastigiata*, Id., XXXIII;—*M. angulosa*, Id., XXXIV; *M. carduus*, Id., xxxv, &c.

\* *Mad. virginea*, L.; Sol. and Ell., XXXVI;—*M. hirtella*, Id., XXXVII;—*M. axillaris*, Id., XII, 5;—*M. prolifera*, Id., XXXII, 2, &c.

† The species arranged by Lamarck in this subgenus are regarded by Gmelin, Esper, &c., as varieties of the *Madrepora muricata*, L.; Pol. and Ell., LVII, &c.

‡ *Mad. dumicornis*, Esper, XLVI;—*Millepora caerulea*, Sol. and Ell., XII, 4.

§ *Mad. seriata*, Pall.; Sol. and Ell., XXXI, 1, 2.

|| *Mad. radiata*, Sol. and Ell., XLVII, 8;—*M. annularis*, Sol. and Ell., LIII, 1, 2;—*M. rotulosa*, Id., LV, 1, 3;—*M. ananas*, Id., XLVII, 6;—*M. pleiades*, Id., LIII, 7, 8;—*M. stellulata*, Id., LIII, 3, 4;—*M. furcosa*, Id., L, 1;—*M. denticulata*, Id., XLIX, 1;—*M. abdita*, Id., L, 2;—*M. siderea*, Id., XLIX, 2;—*M. galarea*, Id., XLVII, 7.

¶ *Mad. cinerascens*, Sol. and Ell., XLIII;—*M. aspera*, Id., XXXIX.

\*\* *Mad. porites*, Sol. and Ell., XLVII;—*M. foliosa*, Id., LII, &c.

†† *Mad. labyrinthica*, Sol. and Ell., XLVI, 3, 4;—*M. cerebriformis*, Seb., III, cxii, 1, 5, 6;—*M. dædalea*, Id., XLVI, 1;—*M. meandrites*, Id., XLVIII, 1;—*M. areolata*, Id., XLVIII, 4, 5;—*M. crispa*, Seb., III, cviii, 3—5;—*M. gyrosa*, Sol. and Ell., LI, 2;—*M. phrygia*, Id., XLVIII, 2;—*M. filograna*, Gm.; Gaull. Ind., XCII.

‡‡ *Mad. agaricites*, Sol. and Ell., 43;—*Mad. lactuca* Id., XLIV;—*M. cristata*, Id., XXXI, 3, 4, &c.

which are at the summit of the projecting parts, as in *Oculina*, or at the bottom of the cavities, as in *Meandrina* \*.

#### AGARICINA.

The Agaricinæ are composed of laminae hollowed on one side only by the valleys, which are themselves sulcated †.

It is thought that we may approximate to the Madreporæ in general, certain corals (*Polypiers*) or the *SARCINULA*, Lam., composed of cylinders, a section of which forms stars, by reason of the projecting laminae which traverse the interior ‡. When there is a solid axis in the middle of these laminae we have *STYLINA*. These corals are perhaps as nearly related to the *Tubiporæ*.

#### MILLEPORA, Lin.,

Where the stony portion is extremely various in form, and the surface merely marked with little holes or pores, or even without any apparent orifices.

#### DISTICOPHORA, Lam.,

Where the more strongly marked pores are arranged on two sides of the branches §. Of those in which the pores are equally distributed, we distinguish

#### MILLEPORA, Lam.,

Or *Milleporæ* proper, which are solid, and variously ramous ||.

When their pores are not apparent, as is sometimes the case, they are called *NULLIPORA* ¶.

Then we have the

#### ESCHARA, Lam.,

Which are furnished with flattened, foliaceous expansions \*\*.

#### RETEPORA, Lam.,

Which are *Escharæ*, pierced with meshes ††.

#### ADEONA, Lamour.

*Escharæ* borne on an articulated stem; some are entire, and others pierced with meshes ††.

\* *Mad. exesa*, Sol. and Ell., XLIX, 3;—and the different *Hydnophoræ* of Fischer.

† *Mad. cucullata*, Sol. and Ell., XLII;—*M. undata*, Id., XL;—*M. complicata*, Id., xli, 1, 2.

‡ *Mad. organum*, L., Ann. Ac., I, iv, 6.

§ *Millepora violacea*, Pall., Sol. and Ell., pl. XXVI, f. 3, 4, copied Encyc. Méthod., Vers, pl. 481, f. 1.

|| *Millepora alcicornis*, Pall., Esper. I, v, 7, and Supp. I, xxvi;—*Mill. aspera*, Lam., Esper. Supp., I, xviii;—*M. truncata*, Sol. and Ell., XXIII, f. 1—8.

¶ *Millepora informis*, Ell., Corall., XXVII, f. c;—*M. calcarea*, Sol. and Ell., XXIII, f. 13;—*M. cretacea*, Id., Ib., 9;—*M. alga*, Id., Ib., 10, 11, 12.

\*\* *Millepora foliacea*, Ell. Corall., XXX, f. a;—*Eschara lichenoides*, Seb., III, c. 10;—*Esch. lobata*, Lamour., add to Sol. and Ell., LXXII, f. 9—12.

†† *Millepora cellulosa*, vulgo, *Manchette de Neptune*, Ell., Corall., XXV, f. d.; Daubent., Pl. Eal., No. 23, No. XXI;—*M. reticulata*, Marsill., Hist. Mar. pl. XXIV, f. 165, 166.

‡‡ *Adeona grisea*, Lamouroux, Sol. and Ell., LXX, f. 5;—*Ad. follicolina*, Id.

For these genera as well as several others, established on consideration of but

In the third tribe, or the

NATANTES,

The axis is stony but not fixed.

PENNATULA, *Lin.*,

A common body, free from all adhesion\*, of a regular and constant form, and susceptible of locomotion by the contractions of its fleshy portion and the combined action of its Polypi. This body is fleshy, and contracts or dilates in its various parts by means of the fibrous layers that enter into its composition; its axis encloses a simple stony stem; the Polypi have generally eight dentated arms.

Most of the species diffuse a vivid phosphorescent light.

Whatever be the general form of the Pennatulæ, one of their extremities is always destitute of Polypi, and has been compared to the tubular portion of a bird's feather.

PENNATULA, *Cuv.*

The Pennatulæ, properly so called, have given their name to the whole genus, which name has been derived from their own resemblance to a quill. The portion destitute of Polypi is cylindrical and terminates in an obtuse point. The other part is furnished on each side with wings or laminae, more or less long and broad, supported by spines or rigid setæ which arise from their interior and roughen one of their edges, without, however, being articulated with the stony stem of the axis; it is from between their laminae that the Polypi protrude.

*P. rubra*, *P. phosphorea*, Gm.†; Albinus, Annot. Acad., I, vi, 3, 4. Where the stem between the laminae is extremely scabrous posteriorly, with the exception of a longitudinal line. In the Atlantic ocean and Mediterranean.

*P. grisea*, Gm.; Albinus, Annot. Acad., I, vi, 1, 2. Larger, with broader and more spinous laminae; stem smooth. More particularly in the Mediterranean‡.

VIRGULARIA, *Lam.*

The Virgulariæ only differ from the Pennatulæ in their wings, which, much shorter in proportion to their total length, are destitute of spines§.

These wings sometimes merely represent transversal ranges of tubercles||. In

little importance, see the "*Exposition Methodique des genres des Polypiers, avec les planches de Solander et Ellis*," by Lamouroux. Paris, 1821.

\* Certain species penetrate into the sand or become entangled in the folds of various marine bodies, but never form any durable adhesion.

† Both are red. The *P. rubra* only differs from the other in having a little spine at the base of each posterior lamina. It is perhaps a mere variety.

‡ Add *Pennatula argentea*, Sol. and Ell., Zooph., VIII, 1, 2, 3;—*P. grandis*.

§ *Pennatula mirabilis*, Müll., Zool. Dan., XI, very different from the true *Pennat. mirabilis* of Linnæus.

|| *Pennatula juncea*, Pall. and Gm.; also very different from the *P. mirabilis*, L. The *Virgulaire australe*, Lam., does not differ from the *juncea*.

SCIRPEARIA, *Cuv.*,

The body is very long and slender, and the Polypi are insulated and ranged alternately along the two sides\*. In

PAVONARIA, *Cuv.*,

The body is also elongated and slender, but the Polypi only occupy one side, where they are crowned in quincunx †. In

RENILLA, *Lam.*,

The body is short, and instead of that part which in *Pennatula* proper is furnished with filaments, has a broad reniform disk bearing the Polypi on one of its faces ‡. In the

VERETILLUM, *Cuv.*,

We find a cylindrical body, simple and without branches, furnished with Polypi in a portion of its length. The bone is usually small and the Polypi large. We can trace the prolongations of intestines into the common stem in these compound Zoophytes much more easily than in any of the others.

One species that inhabits the Mediterranean—*Pennatula cynomorium*, Pall., *Miscell. Zool.*, XIII; *Alcyonium epipetrum*, Gm.; *Rap.*, *Ac. Nat. Cur.*, XIV, p. 2, pl. xxxviii, 1, is frequently more than a foot in length, thicker than the thumb, and remarkable for the phosphoric light that it diffuses §.

Finally, in the

OMBELLULARIA, *Cuv.*,

We remark a very long stem, supported by a bone of similar length, and terminated at the summit only by a bundle of Polypi ||.

Small, porous and stony bodies, which naturalists have thought may be approximated to the *Millepora*, are found among fossils and in the ocean. If they were enveloped by a rind or bark containing Polypi, they would be movable Coralliferi, and should rather be placed near the *Pennatulæ*. Such are the

OVULITES, *Lam.*, which have the form of eggs, hollow, and frequently perforated at both ends: the LUNULITES, which are orbicular, convex, striated, and porous on one side, and concave on the other: and the ORBULITES, that are orbicular, flat, or concave, porous on both sides or on the edges. If the DACTYLOPORA be free, as is the opinion of Lamarck, it will also belong to this subdivision; it is a

\* *Pennatula mirabilis*, L.; *Mus. Ad. Fred.*, XIX, 4.

† *Pennatula antennina*, Bohatsch, IX, 4, 5;—*Penn. scirpea*, Pall. and Gmelin.

‡ *Pennatula reniformis*, Ell., *Phil. Trans.*, LIII, xix, 6, 13, or *Alcyonium agaricum*, Gm.

§ Add *Pennatula phalloïdes*, Pall., *Misc. Zool.*, XIII, 5—9;—*Pennat. stellifera*, Müll., *Zool. Dan.*, XXXVI, 1—3.

|| *Pennatula encrinus*, Ell., *Corall.*, XXXVII, a, b, c.

N.B. The *Pennatula filosa* and the *Pennatula sagitta* are parasitical animals of the genus *Lerneæ* (PENNELLA, Oken), and not *Pennatulæ*. The *Pennat. sagitta*, Esper, *Pennat.*, pl. v, is very different from that of Linnæus, and is perhaps a *Nephtys*.



hollow ovoid, open at both ends and with two envelopes, both perforated by meshes like the *Retepora*\*.

In the fourth tribe the animal rind or bark encloses a mere fleshy substance without an axis either osseous or horny. In

#### ALCYONIUM, *Lin.*,

As in the *Pennatulæ*, we observe *Polypi* with eight denticulated arms, and intestines prolonged into the common mass of the ovaries: but this mass is not supported by an osseous axis; it is always fixed to the body; and where it is drawn out into trunks and branches, nothing is found internally, but a gelatinous substance traversed by numerous canals surrounded with fibrous membranes. The bark is harder and excavated by cells, into which the *Polypi* withdraw more or less entirely. The

*A. digitatum*, Ell., Corall., XXXII, which is divided into thick and short branches; and the *A. exos*, where branches are more slender, of a beautiful red, &c., are very abundant in European seas.

Linnaeus and his successors have rather lightly united to the *Alcyonia* various marine bodies of different tissues but always without any visible *Polypi*. Such are

#### THETHYA, *Lam.*,

Where we observe the interior roughened with long, siliceous, spiral lines, which unite on a similarly siliceous and central nucleus. The crust, as in *Spongia*, presents two sorts of holes; the first, closed by a sort of grating, must be for the intermission of water, and the second, which are gaping, for its exit †.

After the *Alcyonia* are also placed the

#### SPONGIA, *Lin.* ‡,

Or Sponges; marine, fibrous bodies whose only sensible portion appears to be a sort of tenuous gelatine, which dries off, scarcely leaving a trace of it, and in which neither *Polypi* nor other moving parts have yet been discovered. Living Sponges are said to exhibit a sort of tremulousness or contraction when they are touched; it is also affirmed that the pores, with their superficies, are perforated, and

\* The *Rétéporite*, Bosc., Journ. de Phys., June 1826. For these genera of little free *Millepora*, see also the work of Lamouroux just quoted.

† See Messrs. Audouin and Milne Edwards, Ann. des Sc. Nat., XV, p. 17.

N.B. A great portion of the *Alcyonia* of Lam. belong in reality to his *Thethyæ*.

Add the fossil genera, which M. Lamouroux thinks he can approximate to the *Alcyonia* or *Thethyæ*: his *HALLIROE*, and those which form his order of the *ACTINIARIA*; his *CHENONDOPORA*, *HIPALINE*, *LIMNOREÆ*, *SERÆÆ*, &c.—all productions of which the nature is more or less problematical.

‡ The genus of the Sponges is extremely rich in curious species, and would well repay its study. M. de Lamarek—An. sans Vert., II, 345, et seq.—will prove an excellent guide. See also the important Memoir of M. Grant, Ann. des Sc. Nat., XI, pl. xvi.

present a sort of palpitation ; the existence of these motions, however, is doubted by M. Grant \*.

Sponges assume innumerable shapes, each according to its species, and resemble shrubs, horns, vases, tubes, globes, fans, &c.

Every one knows the

*S. officinalis*, or common Sponge, which is found in large fibres, formed of extremely fine, flexible, and elastic fibres, perforated with numerous pores and little irregular canals, all of which intercommunicate.

## CLASS V.

### INFUSORIA.

Naturalists usually close the catalogue of the animal kingdom with beings so extremely minute as to be invisible to the naked eye, and which have only been discovered since the invention of the microscope has unveiled to us, as it were, a new world. Most of them present a gelatinous body of the greatest simplicity, and for these, this is undoubtedly the situation ; but authors have placed among the Infusoria, animals apparently much more complicated, and which only resemble them in their minuteness, and the dwelling in which they are usually found.

They will constitute our first order, though we must still insist upon the doubts relative to their organization, which are not yet dissipated †.

### ORDER I.

#### ROTIFERA.

The Rotifera, as above stated, are distinguished by a greater degree of complication. Their body is oval and gelatinous ; we can distinguish in it a mouth, a stomach, and intestine, and an anus near

\* M. Audouin and M. Edwards, Ann. des Sc. Nat., XI, pl., xvi, have adopted this opinion of M. Grant.

† N.B. As the nature of this work does not require me to enter into the endless details concerning these infinitely minute beings, and as I can say nothing concerning them from my own observations, I can only refer the reader to the work of M. Bory de Saint Vincent, entitled "*Essai d'une Classification des Animaux Microscopiques*," extracted from the second volume of the Zoophytes, of the Encyc. Méthodique, Paris, 1826, where these little animals are divided into eighty-two genera.

the first. It most commonly terminates posteriorly in a tail that is variously constructed, and anteriorly it bears a singular organ, variously lobate, with denticulated edges, and of which the denticulations vibrate successively in such a manner as to give the organ itself the appearance of one or more dentated and revolving wheels. One or two prominences on the neck have even appeared to some observers to be furnished with eyes. This revolving organ does not serve to direct their aliment to the mouth; it may be supposed to have some connection with the function of respiration\*. In

#### FURCULARIA, Lam.,

The body is unarmed; the tail is composed of articulations which enter one into the other, and is terminated by two threads.

It is on one of these—the *Furcularia* or *Rotifère des toits*—that Spallanzani performed his famous experiments. Covered with dust in the spouts on the roofs of houses, it becomes desiccated, and after remaining in that state for several weeks re-acquires life and motion on being humected with a little water.

The TRICHOERCÆ, Lam., appear to me to differ from the *Furcularia* only in the diminished development of their vibratile organs †. The

#### VAGINICOLA, Lam.,

Seem to be *Trichocercæ* with a diaphanous envelope; but we may be allowed to fear there has been some optical illusion ‡.

#### TUBICOLARIA, Lam.

The *Tubicolaria* only differ from the *Furcularia*, by secreting themselves in little tubes, which they construct of foreign molecules, but which do not form any portion of their body, like those of the *Coraliferi* (polypiers). Their rotatory organ however shows itself out of the tube, nearly in the manner of the head of *Polypi*.

There is a species in France common on the *Confervæ* of the marshes—*Vorticella tetrapetala*, Blumenb.; Dutrochet, Ann. du Mus., XIX, xviii, 1—10—whose rotatory organ is divided into four lobes.

#### BRACHIONUS, Mull.

The *Brachioni*, with rotatory organs and a tail nearly similar to those of the *Furcularia*, have a sort of membranous or squamous shield, which covers their back like that of certain *Monoculi*.

\* For the organization of these animals, see the Memoir of M. Dutrochet, Ann. du Mus. XIX, p. 355.

† *Trichoda paxillum*, Müll. XXIX, 9—12; Encyc., XV, 19, 20;—*Trich longicauda*, Müll., XXXI, 10.

‡ *Trich. innata*;—*Tr. ingenua*;—*Tr. inquilina*, Müll.

## ORDER II.

## HOMOGENEA.

The body of the Homogenea presents neither viscera nor other complication, and is frequently destitute of even the appearance of a mouth.

The first tribe comprises those which, with a gelatinous body more or less contractile in its different parts, still present external organs consisting of cilia more or less strong.

When they have the form of a horn (cornet), from which the cilia issue as in the Polypi, called *Vorticellæ*, we have the

UREOLARIA, *Lam.*

When the body is flat, and these cilia are at one extremity.

## TRICHODA,

When they surround the whole body,

## LEUCOPHRA,

When some of them are stout, and represent species of horns,

## KERONA,

When these pretended horns are elongated into threads.

## HIMANTOPES.

The second tribe consists of those which exhibit no external organ whatever, if we except a tail. In

CERCARIA, *Mull.*,

The oval body is in fact terminated by a thread. To this genus belong (among others) those animalcules which are observed in the semen of various animals, and on which so many fantastic theories have been founded.

When this thread is forked, as is sometimes the case, we have the *FURCOCERCA* of Lamarck.

VIBRIO, *Mull.*,

Where the body is round and slender like a bit of thread.

It is to this genus that belong the

*V. glutinis et aceti*, or the pretended *Eels* that are seen in *vinegar* and *paste*. Those that inhabit the former are frequently perceptible to the naked eye. It is asserted that they change their skin, consist of two sexes, produce living young ones in summer, and eggs in autumn. Freezing will not kill them. The others make their appearance in diluted paste.

ENCHELIS *Mull.*,

Where the body is oblong, softer, and less determined than that of a *Vibrio*.

In *CYCLIDIUM* it is flat and oval.

In *PARAMECIUM* it is flat and oblong.

In *KOLPODA* it is flat and sinuous.

In *GONIUM* it is flat and angular.

And in *BURSARIA*, hollow like a sac.

The most singular genus of the whole is the

PROTEUS, *Lin.*

No determinate form can be assigned to them; their figure changes every instant, and is sometimes rounded, sometimes divided and subdivided into thongs, in the most odd and singular manner\*.

MONAS, *Mull.*,

The monades, viewed under the microscope, resemble points moving with great rapidity, although destitute of any apparent organ of motion.

## VOLVOX.

A globular body revolving on its axis, and frequently containing smaller globules, which are doubtless the continuation of the race.

\* *Proteus diffluens*, Rœs. III, ci; Encyc. I, 1, a—m;—*Prot tenax*, Müll., Inf. II, 13—18; Encyc., I, 2, a—f.

For other details concerning all these animals, see the posthumous work of Othon Frederick Müller, entitled *Animalcula Infusoria*, the plates of which have been copied in the Encyc. Méthodique. See also Rœs., III, and for the classification, the work already quoted of M. Bory Saint Vincent.

† M. Audouin and M. Edwards, Ann. des Sc. Nat.; XI, pl., XVI, have adopted this opinion of M. Grant.

# CATALOGUE OF AUTHORS,

AND

## ABBREVIATIONS.

IN explaining the abbreviations employed to indicate the numerous writers necessarily referred to in this work, we have embraced the opportunity of giving the reader a general idea of their profession, the period of their birth and decease, and of the character of their writings.

**ABILD.**—**ABILDGAARDT** (Peter-Christian), a Danish naturalist; Professor at Copenhagen, died in 1808.

One of the continuers of the *Zoologia Danica* of Müller, and author of various Memoirs published among those of the Society of Natural History, and of The Royal Society of Sciences of Copenhagen, as well as those of the Society of Naturalists of Berlin.

**ACAD. DES SC.**

I thus quote the "*Mémoires de l'Académie des Sciences*" of Paris, of which one quarto volume was annually published from 1700 to 1790.

I have also occasionally quoted the "*Memoirs des Savants Etrangers*," eleven volumes, from 1750 to 1786.

I have also frequently quoted the "*Memoirs of the Academy of Berlin*," from 1819, and the new ones of the *Academia Naturæ Curiosorum* of Bonn, from Vol. IX, at which epoch they assumed their new form.

For those of the Academy of Petersburg, see Peterob. or Petrop.

**ACOSTA** or rather **MENDEZ DA COSTA** (Emmanuel), a Portuguese naturalist, resident in London.

"*Historia Naturalis Testaceorum Britannicæ*," 1 vol. 4to. London, 1778.

**ADANSON** (Michael), born at Aix in 1727, and died in Paris 1806, Member of the Académie des Sciences, and one of the first naturalists who attempted the classification of Shells according to their animals.

"*Histoire Naturelle des Coquillages du Sénégal*," 1775, 1 vol. 4to.

**AGASSIS**, a German naturalist.

Editor of the "*Fishes of Spix*," and author of *Memoirs in the Isis*.

**AHR.**—**AHRENS**.

"*Augusti Ahrensii, Fauna Insectorum Europæ, fascic. I—XII.*"

**ALB. OR ALBIN.**—**ALBIN** (Eleazar), an English painter.

"*A Natural History of Birds*," 3 vols. 4to. London, 1731—38, containing 306 indifferent coloured plates.

"*A Natural History of Spiders*," 1 vol. 4to, with plates. London, 1736.

**ALBINUS** (Bernard-Sigefroy), Professor of Leyden, and one of the great anatomists of the eighteenth century, born at Frankfort in 1697, died in 1770.

We have only had occasion to quote him for the description of the *Pennatulæ* inserted in the "*Annotationes Academicæ*," 8 Nos. in 4to. Leyden, 1754—1768.

**ALDROV. OF ALDR.**—**ALDROVANDI** (Ulysse), a nobleman of Bologna, Professor of the University of Bologna, born 1525, died blind 1605.

His "Natural History," in fourteen volumes, folio, from 1599 to 1640, eleven of which are on the subject of animals, was mostly published by his successors. The third volume of the Ornithology and the first of the Insects were the only ones published during his life. It is an undigested and wearisome compilation.

**AMOR.**—**AMOREUX** (N.), a physician of Montpellier.

"Notice des Insectes de la France, réputés Venimeux," 1 vol. folio, with plates. Paris, 1786.

"Description Méthodique d'une espèce de Scorpion commune à Souvignargues, en Languedoc." *Journal de Physique*, XXXV.

**ANDERS.**—**ANDERSON** (John), a merchant and Burgomaster of Hamburg, born in 1674, died in 1743.

"Histoire Naturelle de l'Islande du Groënland," &c., 2 vols. 8vo. Paris, 1750.

This work, although antiquated and superficial, is still the principal source of our information relative to the Cetacea.

**ANDRÆ** (John Gerard Reinhard), druggist at Hanover, born in 1724, died in 1793.

"Letters written from Switzerland to Hanover, 1763," in the German Language. They were at first printed separately in the Hanover Magazine for 1764—65, and republished in 1 vol. 4to. Zurich, 1776.

**ANN. MUS. OF DU MUS.**—"Annales du Muséum d'Histoire Naturelle de Paris," by the professors of that establishment, 20 vols. 4to. from 1802 to 1813.

This work is continued under the title of—

"Mémoires du Muséum d'Histoire Naturelle," &c. Paris, 1815, et seq. Eighteen volumes have been published.

**ARGENV.**—**ARGENVILLE** (Antoine Joseph Des-Alliers d'), maitre des Comptes of Paris, born 1680, died 1765.

"L'Histoire Naturelle Eclaircie dans une de ses principales parties, la CONCHYLOGIE." 4to., first edition. Paris, 1742; the second augmented by the addition of the Zoomorphose, *ibid.*, 1757; the third augmented by M. Favaune, 2 vols. *ibid.*, 1780.

**ARTED.**—**ARTEDI** (Peter), a Swedish naturalist, and a friend of Linnæus, born in 1705, drowned at Amsterdam in 1735.

His work on Fishes was published by Linnæus. "P. Artedi Ichthyologia sive Opera Omnia de Piscibus," 1 vol. 8vo. Leyden, 1738.

The edition of Walbaum, "Artedius Renovatus," 5 vols. 8vo., Gripswald, 1788—89 is greatly augmented, but by an injudicious compiler.

**ASCAN.**—**ASCANIUS** (Peter), Professor at Copenhagen.

Author of five numbers in folio, the first containing "Coloured Illustrations of the Natural History of the North," from 1767 to 1779.

**AUDEB.**—**AUDEBERT** (Jean-Baptiste), a painter at Paris; born in Rochefort, 1759, died 1800.

"Histoire Naturelle des Singes et des Makis," folio, Paris, 1800, with sixty-two plates, drawn from the stuffed specimens in the Museum.

"Oiseaux Dorés ou à Reflets Métalliques," 2 vols. folio, Paris, 1802.

**AUD.**—**AUDOUIN** (Jean-Victor). Doctor of Medicine, sub-librarian at the Institute of France, assistant naturalist to Messrs. de Lamarck and Latreille at the Jardin du Roi, a member of various societies, born in Paris, 27th of April 1797.

"Anatomie d'une Larve Apode" (Conops), found in a *Bombus lapidarius*, by Messrs. Lachat and Audouin, 1818.



"Mémoire sur les rapports des Trilobites avec les Animaux Articulés," published with plates in the *Annales Générales des Sciences Physiques*, VIII, p. 233.

"Mémoires sur l'Achlysie, Nouveau Genre d'Arachnide," published with plates in the *Annales des Sciences Naturelles*, II, p. 497.

"Lettres sur la Génération des Insectes adressée à l'Académie des Sciences," published in the *Annales des Sciences Naturelles*, II, p. 281.

"Recherches Anatomiques sur la Famille du Drele et sur le Mâle de cette Espèce," published with plates in the *Annales des Sciences Naturelles*, II, p. 443.

"Recherches Anatomiques pour servir à l'Histoire Naturelle des Cantharides," published with plates in the *Annales des Sciences Naturelles*, IX, p. 31.

"Prodrome d'une Histoire Naturelle, Chimique, &c., des Cantharides," a medical thesis for the degree of M.D., 4to., Paris.

"Mémoire sur la Nicthoé," a new genus of the Crustacea which lives on the blood of the Lobster. Messrs. Audouin and Milne Edwards, published in the *Annales des Sciences Naturelles*, IX, p. 345.

"Mémoire sur l'Anatomie et la Physiologie des Crustacés," published in the same work.

"Explication Sommaire, &c." of the plates in the great work on Egypt, the publication of which had been interrupted by the indisposition of M. Savigny. To M. Audouin also, in conjunction with M. Geoffroy Saint-Hilaire, we are indebted for the description of the Mammalia.

"Observations pour servir à l'Histoire de la Formation des Perles," inserted in the *Mémoires du Muséum d'Histoire Naturelle*, 1829.

"Mémoires sur plusieurs Mollosques, entre autres sur la Glycimère, sur une Clavagelle vivante, genre Siliquaire, et sur le genre Magile," presented to the Académie des Sciences in 1829, and republished from that work in the review of the *Annales des Sciences Naturelles*.

With MILNE EDWARDS.

"Résumé d'Entomologie ou d'Histoire Naturelle des Animaux Articulés," 2 vols. 18mo., Paris, 1829.

"Histoire Naturelle des Animaux du littoral de la France," still in MS.

AZZ.—DE AZZARA (Don Felix) a Spanish officer, born 1746, has given us two excellent works on the natural history of Paraguay.

"Essai sur l'Histoire Naturelle des Quadrupèdes du Paraguay," translated from the manuscript by M. Moreau de Saint-Méry, 2 vols. 8vo., Paris, 1801.

"Voyages dans l'Amérique Méridionale de 1781, jusq'en 1801," translated by M. Walckenaer, 4 vols. 8vo., Paris, 1809. The two last volumes, translated by Sonnini, contain the natural history of the Birds of Paraguay.

BAJON, formerly staff-surgeon at Cayenne.

"Mémoires pour servir à l'Histoire de Cayenne," &c., 2 vols. 8vo., Paris 1777. They contain some details relative to the animals of that country.

BARR.—BARRÈRE (Pierre), Professor at Perpignan, died 1753.

"Essai sur l'Histoire Naturelle de la France Equinoxiale," 1 vol. 12mo., Paris, 1741.

"Ornithologiæ Specimen Novum," 1 vol. 4to. Perpignan, 1745.

BARTON (Benjam. Smith) an American naturalist and Professor of Botany and Materia Medica in the University of Pennsylvania at Philadelphia, died 1816.

"A Memoir on the power of fascination attributed to the Rattlesnake," 1 vol. 8vo. Philadelphia, 1796.

"Facts, Observations, and Conjectures on the generation of the Opossum," pamphlet in 8vo. Philadelphia, 1801.

"Some Notice of the Sirena Lacertina, and of another Species of the same Genus," pamphlet, 8vo. Philadelphia, 1808.

"Memoir on a Reptile called the Hellbender," pamphlet, 8vo., 1812. It is the *Salamandra gigantea*.

**BARTRAM** (William), an American Botanist.

"Voyage dans les parties sud de l'Amérique Septentrionale," translated from the English by M. Benoits, Paris, 2 vols. 8vo.

**BAUD.—BAUDET DE LA FACE** (Marie-Jean).

"Essai sur l'Entomologie du Département du Puy-de-Dôme," a Monograph of the Lamellicornes, 1 vol. 8vo. Clermont, 1809.

**BAST.—BASTER** (Job), a Physician of Harlaem, fellow of the Royal Society of London, born 1711, died 1776.

"Opuscula Subseciva," 1 vol. 4to., divided into two volumes, with plates, Harlaem, 1764 and 1765.

**BASTEROT** (B. de), a Lawyer.

"Mémoire Géologique sur les Environs de Bourdeaux, 8vo." Paris 1825.

**BEAUV.—BEAUVOIS** (Palisot de). See Palisot.

**BECHST. OR BECH.** **BECHSTEIN** (J. M.), a naturalist of Saxony, born 1757.

"The Common Natural History of Germany," 4 vols. 8vo., Leipsig, 1801—1809, in the German language. It only treats of the Quadrupeds and Birds.

**BELL** (Thomas).

Author of various Memoirs on Reptiles in the Linnæan Transactions, Zoological Journal, &c.

**BEL.—BELON** (Pierre), a Physician at Mans, and a Professor of the College of France, born 1517, died 1564.

"Observations faites dans mes Voyages en Orient," 1 vol. 4to. 1553.

"Histoire des Poissons," 1 vol. 8vo. Transv., 1551.

"Histoire Naturelle des étranges Poissons Marins, et Description du Dauphin, &c." 1 vol. 4to., 1551.

"Histoire Naturelle des Oiseux," 1 vol. folio, 1551.

**BENNET** (E. T.), an English naturalist.

Author of several Memoirs in the Zoological Journal.

**BENNET** (J. Whitchurch), an English naturalist.

"Natural History of the Fishes of Ceylon," of which but two numbers, in 4to. are yet published. The plates are beautiful.

**BERGIUS** (Peter Jonas), a Swedish naturalist, Professor at Stockholm, died 1790.

Quoted as author of certain Memoirs among those of Stockholm.

**BESEKE** (John Melchior Theophilus), Professor at Mittau in Courland, born 1746. Author of

"Materials for the History of the Birds of Courland" (in German), 8vo. 1792, Mittau and Leipzie.

**BENDANT** (F. S.), a French naturalist, &c., member of the Académie des Sciences, quoted for his

"Memoirs on Shells," published in the Annales du Muséum.

**BESLER OR MUS.** **BESLER** (Michael Robert), a physician at Nuremberg, born 1607, died 1661.

"Rariora Musei Besleriani," folio, 1716.

**BLAINV.—BLAINVILLE** (Henri Ducrotay de), adjunct Professor to the Faculté des Sciences, and member of the Académie des Sciences.

I quote several of his Memoirs on all the branches of Zoology, published in the Annales du Muséum, Bulletin des Sciences, Journal Physique, and his articles Mollusques and Vers, in the Dictionnaire des Sciences Naturelles. The first is printed separately under the title of MALACOLOGIE. Paris and Strasb., 8vo., 1828, with 1 vol. of plates.

"Mémoire sur les Bélemnites," 4to. Paris, 1827.

"Essai d'une Monographie de la Famille des Hirudinées," 8vo. Paris, 1827.

**BL.**—**BLOCH** (Mark-Eleazer), a Jewish physician in Berlin, born at Anspach 1723, died 1799. His

"Icthyology, or General and Particular History of Fishes," in twelve numbers, folio, with 432 plates, Berlin, 1785—1796, is far from being general. It only contains such species as he could procure, and almost all the foreign ones are badly coloured. His

"Systema Icthyologiæ"—See **SCHNEIDER**—also includes the species of other authors, but arranged in a fantastic manner.

"A Treatise on the Generation of Intestinal Worms" (in German), 4to. Berlin, 1782.

**BLUM.** or **BLUMEND.**—**BLUMENBACH** (John Frederick), Professor of Medicine and Natural History at Gottingen.

"Manual of Natural History," 8th edition (in German), 1 vol. 8vo. Gottingen, 1807. There is also a French translation of the same by M. Artaud, 1 vol. 8vo., Metz, 1803.

"Plates of Natural History" (Abbildungen), 10 numbers, 8vo., each consisting of 18 plates. Gottingen, 1796—1810.

**BOCCONE** (Paul), a Bernardine monk of Sicily, born in 1633, died 1704.

"Recherches et Observations Naturelles," &c., 1 vol. 12mo. Paris, 1671.

**BODD.**—**BODDAERT** (Peter), Physician, &c., of Fiessingen, in Zealand.

"Elenchus Animalium, vol. 1, sistens Quadrupedia," 8vo., Rotterdam, 1785.

The sequel has not appeared.

Four letters on as many animals of the Cabinet of Schlosser, following that of the latter, and even on the *Lacerta amboïnensis*.

**BOHATSCH** (John Baptist), Professor at Prague, died 1772.

"De quibusdam Animalibus," &c. 1 vol. 4to. Drèsdén, 1761.

This work contains some good observations on certain Mollusca and Zoophyta.

**BOIE**, a young naturalist of Kiel, who died in Java. His voyage was undertaken for scientific purposes.

He had prepared extensive materials for publication on the Reptilia.

**BOJANUS** (Louis Henry), a German naturalist, Professor at Vilna, died 1828.

"Monograph of the Fresh-water Tortoises of Europe," folio, Vilna, 1819, an excellent work. He was also the author of several Memoirs in the *Isis*.

**BOISD.**—**BOISDUVAL** (J. A.), a physician and curator of the cabinet of Count Dejean.

"Essai sur une Monographie des Zygenides," 1 vol. 8vo., with plates. Paris 1829.

"Europæorum Lepidopterorum Index Methodicus," added to the *Essay*, &c.

He has lately, jointly with Major Le Conte of the United States army, published the three first numbers of another work, entitled

"Histoire Generale et Iconographie des Lépidoptères or des Chenilles de l'Amerique Septentrionale," 8vo. Paris.

The same gentleman, in conjunction with Count Dejean, has also published the first number of another, called the

"Iconographie et Histoire Naturelle des Coléoptères d'Europe," 8vo. Paris, 1827.

He has also described some new species of Lepidoptera in the *Annales de la Société Linnéene de Paris*.

**BOMME** (Leonard), a physician in Zealand.

Author of certain Memoirs published among those of the Society of Sciences of Flessingen, or Flushing.

**BON, or BONAN.**—**BONANNI**, or rather **BUONANNI** (Filippo), a Jesuit, Professor at the College of Rome, born 1638, died 1725. He was an assiduous observer, but we have only quoted his work entitled

“*Recreatio Mentis et Oculi in Observatione Animalium Testaceorum*,” 1 vol. 4to. Rome, 1684.

**BONAP. or CH. BONAP.**—Bonaparte (Charles Lucien), Prince of Musignano, son of the Prince of Canino.

Author of an excellent Supplement to Wilson's American Ornithology, and of several memoirs in the Annals of the Lyceum of New York.

**BONNAT.**—**BONNATERRE** (the Abbé), Professor of Natural History at Tulle.

He superintended the engraving of the plates of the Vertebrata for the *Encyclopédie Methodique*, and gave the text for those of the Reptiles and Fishes.

His figures generally are copied from authors, and not always judiciously selected.

**BONEL.**—**BONELLI** (Francesco), director of the Cabinet of Natural History, and Professor of Zoology at Turin.

“*Catalogue of the Birds of Piedmont*,” pamphlet, 4to., 1811.

“*Entomological Observations*,” in two parts, published in the Memoirs of the Academy of Sciences of Turin. They treat of the genus *Carabus* of Linnæus, or of the Carabici.

He also published other Memoirs, of which we may particularly notice the “*Descrizione di sei nuovi Insetti Lepidopteri della Sardegna*,” in the thirtieth volume of the same collection.

**BONNET** (Charles), a celebrated philosopher and naturalist of Geneva, born in 1720, died 1793. We only quote his

“*Traité d'Insectologie*,” 2 vols. 8vo., Paris, 1745, and in the first volume of his works in 4to. Neufchâtel, 1769.

**BONT.**—**BONTIUS** (Jacques), physician general at Batavia in the commencement of the seventeenth century.

“*Histoire Naturalis et Medicæ Indiæ Orientalis, libri VI*,” printed as a sequel to the work of Pison, “*De Indiæ utriusque re Naturali et Medica*.”

**BORLASSE** (William), an English ecclesiastic, curate in the county of Cornwall, born in 1696, died 1772.

“*Natural History of Cornwall*,” 1 vol. folio. Oxford, 1758.

**BORN** (Ignatius de), a Transylvanian naturalist and celebrated mineralogist, born 1742, died 1791.

“*Testacea Musei Cæsarei Vindobonensis*,” 1 vol. folio. Vienna, 1780.

**BORY-SAINT-VINCENT**, a naturalist of Bourdeaux, who accompanied Captain Baudin to the Isle of France, and late president of the Commission of Natural History in the Morea.

“*Voyage aux quatre principales isles d'Afrique*.” This work, which we have quoted, contains various interesting zoological observations.

“*Essai d'une Classification des animaux Microscopiques*,” 8vo. Paris, 1826.

He also furnished the explanations of the latter part of the plates of the article *Vers*, in the *Encyclopédie Méthodique*.

“*Essai Monographique sur les Oscillaires*,” 8vo. Paris, 1827.

Various articles in the *Dictionnaire Classique d'Histoire Naturelle*, of which he is the principal editor.

**Bosc** (Louis), member of the Académie des Sciences.

Author of numerous memoirs in the *Actes de la Société de l'Histoire Naturelle*, the *Bulletin des Sciences*, &c., and of the *Histoires Naturelles des Vers, des Coquilles et des Crustacés*, which form a sequel to Détéville's small edition of Buffon.

**BOSMAN** (William), a Dutch merchant, who lived in the seventeenth century.

"A Voyage to Guinca," 1 vol. 8vo., Utrecht, 1705, containing original notes on various animals.

**BOUD.—BOUDIER** (Henri Philippe), druggist,

Has published in the *Annales de la Société Linnéenne de Paris*, the description of a new species of Lema for the *Faune Française*.

**BOURGUET** (Louis), professor at Neufchatel, born 1678, died 1742.

"*Traité des Petrifications*," 1 vol. 4to., Paris, 1742.

**BOWDICH**, an English naturalist.

Author of a *Journey to Ashantee*, and of a *Voyage to Madeira*, which contain various observations relative to natural history.

**BOWDICH** (Mrs.), now Mrs. Lee,

Is publishing a *History of the Fresh-water Fishes of Great Britain*, with splendid plates. London 1828, 1829.

**BRANDER** (Gustavus), an English naturalist, died 1787.

"*Fossilia Hantouiensia Collecta et in Museo Britannica deposita*," 4to. London, 1766.

**BRANTZ**, a young Dutch naturalist.

"*Memoir on the the Euriotis*," the same Rat as our *Otomys*.

**BREBIS.—BREBISSON**, member of the *Société Linnéenne* of Calvados.

"*Catalogue Methodique des Crustaces Terrestres, Fluviales et Marins, recueillis dans le département du Calvados*," 8vo.

**BREHM** (Christian-Louis), a German clergyman.

"*Materials for a History of Birds*" (in German), 2 vols. 8vo. Neustadt, 1820, 1822.

**BREMSE**R, curator of the Imperial Cabinet of Vienna.

"*On the Worms that inhabit living Man*" (in German), 4to. Vienna, 1819.

It has been translated into French by Dr. Grundler, with additions by M. de Blainville, 8vo. Paris, 1824.

**BREYN.—BREYNIUS** (John Philip), a naturalist and physician of Dantzick, born 1680, died 1764.

"*Dissertatio de Polythalamis, nova Testaceorum classe*," 4to. Dantzick, 1732.

"*Historia Naturalis Cocci radicum Tinctorii*," 1 vol. 4to. Gedani, 1731.

**BRIS.—BRISSON** (Mathurin Jacques), professor of natural philosophy, member of the *Académie des Sciences*, and in his youth curator of the cabinet of natural history of Réaumur; born 1723, died 1806.

"*Le Règne Animal divisé en IX classes*," 1 vol. 4to. Paris 1756. It only contains the Quadrupeds and Cetacea.

"*Ornithologie*," 6 vols. 4to. Paris, 1770. A useful work, on account of the minute exactness of the descriptions. The plates were drawn by the same hand that furnished the figures of the *Planches Enluminées* of Buffon, and are frequently taken from the same specimens.

**BRIT. Zool.**

Under this title we quote the large anonymous folio with fine plates, called "*British Zoology*," printed in London in 1766. It is by Pennant, and has been reproduced by him under the same title in 4 vols. 8vo. See Pennant.

**BROCCHI** (G.), a military engineer, died 1828 at Syria, in the service of the Pacha of Egypt.

"*Conchiologis Fossilis Subappennina*," 2 vols. 4to. Milan, 1814.

**BRONGN.—BRONGNIART** (Alexander), member of the Académie des Sciences, and professor of the Faculté des Sciences de Paris, and of the Jardin du Roi, born 1770.

"Essai d'une Classification Naturelle des Reptiles," 4to. Paris, 1805.

I also quote his works on the Fossil Shells—"Coquilles Fossiles"—both in the Annales du Museum, and our joint publication on the geography of the environs of Paris. I also refer to his

"Histoire des Crustacés Fossiles," 4to., published by him and M. Desmaret. Paris, 1812.

**BROUSS.—BROUSSONNET** (Pierre-Marie-Auguste), perpetual secretary to the Société d'Agriculture, and member of the Académie des Sciences; born 1761, died 1807. I quote his

"Memoire sur les Chiens de Mer," in the Memoires de l'Académie des Sciences, 1780. Also his

"Ichthyologia," 4to., of which but one decade was published. London and Paris, 1782.

**BROWN JAM.—BROWN** (Patrick), an Irish physician, resident in Jamaica.

"The Civil and Natural History of Jamaica," 1 vol. folio. London, 1756.

**BROWN OR BR.—BROWN** (Peter), an English painter.

"New Illustrations of Zoology," 1 vol. 4to., London, 1776, with fifty coloured plates of animals of various classes—all of them indifferently executed.

**BRUCE** (James), the celebrated Scotch traveller, born 1730, died 1794.

"Travels in Abyssinia and to the Sources of the Nile." I quote the French translation, 5 vols. 4to. Paris 1790.

**BRUG.—BRUGIERES** (Jean-Guillaume), a physician at Montpellier, and a traveller, born 1750, and died at Ancona on his return from Persia, 1799. I quote his

"Dictionnaire des Vers," published in the Encyclopedie Methodique. But one volume 4to., has appeared. Paris, 1792. I also quote his

"Figures de Vers," for the same work, of which there are four.

**BRUN.—BRUNNICK** (Martin Thomas), a Danish naturalist. Professor at Copenhagen.

"Ichthyologia Massiliensis," &c., 1 vol. 8vo. Copenhagen and Leipsic, 1768,

"Entomologia sistens Insectorum Tabulas Systematicas," 8vo. Copenhagen, 1764. Also various Memoirs published among those of the Society of Sciences and of the Society of Natural History of Copenhagen.

**BUCHAN.—BUCHANAN** (Dr. Frances Hamilton), a Scotch physician at Bengal, died 1829.

Author of certain Memoirs in the Transactions of the Linnaean Society, and of a Journey from Madras through the Mysore, Canary, &c., which contain several valuable observations. We are particularly indebted to him for

"A Natural History of the Fishes of the Ganges," 1 vol. 4to., with a great number of excellent plates. Edinburgh, 1822.

**BUCKLAND** (William), professor of Geology at Oxford, author of the

"Reliquæ Diluvianæ," 4to., London, 1825, and of numerous Memoirs on fossils.

**BUFF.—BUFFON** (Georges-Louis-Leclerc, Comte de), Intendant of the Jardin du Roi, and Treasurer of the Académie des Sciences, born 1707, died 1788.

"Histoire Naturelle, generale et particuliere, avec la Description du Cabinet du Roi." I always quote the Paris edition of 1749—1789, in 36 vols. 4to., of



which *three* are general, *twelve* relate to Quadrupeds, *seven* are supplements to his general observations and to the Quadrupeds, *nine* treat of Birds, and *five* of Minerals.

**BUF. ENL. OF ENLUM.** See **PLANCHES ENLUMINEES.**

**BULLET. DES SC.**

"Bulletin des Sciences pour la Societ  Philomatique," a journal which has appeared monthly since 1791, which contains a multitude of abridged and valuable observations relative to Natural History.

**BURCHELL**, an English traveller.

"Travels in the Interior of Southern Africa."

**CARENA** (Giacinto), professor at Turin.

"Monograph of the Genus *Hirudo*," Vol. XXV of the Memoirs of the Academy of Turin, 4to., 1820.

**CARMICH.**—**CARMICHAEL**, an English officer.

I quote his Memoir on the Fishes of Tristan d'Acunha. Lin. Trans., XII.

**CARUS** (Charles-Gustavus), Professor at Dresden.

Author of several works on Comparative Anatomy. I quote his Memoir on the circulation in the Larv  of the Neuroptera, printed in German 4to. Leipzig, 1827.

**CAT. CATESB.**—**CATESBY** (Mark), a traveller in North America, born 1680, died 1749.

"The Natural History of Carolina, Florida, and the Bahama Islands," 2 vols. folio, with an Appendix and two hundred and twenty coloured plates. London, 1734, 1743.

**CAUCHE** (Fran ois), of Rouen, a soldier or sailor at Madagascar, died 1638.

"Une Relation de Madagascar," &c., 1 vol. 8vo., 1631.

**CAVOLINI** (Filippo), a physician and naturalist at Naples.

"Memorie per servire alla Storia de' Polipi Marini," 4to. Naples, 1785.

"Sulla Generazione dei Pescic dei Granchi," 1 vol. 4to. Naples, 1787.

**CETTI** (Francesco).

"Storia Naturale di Sardegna," 4 vols. 12mo. Sassari, 1774—1777.

**CHABERT**, director of the Ecole Veterinaire at Alfort.

"Trait  des Maladies Vermineuses dans les Animaux," pamphlet, 8vo. Paris, 1782.

**CHAB.**—**CHABRIER** (J.), a corresponding member of the Societ  d'Histoire Naturelle.

He published a series of Memoirs on the flight of Insects, in the Annales du Museum d'Histoire Naturelle. A certain number of impressions were taken separately, which form his "Essai sur le Vol des Insectes," 1 vol. 4to. Paris, 1823.

**CHAMISSO** (Adelbert de), a distinguished literary gentleman and naturalist of Berlin, who sailed round the world with Captain Kotzebue.

I quote his Memoire on the Salp  (in Latin), 1 vol. 4to. Berlin, 1830.

**CHARP.**—**CHARPENTIER** (Toussaint de).

"Hor  Entomologic ," 1 vol. 4to., with plates. Breslau, 1825.

**CHEMN.**—**CHEMNITZ** (John Jerome), of Magdeburg, chaplain to the garrison of Copenhagen, born 1730.

He continued the great work on Conchyliology of Martini, and is the author of various Memoirs published among those of the Society of Naturalists of Berlin, of Copenhagen, and of the Naturforscher.



**CHORIS** (Louis), a Russian painter, who accompanied Captain Kotzebue in his voyage round the world. He was assassinated near Vera-Cruz, when about to commence his travels in Mexico.

"Voyage Pittoresque autour du Monde," folio. Paris, 1822.

"Vues et Paysages des Régions Equinoxiales," folio. Paris, 1826.

**CLAIRV.**—**CLAIRVILLE**, an English naturalist, residing in Switzerland.

"Entomologie Helvétique," 2 vols. 8vo., in French and German, with excellent plates. The first volume was published in 1798, and the second in 1806; both were printed at Zurich.

**CLARCK**, an English Veterinary Surgeon.

"A Monograph of the Œstri," in the third volume of the Linnæan Transactions. He has published a second edition of it.

**CLERC** (Charles), a Swedish painter, and a pupil of Linnæus.

"Aranei Suecici Descriptionibus et Figuris Illustrati," 1 vol. 4to., in Swedish and Latin. Holmiæ, 1757.

"Icones Insectorum Rariorum," 1 vol. 4to. Holmiæ, 1759—1764. This work is useful as an indication to the Lepidoptera, described by Linnæus, from the Cabinet of Queen Frederica Ulrica.

**CLOQUET** (Jules), a physician and surgeon of Paris.

"Anatomie des Vers Intestinaux," 4to. Paris, 1824.

**CLUS.**—**CLUSIUS**, or **L'ECLUSE** (Charles), born at Arras 1526, died 1609. He was physician to the Emperor, and subsequently a professor at Leyden.

"Exoticorum Libri X," 1 vol. folio. Anvers, 1605.

**COLLET MEYGNET** (G. F. H.), physician.

"Mémoire sur un Vertrouvé dans le rein d'un Chien" (the *Strongylus gigas*), inserted in the Journal de Physique, vol. LV.

**FAB. COL.**—**COLUMNA** (Fabius), a physician at Rome, an illegitimate descendant of the illustrious house of Colonna, born 1567, died about 1660. He was an exact and erudite observer.

"De Purpura," 4to., 1616.

"Aquatilium et Terrestrium aliquot Animalium, aliarumque Naturalium Rerum Observationes," printed at the end of his Ecphrasis, ib., 4to., 1616.

**COM.** or **COMMERS.**—**COMMERSON** (Philibert), born at Dombes in 1727, and died at the Isle of France 1773. A most indefatigable traveller and learned naturalist.

I quote his manuscripts and drawings deposited in the Library of the Museum.

**COCK** (Captain), the celebrated navigator, born 1728, and killed at the Sandwich Islands in 1779.

His three great voyages, which have been translated into all languages, are well known to every one.

**COQUEB.**—**COQUEBERT** (Antoine Jean), a naturalist established at Rheims.

"Illustratio Iconographica Insectorum quæ in Museis Parisinis observavit J. Chr. Fabricius," 3 decades, 4to., Paris, 1799—1804.

He has also published various notes in the Bulletin des Sciences.

**COUCH** (Jonalhan), an English naturalist.

I quote his paper "On the Fishes of Cornwall." Linn. Trans., XIV.

**CRAM.**—**CRAMER** (Peter), a merchant of Amsterdam.

"Papillons Exotiques des trois parties du Monde, l'Asie, l'Afrique et l'Amérique," in Dutch and French, 4 vols. 4to., containing four hundred coloured plates. Amsterdam, 1779—1782.

For the Supplement, see Stoll.

**CREUTE.—CREUTZER (Christian).**

"Entomologische Versuche," or Entomological Essays, 8vo., with coloured plates, Vienna, 1799.

**CREVELT, a German naturalist.**

Author of a Memoir on a Gecko, published among those of the Society of Naturalists of Berlin, 1809.

**CURT.—CURTIS (John), an English naturalist and painter.**

He has commenced a work illustrating the genera of Insects and plants peculiar to Great Britain. Their characters are figured with the greatest accuracy.

This work, which is published in numbers, already forms 3 vols. 8vo.

The same author has also published in the Zoological Journal some interesting observations on the Elater noctilucus.

**CUV.—CUVIER (George-Leopold-Chretien-Frederic-Dagobert), born at Montbéliard, 1769; perpetual Secretary to the Académie des Sciences, &c. &c. &c.**

Of my own works, exclusive of my Memoirs contained in the Annales du Muséum, I quote the following:—

Ménag. du Mus., or "Ménagerie du Muséum d'Histoire Naturelle," by Messrs. Lacepède, Cuvier, and Geoffroy, with plates, coloured by Marechal, and engraved by Miger, 2 vols. 8vo. Paris, 1804. There is another edition in folio.

Tab. Elem., or "Tableau Élémentaire de l'Histoire Naturelle des Animaux." 1 vol. 8vo. Paris, 1798.

Leç. d'Anat. Comp., or "Leçons d'Anatomie Comparée, recueillies et publiées, par MM. Dumeril and Duvernoy," 5 vols. 8vo. Paris, 1800, 1805.

Rech. sur les Oss. Foss., or Oss. Foss., or "Recherches sur les Ossements Fossiles des Quadrupèdes," 4 vols. 4to. Paris, 1812. A second edition was published in 5 vols. 4to., 1821—1823.

Mém. sur les Moll., or "Mémoires pour servir à l'Histoire des Mollusques," 1 vol. 4to. Paris, 1816.

**CUV. ET VAL.—CUVIER AND VALENCIENNES.**

"L'Histoire Naturelle des Poissons," a work which I am now publishing in conjunction with M. Valenciennes. There are now completed 5 vols. 4to. and 8vo. Paris and Strasburg.

**FRED. CUV.—CUVIER (Frederick), Inspector General of the University of Paris, member of the Académie des Sciences, &c. &c., born at Montbéliard, 1773.**

I quote his Mémoires in the Annales du Muséum, and principally those which relate to the teeth of the Mammalia, published in 1 vol. 8vo. Paris, 1825. I also particularly cite his

"Histoire Naturelle des Mammifères," published in conjunction with M. Geoffroy Saint-Hilaire, in folio and 4to., with illustrations drawn from nature.

**CYRILL.—CYRILLUS or CIRILLO (Dominico), a physician at Naples, publicly executed in 1796.**

"Entomologiæ Neapolitanæ Specimen," 1 vol. folio, with coloured plates. Naples, 1787.

**DAHL (George).**

"Coleoptera and Lepidoptera," 1 vol. 8vo. Vienna, 1823.

**DALDORF, a Danish officer.**

"Author of Memoirs on certain Fishes, published in the Linnean Transactions, and in the Journal of Gottingen.

**DALM.—DALMAN (John William), lately deceased at Stockholm, where he was director of the Museum.**

"Analecta Entomologica," 1 vol. 4to. with plates. Holmiæ, 1823.

"Prodromus Monographiæ Castiniæ," 1 vol. 4to. with one plate. Holmiæ, 1825.

- “*Om Nagra Svenska Arter of Coccus*,” Memoir, 4to. with plates. Stockholm, 1826.
- “A Monograph of the Chalcidites, or of the Insects of his family of the Pteromalini,” 1 vol. 8vo. Stockholm, 1820.
- “A Synopsis of the Lepidoptera of Sweden,” published in the Memoirs of the Academy of Stockholm, 1816.
- “*Ephemerides Entomologicae*,” 1 vol. 8vo. Holmie, 1824.
- “A Memoir on certain Ichneumonides, 1 vol. 8vo. Stockholm, 1826.
- A second, in the Swedish language, on the Insects enclosed in Copal, 1 vol. 8vo. Stockholm, 1826.
- DAL.**—**DALYELL** (J. Graham), a Scotch naturalist.
- “Observations on various Interesting Phenomena of the Planaria,” 8vo. Edinburgh, 1814.
- DAMPIER** (William), the celebrated English mariner, born 1652.
- “*Voyage round the World*,” 2 vols. 8vo. London, 1697 and 1699. It has been translated into French, and undergone several editions. It contains some interesting traits of the history of animals.
- DANIELS** (Samuel), an English painter.
- “*African Scenery*,” 1 vol. folio, a magnificent work, which contains several beautiful figures of extremely rare animals.
- DAUB.**—**DAUBENTON** (Louis-Jean-Marie), born at Montbard, 1716, died at Paris, 1800. He was a Professor of the Museum and of the College de France, and member of the Institute.
- I quote the descriptions of the animals with which he has enriched the Natural History of Buffon.
- DAUD.**—**DAUDIN** (François-Marie), died at Paris in 1804.
- “*Traité Élémentaire et Complet d’Ornithologie*,” of which but 2 vols. 4to., Paris, 1800, have yet appeared; they only contain the Birds of Prey, and a part of the Passerinae. It is an indifferent compilation.
- “*Histoire Naturelle des Reptiles*,” 8 vols. 8vo. Paris, 1802 and 1803, a sequel to the Buffon of Sonnini.
- “*Histoire Naturelle des Rainettes, des Grenouilles et des Crapauds*,” 1 vol. 8vo., with numerous and coloured plates. Paris, 1803.
- DEJ.**—**DEJEAN** (Comte), peer of France, lieutenant-general, &c.
- “*Catalogue de la Collection des Coléoptères de M. le Comte Dejean*,” 1 vol. 8vo., 1821.
- “*Species General des Coléoptères*,” 3 vols. 8vo., 1825—1829. The fourth volume has lately been published.
- “*Histoire Naturelle et Iconographie des Coléoptères d’Europe*,” by MM. Latreille and Count Dejean, 3 Nos. 8vo., 1822.
- See **BOISDUVAL**.
- JUSS.**—**DE JUSSIEU** (Antoine de), Professor of Botany to the Jardin du Roi; born at Lyon, 1686, died 1758.
- I quote some of his Memoirs on Zoology published among those of the Academie des Sciences.
- DEKAY** (James E.), an American physician and naturalist.
- Author of several Memoirs in the Annals of the Lyceum of New York.
- DELAP. et BRUL.**—**DELAPORTE et BRULLE**.
- “*Notice sur un Nouveau Genre de la Famille des Charançons*,” published in the fourth volume of the *Mémoires de la Société d’Histoire Naturelle de Paris*.
- DELLE CHIAJE** (Stefano), Professor at Naples.
- “*Memoirs on the History of the Invertebrate Animals of the Kingdom of Naples*,” 2 vols. 4to. Naples, 1823, 1825.
- DELUC** (John Andrew), a naturalist of Geneva, &c.
- “I have only quoted this celebrated geologist in relation to his Memoir “*Sur les pierres judaiques*,” published in the *Mémoires des Savants étrangers*.

**DESHAYES (G. P.)**, a naturalist of Paris.

"Anatomie et Monographie du genre Dentale," in the "Description des Coquilles Fossiles des Environs de Paris," 4to. Paris, 1824, 1825.

**DESM.—DESMARETS (Anselme Gaetan)**; corresponding member of the Académie des Sciences, and Professor of Zoology to the Ecole Veterinaire of Alfort.

"Histoire Naturelle des Tangaras, des Manakins, et des Todiers," 1 vol. folio. Paris, 1805.

"Traite de Mammalogie," serving as an explanation to the plates of the Mammalia of the Encyclopedie Methodique, 1 vol. 4to. Paris, 1820.

He is also the author of various articles in the "Dictionnaire d'Histoire Naturelle;" of which we will particularly designate that on the Malacostraea.

"Considerations generales sur la Classe des Crustaces," 1 vol. 8vo. with plates. Paris, 1803.

"Histoire Naturelle des Crustaces Fossiles," published by him and M. Brongniart.

**DESMOULINS (Charles)**, Vice-president of the Societé Linnéenne de Bourdeaux.

"Essai sur les Spherulites." Bourdeaux, 1826.

**DIQ. OR DIQUEM.—DICQUEMARE** (the abbé Jacques François), a naturalist of Havre, born 1733, died 1789.

An indefatigable observer, and author of various memoirs on the Zoophyta and Mollusca in the Philosophical Transactions, Journal de Physique, &c. &c.

**DONATI (Vitale)**, a physician at Padua, and traveller to the king of Sardinia, born 1713, and shipwrecked on his return from Egypt in 1763.

"Natural History of the Adriatic Sea," published in Italian, 1 vol. 4to. Venice, 1750. The French translation, La Haye, 1758. An imperfect and superficial work.

**DONOV.—DONOVAN (Edward)**, an English painter.

"The Natural History of British Fishes," 5 vols. 8vo. London, 1820.

"The Natural History of British Insects," 8vo.

"An Epitome of the Natural History of the Insects of China," 1 vol. 4to. London, 1778.

"An Epitome of the Natural History of the Insects of India," 4to. London, 1800. I have seen but twelve numbers.

"General Illustration of Entomology," Part I. "An Epitome of the Insects of Asia," 1 vol. 4to. London, 1805.

**DORTES (Jacques Antoine)**, a physician at Montpellier, born 1759, died 1794.

"Memoire sur les Araignées Maonnes," published in the second volume of the Transactions Linnéennes.

**DRAP. OR DRAPARN.—DRAPARNAUD (Jacques-Philippe-Raimond)**, Professor at Montpellier, born 1772, died 1804.

"Tableau des Mollusques Terrestres et Fluviales de la France," pamphlet, 8vo. Montpellier and Paris, 1801.

"Histoire Naturelle des Mollusques Terrestres et Fluviales de la France," 4to. with fine engravings. Paris, 1805.

**DRAP.—DRAPIEZ**, Professor of Chemistry at Brussels.

Memoirs on a new genus of tetramerous Coleoptera, and a description of new species of Mammalia, Birds, and Insects, published in the Annales Generales des Sciences Physiques.

**DRUR.—DRURY**, an English goldsmith, lately deceased.

"Illustrations of Natural History," 3 vols. 4to., with finely coloured plates, representing the rarer insects of his cabinet. London, 1770—1782.

DUF.—DUFOUR (Leon), a physician at Saint-Sever, Landes.

"Memoire Anatomique sur une nouvelle espece d'Insecte du genre Brachine," in the 18th volume of the Annales du Muséum d'Histoire Naturelle.

Various memoirs "Sur l'Anatomie des Coleoptères, des Cigales, des Cicadelles, des Labidoures," on a new species of Ornithomyia, and on the genus Ocyptera, published in the Annales des Sciences Naturelles. Two Memoirs inserted in the Journal de Physique, one on the Anatomy of the Scorpions, and the other on that of the Scolia. The Annales Generales des Sciences Physiques contain several others, in which he gives a description of various Arachnides, and of several new species of Coleoptera, together with the anatomy of the Ranatra linearis, and of the Nepa cinerea.

DUFYS.—DUFTSCHMID (Gaspard), Professor at Lintz.

"Fauna Austriae," 8vo. in German.

I have only seen the two first volumes, one of which appeared in 1805, and the other 1812. Lintz and Leipsic.

DYZEY (Antoine), Professor at Montpellier.

"Recherches sur la Circulation, la Respiration et la Reproduction des Anneles à branches," 1828.

"Espèces Indigènes du genre Lacerta," Annales des Sc. Nat. XVI, 1828.

DUHAM.—DUHAMEL DU MONCEAU, naturalist, agriculturist, &c., member of the Académie des Sciences, born at Paris, 1700, died 1782.

"Traité general des Pêches," folio, Paris, 1769. I quote this work on account of the number of good plates of fishes which it presents.

DUM. or DUMER.—DUMERIL (Constant), Professor to the Faculté de Medicine, and to the Jardin du Roi, member of the Académie des Sciences, born at Amiens, 1774.

Editor of the two first volumes of my "Leçons d'Anatomie Comparee."

"Zoologie Analytique," 1 vol. 8vo. Paris, 1806.

"Traité Elementaire d'Histoire Naturelle," 2 vols. 8vo., second edition.

Paris, 1807. Fourth edition. Paris. 1830.

Various Memoirs on Comparative Anatomy, among which is one on the Poissons Cyclostomes," &c.

"Considerations Generales sur la Classe des Insectes," 1 vol. 8vo., with plates.

Also the articles in the Dictionnaire des Sciences Naturelles relative to Insects.

DUPONCH.—DUPONCHEL (A. J.), continuer of Godart's Natural History of the Lepidoptera of France.

"Monographie du Genre Erotyle," 4to, with plates, printed in the twelfth volume of the Memoires du Muséum d'Histoire Naturelle.

He has continued, from the sixth volume inclusively, the work of the late M. Godart, entitled "Histoire Naturelle des Lepidopteres de France." The seventh is nearly completed. He has described a new genus of Coleopterous Insects, which he calls Adelostoma, and has published observations on the metamorphosis of the Nymphae Petit Sylvain.

DUPORT (Andrew Peter), fellow of the Royal Society of London.

Author of a Memoir on the Glaucus, in the fifty-third volume of the Philosophical Transactions.

DUTERTRE (Jean-Baptiste), a Dominican friar, missionary to the Antilles, born 1610.

"Histoire Generale des Antilles habitées par les Français, 4 vols. 4to. Paris, 1666, 1671.

The second volume, or that relative to Natural History, contains some good observations. There is an edition in 1 vol. 1654.

**DUTROCHET (N.)**, physician at Chateau-Renaud.

An accurate and ingenious observer, author of certain memoirs in the *Annales du Museum*, &c.

**DUV.—DUVAU (Augusta)**, member of the *Société d'Histoire Naturelle*.

"*Nouvelles Recherches sur l'Histoire Naturelle des Pucerons*," a memoir read before the *Académie des Sciences* on the 26th of April 1825, and published in the *Memoires du Museum d'Histoire Naturelle*.

**EDWARDS (George)**, an English painter, member and librarian of the *Royal Society*.

"*Natural History of Rare Birds*," 4 vols. 4to.

"*Gleanings of Natural History*," 3 vols. 4to.

These two works form but one single collection of three hundred and sixty-two plates.

Next to the *Planches Enluminées*, it is the richest in respect to birds that we possess. It also contains animals of other classes. The figures are beautiful, the text indifferent.

**EDW.—EDWARDS (Milne)**, in conjunction with M. Victor Audouin has published

"*Recherches Anatomiques et Physiologiques sur la Circulation dans les Crustacés*." *Annales des Sciences Naturelles*, II.

"*Recherches Anatomiques et Physiologiques sur le Système Nerveux des Crustacés*." *Ann. des Sc. Nat.* XIV.

"*De la Respiration Aérienne des Crustacés et des modifications que l'appareil branchial présente dans les Crabes Terrestres*." *Ann. des Sc. Nat.* XV.

"*Memoire sur le Nicotioe*," a singular animal that sucks the blood of the Lobster. *Ibid.* IX.

"*Resumé des Recherches sur les Animaux sans vertèbre faites aux Isles Chausay*."

"*Description des Annelides des Côtes de la France*."

**EDWARDS (Milne)**, alone.

"*Description de quelques Crustacés nouveaux*." *Ann. des Sc. Nat.* XIII.

"*Recherches Zoologiques pour servir à l'Histoire Naturelle des Lézards*." *Ann. des Sc. Nat.* XVI.

"*Monographie des Crustacés Amphipodes*."

**EGEDE (John)**, a Dane, Missionary to Greenland, born 1686, died 1763.

"*Description of Greenland*," 1 vol. 8vo. Copenhagen and Geneva, 1763.

**EISENH.—EISENHARDT (Charles William)**, author of

"*A Memoir on the Medusæ*," in those of the *Academia Naturæ Curiosorum* of Bonn; and with additions by Chamisso, of a *Memoir on certain animals of the class of Worms*, *Ibid.* X., part II.

**ELLIS (John)**, a London merchant.

"*Essay towards a Natural History of the Corallines found on the Coast of Great Britain and Ireland*," 4to, London, 1755. Translated into French, and published at the Hague, 1756.

"*The Natural History of many curious and uncommon Zoophytes*," 1 vol. 4to, London, 1786. This work was published by him and Solander.

**ENGRAM.—ENGRAMELLE (Marie-Dominique-Joseph)**, an Augustine friar at Paris, born in 1727, died in 1780.

"*Papillons d'Europe, peints par Ernest, et décrits par le reverend père Engramelle*," 6 vols. small folio, consisting of three hundred and forty-two coloured plates. The work finishes with the *Noctua* inclusively.

Ernest was an artisan of Strasburg, who had a great and self-acquired talent for painting lepidopterous insects.



**ERXL.—ERXLEBEN** (John Christian Polycarpe), Professor of Natural History at Gottingen, born 1744, died 1777.

*Systema Regni Animalis, Classis I, Animalia* 1 vol. 8vo. Leipsic 1777.

**ESP.—ESPER** (E. T. C.), Professor at Erlang.

"*Europæische Schmetterlinge*," or Lepidoptera of Europe, 4 vols. 4to, the first and the fourth divided into two, with coloured plates.

This work is not completed, but some additional numbers on the true Phænites or the Goanetræ have been published.

"*Die Pflanzenthier*," &c., his work on Zoophytes, 4 vols. 4to. Nuremb. 1791, et seq.

**EUPHRASEN** (B. A.), a Swedish naturalist.

Author of a Voyage to St. Bartholomew, and quoted for a Memoir inserted among those of the Academy of Stockholm.

**EVERSH.—EVERSHAM.**

Author of the Zoological Appendix to the "Travels in Bucharia," of the Baron de Mayendorf, with notes by M. Lichtenstein. It has been translated into French by M. Amédée Jantert, Svo, Paris, 1826.

**Fab.—FABRICIUS** (J. C.), a pupil of Linnæus, Professor of Natural History and Rural Economy at Kiel, born at Tundern, in the Duchy of Sleswick in 1742, died 1807. He published a great many works on Entomology, of which I have particularly quoted the following.

"*Entomologia Systematica emendata et aucta*," 4 vols. Svo, the first and third in two parts. Hafniæ, 1792—1794. This work contains several of his anterior ones, revised and modelled, such as the "*Systema Entomologiæ*," 1 vol. Svo; "*Species Insectorum*," 2 vols. Svo; "*Mantissa Insectorum*," 2 vols. Svo.

"*Supplementum Entomologiæ Systematicæ*," 1 vol. Svo. Hafniæ, 1798.

"*Systema Eleutheratorum*," 2 vols. Svo. Kiliæ, 1801.

"*Systema Rhyngotorum*," 1 vol. Svo. Brunsvigæ, 1801.

"*Systema Piezatorum*," 1 vol. Svo. Brunsvigæ, 1804.

"*Systema Antliatorum*," 1 vol. Svo. Brunsvigæ, 1805.

He was about to publish his "*Systema Glossatorum*," when the hand of death was laid upon him. An extract from that work is given by Illiger in his *Magazin für Insectenkunde*.

**Fab. or FABR.—FABRICIUS** (Otho), a pastor in Greenland, and subsequently in Norway and Denmark.

"*Fauna Groenlandica*," &c. 1 vol. Svo, Copenhagen and Leipsic, 1790; a work of great value on account of the exactness of the descriptions, but in which names are frequently improperly applied.

He also published certain memoirs among those of the Society of Natural History of Copenhagen.

**FALCK** (J. P.), a Swede, Professor of Botany at Petersburg, born 1727; travelled in the Service of the Russian government from 1768 to 1773, and committed suicide at Cassan in 1774.

His travels were published in German, 3 vols. 4to. Petersburg, 1785, 1786. The two last relate entirely to Natural History.

**FALL.—FALLEN** (Charles Frederick), Professor of Natural History at Lund.

"*Diptera Sueciæ*," 4to, First volume. Lundæ, 1814—1817.

**FARIN.—FARINES**, a naturalist residing in the department of the Pyrenees Orientales,

Author of Observations on the larva of the *Ripiphorus bimaculatus*, in the *Annales des Sciences Naturelles*, 1826.

**FAVANNE.**

Author of a "*Dictionnaire de Conchyliologie*," and of a greatly enlarged edition of the *Conchyliologie* of d'Argenville.



**FAUJ.—FAUJAS DE SAINT-FOND (B).** Professor of Geology at the Museum d'Histoire Naturelle.

"Histoire Naturelle de la Montaigne de St. Pierre de Maestricht," 1 vol. 4to. Paris, 1799.

**FERMIN (Philip),** physician at Surinam.

"Histoire Naturelle de la Hollande equinoxiale," 1 vol. 8vo. Amsterdam, 1765.

"Description de Surinam," 2 vols. 8vo. Amsterdam, 1769.

Two indifferent works filled with errors of nomenclature.

**FERN. OR HERN.—HERNANDEZ (Francisco),** physician-in-chief at Mexico, under Philip II.

"Nova Plantarum, Animalium et Mineralium Mexicanorum Historia," folio, Rome, 1651. A singular combination of fragments of the author, figures drawn by others, and annotations of editors. It should be read cautiously.

**FERUSS.—FERUSSAC (J. Daubert de),** a French naturalist.

Author of a new and enlarged edition of an "Essai d'une Methode Conchyliologique," originally written by M. de Ferussac, Sen., pamphlet, 8vo, Paris, 1807.

"Histoire des Mollusques, Terrestres et Fluviales," folio, with fine plates. It is not yet completed.

He is also the principal editor of that important periodical called the "Bulletin Universel des Sciences," &c.

**FEUILL.—FEUILLEE (Louis),** a Minim, the companion and plagiarist of Plumier, born 1660, died 1732.

"Journal d'Observations faites sur les Côtes Orientales de l'Amérique;" 2 vols. 4to. Paris, 1714.

Journal, &c., in New Spain and the islands of America, 1 vol. 4to. Paris, 1725.

**FITCH. and MOLL.—FITCHTEL (Leopold de),** a naturalist of Vienna, who in conjunction with J. P. C. DE MOLL, member of the Academy of Munich, published the

"Testacea Microscopica, aliaque minuta ex generibus Argonauta et Nautilus," cum Tab. XXIV. Vienna, 1803.

**FISCH.—FISCHER DE WALDHEIM (Gotthelf),** a German naturalist, Director of the Imperial Museum at Moscow. Of his numerous works we quote the following:—

"Fragments of Natural History," in German, 1 vol. 4to. Franckfort, 1801.

"Anatomy of the Makis," in German. Franckfort, 1804.

"Description of certain Insects," published in the Memoirs of the Naturalists of Moscow, 1 vol. 4to. Moscow, 1806.

"Entomographia Imperii Russici," 2 vols. 4to, with splendid engravings. Moscow, 1820—1822.

"Observations on a carnivorous Fly, called Medeterus," 4to, with plates, Moscow, 1819.

"Memoir on the Argas of Persia," 4to, with a plate. Moscow, 1823.

"Letter on the Physodactylus, a new genus of Coleopterous Insects," 8vo., Moscow, 1824.

**FITZING.—FITZINGER,** a physician and naturalist at Vienna.

"A New Classification of Reptiles, according to their national affinities," 4to, in German. Vienna, 1826.

**FLEMING (John),** a Scotch Pastor.

"Philosophy of Zoology," 2 vols. 8vo. Edinburgh, 1822.

**FLEURIAU DE BELLEVUE,** a naturalist at Rochelle.

Author of Memoirs on the Testacea and other Mollusca, published in the Bulletin des Sciences, Journal de Physique, &c.

**FORSK.**—**FORSKAHL**, (Peter) a Swedish naturalist, born 1734, a pupil of Linnæus, and the companion of Niebuhr in his travels to the East, died during the journey in 1763.

"Descriptiones Animalium," &c., quæ in Itinere Orientali observavit," 4to. Copenhagen, 1775.

"Icones Rerum Naturalium quas in Itinere Orientali depingi curavit," 4to, Copenhagen, 1776.

Posthumous works, and extremely precious on account of the new species described in them, although the nomenclature is incorrect.

**FORTIS** (J. B. or Alberto) an Italian naturalist, born at Venice 1740, died a bookseller at Bologna, 1803. I quote his

"Memoires pour servir à l'Histoire Naturelle et principalement à l'Orictographie de l'Italie," 2 vols. 8vo. Paris, 1802.

**FORST.**—**FORSTER** (John Reinhold), born at Dirchaw in Polish Prussia 1729, naturalist in the English service for the second voyage of Cook, and subsequently Professor at Halle. He died in 1798.

"Zoologiæ Indicæ Rarioris Spicilegium," 4to. London, 1790.

"Enchiridion Historiæ Naturali inserviens," 8vo. Halle, 1788.

I also quote him for the articles inserted by Bloch in his posthumous System of Fishes.

**FOURCROY** (Antoine François de), the celebrated Professor of Chemistry, Counsellor of State, and member of the Academie des Sciences; born 1755, died 1809. The only work we have had occasion to quote is his

"Entomologia Parisiensis," 2 vols. 8vo, Paris, 1785, a small work of his youth, and a mere abridgment of that of Geoffroy.

**FRED. CUV.** See **CUV.**

**FREMINV.**—**FREMINVILLE** (Baron de), an officer of the French navy; an able naturalist.

Author of various articles in the Dictionnaire Classique d'Histoire Naturelle.

**FRIES** (B. F.)

"Monographia Tanyporum Sueciæ." Lundæ, 1823.

**FR.**—**FRISCH** (J. L.) Rector of the Gymnasium of Berlin, born 1666, died 1743.

"A Representation of certain German and Foreign Birds" (in German), 2 vols. folio, Berlin, 1739—1763, containing two hundred and fifty-five extremely exact but not fine plates.

"Beschreibung von Insecten in Teuschland," or a Description of the Insects in Germany, 1 vol. 4to. Berlin, 1730.

**FROEL.**—**FROELICH** (J. A.), a German naturalist and physician of Elwangen.

Author of two Memoirs on the Intestinal Worms in the Naturforscher.

**GÆRT.**—**GÆRTNER** (Joseph), a celebrated botanist of Wirtemberg, born 1732, died 1791.

Author of the Carpologia, and also Zoological Observations inserted in the Philosophical Transactions, and in the Miscellanea Zoologica of Pallas.

**GAILLARDOT**, a physician at Luneville, and an able naturalist.

Author of Memoirs on Fossils published in the Annales des Sciences Naturelles, &c.

**GARDEN** (Alexander), a Scotchman, physician at Charleston, South Carolina, born 1730, died 1771.

He transmitted various observations to Linnæus.

**GAZA** (Theodore de), a Greek who sought an asylum in Italy in the

sixteenth century. He translated into Latin the work of Aristotle upon Animals.

**GEB.**—**GEBLER (F)**, a Russian naturalist and physician.

"Observationes Entomologicae," a Memoir in 4to.

**DEG.**—**GEER (Charles, Baron de)**, Marshal of the court of the Queen of Sweden, and member of the Academy of Stockholm, born 1720, died 1778.

"Memoires pour servir a l'Histoire des Insectes," 7 vols. 4to, with plates. Stockholm, 1752—1778. An excellent work, that forms a sequel to that of Reaumur. The two first volumes are rare. Retzius has given an abridgement of this work in Latin, entitled:

"Genera et Species Insectorum," 1 vol. 4to. Lipsiæ, 1783.

There is also a German translation of it enlarged, by Goetz.

**GEOFF.**—**GEOFFROY**, a celebrated physician of Paris.

"Histoire abrégée des Insectes," 2 vols. 8vo., with plates. Paris, 1764.

This very elementary work has been re-published, and augmented by Species added to it by Fourcroy in his abridgement of the same. See **FOURCROY**.

"Traité sommaire des Coquilles tant Fluviales que Terrestres, qui se trouvent aux environs de Paris," 1 vol. 12mo. Paris, 1767.

A small work, but remarkable for the attempt to class shells according to their animal.

**GEOFF.**—**GEOFFROY SAINT-HILAIRE (Etienne)**, Professor of the Museum d'Histoire Naturelle, and member of the Académie des Sciences, born at Etampes, 1773.

I quote his numerous Memoirs published in the Magasin Encyclopedique, the Annales du Museum, and in the great work on Egypt.

Various Memoirs on the organization of the Crustacea and Insects, published in different periodicals, such as the Journal Complémentaire des Sciences Médicales, Memoirs du Museum d'Histoire Naturelle, &c., and his

"Philosophie Anatomique," 2 vols. Paris 1818 and 1822.

**ISID. GEOFF.**—**GEOFFROY SAINT-HILAIRE (Isidore)**, son of the preceding, assistant naturalist of the Museum.

Author of various memoirs among those of the Museum d'Histoire Naturelle, and the Annales des Sciences Naturelles; also of the description of the Fishes of Egypt in the great work on that country.

**GEOR.**—**GEORGI (J. T.)**, a German naturalist, who travelled in the service of the Russian government in 1772, 1773, and 1774.

"His travels are printed in German, 2 vols. 4to. Petersburg, 1775.

**GERMAR (Ernest Frederick)**, a German naturalist.

"Dissertatio sistens Bombycum Species," &c., 4to. Halle.

He continues the "Magazin for Insectenkunde" of Illiger.

**GM.**—**GERMAN (E. Francis)**, Professor of Mineralogy at Halle.

"Magazin der Entomologie," 4 vols. 8vo. Halle, 1813—1821.

"Insectorum Species Novæ," first vol. 8vo., with plates. Halle, 1824. See **AHRENS**.

**GESN.**—**GESNER (Conrad)**, a physician at Zurich, born 1516, died 1565.

I quote his "History of Animals," 3 vols. folio, to which has been added a Treatise on Serpents, and one on the Scorpion. This work, which is arranged alphabetically, is an excellent compilation of all the knowledge of the ancients, and is enriched with useful observations, and numerous wood cuts, most of them good.

**GILLIAMS**, an American naturalist.

Author of certain Memoirs on Reptiles and Fishes, published in the Journal of the Academy of Natural Sciences of Philadelphia.

**GIOENI** (Giuseppe), a Sicilian naturalist of the house of Angio.

"Description of a new family and of a new genus of the Testacea," &c., in Italian, pamphlet, 8vo. Naples, 1783.

It is the stomach of the *Bulla lignaria* which he has thus converted into an animal.

**GIORNA** (M. P.), a Piedmontese naturalist, Professor at Turin, born 1741, died 1809.

I quote some of his Memoirs published among those of the Academy of Turin.

**GMELIN** (Samuel Theophilus), born at Tübingen, 1743, a German naturalist and traveller in the service of Russia, from 1768 to 1774, at which period he died in Persia.

His travels were published in German, 4 vols. 4to. Petersburg, 1770—1784.

They abound in valuable articles on Natural History.

**GM.**—**GMELIN** (John Frederic), Professor of Chemistry at Göttingen, born at Tübingen in 1748, died in 18—.

The author of the thirteenth and last edition of the "*Systema Naturæ*" of Linnæus. His work, notwithstanding the ignorance of things, want of judgment and crudity that it exhibits, is still necessary, as being the only tolerably complete account of what had been done down to 1790.

**GODART** (J. B.), Chief of the Lycæum of Bonn under the Imperial Regime, died 1825.

Editor of the article "*Papillon*" of the *Encyclopédie Methodique*.

"*Histoire Naturelle des Lépidoptères* or *Papillons de France*, 5 (first) vols. 8vo. Commenced in 1822.

**GOETZ**. or rather **GOEZ**.—**GOEZE** (I. A. E.), pastor of Quedlinburg, one of the principal writers on the Intestinal Worms, born 1731, died 1793.

"*Natural History of Intestinal Worms*" (in German), 1 vol. 4to. Brackenberg, 1782.

**GOLDFUSS** (G. A.), Professor at Bonn.

"*A Manual of Zoology*," 2 vols. 8vo. Nuremberg, 1820.

Author of various memoirs published among those of the *Academia Naturæ Curiosorum*.

**GORAN** (Antoine), Professor at Montpellier.

"*Historia Piscium*," 1 vol. 4to. Strasburg, 1770.

Of the numerous works published by this learned naturalist, the above is the only one we have had occasion to quote. Strictly speaking, it is a mere description of genera, but drawn up in detail and in technical terms, in the manner of Linnæus. It is preceded by a sort of Ichthyological Philosophy.

**GRAV.**—**GRAVENHORST** (J. L. C.) member of the Physical Society of Göttingen, &c.

"*Coleoptera Microptera Brunsvicensia*," &c., 1 vol. 8vo. Brunsvigæ, 1802.

"*Monographia Coleopterorum Micropterorum*," 1 vol. 8vo. Göttingæ, 1806.

"*Nosography of the genus Ichneumon*," 1 vol. (the first) 8vo., with plates, 1814.

"*Monographia Ichneumonum Pedemontanæ Regionis*," forming part of the twenty-fourth volume of the *Memoirs of the Academy of Sciences of Turin*.

"*A Monograph of apterous Ichneumons*," 1 vol. 8vo., with plates.

The description of a new genus, *Helwigia*, of the same tribe, an extract of which has been published in the *Bulletin Universel* of Baron de Ferussac.

"*Conspectus Generum et Familiarum Ichneumonidum*," auctoribus J. L. C. Gravenhorst et C. G. Neg. ab Esenbeck," 4to.

**GRAY** (J. E.), an English naturalist attached to the British Museum.

Author of *Memoires on Reptiles*, in the *Annals of Philosophy*, 1825, and the *Philosophical Magazine*, 1827.

**GREW (Nehemiah)**, celebrated for his discoveries in his "*Vegetable Physiology*," Secretary of the Royal Society of London, died 1711. I sometimes quote his

"*Museum Regalis Societatis*," folio. London, 1681.

**GRONOV.—GRONOVIVS (John Frederick)**.

Author of various *Memoirs on Fishes*, published among those of various learned bodies, the *Philosophical Transactions* in particular.

**GRONOV.—GRONOVIVS (L. Theodore)**, a municipal officer of Leyden, nephew of the preceding, born 1730, died 1777.

"*Museum Ichthyologicum*," 1 vol. folio. Leyden, 1754.

"*Zoophylacium Gronovianum*," 1 vol. folio. Leyden, 1765—1787.

**GENDLER (G. A.)**, painter and engraver at Halle.

Quoted for a *Memoir* in the *Naturforscher*.

**GUALT.—GUALTIERI (N.)**, physician at Florence, previously a Professor at Pisa.

"*Index Testarum Conchyliorum quæ adservantur in Musco R.*" *Gualteri*, folio. Florence, 1742.

The figures are numerous and exact.

**GUER.—GUERIN (F. E.)**, member of the *Société d'Histoire Naturelle*.

A *Memoir* on a dipterous Insect of the genus *Boletophila*, published in the tenth volume of the *Annales des Sciences Naturelles*.

A second on the *Eurypode*, a new genus of the *Crustacea*, in the sixteenth volume of the *Memoires du Museum d'Histoire Naturelle*.

A third on a new genus, *Themisto*, of the same class, in the fourth volume of the *Mem. d'Hist. Nat.*

"*Iconographie du Regne Animal*," 4to. 1829. Ten numbers have already been published.

He edited many of the articles relative to *Insects* in the *Encyclopedie Methodique*, and gave the explanations of the plates, relative to those animals, of the same work.

**GULDENST.—GULDENSTEDT (J. A.)**, of Riga, born 1745, and died at *St. Petersburg* in 1781; traveller in the service of *Russia* from 1768 to 1775.

His travels were published in *German*, 2 vols. 4to. *Petersburgh*, 1787—1791.

We also quote several of his *Memoirs* published among those of the *Academy of Petersburg*.

**GUILD.—LANSDOWN GUILDING**.

"*Natural History of the Lamia amputator*." *Linnæan Transactions*, vol. XIII.

**GUNNER (J. E.)**, bishop of *Drontheim* in *Norway*, born 1781, died 1773.

We quote certain *Memoirs* published among those of the *Society of Drontheim*, and of the *Society of Sciences of Copenhagen*.

**GYLLENH.—GYLLENHAL (L.)**, a *Swedish naturalist*. We quote the fourth part of the first volume of his

"*Insecta Suecica*," 1 vol. 8vo. *Lipsiæ*, 1827.

**HAAN (William de)**, Curator of the *Royal Museum of the Netherlands*, at *Leyden*.

"*Monographiæ Ammoniteorum et Goniatiteorum Specimen*," 8vo. *Leyden*, 1825.

HAGENB.—HAGENBACH (J. J.), one of the Curators of the Royal Museum of Leyden, died 1826.

“*Mormolyce Novum Genus*,” 1 vol. 8vo., with a plate. Nurembergæ, 1825.

HAMM.—HAMMEL (A. D.)

“*Entomological Essays*,” No. 1—6, 8vo. Petersburg, 1821—1827.

“*Observations on the Blatta germanica*,” 8vo. Petersburg, 1821.

HAMMER (L. F.), Professor of Natural History at Strasburg, son-in-law of the late Hermann.

We quote his Memoir on the American Ostrich, published in the *Annales du Museum*.

HARDW.—HARDWICKE (T.), an English general who resided in India.

“I quote several of his papers from the *Linnean Transactions*.”

HARLAN (Richard), an American naturalist and physician, Professor of Comparative Anatomy at Philadelphia.

“*Fauna Boreali Americana*,” 1 vol. 8vo., Philadelphia, 1825, a work which contains the history of the quadrupeds of this country.

He has also published various interesting Memoirs among those of the *Lycœum of New York*, and of the *Academy of Natural Sciences of Philadelphia*.

HARRIS (G. P.), an English naturalist.

I quote his description of two new species of *Didelphis*, inserted in the *Linnean Transactions*, vol. IX.

HARR.—HARRIS (Moses), an English painter.

“*An Exposition of English Insects*,” in French and English, 1 vol. 4to., with coloured plates. London, 1781.

HART.—HARTMANN, painter and engraver of subjects of Natural History at St. Gall.

Author of a *System of the terrestrial and fluviatile Testacea of Switzerland*.

HASSELQ.—HASSELQUIST (Frederick), a Swedish naturalist, one of the first pupils of Linnæus, born 1722, died 1752.

His *Travels in the East* were published by Linnæus in the Swedish language, with Latin descriptions of the animals and plants. Stockholm, 17—.

There is a French translation without the descriptions, 1 vol. 12mo. Paris 1769.

HASSELT (J. C. Van), a young Hollander, physician, and naturalist, the friend and companion of Kuhl, whom he survived but a few months.

HEGETSCH.—HEGETSCHWEILER (J. J.), a naturalist of Switzerland.

“*Dissertatio Inauguralis Zootomica de Insectorum Genitalibus*,” 1 vol. 4to. Turici, 1820.

HELW.—HELWIGG (J. C. L.).

“*Fauna Etrusca, &c., Petrii Rossii, iterum edita et annotatis perpetuis aucta*,” 1 vol. 8vo. Helmstadii, 1755. See Illiger.

HERBST (J. F. W.), a preacher at Berlin, born 1743.

“*Natursystem aller Bekanten in und Auslændischen Insekten*,” &c., von Carl. Gustaf Jablousky forgesetzt, von J. F. W. Herbst, 10 vols. 8vo., with an atlas of coloured plates to each volume. Berlin, 1758, et seq. It is a treatise on the Coleoptera.

“*Versuch einer Naturgeschichte der Kraben und Krebse*,” 3 vols. 4to., with sixty-two coloured plates. Berlin, 1790—1803. A treatise on the Crustacea, and a useful compilation, containing several new figures.

“*Natursystem der Ungerflugelten Insekten*” (the genera *Solpuga*, *Tarentula* and *Phalangium*), 1 vol. 4to. with coloured plates. Berlin, 1797.



"Natarsystem der ungerflugelten Insekten (genus Scorpio)," 1 vol. 8vo. Berlin, 1708.

"Archiv der Insecten Geschichte, Herausgegeben," von J. Casp. Fuesly, 1 vol. 4to., with coloured plates. Zurich and Wintertkar, 1791. This work has been translated into French.

He has also published a Monograph of the Linnæan genus *Papilio*, representing all the species, but as most of the figures are copies, I have not quoted it.

**HERM.**—**HERMANN** (John), Professor at Strasbourg, a laborious and erudite naturalist, born 1738, died 1800.

"Tabula Affinitatum Animalium," 1 vol. 4to., Strasb., 1783.

"Observationes Zoologicae Posthumæ, 1 vol. 4to. Strasb., and Paris, 1804.

**HERM.**—**HERMANN** (J. F.), son of the preceding, born in 1768, died before his father, in 1793.

He has left an "Apterological Memoir," 1 vol. fol. Strasbourg, 1804.

**HOEV.**—**VANDER HOEVEN** (John), Professor at Leyden.

Author of a "Manual of Zoology," in Dutch, 2 vols. 8vo., Delft. 1807; of a "Thesis de Sceleto Piscium," 8vo., Leyden, 1822; and of a Memoir on the *Ornithorhynchus*, &c.

**HOFMAN.**—**HOFMANSEGG** (Count), a learned naturalist of Saxony, and a zealous protector of the sciences.

Author of various Memoirs on the animals of Brazil and Portugal.

**HOLTEN**, a Danish naturalist.

Quoted as author of a Memoir, published in the fifth volume of the Soc. of Natural History of Copenhagen.

**HOME** (Sir Everard), the celebrated surgeon, curator of the Hunter Museum, at London, and fellow of the Royal Society.

"Lectures on Comparative Anatomy," 6 vols. 4to. London, 1814—1828.

I also quote several of his Memoirs published in the Philosophical Transactions.

**HOPP.**—**HOPPE** (D. H.) druggist at Ratisbonne.

"Enumeratio Insectorum Elytratorum Indigenorum," 1 vol. 4to., with coloured plates. Erlangæ, 1795. It is a useful work in studying the *Donaciæ*.

**HORNS.**—**HORNSTEDT**, a Swede who travelled in Java.

Quoted for a Memoir on the *Acrochordus*, published among those of Stockholm, 1787.

**HORSF.**—**HORSFIELD** (Dr. Thomas), an American naturalist residing in London.

"Zoological Researches in Java and the neighbouring Islands," 4to., with excellent plates. London, 1825.

He has also published the first number of a "Descriptive Catalogue of the Lepidoptera in the Museum of the East India Company," 4to., London, 1828.

**HOUTT.**—**HOUTTUYN** (Martin).

Author of certain Memoirs among those of the Academy of Haarlem; of a Dutch translation taken from the *Systema* of Linnæus, &c. He is also the continuer of *Noseman's History of the Netherlands*.

**HUB.**—**HUBER** (Francis), corresponding member of the Academy of Sciences of Geneva. Deprived of sight, but still a most perspicacious observer.

"Nouvelles Observations sur les Abeilles," 2 vols. 8vo, with plates. Paris and Geneva, 1814. The second volume is from the pen of his son.

**HUB.**—**HUBER** (Peter), son of the preceding.

"Recherches sur les mœurs des Fourmis Indigènes," 1 vol. 8vo. with plates. Paris and Geneva, 1810.

"Observations sur les Bourdons," published in the sixth volume of the *Transactions de la Societé Linnéene*.



HUBN.—HUBNER (J.), painter at Augsbourg.

His Iconographic work on the Lepidoptera of Europe is the most complete and perfect of the kind hitherto published. The text is in the German language. He is about to give us the Exotic Lepidoptera, of which several plates have already appeared; the whole number, in royal 8vo., will amount to near a thousand.

HUMB.—HUMBOLDT (Alexander de), member of the Académie des Sciences, of the Academy of Berlin, &c. &c., born 1769.

Of the works of this illustrious savant I chiefly quote the "Observations de Zoologie et d'Anatomie Comparée," of which there are already published fourteen numbers, 4to. Paris, 1811—1827.

HUNTER (John), the celebrated Scotch surgeon who settled in London, born 1728, died 1793.

I quote his Treatise on the teeth, and various Memoirs inserted in the Philosophical Transactions.

HUZARD, JUN., who in conjunction with M. Pelletier published

"Recherches sur le Genre Hirudo." Paris, 1825.

ILLIG.—ILLIGER (J. C. G.), Professor at Berlin; he died young.

"Prodromus Systematis Mammalium et Avium," 1 vol. 8vo. Berlin, 1811. A work remarkable for the precision which the author endeavours to give to the genera of these two classes, and for the elegance of its nomenclature.

"Verzeichniss der Käfer Preussens," or a Catalogue of Prussian Insects, a work commenced by Theophilus Kugelann, and terminated by I. Illiger, 1 vol. 8vo. Hall, 1798.

"Magasin für Insectenkunde," 7 vols. 8vo. Brunswick, 1801—1807.

"Systematisches Verzeichniss von den Schmetterlingen der Wiener Gegend," 2 vols. 8vo. Bruns., 1801. It is a new edition of the "Systematic Catalogue of the Lepidoptera of the Environs of Vienna."

He has also continued the "Fauna Etrusca" of Rossi, commenced by Helwig, vol. ii, 8vo. Helmstadii, 1807.

ITTIOL. VERON.—ITTIOLITOLOGIA VERONESE.

A great work on the Petrified Fishes of Mount Bolca, where, notwithstanding its magnificence, they are neither faithfully delineated nor well characterized.

JACQ.—JACQUIN (N. J. de), a celebrated botanist and professor at Vienna, born at Leyden, 1727, died in 18—.

"Miscellanea Austriaca," 2 vols. 4to. Vienna, 1778, 1781. It contains some observations relative to animals.

JACQ.—JACQUIN (J. F. de), son of the preceding.

The author of "Materials for a History of Birds" (in German), 1 vol. 4to., which contains some figures of rare birds. Vienna, 1784.

JOHNS.—JOHNSON (J. Rawlins), an English naturalist.

"A Treatise on the Medicinal Leach," 8vo. London, 1816, and the second part, *Ibid*, 1825.

"Observations on the genus Planaria." Philosophical Transactions, 1822, and continued in 1825.

JOUR. d'HIST. NAT.

By this title we designate a periodical work, of which only two volumes 8vo. were published, and which were united under the name of "Choix de Mémoires sur divers objets d'Histoire Naturelle, par MM. Lamarck, Brugières, Olivier, Haüy et Pelletier." Paris, 1792.

JOURN. DE PHYS.

Under this appellation I quote the "Observations sur la Physique, l'Histoire Naturelle et les Arts," of which 2 vols. appeared annually, from 1773 to 1823 at first under the direction of the Abbé Rozier, then under that of Lametherie, physician and adjunct professor in the College de France, and finally under the superintendance of M. de Blainville.

**JURINE (Louis)**, Professor of Anatomy and Surgery at Geneva.

"Nouvelle méthode de classer les Hyménoptères et les Diptères," with plates, Hymenop., vol. I, 4to. Geneva, 1807; a very superior work, and indispensable for the study of this order.

"Observations sur le Zeas vesparum," a memoir in 4to., with one plate, 1816.

"Observations sur les ailes des Hyménoptères," a memoir, with plates, published in the twenty-fourth volume of the Memoirs of the Academy of Sciences of Turin.

"Histoire des Monocles," 1 vol. 4to., with plates. Geneva, 1820.

His second son, whose demise is to be regretted, has published in his seventh volume of the Annales du Muséum, &c., an excellent Memoir on the Argulus foliaceus. [See Argulus.

**KÆMPFF.—KÆMPFER (Engilbert)**, a German physician who travelled in Persia, India and Japan, born at Lemgo, in the county of Lippe in 1651, died 1713.

"Amœnitatum Exoticarum," fascic. V, 4to. Lemgo, 1712.

"A Description of Japan" in German, translated into French under the title of "Histoire Naturelle, Civile et Ecclesiastique du Japon," 2 vols. folio. La Haye, 1729.

**KAUP**, a German naturalist.

Author of the notes on Reptiles in the Isis of Oken.

**KIRB.—KIRBY (William)**, an English clergyman, member of the Linnean Society, rector of Barham, in the county of Suffolk, &c.

"Monographia Apum Angliæ," 2 vols. 8vo., with plates. Ipswich, 1802.

He has published, in the ninth volume of the Transactions of the Linnean Society, a Monograph of the Apions of England, and in the eleventh, that of the Strepsiptera.

He has lately, in conjunction with M. Spence, published a new edition of the "Introduction to Entomology," 4 vols. 8vo., with plates. London, 1828.

He has also written several Memoirs on various Insects, for the Linnean Transactions, and the Zoological Journal, most of which we have quoted.

**KLEEM.—KLEEMAN (C. F. C.)**, a painter at Nuremburg, born 1735, died 1789.

"Beytræge zur Natur Oder Insecten-geschichte," 1 vol. 4to. Nüremberg, 1761. A supplement to the work of Ræsel, his father-in-law, forming the fifth volume.

**KL.—KLEIN (J. T.)**, Secretary of the Senate of Dantzick, a laborious author who has written on every branch of natural history, but without taste or genius; born in 1685, died 1759.

"Summa Dubiorum circa classes Quadrupedum et Amphibiorum Linnæi," 1743.

"Quadrupedum Dispositio et brevis Historia Naturalis," 1751.

"Historiæ Avium Prodrromus," 1750.

"Stemmata Avium," 1759.

"Tentamen Herpetologiæ," 1755.

"Historiæ Naturalis Piscium promovendæ missus," V, 1740—1749.

"Mantissa Ichthyologica," 1746.

"Methodus Ostracologica," 1753.

"Descriptiones Tubulorum Marinorum," 1737.

"Naturalis Dispositio Echinodermatum," 1734.

**KLUG.—KLUG (Francis)**, physician at Berlin.

"Monographia Siricum Germaniæ, atque Generum illis Adnumeratum, cum tabulis æneis coloratis VIII," 1 vol. 4to. Berlin, 1803.

Various Memoirs on different genera or species of Hymenoptera, published among those of the Society of Naturalists of Berlin.

"A Critical Review of the Genera of Fabricius derived from that of Apis, Lin." in the *Magazin für Insectenkunde* of Illiger, 1807.

"Entomologische Monographien," 1 vol. 8vo., with plates. Berlin, 1824.

"Proscopia, Novum Genus Insectorum Orthopterorum," folio, with two plates.

"Entomologiæ Brasiliænæ Specimen."

And several Monographs in the German language.

#### KNÖCH (A. G.).

"Neue Beytraege zur Insectenkunde," 1 vol. 8vo., with plates. Leipsic, 1801.

#### KNORR and WALCH, ON KNORR, &c., OR WALCH PETRIF, OF KNORR.

KNORR (George Wolfgang), an engraver at Nuremberg, born 1705, deceased 1761, and

WALCH (J. E. E.), Professor at Jena, jointly published a work called the

"Collection of the Monuments of the revolutions experienced by the terrestrial globe, containing petrifications, &c., 4 vols. Nuremberg, 1775—1778.

I quote them in relation to certain Testacea and Lithophyta.

I also quote, under the title of KNORR VERGN., or KNORR DELIC., a work of the same engraver, editions of which are to be found in various languages, styled in German Vergnügungen, &c.; Deliciæ, in Latin; and in French, Amusements des yeux et de l'esprit, or Collection de Coquillages, &c., 6 vols. 4to. Nuremb., 1760, 1773.

#### KÆHL.—KÆHLREUTER (J. G.).

We quote several of his Memoirs inserted in the *Nov. Comment., Acad. Petrop.*

#### KRUSENSTERN, a Russian admiral,

Whose voyage round the world contains several observations relative to Natural History, by Tilesius.

KUHL (Henry), a young naturalist of Hanau, born in 1797, who died at Batavia, where he was engaged in collecting for the Museum of the Netherlands, in company with a young Hollander named Van Hasselt. Their collections were immense, and included all the classes. Kuhl has left us in German

"Materials for Zoology and Comparative Anatomy, Monographs of the Parquets, Petrels, Bats of Germany," &c.

LAC. OR LACEP.—LACEPEDE (B. G. E. de la Ville Courte de), Professor of the Museum d'Hist. Nat., member of the Acad. des Sciences, &c., &c.; born at Agen.

I have frequently quoted his three principal works, which form a sequel to the great "*Histoire Naturelle*" of Buffon.

"*Histoire Naturelle, Generale et Particulière des Quadrupèdes Ovipares et des Serpents*," 2 vols. 4to. Paris, 1798—1803.

"*Histoire Naturelle, &c., des Poissons*," 5 vols. 4to. Paris, 1798—1803.

"*Histoire Naturelle, &c., des Cétacés*," 1 vol. 4to. Paris, 1804.

Also certain Memoirs in the *Annales du Muséum*.

LAET (Jean de), a geographer of Anvers in the seventeenth century.

"*Novus Orbis, seu Descriptionis Indiæ Occidentalis*," lib. XVIII, 1 vol. folio. Leyden, 1633.

#### LAICH.—LAICHTING (J. N. de), Professor at Inspruck, born 1757.

"*Verzeichniss der Tyroler Insecten*," with plates, 2 vols. 8vo. Zurich, 1781—1784.

LAM.—LAMARCK (Jean-Baptiste DE MONNET, Chevalier de), Professor of the Muséum d'Hist. Nat., and Member of the Acad. des

Sciences; born at Barentin, in Picardie, in 1743, died at Paris in December, 1829.

Of the numerous works of this celebrated naturalist I have chiefly quoted the "Système des Animaux sans vertèbres," 1 vol. 8vo. Paris, 1801.

"Extrait du Cours de Zoologie sur les Animaux sans vertèbres," 8vo. Paris, 1812.

"Histoire Naturelle des Animaux sans vertèbres," 7 vols. 8vo. Paris, 1825—1822.

"Mémoires sur les Coquilles," published in the Annales du Muséum.

The author having become blind during the publication of this work, was aided, in the Bivalves, by M. Valenciennes, and in the following classes, by Mademoiselle Lamarck, his eldest daughter.

**LAMARTINIÈRE**, a French naturalist, one of the unfortunate companions of *La Peyrouse*.

Quoted for a Memoir on some parasitical animals, published in the Journal de Physique for 1787, and at the end of the Voyage de *la Peyrouse*.

**LAMBERT**, an English naturalist.

Author of a Memoir on the *Bos Frontalis* in the seventh volume of the Linnean Transactions.

**LAMOUR**.—**LAMOUREUX** (J. V. F.) a naturalist of Agen, Professor at Caen.

Quoted for certain Memoirs in the Annales du Muséum, and for a "Histoire des Polypiers," of which I saw a part in MS., at the time of my first edition. It was published in 1 vol. 8vo, 1817.

"Exposition Méthodique de l'ordre des Polypiers," with the plate of Ellis and Solander, and some new ones, 1 vol. 4to. Paris, 1821.

"Dictionnaire des Zoophytes," forming part of the Encyclopédie Méthodique, 4to. Paris, 1824.

**LANGSD.**—**LANGSDORF**, a German naturalist who accompanied admiral Krusenstern, and established himself at Brazil.

Author of Certain Memoirs, and quoted as having given names to the various objects he discovered.

**LAPEYR.**—**LAPEYROUSE** (Philippe Picot, Baron de), Professor of Natural History at Toulouse.

"Description de plusieurs espèces d'Orthoceratites et d'Ostracites," 1 vol. folio, Nuremb., 1781.

I also quote certain articles written by him for the Dictionnaire des Oiseaux of the Encyclopédie Méthodique.

**LAROCHE** (De), a young physician of Paris, prematurely snatched from the sciences by death.

Author of Memoirs in the Annales du Muséum, and of one in particular, Sur les Poissons d'Ivica, in the thirteenth volume of that collection.

**LASP.**—**LASPEYRES** (J. H.), a municipal officer of Berlin.

"Sesiæ Europææ Iconibus et Descriptionibus, illustratæ," 1 vol. 4to. Berlin, 1801.

"Critical observations on the Systematic Catalogue of the Lepidoptera of the Environs of Vienna," inserted in the Magazin für Insectenkunde of Illiger, &c.

**LATH.**—**LATHAM** (John), Fellow of the Royal Society, born 1740.

This author has enriched the science of Ornithology, in particular, with new and beautiful species, but his works, which are not written with critical accuracy, should be read with caution.

"A General Synopsis of Birds," 3 vols. 4to., and Supplements. London 1782, et seq.

"Index Ornithologicus," 2 vols. 4to. London, 1790.

**LAT.—LATREILLE (Pierre-André)**, Professor of the Museum d'Histoire Naturelle, member of the Académie des Sciences, &c., born at Brives in 1762.

"Histoire Naturelle des Salamandres," 1 vol. 8vo., with plates. Paris 1800.

"Histoire Naturelle des Reptiles," forming a sequel to Deterville's Buffon, 4 vols. 12mo., with plates.

"Précis des Caractères Génériques des Insectes," 1 vol. 8vo. Brives, 1796.

"Genera Crustaceorum et Insectorum," 4 vols. 8vo., with plates. Paris, 1806—1807.

"Histoire Naturelle des Crustacés et des Insectes," forming a sequel to Sonnini's edition of Buffon, 14 vols. 8vo., with plates. Paris, 1802—1805.

"Histoire Naturelle des Fourmis," 1 vol. 8vo., with plates. Paris, 1802.

His Memoirs inserted in the *Annales du Muséum*, &c.

The entomological portion (partly written by him) of the *Nouveau Dictionnaire d'Histoire Naturelle*, and of the *Encyclopédie Méthodique*, and the whole of the same part in the *Observations de Zoologie et d'Anatomie Comparée*, or the second part of the *Travels of Messrs. de Humboldt and Aimé Bonpland*.

"Memoires de la Soc. d'Hist. Nat., de Paris," 4to.

"Esquisse d'une Distribution Generale du Règne Animal," 1 vol. 8vo. Paris, 1824.

"Familles Naturelles du Règne Animal," 1 vol. 8vo. Paris, 1825.

Various general Memoirs on Insects, published among those of *Mus. d'Hist. Nat.*

The description of the Insects collected by M. Caillaud in his travels in Nubia, which forms part of his Narrative.

The Entomological portion of the second edition of the *Nouveau Dictionnaire d'Histoire Naturelle*, and various articles of the *Dictionnaire Classique d'Histoire Naturelle*, as well as those relative to the same subject of the *Encyclopédie Méthodique*.

The description (*Ann. der Sc. Gener.*), of a new genus of Araneides.

**LAUR., or LAURENT.—LAURENTINI (J. N.)**, a physician of Vienna.

"Specimen medicum exhibens Synopsis Reptilium emendatum," 1 vol. 8vo. Vienna, 1768.

This thesis is said to have been written by Winterl, since celebrated as a paradoxical chemist.

**LEACH (W. E.)**, an English physician and naturalist, one of the Curators of the British Museum.

A Monograph of the genus *Meloe*, with plates, inserted in the *Transactions of the Linnean Society*.

"Malacostraca Podophthalma Britannia," 4to, with fine coloured plates. London, 1815, 1816. Eight numbers have been published.

"A General Arrangement of the Classes Crustacea, Myriapoda, and Arachnides, constituting part of the eleventh volume of the *Transactions of the Linnean Society*. An extract of this work is given in the *Bulletin de la Societé Philomatique*.

"On the Classification of the Natural Tribes of Insects, Notonectidea," published in the twelfth volume of the above mentioned *Transactions*.

"Description of some new genera and species of Animals discovered in Africa," by T. C. Bowdich, a half sheet in 4to.

"Zoological Miscellany," 3 vols. 8vo. London, 1817.

"On the Genera and Species of Proboscideous Insects," 1 vol. 8vo, with plates. Edinb. 1817.

"Appendix, No. 10, to a general notice of the animals taken by John M. Cranch, during the expedition to explore the source of the river Zaire," 4to.

Various articles in the *Dictionnaire des Sciences Naturelles*, relative to the Crustacea, and Memoirs in the *Linnean Transactions*.

**LE CL.,—LE CLERC**, naturalist at Laval, author of

"Observations sur la corne du Psile de Bosc," presented to the *Académie des Sciences*, in 1815, and of other interesting observations.

**LEC., or LE C.—LE CONTE** (Major John), an American naturalist, and officer in the service of the United States.

Author of various memoirs on Quadrupeds, Reptiles, &c., published in the Journal of the Academy of Natural Sciences of Philadelphia, and in the Annals of the New York Lyceum.

**LEFEBV.—LEFEBVRE** (Alexander), a French naturalist,

Has published in the Annales de Societé Linnéenne, a description of several new Insects captured by him in Sicily, and that of three Lepidoptera.

**LEGUAT** (François), a protestant of Burgundy, who sought refuge in Holland.

"Voyages et Aventures de Fr. Leguat et de ses Compagnons," 2 vols. 12mo London, 1720. They contain good figures of various animals.

**LEISLER.**

Author of a Supplement to Bchstein's Birds of Germany. Hanau, 1812, 1813.

**LEPEL.—LEPELLETIER DE SAINT FARGEAU** (Amedée), a naturalist of Paris. Author of

"Monographie des Chrysis des Environs de Paris," in the Ann. du Mus. d'Hist. Nat., No. 58.

"Mémoire sur les Araignées," in the Bulletin de la Societé Philomatique, April, 1813, No. 67.

"Monographia Tenthredinetarum Synonymia Extricata," 1 vol. 8vo. Paris, 1823.

Jointly with M. de Serville, of the article on Insects in the tenth volume of the Encyclopédie de Methodique.

He has communicated to the Académie des Sciences, Observations on the coition of different species of Volucella, a genus of Dipterous Insects.

**LESKE** (N. G.), Professor at Leipsick, and subsequently at Marburg, born 1752, died 1786.

"Museum Leskeanum, Regnum Animale," 1 vol. 8vo, with coloured plates, Lips. 1789.

I also quote him for his enlarged edition of "Klein's Treatise on the Echini," 1 vol. 4to. Lips., 1778.

**LESS.—LESSON** (R. P.), naturalist, jointly with M. Garnot, of Duperrey's Expedition in the Coquille.

These two naturalists have edited the Zoological part of the narrative of the above expedition; that part is not yet completed. M. Lesson is also author of the

"Manuel de Mammalogie," 1 vol. 12mo. Paris, 1827.

"Manuel d'Ornithologie," 2 vols. 12mo. Paris, 1820.

"Manuel de l'Histoire des Molusques et de leurs Coquilles," 2 vols. 12mo. Paris, 1829. His

"Histoire des Oiseaux Mouches," with excellent plates, now being published.

**LESUEUR** (C. A.), a French naturalist, from Havre, residing in the United States.

One of the draughtsmen who accompanied Baudin, and one of Péron's most efficient and zealous co-operators in Zoological researches. He has published some Zoological Observations in the Bulletin des Sciences, and the prospectus of a great work on the Medusæ, accompanied by specimens of several of the plates. He has also furnished various papers for the Journal of the Academy of Natural Sciences of Philadelphia, the Memoires du Mus. d'Hist. Nat., &c.

**LEUKARD** (F. S.), author of

"Zoological Fragments," Helmstadt, 1819.

The Mollusca of the Voyage of Ruppel.

**LEW.**—**LEWINS** (J. W.) author of the

“Natural History of the Lepidopterous Insects of New South Wales,” with coloured plates, 1 vol. 4to. London, 1805.

“Natural History of the Birds of New Holland.”

**LICHT.**—**LICHTENSTEIN** (A. A. H.), Professor of the Oriental Languages at Hamburg, born in 1765.

A dissertation on the genus *Mantis* of Linnaeus, in the sixth volume of the Linnean Transactions.

**LICHENSTEIN** (H.), Professor at Berlin.

“Voyage to the Cape of Good Hope,” 2 vols. 8vo. Berlin, 1811.

Various Memoirs on the Antilopes, the genus *Dipus*, the Animals of Marcgrave, &c., published among those of the Academy of Berlin.

**LINDROTH**, a Swedish naturalist.

“Author of a paper in the nineteenth volume of the New Stockholm Memoirs.

**LINK** (J. H.), a physician at Leipzig, born in 1674, died in 1734.

“*De Stellis Marinis, liber singularis*,” published by Christ., Gabr. Fischer, 1 vol. folio. Leipzig, 1733.

**L. OR LIN.**—**LINNÆUS** OR **LINNE** (Charles de), Professor of Natural History at Upsal, and author of the great reform in the nomenclature of Natural History. He was born 1707, and died in 1778. I quote his

“*Systema Naturæ*,” particularly the tenth edition of 1757; the twelfth of 1766; and above all, the thirteenth edition, published by Gmelin, 7 vols. 8vo. Leipzig, 1788.

“*Amœnitates Academicæ*,” a collection of theses, in 10 vols. 8vo, 1749—1790.

“*Museum Adolphi Frederici Regis*,” with thirty-three plates, 1 vol. folio. Stockholm, 1754.

The author himself, in his other works, quotes a second volume of this latter one; it is a small 8vo.

“*Musæum Ludovicæ Ulricæ Reginae*,” 1 vol. 8vo. Stockholm, 1764.

“*Fauna Suecica*, 1 vol. 8vo, first edition, 1746; second, 1761; the third by Retzius, Leipzig, 1800, only containing the Vertebrata.

**LIN. TRANS. OR TRANS. LIN. SOC., OR LIN. SOC.**

“Transactions of the Linnean Society of London,” 13 vols. 4to. London, 1791, et seq.

**LISTER** (Martin), an English naturalist, and physician to Queen Anne, died 1711.

“*Historia sive Synopsis Methodica Conchyliorum*,” with 1059 engravings, 1 vol. folio. London, 1689—1693.

“There is another edition, with the synonymes of Linnaeus, published by William Huddesford. London, 1770.

“*Historia Animalium Angliæ, de Araneis, de Cochleis, tum Terrestribus tum Fluvialibus, de Cochleis Marinis*.” London, 1678.

The part relating to the Spiders is also found in the “*Historia Insectorum*” of Ray.

**LYON.**—**LYONNET** (Peter), Interpreting Secretary to the United Provinces, born in 1707, died in 1789.

“*Traité Anatomique de la Chenille du Saule*,” 4to. La Haye, 1762, with plates, engraved by the author, a work which is at once the masterpiece of engraving and anatomy.

**MACL., OR MAC L.**—**MAC LEAY** (W. S.), of the Linnæan Society of London.



"Horæ Entomologicæ," 8vo, vol. 1st, in two parts, with plates. London, 1819, 1821.

"Annulosa Javanica," 4to, with plates, No. 1. London, 1825.

He has also published some general Memoirs on Insects, not referred to, however, in this work.

**MACCAR.**—**MACCARI (P.)**, member of the Société de Médecine of Marseilles, &c.

"Mémoire sur le Scorpion, qui se trouve sur la Montagne de Cette," &c., 1 vol. 8vo. 1810.

**MACQ.**—**MACQUART (J.)**, member of the Société Royale des Sciences, d'Agriculture et des Arts of Lille.

"A series of Memoirs on the "Insectes Dipteres du Nord de la France," with plates representing their wings, published among those of the above Society, which form 4 vols. 8vo, with plates, Lille, 1826—1829.

**MACRI (Zaverio)**, a Neapolitan naturalist.

"New Observations on the Pulmo Marinus of the Ancients," in Italian, 1 vol. 8vo. Naples, 1778.

**MANN.**—**MANNERHEIM (C. G.)**, counsellor to the Emperor of Russia.

"Eucnemis Insectorum genus," with two plates, 1 vol. 8vo. Petrop., 1823.

"Observations on the genus Megalopus," in the tenth volume of the Memoirs of the Imperial Academy of Sciences of St. Petersburg, 1824.

"Description of forty new species of Scarabæides from Brazil," with plates, 4to.

**MANTELL (G.)**, member of the College of Surgeons of London resident at Lewes.

"Illustrations of the Geology of the County of Sussex," 2 vols. 4to. London, 1822, 1827.

**MARCGR.**—**MARCGRAY** de Liebstadt (George) of Meissen in Saxony, a traveller in Brazil; born 1610, died in Guinea 1644.

"Historiæ Rerum Naturalium Brasiliæ," lib. 8, in fol. Leyden and Amsterdam, 1648. An excellent work for the times, full of exact descriptions, and recognizable though rude figures of all kinds of animals.

**MARSH.**—**MARSHAM**, an English naturalist, Treasurer of the Linnean Society, &c.

"Entomologia Britannica, sistens Insecta Britannicæ Indigena, secundum methodum Linnæanum disposita," tom. I, Coleoptera. London, 1802.

"A Monograph of the genus Notoclea," (Paropsis, Olivier), with plates, published in the ninth volume of the Transactions of the Linnean Society.

**MARTENS (Frederick)**, a surgeon at Hambourg.

"A Voyage to Spitzberg," in German, 1 vol. 4to, Hambourg, 1675.

It is useful with respect to the animals of the Arctic Ocean.

**MARTENS (George de)**, Secretary of the Supreme Court of Wirtemberg.

"A Voyage to Venice," 2 vols. 8vo. Ulm, 1824. It contains a Catalogue of the Fishes of that port.

**MARTINI (F. H. G.)**, a physician of Berlin, born 1729, died 1778. He commenced the great conchyliological work entitled the

"Systematic Cabinet of Shells," 10 vols. 4to, and 1 of Suppl., with coloured plates. Nuremberg.

The three first volumes, 1769—1777, are from his pen, the other from that of Chemnitz.

**MATHIOLE (P. A.)**, of Scœna, born 1500, died 1577.

In his Commentary on Dioscorides, he enters into details of various animals.

**MAUD.—MAUDUIT—(R. J. E.),** a physician at Paris, who died in 1792.

Author of the "Dictionnaire des Oiseaux" of the Encyclopédie Méthodique.

**MAUPERT.—MAUPERTIUS (P. L. M. de),** member of the Académie des Sciences, president of that of Berlin, &c., born 1671, died 1759. An astronomer and geometrician, also author of certain Memoirs on Natural History.

"Expériences sur les Scorpions," in the Mémoires de l'Acad. de Sciences, 1731.

**MAURICE DE NASSAU (Prince),** or rather Count John Maurice de Nassau-Siegen, born 1604, the Dutch governor of Brazil from 1637 to 1644.

He encouraged the labours of Maregrave in that country, and drew several fishes which have been engraved and published in the Ichthyology of Block. He died in the service of Brandebourg in 1679.

**MECKEL (J. F.),** Professor at Halle. We quote his

"Materials for Comparative Anatomy" (in German), 8vo. Leipzig, 1808.

"A Treatise on the Ornithorhynchus," folio. Leipzig, 1826.

**MEG.—MEGERLE DE MUHLFIELD (J. C.)**

Author of "A Classification of Bivalve Shells," inserted in the Magazine of the Society of the Friends of Nature of Berlin.

**MEHLIS (Edward).**

"De Distomate Hepatico et Lanceolato," folio. Gottingen, 1825.

**MEIG.—MEIGEN (J. G.),** a German naturalist.

This author has published (in German), a work on the "Diptera of Europe," now forming 5 vols. 8vo., accompanied with plates representing at least one species of each genus, with the details of their characters.

M. Baumauer published an extract from the same work, under the title of a "Nouvelle Classification des Mouches à deux ailes," 8vo. Paris, 1800.

**MEM. DE LA SOC. D'HIST. NAT.**

"Mémoires de la Société d'Histoire Naturelle de Paris," 1 vol. 8vo., 1799, the only one that appeared.

There is another work with a similar title, in 3 vols. 4to., 1823, et seq.

**MERIAN (M. S.),** a German lady established in Holland, born 1647; died 1717. She has left us two posthumous works, remarkable for the beauty of the drawings:

"De Generatione et Metamorphosibus Insectorum Surinamensis," 1 vol. folio. The Hague, 1726.

"Histoire des Insectes d'Europe, translated into French by Mairet, 1 vol. folio. Amsterdam, 1730.

**MERR.—MERREM (Blaise),** born at Bremen, Professor of Natural History at Marburg.

"Avium Rariorum et minus Cognitarum, Icones et Descript.," four Nos. 4to. Leipzig, 1786.

"Materials for the Natural History of Reptiles" (in German), 2 Nos. 4to. Duisbourg and Lemgo, 1790. All that it contains relates to Serpents.

"Tentamen Systematis Amphibiorum," in Latin and German, 1 vol. 8vo. Marburg, 1820.

**MESNARD.—MESNARD DE LA GROYE,** naturalist of Angers, and my adjunct in the Collège de France, died in 1827.

Author of various Memoirs in the Annales du Museum, Journal de Physique, &c.

**MEYER and WOLF.**

"Taschenbuch," &c., or Almanack of the Birds of Germany, 2 vols. 8vo.,

Franckfort, 1810. The first volume contains the terrestrial birds by Wolf; the second the water-birds by Meyer. This work is filled with excellent observations.

**MIG.**—**MIGER** (Felix), a naturalist at Paris.

"Memoire sur les Larves des Insectes Coléoptères Aquatiques," inserted in the fourteenth volume of the *Annales du Museum*.

**MIK.**—**MIKAU** (I. C.) a Bohemian naturalist.

"*Monographia Bombyliorum Bohemiæ*," with plates, 8vo. Prague, 1796.

**MILLER** (J. S.), an English naturalist.

"Natural History of the Crinoides," and a "Memoir on the Belemnites," 4to. Bristol, 1821. In the *Transactions of the Geological Society of London*, second series, vol. II, part I.

**MITCHILL**, an American naturalist and physician.

I chiefly quote his work on the "Fishes of New York," in the *Trans. of the Literary and Philosophical Society of New York*. He has also published other Memoirs in the *Annals of the New York Lyceum*, and in the *Journ. of the Academy of Natural Sciences of Philadelphia*.

**MOEHR.**—**MOEHRING** (P. H. G.), a physician at Jever.

"*Avium Genera*," 8vo. Aurich, 1752.

**MOLIN**—**MOLINA** (the Abbé J. I.), an ecclesiastic of Chili, resident in Italy.

"*Essai sur l'Histoire Naturelle du Chili*," in Latin, and translated into French by Gruvel, 1 vol. 8vo. Paris, 1789. This work was written in Italy from memory, and contains many doubtful passages.

**MOLL.** (J. P. C. de), see **FICHEL**.

**MONTAG.**—**MONTAGUE** (George), an English naturalist.

Author of descriptions of various species of Birds, Fishes, Mollusca and Crustacea, in the *Transactions of the Linnean and Wernerian Societies of London*.

**MONTGRE**, a physician of Paris, who died in the colonies.

I quote his "*Mémoire sur les Vers de terre*," published in the *Mémoires du Muséum*.

**MONTF.**—**MONTFORT** (Denis de), a singular man who styled himself an ancient naturalist of the King of Holland; he perished through want in the streets of Paris in 1820 or 1821. I principally quote his

"*Conchyliologie Systematique*," a sort of *Genera Conchyliorum*, where the genera are extremely numerous, and represented by wood cuts, executed by the author, in as exact a manner as can be done by that species of engraving.

There are but two volumes 8vo., which contain the Univalves only. Paris 1808, 1810.

He is also the author of the four first volumes of the "*Histoire Naturelle des Mollusques*," that form a sequel to Sonnini's *Buffon*, Paris, 1802, in which he has inserted apocryphal figures. They merely contain the generalia and the Cephalopoda.

**MOQ. TAND.**—**MOQUIN-TANDON** (A.), a physician of Montpellier, Professor at Marseilles.

"*Monographie de la famille des Hirudinées*," 4to. Montpellier, 1826.

**MOREAU DE JONNES**, corresponding member of the Institute.

Quoted as author of several Memoirs on the animals of the Antilles.

**MORREN**, (C. F. A.) a naturalist of Belgium.

"*De Lumbrici Terrestris Historia Naturali nec non Anatomia*," 4to. Brussels, 1829.

**MOUFF.**—**MOUFFET** (Thomas), an English naturalist, died about 1600.

"*Insectorum sive Minimorum Animalium Theatrum*," 1 vol. folio, with five hundred wood cuts. London, 1634.

It was published by Theodore de Mayerne, a Frenchman and physician to James I. It is the first special work on Insects.

**STAT. MULL.—MULLER (Philip Louis Statius)**, Professor at Erlang, born in 1725, died 1776.

Author of a bad translation, into German, of the *Systema Naturæ* of Linnæus, from the Dutch translation of Houttuyn, 9 vols. 8vo., Nuremb., 1773—1776, containing the animals only.

**MULL.—MULLER (O. F.)**, a Dane, Counsellor of State, and one of the most laborious observers of the eighteenth century, born 1730, died 1784. I quote his

"Von Würmern der Süssen und Salzigen Wassers," 1 vol. 4to., or fresh and salt-water worms.

"*Verminium Terrestrium et Fluviatilium Historia*," 2 vols. 4to.

"*Zoologica Danica*," folio, with coloured plates. The three first numbers, Copenhagen, 1788, 1789, are from his pen; the fourth from *Abildgaardt*, *Vahl*, &c.

"*Zoologia Danica Prodromus*," 1 vol. 8vo. Hafniæ, 1776.

"*Entomostraca sen Insecta Testacea*," 1 vol. 4to., with plates. Lips. and Havnæ, 1785.

"*Hydrachnæ*, 1 vol. 4to., with coloured plates. Lipsæi, 1781.

"*Animalcula Infusoria*," 1 vol. 4to.

**NACCARI (L. F.)**, librarian of the seminary of Chioggia.

"*Ittiologia Adriatica*," published in the *Physical Journal of Pavia*, Vol. V, Dec. 11, 1822.

**NARDO (Domenico)**, an Italian naturalist established at Chioggia.

He made some additions to the work of Naccari in the *Physical Journal of Pavia*, XVII.

**NATTER.—NATTERER**, an Austrian naturalist, who travelled in Brazil.

Author of various interesting observations on the animals of Germany.

**NATURF.—NATURFORSCHER**.

"*Der Naturforscher*," or the Naturalist. The title of a German Journal on Natural History, of which twenty-seven numbers were published at Halle, from 1774 to 1793. It abounds in important observations and good figures.

**NAUM.—NAUMAN (J. A. and J. F.)**, father and son.

"*Natural History of the Birds of Germany*." An excellent work, the plates of which, though small, are perfect. The second edition, 8vo., Lips., 1820, et seq.—which we chiefly quote—is not yet terminated.

**NEES D'ESENB.** See **GRAVENHORST**.

**NICOLS.—NICOLSON**, an Irish Dominican, missionary to St. Domingo.

"*Essai sur l'Histoire Naturelle de St. Domingue*," 8vo. with plates. Paris, 1776.

**NIEREMB.—NIEREMBERG (J. E.)**, a Jesuit, Professor at Madrid.

"*Historia Naturalis maxime peregrina, libris XVI distincta*," folio, Anvers, a compilation but of little value.

**NILS.—NILSON (S. V.)**, Curator of the Lund Museum.

"*Ornithologia Suecica*," 2 vols. 8vo. Copenhagen, 1817, 1821.

**NITZCH (C. L.)**, Professor at Halle.

Author of various Memoirs on the osteology of Birds and the Invertebrata, published among those of Halle, Bonn, &c.

"*Spiropteræ Stramosæ Descr.*, 4to. Halle, 1829.

"*Materials for a History of the Infusoria, or a description of the Cercariæ and Bacillariæ*," 8vo, in German. Halle, 1817.

**NOSEM.—NOSEMAN (N.)** died 1786.

In conjunction with the engraver, Christian Sepp, author of a "*History of*

the Birds of the Netherlands" (in Dutch), folio, with remarkably beautiful plates. The last numbers are by Houttyn. Amsterdam, 1770, et seq.

**OCHSENH.—OCHSENHEIMER (Ferdinand).**

His work written in German on the "Lepidoptera of Europe," is the best that has been published with respect to critical accuracy and the descriptions of the species. The first volume appeared at Leipzig in 1806. The one he is about to publish will contain the Noctuae.

**ODIER (Auguste).**

"Mémoire sur la Composition Chimique des parties cornées des Insectes," inserted in the first volume of the "Mémoires de la Soc. d'Hist. Nat." 4to, 1823.

**OKEN**, a German naturalist of Fribourg in Brisgau, established at Jena.

"Philosophy of Nature," 3 vols. 8vo. Jena, 1809.

"A Treatise on Natural History," of which the Zoology forms the third part, in 2 vols. 8vo., with an Atlas. Jena, 1816.

"A Natural History for Schools," 1 vol. Jena, 1821.

"Esquisse de Système d'Anatomie, de Physiologie, et d'Histoire Naturelle." 8vo. Paris, 1821.

He is the principal editor of the *Isis*, a journal which abounds in important articles relative to natural history.

**OLAFSEN (Eggert)**, or **Erard OLAVIUS**, a naturalist of Iceland, born 1726, died 1768.

Jointly with Biorn POVELSEN, or PAULI, the first physician of that island, who died in 1778, author of a "Journey in Iceland," printed in 1772. I quote the French Translation, 5 vols., 8vo., with an atlas. Paris, 1802.

**OLIVI (The Abbé Joseph).**

"Zoologica Adriatica," 1 vol. 8vo., with plates. Bassano, 1792.

It contains excellent observations on the Mollusca and Crustacea.

**OLIV.—OLIVIER (Antoine-Guillaume)**, member of the Académie des Sciences, Professor of Zoology to the Ecole Vétérinaire of Alfort, &c., born at Draguignan, 1756, died 1814.

"Entomologie, ou Histoire Naturelle des Insectes" (Coleoptera), 5 vols. folio, with coloured plates. Paris. 1789—1808.

Insects of the Encyclopédie Methodique, from the fourth volume of the Natural History to the eighth inclusively.

"Voyage dans l'Empire Ottoman, l'Egypte et la Perse," 3 vols. 4to., with plates. Paris, 1807. It contains interesting species of several classes of animals.

**OMALIUS DE HALLOY**, governor of the province of Namur, and a learned geologist.

**OPPEL (Michael)**, a Bavarian naturalist, who died in 18—.

"Sur la Classification des Reptiles." The first Memoir is on the Ophidia, the second on the Batrachia, published in the Annales du Muséum.

"The Orders, Families, and Genera of Reptiles" (in German), 4to. Munich, 1811.

I also quote his Memoir on the Tanypus, inserted in the Memoirs of the Academy of Munich, 1812.

In conjunction with Messrs. Tiedeman and Liboschitz, he commenced a work on Reptiles, with numerous plates, of which the Crocodiles only were published. Heidelberg, folio, 1817.

**OSBECK (Peter)**, a pupil of Linnæus, and chaplain of a Swedish vessel that went to China in 1750.

His narrative was printed in the Swedish language in 8vo., Stockholm, 1757, and translated into German by G. Rostock, 8vo., 1765.

**OTTO (A. W.)**, a German naturalist, Professor at Breslau.

Author of several Memoirs among those of the Academy of Sc., of Nature, and other Collections.

"*Conspectus Animalium quorundam*," &c. Breslau, 1821.

"*De Stermaspide Thalassemoides et Siphostomate Diplochaito*," 4to. Breslau, 1820.

**PALIS. DE BEAUV.**—**PALISOT, BARON BEAUVOIS** (A. M. F. J.) member of the Academie des Sciences, born 1755, died 1820.

"*Insectes recueillis en Afrique et en Amérique*," &c., folio, with coloured plates. Paris, 1805, et seq.

**PALL.**—**PALLAS** (P. S.), one of the great Zoologists of Modern times, born at Berlin 1741, died 1812. I quote his

**GLIR.**

"*Novæ Species Quadrupedum e Glirium Ordine*," 4to., with thirty-nine coloured plates. Erlang, 1778.

**SPIC. OR SPIC. ZOO.**

"*Spicilegia Zoologica*," fourteen numbers, 4to. Berlin, 1767—1780.

**MISCEL.**

"*Miscellanea Zoologica*," 1 No., 4to. Haga, 1766.

**VOY.**

"*Voyage dans plusieurs provinces de l'Empire de Russie*," French Tr., 8vo., with an atlas. Paris.

**NORD. BEYTR.**

"*Neue Nordische Beyträge*," &c. (or New Materials from the North for Geography, &c.), 7 vols. 8vo. Petersburg and Leipzig, 1781—1796.

"*Zoographia Russo-Adriatica*," 3 vols. 4to. Some of the plates of this work having been mislaid; it has not yet been published, though the Academy of St. Petersburg have granted the use of the MSS. to certain naturalists.

Several of his Memoirs inserted among those of the Academy last mentioned.

**PANZ.**—**PANZER** (G. W. F.), a physician of Nuremberg, born in 1755.

"*Faunæ Insectorum Germanicæ initia, or Deutschlands Insecten*," one hundred and nine numbers, 12mo., each consisting of twenty-four coloured plates. Nuremberg, 1796, et seq. One of the most useful entomological works we possess, on account of the accuracy of the figures.

"*Entomologischer Versuch über die Jurineschen Gattungen der Linneischen Hymenoptern*," 1 vol. 12mo. Nuremberg, 1806.

"*Index Entomologicus, pars prima, Eleutherata*," 1 vol. 12mo. Nurembergæ, 1813.

He has also published several other works on Insects, which I have not had occasion to quote.

**PARK.**—**PARKINSON** (James), an English naturalist.

"*Outlines of Oryctology*," 1 vol. 8vo., with plates.

"*Organic Remains of a former World*," 3 vols. 4to. London, 1811.

**PARRA** (Don Antonio), an American naturalist.

Author of a "*Description of various portions of Natural History*," and chiefly of marine productions, written in Spanish, 4to. Havana, 1784.

In this work the author describes and figures many fishes and crustacea.

**PASSER.**—**PASSERINI** (Charles).

"*Observations on the sound produced by the Sphinx Atrôpos*," in Italian, from which M. Dufronches has given an extract.

**PAYKULL** (Gustavus), Counsellor to the King of Sweden, and member of the Academy of Stockholm.

"*Fauna Suecica*" (Insecta). 3 vols. 8vo. Upsal, 1800.

These three volumes refer exclusively to the Coleoptera; his descriptions are carefully and completely given.

He has also published good Monographs of the genera *Carabus*, *Curculio*, and *Staphylinus*, but they are incorporated with the *Fauna*.

"*Monographia Histeroideum*," with plates of all the species, 1 vol. 8vo. Upsal, 1811. This Monograph is superior to the preceding ones, and is indispensably requisite for the study of these Insects.

He has published certain Memoirs on Birds.



**PECK** (William), Professor of Botany at the University of Harvard, died in —.

Author of a Memoir inserted in the fourth volume of the *Agricultural Journal* of Massachusetts, relative to a species of *Rhynchænus*, that attacks the Pine.

**PENN. PENNT.—PENNANT** (Thomas), a Welchman, born in 1726, died in 1798. A laborious naturalist. The works we chiefly quote are his

“*Histoire of Quadrupeds*,” 2 vols. 4to.

“*British Zoology*,” 1 vol. folio.

“*British Zoology*,” 4to. and 8vo. 4 vols.

“*Arctic Zoology*,” 2 vols. 4to.

“*Indian Zoology*,” 1 vol. 4to.

**PERNETTY**, a Benedictine, who accompanied Bougainville to the Faulkland Islands; he was afterwards librarian to Frederick II. of Prussia.

“*Voyage aux Iles Malouines*,” 2 vols. 8vo. Paris, 1770. It contains some valuable details on Natural History, and useful figures.

**PER.—PERON** (François), born at Cerilly in 1775, died in 1810, a zealous traveller, prematurely snatched from the sciences, and one of those who have most contributed to enrich the Museum of Paris.

He edited the first volume of the “*Voyage de découverte aux Terres Australes en 1800—1804*,” 1 vol. 4to. with an atlas. Paris, 1807.

He was also the author of various Memoirs published in the *Annales du Muséum*.

**PERRAULT** (Claude), a naturalist, architect of the Louvre and Observatory of Paris, born 1613, died 1688.

He published, from the dissections of Duverney, the “*Mémoires pour servir à l’Histoire Naturelle des Animaux*,” which form the third volume of the *Mém. de l’Acad. des Sciences*, previous to 1669.

**PETAG.—PETAGNA**, (V.), of Naples.

“*Specimen Insectorum Ulterioris Calabriae*,” 4to. with one plate. Francofurti, 1787.

“*Elements of Entomology*,” 2 vols. 8vo.

**PETERSB. or PETROP. MEM., or COMMENT., or NOV. COMMENT., or ACT., or NOV. ACT.**

Such are the various titles of the Memoirs of the Imperial Academy of Sciences of St. Petersburg.

The “*Commentarii*,” 14 vols. 4to. from 1726, to 1746.

The “*Novi Commentarii*,” 20 vols. from 1749 to 1775.

The “*Acta*,” 7 vols. from 1777 to 1782.

The “*Nova Acta*,” 15 vols. from 1783 to 1802.

The “*Memoirs*,” from 1809.

**PHELSUM** (Murck Van), a Dutch naturalist.

Quoted for his “*Letter to C. Noseman on the Echini*,” 8vo. Rotterdam, 1774.

**PHILLIP** (Arthur), a German, and Governor of Botany Bay, in the English service.

“*The Voyage of Governor Phillip to Botany Bay*,” &c., with fifty-five coloured plates, London, 1789. An anonymous work, the part relative to natural history by Latham. There is a French translation of it without plates, in 1 vol. 8vo. Paris, 1791.

**PHIPS** (C. J.), the celebrated English navigator, subsequently Lord Mulgrave; born 1746, died 1792.

“*Voyage to the North Pole in 1773*,” translated into French by Desmeuniers, 1 vol. 4to. Paris, 1775.

**PLANC.—PLANCUS** (Janus), or **J. BIANCHI**, a physician of Rimini, born in 1693, died in 1775.



"De Conchis minus notis," 1 vol. 4to., with plates. Venice, 1739. The second edition greatly enlarged, Rome, 1760.

**PL. COL.—PLANCHES COLORIÉES.**

"Planches Coloriées des Oiseaux, par MM. Temminck and Laugier," 4to. and folio, a great work which forms a sequel to the *Planches Enlumînées*, &c. of Buffon.

**PL. ENL.—PLANCHES ENLUMINEES.**

The coloured plates of Birds, published for Buffon's Natural History, by Dufrenoy, Jun., amounting to one thousand and eight, but arranged without order. It is beyond all doubt the richest collection of that class that has ever appeared. Most of the figures are good.

**PLUM.—PLUMIER (Charles)**, a Minim, who travelled for a long time in the service of Louis the Fourteenth; he was a great naturalist in all the branches of the science, although several of his works have remained unpublished.

I have had occasion to quote his observations on Fishes and Reptiles, part of which are at Paris and part at Berlin, all in MS., with numerous drawings; a portion of them has been published by Bloch and Lacépède.

**POLI**, a naturalist and anatomist at Naples, author of the magnificent work entitled

"*Testacea utriusque Siciliæ eorumque Historia et Anatomie*," 2 vols. folio. Parma, 1791 and 1795. A third volume has been lately published.

**PREV.—PREVOST (Benedict).**

"*Mémoire sur le Chirocéphale*," published at the end of the *Histoire des Monocles of Jurine*. See Jurine.

**PREYS.—PREYSLER (J. D.)**

"*Werzeichniss Boehmischer Insecten*," 1 vol. 4to. Prague, 1790.

**PR. MAX.—MAXIMILIAN PRINCE, DE WIED-NEUWIED.**

His "*Voyage to Brazil*," 2 vols. 4to., with an atlas, Franckf., 1820 and 1821, his "*Natural History of Brazil*," of which two vols. 8vo. were published at Weimar, 1826, and several numbers of coloured plates, in folio, are among the number of those productions of modern times which are richest in novelties.

**PRUNN.—PRUNNER (Leonard de).**

"*Lepidoptera Pedemontana*," 1 vol. 8vo. Turin, 1798.

**Q. and G. or QUOY and GAYM., or GAIM.—QUOY and GAYMARD**, fellow travellers, who have already made two great voyages.

They have published the "*Zoologie du Voyage de l'Uranie*," 1 vol. Paris, 1824, with one volume, folio, of plates. They are at present occupied with that of the "*Voyage de l'Astrolabe*," of which several numbers have already appeared.

**RAFFLES (Sir Stamford)**, an English General and Governor of Sumatra, who has greatly contributed to our knowledge of the productions of that island.

I quote his paper on this subject in the thirteenth volume of the *Linnean Transactions*

**RAF.—RAFINESQUE SCHMALTZ (C. S.)**, naturalist, long a resident in Sicily, and at present established in the United States.

Author of numerous little works on new species, genera, and systems.

"*Caratteri di alcuni nuovi Generi et nuove Specie di Animali e Pianta della Sicilia*," 8vo. Palermo, 1810.

"*Indice d'Ittiologia Siciliana*," 8vo. Paris, 1810.

"*Principes Fondamentaux de Séméiologie*," Palermo, 1814.

"*Analyse de l'Univers, ou Tableau de la Nature*," 8vo. Paris, 1815.

"*Icthyologia Ohiensis, or Natural History of the Fishes inhabiting the river Ohio*," &c., 8vo. Lexington, Kentucky, 1820.

**RAY (John)**, an English theologian, born 1628, died 1704; the

first true methodiser of the animal kingdom, and the principal guide of Linnæus in that department of the natural sciences.

"Synopsis Methodica Animalium Quadrupedum et Serpantum," 8vo. London, 1683.

"Synopsis Methodica Avium et Piscium," 8vo. London, 1783.

"Historia Insectorum," 4to. London, 1710.

**RANDOHR** (C. A.), a German naturalist.

Author of a treatise "On the Digestive Organs of Insects," in the German language, 4to., Halle, 1811; and of "Materials for the History of certain German Monoculi," 4to. Ibid. 1805.

**RANG** (Sander), an officer of the Corps Royal of the French Navy, an able naturalist.

"Manuel de l'Histoire Naturelles des Mollusques et de leurs Coquilles," 12mo., Paris, 1829.

"Etablissement de la famille des Béroïdes," published in the fourth volume of the Mem. de la Soc. d'Hist. Naturelle.

"Histoire Naturelle des Aplysies," 4to. Paris, 1828.

**RANZANI** (The Abbé Camillo), Professor of Natural History at Bologna, &c.

"Elements of Zoology" (in Italian). Bol. 1819, et seq., of which thirteen volumes, 8vo., have already appeared, all relating to Quadrupeds and Birds.

"Memoirs on Natural History" (also in Italian), 4to. Bologna, 1820.

**RAPP** (William), Professor at Tubingen.

"On the Polypi in general and the Actinæ in particular," 4to. Weimar, 1829.

**REaum.—REaumER** (R. A. Ferchault de), member of the Académie des Sciences, born 1683, died 1757; his labours were directed to all the sciences. We chiefly quote his

"Mémoires pour servir à l'Histoire des Insectes," 6 vols. 4to., with plates. Paris, 1734—1742. The seventh volume remains in MS.; the others were not commenced. An admirable work.

**RED.—REDI** (F.), a celebrated literary character and physician of Arezzo, born 1626, died 1698.

"Experimenta circa Generationem Insectorum," 3 vols. 12mo., with plates. Amstelodami, 1671, 1686, 1712.

**REICH.—REICHENBACH** (H. T. L.)

"Monographia Pselaphorum," 1 vol. 8vo., with plates, Lipsiæ, 1816.

**REINW.—REINWARDT**, a German naturalist, Professor at Leyden, who travelled through the Archipelago of India, where he made a splendid collection.

**RENARD** (Louis), editor of a collection of drawings of Fishes and other marine animals, executed in India by native painters, which, under a barbarous appearance, exhibits interesting and true species. One vol. folio. Amsterdam, 1754.

**RENIMERI**, an Italian naturalist, Professor at Padua.

**RETS.—RETSIUS**, a Swedish naturalist, Professor at Lund.

"Author of a greatly enlarged edition of the "Fauna Suecica" of Linnæus, of various theses, &c.

**RICHARDS.—RICHARDSON** (John), surgeon to the first expedition under Captain Franklin.

Author of the Zoological appendix attached to the account of that voyage. London, 1823, in 4to.

**RISS.—Risso** (A.), a naturalist of Nice, and a zealous observer.

"Ichthyologie de Nice," &c., 1 vol. 8vo., Paris, 1810, a work of extreme value on account of the number of new species which it contains.

"Histoire Naturelle des Crustacés des environs de Nice," 1 vol. 8vo., with plates. Paris, 1816.

These works have been reproduced in his "Histoire Naturelle de l'Europe Merid.," 5 vols. 8vo. Paris, 1826.

He has also published a description of some new Crustacea in the *Journal de Physique*.

**ROBIN.**—**ROBINEAU DESVOIDY**, physician at St. Sauveur, department of the Yonne.

"Recherches sur l'Organisation Vertebrales des Crustacés, des Arachnides, et des Insectes," 1 vol. 8vo. Paris, 1828.

"Essai sur la tribu des Culicides," inserted in the second volume of the *Mémoires de la Société d'Histoire Naturelle*.

A great work on the Muscidae, which he calls "Myodaires," published in the *Mém. des Savants Etrangers, &c.*

"Observations on the Olfactory Organ of the Crustacea and on the use of the Halteres of the Diptera."

**ROCHFORD (N.)**, protestant minister of Holland.

"Natural and Moral History of the Antilles and America." The first edition is anonymous and published at Rotterdam, 1658. The part relative to Natural History is copied from the first edition of Dutertre, 1654.

**RÆM.**—**RÆMER (J. C.)**

"Genera Insectorum Linnæi et Frabricii, Iconibus illustrata," 1 vol. 4to. Vitoduri Helveticum, 1789.

His work is merely an edition of that of Sulzer on the same subject; with some new plates.

**RÆS.**—**RÆSEL DE ROSENHOF (A. J.)**, a painter of Nuremberg, born 1705, died 1795, one of the most ingenious observers, and an able painter of subjects of Natural History.

"Historia Naturalis Ranarum nostratium," 1 vol. folio, Nuremb., 1758.

"Insecten-Belustigungen," with excellent coloured plates, 4 vols. 4to. Nuremb., 1746. et seq. See Kleemann.

**ROG.**—**ROGER**, a naturalist of Bourdeaux.

"Instructions à l'usage des personnes qui voudraient s'occuper à recueillir des Insectes pour les Cabinets d'Histoire Naturelle," 8vo. Bourdeaux.

**ROISS.**—**ROISSY (Félix de)**, a naturalist of Paris.

He completed, by the 5th and 6th vols. 8vo., the "Histoire des Mollusques," commenced by Denys de Montfort for Sonnini's Buffon.

**RONDEL.**—**RONDELET (Guillaume)**, Professor at Montpellier, born 1507, died 1566.

"Libri de Piscibus," 1 vol. folio. Lyons, 1554, a work still useful from its numerous wood-cuts.

**ROSS.**—**ROSSI (Pietro)**, an Italian naturalist, Professor at Pisa, died in 18—.

"Fauna Etrusca, sistens Insecta quæ in provinciis Florentina et Pisana præsertim collegit Petrus Rossius," 2 vols. 4to., with coloured plates. Liburni, 1790.

"Mantissa Insectorum exhibens Species nuper in Etruria collectas, a Petro Rossio," &c., with coloured plates, 2 vols. 4to. Pisis, 1792—1794.

**ROUX (Polydore)**, Curator of the Museum of Marseilles.

"Ornithologie Provençale," 4to., with beautiful lithographic plates.

"Crustacés de la Méditerranée et de son littoral," 4to., with plates, the three first numbers. Marseilles, 1827—1828.

**ROXBURGH**, an English physician at Bengal.

I quote his paper on the Dolphin of the Ganges.

**RUDOLPHI (C. A.)**, a German naturalist and anatomist, Professor at Gripswald and now at Berlin. Chiefly quoted for his classical work on the Intestinal Worms.

"Entozoa seu Vermium Intestinalium Historia Naturalis," 2 vols. 8vo. Amsterdam, 1808.

**RUMPH (G. E.)**, a German merchant born at Hanau in 1637, Intendant at Amboyna in the Dutch service, died in 1706.

"The Cabinet of Amboyna" (in Dutch), 1 vol. folio. Amsterdam, 1705.

"Thesaurus Imaginum," &c. Haga, 1739, 1 vol. folio, with the same plates, but a more abridged text.

**RUPPEL** (Edward), a naturalist of Franckfort.

Author of "Travels in Nubia," with excellent lithographic and coloured plates, representing new species of various classes, of which several numbers are already published in 4to. Franckf., 1826.

**RUSSEL** (P.), formerly a surgeon at Bengal.

"Serpents of the coast of Coromandel," 1 vol. folio, with a supplement, and excellent plates. London, 17—.

"Description and figures of two hundred Fishes from the Coast of Coromandel," 2 vols. folio. London, 1803. Two capital works.

**RUYSCH** (Henry), son of the celebrated anatomist; he died before his father. Under the title of

"Theatrum Animalium," 2 vols. folio, Amsterd., 1718, he gave an edition of Johnstone, to which he added a copy of the same plates of fishes employed by Renard and Valentin.

**SABINE**, an English naturalist.

Author of the appendix to Captain Parry's first voyage, and of various papers in the Transactions of the Linnean Society.

**SAGE** (B. G.), Chemist of the Academy of Sciences, died 1824.

"Mémoire sur les Belemnites," published in the Journal de Physique.

**SAHL**.—**SAHLBERG** (C. R.)

"Dissertatio Entomologica Insecta Fennica enumerans," Præs. C. R. Sahlberg, 8vo. Aboæ, 1717, 1823.

"Periculi Entomographici," 1 vol. 8vo. with plates. Aboæ, 1823.

**SALERNE**, a physician of Orleans.

Author of a translation of the "Synopsis Avium" of Ray, under the title of "l'Histoire Naturelle éclaircie dans une de ses principales parties, L'Ornithologie," &c. 4to. Paris, 1767.

The drawings are by the same hand that furnished those of Brisson and of the Planches Enluminées, and are frequently taken from the same specimens.

**SALT**, English consul in Egypt.

"Travels in Abyssinia." They contain some observations relative to natural history.

**SALV.**—**SALVIANI** (Ippolito), of Citta di Castello, a physician at Rome, born 1513, died 1572.

"Aquatilium Animalium Historiæ," 1 vol. folio, with numerous and excellent copperplate engravings of Fishes. Romæ, 1554.

**SAV.**, **SAVIGN.**—**SAVIGNY** (J. C.), member of the Académie des Sciences.

"Histoire Naturelle et Mythologique de l'Ibis," 1 vol. 8vo. Paris, 1805.

"Mémoires sur les Oiseaux de l'Égypte," in the great work on Egypt.

"Mémoires sur les Animaux sans Vertèbres," part first, No 1, 8vo. Paris 1816.

"Système des Annelides," published in the great work on Egypt, as well as his "Tableau Systematique des Ascidies."

**SAVI** (Paulo), a young naturalist of Tuscany, and Professor at Pisa.

Author of various good observations on the animals of that country, published in the Giornale dei Letterati. He has given in Italian two memoirs on a species of Iulus, which have lately been reproduced with others of the same savant, in a work entitled "Memorie Scientifiche di Paolo Savi, decade prima con sette tavole," 1 vol. 8vo. Pisa, 1828.

**SAY** (Thomas), an American naturalist.

Author of various papers in the Journal of the Academy of Natural Sciences of Philadelphia, and the Annals of the New York Lyceum.

**SCHÆFF.**—**SCHÆFFER** (J. C.), a clergyman at Ratisbonne, born 1718, died 1799.

"Elementa Entomologica," with coloured plates, 1 vol. 4to. Ratisbonne, 1769.

"Icones Insectorum circa Ratisbonam Indigenorum," 3 vols. 4to. Ratisbonne, 1769.

"Apus pisciformis Insecti Aquatici Species noviter detecta," 4to., with plates, Ratisbonne, 1757. This Crustaceous animal is the Cancer Stagnalis of Linnaeus. See Branchipus.

"Abhandlungen von Insecten." Regensburg, 1764—1779.

**SHELLENB.—SCHELLENBERG (J. R.),** painter and engraver at Zurich.

"Cimicum in Helvetiæ Aquis et Terris degens Genus," with plates, 1 vol. 8vo. Turici, 1800.

"Genres des Mouches Diptères," in French and German, with coloured plates. Zurich, 1803. The text is by two anonymous writers.

**SCH., or SCHEUCHZ.—SCHEUCHZER (J. J.),** a physician of Zurich.

"Physique Sacrée," 4 vols. folio. Amsterdam, 1732. It contains numerous figures of Serpents.

**SCHINTZ,** Secretary of the Society of Natural History at Zurich, the translator into German of the *Régne Animal*.

Author of the "History of the Eggs and Nests of Birds."

**SCHLOSS.—SCHLOSSER,** a physician at Amsterdam.

"Author of certain Memoirs on Fishes, jointly with Boddaert, published in the Philosophical Transactions.

**SCHN.—SCHNEIDER (J. G.),** the celebrated hellenist and naturalist, Professor at Franckfort-on-the-Oder, now Breslau.

"Amphibiorum Physiologiæ Specim.," 4to. Fascic. I et II. Zulichow, 1797.

"Historiæ Amphibiorum Naturalis et Litterariæ," 8vo., Fascic. I et II. Jena, 1799, 1801.

"The Natural History of Tortoises in general," (in German), 1 vol. 8vo. Leipsic, 1783.

I frequently quote under his name his edition of the "*Systema Ichthyologiæ*," of Bloch, 8vo. with one hundred and ten plates. Berlin, 1801.

**SCHÆFF (J. D.),** a physician at Anspach, born 1752.

"Historia Testudinum Iconibus Illustrata," 4to. with coloured plates. Erlang, 1792, et seq.

**SCHONEFELD (E. de),** a physician of Hamburg.

"Ichthyologia, &c., ducatum Slesvigi at Holsatiæ," 4to. Hamburg, 1824.

**SCHON.—or SCHØNH.—SCHØNHERR (C. J.),** a Swede.

"Synonymia Insectorum," 2 vols. 8vo. with plates. Stockholm, 1806—1808.

"Curculionidum Dispositio Methodica," 1 vol. 8vo. Leipzig, 1826.

**SCHRANK (F. de P.),** a Bavarian naturalist, Professor at Ingolstadt, born in 1747.

"Enumeratio Insectorum Austriæ Indigenorum," 1 vol. 8vo., with plates. Augustæ Vindelicorum, 1781.

"Fauna Boica," 6 vols. 8vo. Nuremberg and Ingolstadt, 1798, et seq.

**SCHREB.—SCHREBER (J. C. de),** Professor at Erlang, born in 1739.

We chiefly quote his "History of the Mammalia" (in German), with coloured plates, 4to. Erlang, 1775, et seq.

There are also some French copies of the first parts. The greater part of the plates is copied from Buffon, and coloured from the descriptions, although some of them are original and good.

**SCHREIB.—SCHREIBERS (Charles de),** Director of the Imperial Museum of Vienna.

The description of various unpublished or but little known Coleoptera, with plates, inserted in the sixth volume of the Transactions of the Lin. Society.

A Memoir on the Proteus, in the Philosophical Transactions.

SCHRÆT.—SCHRÆTER, (J. S.), Lutheran superintendent at Buttstedt in the Duchy of Weimar, born in 1735. Author of numerous works on Conchyliology; we quote his

"History of Fresh-water Shells" (in German), 4to. Halle, 1779.

SCHWEIG.—SCHWEIGGER (A. F.), a Prussian naturalist, who was assassinated by his guide during a journey in the interior of Sicily.

"Prodromus Monographiæ Cheloniorum," in which he particularly describes the new species in the Museum of Paris. It is published in the "Archives of Kœnigsberg" for 1812. He has also given us

"Observations during his Travels," in which he treats of the Corallines and yellow Amber, 4to. Berlin, 1819.

"A Manual of the Invertebrate and Inarticulated Animals," 1 vol. 8vo. Leipzig, 1820.

SCILLA (Agostino), a Sicilian painter.

La Vana Speculatione disingannata dal Senso," 1 vol. 4to. Naples, 1670.

The first exact comparison of fossils with analogous recent bodies, that was instituted. There is a Latin translation of this work in 4to. Rome, 1752.

SCOP.—SCOPOLI (J. A.), Professor of Botany and Chemistry at Pavia, born in 1723, died in 1788.

"Entomologia Carniolica," 1 vol. 8vo. Vindebonæ, 1763.

"Deliciæ Floræ et Faunæ Insubricæ," with plates, 4 vols. folio. Ticini, 1786—1788.

"Introductio ad Historiam Naturalem," 1 vol. 8vo. Pragæ, 1777.

"Anni Historici-Naturales, V." Lipsiæ, 1768—1772, united in 1 vol. 8vo.

He has also published some plates which are but little known, forming a sequel to his "Entomologia Carniolica."

SCORESBY, an English navigator, who re-discovered Oriental Greenland, and author of

"Arctic Regions," &c., 1 vol., London, 1816, which contains many valuable observations on the Cetacea.

SEB.—SEBA (Albert), a druggist of Amsterdam, born in 1665, died in 1736. Celebrated for his

"Locupletissimi Rerum Naturalium Thesauri Accurata Descriptio," 4 vols. folio. Amsterdam, 1734, 1765.

A work that I have frequently quoted, because it is enriched with numerous and excellent plates; the text, however, is of no authority whatever, being written without accuracy or judgment.

SELBY (P. J.)

Author of "Illustrations of British Ornithology," 8vo., Edinburgh, 1825, with a very large atlas, the most magnificent work on Ornithology that exists [that of an American, M. Audubon, excepted, which the Baron himself, in a late report to the Institute, declares to be "the most magnificent monument the arts have ever erected to the Science."—Eng. Ed.]

He has also published various papers in the Zoological Journal, &c.

SENGUARD.—SENGUARDIUS (Wolferd).

"Tractatus Physicus de Tarentula," 1 vol. 12mo. Lugduni Batavorum, 1688.

SERRES (Marcel de), Professor of Mineralogy to the Faculté des Sciences of Montpellier. Author of

"Mémoire sur les yeux composés, et les yeux lisses des Insectes," with plates, 1 vol. 8vo. Montpellier, 1813.

Several Memoirs on the Anatomy of Insects, published in the Annales du Muséum.

SERV.—SERVILLE, one of the writers for the Entomological Department of the Faune Française, and of the Encyclopédie Méthodique.



He has also published the last number of the work of the late Paliset de Beauvois, on the Insects collected by him in Africa and America; as well as extracts from various works on Insects, in the "Bulletin Universel" of Baron Férussac.

**SHAW (Thomas)**, a theologian of Oxford, who travelled in Africa and the Levant.

His work, published in English at Oxford, in folio, 1738, has been translated into French under the title of "Voyage dans plusieurs parties de la Barbarie et du Levant," 2 vols. 4to. La Haye, 1743.

**SH. OR SHAW.—SHAW (George)**, Adjunct Librarian of the British Museum, a laborious compiler and describer, died in 1815.

"The Naturalist's Miscellany," 8vo. London, 1789, et seq.; a numerous collection of coloured plates, mostly copies, with some that are original.

"General Zoology," London, 1800, et seq., several volumes, 8vo., with plates, most of them copies.

"Zoology of New Holland," a few numbers, 8vo. London, 1794, et seq. The work remains unfinished.

**SLOANE (Hans)**, a former President of the Royal Society, born in 1660, died in 1753.

"Voyage to the Islands of Madeira, Barbadoes, Nevis, St. Christopher, and Jamaica," with 274 indifferent or bad plates, 2 vols. folio. London, 1707, 1727.

**SMEATH.—SMEATHMAN (Henry)**.

His History of the Termites, published in the seventy-first volume of the Philosophical Transactions, has been translated into French, by Dr. Rigaud, of Montpellier, and inserted in the French translation of Sparrman's Voyage.

**SMITH (Hamilton)**, an officer in the English service, and a learned naturalist.

Author of a great portion of the additions to the English translation of the Règne Animal, and particularly of the Synopsis Mammalium, which terminates the third volume.

**SOC. NAT. BERL., OR BERL. MEM., OR NAT. OF BERL., OR BERL. NAT.**

The Memoirs of this Society have appeared successively under four different titles, in German.

1. "Beschäftigungen" (Occupations), 4 vols. 8vo., 1775—1779.

2. "Schriften" (Writings), 11 vols. 8vo., 1780—1794, the five last of which are also styled "Beobachtungen und Entdeckungen" (Observations and Discoveries).

3. "Neue Schriften" (New Writings), 4to., 1795—17—.

4. "Magazin," &c. (The Magazine of New Discoveries in Natural History), quarterly, from 1807.

**SOLD.—SOLDANI (Ambrosio)**, General of the Camaldolites, subsequently Professor at Siena, author of various works on Microscopic Testacea, both fossil and recent.

"Saggio Orithografico Ovvero Osservazioni sopra le Terre Nautilitiche," &c. 1 vol. 4to. Siena, 1780.

"Testaceographia ac Zoophytographia Parva et Microscopica, 3 vols. folio. Siena, 1789—1798.

**SONNER.—SONNERAT**, born at Lyons, died in Paris, 1814, an indefatigable collector.

"Voyage à la Nouvelle-Guinée," with one hundred and twenty plates, 4to. Paris, 1776. His first voyage.

"Voyage aux Indes Orientales et à la Chine," from 1774 to 1781, 2 vols. 4to., with one hundred and forty plates. Paris, 1782. His second voyage.

**SONNINI DE MANONCOURT (C. S.)**, engineer, born at Lorraine, died in Wallachia in 1814. I quote his

"Voyage dans la Haute et Basse Egypte," with an atlas of forty plates, 3 vols. 8vo. Paris, 1799.

And sometimes his edition of Buffon, 8vo. Paris, Dufart, 1798.



**SOWERB.—SOWERBY (James), and SOWERBY (G. B.),** his son, English naturalists and artists.

“The Genera of Recent and Fossil Shells,” thirty numbers, 8vo.

“Fossil Conchology.”

Various papers in the *Zoological Journal*.

**SPALL.—SPALLANZANI (Lazzaro),** the celebrated observer, Professor at Reggio, then at Modena, and finally at Pavia, born in 1729, died in 1799. Of his numerous works we have only had occasion to quote the

“*Opuscoli di Fisica Animale e Vegetabile*,” 1776.

They have been translated into French by Sennebier, 3 vols. 8vo. Geneva, 1787.

**SPARM.—SPARMANN (Andrew),** born in 1748, a pupil of Linnæus. He visited the Cape of Good Hope and China, and was subsequently a Professor at Upsal.

*Voy.*

“*Voyage au Cap de Bonne-Esperance*,” a French translation, 3 vols. 8vo. Paris, 1787.

**MUS. CARLS.**

“*Museum Carlsonianum*,” four small folio numbers. Stock., 1786, et seq.

It contains figures of Birds, of which certain varieties are converted into species.

**SPENCE (William),** an English naturalist.

“A Monograph of the *Cholevæ*” that are found in England, published in the *Transactions of the Linnean Society*.

**SPENGL.—SPENGLER (L.),** Curator of the cabinet of the King of Denmark, born in 1720.

Quoted for certain Memoirs in the *Naturforscher*, &c.

**SPIN.—SPINOLA (Maximilian),** a Genoese noble, and a learned naturalist.

“*Insectorum Liguriaë Species Novæ aut Rariores*,” with plates, 2 vols. 4to. Genæv, 1806—1808.

“*Mémoires sur les Poissons de Ligurie* ;” one on the “*Cératine Albilabre* ;” and the “*Essai d’une Nouvelle Classification Générale des Diplolépaires*,” in the *Annales du Muséum*.

**SPIX (John),** a naturalist of Bavaria and member of the Academy of Munich.

Quoted for his Memoirs in the *Annales du Muséum*, and for his great works on the Zoology of Brazil, where he travelled with M. de Martius by order of the King of Bavaria.

“*The Natural Hist. of New Species of Monkeys and Bats*” (in Lat. and Fr.), 1 vol. folio. Munich, 1823.

“*New Species of Birds*” (in Latin), with one hundred and nine coloured plates, 1 vol. 4to. Munich, 1824.

“*New Species of Tortoises and Frogs*” (in Latin), 4to. Munich, 1824.

“*Nat. Hist. of New Species of Serpents*,” from the notes of the traveller, by John Wagler (Latin and French), 4to. Munich, 1824.

“*Selected Genera and Species of Fishes*,” described by L. Agassiez, 4to. Munich, 1829.

**SLAB.—SLABBER (M.),** a Dutch naturalist.

“*Natural Amusements, containing Microscopical Observations*,” &c. (in Dutch), 1 vol. 4to. Harlem, 1778.

He is also the author of certain Memoirs, published among those of the Academy of Harlem.

**STAT. MULL.** See article immediately preceding MULLER, page 472.

**STEV.—STEVEN (C.),** Director of the Imperial Botanical Garden of Odessa.

"Description of certain Insects of Caucasus and of Southern Russia," a Memorial in 4to., printed among those of the Imperial Society of Naturalists of Moscow, Vol. II.

**STOCK. MEM.**

"Memoirs of the Academy of Sciences of Sweden," of which 1 vol. 8vo. (in the Swedish language) has annually appeared since the year 1739. The first forty reach to 1779. Since 1780 they have been published under the title of the "New Memoirs," &c.

**STOLL.—STOLL (Casper), a Dutch physician.**

Supplement to the work entitled "Les Papillons Exotiques des trois parties du Monde" (in Dutch and French), 1 vol. 4to. Amsterdam, 1790, et seq.

"Représentation exactement coloriée d'après Nature, des Spectres, des Mantes, des Santerelles," &c. (in Dutch and French), 8 Nos. 4to. Amsterdam, 1780, et seq.

"Représentation exactement coloriée d'après Nature des Cigales et des Punaïses" (in Dutch and French), 10 Nos. 4to. Amsterdam, 1780, et seq.

**STORR (T. C. C.), Professor at Tubingen.**

His thesis entitled "Prodromus Methodi Mammalium," Tub., 1780. and republished in the "Delectus Opusculorum ad Sc. Nat. Spect. de Ludwig," 1 vol. 8vo. Leipzig, 1790, has been of great use to us.

**STRAUS.—STRAUS DURCKHEIM (H.)**

"Considérations Générales sur l'Anatomie Comparée des Animaux Articulés, auxquelles on a joint l'Anatomie Descriptive du Hanneton," with plates, 1 vol. 4to. Paris, 1828.

The only work that can be compared to that of Lyonnet already mentioned.

He has read to the Acad. des Sciences, a "Mémoire sur le Systeme tégumentaire et musculaire de l'Araignée aviculaire," Mygale of Le Blond, Lat.

**STROEM (John), a pastor in Norway, born in 1726.**

Author of several Memoirs inserted among those of Drontheim, Copenhagen, &c., and of a description of the district of Sondmer.

**STURM (J.), a German naturalist and painter.**

"Deutschland Fauna," with excellent plates, 2 vols. 8vo. Nuremberg, 1807.

**SULZ.—SULZER (J. H.).**

"Die Kennzeichen der Insecten," with plates, 1 vol. 4to. Zurich, 1761.

**SURRIR.—SURRIRAY, a physician at Havre.**

"Observations sur le fœtus d'une espèce de Calige," in the third volume of the Annales Générales des Sciences Physiques.

**SWAINS.—SWAINSON, an English naturalist.**

Author of various papers on Birds, published in the Linnean Transactions and in the Zoological Journal; also of

"Zoological Illustrations," a work which forms a sequel to the Zoological Miscellany of Leach, and to the Naturalist's Miscellany of Shaw.

In conjunction with Dr. Horsfield he has published a Memoir on the Birds of New Holland, in the Linnean Transactions.

**SWAMMERDAM (John), a Dutch physician, born at Amsterdam in 1637, died in 1680.**

"Biblia Natura," 1 vol. folio (Latin and Dutch). Leyden, 1737, 1738.

The principal writer on the Anatomy of Insects.

**SWED.—SWEDER (N. S.), a Swedish naturalist.**

Author of a Memoir published among those of Stockholm, 1784.

**TEMM., and sometimes T.—TEMMINCK (C. J.), formerly Director of the Society of Sciences of Haarlem, and proprietor of a valuable zoological collection, and now Director of the Royal Museum of Leyden.**

"Histoire Naturelle Générale des Pigeons et des Gallinacés," 3 vols. 8vo. Amsterdam and Paris, 1813, 1815.

The part containing the Pigeons has also been published in folio, with splendid coloured plates, by Madame Knip.

"Manuel d'Ornithologie ou Tableau Systématique des Oiseaux qui se trouvent en Europe," 1 vol. 8vo. Amsterdam and Paris, 1815.

"Monographies de Mammalogie," 4to. Paris, 1827.

"Planches Coloriées," 4to. and folio, forming a sequel to the Planches Enluminées of Buffon. This work was published by Temminck jointly with M. Meiffren de Laugier, Barcn, &c. &c.

**THIEN, OF THIENEM.**—**THIENEMAN**, Professor and Curator of the Museum of Dresden.

Author of Observations (in German) on the Animals of the North, and chiefly on the Phocæ, 8vo. with an atlas in 4to.

**THIER.**—**THIERY DE MENONVILLE** (N. J.), a French physician, who visited Mexico for the purpose of carrying off the Cochineal.

"Traité de la culture du Nopal et de l'Education de la Cochinelle," 2 vols. 8vo. with plates. Paris, 1787.

**THOMAS** (P.), a physician of Montpellier.

"Mémoires pour servir à l'Histoire Naturelle des Sang-sues," pamphlet 8vo. Paris, 1806.

**THOMPSON** (John W.), a surgeon of the English army.

"A Memoir on the Pentacrinus Europæus," 4to. Cork, 1827.

**THOMPS.**—**THOMPSON** (William), an English physician established at Naples.

Author of a Memoir on a Hippurites which he calls Cornucopia.

**THUNB.**—**THUNBERG** (C. P.), a pupil of Linnæus, who visited the Cape of Good Hope and Japan, Professor at Upsal, born in 1743.

Quoted for various Memoirs published among those of the Academy of Stockholm.

**TIEDEMAN** (Frederick), Professor at Heidelberg.

"Anatomy of the Holothuria, Asterias, and Echinus," folio, Landshut, 1805; one of the most splendid Monographs of invertebrated animals.

**TILES.**—**TILESIUS** (W. G.), a German naturalist, who sailed round the world.

Author of several Memoirs presented to the Academy of St. Petersburg, of observations on various new animals in the Voyage of Krusenstern, and previously of an "Annual of Natural History," in the German, 12mo. Leipzig, 1802.

**TRANS. LIN.** See **LINN. TRANS.**

**TREITS.**—**TREITSCHKE** (Frederick), a German naturalist.

The continuer of Oechsenheimer's work on the Lepidoptera of Europe. The last volume (1829) contains the Pyralides.

**TREMBL.**—**TREMBLEY** (Abraham), a native of Geneva, born in 1710 and died in 1784; immortalized by his discovery of the reproductive power of the Polypus.

"Mémoires pour servir à l'Histoire des Polypes d'eau douce à bras en forme de cornes," with fifteen plates, 4to. Leyden, 1774.

**TREUTL.**—**TREUTLER** (F. A.), a German physician, author of a thesis entitled

"Observationes Pathologico-anatomicæ ad Auctarium ad Helminthologiam Humani Corporis Continentes," 4to. Leipzig, 1793.

**TREVIR.**—**TREVIRANUS** (G. R.). Professor at Bremen.

"On the Internal Organization of the Arachnides" (in German), with plates, 4to. Nuremberg, 1812.

**TUCKEY** (J. K.), a Captain of the British Navy.

"Relation d'une Expedition pour reconnoître le Zaire," the French translation, with an atlas in 4to. 2 vols. 8vo. Paris, 1818.

**VAHL** (Martin), a celebrated Danish botanist.

Author of certain Memoirs on Zoology published among those of the Society of Natural History of Copenhagen.

**VAILL., OR LE VAILL.**—**LEVAILLANT** (François), a celebrated traveller and collector, born at Surinam. His father was a Frenchman.

**VOY. I.**

"Voyage dans l'intérieur de l'Afrique par le Cap de Bonne-Espérance," 2 vols. 8vo. Paris, 1790.

**VOY. II.**

"Seconde Voyage dans l'intérieur de l'Afrique," &c., 1 vol. 8vo. Paris, 1795.

**AFR.**

"Histoire Naturelle des Oiseaux d'Afrique," 5 vols. 4to. Paris, 1799, et seq.

**PERR.**

"Histoire Naturelle des Perroquets," 2 vols. 4to. and folio. Paris, 1801.

**OIS DE PAR.**

"Histoire Naturelle des Oiseaux de Paradis et des Rolliers, suivie de celle des Toucans et des Barbas," 2 vols. folio. Paris, 1806.

"Histoire Naturelle des Promerops et des Guepiers," folio. Paris, 1807.

**VAL.**—**VALENCIENNES** (A.), Adjunct Naturalist to the Museum of Paris, and my fellow labourer in the great work on Fishes.

Author of various Memoirs published among those of the Museum of the Annales des Sciences Naturelles, and of the Zoological Observations of M. de Humboldt.

**VALENTYN** (F.), a pastor at Amboyna.

"The East Indies, Ancient and Modern" (in Dutch), 5 vols. folio. Dordrecht and Amsterdam, 1724—1726.

The third volume contains numerous observations on the Natural History of Amboyna. The plates of the Fishes are identical with those of Renard.

**VALL.**—**VALLOT**, Professor at Dijon,

Has presented to the Académie des Sciences a Memoir on certain species of Cicidomyiæ, and has also published in the thirteenth volume of the Annales des Sc. Nat. some observations on the habits of the *Anthrribus marmoratus*, but which were made in Sweden by Dalman.

**VANDELLI**, an Italian naturalist, Director of the Museum at Lisbon.

"Author of certain Memoirs on the Fishes of the river Amazon, published among those of the Academy of Lisbon.

**VANDER LIN.**—**VANDER LINDEN** (P. L.), a physician and Professor of Natural History at Brussels,

Has published, in two Memoirs 4to., a description of the Libellulæ of the territory of Bologna, and also in 1 vol. 8vo. that of all the species of the same family peculiar to Europe.

Also observations on European Hymenoptera of the family of the Fossores.

The first number of a work entitled "Essai sur les Insectes de Java et des Isles Voisines;" a notice of the impression of an Insect enclosed in a piece of schistous limestone from Solenhofen in Bavaria. These three last Memoirs are published in the General Annals of the Physical Sciences. Brussels, 1819, et seq.

**VAUCHER** (J. P. the Reverend), Professor at Geneva.

"Histoire des Conferves d'eau douce," 1 vol. 4to. Geneva, 1803.

Author of some observations on Zoophytes, published in the Bulletin des Sciences.

**VIEILL.**—**VIEILLOT** (L. P.), a naturalist of Paris, died 1828.

"Histoire Naturelle des plus beaux Oiseaux Chanteurs de la zone torride," 1 vol. folio. Paris, 1805.

"Histoire Naturelle des Oiseaux de l'Amerique Septentrionale," of which but 2 vols. folio have appeared. Paris, 1807.

He also continued the "Oiseaux Dorées" of Audibert, and has given us an "Analyse d'une nouvelle Ornithologie Élémentaire," pamphlet 8vo. Paris, 1816.

"Galerie des Oiseaux," which is quoted as Vieill. Gal. He assisted in publishing the edition of Buffon's "Birds," printed by Dufart, and the "Nouveau Dictionnaire d'Histoire Naturelle," by Deterville.

**VIGORS**, an English naturalist and principal editor of the *Zoological Journal*.

Author of various papers in the *Linnean Transactions*, &c.

**VILL.—VILLERS** (Charles de), a naturalist of Lyons.

"*C. Linnæi Entomologia*," 4 vols. 8vo., with tolerably good plates. Lugduni, 1789.

A useful compilation at the time when it was published, and to which the author has added a description of various Insects peculiar to the southern departments of France.

**VILL.—VILLIERS** (Adrian P. de)

Has published in the *Annales de la Société Linnéenne de Paris*, Nov. 1826, a description of three undescribed or but little known Lepidoptera of the south of France, with a plate in which they are figured. He there also rectifies the description previously given of the "*Bombyx Milhanseri*."

**VIQ D'AZ.—VIQ D'AZYR** (Felix), born at Valogne in 1748, died at Paris in 1794; member of the *Acad. des Sciences*, and perpetual Secretary to the *Société Royale de Médecine*. I quote his

"*Système Anatomique*," which forms a portion of the *Encyclopédie Méthodique*, and of which only the second volume appeared, containing the *Quadrumana* and the *Rodentia*, 1 vol. 4to. Paris, 1795.

**VIREY** (J. J.), a physician, and one of the editors of the "*Journal de Pharmacie et des Sciences accessoires*" in which he has published his

"*Histoire Naturelle des Vegetaux et des Insectes qui les produisent*," as well as "*Recherches sur l'Insecte de la Gomme-laque*."

**VIV.—VIVIANI** (Domenico), Professor of Botany and Natural History at Genoa.

"*Phosphorescentia maris quatuordecim lucescentium Animalculorum, Novis Speciebus illustrata*," 1 vol. 4to. Gennæ, 1805.

**VOSM.—VOSMAER** (Arnold), a Dutch naturalist, who died in 1799; he was Curator of the Museum and Menagerie of the Stadtholder.

Author of numerous Monographs (in Dutch and French) of various animals, with coloured plates, from 1767.

**VOY. DE DUPER.**

The Zoological part of the "*Voyage de la Coquille*," under M. Duperrey.

This portion of the work is by Messrs. Lesson and Garnot.

**VOY. DE FREYCN., OR ZOOL. DE FREYCN.**

The Zoological portion of the "*Voyage de l'Uranie*," under M. de Freycinet.

It is by Messrs. QUOY and GAIMARD.

**WAGLER** (John), a German naturalist, author of Ornithological fragments entitled

"*Systema Avium*," editor of the History of Serpents in the Brazilian Zoology of Spix and Martius, and author of *Memoirs on Fishes in the Isis*.

**W ALB.—WALBAUM** (J. J.), a physician of Lubeck, born 1724,

Besides his edition of "*Arledi*," has given us (in German) a "*Chelonographia*," or Description of certain Tortoises, 1 vol. 4to. Lubeck and Leipzig, 1782.

Also some *Memoirs* inserted amongst those of the Naturalists of Berlin.

**WALCH** (J. E. E.), Professor at Jena, born in 1725 and died in 1778.

Author of the text of Knorr's "*Monuments*," &c. See Knorr.

**WALCK.—WALCKENAER** (C. A.), member of the *Académie des Inscriptions et Belles-Lettres*.

"*Faune Parisienne*," 2 vols. 8vo. Paris, 1802.

"*Tableau des Araneides*," in numbers, like those of Panzer on the Insects of Germany. But five have appeared.

"Araneides de France," a work which forms part of that entitled "La Faune Française," published by MM. de Blainville, Desmarest, Vieillot, &c.

"Mémoires pour servir à l'Histoire Naturelle des Abeilles Solitaires," 1 vol. 8vo. Paris, 1817.

**WEB.**—**WEBER** (Frederick), a German naturalist, Professor at Kiel.

"Observationes Entomologicae," 1 vol. 8vo. Kiel, 1801.

**WHITE, BOT. B.**, or **WHITE VOY.**—**WHITE** (John), a surgeon in the English service at Botany-Bay.

"Journal of a Voyage to New South Wales," with sixty-five plates, 1 vol. 4to. London, 1790. The Zoological part of this work, which is enriched with splendid drawings, appears to have been from the pen of John Hunter, the celebrated anatomist. There is a French edition, 1 vol. 8vo. Paris, 1795, in which useless notes are added to the original work, and the natural history and plates are suppressed.

**WIEDEM.**—**WIEDEMANN.**—**WILLUGHBY DE ERESBY** (Francis), born in 1635, and died in 1672, an English nobleman and a zealous naturalist.

"Ornithologiæ, lib. III," 1 vol. folio, London, 1676; published by Ray from his posthumous papers. It was translated by Salerne with additions, 1 vol. 4to. Paris, 1767.

"Historia Piscium, lib. IV," 2 vols. folio. Oxford, 1685.

The plates of these two works are mostly copied from other authors.

**WILS.**—**WILSON** (Alexander), an American naturalist, born in 1776, and died in 1813.

"American Ornithology," with coloured plates, 9 vols. 4to. Philadelphia, 1808—1814.

A new edition, 3 vols. 4to. appeared in 1828.

**WOLFF** (J. F.), a German naturalist.

"Icones Cimicum Descriptionibus Illustratæ," 4 Nos. 4to. Erlangæ, 1804.

**WILSON**, joint author with **MEYER** of the "Almanack of German Birds."

**WORM. OR MUS. WORM.**—**WORMIUS**, or **WORM. OLAUS**, Professor at Copenhagen, born in 1588, died in 1654.

"Museum Wormianum," 1 vol. folio. Leyden, 1650.

**YARR.**—**YARRELL**, an English naturalist, author of various papers in the Zoological Journal of London, &c.

**ZED.**—**ZEDER** (J. G. H.), a German naturalist.

"Author of "First Supplement to the Natural History of Intestinal Worms by Goeze," 1 vol. 4to. Leipzig, 1800.

"An Introduction to the Natural History of the Intestinal Worms," 1 vol. 8vo. Bamberg, 1803.

**ZETTERST.**—**ZETTERSTED** (J. G.), a Swedish naturalist.

"Orthoptera Sueciæ," 1 vol. 8vo. Lundæ, 1811.

"Fauna Laponica," part first, 1 vol. 8vo. Hammone, 1828.

**ZOOL. JOURN.**

Published in London by M. VIGORS, aided by Messrs. TH. BELL, E. T. BENNET, J. E. BICHENO, J. G. CHILDREN, GEN. T. H. HARDWICKE, DR. HORSEFIELD, W. KIRBY, the Messrs. SOWERBY, father and son, and W. YARRELL. We have sixteen numbers, from 18— to 1829.

**ZORGDR.**—**ZORGDRAGER**, a Dutchman.

Author of a treatise on the whale fishery.

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