



A N

ACCOUNT

O F

ENGLISH ANTS;

Which Contains

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|--|--|--|
| I. Their different Species and Mechanism. | | III. The Production of their Eggs, and Process of the Young. |
| II. Their manner of Government, and a Description of their several Queens. | | IV. The incessant Labours of the Workers or common Ants. |

W I T H

Many other Curiosities observable in these surprising Insects.

—*Jovis omnia plena.* —Virg. Ecl. iii. l. 60.

By the Rev. WILLIAM GOULD, A. M.
of *Exeter College, Oxon.*

L O N D O N.

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ROBERT HENLY Esq;

S I R,

IT has been the immemorial Custom of Poets to assist their Genius by the Invocation of a favourite Muse. Perhaps, in imitation of them, Prose Authors were first tempted to send abroad their Performances under the Countenance of a worthy Patron. The Advantages arising hence are great. Readers are apt

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to

DEDICATION.

to conclude an Author not undeserving their Perusal, when they see him approved by a Gentleman of distinguished Character ; and Criticks are more cautious in their Censures, when they find him supported by a Person of unquestionable Judgment. It may be justly said, that such a Treatise makes its Appearance with a Royal Privilege, and is published by Authority. The Happiness of my Choice in these Respects need not be mentioned. The Liberty I have taken in prefixing your Name to the following Curiosities will, at least, be a great

Recom-



D E D I C A T I O N.

Recommendation of them, and more particularly as they had the Honour of your Perusal and Correction in Manuscript. The Subject indeed is small, but not inglorious. The Ant, as the Prince of Wisdom is pleased to inform us, is exceeding wise. In this Light it may, without Vanity, boast of its being related to you, and therefore by right of Kindred merits your Protection. How just the Observation of *Solomon* was, this short Series of Experiments may in some Measure illustrate; and how just the Comparison is, the World well knows. Your

D E D I C A T I O N .

Taste for polite Literature, and Encouragement of every thing that promotes Knowledge, must endear you to the Scholar, Poet, and Philosopher. With what Lustre you Shine in your Profession is so apparent to the Publick, that I cannot almost without Impertinence mention it, nor without Injustice pass it over in Silence. I have indeed so sensibly experienced your great Ability, and generous Protection in that Capacity, that I can, without the Compliments of a Dedication, pretend to say you was born to be the Ornament and Support of our
Laws.

DEDICATION.

Laws. To recount your Virtues would be offensive to your Modesty. I shall therefore forbear those usual Enlargements, and only beg Leave to lay this imperfect Treatise under your Patronage. How little it deserves such Honour I am extremely sensible; but I may venture to suggest, that whatever meets with your private, cannot fail of public Approbation.

I am, with all Acknowledgment,

your most Obliged

Humble Servant,

William Gould.



T H E

P R E F A C E.

IT is difficult in the Pursuit of Learning, and remarkably so in the study of Nature, to confine our Searches to a particular Subject. Hence Treatises on the Works of Providence are often defective and superficial. The Mind, amidst such a Scene of Wonders, is lost in Astonishment, and therefore can seldom fix its Enquiries. Thus in a Collection of Pictures, or Museum of Rarities,

P R E F A C E.

rities, the Eye roves from one Object to another, without taking Time to distinguish their peculiar Beauties. I have endeavoured to guard against this Error, by making Choice of one Species of Animals, and perhaps, next to the Bees, the most extraordinary amongst the numerous Race of Insects. In treating of them, I have attempted to follow the Model intimated by Mr. *Addison* to a learned Society of this Nation, which, as it may be some Apology for the Work itself, and the Manner of its Composition, it will not be impertinent to transcribe.

“ * I could wish (says he) our Royal Society
“ would compile a Body of Natural History,
“ the best that could be gathered together
“ from Books and Observations. If the
“ several Writers among them took each
“ his particular Species, and gave us a
“ distinct Account of its Original, Birth

* *Spectator* Vol. 2. No. 121. p. 145.

“ and

P R E F A C E.

“ and Education ; its Policies, Hostilities
“ and Alliances, with the Frame, and Tex-
“ ture of its inward and outward Parts,
“ and particularly those that distinguish it
“ from all other Animals, with their pecu-
“ liar Aptitudes for the State of Being in
“ which Providence has placed them, it
“ would be one of the best Services their
“ Studies could do Mankind, and not a
“ little redound to the Glory of the all-
“ wise Contriver. ”

How far I have answered the Recommendation, is left to the Judgment of the Reader. It may not, however, be improper to mention that it is impossible to write an exact or perfect History of this Kind ; because a Number of Particulars will escape our nicest Observations, and leave Room for future Discoveries. Upon this Reason my * Lord *Bacon* does not approve of the historical Method of writing in Philosophy ; and hence

* *Bacon's Philosophical Works*, Vol. I. p. 70.

P R E F A C E.

I rather chose to give this Treatise the Title of an *Account* than *History* of *English* Ants. I shall only add, that I wish it may in any Degree tend to promote the Ultimate Design of these Performances; the Glory of God, and Improvement of Knowledge.





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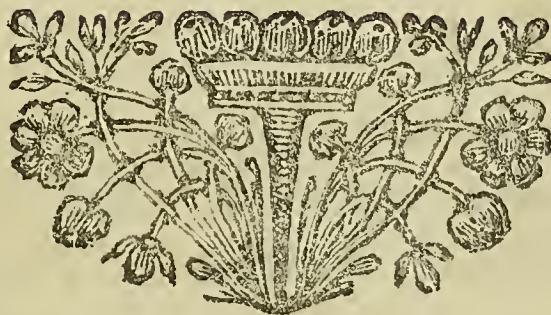
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Corn*

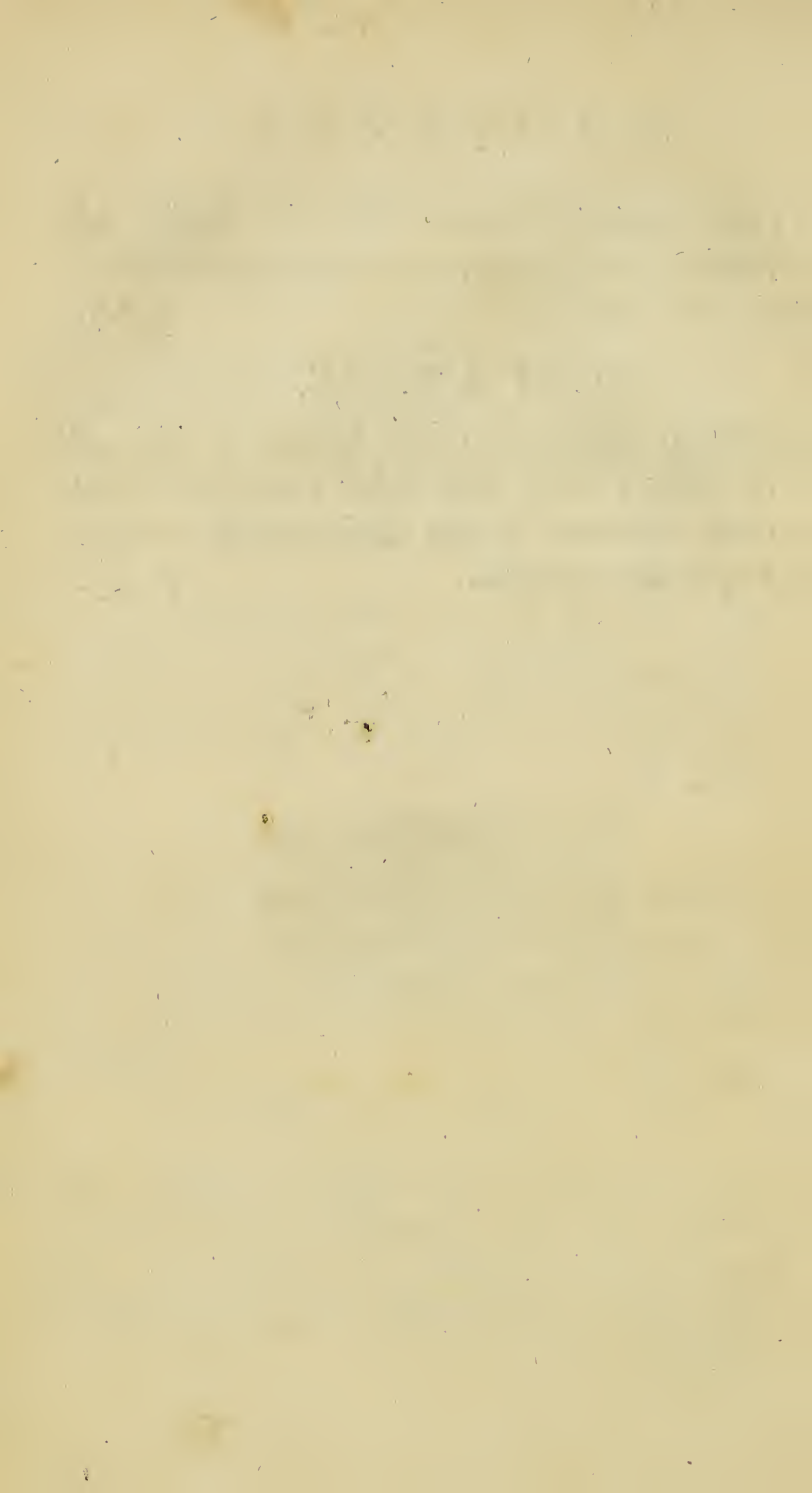
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A N
A C C O U N T
O F
E N G L I S H A N T S.

C H A P. I.

A Description of Ants in general, their various Sorts, Colour and Structure of their Parts.



THE * Ant is an Insect composed of three principal Divisions, the Head, Breast, and Body ; which are connected together by Ligaments formed with equal Curiosity and Wisdom. Each of these Divisions is also furnished with several Parts that tend either to the Use or Orna-

* They are also called Pismires, and vulgarly Emmets. Pismire is a *Danish* word compounded of *Puid* and *myre*, (*Saxon* *myra*) and intimates such Ants as reside in Hillocks. Emmet is derived from *Saxon*, and signifies, as the word *Ant* likewise does, those which live under Stones, or in old Ruins.

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ment

ment of this Animal. It may be proper, before a minute Examination of these Parts, to mention how many Sorts of Ants have fallen under my Notice, and wherein they differ to outward Appearance.

Five Species of Ants have occurred to my Observation; all which have to the naked Eye, without the Assistance of a Glass, some considerable Difference, either in respect of Colour or Size. They will easily be distinguished, if we range them under the following Characters.

1. The Hill Ant.
2. The Jet Ant.
3. The Red Ant.
4. The common Yellow Ant.
5. The small Black Ant.

The * Hill Ants I so denominate from their usual Place of Residence, the sunny Banks or Sides

* They are also called Horse Ants, or Hippomyrmaces, from ἵππος (an Horse) and μυρμηξ, an Ant, probably on Account of their being superior in Size to the other Species. Thus we say Horse Plums, Horse Mint, Horse Chesnut, Horse Laugh. Which way of Expression is derived from the Greeks amongst whom the word ἵππος, (Horse) was often prefixed to denote Greatness or Strength. As in ἵππολάπαθον, ἵππογλωσσον, ἵππομάραθρον, ἵπποσέλινον, to which may be added ἵππογνώμων, a great Connoisseur.

of Hills, for the Advantage of a stronger Heat to bring their Young to maturity ; and near Woods for the Conveniency of old Trees, in the Bottoms of which they are most fond of residing. This Kind is much larger than any of the rest, generally exceeding them in such Proportion as will be presently observed. Their Head and Body are a fine brown ; their Breast a faint Degree of Red.

The Red and Jet Ants are of an equal Largeness, and about three Parts less than the Hill Ants. They also vary from them and from one another in respect of Colour. The first are of a languid Red ; the second extremely black and shining ; for which Reason I choose to give them the name of Jet.

The common Yellow and small black Ants are nearly of one Proportion, and about half as big as the Red or Jet Ants. They are easily discerned from each other ; the first being of a light Yellow ; the second a dark Brown or rather Black.

These are the more obvious distinctions open to the Eye. What other Properties are peculiar to each Species will be mentioned as Circumstances require.

It may be agreeable next to give such a Description as I have been able to form of the Admirable Structure and nice Mechanism of Ants. This will appear the more wonderful if we consider their principal Divisions, and the several Parts with which each of them is adorned.

The Head of an Ant is rather oblong than round. The Face or Front of it is full; the under part Flat. It is provided with a double Saw, a Mouth, a pair of Antennæ, or Horns; two Eyes, and a Neck which joins it to the Breast.

The double Saw is a hard bony Substance, and in Shape not altogether unlike the top part of a Lobster's Claw. It consists of two Saws placed one on each side of the Mouth. They have four or five Teeth in a Saw, and terminate in a fine Hook bending inwards and corresponding to each other. They play from Right to Left, and are capable of being extended to some distance. By the wise Contrivance of this Implement the Creature is enabled to form its Cells, carry Provisions, transfer the Young to different Places, remove the Dead, or what else may be prejudicial to it.

The

The Mouth lies between the two Saws and is composed of a hollow Tube which answers the end of a Throat, and four Horns that serve instead of Lips and Fingers to convey the Food into the Throat. Each Horn has several little Joints, by which means it plays to and fro with great facility. The outside Horns are longer than the others, and are annexed to small Yellow Lobes on each side the Throat; the other two are joined to the Throat itself. These Players are of particular Use to the Ants both in feeding themselves and also their Young.

The Horns, Antennæ, or more properly Feelers, are placed between the Mouth and Eyes in little Sockets not far separate from one another. Each Feeler has two Parts which are connected by a small Joint. The first reaches not half way, and bends outward, diverging from the Socket; the second Branch also diverges, is much longer, and has eleven or twelve lesser Divisions like so many little Cups placed in one another; and hence they can move them with great Celerity. Each Part gradually decreases downwards. * They are

* The Antennæ of Ants are what Virtuosi call articulated.

situated within the Eyes so as not any ways to hinder the Sight. The Chief use of these Antennæ in Ants and other Insects is (as * Mr. *Derham* observes) to feel with. The Reason he assigns for it is this. “ *The Eyes of Insects being immove-*
“ *able, and their Cornea and Optic Nerve being al-*
“ *ways at one and the same Distance, are fitted only*
“ *to see distantial Objects, but not such as are very*
“ *near.* ” The Feelers therefore prevent any Inconveniency that may proceed from Objects not within the Focus of their Eyes. This Use is also confirmed from the Shortness of the Antennæ in those Insects whose Eyes are extended over great Part of their Heads, and † who therefore require not such a length of Horns to feel out the Way directly before them.

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* *Derhams*, Phys. Theol. B. 8. cap. 3.

† There is Reason to believe this may be the chief End or Use of the Antennæ ; for it is remarkable that Insects whose Eyes are very prominent, or extended over great Part of their Heads, have exceeding short Feelers. As may be seen in many common Flies, and other Papilio's ; especially in the Dragon, or more properly, large Hawk-fly. On the contrary such as have very little Eyes, and placed on each side the Head at a distance from one another, have remarkably long Antenn-

A common Ant has two Eyes which are placed on each Side of its Head ; they are convex, immoveable, and of a black Colour ; they lie so far on either Side that they cannot take in Objects directly before or above them. This Disadvantage is obviated by the Feelers which give them Notice of any Impediment in the way. The external Part is a Cornea, which, like the Eyes of other Insects is a Piece of Lattice Work consisting of a Number of Lenses that represent Objects to them on all Sides, and so answer the End of a moveable Eye.

The Head is connected with the Breast by a Ligament which they can dilate or contract at Pleasure. It contains part of the Hollow Tube which communicates with the Mouth, and continues through the Breast and other Ligament that unites the Body and Breast, and so conveys the Juices or Food to the Intestines.

Antennæ. As may be observed in Variety of Scarabs or Beetles, in the Hawk-Grasshopper, Gryllotalpa, House-Crickets and several Flies. The Feelers of many Insects seem to lengthen or shorten in a kind of Proportion to the Largeness and Distance of their Eyes. Probably therefore the Feelers rather supply the Want of large Eyes than the Immobility of them.

The Breast is oblong, has a Dent in the Middle, and the upper Part is round. On dissecting it you will find within a strong Muscle which gives Life and Motion to this and most other Insects. For it is observable that by pressing this Part an Insect is immediately deprived of Life; but if you separate it from the Head and Body, it will prolong its Motion a great while after. The under Part is furnished with six Legs. The two first are shortest; the Middle ones are somewhat Longer; but the Hindmost exceed either. Each Leg has three Divisions besides a small Lobe that unites it to the Breast. At the Extremities are two Hooks, and in the last Part of either Leg are several Joints. By this Artifice the Ant can adhere to Surfaces or move with great Facility and Quickness.

The Ligament that unites the Breast and Body in the Red Ant consists of two Lobes somewhat round and divided in the Middle. A fine Thread connects it with the Breast, and another with the Body. In other Ants there appears but one Lobe between the Threads; which rises higher, and is broader than the Lobes in Red Ants. This Species has also at the End of its Breast two sharp Prickles that stand up like Thorns.

The Body is composed of our Rings, and terminates in a Point. Each Ring is proportionably less, except in the Red Ants, whose first Ring much exceeds any of the rest. The Inside of the Body contains, besides the other Viscera, a Bag of corroding Spirituous Liquor, which the Ant can at its Pleasure eject to a considerable Distance.

The Red Species has also a Sting of the same Contexture as a Bee, only in Miniature. With this it opens an Orifice in the Flesh, and afterwards injects a Venom which gives a smart but momentary Pain. In other Ants I cannot discover any Sting; and therefore unless you allow them Time they are not so venemous. They are obliged, first of all, to bite or make a small Incision with their Saws, and then eject some of their corroding Liquor on the Wound, which has the like Effect as the above. The Red Ants live more open and exposed to View, travel at greater Distances from their Cells, are more bold than any of the others, and therefore a Weapon of this kind is serviceable to them.

It may be remarked that the Jet Ants have a peculiar disagreeable Smell, which, I fancy, is a great Preservative to them against an Enemy.

The

The * Spirit which all the Ants eject is very strong, and at a little distance affects one in the same Manner as Spirits of Hartshorn or Sal Volatile.

* This Experiment is best proved in Winter, because at that Season they lie together in Clusters, and are not easily separated from one another. If you then smell to a Cluster, particularly of the small black Ants, you will have a sensible Idea of the Effect. You may find a learned Account of this acid Spirit in Dr. *James's* Medicinal Dictionary, VOL. 2.



C H A P II.

Of their Colonies, Cells, subterraneous Channels ; their Texture and Variety.

ANTS unite together in Colonies, which they form in such Places and Situations as are most agreeable to their different Natures, and the Management of their Affairs.

The yellow and small black Ants most frequently make Choice of those little Eminencies cast up by Moles, from whom they derive the Name of Mole-hills: But from the Habitation they afford these Creatures are more usually called Ant or Emmet Hills. Thus the Inconveniences produced by one Creature tend to the Service of another.

The Red Ants are to be met with under broad Stones, or other Rubbish. Very often they reside in a distinct Part of the yellow Ant-Hills; and sometimes if a Hill be small and suitable to their Colony, which is not so numerous as the rest, they occupy the whole.

The Hill and Jet Ants delight mostly in old decayed Roots of Trees; the Substance of which being soft and tender, is the better adapted to their double Saw, by means whereof they work their Apartments, and compleat their Cities.

We are not so to limit the Residence of Ants as to expect no Variation; for we may often meet with Colonies of Yellow or small Black Ants under Stones, or in old Walls; and the like Situation will sometimes please the Hill and Jet Ants.

It may however be worth observing, that the several Species never intermix so as to associate or breed together. They will indeed live very near and good Neighbours to one another. But if any venture into a different Colony, they must retire with the utmost Expedition, or soon fall Victims to the Foe. They are immediately surrounded by a Party, who pinch them to Death, and afterwards devour or carry them out of the Settlement.

The Largeness of their Cities depends in a great Measure on the Number of Inhabitants, and partly also on the Change of Seasons and Variableness of the Weather. In Winter they are obliged as
much

much as possible to shun the Excess of Cold and Frost; for which Reason they carry their Works to a considerable Depth; sometimes two or three Feet from the Surface of the Hill. * At this time of the Year you seldom find many towards the upper Part of the Colony. On the other Hand, at the Approach of Summer they begin to leave their Winter Quarters, and remove higher in Proportion to the Warmth of the Season, and Progress of their Young; so that about Midsummer they even raise the Edifice half a Foot or more above its usual Height. By this means they have always a great deal of spare Room to supply any Damages that may happen to their Works, and to which they may retire, or at any time transfer the Young.

The manner of the Architecture deserves our Consideration, as being adjusted with remarkable Curiosity and Art. The whole Structure is divided into a Number and Variety of Cells or Apartments, all communicating with one another by little subterraneous Channels which are circular and smooth. The design is obvious. For hence several of them

* If the Season be very mild the Ants continue nearer the Surface.

can more conveniently pass to and fro at the same Time. The Water sooner drains off, and small Particles of Dust, with other Obstructions, cannot so easily fill up the Spaces. The Smoothness is also more commodious to the Tenderness of the Young, which they frequently carry from one Lodgment to another. Most of these Channels terminate in Cells, except the direct ones, which go through the whole Colony, and discharge the Water at the Bottom. The other Passages serve as so many Entries to different Apartments, and on Examination appear to be only Branches of the large and direct Channels; which shews the exact Contrivance of the Ants, or how nicely Providence hath proportioned their Reason to their State: For by this means the Excess of Water, or other Impediments, is constantly avoided, and so no ways incommodes the Ants themselves, or their growing Posterity.

We cannot less admire the Texture of their Cells. As the Ants lie together in Clusters, and dispose of the Eggs and many of the Young in the like manner, an oval Figure is the most convenient for this purpose, and such is the Structure of many of their Apartments. A * Square, a Circle,

* We may observe that some of their Lodgments are more Circular and Oblong than others, but generally Oval.

or any other Figure, would too far separate them from one another, and consequently not so well Answer that warm and close Position in which they choose to unite. As the Eggs are very small, and the Young are of different Sizes, the same Variation is necessary in respect of their Cells. We find accordingly some of them more spacious than others. And that they may be no Ways prejudicial, they are all well polished.

There are two Particulars which most Virtuosi mention with Regard to the Apartments of Ants. Their † Incrustation; and that some of them are designed for Magazines or Granaries for Corn. The latter will be considered when we treat of their Provisions. As to the former I cannot by the most careful Observation discover any Composition in the Structures of English Ants. The Cells are formed in the Mold itself, whether Sand or Clay, without any Addition of Grew, Straw, or other Materials. But that it may be otherwise in hotter Climates, where the Sand is more apt to crumble, and a supply of Moisture often wanting, is not at all improbable, nor out of the Limits of their Reason.

† Nature Displayed, VOL. I. DIAL. 8.

The Hill and Jet Ants admit of some Difference in the manner of their Building. For as they generally inhabit the Bottoms of old Trees, the Surfaces of the Trees are sufficient to prevent the Distilling of any Water into their Cells. As therefore they do not want, they are not at the Trouble of making direct Channels to drain it off. In most other Respects the Architecture is the same, consisting of a number and Variety of Apartments formed with a great deal of Curiosity, and all communicating with one another.

All these Works the ingenious Ants carry on by the Assistance of their double Saw and the Hooks placed at the Extremities of them. And it is wonderful to observe with how great Celerity they manage these Implements, and finish the Structure. They first of all grate or cut the Earth into little Particles with their Saws, and afterwards remove it between their Hooks, which answer the End of a Pair of Pincers or Forceps. The Process and manner of their Working might be easily observed by depositing some Ants with a lump of Moist Earth under a Glass. It may be proper to moisten the Earth, or it will be too hard for their Saws.

It may be added that Ants are extremely careful to keep their Apartments clean. They remove all Rubbish, or what else might prove incommodious or offensive. As soon as one of their Fraternity dies, it is carried out of the Settlement and thrown upon the Ground without Ceremony or Rites of a Funeral. * *Pliny* informs us that the Ants of his Country are wont to bury their Dead, which is a Curiosity not imitated by ours in *England*.

There remains a remarkable Exception to be mentioned with regard to the Ants retiring downwards. If the Autumnal and Winter Months, are more than ordinary wet, they are obliged to keep above or near the Center of their Colonies. Immoderate Rains are apt to fill Part of the subterraneous Channels, and soak into the lower Cells, which, like so many little Cisterns, retain the Moisture, and prevent the Ants from inhabiting them. We may hence discern the happy Formation of Mole-hills for the Advantage of these Insects. Their rising above the level protects

* *Sepeliuntur inter se viventium solæ præter Hominem.*
Pliny Nat. Hist. L. II. cap. 29.

them from Floods, and their gradual Descent in manner of a Slope carries off Excess of Water. Without this Disposition, every impending Storm would endanger their Security, and overflow their Settlements.



C H A P. III.

Of their Government, a Description of the several Queens, the Respect shown them by the Common Ants, Extent of their Power, &c.

A Colony of Ants, from the latter End of *August*, to the beginning of *June*, is usually composed of a large Female and various Companies of Workers. We may by way of Eminence, as well as in Regard to the Honours paid Her by the Society, stile the former, the Queen. Besides these, there are in the latter End of *June*, all *July*, and Part of *August*, a Number of winged Ants, which are commonly known by the Name of Ant-Flies.

The Government of Ants has been universally taken for a * Republic or Common-Wealth, and accord-

* Learn each small Peoples Genius, Policies, The Ants Republic, and the Realm of Bees.

accordingly they have been treated of as a Body consisting of Males and Females; the former of which are looked upon to be those that make their Appearance in Summer-time with Wings. The Care and Tenderneſs which theſe imagined Females expreſs towards the Young might naturally miſguide our Enquiries. But if we recollect the Oeconomy of the Bees, that the generality of them have no Diſtinction of Sex, and yet make it their whole Employment to provide for the Young laid by their Queen, we ſhall not ſo much wonder to find the ſame Character maintained in the Conſtitution of Ants.

The common Ants therefore which uſually preſent themſelves to our View are like the common Bees, of neither Sex; but ſeem entirely deſtined to take care of and educate the Young which their Queen depoſites in the Cells, and reſigns to their Protection.

How thoſe in Common, all their Stores beſtow,
And Anarchy without Confuſion know.

Popes, Eth. Ep. 3. l. 184.

Et iis reipublicæ ratio : memoria : cura.

Plin. Nat. Hiſt. L. 11. cap. 29.

Sir *Edward King's* account of Ants, *Philof. Tranſ. Lowth.*

Abridg. Vol. 2. Ray on Inſects.

Every

Every perfect Colony of Ants, has at least one Queen, who, in the Space of Seven or Eight Months, gives Birth to a Family, at a moderate Computation amounting to Four or Five Thousand: Except the Red Queens who are not so prolific. She is easily distinguished by her superior Largeness, different Colour, and the particular Respect shown her by the rest.

As the Yellow Ants are most frequent, I shall give a Description of their Queen, and afterwards mention any Circumstances wherein the others differ from her.

A Queen of the Yellow Ants, is in regard of Size perhaps five Times larger than any of her Subjects. Her Colour is a kind of Bay intermixt with Yellow, and carries the Gloss of a fine Velvet. Her Head is furnished, like the common Ants, with a Mouth, a double Saw, a Pair of Feelers, two Eyes one on each Side her Head, and a Neck which unites it to the Breast. She has moreover on her Front three Eyes less than the others, and placed in a triangular Form. They are very convex, of a brown Colour, and jut out like small Beads. We meet with the same Apparatus in Bees, and probably the Reason is the same in both.

As their Side Eyes are at a considerable Distance from each other, are immoveable, and take in only Side Objects; this Triangle in all likelihood serves them for a Sky-light, and may be of great Use in traversing the dark Recesses of their Cities. Her Breast and Body are, excepting Colour and Proportion, almost of the same Make as the Workers. The Queen has indeed on each Side of her Breast a kind of hollow or indented Place, which shews as if she had been originally adorned with Wings. Her Body terminates in a taper Point, and besides the other Viscera contains a fertile Bag of Eggs. We may observe in a Queen distended with Egg a partition along the Back, and a continued Motion from one Extreme to the other, much like to that we find in Silk Worms; which answers the End of Respiration, and promotes the Circulation of her Juices.

The Queen of the small Black Ants differs from this only in Respect of Colour. She is of a very * deep Brown tending to Black, and in some Places tinged with a faint Degree of Red.

* It may be remarked that most of the Queens lose somewhat of their Gloss in the Summer Months.

The Hill Queen is not so proportionably large: She does not exceed any of her Subjects above three to one. Her Breast is rather more yellow, and her Body more shining.

The Queen of the Jets I had never the Pleasure of seeing; but from their Manner of Life, and Process of their Young, am inclined to believe she varies from her Attendants in such Proportion as the Red Queens do from theirs.

The red Queen is not above as large again as the rest of her Colony. The top Part of her Head and Breast are black, and varied with a Number of short bright yellow Hairs, which in the Sun often resemble so many Particles of gold Dust. She is also armed with a Sting which is denied to the other Queens. She is of an agile Disposition, and often appears in Public; for which Reason she is probably furnished with a Weapon of Defence.

The Yellow, Black, and Hill Queens at different Times of the Year reside in various Parts of the Colony. In the Winter Season they retire to some of the remotest Apartments, or however seldom venture above the Center of their Cities.

In Summer they often shift their Quarters, and remove from Cell to Cell, distributing such a quantity of Eggs, as they think convenient. In whatever Apartment a Queen Ant condescends to be present, she commands Obedience and Respect. An universal Gladness spreads itself through the whole Cell, which is expressed by particular Acts of Joy and Exultation. They have a peculiar Way of skipping, leaping, and standing upon their Hind Legs, and prancing with the others. These Frolicks they make use of, both to congratulate each other when they meet, and to show their Regard for the Queen. Some of them gently walk over her, others dance round her, and all endeavour to exert their Loyalty and Affection. She is generally encircled with a Cluster of Attendants, who, if you separate them from her, soon collect themselves into a Body, and inclose her in the midst. Howsoever romantick this Description may appear, it may easily be proved by an obvious Experiment. If you place a Queen Ant with her Retinue under a Glass, you will in a few Moments be convinced of the Honour they pay, and Esteem they entertain for her. There cannot be a more remarkable Instance than what happened to a Black Queen, the beginning of last Spring. I had placed her with a large Retinue in a sliding Box,

in the Cover of which was an Opening sufficient for the Workers to pass to and fro, but so narrow as to confine the Queen. A Corps was constantly in waiting and surrounded her, whilst others went out in search of Provisions. By some Misfortune she died; the Ants, as if not apprised of her Death, continued their Obedience. They even removed her from one Part of the Box to another, and treated her with the same Court and Formality as if she had been alive. This lasted two Months, at the End of which the Cover being open, they forsook the Box, and carried her off.

The Queen Ant seldom continues long with her Young. As soon as she has deposited a Parcel of Eggs, she leaves them to the Care of the Workers, and withdraws to a separate Apartment. Hence you always find her in a Cell with nothing but her Attendants; unless you happen to light upon her at the Time of her Laying.

If you take three or four Cells of Ants with the Young delivered to their Care, and also a Queen with her Retinue, and mix them together, and then place them in a Box with a Quantity of moist Earth, they will in a short Time, form a
like

like Number of Lodgments, and re-assemble in the Manner you first found them. The Queen and her Attendants in an Apartment by themselves, the Workers and their respective Young in the others.

There is great Reason to presume that the Obedience of the Common Ants to the Queens, is temporary, and limited to particular Cells; for on putting several in Boxes, I observed that after laying their Eggs, their Attendants grew more cool towards them, and the Queens seemed unsettled and discontented. It is certain that in the Summer Months, the Queen is to be met with in various Places of the Colony; that in several of the Lodgments you may find new-laid Eggs; and that the Size of her Body decreases in Proportion. From whence I am inclined to believe that having deposited a Parcel in one, she retires to another Cell and does the same; and thus in the laying Season from *January*, to * *September*, she often changes her Situation, and likewise her Attendants; furnishing each Company in their turn with a Supply of Eggs. She is received into the new Apartment with universal Pleasure, and until she

* See the Note Page 31.

has given them their Charge, is carested with the highest Marks of Honour and Esteem. As there are always a Number of Lodgments void of Eggs, but full of Ants, she is never at a loss for an agreeable Settlement and submissive Retinue; and by the Time she has gone round the Colony in this Manner, the Eggs she first laid are brought to Perfection, and her old Attendants are glad to admit her again.

It may however be noted, that although in the above Experiment there often grows a Coolness between the Queen and her Attendants, yet they do not always forsake one another. Upon confining a Queen and her Retinue I have often known them unite together in the same Lodgment after the Queen has deposited her Young. The Common Ants, on this Occasion seem to divide their Care, and are at a Loss which to defend. If you give them a great deal of Disturbance, some will run to the Protection of their Queen, but they generally express most Affection for the Eggs.

From this Limitation of her Sovereignty it partly happens, that if you remove a Queen Ant from her Colony, the rest, without taking Notice of her

her

her Absence, continue on their Employment of feeding and bringing up the Young to Maturity ; which is otherwise in the Government of Bees, who upon the Loss of their Queen, immediately forsake the Hive and disperse.

These Paragraphs may at at first Sight seem to Clash * with the above mention'd Curiosity of the Black Queen. But this seeming Repugnance is easily reconciled by supposing that her Attendants continued their excessive Fondness in Expectation of a Parcel of Eggs, which they would long before have been supplied with, had she not unfortunately lost her Life.

In *October*, the Ants with their Queens begin to retire downwards, and in the Depth of Winter are to be found in some of the remotest Apartments encircled with a large Cluster of Attendants, and as it were benumbed. From *January* to the beginning of *May* they lay Eggs at Intervals and sparingly. From thence to *September* they come nearer the Surface. The latter End of *June*, and particularly in *July*, their Bodies are surprisngly distended with Egg. All which by *September*, they commonly deposit.

* See Page 25.

You may sometimes expect to find two yellow Queens in the same Colony. I have once or twice met with three. They most usually reside in the same Lodgment, and live together in perfect Harmony and Union. The Hill and small Black Ants seem to differ in this Circumstance: For I never could, by the nicest Researches, observe more than one in a Settlement.

A Colony of Red Ants, as in many other, so in this Respect has a Variation. You seldom find among them fewer than two Queens. If the Family be tolerably numerous, there are often three or four. A Thousand or Fifteen Hundred are the most a Settlement of this Sort generally amounts to. It has been already observed that the Red Queens exceed not their Vassals above two to one, or thereabouts. As such a Proportion might not so well answer a supply of Young, this Deficiency is made up in Number. If they inhabit under a broad Stone, you may in Summer by lifting it up often see them on the Surface intermixt with the rest. They never work, are respectfully treated, and seem to have no other Care on their Hands than to keep up their Names, and give Birth to a succeeding Posterity.

This

This manner of Oeconomy or Government amongst the Ants may be esteemed a particular Instance of divine Wisdom. Had the common Workers been of either Sex, it must have given a great deal of Interruption to their Labours, and have often interfered with that Assiduity required in Breeding up the young Offspring. At the same Time there is such a strong expressive *Affection imprinted on them towards the Eggs, as cannot but shew it to be the Result of a superior Goodness. Had the Queens been more numerous, it would have engaged too large a Circle of Attendants; had they been less, or equal with Regard to Size, it would not so well have answered the different Proportions of Young observable in the several Colonies. So exact are the Wonders of Providence! in nothing superfluous or deficient.

* Mr. *Derham* justly calls this their unparalleled $\Sigma\tau\omicron\epsilon\lambda\eta$, or Tenderness towards their Young.

Derham's Phys. Theol. B. 8. cap. 5.



C H A P. IV.

Of the Queens laying their Eggs. Time and Manner of it. A Description of the Eggs, their different Sorts and Proportions.

THE preceeding Observations inform us that the Queen, or large Female Ant, supplies the whole Colony with Eggs; that likewise the common Ants have no Distinction of Sex, and undertake the Charge of feeding and educating the Young delivered to their care by the Queen. To be satisfied of this we need only refer ourselves to some of the following Experiments.

If you dissect a Queen in the Spring or Summer Months, you will often find in her Alvis or Body a Quantity of Eggs. You may sometimes expect the same at the latter End of* *November*.

* If the Autumn Months are very serene, the Female Eggs are mostly deposited by the latter End of *November*.

If you place a Queen with her Attendants most of the Spring or Summer Months under a Glass, or in a Box, she will in a few Days deposit some Eggs, unless she had laid before you took her.

In *June*, *July*, and part of *August*, you may be certain of the Experiment; for they are, at this Season incredibly distended with Egg, and frequently laying.

If in *July*, you put one of these distended Queens by herself under a Glass, she will in some Hours deposit there a Parcel of Eggs. She will do the same in your Hand if taken at the Time she is laying, and gently squeezed.

If you kill her, and immediately place her Body on the Field of a Microscope, or on a Piece of Paper, you will in a few Moments perceive some Eggs to proceed from the Extremity of her Body.

We may with equal Certainty be assured that these are the Eggs, of which the Workers are so extremely careful.

As soon as a Queen Ant has laid any of her Eggs, under a Glass you may observe several of her Attendants begin to express their Fondness. They will, in the most soft and gentle Manner, take them in their Forceps, and carry them to an Apartment, or lay them together in small Clusters.

In * *July*, you may find, in most Colonies, Parcels of new-laid Eggs; and the Queens Bodies diminished in Proportion. Upon examining them with a Microscope, they will, in all Particulars, answer to those you shall take from a Queen by Dissection; and exactly of the same Contexture are the Eggs provided for by the common Ants.

I have been the more circumstantial in this Point, in order to remove a Mistake in † Sir *Edward King's* Account of Ants, published in the Philosophical Transactions. As he was not aware

* These Experiments have been generally confined to the common Yellow, and small Black Colonies; but from many Circumstances, it appears that the Process of the others is analogous to it.

† *Lowthorp's* Abridgment of the Philos. Transact.
VOL. 2. p. 7.

of a superior Female, he gave way to the old Opinion, that the small Ants were of this Sex, and supplied the Colony with Young. After a just Description of the Sperm or Eggs (which is entirely answerable to what the Queen lays) he is pleased to observe, that he found that Substance in the common Ants, and gives the more Credit to it, because of the great Care and Tenderness wherewith they treat it; but this Occurrence is also to be met with in the Constitution of Bees, and therefore is no ways conclusive. I have all Times of the Year observed the common Ants, and could never discern any Alteration in their Bodies, but what was occasioned by Food, or some Accident. They never appear to have any true Sperm, or to lay any Eggs. The only Resemblance of it, is perhaps the little Bag of corroding Liquor, which is the same in all Ants, and in most Times of the Year without Exception. Or it may be some of the Viscera, which often look white and viscous. Such, I flatter myself, is the imaginary Sperm of the above Virtuoso. If you disturb a Cluster or a single Ant of the Yellow or small Black Species, they are often won't to eject their Venom, and, in the Heat of Rage, will sometimes push out the Bag, but will soon retract it. This

may probably, at first Sight, carry a Deception, and the Appearance of Eggs; but, on Examination, it is, in most Respects, remarkably different.

The Time and Manner of the Queen's laying is also an Argument, that the Eggs fostered by the Workers were originally hers.

If you search a Number of Colonies in *June*, before the Queen has begun to lay, and whilst she is vastly distended, you will not find any Parcel of new Eggs in the Cells; but as soon as she has deposited them, the Eggs will appear in Proportion, and the Workers be accordingly employed.

The Queen Ant lays three different Sorts of Eggs, the Male, Female, and * Neutral. The two first are deposited in the † Spring; the last in *July*, and part of *August*; or if the Summer be extremely favourable, perhaps a little sooner. The Female Eggs are covered with a thin black Membrane, are oblong, and about the sixteenth or

* I make use of this Name, in Allusion to their being of neither Sex.

† See the Note Page 31.

seventeenth Part of an Inch in length. The Male Eggs are * of a more brown Complexion, and usually laid in *March*. The last, or neutral Eggs, are to be seen in *July* or *August*, in small Parcels, which have the Appearance of a white Substance, not altogether unlike the Scatterings of fine Sugar or Salt. In a Microscope, or very near a good Eye, they may be discovered to be Assemblages of minute Eggs. Each of them is distinct, and clothed with a white transparent Membrane, is somewhat oblong, and in the middle a little bending. They are precisely of the same Form and Colour as those you may take from a Queen by Dissection. We cannot here but reflect on the seasonable Disposition of the Queen's laying. As the Female Eggs are by far the largest, and require more Time in coming to Maturity, it was proper they should first be deposited. It was requisite the Males should be contemporary with them, but as their Eggs are less, some Distance of Time is convenient in the laying, which is agreeably ordered. The last Place, in point of Ceremony, as well as Justice, is given to the Workers.

It may not be improper to take Notice, with how much Sagacity the Ants can distinguish the

* They are considerably less than the female Eggs.
true.

true Clusters of Eggs from any Contrivance to delude them. If you Place several little Parcels of Eggs, as also of Sugar, Salt, or any other Resemblances under a Glass with a Quantity of Ants, they will, at one View, perceive the Cheat, and remove nothing but the Eggs. If you mix the Ingredients they will as easily make a due Separation. If you put Clusters from Colonies of different Ants under the same Glass, they will often touch only their own. But I have sometimes known the contrary; and if the Eggs be of the same Species they seldom make any Distinction.

There does not seem to be any considerable Variation in regard of the Eggs, *Time or Manner of the Queen's laying, amongst the several Ants. The Eggs of the hill Colonies are a little larger and earlier. And indeed many Queens deposit their Eggs sooner than others of the like Species.

* The Inconstancy of our Climate, occasions a Variation in the Time of laying. If the Autumn be fine, a Queen Ant deposits the Female Eggs in *November*, the Male in *February*, but usually in *March*:

C H A P. V.

Of the Change of the Eggs to Vermicles, or little Worms. A Description of them, their Process, and surprizing Continuance in that State.

WHEN the Queen has furnished an Apartment, the common Ants immediately exert their Affection. They brood over the Eggs in little Clusters, perhaps by way of Incubation; and remove them to different Parts of the Colony for the better Advantage of Moisture, and a just Degree of Heat or Cold. The Continuance of Ants in the Egg State is somewhat precarious. As the Female Eggs are larger, and both the Male and Female laid in the colder Months, they do not come to Life so soon as the others, which are deposited in *July* or *August*, and forwarded by the warmer Season of the Year.

After the Ant-Eggs have remained in that State, cherished some Time by the Workers, * they be-

* Ant-Vermicles seem to disengage themselves from the several Membranes that inclose the Eggs, in the same Manner as Silk Worms do.

gin to lose their Transparency, and become white without being clear. In a few Days more, they are mantled over with a Multitude of diminutive Hairs, look rough, are extended into several Rings, and appear in the Shape of Vermicles, or little Worms. They are at first very small, and their Motion scarce discernible. When they are grown somewhat larger, you may number in some Nine or Ten, in others thirteen Rings, besides the Head, which is not unlike the Head of a Silk-Worm. This Part, when the Worm is young, bends inward, and is much less than the other Extremity. You will, in a few Days, discover in these Vermicles a feeble Motion of Flexion and Extension, and also in each a black Speck, which I take to be their digested Food. It is observable of Ant-Worms, that they have not a locomotive Faculty, or a Power of removing from one Place to another. Most Insect Maggots are furnished with a Set of Legs, or can transfer themselves to different Places, by dilating and contracting their Rings. But Ant Worms can only a little turn or extend their Bodies. This Disadvantage is however remedied by the Assistance of the Workers, who are always upon guard, and ready to carry them wherever their proper Nurture or Security demands.

As of Eggs, so likewise are there three different Sorts of Vermicles in a Colony of Ants; Male, Female, and Neutral. As many of them are laid and change sooner than others, there is also a constant Variety of different Sizes. You shall, the latter End of *August*, distinguish four or five Degrees of Worms, besides several Clusters of New laid Eggs.

The Process of Ant Vermicles is remarkable and worth Observation. The Female Eggs put on the Form of Worms, at farthest some time in *February*. The Male by the latter End of *March*, and the Neutral by *September*. The first Summer they grow very sparingly. The largest not exceeding a small Grain of Wheat; the others are a great deal less, but of various Sizes. The succeeding Winter they seem at a stand, and not to increase at all. In the Beginning of * *April*, of the Second Year, they visibly augment every Day, and in six Weeks, or at most by the End of *May*, the Male and Female Worms in general attain

* The Hill and Jet Vermicles, most Years, begin to augment in *March*, and hence the Flies in these Colonies are much earlier.

their

their greatest Proportions, and are ready for another Change; but the Neutral Worms are to be seen 'till the latter End of *June*, or later.

This long Continuance of Ants in the Vermicular State is a Curiosity perhaps hardly to be met with in any other Class of Insects. Some few of the Maggot and Palmer-kind remain so for a Period of Half a Year. But the usual Duration of most is a great deal shorter. On the contrary the Female Ant Worms continue in that Form above a Year and Quarter. The Workers or Neutral, a Twelve-Month, the Males somewhat more. By this means a Colony of Ants, after the first Season, is furnished all the Year round with Variety of Worms, which probably serve as a constant Supply of Provisions for a Number of Animals that delight in this Food. At the same Time their slow Progress is so happily contrived, that the Workers have never too much or too little Employment.

The Vermicles of the several Species of Ants seem only to vary in respect of Proportion, and Degrees of Roughness. The Hill Ant-Worms are the largest. Next to them the Jet and red Ants. The yellow and small Black Colonies are nearly equal.

equal. The Hill, Jet, and Black Ant-Vermicles have also a greater Number of Hairs, are more rough, and not so easily dissected.

There is also a Peculiarity observable in the Manner of the Red and Jet Ants breeding their Vermicles. You will sometimes perceive them in the Spring carrying the Young to and fro at great Distances from their Home. Whereas the others only remove their Worms nearer to, or farther from the Surface of the Settlements. The just Reason of this, as well as of many other Particulars, it is not easy to determine; they may possibly require more Air, or a stronger Heat than their usual Confinement affords. Or perhaps it may be for the Benefit of a more suitably Aliment. Or, what the Workers little imagine, that the young Progeny might become a more open Prey to their Enemies. Or * lastly, it may be only a Removal of their Colonies to a different Place.

* I have sometimes observed this to be the Design of it.

C H A P. VI.

Of the Transmutation or Change of Ant Vermicles to Nymphs or Aurelia's; a Description of that State; and a remarkable Variation in the Red Ants.

TOwards *April* of the Second Year, after the Ant-Worms have continued the preceding Winter inactive, they begin visibly to augment every Day. The Workers are now in full Employment. Each Moment is laid out in the Education of the Young. And with such Affiduity do they maintain their Care, that by the End of *May*, most of the Male and Female Worms, are fit for a Second Metamorphosis, or their Change to Nymphs.

The Nymph, or Aurelia State, is a turn peculiar to the Race of Insects; and is that Period which they pass in a kind of Sepulchre, and Appearance of Death, between their being Worms and Flies or compleat Insects. They are called * Nymphs in allusion to Brides, because when they leave this

* From *νυμφή*, a Bride.

State, they are often arrayed in Gayety and Splendour, as may be observed in Butter-Flies, and Variety of Night-Papilio's. The Name of Aurelia, or * Chrysalis, they borrow from the Golden Hue, with which many of them are tinged.

When the Ant-Worms have attained their Maturity of Growth, the Workers transfer them to some proper Situation near the Surface of the Colony, and cease to give them Nourishment. The Vermicles soon after begin to weave in the Manner of Silk-Worms, and in a few Days in-fold themselves in a soft Silken Kind of Tissue. They henceforth assume, and whilst confined in this Monument, continue the Character of Aurelia's, and are those small Bodies, which most of the Summer Months abound in the Settlements, and are vulgarly reputed Ant-Eggs. But their Largeness, and visible Transformation, shew the Mistake.

The Female Worms first undergo this Alteration; the Male succeed them, and last of all the Neutral. I have known several Apartments of large

* From χρυσος, aurum, Gold.

Nymphs the Beginning of *May*, but they continue changing through all that Month, and by the latter End you will discover few of this Sort in a Colony. The Male do not finish their Transmutation 'till *June*; and abundance of the Neutral Vermicles may be seen in *August*. It must be remembered, in the several Processes of Ant-Eggs, Vermicles, and Nymphs, to make Allowances for the Warmth of the Season, and Position of the Settlement.

By frequent Dissections of Ant Nymphs, you may form some Idea of their Nature and Progress. After the Maggot has compleated its Texture, and is perfectly surrounded with a fine Silken Covering, it gradually dissolves into a liquid tenacious Humour, in the midst of which is a small Purple or black Consistence, that contains or gives Life to the future Ant. This Humour becomes the Aliment of the little Embryo, which resides in this close Imprisonment a considerable Time. You will perceive this Liquid to diminish in Proportion to the Growth of the Ant, which is not dissimilar to the Progress of an Embryo nourished in an Egg.

The Aurelia of an Ant is oblong, and somewhat larger at that End which incloses the Head.

You

You will, after some Days, when the Vermicle is entirely dissolved, find at the other Extremity of the Nymph a black Speck which * Sir *Edward King* supposes to be a Secretion cast out by the Maggot in its Transformation. Perhaps it may be only the outward Skin of which the Worm divests itself, in changing to a Nymph. For it is observable that you may discern such Disproportions in the Cones of Silk-Worms, and other Aurelian Textures.

There are in a Colony of Ants, three Sorts of Nymphs, Male, Female, and Neutral. The Male and Neutral have little Difference in Respect of Size, if they are of the same Species; but the Female Nymphs are a great deal larger. It must be also noted, that their Proportions vary according to their respective Species. The Male and Neutral Aurelia's of the Hill exceed those of the like Denomination amongst the other Ants. The Jet Nymphs are next to them. The yellow and small black ones are nearly equal, but less than any of the above. There is not that Disproportion between the Female Nymphs of the several Colonies as might at first be imagined. The Reason is, be-

* Phil. Transact. *Lowthorp's* Abridg. V O L. 2. p. 7 and 9, &c.

cause you cannot observe any considerable Difference between the Females themselves. A Queen of the Hill Ants, is but a little larger than a Queen of the Yellow or small Black ones. The Female Nymphs, are about the Size of a Grain of Wheat when it is swelled with Moisture. The Male and Neutral Nymphs of the Hill and Jet Colonies are perhaps as large as a common Wheat-Corn; the rest exceed not a Grain of Rye. There is also a Variation in the Colour of Ant-Nymphs. The Hill and Jet Aurelia's are almost white, and the Tissues extremely fine. The others are more yellow, and a little coarser.

The Female Ants continue in the Form of Aurelia's between Five and Six Weeks, or more. I have observed Vermicles change to Nymphs the Middle of *May*, and come to Maturity towards the latter End of *June*; others not 'till the Beginning of *July*; Six Weeks seem to be the Medium. The Male and Neutral Aurelia's, as near as I can guess, change in a Month or thereabouts. It is to be intimated that, as there are successive Transformations of the Worms to Aurelia's in *May*, *June*, and *July*, and as the Workers are frequently removing them, it is difficult to state their exact Duration in the Form of Nymphs.

We

We may be certain that at the latter End of *April*, there are few or none of the Male or Female Worms transformed to Nymphs; and not many of these Aurelia's to be met with towards *August*. But the Neutral sometimes continue to the Beginning or middle of *September*.

The Workers, or Common Ants, are not insensible of this Change the Vermicles are to undergo, nor do they forsake them in this Period, or any ways discontinue their Employment. On the contrary, they seem to know the Moment of their Transmutation, and do attend them all the while with the utmost Care and Vigilance. They carry them to various Parts of the Colony, and in all other Respects, excepting Food, shew the same Tenderness towards them, as when they appeared in the Character of Worms.

If you give any Disturbance to a Colony, and displace the Nymphs, the Workers will immediately seek their Protection, and transfer them to a more secure Situation. If, to try the Extent of their Sagacity, you put Aurelia's of different Species in one Settlement, the Ants will soon discover the Imposition, and separate their own. But if the Nymphs be of the same Species, they will

as in Case of Eggs or Vermicles, frequently make little or no Difference.

There is a remarkable Variation observable in the Aurelia's of Red Ants. When the Worms arrive to their Period of Transmutation, they do not, like the rest, infold themselves in a Tissue or Shell, but lie motionless, and, to outward Appearance, insensible. In a few Days they look whiter than ordinary, and in this manner gradually put on the Form of Ants. Thus Providence is not tied down to particular Laws, but can, by a surprizing Variety, accomplish the same Ends.



C H A P. VII.

Of the Transformation of the several Aurelia's to Flies and Common Ants. A Description of their different Structure, Duration, and some other Curiosities, relating to this Change.

AS the Red Ants are not concealed in any discernible Texture, they are best adapted for Observation of the gradual Process of the Aurelia State. But we may, with little Trouble and Carefulness in opening, equally gratify our Curiosity from any of the rest.

After a Weeks Time, or more, you may begin to discover in a Nymph the outlines of a Rising Ant. The Head with its Ornaments, and the Legs regularly placed, first make their Appearance. In a few Days after, you will find the compleat Form of an Ant, but extremely white, except the Eyes, which seem like so many Particles of Orange-Peel upon a White Ground. There is such a nice Attendance required, that it is impossible so exactly to describe the Metamorphosis of Ant-Nymphs as

might be expected. It is also an additional Misfortune that they will not, like most other Aurelia's, come to any Perfection under a Glafs.

When the Nymphs have attained this perfect Form of Ants, they continue their White Complexion about three Weeks; and all the while do not appear to have the least Spark of Life or Motion, but resemble so many little Images formed of Alabaſter. Upon their approaching nearer to Maturity ſome of them turn yellow, others brown. * When they have been thus diſcoloured for ſeven or eight Days, they begin to free themſelves from Imprisonment. You will firſt of all perceive a weak and feeble Tendency to Motion in their Legs and Antennæ. In ſome Days more the Ants will appear in their proper Characters, and be in all Reſpects complete, except as to Colour, wherewith they are not perfectly ſtained for a conſiderable Space.

* The juſt Progreſs of Ant-Eggs, Vermicles, Nymphs, &c. cannot be preciſely ſtated, as they will not arrive to Maturity under Glaſſes, &c. *Swammerdam* has alſo mentioned this Miſfortune. *Multoties fui conatus, ut eos Vermiculos ipſe educarem, at ſemper conatum ſefellit eventus, &c.* *Swammerd. Epilog. ad Hiſt. Inſect. p. 153.*

As soon as the Ant-Nymphs that are surrounded with a Tissue are tending to Life, the Workers give them the Air by an Aperture in the Head-Part of the Covering, which they open with their Saws. This Aperture they gradually enlarge, and after a Day or two take out the young Ant, and expose it to the freer Access of the Sun-Beams, which are of great Force in promoting its Maturity. They are indeed a little inconstant in the Time of dismantling these Nymphs. I have often seen them out of their Shells perfectly white, and often found them inclosed when turning yellow.

The Female Aurelia's are generally the first which transform, and are those that make their Appearance in the Shape of large Flies. The Male or small Ant-flies appear next, and early enough to be contemporary with the others. Last of all, the Neutral Aurelia's change to Common Ants, but not until most, or all the Flies have forsook the Settlement.

It must be observed that in every perfect Colony there are two Sorts of Ant-Flies, the large and small, which are those I have all along distinguished under the Character of Male and Female. As this is another Novelty in the Account of Ants,

it will be proper to shew on what Presumptions it is grounded, which may best be understood by a particular Description of their Nature and Progress.

If towards the Middle of *June*, or later, you open a Female Nymph, and take out the young Ant, you will, besides the other Parts, observe on each Side of its Breast a small white Foliage of Wings. As soon as the Fly comes to Life, it expands these Wings in the same manner as Palmer or Silkworm Papilio's do upon leaving their Textures.

The * large Ant Fly, at the first Expansion of its Wings, is extremely tender. It varies in Size and Colour, according to the Settlement in which it was bred.

The large Flies of the common Yellow Ant Colonies are in their Infancy of a light Bay, but in a short Time they turn to a more brown Complexion. If you examine their Structure, they will appear in all Respects, excepting the Wings, formed like the Queen. Their Head, like hers, is

* The Hill Ant Flies often appear in *May*.

furnished with a double Saw, a Mouth, a Pair of Antennæ, two Side Eyes, and a Triangle of lesser Eyes placed on the Front.

The Breast has Six Legs, which are of the same Make and Proportion as the Queens. It is moreover adorned with four Wings, two on each Side, from whence they derive the Name of Ant-Flies. These Wings are composed of exceeding fine and thin Films, which in the Sun often reflect Variety of Colours. You may divide them into the external and internal, or upper and lower Pair. The former reach a little beyond the Extremity of the Ant. The others are considerably shorter, and when shut lie under and close to the upper Wings. They are all placed in the Top Part of the Breast. Each Pair is united to it on their respective Sides, and at a small Distance from one another.

The Body also consists, like the Queens, of five Rings, and ends taper. At the Extremity is a small Orifice through which it emits a white viscous Juice, and on Dissection the Inside appears full of the like Substance.

The Form of the Ligaments, Make of the Antennæ, Joints of the Legs, and Position of the Eyes, are all exactly similar to the Queens.

The

The large Flies of the small Black Colonies differ nothing from these but in Colour, which at first is a light brown, but soon after tends to black.

The Hill Flies of this Sort vary not a great deal from either in Colour or Proportion. They are perhaps a little larger, and less black.

The Red and Jet Flies, are not in general above as large again as the Workers. The first are of a languid red. The second extremely black. In other Circumstances they are not different from the rest.

Besides these, there are in every Colony a Set of small Ant Flies which are about the Size of the common Workers, or rather less in Bulk, but somewhat longer.

It is observable of the small Flies, that on their first coming out from the Aurelia State they are all of a deep brown, and most of them afterwards turn black ; some indeed continue their brownness, or vary a little to the Complexion of the Workers. Their Antennæ are more articulated, or consist of several more Joynts than the Females, or

common Ants. The Bodies of those which you find in the Yellow and small Black Colonies have seven Rings; in most others you can number only five. At or near the Extremity of each small Ant-Fly, are two or more little Hooks placed in the same Manner and of the like Contexture as those you may discover in abundance of Male Insects of the Fly Kind. These Hooks are the external Parts of Generation by which they fasten to the Females, as is obvious from the Appearance of the Papilio's of Silkworms, and a great Number of Gnats. They have a Triangle of Eyes in the same Position as the large Flies, and which are very discernible in the * Front of the Jet Ants. They have also four Wings united to the Breast, which is more prominent than any of the others. In most Particulars besides there is little or no Variation.

Philosophers have usually confounded these two different Sorts of Ant-Flies, and have looked upon them all under the Character of Males; but a little Curiosity in Observation will easily remove so plain an Error. There is so wide and manifest a Vari-

* The best Season to observe this triangle of Eyes, is in the Nymph State, just before they commence Ants.

ance in the Colour, Size and Structure of their Parts, that the naked Eye may easily distinguish it.

On the contrary, it is to be presumed that these Flies are of different Sexes. The small ones I take to be Males, and the large to be Females. It is also highly probable that some of these Females afterwards give Birth to new Colonies, and entitle themselves to the Dignity of Queens. There are many strong experimental Reasons that concur to support so uncommon a Curiosity.

If you dissect a small Ant-Fly, or squeeze the Extremity of its Body, and put it in a Microscope, you will observe an Apparatus exactly analogous to what may be found in Numbers of Male Insects, and which undoubtedly answers the End of Generation.

If you examine a large Ant-Fly, you will find the Extremity of its Body to be taper, and supplied with an Orifice that communicates with the Inside, but entirely foreign to what is met with in the Males. Upon opening it, you will observe the Substance and Make to be very like that of a Female Bee, Wasp, or Queen Ant, when not
with

with Egg, only perhaps it is at first a little whiter.

That the large Ant-Flies are Females, and that some of them become Queens, is exceeding probable from the following remarkable Incidents.

If you compare a large Ant-Fly, when five or six Days old, with a Queen of the same Colony, and not with Egg, they will nearly resemble each other in Size, Structure of their Parts, and in every Circumstance, except the Wings and Gloss of its Complexion, which seems to be only the Produce of Time.

If you strip a large Ant-Fly of its Wings, when a Week old or more, which is very easily done, for they will come off by the most gentle Touch imaginable, and then place it in a Microscope with a Queen, you will perceive no manner of difference as to their Frame. The like indented Places, or little Hollows in the Breast where the Wings commonly lie, will be observed in both; from whence there is great Reason to believe the Queen was originally adorned with such Gayety, and appeared in the Character of a Fly.

It

It is also observable, as a strong Confirmation of this Sentiment, that abundance of the large Ant-Flies, just before or soon after leaving the Colonies, actually drop their Wings, and except, a small Difference in Complexion, which has not yet attained its true Gloss, are not to be distinguished from the Queens. You may, the latter End of *July*, and great Part of *August*, often meet with these un-winged Ants travelling about as it were at Random. If you place a Number of large Ant-Flies in a Box, the Wings of many of them will, after some Time, gradually fall off like Autumnal Leaves. This Circumstance is peculiar to the large Sort; for if you confine the small ones ever so long, their Wings will continue fixed, and cannot be separated without some Difficulty. Nor is it indeed common to all the large Flies; for you may frequently observe many of them dead, and others roving with their Wings on; but they make little or no Use of them in Flight: Whereas the Male can waft themselves to considerable Distances. The final Cause of this different Appearance will be considered in another Place.

If farther we recollect the Descriptions already given of the Queens and large Ant-Flies in the several Colonies, we shall find they exceed the
common

common Ants, and likewise one another in the same Proportion. Thus the Queens and large Flies of the Yellow and small Black Colonies exceed the Workers as five or six do one ; those of the Red Ants, not at most as two do one. Whence it is reasonable to suppose they had the same Original.

As an additional Proof it may be proper to mention an Instance that occurred to my Observations. Upon frequent opening of Mole-Hills, amongst them I met with three, in each of which was a Cluster of large Female Ants, amounting to six or seven in a Cluster. They lay near the Surface, but had no regular Apartment. Upon examining and comparing them with a Queen, there was an exact Agreement in Colour, Form, and Structure. Upon Dissection several of them had Parcels of Eggs in their Insides. I deposited one of the Clusters in a Box with some Earth, under which they concealed themselves, and united together, but did not work any Lodgment. Some Time after, three or four of these Females laid a few Eggs, but did not seem to take any great Notice of them. For Curiosity I placed in the Box, a Cell of Workers of the same Species, and it was surprizing to observe what Fondness was
expres-

expressed. The Common Ants immediately surrounded the Females, took care of the Eggs, and in a short Period made an Apartment in the Earth fit to receive them. It may also be observed, that there were no Common Ants in the Hills where I found the above Clusters. In all probability they were originally large Ant-Flies, which having been expelled their Colonies, and not falling Victims to their Adversaries, associated together in this Manner, and survived the Winter.

If we also recollect, that there are but three Sorts of Eggs, Vermicles, and Aurelia's in a Settlement; more than which I could never discover; it may be esteemed a farther Argument to strengthen the Presumption.

The chief Objection against it, is the Number of Ant-Flies, which, in the Hill, Jet, Yellow, and small Black Colonies, frequently amount to two or three hundred, or more. But, on the other hand, if we consider that the most obvious Use of these Flies is for the Sustainance of other Animals; that perhaps not one in fifty arrives to Perfection; that the generality of them are discarded by the Workers, or die in the Colony, or become
a Prey

a Prey to the Enemy; the Objection will not be so strong as at first Glance it may seem.

The Proportion in the Number of the small and large Ant-Flies in most Settlements (which is often nearly equal) proves them to be answerable, and designed for each other.

From this Variety of Circumstances, it appears at least extremely probable that a * Queen Ant was originally in the Fly-State; that afterwards she changed her Character, and became the Parent of a numerous Posterity.

The Duration of Ant-flies is very short. The small ones seldom continue three Weeks. After their Transformation they spend the first Week or ten Days in traversing the Colony, and are to be met with in most of the Lodgments intermixt with the Females and Workers. In a few Days more they take the Opportunity of a Sunshine to disperse in the Air, and furnish several Creatures with an elegant Repast. The Majority of the large Ant-flies are also very transient. I have known a Colony swarm with them the Be-

* It may be hence conjectured that a Queen of the Jet Ants is in the same Proportion to her Attendants as the large Jet Ant-Flies are to them.

gining,

ginning, and the latter End of the Week have found scarce any therein: Sometimes they remain three Weeks, or longer, interspersed with the others all over the Cells.

Amongst other Incidents that tend to lessen and destroy Ant-Flies, it is observable that abundance of them are demolished by a white and long Kind of Worm, which is often met with in their Bodies. You may frequently take three from the Insides of the large, but seldom more than one from a small Ant-Fly. These Worms lie in a spiral Form, and some of them may be extended Half an Inch.

The general Part of the Workers, or Common Ants, do not transform * 'till the Middle of *August*, and most Times the Beginning of *September*. The Red Ants are somewhat earlier, and many of them even precede their Flies; but the main Body of most Colonies generally change in *September*. The Process of their Transformation is similar to the others. They are at first white, and gradually put on their true Complexion.

* These observations more strictly belong to the Common Yellow, and small Black Species, which also in different Years vary as to the Time of Changing.

It

It may not be amiss to annex a few remarkable Curiosities that result from this Change.

The casting of their Wings is an Instance peculiar to the large Ant-Flies. These are to other Insects their highest Decorations, and the Want of them lessens their Beauty, and shortens their Life. On the reverse, a large Ant-Fly gains by the Loss, and is afterwards promoted to a Throne; and drops these external Ornaments, as Emblems of too much Levity for a Sovereign.

The Transmutation of the Common Ants from the Aurelia-State is likewise very singular. All other Insects change from Nymphs to Flies, and are furnished with a Pair of Wings, or more, according to their Structure and Manner of Living; but the Workers have no Occasion, and therefore are not supplied with any. In which Respect they are perhaps an Exception to all other Insects that undergo the Aurelia-State.

In the Month of *July*, a Colony of Ants is replenished with a surprizing Diversity of Particulars. It is at once embellished with a Queen, and great Numbers of Attendants; with several Parcels of Eggs; three Sorts and many different Sizes of

Ver-

Vermicles; with two Kinds of * Ant-Flies and a Number of Aurelia's. We may therefore not improperly stile it, in this Month, a Cabinet of living Curiosities. So abundant are the Wonders in every Part of Nature, and Rank of Beings; and no where does there seem to be a greater Profusion, than amongst the Inhabitants of a common Mole-Hill.

* *Pliny*, observes that in *Sicily*, there are no Ant-Flies. *Non sunt in Sicilia pennatæ.* *Plin. Nat. Hist. L. 11. cap. 29.*



C H A P. VIII.

Of the incessant Labours and Industry of the Common Ants, or Workers. Of their Method and Time of collecting Provisions. Whether they have Magazines, or lay up Corn against Winter. Of the Variety of Food they delight in; with other Observations on this Head.

THE general Subject of this Chapter has been so largely treated of, and well illustrated by some of the happiest Favourites of * *Minerva*, and *Apollo*, that it is impossible to set it off with more Beauty of Thought, or Elegance of Stile. But perhaps, in many Circumstances, they have rather shewn the Poet than Philosopher; and rather indulged an extensive Fancy, than Strictness of Enquiry. I shall therefore endeavour to supply that Deficiency, by keeping exactly to Truth, and a Series of repeated Experiments.

* *Pliny, Aldrovandus, Swam. Virgil, Horace, and several French, and other foreign Authors.*

It may, however, be noted, that the most finished Pieces of this Kind have been writ by Foreigners ; and, in all probability, the Usages of Ants may, like those of Men, vary in different Climates. As therefore the present Observations are limited to *England*, it will not be so wonderful to find considerable Alterations in their Oeconomy and Government.

* The Labours therefore of our Ants begin in *March*, either earlier or later according to the Fineness of the Month, and by the same Rule continue to the Middle or latter End of *October*. All this Time, particularly in the Summer part, a Settlement of Ants is one constant Scene of Employment. The whole Society is engaged in perpetual incessant Labours. All mutually endeavour to advance the common Emolument, and provide for the Progeny of their prolific Queen. † A Colony is now indeed a small but glorious Example of Public Care. ‡ A proper Theme to quicken hu-

* The Hill Ants, and sometimes the Red and Jet Species, begin to work in *February*, hence their Transformations are earlier than the other Species.

† *Magni Formica laboris*, Horace.

‡ This use is happily illustrated in the Second Vol. of the *Guardians*, No 156.

man Industry, and a just Reproach to the*Lazy or Indolent. They even exceed the painful industrious Bees. For the Ants employ each Moment by † Day and Night almost without Intermission, unless hindered by excessive Rains: Whereas the others venture not abroad until the Morning.

We may reduce the Employments of Ants to three Divisions. 1. The Management of their Colonies. 2. Taking care of the Young. 3. And collecting Provisions. Each of which merits our Admiration.

The general Form of the Colonies and Texture of their Apartments, with the Manner of making them, have been already described. We are next to enquire, what other Particulars relate to

* According to the noble Period of *Solomon*. Go to the Ant thou Sluggard, consider her Ways, and be Wise, *PROV. 6. v. 5.*

† *Pliny* has mentioned the nocturnal Labours of the Ants, which he confines to Moonlight. *Operantur et noctu plenâ lunâ ; eadem interlunio cessant. Jam in opere qui labor? quæ sedulitas?* — *Plin. Nat. Hist. L. 11. cap. 29.* But, as far as I can observe, they make no Difference, except in Rain.

the ordering their Settlements after they are finished, and which return every Summer, and may be looked upon as a constant Part of the Ants Labours.

The Hill Ants collect a vast Quantity of Pieces of dry Sticks, Chips, Straw-Motes, and other Rubbish, which they carry to the Surface of their Colonies, and place together in Heaps. This Employment they renew every Spring, and continue through the whole Summer. It is not a little curious to observe from what Distances they will bring, and with what Dexterity manage, Sticks of an Inch or two in length. The Design of this Collection is, in some Measure, to guard against any Foreign Invasion; for as they are very fond of Basking in the Sun, they can, by this means, in a Moment withdraw out of Sight, and escape the Enemy. You may, in a fine serene Morning, see them, like a Swarm of Bees, on the external Part of the Rubbish; and they will on the least disturbance, with incredible Swiftnes, vanish and disappear. This Collection seems also to be of great Use in promoting the Maturity of the young Nymphs; Numbers of which you may, at the proper Season, find interspersed with the Rubbish. The Fierceness of the Sun-beams is, by such Interposition,

terposition, abated, and so duly qualified, as not either to scorch, or leave them without a just Degree of Warmth.

The common Yellow, small Black, and Red Ants, [at least such of them as inhabit Mole-Hills] have another Manner of disposing their Settlements. They gradually loosen the Earth by cutting it into small Particles, and carrying them to the Surface of the Hills; where they place them together in little Parcels, and thus in a few Weeks visibly heighten the Superficies. The small black Ants begin this Operation in *March*, the others not 'till *April*. The yellow ones, as being the most feeble and inactive of all, are, in this and many Circumstances, generally behind the rest. You may easily perceive the Progress of this Employment from the Increase of the fine Raspings of Earth, which appear fresh on the Surface, and every Day more or less in proportion to the Demands of the Colony. By this means the Ant-Hills are always kept open and spongy towards the Top; and as this Labour is repeated every Summer, we may esteem it one material Reason why, after some Years standing, many of the Hills grow to that prodigious Size as we see in many Places. The Quantity of Mold cast up each
Season

Season admits of great Difference, according either to the Number of Inhabitants, or Place of their Residence. They raise them from three or four Inches to half a Foot or more ; and hence you will in *June* frequently meet with such new-erected Colonies in Situations where some time before there was little or no Appearance of any. The red Ants seem particularly to delight in forming these Edifices ; which they begin the latter End of *April*, and perhaps not finish until *June*. The Manner of the Process is not incurious. They cut out the Earth into small Parcels and * incrust them with the Blades of Grass. As the Blades at this Part of the Year grow every Day, so the Ants advance their Works in proportion. By this Contrivance they present you, in a Month or thereabouts, with a Number of little Mounts half a Foot high. We may rather compare these Eminences to so many little Turrets or Obelisks ; for they decrease from the Base upwards, and sometimes terminate like a Cone. The Use of these Structures is to promote the Growth of the Vermicles, and forward the Metamorphosis of the Nymphs ; for you may find

* This Incrustation is not the same as mentioned cap. 2. for that refers to their subterraneous Apartments

abundance of them laid together and interspersed through the whole Building. The Workers remove them higher or lower as the Seasonableness of the Weather requires. This Kind of Architecture is slight, and therefore the Demolition of it is easy; however, without any great Accident it will last long enough to answer their Purposes. The Autumnal Rains reduce the Mounts to a narrow Compass, and almost level them to the Ground. Hence likewise other Ant-hills are depressed towards the Winter, which otherwise would in a few Summers be too Aspiring. It must be remarked that we are to limit this Operation to Ants which inhabit Mole-hills; such as reside under Stones, Pavements, in old Walls, or other Ruins have not an Opportunity of forming these Out-Works, and therefore are contented to dispose of their Young near the under Part of the Stones, and most commonly transfer them deeper, as it suits their Conveniency.

The next Part of the Ants Employments consists in taking Care of the Young. Under which Denomination it will be requisite to include the Eggs, Vermicles, Nymphs, and their Progress thence to Flies or Workers.

As soon as the Queen has deposited a Parcel of Eggs, the Workers take them under their Protection, and provide for their Process to Worms. They first of all brood over them in Clusters, and remove them to different Lodgments, either nearer to, or farther from the Surface, as a just Proportion of Heat and Cold, Dryness or Moisture Demands. When the Eggs have been changed to Vermicles for some Days, the common Ants distribute them into several Heaps, and carry each Division into a separate Apartment. For the first Season they grow sparingly, and therefore the common Ants are not at a great Expence of Trouble or Provisions in maintaining this Set of Worms. Their chief Business is to guard them against Hostility and excessive Rains, which they manage by keeping a sufficient Centry, and removing them to Places of greater Security. It may be proper to recollect, that in most Settlements there is a double Progeny of Young, so that the Labours of the Workers are not abated, but rather much encreased, by this slow and gradual Advancement of the Vermicles. They have, by this means, after the first Year, two Successions of Posterity under their Charge; however, by the wise Disposition it is so accurately ordered, as in no Way to Overbalance their

their Strength, or diminish their Affection. In the second Year these Vermicles, through all their strange Metamorphoses, become the chief Employment of the Colony. The Workers are now, almost without Remission, engaged in supplying their Exigencies, and forwarding their Growth. It is no less wonderful than curious to observe the busy Cares of these little but important Creatures. We may distinguish their Engagements, with reference to the Young, into three Particulars. 1. The Transferring them to various Parts of the Colony. 2. Giving them proper Sustainance. 3. And dismantling the Nymphs. Each of which Offices they perform with equal Assiduity, Constancy, and Exactness. The first returns every Morning and Evening, or more often, by Reason of the Alteration of Weather. The second continues all the Summer. The last attends the Change from Aurelia's to Ants. It is remarkable, that every Day, towards the Cool of the Evening, the Workers carry all their Young, whether Eggs, Vermicles, Nymphs, or tender Ants, into Cells remoter from the Surface; and every Morning nearer to it. What also may increase our Admiration, is to observe, that in this Transaction they regularly follow the Rising and Setting of the Sun. Thus when it rises and sets at Seven or later, they

they begin not their Removals 'till about Five in the Afternoon. When at Six or earlier, they are at Work between three and four, and so in Proportion as the Days vary in Length or Shortness. You may easily be convinced of this Fact by frequently taking notice of Settlements of Ants that reside under broad Stones. There is some Nicety required in the Experiment; because if you give any great Disturbance in elevating the Stones, or if you expose the Young to the Sun-beams, the Guards will immediately remove them out of Sight without Respect to Time or Serenity. If the Morning threatens Rain, or cold bleak Weather, the prophetic Ants forbear to bring up their Young that Day, as well knowing their Tenderness is unable to defend them against an inclement Sky, and the Rigour of the North. So wisely precautionous is this industrious Animal. Whether such as inhabit Mole-hills, or the above-mentioned Turrets, universally pursue this Scheme of Transferring the Young every Day, is not altogether so manifest. I have most Times of the Day and Night found abundance of Young in these Colonies, not a great way from the Surface, and for a considerable Period lying in the same Position. Perhaps in a settled Calm the new-cast Earth is a sufficient Protection, whereas the Coldness of the Stones may be injuri-

ous, and occasion Damps. However, in very unreasonable Weather they all withdraw the Young into lower Apartments.

The next and most laborious Exercise belonging to the working Ants, is feeding the Maggots or Vermicles. This Part of their Industry is the most uninterrupted of all, and from which nothing but Violence of Rains can tempt them to desist. They misemploy no Moment, but are restless in the Pursuit of proper Nourishment to succour the Family. You may see Troops going out in Search, and Numbers returning Home with Plenty of Provisions, which they bring to the Lodgments, and distribute amongst the Vermicles as Necessity demands. We cannot form a clearer Preception of their indefatigable Pains, than from a Calculation of a single Colony. If we suppose a Bank of Hill Ants to amount (which is a moderate Estimate) to six Thousand, they will have near an equal Number of Vermicles to maintain, and which are to be brought to Perfection in the Summer Months. Besides these, there is also the succeeding Years Progeny, which is, at Intervals, to be provided for. Moreover, the Queen, with her Attendants, and all the Workers themselves, require a great and repeated Supply. All which Considerations
swell

swell the Account of the Ants Labours, and highly justify the extraordinary Descriptions given of them by Variety of * Authors.

The Manner of their Feeding the Worms, and Diversity of Aliment, is worth Observation. The Juices of most Sorts of Fruits and Insects, with Honey, or any other delicious Liquid, are the Repast wherewith they choose to nurture them. These Juices the common Ants extract, and first convey into their own Alvus, and afterwards infuse them into the Bodies of the Vermicles. This Aliment, in all likelihood, undergoes some Refinement in the Repositories of the Ants, and being there meliorated, is properly tempered for the delicate Structure of the Worms.

The dismantling of the Nymphs is also an additional Task in reference to the Workers. This, indeed, is not a continued Scene; but, whilst it lasts, makes not a little Part of their Labours. The Tissues are strong, and Aurelia's numerous; wherefore a considerable Time, at Intervals, and a great deal of Trouble are employed in the Dissection. The peculiar Method and Periods of these Disrobements have been intimated in some preceding Paragraphs.

* *Virgil, Horace, Pliny, &c.*

We are, in the last Place, to treat of the third Part of their Employments, which relates to the End and Manner of collecting Provisions. And here we shall have great Occasion to renew our Wonder, and admire the wise laborious Ant.

It has been a Dispute amongst the Inquisitive on this Subject, whether Ants have Magazines or Granaries of Corn, and lay up a Stock of Provisions for the Winter. The * generality of Authors hold the affirmative, and have given us not less elegant than positive Descriptions thereof. The most remarkable and modern Account of this Sort is contained in an Extract of a letter published by the Members of the *French Academy*. Mr. *Addison* has favoured us with this Extract in the † Second Volume of the *Guardians*, and is pleased to observe, that the Narrative is of undoubted Credit

* Solomon, Pliny, Virgil, Horace, Aldrovand, Swammerdam, Nature Displayed, &c.

*Ore trahit quodcunque potest et addit aceruo,
Quem struit haud ignara ac non incauta futuri
Quæ simul inversum contristat aquarius Annum,
Non usquam prorepat et illis utitur ante
Quæsitis sapiens.*

Horace.

† *Guard.* VOL. 2. No. 156.

and

and Authority. It is there asserted that Ants have * Magazines, do lay up Corn, and despoil it of the † Bud, in order to prevent its growing. So nice and curious a Relation cannot but engage every Virtuoso to wish it true, and also make us extremely tender in contradicting a Point supported by such Credit, and so weighty a Declaration. As therefore the following Account is repugnant to it, I shall offer some Apology, that may tend to reconcile so unusual a Disagreement in Creatures of the same kind or Species.

Perhaps in this, as it has been observed in other Circumstances, the Difference of Climates might occasion a different Management. In warmer Regions the Weather is more favourable, and

* Thus also *Virgil*,

Ac veluti ingentem Formicæ farris acervum,

Cum populant, hyemis memores, tectoque reponunt,

Æn. 4. 402.

Semina arrosa condunt; ne rursus in fruges exeant è terrâ Majora ad introitum dividunt. Madefacta imbre proferunt atque siccant. Plin. Nat. Hist. L. 11. cap. 29. 30.

† This curiosity is also asserted by most Virtuosi.

Prov. 30. 34. The Ants are a People not strong, yet they prepare their Meat in the Summer.

Seasons

Seasons less severe; therefore Ants may not undergo that Chill which they do in *England*; nor consequently pass the Winter in a State of Numbness. If this Representation be true, it is obvious, that with regard to Foreign Ants, Magazines must be of great Utility and Service. The *Lilliputian* Race could not subsist without a proper Store of Food, to prevent Famine and expel Hunger. On the other Hand, our Northern Ants, like a Variety of other Insects, lie as it were entranced, and demand little or no Allowance in the colder Months. Such Granaries would therefore be to them useless and unprofitable. But, after all, upon an impartial Consultation of Authors, this Opinion seems rather to be supported by its Antiquity, than reduced to a clear Demonstration. If it may not be too adventurous to play the Critic with the above celebrated Extract, there is a short Paragraph which gives us Room to imagine the ingenious Philosopher had not brought the Point to an indisputable Certainty. “ * I make
 “ no doubt (says he) but they lay up Provisions
 “ against Winter. We read it in Holy Scripture.
 “ A Thousand Experiments teach us the same,
 “ and I don’t believe that any Experiment has
 “ been made to the contrary.”

* *Guard*. VOL. 2. No. 156.

But leaving this to be more evidently determined by Foreign Virtuosi, let us return to the Conduct of the *English* Ants ; and it will appear, from a repeated Series of Observation and Experiments, that our Ants do not lay up Corn or other Food against Winter ; have not Magazines peculiar to this Purpose ; but that, in reality, their unwearyed Diligence in collecting Provisions is chiefly carried on for the noble Design of maintaining Posterity.

Upon the most exact and frequent Examination of numerous Settlements in the Winter, I could never trace out any Reservoirs of Corn or other Aliment. Some of which, in all probability, would not constantly disappoint our Enquiries, if attended with any Precaution. The Earth, at this Season, is cemented by the Wet, and therefore does not prevent our Discoveries by crumbling. The several Apartments are very distinct, and Grains of Wheat are obvious to the Eye. Besides, it seems more difficult to trace out a single Queen encircled with her Attendants, than Granaries so well replenished.

If farther we recollect the Frame or Contexture of the common Yellow and small Black Ants,

G

their

their Strength will be found disproportionate to the Burthen. Their * Ligaments, Muscles and Saws are indeed exceeding strong, and the wise Ants have Sagacity enough to heave or carry any thing in the lightest manner. You may observe them most usually to take their large Vermicles, Nymphs, and young Ants towards the Center of Gravity, which by the Laws of Mechanics is the most easy and expeditious Method of removing a Body. However, it is not without some Difficulty they manage these; and as to Corn, its specific Weight is so great that it cannot but exceed the most romantic Force you will allow to any of the Yellow or Black Colonies.

If we next consider the Red Ants, which are much larger, and by their Formation better able to carry any Thing of Weight, there are some Circumstances which contribute to support what we have delivered. Their Settlements are small, and Apartments few; wherefore it is highly improbable to suppose nothing of that Sort should

* The famous *Leuwenhoek* observes, that Ants are not deficient of any Part necessary to the Life and Motion of the largest Animals; and that the Filaments of their Organs resemble those of an Ox,

have

have occurred to our Examinations. But I never could, upon repeated Searches, discover any Appearance of Corn or other Victuals in the Winter Season.

One might reasonably conclude the Hill-Ants (if any) to have repositories of Corn. They are far the largest of all the rest, and proportionably strong. They have, perhaps, sufficient Force not only to raise a considerable Weight from the Ground, but also to transfer a Wheat Corn, or other Grain, to some Distance. But, upon Examination of their Settlements, I never could find any Magazines or Collections of Food.

As little Success hath accompanied my Observations on the Jet Ants. Such a constant Scene of Disappointments led me to farther Experiments, which, was the supposition true, could not probably fail of succeeding.

At the beginning of Spring I placed in several Flower-Pots and other Conveniences different Colonies of Yellow, small Black, Red, and Hill Ants with their respective Queens, Attendants and Vermicles. They continued in this Position the whole Summer, Autumn, and Winter. They carried

on their Operations as in other Settlements. They formed Apartments ; nourished the Young, and brought them to Perfection. The Queens deposited their Eggs, and the Workers exerted their usual Care. From whence it is to be presumed, they should have laid up Provisions, had it been their Custom ; for it is remarkable of most Insects, that, if duly taken care of, they will, under proper Confinement, carry on their various Employments, and no ways deviate from their ordinary Instinct. In *October* and *November* I carefully examined some of these Flower Pots, by gradually removing the Earth, and searching the Lodgments ; but there was no Appearance of Magazines, Corn, or any Sort of collected Food.

As these Experiments gave me room to suspect our Ants have no Store-houses, for a fuller Conviction I frequently observed their Excursions from, and Returns to the Colonies ; and hence I could, with equal Pleasure, discern their inimitable Pains in quest of Provisions, and the different Sorts they brought Home. In the Spring and Summer Months Opportunities are seldom wanting for these Observations. Every Interval of fine Weather is employed in collecting Sustenance for themselves and Young. The most usual Forage they sought
after

after, was either the extracted Juices of Fruit and Insects, or the Insects themselves. They will also, with Eagerness, attack a Pot of Honey, Jar of Sweetmeats, or any pleasant Liquid that falls in their Way. In pursuit of such Aliment the busy Multitude spares neither Time nor Trouble. Some you may see going out in search, others returning Home loaded with an Insect, or distended with nectareous Juice. The former they carry in their double Saws; the other in their Bodies, where, as in Bees, are Receptacles fit to contain it. But I never observed any of them return with a Wheat Corn, or other vegetable Seed, which I think could not have happened, if they at all delighted in such Kind of Provisions.

To improve these Observations, I made use of the following Experiment. Having deposited several Colonies in Flower-Pots as above, I placed them in some Earthen Pans full of Water. By this Limitation they could not venture abroad without Danger of being drowned. When they had been accustomed some Days to this Imprisonment, I fastned small Threads to the upper Parts of the Flower-Pots, and extending them over the Water-Pans, fixed them to the Ground. The sagacious Ants soon became acquainted with the Contrivance.

vance. It was communicated to the whole Society, and in a short Time the Threads were filled with Trains of Workers, who ran up and down with a surprizing Dexterity and Swiftnes. The Experiment answered my Expectation; for I could hence easily discover the Progress of their collecting Provisions. Some of them might be seen climbing up the Threads with small Worms, Flies, or Pieces of larger Insects. Others, and indeed the greater Part, were distended with Juices; but none appeared with any Sort of Grain or Seed. If a Virtuoso has an Inclination to repeat this Experiment, I would recommend the small Black Ants; because they are extremely active, and seem well pleased in this narrow Confinement. The Red and Hill Ants are very apt, without a great deal of Caution, to remove their Quarters. The Yellow ones do not work so constantly, nor delight in Variety of Aliment. It is necessary to leave but one Aperture in each Flower Pot, otherwise too much Water will soak in and drown the Colonies.

There remains a particular Curiosity to be mentioned with regard to the Jet Ants, which not only deserves Admiration, but strongly tends to illustrate the preceeding Observations, and to show that Man is not the only Partaker of Wisdom.

dom. It is remarkable of these Ants, that in carrying on their Employments they Form so many Streets or different * Tracts as are proportionable to the Size and Situation of their Colonies. If the Inhabitants be very numerous, as it usually happens in this Species, they extend their Streets to a considerable Length, (Forty Yards or more) and the Number of them shall amount perhaps to four, besides several less Branches that strike off from the main Tracts. Sometimes there is but one, sometimes two or more grand Streets, besides the little Allies, all which frequently vary in Length. In these Paths the Workers continually make their Progresses to and from the Colony. And you may, with equal Pleasure and Certainty, observe the Variety of their Provisions, their Sedulity in seeking, and Method of bringing it Home. The † Tracts

* We find this Curiosity mentioned by the Antients, *Silices itinere earum attritos videmus; et in opere semitam factam*, Plin. Nat. Hist. Lib. 11. cap. 29.

By *Virgil's* Description they seem to be Ants of the same Species as Ours.

*It nigrum campis agmen, prædumque per herbas.
Convectant calle angusto,* Æn. 4. 404.

† *Pars agmina cogunt.
Castigantque moras: opere omnis semita fervet.*

Virg. Æn. 4. 406.

are every Moment thronged with Multitudes of industrious Ants ; we may (to compare little things with great) not improperly resemble them to the busy Concourse in the Streets of *London*,—a regular Confusion. Only with this Difference, that not a single Ant is unemployed, or deserves the Title of a Vagrant. All are engaged for the Public Emolument, without Envy, without Complaint. No other Strife, but who shall first return laden with Provisions to sustain the Young. A laudable Emulation ! They exert their Labours at the earliest Appearance of Spring, and continue them so long as the Smiles of *Autumn* give leave. Nothing but Severity of Weather interrupts their Processions. Amongst the many Curiosities this Scene affords us, the Opportunity we have of viewing their Diversity of Aliment is not the least. Numbers of them come Home either with the Spoils of Insects, or the Insects themselves. But far the greatest Part are distended with Juice. I never could discern any fatiguing themselves with the Carriage of Wheat or other Grain ; and how such a constant Delusion should arise, if they delighted in Corn, is not easy to conjecture. Their Manner of collecting Provisions is likewise a pleasing Amusement. Their Settlements are generally placed in the Bottom of a Tree somewhat decayed,

decayed,

decayed, and in whose Neighbourhood are other Trees more flourishing and verdant. Sometimes the Jet Ants prefer residing in a Garden Wall replenished with Fruit. The Tracts are so contrived as to pass along by such Trees as promise the most Nourishment. The Labourers make Excursions from their main Paths to the Trees, and having gathered what Forage they can meet with, return the same Way they came. In order to facilitate their Progress, they remove any Obstacles that lie in their Road, as Bits of Straw, Sticks, and other Rubbish; and also Bite off the Herbs almost even with the Surface of the Ground. Thus by their indefatigable Pains they suffer not the Grass to grow in the Streets.

To try the Extent (if I may so express it) of their Reason, and the Invariableness of their Forming these Works, I took the Opportunity of an exceeding Wet Day (otherwise their Activity will not permit) to remove a Settlement of Jet Ants to a different Situation. As soon as the Weather altered, they divided into three Parties, and within a Week formed so many Streets, which led from the Colony to several Fruit-Trees, whereon the Workers made Excursions, and collected Food. It was pleasant to observe with how much Nicety they

they polished their Tracts, by biting off the Blades of Grass, and carrying away the Rubbish. They continued in this Position above six Weeks, seemingly contented; but upon the falling of considerable Rains, which distilled into their Settlement, they changed their Quarters, and removed to a Place of greater Security.

To make some Discovery of the various Aliment they delight in, and likewise to be farther satisfied whether they have Granaries, I deposited, in a Number of Papers, many Different Kinds of Provision. In some, Grains of Wheat, Barley, Oats; in others, divers vegetable Seeds, as Lettice, Turnip, Parsley, &c. In some were placed Pieces of Apples, Pears, Plums, Figs, Peaches, and Nectarines; in others, Honey, Bits of Bread, Sugar; and in some, Ant Vermicles, Aurelia's, and a Quantity of Workers. Upon placing several of these Papers before the Colonies of each Species of Ants, it was observable that none, either of the Red, Jet, common Yellow or small Black Sort, ever pretended to remove any of the Corn or Seed, but with much Eagerness carried off the Insects, extracted the Juices of the Fruit, and seemed particularly fond of Honey. They also seized on the Ant Vermicles, if not of the same Species. I tri-

ed the like Experiment with the * Hill Colonies; and it was observable that sometimes they would transfer a Wheat Corn from the Paper, but always left it towards the Surface of their Settlements, and made no other Use of it than of the Straw-Motes and other Rubbish they collected together.

Upon frequently searching the small Black Colonies through the Summer Months, I found in abundance of their Apartment's several Pieces of Worms, Flies, and other Insects, and also a Number of Yellow Ants, which they had killed and placed in the Cells along with their Vermicles; but there was no Appearance of Corn, or Reservoirs designed merely for the Use of Provisions. The Insects were distributed in Lodgments furnished with Young, and the Labourers soon demolished them. The like may be often noted in Colonies of Red Ants; but at the Approach of Winter there is no Sort of Aliment to be traced in any of their Cells.

* This Species is very rapacious after the Vermicles and Nymphs of other Ants. If you place a Parcel before or near their Colonies, they will, with remarkable Greediness, seize and carry them off.

As this series of Experiments induced me to believe that none of our Ants have Granaries, or lay up Food against Winter, for a more evident Information I deposited several Lodgments of small Black, common Yellow, and Red Ants, with their respective Queens, under Glasses, without any Sort of Aliment but Water. They continued in this Confinement from *October* to Spring, and discovered no Symptoms of Variation from others that resided in their proper Colonies. It is necessary to give them a frequent Supply of Moisture, or they soon loose their Spirits and decay. If you deny them Water for some Time, and then drop a little into their Apartments, they will immediately surround and drink it with particular Expressions of Pleasure. I have preserved Ants in this Manner almost two Years, and never found any Alteration in their Appearance, or a Necessity of other Sustainance.

From repeated Success in these Experiments it seems highly probable, that *English* Ants have no Magazines for Corn, or require any other Food in the Winter than Water. In Excess of Cold they lie half benumbed, and at other Times are contented to regale themselves with the common
Moisture

Moisture of the Earth. The Customs of Foreign Ants may, in this and various Instances, deviate from ours. But, to speak impartially, Virtuosi have not brought their Accounts on this Head to any Degree of Certainty or Demonstration.

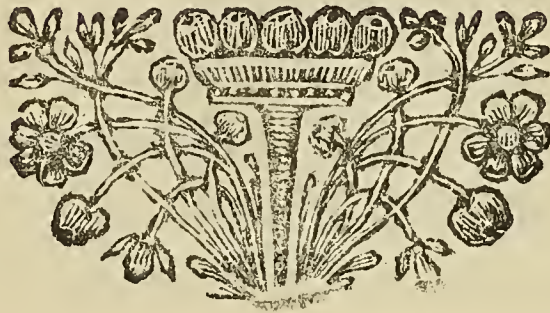
The most material Argument in Favour of Ant-Magazines is the Authority of the sacred Writings. *Solomon*, who, as in other Points of Wisdom, was likewise versed in the Arcana of Nature, has * twice mentioned these extraordinary Insects, and each Time with an immediate Reference to their Sagacity in providing for the Necessities of Winter. The learned *Mr. Ray*, *Mr. Derham*, and other Naturalists, are hence byassed to believe the Curiosity. If indeed we consider the superior Warmth of the Eastern Parts of the World, and of consequence the proportionable Clemency of the Seasons, it will not be improbable that the Oriental Ants should vary

* Prov. vi. 7. *Which having no Guide, Overseer, or Ruler, provideth her Meat in the Summer, and gathereth her Food in the Harvest.*

Prov. xxx 25. *The Ants are a People not strong, yet they prepare their Meat in the Summer.*

from

from ours in this and many other Respects. Or perhaps it might have been a received Opinion (as was the Sun's Motion) from whence this great Prince might recommend it as a worthy Example of Industry and Wisdom.



C H A P. IX.

*Reflections upon the final Cause, or Use of
of Ants ; with some other Curiosities that
have occurred to my Observations on this
surprizing Animal.*

TH E R E is no Point of Philosophy more difficult to resolve than final Causes, or the particular Ends designed by Providence in the various Parts of the Creation. We may look upon it as a Maxim, that infinite Wisdom has ordered nothing in vain, nor formed any Circumstance without a proper Use. The Knowledge of this is often beyond our Sphere, and what we are usually better able to conjecture than determine. If a Man of Letters views a fine Piece of Clock-Work, although he cannot explain the immediate Tendency of every Wheel, yet his Philosophy will dictate to him the general Plan, and that each Movement had its Province assigned by the ingenious Artificer. Thus in the wonderful Curiosities of Nature, if Reason cannot unfold, yet it is sufficient to convince us that all have their Purposes allotted them by the supreme Architect.

Accord-

According to the Son of SIRACH, * *a Man need not say, what is this, wherefore is that? for he hath made all things for their Uses.*

The chief and most obvious Design, hitherto discovered, of the noble Insect before us, is its being intended as Sustainance for many Species of Animals, but in particular for young Pheasants and Partridges. The tender Infancy of these Birds calls for an easy and delicious Repast, which is so happily contrived by the Disposition of Ants, as highly tends to exemplify the superior Wisdom and Beneficence of the great Creator. If we recollect the Period when their Vermicles begin to augment, their Progress, and the Metamorphoses they undergo, with several other Circumstances; and if we compare all this with the Contexture of Young Birds, and the Season when they make their Appearance, the Design will be no less conspicuous than wonderful. The Eggs of a Queen Ant, in a short Time after they are laid, transform to small Worms, and having continued in this Shape a Winter without any considerable Enlargement, in the Spring they increase every Day by the plentiful Nuture the Workers afford them. Towards *June*, all the Female and most of the

* Ecclesiasticus, xxxix. 21.

Male Vermicles, change to Aurelia's; and in the same Month variety of the feathered Race visit Life; nor, if the Summer be any ways favourable, are large Coveys of Partridges wanting to promise the Sportsman a delightful Season. As soon as the young Brood require Aliment, the fond Parent leads them to a Colony of Ants, where is a Table spread for their Entertainment, and furnished with a sumptuous Feast. The Settlement is now replenished with a Number of Male and Female Nymphs, a Sort of Food nicely adapted to their tender Stomachs. An Aurelia, upon dissection, appears to contain a liquid Humour or young Ant, than either of which nothing can be of a more easy Digestion. The soft Tissues that surround the Nymphs answer the End of small Pebbles, which probably, at first, would prove injurious and relax their Membranes. The Vermicles also, from the Multitude of Hairs that mantle them, are not so proper a Nourishment. Partridges go to feed about Ten in the Morning, and again at Four in the Afternoon, at which Periods the Aurelia's are interspersed near the Surface of the Hills, whereas earlier or later they are often removed into lower Apartments. It has been observed that towards the Spring the Workers begin to loosen the Earth, and continue this Operation

H

ration

ration thro' most of the Summer Months. This Management is also of great Service to young Partridges, who can hence, without Difficulty, scrape away the Earth and gratify their Hunger. A Covey that invited my Attendance last Season gave me an Opportunity of viewing the Delight they take in this Kind of Food. Upon my turning up a Colony, and withdrawing to some Distance, the affectionate Parents which frequented the Place led their young Offspring to the Hill, and lived in the midst of Plenty. After a few Days, they grew more bold, and would venture to feed within Twelve or Fourteen Yards of me. The Grass was high, by which means they wou'd, on the least Molestation, run out of Sight, and conceal their Young. The suitableness of such Food to Partridges may be also found from those bred under a Hen, which, if constantly supplied with proper * Ant-hills and fresh Water, seldom fail of arriving to Maturity. Such a Concurrence of Circumstances seems evidently to illustrate, that one Use of Ant-Colonies is to sustain the above-mentioned, and perhaps other Species of Birds

* Sir *Edward King*, recommends at Intervals a Mixture of Millipedes and Earwigs, which prevents their surfeiting on one luxurious Diet. *Lowth's Abridg. of Phil. Transact.* VOL. II. p. 7 and 9.

and Animals. So wisely has Providence ordered the several Ranks of Creatures, and consulted their mutual Advantage.

From this Use of Ants we may partly account for the Quantity of Male and Female Aurelia's to be met with in their Settlements. These, particularly the Female Nymphs, are a great deal larger than the Neutral, and so are better proportioned for Aliment. They are likewise more obvious to the young Partridges Eye, and not so easily carried away by the Workers, or concealed by any Mixture with the Dust. Great Numbers, indeed, escape their Enemies Searches, and transform to Flies. In this State they are again pursued by Variety of Animals, and become an agreeable Bait to delude the unwary Fish, and reward the Hopes of a patient Angler.

It may not be improper to remark, that the preceeding Paragraphs relate to the common Yellow Ants, and therefore do not altogether account for the final Cause or Design of the Others. The small Black and Red Colonies are very frequently to be seen in the open Fields, and disposed in the same Manner as the Yellow ones, but their Agility and Venom are Preservatives against the Ap-

proaches of young Birds or Insects. The Hill and Jet Ants are generally secured by the Places of their Residence. The Surface of the Trees defends their Progeny from foreign Attacks, and prevents their falling a Prey to voracious Enemies. These Species, in their Vermicular and Aurelia State, do not appear to lose many of their Young; and hence in such Colonies the Flies are exceeding numerous, which may perhaps be of great Service in supplying several Creatures with Sustainance. It may be noted, that at the Time when these Flies leave their Settlements, young Birds are nearly full grown, and their Stomachs, as they are better able to digest, may demand a stronger Aliment. There are undoubtedly other Ends, and probably more wonderful ones, answered by this Variety of Ants; but what they are, Philosophy has not discovered.

It may be mentioned as another and very important Use of Ants in general, that there is prepared from them, by Distillation, an * acid Spirit

* *Spiritus Formicarum*; their acid Smell refreshes the vital Spirits, and are said to cure the Lepra and Lentigo. *James's Medicinal Dictionary* VOL. 2.

and

and † Oil which are of considerable Service in the Art of Physick. Their ‡ Eggs, or rather, I presume their Nymphs, are likewise served up in Prescriptions, and esteemed beneficial in some Disorders. Thus nothing can escape the penetrating Eye of them whose honourable Profession it is to heal the Sick, and study the Health of Mankind.

Foreign Authors describe some particular Enemies, none of which, as far as I can observe, ever infest our *English* Settlements. Abundance of Creatures delight in this Food, but in all Appearance they are secure from the Stratagems of the * Ant Bear, ‖ Lion Pismire, or other sagacious
Insect

† Oil of it by Infusion good for the Gout and Palsy.
James's Med. Diet. VOL. 2.

‡ *Ova Formicarum* are effectual against Deafness, &c.
James's Med. Diet. VOL. 2.

* The *Tamandua* or *Ant Bear*, (as Mr. Ray acquaints us) hath a Tongue like a Lute String, and in some is more than two Foot long, and therefore lies doubled in a Channel between the lower Parts of the Cheeks. When hungry, they thrust forth this Tongue being well moistned, and lay upon the Trunk of Trees, and when it is covered with Ants suddenly draw it back into their Mouths. If the Ants lie deep in the
H 3 Ground,

Insect of this Kind. I have kept a * Mole Cricket in the Summer Months upon Ant Nymphs and Vermicles, but it did not offer to seize any of the Workers.

It is observable of Ants, that no Insects but young Millepedes are permitted to reside in their Apartments. These are plentifully intermixed with the Workers in every Cell, who no ways incommode, or endeavour to drive them out. Numbers of other Insects lodge around and towards the Surface of Ant-hills, and particularly abundance of Earwigs. This Disposition affords Partridges and other Animals a grateful Variety, and, according to Sir *Edward King's* Recommendation, shews the Advantage of supplying House-Coveys with such Insects.

Ground, they dig up the Earth with their Claws, with which their Forefeet are armed for that Purpose. *Ray on the Creation.* p. 142.

|| Called by Virtuosi, *Formicaleo*; by the Greeks *μυρμηκολέων*, *Leo formicarius*, *Animal parvum Formicis insidians*.

* Or *Gryllotalpa*. You may see a Description of these Insects, with their Stratagems to delude Ants, in *Nat. Display'd*, VOL. I. Dial. 8.

As there are many Curiosities in reference to Ants which escape our Observations, so are there others that may not easily admit of a Solution; but however for their Singularity deserve not to be past over in Silence.

It is remarkable of common Yellow and Hill Settlements, that you will find two Sizes of Workers in most of them. The larger exceed the less about one Part in three; but there is no apparent Difference as to Contexture or other Circumstances. They are mutually interspersed all over the Colony, and carry on the same Offices of Labour and Employment. They equally make up the Number of the Queens Attendants, and express the like Solitude to her Eggs and their Process. You seldom meet with this Difference amongst the rest; and what may be the particular Use designed thereby in the above Species is a Secret that eludes our Searches.

The Red and Hill Ants have a very odd and diverting Curiosity belonging to them. You may frequently perceive one of these Ants run to and fro with a Fellow-Labourer in his Forceps of the same Species and Colony. It appeared at first in the Light of Provisions; but I was soon undeceived

by observing that after being carried for some time, it was let go in a friendly Manner, and received no personal Injury. This Amusement, or whatever Title you please to give it, is often repeated, particularly amongst the Hill-Ants, who are very fond of this sportive Exercise.

The Red Colonies are the only ones I could ever observe to feed on their own Species. You may frequently discern a Party, from five or six, to twenty, surrounding one of their own Kind, or even Fraternity, and pulling it to Pieces. The Ant they attack is generally feeble, and of a languid Complexion, occasioned, perhaps, by some Disorder or other Accident. This Species is, in many Instances, the most daring and venemous, as Experience will teach any that presume to discompose their Settlements. We may from their bold and resolute Qualities imagine the * Ants
trans-

* *Jupiter* being enamoured with *Ægina* the Daughter of *Asopus*, to conceal his Passion from *Juno*, transported her into the Island *OEnopia*, where she was delivered of *Æacus*, who altered the Name of the Isle, and gave it that of his Mother *Ægina*. *Juno* discovering the Intrigue, to satiate her Revenge depopulated the Island of its Inhabitants by a Pestilence. Afterwards

transformed by *Jupiter*, at the Request of *Æacus*, into Men, were of this Species; a poetical Fiction which gave Birth to the Race of Myrmidons. They are, however, very sollicitous and careful of their Young, nor pretend to demolish any of the Vermicles or Nymphs that belong to their own Colonies.

It is a Question in what manner Ants transplant themselves, and form new Settlements. The Conduct of Bees in this Respect is obvious. But whether a Queen Ant, when a Colony is overfull, with a Set of Attendants, seeks a new Habitation, or what other Method they pursue, is a Point my Observations have not determined.

It is a Suspicion amongst Virtuosi, whether Ants are præjudicial to Fruit, and make it any Part of their Aliment. I am sorry my Partiality towards this curious Insect cannot engage me to wards, on the Petition of *Æacus* for a new Set of Subjects equal in Number to a large Colony of Ants in the Neighbourhood of his Palace, *Jupiter* changed the Ants into Men, and *Æacus* gave the new People the Name of *Myrmidons* from *μυρμύς*, an Ant. *Ovid Met.* L. 7. Tho' we must be so candid to allow that *Ovid* gives them the Colour of Black.

plead

plead its Innocence. Extracted Juices, it is certain, are the Nourishment Ants choose to give their Vermicles, and for their Advantage they will venture to despoil the delicious Apricock, Fig, or other luscious Fruit. The Myrmidonian and Jet Settlements are particularly delighted with Juices, and may therefore be looked upon as Enemies to a Garden. It must, at the same time, be allowed, by way of Apology for them, that in a great Measure they atone for their Mischief, by destroying a great Quantity of blight Worms and other Insects, that devour the Leaves, and by this means often kill many Fruit Trees, Flowers, and Shrubs. If to this we add the Service they are of in supplying a Number of Animals with Nurture, and the Sportsman with Game, we may reasonably indulge them the moderate Use of our Gardens.

It is usual with Farmers to make Choice of the colder Months to destroy Ant-Settlements. They commonly manage it by digging up the Hills and exposing them to the Winter Air, or placing them together in Heaps and burning them for Manure. Either way seems, at first, sufficient to depopulate the Fields, and answer the Husbandman's Design. But if we recollect that at this Part
of

of the Year a Queen Ant lies exceeding deep (* generally two Feet from the Surface of the Hill) we shall not wonder to find, after a few Seasons, the same Colonies appear again. The Labourers seldom go farther than half a Spit from the Level, and therefore leave the Queen to multiply her Offspring with Cells of Neutral Ants or Workers, enough to provide them Sustenance. The Summer Months are more effectual for this Purpose. The Queens are now in the upper Apartments. If therefore you place a Quantity of Hills together and burn them, you will, in all probability, commit a Number of Queens to the Flames, and thus proportionably lessen their Colonies and clear your Grounds.

It has been observed, that if you remove a Queen Ant from her Settlement, the Workers will carry on their several Employments, and nourish the Young with their usual Sollicitude, nor any Ways regard their Sovereign's absence. As the Progeny of Ants is intended by way of Food, we may imagine Providence has ordered it in this Manner, that in Case of any Accident to the Queen, there may be no Diminution of the

* If the Winter be exceeding wet they lie not so deep. See p. 17.

Young, which are so serviceable to a Number of Creatures.

Many are the moral Instructions arising from the Sight of a Colony of Ants ; with a few of which it may not be impertinent to close this Account. Their surprizing incredible * Affection towards the Young, might teach us to value Posterity and promote its Happiness. The Obedience they pay their respective Queens might read us a Lecture of true Loyalty and Subjection. Their incessant Labours may serve to enliven the industrious, and shame the lazy Part of Mankind. The unanimous Care exerted by each Colony for the common Emolument, might let us know the Consequence of Public Good, and tempt us to endeavour the Prosperity of our Countrymen. From their Œconomy we may learn Prudence ; from their Sagacity Wisdom. If, lastly, we call to Mind the infinite Curiosities that distinguish a Settlement of Ants ; the Form and Structure of the common Workers ; the glorious Character of the Queen ; the strange unparalleled Circumstances that attend

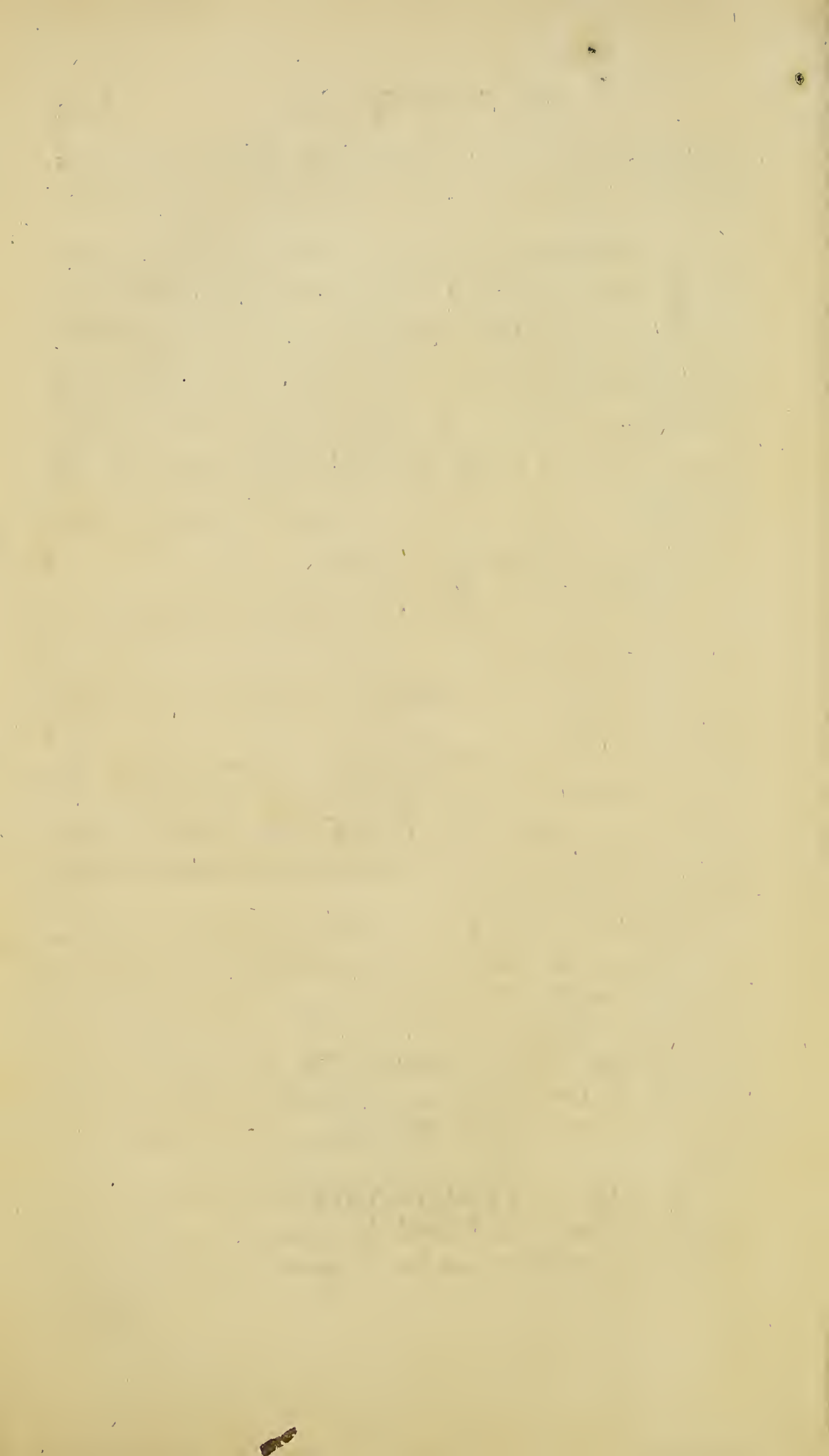
* *Incredibili Progenē et curâ Formicæ educant, summamque dant operam, ne vel tantillum quod spectet eorum Vermiculorum educationem atque nutritionem omittant, &c. Swamm.*

the Flies; the many stupendous Metamorphoses of the Young; the different Species, and particular Use they answer in the Scale of Beings; we cannot but extol the Majesty of God, who has arrayed the Universe with so much Beauty, and embellished each Part of it with such a Scene of Wonders. * *Great is the Lord and marvellous, worthy to be Praised; there is no End of his Greatness.*

* Psalm CXLV. 3.

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