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ROYAL SOCIETY OF TASMANIA.

PAPERS AND PROCEEDINGS, 1918.

CONTENTS.

PAPERS & PROCEEDINGS

OF THE

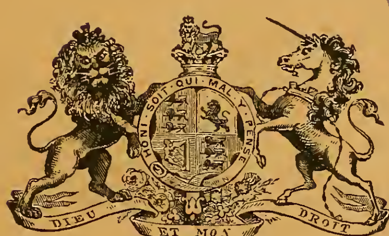
ROYAL SOCIETY

OF TASMANIA

FOR THE YEAR

1918

With 14 Plates.



ISSUED APRIL 1st, 1919.

PUBLISHED BY THE SOCIETY.

The Tasmanian Museum, Argyle Street, Hobart.
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The responsibility of the statements and opinions in the following papers and discussions rests with the individual authors and speakers; the Society merely places them on record.

Printed at "The Mercury" Office, Macquarie Street, Hobart.

THE ROYAL SOCIETY OF TASMANIA

The Royal Society of Tasmania was founded on the 14th October, 1843, by His Excellency Sir John Eardley Eardley Wilmot, Lieutenant Governor of Van Diemen's Land, as "The Botanical and Horticultural Society of Van Diemen's Land." The Botanical Gardens in the Queen's Domain, near Hobart, were shortly afterwards placed under its management, and a grant of £400 a year towards their maintenance was made by the Government. In 1844, His Excellency announced to the Society that Her Majesty the Queen had signified her consent to become its patron; and that its designation should thenceforward be "The Royal Society of Van Diemen's Land for Horticulture, Botany, and the Advancement of Science."

In 1848 the Society established the Tasmanian Museum; and in 1849 it commenced the publication of its "Papers and Proceedings."

In 1854 the Legislative Council of Tasmania by "The Royal Society Act" made provision for vesting the property of the Society in trustees, and for other matters connected with the management of its affairs.

In 1855 the name of the Colony was changed to Tasmania, and the Society then became "The Royal Society of Tasmania for Horticulture, Botany and the Advancement of Science."

In 1860 a piece of ground at the corner of Argyle and Macquarie streets, Hobart, was given by the Crown to the Society as a site for a Museum, and a grant of £3,000 was made for the erection of a building. The Society contributed £1,800 towards the cost, and the new Museum was finished in 1862.

In 1885 the Society gave back to the Crown the Botanical Gardens and the Museum, which, with the collections of the Museum, were vested in a body of trustees, of whom six are chosen from the Society. In consideration of the services it had rendered in the promotion of science, and in the formation and management of the Museum and Gardens, the right was reserved to the Society to have exclusive possession of sufficient and convenient rooms in the Museum, for the safe custody of its Library, and for its meetings, and for all other purposes connected with it.

In 1911 the Parliament of Tasmania, by "The Royal Society Act, 1911," created the Society a body corporate by the name of "The Royal Society of Tasmania," with perpetual succession.

The object of the Society is declared by its Rules to be "the advancement of knowledge."

His Majesty the King is Patron of the Society; and His Excellency the Governor of Tasmania is President.

ROYAL SOCIETY OF TASMANIA.

PAPERS AND PROCEEDINGS, 1918.

CONTENTS.

PAPERS

OF THE

ROYAL SOCIETY OF TASMANIA

1918

OBSERVATIONS REGARDING ACCUMULATED CAPITAL WEALTH.

By R. M. Johnston, I.S.O., F.S.S.

[Received 18th February, 1918. Read 11th March, 1918.]

Improper Exclusion of Man (The Wage-earner) as a Value-earning Instrument of Production, in Estimates, Usually Made, of Accumulated Capital Wealth.

By the greater number of writers on economic subjects, the terms "Capital" and "Accumulated Capital Wealth" are usually restricted to man's auxiliary forces and instruments of production. This unreasonable restriction involves the introduction of serious difficulties and inconsistencies when questions arise bearing upon the production, distribution, and appropriation of the annual supply of consumable wealth necessary to sustain the life, comfort, and well-being of the people generally.

The improper restriction of the elements, which should be embraced under the term "Wealth" of a country, is well illustrated by Mr. J. A. Jobson, M.A., in his recent treatise, "The Science of Wealth." In describing the meaning attached by him to the term "Wealth," he observes:—"When we think of 'a wealthy man,' we reduce to terms of money all his saleable possessions, including not only the lands, buildings, machinery, materials, cash, he owns and employs for business purposes together with the share certificates, and other paper documents, which give him claim upon the products of the future, but also his house-furniture, pictures, books, and other private possessions which he has no intention of selling. All have their market value, and his 'wealth' is the sum of these values."

It seems, however, by this restriction that—excepting man as a slave—man, himself the most important of all wealth-earning instruments of production, has been ignored entirely.

A

From a true economic point of view, there can be no justification for the exclusion of man, "the wage-earner," from the category of those things "which give (valid) claim upon the products of the future."

There cannot be any doubt but that man, free, and owned by himself, should be a far more effective value-producing instrument than the average bond-slave owned by another. Yet those who take a restricted view of the elements which go to form the aggregate of "accumulated capital wealth" exclude the free "wage-earner," who, undoubtedly, is also the more effective economic producing machine, not because his life expectation value of average annual earnings would fail to afford him indisputable "claim upon the products of the future"—but, merely, because he, as a productive machine, happened not to be owned by another person, as in the case of a slave, horse, or steam-engine.

The untenability of the standpoint of those who exclude the free wage-earner as an important instrument of production is at once obvious if we could conceive of a nation suddenly overpowered, and reduced to the condition of an enslaved community. If this occurred, the nation's nominal accumulated wealth would be at once marvellously increased. At the same time, its real accumulated capital wealth would, in all probability, have shrunk in value.

The mere expenditure of a year's labour—time, energy, and skill, by man—the greatest of all economic instruments of production, no more destroys the whole of his life's capital energy value, as an economic producing instrument, than can a single year's tear and wear wholly destroy the remaining capital value of his, often shorter-lived, inanimate tools and instruments of production. If the still unexhausted producing power of the latter be assessed as having a "present capital value" based on their estimated years' life of annual revenue-yielding power, it is, surely, reasonable to infer that "man" the major revenue-yielding instrument of production—with a life-expectation practically interminable (as regards the ever-continuous State breadwinner) should also be assessed on the same basis, as an element—indeed the principal one—of the real accumulated capital wealth of a State at any point of time.

We may be assured, therefore, that when we regard real things, and real necessary services—which, in the very act of consumption, compose and satisfy all the needs and satisfactions of human life, the conclusion is, surely, inevitable—that man himself as the chief element of instrumental production, must also be regarded as the principal element of accumulated capital value. Man's auxiliary natural forces and instruments of production (the lesser element of accumulated capital value generally composing about 19 to 25 per cent. of the whole) cannot reasonably have a better claim to be included in any estimate determining the accumulated capital value of any country.

Whether as a freeman owned by himself or whether as a slave owned by some other person, man, from an economist's point of view in the initial stage—like all other natural elementary or primary forces—is regarded as devoid of economic price or value. Yet, like all other elementary substances or forces, as soon as the cost of man's labour is incorporated in man (regarded as an economic instrument of production) he becomes an element of economic price or value like any other commodity or production machine.

The existing 82,441 breadwinners of Tasmania regarded, from an economist's point of view, as the most important as well as the most costly part of the economist's instruments of production, both produce and expend upon themselves and their dependents about 7½ million pounds sterling per year. Regarded as an interminable annuity, at 4 per cent., it represents a present value capital of £179,906,075.

But this capital value cannot altogether be set down to the credit of the existing breadwinners, for the following important reasons:—

In the independent stage—from birth to the average age limit of the dependent breadwinner—say, on the average, at least a period of 15 years—anterior-labour services of parents or natural guardians were expended upon the young future breadwinners, in the form of protection, shelter, food, clothing, education, etc., which (for a period of 15 years, say, at £18 per annum, at 4 per cent. interest) would accumulate to a sum of £360, as an element of capital value, which, logically, must be assumed as being incorporated in the existing 82,441 Tasmanian breadwinners, regarded in the light of economic productive instruments. In the aggregate this amounts to £29,678,760 of present capital value now incorporated in the breadwinner economic instruments of production which, logically, must be credited to "the anterior-labour service of man."

Adam Smith, in commenting on the "Errors of M. de Quesnai's System," observes:—

> "The capital error of the system seems to lie in representing the class of artificers, manufacturers, and merchants, as altogether barren and unproductive.
>
> "The following observations may serve to show the impropriety of this representation.
>
> "First, this class, it is acknowledged, reproduces annually the value of its own annual consumption, and continues, at least, the existence of the stock or capital which maintains and employs it.
>
> "Secondly, it seems, upon this account, altogether improper to consider artificers, manufacturers, and merchants, in the same light as menial servants. The labour of menial servants does not continue the existence of the fund which maintains and employs them. Their maintenance and employment is altogether at the expense of their masters (?) and the work which they perform is not of a nature to repay that expense."

It seems strange that an economist, so eminent as the author of "The Wealth of Nations," should have failed to see that the menial's personal service referred to was—as a product—directly absorbed and enjoyed by the masters—not in the relation of master to servant, but rather as consumers of services of a definite economic value. In the differentiated condition of the modern system of organised labour, it is rarely the case that the primary raw materials, upon which the particular worker or factory is engaged, happens to pass directly—as in the case of the menial's personal services—in a finished condition to the consumer. On the contrary, the raw material, in most cases, passes through many hands, and many stages of transport, modification, and improvement, before it attains to the completed condition of the consumer's marketable commodity.

In the latest of all the stages and processes of the commodity or personal service, is accumulated the composite cost of all its previous stages of production, transport, and modification. At this final stage, when passing over to the consumer, the latter pays the cost of the services of all the productive agencies which, stage by stage, accrued and became incorporated in the final marketable stage of the specific commodity or service.

But it is important to observe that in the act of consumption, whether of a valuable commodity or a valuable personal service, the consumer destroys or annihilates the commodity, per se, with its economic monetary value, transforming a costly product into one of the necessary satisfactions or enjoyments by which the life of man is sustained, and without such final absorption of costly but necessary wants, life would not be possible.

By looking at the whole question in this light, it would seem to be true that the last stage of any completed commodity is placed in the same position as the last stage in the completion of a necessary and valuable personal service, so far as Adam Smith's test of barren and unproductive services is concerned. In this aspect of the question, all the services of primary producers, artificers, manufacturers, and merchants, do not really differ, essentially, from that of "menials," nor from each other, inasmuch as all values of commodity products, in common with personal service products, cease to exist when absorbed, dissolved, or transformed, into the benefits, satisfactions, and enjoyments involved in actual consumption. The actual realisation of the enjoyment of the needs and satisfactions of life, involved in the very act of consumption of valued products, is, in itself, the alpha and omega of real wealth. All money or other values related thereto are mere measurements of this wealth of consumption.

It is the instruments of production—human labour and its auxiliary aids (kept up to pristine value, by renewals, repairs, and fresh creations)—which permanently continue to retain monetary value—not the perishable products, per se, actually appropriated and dissolved in annual or periodical consumption.

This end is, truly, the great object, as well as the motive, of all human producing effort.

The annual value of "Consumable Wealth" only represents about 4 per cent. of the nominal capital wealth of a country.

The former represents the actual wealth produced available for use or consumption within the current year; the latter represents the estimated nominal present capital value of the future productions of exchange value.

No matter how great may be the estimate of the present capital value of "claim on future productions," only about one-twenty-fifth of its value, of actual products, can be appropriated or absorbed within any one year.

The following tabular extracts from "The Statesman's Pocket Year Book of Tasmania, 1917," may better indicate the comparative nominal values of present capital value of production as compared with the annual value alone available for the current year's consumption. No mere readjustment of ownership of claim or right to the existing instruments of production can increase the volume or value of the current year's wealth of production available for consumption.

TASMANIA.

THE STATE WEALTH-PRODUCING MACHINERY AND FORCES.

Estimated Value, Year 1914.

	Annual Value.	Capital Value.	Per cent.
I.—Private Ownership*	(£1000)	(£1000)	%
Real Estate...	1246	31,146	14·24
Mining Plant, etc....	136	3400	1·55
Livestock	90	2259	1·03
Furniture, etc.	80	2000	·92
Railways and Tramways...	53	1330	·61
Factories' Machinery	46	1161	·53
Coin and Bullion	32	790	·36
Shipping	10	250	·11
TOTAL	1693	42,336	19·35
II.—Public Ownership*			
Railways and Tramways	177	4423	2·02
Roads, Harbours, etc.	200	5015	2·30
Lands, Buildings, etc.	117	2914	1·33
TOTAL	494	12,352	5·65
III.—Human Instruments (Self-owned) Potential Value of Labour-time and Skill of 82,441 Breadwinners n.e.i. ...	6563	164,060	75·00
GRAND TOTAL	8750	218,750	100·00

* The somewhat misleading title "Accumulated Wealth," unfortunately, is usually restricted to the Groups I. and II.

TASMANIA.

CONSUMABLE WEALTH DISTRIBUTION, YEAR 1914.

Estimate showing approximately how the Value of Annual Wealth Produced is Appropriated and Absorbed by the various classes of Breadwinners, and by Man's Auxiliary Instruments of Production.

Description.	Bread-winners	Real Wealth Absorbed.		
		Amount.	Per cent.	Per Bread-winner per Labour Day.
(A) Breadwinners' Incomes - Class—	No.	(£1000)	%	s. d.
I. Under £80	62,144	3800	43·43	4 1
II. £80—£150	12,988	1474	16·84	7 7
III. £150—£400	6063	1223	13·98	13 5
IV. £400—£1000	1000	476	5·43	31 9
V. £1000 and over	246	223	2·56	60 4
TOTAL II.—V.	20,297	3396	38 81	11 2
Total Breadwinners ...	82,441	7196	82·24	5 10
(B) Man's Auxiliary Instruments of Production ...	...	1554	17·76	1 3
GRAND TOTAL	82,441	8750	100·00	7 1

Tasmania.

CURRENT "STANDARD OF LIVING."

Estimate of the Nature and Approximate Annual Cost of the "Standard of Living" of the People, 1914.

Description.	Total Amount	Per Head of Population.			Per cent.	Equivalent Labour Days.
A.—By Human Agents and Dependents—	(£1000)	£	s	d.	%	No.†
Food	2890	14	14	11	33·03	99·1
Clothing	796	4	1	3	9·10	27·3
Dwellings	1018	5	3	10	11·63	34·9
Fuel and Light	283	1	8	10	3·23	9 7
Medical Services	206	1	1	0	2·35	7·0
Education	166	0	16	11	1·90	5·7
Protection	101	0	10	5	1·15	3·5
Charities	103	0	10	6	1·18	3·5
Spirits and Tobacco ...	913	4	13	2	19·44	31·3
All other	720	3	13	6	8·23	24 7
Total	7196	36	14	4	82·24	246·7
B.—By Man's Auxiliary Instruments and Forces	1554	7	18	7	17·76	53·3
	8750	44	12	11*	100·00	300·00

No. of Breadwinners, 82,441. Total Number of Labour Days, 24,732,300.

* Per Breadwinner, £87 5s. 9d.

† Per Average Breadwinner.

NOTES ON THE DISCOVERY OF A NEW FOSSIL FRUIT FROM THE DEEP-LEAD TIN DRIFTS AT DERBY, TASMANIA.

By R. M. Johnston, I.S.O., F.S.S.

[Received 4th March, 1918. Read 11th March, 1918.]

On my last visit to the Briseis Mine workings, at Derby, the mining manager, Mr. Lindesay Clark, kindly guided me over the various alluvial tin-bearing sections now being sluiced by powerful hydraulic force.

The formation in which the fine alluvial occurs at suc cessive levels consists of white clayey sediments of an ancient lake-like river-course, generally overlaid by a thick layer of olivine-basalt.

Among the successive alluvial tin-bearing layers of the 60 to 70 feet of clays, underlying the basalt, lenticular patches of lignite frequently occur, where, as in the ligneous clays of the auriferous deep-leads of Beaconsfield, they are associated with fossil leaves, twigs, and fruits, now regarded by me as of Eocene age, and contemporaneous with the fossil vegetable remains found abundantly intermixed with the marine fossils of the Eocene age at Table Cape.

On the basis of the percentage proportion of extinct to living forms the marine beds at Table Cape are now generally assigned to the earliest Eocene period.

I have always been confident that if the lignites of the Briseis deep-leads were carefully examined after sluicing operations, that fossil fruits would be found. The discovery of such fruits would then enable us to determine, with confidence, the true relation of these older alluvial tin-drift deposits to similar lignitic clays of the same character, underlying the older olivine basalts, in areas occupied by the sediments of the numerous old Tertiary lake basins, as at Macquarie Harbour, Mount Bischoff, "old lake of the Derwent," Launceston Tertiary lake basin, and elsewhere.

The recent discovery, by Mr. Lindesay Clark, of a large lignified fossil fruit (closely resembling and possibly allied to Plesiocapparis prisca, F. von Mueller—occurring in probably the lowest layers of the oldest auriferous deep-leads, at Haddon, Victoria), is most important, as it affords satisfactory evidence in determining the relationship and geological horizon of the deep layer of the stanniferous drift where the fruit was embedded.

The following description of the new species of fossil fruit, together with photographic views of various sections of the same, will be of much interest to palæontologists:—

CARPOLITHES (PLESIOCAPPARIS) CLARKII, nov. sp.

Fruit lignified, roundly ovate, indehiscent, about $2\frac{1}{4}$ inches long, and 2 inches broad, when freshly removed from the moist lignitic clay.

The lignified pericarp is soft and plastic, and may be cleanly sliced with a sharp razor, when freshly removed from the moist lignitic clay in which it had been embedded; but after removal dries quickly, contracts and becomes hard, distorted, and brittle, exhibiting deep cracks or fractures. The pericarp is, relatively, very thick, measuring five-eighths of an inch, or nearly one-third of the total diameter of the fruit. The cavity is depressedly globular, measuring about 1 inch, in its vertical diameter, and $\frac{3}{4}$ of an inch, transversely. When the pericarp was opened, in the line of one of its principal fractures, the whole cavity appeared to be filled with a series of closely compressed, concavely laminated, wing-like seeds. These wing-like seeds filling the whole cavity are minutely striated longitudinally, and closely enfolded in curved shell-like layers. There were no distinct protuberant portions discernible on the winged seeds such as shown in figs. 11, Pl. VI. (F. von Mueller's Observations on New Vegetable Fossils of the Auriferous Drifts, Vol. I., Geol. Survey of Victoria), under the specified name of Plesiocapparis prisca, F. von M.

The external surface of the pericarp is microscopically verrucose and much less pronouncedly rugose as compared with the pericarp surface of P. prisca.

The specific name of the new species of fruit from the Briseis Mine is given in honour of its discoverer, Mr. Lindesay Clark, the mining manager.

ON A PYCNOGONID OF THE GENUS *HALOSOMA*, From New South Wales,

by

PROFESSOR T. THOMSON FLYNN, University of Tasmania.

[Received 30th May, 1918. Read 10th June, 1918.]

(Pl. I., figs. 1-6.)

1. INTRODUCTION.

Being engaged on a re-examination of the holotypes of Australian Pycnogonida described by Haswell in 1885 (1) I have found it necessary to supplement the material available by collecting at the localities mentioned in Haswell's paper. During one of these excursions recently to Shark Island, Port Jackson, I obtained a Pycnogonid which could without any difficulty be referred to the genus *Halosoma* defined by Cole in 1904 (2). I have, therefore, taken the opportunity of describing this new species, and of discussing the position of the genus *Halosoma*.

Shark Island is a small islet a few miles from the entrance to Port Jackson, and its little coast presents the main ecological features which have been so excellently described for Port Jackson by Hedley (3). This author points out that in the sheltered parts of Port Jackson between tide marks the rocks are plastered with a more or less thick layer of rock oysters (*O. cucullata*, *Born.*). This layer becomes exposed at ordinary low tides. Deeper than this, and only usually seen at the very lowest tides, is a zone occupied by mussels (*Brachyodontes hirsutus*). At that island this region of mussels is by no means continuous, but is, nevertheless, well represented. The various nooks and crannies between the mussels serve as lurking places for many unique and rare forms, and it is in this position that the single male specimen of *Halosoma* was found. It is easily overlooked on account of its extremely small size. Nevertheless there is no doubt that further detailed search would lead to the discovery of fresh specimens.

2. Genus HALOSOMA, Cole, 1904.

Halosoma, Cole. Harrim. Alask. Exp., Vol. X., Crust., 1904. Pl. XIV., fig. 11; pl. XXIV., figs. 6-8; pl. XXV., figs. 1-4.

The genus *Halosoma* was based by Cole in 1904 on a single female specimen of *H. viridintestinalis* from Dillon's

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(1) 1885 Haswell, W. A. Proc. Linn. Soc., N.S.W., Vol. IX., p. 1021.

(2) 1904 Cole, L. J. Harriman Alaska Expedition, Vol. X., Crustacea, p. 286.

(3) 1915 Hedley, C. Presidential Add. Proc. Royal Soc. N.S.W., Vol. XLIX.

Beach, California. It is very closely related to both *Phoxichilidium* and *Anoplodactylus*, more closely to the latter than to the former. *Halosoma* differs from these genera, as Cole shows, in its greater concentration producing a stouter trunk and closely approximated lateral processes; further, in the moderate development of the neck it is intermediate between the two genera mentioned. In his definition of the genus, Cole describes the second tarsal joint (propodus) as possessing a well expanded spinous heel and "a thin chitinous knife-like ridge along the sole," a well developed claw and minute auxiliary claws.

The position of Cole's genus has been considered by Loman (4), who comes to the conclusion that *Halosoma* should be regarded as a subgenus of *Anoplodactylus*. This author gives a list of a number of Pycnogonida already described in literature which in his opinion should be included under *Halosoma*, viz.:—

Pallene lappa, Bohm, 1879.
Phoxichilidium exiguum, Dohrn, 1881.
Halosoma viridintestinalis, Cole, 1904.
Anoplodactylus anarthrus, Loman, 1908.

Without modifying in any way Cole's original definition of the genus, Loman shows that all the above enumerated species agree in the following points:—

(a) Arrangement of the special spines of the legs (a single spine at the distal end of the femur and of the 1st tibia, and one placed some little distance from the distal end of the 2nd tibia).

(b) Structure of the tarsus and propodus and their relationship to one another and to the large claw which is able to close up against the propodus like the blade of a penknife.

I am inclined, after consideration, to follow Cole in making *Halosoma* a separate genus.

The points in which *Halosoma* differs from *Anoplodactylus*—the particularly small size, the crowded nature of the crurigers (5), the tendency of the trunk segments towards coalescence, the feeble development of the neck, the particular arrangement of the spines on the legs, and the structure of the tarsus and propodus (all of which points are mentioned by Loman)—are sufficient, in my opinion, to characterise *Halosoma* as a distinct genus.

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(4) 1912 Loman. Bull. de l'Inst. Oceanog, No. 238, p. 6.

(5) Such expressions as "lateral processes," "lateral prolongations," etc., are to be regarded as descriptions rather than scientific terms, and I therefore suggest the use of the term "cruriger" to denote in a Pycnogonid the hollow process of the body wall to which the ambulatory leg is attached.

Of the examples mentioned by Loman, as coming under this genus, it should be noted that all except the genotype *H. viridintestinalis* agree in lacking auxiliary claws. It may later be necessary to amend the generic definition to include these species, but they should be first examined to verify their descriptions with regard to this particular character. The presence of auxiliary claws when very small was often overlooked by earlier writers.

The following emended definition of *Halosoma* is based on the characters exhibited by *H. haswelli* and *H. viridintestinalis.*

HALOSOMA, Cole (1904), emend.

Trunk rather stout, crurigers broad, more or less closely crowded, neck little developed, proboscis cylindrical or nearly so, large, issuing ventrally from the 1st segment. Chelifori well developed but slender, chelate. Palps absent. Ovigers, in female absent, in male 6 jointed, ultimate joint devoid of terminal claw or specially developed spines, much smaller than penultimate. Legs rather stout, propodus with expanded heel with a few large spines, sole with well developed spines. Claw well developed, auxiliary claws minute but distinct.

Genotype:—*Halosoma viridintestinalis*, Cole (1904).

3. Halosoma haswelli, sp. nov.

(Pl. I., figs 1-6.)

Description.—*Trunk* fairly broad, all segments united, sutural lines not distinct dorsally, but more distinct ventrally, first segment almost twice as long as second, crurigers in contact proximally, but diverging somewhat distally, crurigers about as long as broad; neck very short.

Ocular tubercle of medium length, rounded, shorter than caudal segment, placed mesially almost at anterior margin of first segment, apex pointing anteriorly; eyes large.

Caudal segment of medium length, longer than ocular tubercle, apex rounded, almost erect.

Proboscis large, almost cylindrical, arising from ventral side of first segment, extending forward and slightly downward, increasing slightly in diameter from base to apex; anterior end truncated, length about half that of trunk, slight circular constriction present near anterior end of proboscis.

Chelifori well developed, scape smooth, one jointed, projecting slightly beyond the end of proboscis, clavate;

chela well developed, suspended vertically in front of proboscis, palm swollen with immovable finger only slightly curved, movable finger external and much curved, the two fingers when opposed enclosing a considerable space and having ends of fingers slightly crossed. Each finger possesses on its inner edge a few minute but distinct teeth.

Palps wanting.

Ovigers 6 jointed, 1st joint short and square in surface view, being about as long as broad, 2nd and 4th joints longer and subequal, 2nd joint much wider than the 4th, which is much curved, 3rd joint is much the longest, being about twice as long as the 2nd; at about one-third the distance from its proximal end is a slight constriction indicating possibly the fusion of two joints; 5th joint is shorter than the 4th, the 6th is very small, much smaller than the 5th, with rounded apex; terminal claw absent, no compound spines are present, but a few simple ones occur on the last few joints. Egg masses simple rounded, one to each oviger.

Legs rather stout; 1st, 2nd, and 3rd coxæ small, the 2nd being the largest, proportion of lengths being approximately 5 : 8 : 6; femur a little shorter than coxal region, somewhat expanded at distal end with well marked spine at dorsal distal angle. 1st tibia about same length as femur, bearing a similar spine in a similar position; 2nd tibia slightly shorter than 1st tibia, bearing a dorsal spine about one-third the distance from its distal end; tarsus very small, squarish, but with a distally hollow surface for articulation with the propodus, tarsus provided ventrally with strong hairs, dorsally with a minute but distinct spine; propodus stout and curved, longer than 2nd tibia, possessing a well-marked heel armed with two strong and several smaller spines, sole provided with a number of spines with tips strongly bent outwards. The chitinous knife edge, mentioned by Cole, is not observable in the species. Claw large and strong, about two-thirds the length of the propodus, capable of closing against propodus like the blade of a penknife; auxiliary claws small but distinct.

Genital apertures on the second coxæ of all the legs.

Measurements :—

Trunk	1.3 mm.
Third leg—1st coxa	.18 ,,
,, ,, 2nd ,,	.32 ,,
,, ,, 3rd ,,	.24 ,,
,, ,, Femur	.64 ,,

Third leg—1st Tibia	.62	mm.
,, ,, 2nd Tibia	.48	,,
,, ,, Tarsus and Propodus	.6	,,
,, ,, Claw	.36	,,

Affinities. This species differs from *H. viridintestinalis* in many points, but particularly in the proportions of the trunk segments, in the possession of a dorsal spine on the tarsal joint, and in the presence of teeth on the inner edge of each of the chela fingers.

I have taken the opportunity of naming the species after my old friend and tutor, Professor Haswell, to whom our present knowledge of Australian Pycnogonida is almost entirely due.

Occurrence—Shark Island, Port Jackson, found at low tide amongst (6) mussels (*Brachyodontes hirsutus*).

Holotype, 1 ♂, Australian Museum Collection, No. 4,156-62.

Halosoma haswelli, sp. nov. (Holotype 1.3 mm. long, from Shark Island, Port Jackson).

1. Entire animal (♂) dorsal view.
2. Profile view, legs removed.
3. Anterior end, ventral view.
4. Chela, anterior view.
5. Terminal joints of oviger.
6. Tarsus and propodus.

(6) It is of interest to note that *H. viridintestinalis* has been recently found also among mussels at Laguna Beach, California (1915 Hilton Journ. Entomol. and Zool., Vol VII., p. 69 and p. 205).

NOTES ON THE MAMMALS OF TASMANIA.

By Clive E. Lord.

(Tasmanian Museum.)

[Received 30th July, 1918. Read 9th September, 1918.]

INTRODUCTION.

It is remarkable that more attention has not been paid to the Mammals of Tasmania. Many interesting species occur here, and as they are decreasing in number every year, the following notes have been compiled in order to attempt to arouse interest ere it is too late. Unless unforeseen circumstances occur, many of our Mammals will share the fate of our Tasmanian Emu, and become extinct. Apart from the lists compiled by Gunn (1852), Krefft (1868), and Higgins and Petterd (1883), there has not been a separate list of our Mammals published. The foregoing lists are incomplete, and also out of print. Anyone desiring general information has to search through numerous descriptions of species in works dealing with Australian fauna, and, if possible, select the Tasmanian forms. As these are not always given in full, some confusion has been caused. In order to eliminate this, and also to make a starting point for further study, the accompanying list has been drawn up. Many quotations are made from the British Museum Catalogues, but this is necessitated owing to the fact that the Tasmanian student, in the majority of cases, has not the opportunity to consult a large scientific reference library. If, however, he should be working on a particular species he could doubtless obtain much information by working from the keys given in the various British Museum Catalogues. It must also be remembered that the type specimens of the majority of our animals have been carried to the other side of the world. In the compilation of the following notes, I must acknowledge my indebtedness to Messrs. W. H. D. Le Souëf and H. H. Scott for kindly advice, and also to many works dealing with the Tasmanian fauna. Although the number of works consulted was large, it was by no means a complete list, as such is unobtainable in Tasmania. This is one of the disadvantages a local student works under. The need for a list of our Mammals has been apparent for a considerable time, and such a list has been continually asked for by nature students, collectors, and others. The present work claims no originality, but is merely intended to serve as a foundation for further study, and to extend the general knowledge of our Tasmanian fauna.

CLASSIFICATION.

Class MAMMALIA.

Sub-class I. *PLACENTALIA.*

Order CHIROPTERA.

Sub-order *Microchiroptera.*

Family VESPERTILIONIDÆ.

Genus NYCTOPHILUS.
NYCTOPHILUS TIMORIENSIS (Aust. Long-eared Bat).

Genus VESPERUGO.
VESPERUGO PUMILUS (Little Bat).
VESPERUGO KREFFTI (Krefft's Bat).

Genus CHALINOLOBUS.
CHALINOLOBUS MORIO (Chocolate Bat).
CHALINOLOBUS GOULDI (Gould's Bat).

Family EMBALLONURIDÆ.

Genus NYCTONOMUS.
NYCTONOMUS PLICATUS (Plicated Bat).

Order CARNIVORA.

Sub-order *Pinnipeda.*

Family PHOCIDÆ.

Genus OGMORHINUS.
OGMORHINUS LEPTONYX (Sea Leopard).

Family OTARIIDÆ.

Genus EUTARIA.
EUTARIA CINEREA (Sea Bear or Fur Seal).

Order RODENTIA.

Sub-order *Simmplicidentata.*

Family MURIDÆ.

Genus HYDROMYS.
HYDROMYS CHRYSOGASTER (Water Rat).

Genus EPIMYS.
EPIMYS FUSCIPES (Dusky-footed Rat).
EPIMYS VELUTINUS (Velvet-furred Rat).

Genus PSEUDOMYS.
PSEUDOMYS HIGGINSI (Short-tailed Mouse).
Genus MASTACOMYS.
MASTACOMYS FUSCUS (Broad-toothed Rat).

Order CETACEA.

Sub-order *Odontoceti*.

Family PHYSETERIDÆ.

Genus PHYSETER.
PHYSETER MACROCEPHALUS (Sperm Whale).
Genus KOGIA.
KOGIA BREVICEPS (Short-headed Sperm Whale).
Genus HYPEROODON.
HYPEROODON, SP.
Genus MESOPLODON.
MESOPLODON LAYARDI.
MESOPLODON GRAYI.

Family DELPHINIDÆ.

Genus ORCA.
ORCA GLADIATOR (Killer).
Genus PSEUDORCA.
PSEUDORCA CRASSIDENS (Tas. Killer).
Genus GLOBICEPHALUS.
GLOBICEPHALUS MELAS (Pilot Whale).
Genus DELPHINUS.
DELPHINUS DELPHIS (Dolphin).
Genus TURSIOPS.
TURSIOPS TURSIO (CATALANIA), (Southern Dolphin).
Genus LAGENORHYNCHUS.
LAGENORHYNCHUS SP. (Dolphin).

Sub-order *Mystaceti*.

Family BALÆNIDÆ.

Genus BALÆNA.
BALÆNA AUSTRALIS (Southern Right Whale).
Genus NEOBALÆNA.
NEOBALÆNA MARGINATA (Pigmy Right Whale).
Genus MEGAPTERA.
MEGAPTERA BOOPS (Hump-back Whale).
Genus BALÆNOPTERA.
BALÆNOPTERA HUTTONI (Sulphur-bottom Whale).

Sub-class II. *MARSUPIALIA.*

Order MARSUPIALIA.

Sub-order I. *Diprotodontia.*

Family MACROPODIDÆ.

Genus MACROPUS.

MACROPUS GIGANTEUS VAR. FULIGINOSUS (Forester Kangaroo).

MACROPUS RUFICOLLIS VAR. BENNETTII (Bennett's Wallaby).

MACROPUS BILLARDIERI (Rufous Wallaby).

Genus BETTONGIA.

BETTONGIA CUNICULUS (Tas. Bettong).

Genus POTOROUS.

POTOROUS TRIDACTYLUS (APICALIS), (Rat Kangaroo).

Family PHALANGERIDÆ.

Genus DROMICIA.

DROMICIA LEPIDA (Lesser Dormouse-Phalanger).

DROMICIA NANA (Dormouse-Phalanger).

Genus PETAURUS.

PETAURUS BREVICEPS (Lesser Flying-Phalanger).

Genus PSEUDOCHIRUS.

PSEUDOCHIRUS COOKI (Ring-tailed-Phalanger).

Genus TRICHOSURUS.

TRICHOSURUS VULPECULA VAR. FULIGINOSUS (Tasmanian-Phalanger).

Family PHASCOLOMYIDÆ.

Genus PHASCOLOMYS.

PHASCOLOMYS URSINUS VAR. TASMANENSIS (Tas. Wombat).

Sub-order II. *Polyprotodontia.*

Family PERAMELIDÆ.

Genus PERAMELES.

PERAMELES OBESULA (Short-nosed Bandicoot).

PERAMELES GUNNI (Tas. Striped Bandicoot).

Family DASYURIDÆ.

Genus THYLACINUS.

THYLACINUS CYNOCEPHALUS (Tas. Marsupial Wolf), ("Tiger").

Genus SARCOPHILUS.

SARCOPHILUS URSINUS (Tas. Devil).

Genus DASYURUS.

DASYURUS MACULATUS (Tiger Cat).

DASYURUS VIVERRINUS (Native Cat).

Genus PHASCOLOGALE.

PHASCOLOGALE SWAINSONI (Swainson's Pouched Mouse).

PHASCOLOGALE MINIMA (Little Pouched Mouse).

Genus SMINTHOPSIS.

SMINTHOPSIS LEUCOPUS (White-footed Pouched Mouse).

Sub-class III. *MONOTREMATA.*

Order MONOTREMATA.

Family ORNITHORHYNCHIDÆ.

Genus ORNITHORHYNCHUS.

ORNITHORHYNCHUS ANATINUS (Platypus).

Family ECHIDNIDÆ.

Genus ECHIDNA.

ECHIDNA ACULEATA VAR. SETOSA (Hairy Echidna), ("Porcupine Anteater").

Sub-class I. *PLACENTALIA.*

Order CHIROPTERA.

Six species are recorded from Tasmania, but not much attention has been paid to them. All are Insect-eating Bats (*Microchiroptera*). Five species belong to the family Vespertilionidæ, and the sixth to family Emballonuridæ.

NYCTOPHILUS TIMORIENSIS, Geof., Australian Long-eared Bat.

Nyctophilus timoriensis, Lucas and Le Souëf, An. Aus., p. 44 (1909);
Gould, Mamm. Aust., vol. 3, pl. 39 (1863);
Ogilby, Cat. Aust. Mamm., p. 87 (1892);
Nyctophilus geoffroyi, Gould, Mamm. Aust., vol. 3, pl. 37 (1863).
Nyctophilus unicolor, Gould, Mamm. Aust., vol. 3, pl. 38 (1863).
Krefft, notes faun. Tas., p. 93 (1865).

Nyctophilus timoriensis, Dobson, Cat. Chir. B. Mus., p. 172 and 553 (1878), who also gives the following synonymy:—

Vespertilio timoriensis, Geoffroy, An. du Museum, viii., p. 200 (1806); Temminck, Monogr. Mammal., ii., p. 253 (1835-41). Barbastellus pacificus, Gray, Zoolog. Misc., 1831, p. 38. Nyctophilus geoffroyi, Leach, Trans. Linn. Soc., xiii., p. 73 (1822); Temminck, l.c.p. 47, pl. 34; Wagn., Supp. Schreb. Säugeth, v., p. 649 (1855). Nyctophilus geoffroyi, timoriensis, gouldi, unicolor, Tomes, P.Z.S., 1858, pp. 29-37.

This species also occurs in Australia and the adjacent islands, reaching as far as Fiji. Head and body about two inches, but the size varies greatly, as also does the fur, which may be either dark or light brown. The ears are longer than the head.

VESPERUGO PUMILUS, Gray.

Little Bat.

Vesperugo pumilus, Lucas and Le Souëf, An. Aus. p. 44 (1909);
Ogilby, Cat. Aust. Mamm., p. 88 (1892).

Scotophilus pumilus, Gould, Mamm. Aust. Vol. III., pl. 46 (1863).

Vesperugo pumilus, Dobson, Cat. Chirop. B. Mus., p. 201 (1878), who also gives the following synonymy:—

Scotophilus pumilus, Gray, Append. Grey's Austr. Journ., p. 406.

Type in British Museum.

This species also occurs on the mainland. The head and body are about one and a half inch long. Fur both above and below, black.

VESPERUGO KREFFTII, Peters.

Krefft's Bat.

Vesperugo krefftii, Lucas & Le Souëf, An. Aust. p. 45 (1909;
Ogilby, Cat. Aust. Mamm., p. 89 (1902).

Vespertilio tasmaniensis, Gould, Mamm. Aust. Vol. III., pl. 48 (1863);
Krefft, notes fauna, Tas., p. 93 (1865).

Vesperugo krefftii, Dobson, Cat. Chirop. B. Mus. p. 232 (1878), who gives the following synonymy:—

Noctulinia tasmanensis, Gray, List of Mammal. Brit. Mus., p. 194 (not described) (1843). Vesperugo krefftii, Peters, MB. Akad. Berl., 1869, p. 404.

Type in British Museum.

This species, which also occurs in N.S.W., measures almost two and a half inches over head and body. The fur above is dark reddish-brown, the under surface being paler.

Chalinolobus morio, Gray.

Chocolate Bat.

Chalinolobus morio, Lucas & Le Souëf, An. Aust., p. 45 (1909);

Ogilby, Cat. Aust. Mamm., p. 90 (1892);

Scotophilus morio, Gould, Mam. Aust. Vol. III., pl. 41 (1863).

Chalinolobus tuberculatus, Dobson, Cat. Chirop. B. Mus., p. 248 (1878), who also gives the following synonymy:—

Vespertilio tuberculatus, Foster, Descrip. Animal. in itinere ad maris Australis Terras per annos 1772-74, &c., p. 62 (1844), ed. Lichtenstein. Scotophilus morio (in part), Gray, App. Grey's Narrat. Two Exped., p. 405 (1841). Scotophilus tuberculatus, Tomes, P.Z.S., 1857, p. 135, pl. liii. (bad); Hutton, Trans. New Zealand Institute, iv., p. 185 (1871). ?Scotophilus microdon, Tomes, P.Z.S., 1859, p. 68. Chalinolobus tuberculatus, Peters, M.B. Akad. Berl., 1866, p. 679, and 1867, p. 480 (note); Dobson, P.Z.S., 1875, p. 383.

This species also occurs over the whole of Eastern Australia and New Zealand. The head and body measure about one and four-fifths of an inch. Fur above, very dark brown, under surface paler.

Chalinolobus gouldi, Gray.

Gould's Bat.

Chalinolobus gouldi, Lucas & Le Souëf, An. Aust., p. 45 (1909);

Ogilby, Cat. Aust. Mamm., p. 91 (1892).

Scotophilus gouldi, Gould, Mamm. Aust. Vol. III., pl. 40 (1863).

Chalinolobus gouldi, Dobson, Cat. Chirop. Br. Mus. (1878), who also gives the following synonymy:—

Scotophilus gouldii, Gray, Appendix to Grey's Journ. of two Expeditions of Discovery in Australia, p. 405. Chalinolobus gouldii, Dobson, P.Z.S., 1875, p. 383.

This species occurs over Eastern and South-Eastern Australia also. Head and body measure about two and a half inches. The fur on head, neck and shoulders is black, tinged rufous, back yellowish brown, under surface reddish to yellowish white.

NYCTONOMUS PLICATUS, Buch.-Ham.

Plicated Bat.

Nyctonomus plicatus, Lucas & Le Souëf, An. Aust., p. 49 (1909);

Ogilby, Cat. Aust. Mamm., p. 98 (1892).

Nyctonomus plicatus, Dobson, Cat. Chirop. B. Mus. (1878), p. 425, who also gives the following synonymy:—

Vespertilio plicatus, Buchanan-Hamilton, Trans. Linn. Soc., v., p. 261, fig. (1800). Nyctinomus bengalensis, Geoffroy, Deser. de l'Egypte, ii., p. 130 (1812). Nyctinomus tenuis et dilatatus, Horsefield, Zoolog. Research in Java (1825); Cantor, J.A.S.B. xv., p. 179. Dysopes murinus, Gray, Illustr. Ind. Zool. (figured), 1830. Dysopes plicatus, Temminck, Monogr. Mammal., i., p. 223 (1835-41). Dysopes tenuis, Temminck, l.c.p. 228. Nyctinomus plicatus, Jerdon, Mammals of India, p. 33 (1867); Dobson. J.A.S.B., 1874, p. 143; Monogr., Asiat. Chiropt., p. 182 (1876), P.Z.S., 1876, p. 721.

Type in British Museum.

This species is also met with on the mainland through the islands to India. The head and body measure about two and three-quarter inches. The ears are united in front by a low band. Fur very soft and dense. Above smoky black, below paler.

Order CARNIVORA.

Concerning this order there is great need for further research. The Sea Leopard (*O. leptonyx*) is a fairly frequent visitor to the shores of Southern Tasmania, and occasionally a specimen of another species of Antarctic seal may wander so far from the Southern ice pack as to reach Tasmania. Of the "Sea Lions" and "Sea Bears" many species have been described—apparently on slender evidence. To work out the synonymy is an almost impossible task. There is very little material for research available at present, and I am greatly indebted to Mr. H. H. Scott of the Victorian Museum for information and specimens for examination. The synonymy of the scientific terms is confused but that of the vernacular designations is doubly so, mainly on account of the loose manner in which the terms "Sea Bear" and "Sea Lion" have been used.

Some writers have paid considerable attention to the teeth of the seals, as an index to species, but, as Mr. Scott has pointed out, the teeth vary greatly in the same species, not only on account of age and sex but on account of the type of food that the animal has been forced to make use of. I have just examined a series of specimens that amply demonstrate this. Space will not permit the matter being fully discussed in the present instance, but on the material at present available I propose to credit Tasmania with one member of the Otariidæ, as it appears probable that the few survivors (of a once beautiful species) (1) that exist around the shores of Tasmania may be grouped under the one head. (2) But even now a further difficulty exists, and that is to choose one designation from many that might be attached to this species. After investigating the question as far as the material available permitted I have resolved to adopt the designation *Eutaria cinerea.*

Seals are still to be met with in Bass Straits, and I know of several isolated rocks on the Southern and Eastern Coasts where seals can usually be seen. I hope at a future date to obtain specimens for examination.

Ogmorhinus leptonyx, Blain.

Sea Leopard.

Ogmorhinus leptonyx, L. & Le S., An. Aust., p. 20 (1909); Ogilby, Cat. Aust. Mamm., p. 129 (1892).

Stenorhynchus leptonyx, Voy. Ereb. & Terr. Zoolog. Mamm. Vol. I., p. 6;

Gould, Mamm. Aust. Vol. III., pl. 50;

Krefft, notes Faun. Tas., p. 93;

McCoy, Prod. Zoo. Vic., pl. 21;

Gray, Hand-list of Seals, etc., p. 11;

Gray, Cat. Seals and Whales, Brit. Mus., p. 16 (1866), who also gives the following synonymy:—

Phoca leptonyx, Blain, Journ. Phys., xci., 288, 1820; Desm., Mamm. 247, from Home's specimen; Cur. Oss. Foss., v., 208, t. 18, f. 2; Gray, Griffith's A.K.V. 178; Blain, Osteogr. Phoca, t.i. & t.a.f., skull (Mus. Paris); F. Cuvier, Dent's des Mamm. 118, t. 38a. Seal from New Georgia, Home, Phib. Trans., 1822, 240, t. 29, skull. Phoque quatrième, Blain, in Desm. Mamm. 243, note; see Cur. Oss. Foss., v., 207. Stenorhynchus leptonyx, F. Cuv., Dict. Sc. Nat., xxxix., 549, t. 44; Mem. Mus., xi., 190, t. 13, f. 1; Dent's des Mamm.

(1) The "innumerable legions" of Péron.

(2) As against this see Flinders' Voyage Terr. Aust. Intro.

118, t. 38a; Nilsson, Wiegm. Arch. vii., 307; Skand., Fauna, t.; Gray, Zool. Erebus & Terror, Mamm., t. 3 (Animal), t. 4 (skull); Cat. Osteol. Spec. B.M. 31; Cat. Seals B.M. 13; Blain, Osteogr. Phoca, t. 5, f. 9 (teeth and skull); Owen, Ann. N.H., xiii., 417. Phoca homei, Lesson, Dict. Class. H.N., xiii., 417. Phoca (Stenorhynche) leptonyx, Blain; Pucheran, Dumont d'Urville, Zool., t. 9. The Small Nailed Seal, Hamilton, Nat. Lib., 180. t. 11 (nails too large). Stenorhynchus, aux petits ongles, Hombr. & Jaeg., Voy. à Pole Sud, t. 9. Sea Leopard of the Whalers. Sea Bear of New Zealand, knot in letter. Phoca ursina, or Sea Bear, Pollach, New Zealand.

The usual growth is about eight feet, but some specimens reach twelve feet. The sexes do not differ greatly in size. The colour of the upper surface is ashy grey, with lighter patches and dark spots. This seal inhabits the pack ice of the Antarctic Ocean, but frequently visits the shores of Tasmania. It sometimes comes up the Derwent as far as Hobart, and one specimen, now in the Tasmanian Museum, was captured at the Hobart Wharf.

Eutaria cinerea.

Australian Fur-seal ("Sea Bear").

References:—McCoy, Prod. Zoo. Vic. Vol. I., pls. 31 & 71.
Gray, Hand-list Seals, p. 34.

The adult males of this species grow up to eight feet, but the females are smaller. The upper surface is dark brown, the under surface chestnut. The colour, however, varies considerably, and in some instances the fur is almost grey. Considerable research is needed to determine the exact position of this species. The synonymy is very involved.

Order RODENTIA.

The representation of this order is one of doubt. Four valid species are recognised, but in 1882 and 1883 Messrs. Higgins and Petterd described in the Papers and Proceedings of the Roy. Soc. of Tas. no less than eight new species, as follow:—

1. *Mus griseo-cœruleus* (Blue Rat).
2. ,, *leucopus* (Short-tailed Rat).
3. ,, *variabilis* (Swan's Rat).
4. ,, *simsoni* (Simson's Rat).
5. ,, *pachyurus* (Thick-tailed Rat).
6. ,, *castaneus* (Chestnut-coloured Rat).
7. ,, *tamarensis* (Tas. Water Rat).
8. ,, *tetragonurus* (Quadrangular-tailed Rat).

I am indebted to Mr. H. H. Scott for particulars concerning these. Mr. Scott informs me that, working direct with Mr. Oldfield Thomas, of the British Museum, he proved that *Mus griseo-cœruleus*, *M. variabilis*, and *M. castaneus* were synonymous with *M. rattus*. Mr. Scott also states that the late Mr. Petterd told him that the type specimens of these species were not preserved. Under these circumstances, and taking into account the fact that Messrs. Higgins and Petterd relied on mere external appearances on which to found species, I cannot see my way to include any of the foregoing except *M. leucopus* (now *P. higginsi*) which has been recognised by Mr. Oldfield Thomas. It is also included in the recently issued list of Australasian Muridæ by Mr. Heber Longman, of the Queensland Museum (3). *M. tetragonus* (*petterdi*) may also prove to be a valid species, but I have not yet been able to secure specimens. Mr. Thomas states (4) that there is in the British Museum specimens of a rat closely allied to if not identical with *Mus linœolotus*, Gould (5).

Hydromys chrysogaster, Geof.

The Water Rat.

Hydromys chrysogaster, Longman, Mem. Qld. Mus. Vol. V., p. 25 (1916);
Lucas & Le Souëf, An. Aust., p. 23 (1909);
Ogilby, Cat. Aust. Mamm., p. 101 (1892);
Krefft, P. & P. Roy. Soc. Tas. (1868).

The water rat is fairly common in many localities. Length up to twenty inches. The coloration varies, but the head and back are usually black, sides of face and body and the whole of the under surface orange to greyish white. This rat is sometimes referred to as the "Musk Rat," but the term is quite misleading. The origin error arose through some of the first skins that were sent home to England being packed with skins of the Musk Duck (*B. lobata*) and as a result they inherited a distinct musky odour.

Epimys fuscipes, Waterh.

Dusky-footed Rat.

Epimys fuscipes, Longman, Mem. Qld. Mus. Vol. V., p. 28 (1916);
Thomas, Ann. Mag. N.H., vi. 605 (1910).

(3) Longman, List of Australasian and Austro-Pacific Muridæ, Vol. v., Mem. Qld. Mus. 1916.

(4) Thomas, Ann. and Mag. Nat. Hist. p. 415, 1882.

(5) Gould, Mamm. Austr., Vol. iii., pl. xviii., 1865.

Mus fuscipes, Ogilby, Cat. Aust. Mamm., p. 104 (1892).

Size up to six and a half inches (head and body). Tail equal in length to body. Colour of upper surface blackish brown, under surface greyish white. Feet dusky brown, tail blackish.

EPIMYS VELUTINUS, Thos.

Velvet-furred Rat.

Epimys velutinus, Longman, Mem. Qld. Mus. Vol. V., p. 30 (1916);
Thomas, Ann. Mag. N.H., vi., p. 605 (1910).

Mus velutinus, Ogilby, Cat. Aust. Mamm., p. 106 (1892);
Thomas, Ann. Mag. N.H., p. 415, ix. (1882).

Size up to six and a half inches, tail four inches. Fur very long and velvety. General colour grey, Ears, feet and tail brown.

PSEUDOMYS HIGGINSI, Troues.

Short-tailed Mouse.

Pseudomys higginsi, Longman, Mem. Qld. Mus., p. 31 (1916);
Thomas, An. Mag. N.H., vi., p. 606 (1910).

Mus leucopus, Ogilby, Cat. Aust. Mamm., p. 111 (1892);
Higg. & Pett., P. and P. Roy. Soc. Tas. (1882).

Size five and three-quarter inches, tail three and three-quarters. Fur long, soft, dark brown, paler at sides, passing into ashy grey on under surfaces. Fore and hind feet white.

MASTACOMYS FUSCUS, Thos.

Tas. Broad-toothed Rat.

Mastacomys fuscus, Longman, Mem. Qld. Mus. Vol. V., p. 39 (1916);
Ogilby, Cat. Aust. Mam., p. 120 (1892);
Thomas, Ann. Mag. N.H., ix., p. 413 (1882).

Size up to three and three-fifths inches. Tail three and three-quarter. General colour dark greyish brown. Molars remarkably broad and heavy.

Order CETACEA.

The members of this order are cosmopolitan in many cases. Very little is known concerning the habits and characteristics of some of the species. The following are found in Tasmanian seas, but it cannot be considered a complete list.

Fam. BALÆNIDÆ.

BALÆNA AUSTRALIS, Des.

Southern Right Whale.

Balæna australis, Lucas and Le Souëf, An. Aust., p. 53 (1909).
Eubalæna australis, Gray, Cat. Wh. Brit. Mus., p. 91 (1865).

NEOBALÆNA MARGINATA, Gray.

Pigmy Right Whale.

Neobalæna marginata, L. & Le S., An. Aust., p. 53 (1909).
Balæna marginata, Gray, Cat. Wh. Brit. Mus., p. 90 (1865).

MEGAPTERA BOOPS, Fab.

Hump-back Whale.

Megaptera boops, L. & Le S., An. Aust., p. 53 (1909).
Megaptera longrimans, Gray, Cat. Wh. Brit. Mus., p. 119 (1865).

BALÆNOPTERA HUTTONI, Gray.

Sulphur-bottom Whale.

Balænoptera huttoni, L. & Le S., An. Aust., p. 54 (1909).
Balænoptera sp., Gray, Cat. Wh. Brit. Mus., p. 186 (1865).

Fam. PHYSETERIDÆ.

PHYSETER MACROCEPHALUS, Linn.

Sperm Whale or Cacholot.

Physeter macrocephalus, L. & Le S., An. Aust., p. 55 (1909).
Catodon macrocephalus, Gray, Cat. Wh. Brit. Mus., p. 202 (1865).
Catodon australis, Gray, Cat. Wh. Brit. Mus., p. 206 (1865).

KOGIA BRENICEPS, Blain.

Short-headed Sperm Whale.

Kogia breniceps, L. & Le S., An. Aust., p. 56 (1909); Gray, Cat. Wh. Brit. Mus., p. 217 (1865).

HYPEROODON, Sp. (6)

MESOPLODON LAYARDI.

MESOPLODON GRAYI.

Refs.: Ogilby, Cat. Aust. Mammals, pp. 70 and 71.
L. and Le S., An. Aust., p. 57.

Whales of the Genus *Mesoplodon*—and also *Hyperoodon*—certainly visit our shores, at rare intervals. Owing to the need for a sound taxonomic revision of the genera and species of Ziphoid whales the inclusion of the above species in this list should be regarded as a provisional arrangement only.

Fam. DELPHINIDÆ.

ORCA GLADIATOR, Bonn.

Killer Whale.

Orca gladiator, L. and Le S., An. Aust., p. 58 (1909); Gray, Cat. Wh. Brit. Mus., p. 279 (1865).

PSEUDORCA CRASSIDENS, Owen.

Tasmanian Killer.

Pseudorca crassidens, L. & Le S., An. Aust., p. 58 (1909); Gray, Cat. Wh. Brit. Mus., p. 290 (1865).

GLOBICEPHALUS MELAS, Traill.

Pilot Whale.

Globicephalus melas, L. & Le S., An. Aust., p. 59 (1909).
Gloliocephalus intermedius, Gray, Cat. Wh. Brit. Mus., p. 318 (1865).

DELPHINUS DELPHIS, Linn.

The Dolphin.

Delphinus delphis, L. & Le S., An. Aust., p. 59 (1909); Gray, Cat. Wh. Brit. Mus., p. 242/396 (1865).

TURSIOPS TURSIO (CATALANIA), Gray.

Dolphin (Southern).

Tursiops catalania, L. & Le S., An. Aust., p. 60 (1909); Gray, Cat. Wh. Brit. Mus., p. 262 (1865).

Mr. Scott, who has paid some attention to this species, considers that *T. tursio* = *T. catalania*.

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(6) There is in the Tasmanian Museum, a skull labelled *Epidon chathamensis*, which was obtained from Port Arthur in 1868. Detailed investigation will probably prove this to belong to a representative of the genus *Hyperoodon*.

Lagenorhynchus, Sp.

This species is included on the authority of Mr. H. H. Scott, who writes from Launceston. "There is another dolphin which appears in our river, at very, very rare intervals, so cannot say too much about it, although I am always on the lookout to get a second for structural and taxonomic purposes. From external data I call it '*Lagenorhynchus cruciger*.' I feel sure it will so work out. The genus is practically certain."

Sub-class II. *MARSUPIALIA.*

Order MARSUPIALIA.

Under this order are grouped the Families *Macropodidæ*, *Phalangeridæ*, *Phascolomyidæ*, *Dasyuridæ*, and *Peramelidæ*. The first is represented by six species. Of *Phalangeridæ* six species also occur, while *P. ursinus* is the sole representative of the *Phascolomyidæ*. *Dasyuridæ* is represented by seven species, while *P. gunni* and *P. obesula* are the only representatives of the *Peramelidæ*.

Macropus giganteus, var. fuliginosus, Des.

Tasmanian Great or Forester Kangaroo.

Macropus giganteus, var. *fuliginosus*, Br. As. Ad. Sc., p. 49 (1914).

Macropus giganteus, Tas., var., Lucas & Le Souëf, An. Aust., p. 90 (1909).

Macropus giganteus, var. *fuliginosus*, Ogilby, Cat. Aust. Mamm., p. 59 (1892).

Macropus giganteus & *M. major*, Pict. Mus. An. Nat. Vol. I., p. 18, pls. 76-79.

Macropus major, West, Hist. Tas. Vol. I., p. 325 (1852).

Macropus giganteus, var. *fuliginosus*, Thomas, Cat. M. & M. Brit. Mus., p. 19 (1888), who also gives the following synonymy:—

Kangurus fuliginosus, Desm., N. Dict. d'H.N. (2), xvii., p. 35, pl. xxii., fig. 1 (1817); id., Mamm., i., p. 273 (1820); Geoff., Dict. Class d'H.N. ix., p. 109 (1826); Gray, Griff. Cuv. An. K., v., p. 202 (1827); Gerv., Hist. Nat. Mamm., ii., p. 270 (1855). Macropus fuliginosus, Less., Man. Mamm., p. 225 (1827); Fisch., Syn. Mamm., p. 281 (1829); Less., H.N. Mamm. (Compl. Buff.), v., p. 377 (1836); Waterh., Jard. Nat. Libr., Mamm., xi., p. 200 (1841); Gray, Grey's Austr., App. ii., p. 402 (1841); Gould, Mon. Macr., pl. xvi. (animal) (1842); Less., N. Tabl. R.A., Mamm., p. 194 (1842); Gray, List. Mamm. B.M., p. 88 (1843); Gould, Mamm. Austr., ii., pl. v. (animal) (1858); Krefft, Mamm. Austr. text to pl. x., p. 1

(1871). Halmaturus fuliginosus, Wagn., Schr. Säug. Supp., iii., p. 109 (1843); Schinz, Syn. Mamm., i., p. 546 (1844).

Type specimen in Paris Museum.

This species is now almost extinct, only a few carefully guarded specimens being left of this once plentiful species. The general colour is brownish grey, under surface white. Head and body about sixty inches, tail thirty-six inches long.

MACROPUS RUFICOLLIS, var. BENNETTI, Waterh.

Bennett's Wallaby.

Macropus ruficollis, var. *bennettii*, Br. As. Ad. Sc. Hbk., p. (1914).

Macropus bennettii, Smith, Nat. Tas., p. 85 (1909).

Macropus ruficollis, Tas. var. Bennett's Wallaby, Lucas & Le Souëf, An. Aust., p. 85 (1909).

Macropus ruficollis, var. *bennetti*, Ogilby, Cat. Aust. Mamm., p. 56 (1892).

Macropus (*Halmaturus*) *bennettii*, West Hist. Tas. Vol. I., p. 327 (1852).

Macropus ruficollis, var. *bennettii*, Thomas, Cat. M. & M. Brit. Mus., p 34 (1888), who also gives the following synonymy.—

?Macropus albus, Gray, Spic. Zool., ii., p. 10 (1830); Waterh., Jard. Nat. Libr., Mamm., xi., p. 214 (1841). ?Halmaturus albus, Gray, Charlesw. Mag. N.H., i., p. 583 (1837). Macropus bennettii, Waterh., P.Z.S., 1837, p. 103; id., Cat. Mamm. Mus. Z.S., p. 66 (1838); id., Jard. Nat. Libr., Mamm., xi., p. 211 (1841); Owen, Tr. Z.S., ii., p. 383, pl. lxxi. (palate & teeth) (1841); Gulliver, P.Z.S., 1841, p. 50, et 1842, pp. 64-70; Less., N. Tabl. R.A., Mamm., p. 194 (1842); Owen, Cat. Ost. Mus. Coll. Surg., i., p. 324 (1853); Gieb., Odontogr., p. 43, pl. xix., fig. 16a (incisors) (1855); Schleg., Dierk., i., p. 142 (1857); Gieb., Bronn's Kl. U. Ordn. vi., Abth. v. pl. xlvii., fig. 21 (9) (incisors) (1876); Flow. & Gars., Cat. Ost. Coll. Surg., ii., p. 711 (1884). Halmaturus ualabatus, Gray, Charlesw. Mag. N.H., i., p. 583 (1837) (nec Less.). Macropus (Halmaturus) fruticus, Og., Ann. Mag. N.H., i., p. 219 (1838). Halmaturus bennettii, Gould, Mon. Macrop. pl. vii. (animal) (1841); Gray, Grey's Aust., App. ii., p. 402 (1841); id., List Mamm. B.M., p. 89 (1843); Wagn., Schr. Säug. Supp., iii., p. 115 (1843), v., p. 317 (1855); Schinz, Syn. Mamm., i., p. 550 (1844); Gould, Mamm. Austr., ii., pls. xvi., xvii. (animal) (1856); Gerrard, Cat. Bones Mamm. B.M., p. 125 (1862); Blyth, Cat. Mamm. Mus. As. Soc., p. 184 (1863); Peters, P.Z.S., 1867, p. 953; Krefft, Notes Faun. Tasm., p. 4 (1868); id., Austr. vert., p. 10 (1871); Gieb., Bronn's Kl. U. Ordn. vi., Abth. v., pl. xxi., figs 8-10 (skull) (1874); Schmidt, P.Z.S., 1880, p. 305; Higg. & Pett., P. Roy. Soc. Tasm., 1883, p. 196; Jent., Cat. Ost. Leyd. Mus., p. 319 (1887). Halmaturus fruiticus, Wagn., Schr. Säug. Supp., iii., p. 118 (1843). Halmaturus leptonyx, Wagn., Schr. Säug. Supp., iii., p. 116

(1843); Schinz. Syn. Mamm., i., p. 554 (1844). Macropus (Halmaturus) ruficollis, var. bennetti, Waterh., N.H. Mamm., i., p. 130, pl. v., fig. 9 (incisors) (1846).

Type specimen unknown.

The Tasmanian form of *M. ruficollis* is generally referred to as the "Kangaroo" by the country dweller. The name wallaby being specifically reserved for *M. billardieri*. General colour fawn grey. Back of neck and rump bright rufous. Under surface greyish white. Head and body forty-four inches, tail thirty inches long. These dimensions vary. This species is now becoming rare in many districts owing to the inroads of the "Trappers." This species is being preserved in the recently (1917) formed National Park, where it is hoped its numbers will increase.

Macropus billardieri, Des.

The Rufous-bellied Wallaby.

Macropus billardieri, Br. As. Ad. Sc. Hbk., p. 49 (1914); Lucas & Le Souëf, An. Aust., p. 82 (1909);
Smith, Nat. Tas., p. 85 (1909);
Ogilby, Cat. Aust. Mamm., p. 51 (1892).

Macropus (Halmaturus) billardieri, West, Hist. Tas. Vol. I., p. 327 (1852).

Macropus billardieri, Thomas, Cat. M. & M. Brit. Mus., p. 58 (1888), who gives the following synonymy:—

Kangurus billardieri, Desm., Mamm. (Supp.), ii., p. 542 (1822); Geoff., Dict. Class d'H.N. ix., p. 111 (1826); Gray, Griff, Cur. An. K., v., p. 203 (1827). Macropus billardieri, Less., Man. Mamm., p. 227 (1827); Fisch., Syn. Mamm., p. 283 (1829); Less., N.H. Mamm. (Compl. Buff.), v., p. 378 (1836); Waterh., Jard. Nat. Libr., Mamm., xi., p. 227 (1841); Owen, Cat. Ost. Mus. Coll. Surg., i., p. 325 (1853); Gerv., H.N. Mamm., ii., p. 270 (fig. of skeleton) (1855); Gieb., Odontogr., p. 43, pl. xix., fig. 16c. (incisors) (1855); id., Säug., p. 682 (1859); Flow. & Gars., Cat. Ost. Coll. Surg., ii., p. 713 (1844). Halmaturus (Thylogale) tasmanei, Gray, Ann. Mag. N.H., i., p. 108 (1838). Macropus rufiventer, Ogilb., P.Z.S., 1838, p. 23; Waterh., Cat. Mamm. Mus. Z.S., p. 67 (1838); Owen, Tr. Z.S., ii., p. 327 (1841). Macropus (Halmaturus) rufiventer, Ogilb., Ann. Mag. N.H., i., p. 220 (1838). Halmaturus billardieri, Gould, Mon. Macrop. pl. x. (Animal) (1841); Gray, Grey's Austr., App. ii., p. 403 (1841); Less., N. Tabl. R.A., Mamm., p. 194 (1842); Gray, List. Mamm. B.M., p. 90 (1843); Wagn., Schr. Säug. Supp., iii., p. 128 (1843) v., p. 325 (1855); Schinz, Syn. Mamm., i., p. 556 (1884); Gould, Mamm., ii, pls. xxxv., xxxvi. (animal) (1860); Gerrard, Cat. Bones Mamm. B.M., p. 126 (1862); Blyth, Cat. Mamm. Mus. As. Soc., p. 185 (1863); Lucae, Zool. Gart., viii., pp. 418-471 (anat.) (1867); Krefft, P.Z.S., 1868, p. 2; id., Notes Faun. Tasm., p. 4 (1868);

id., Austr. Vert., p. 10 (1871); Higg. & Pett., P.R. Soc. Tasm., 1883, p. 196; Sclat., List An. Zool. Soc. (8), p. 205 (1883); Jent., Cat. Ost. Leyd. Mus., p. 320 (1887). Halmaturus rufiventer, Less., N. Tabl. R.A. Mamm., p. 194 (1842); Wagn., Schr. Säug. Supp., iii., p. 120 (1843). Halmaturus brachytarsus, Wagn., Schr. Säug. Supp., iii., p. 121 (1843). Macropus (Halmaturus) billardieri, Waterh., N.H., Mamm., i., p. 159, pl. v., fig. 11 (incisors) (1846); Gunn, P.R. Soc. Tasm., ii., p. 87 (1852). Halmaturus brachyurus, Owen, Phil. Trans., 1874, p. 787, pl. lxxvii., fig. 1 (lower view of skull) (nec Quoy & Gaim.).

Type specimen in Paris Museum.

An inhabitant of the scrub, this species is stout in build. The fur is soft and thick, that of the body being greyish-brown. The under surface is tinged with rufous. Head and body measure about twenty-seven inches and the tail fifteen inches long. Owing to the advance of settlement this species is gradually becoming rarer.

Bettongia cuniculus, Ogil.

Tasmanian Bettong.

Bettongia cuniculus, Br. As. Ad. Sc. Handbk., p. 49 (1914);
Lucas & Le Souëf, An. Aust., p. 66 (1909);
Smith, Nat. Tas., p. 85 (1909);
Ogilby, Cat. Aust. Mamm., p. 41 (1892).

Hypsiprymnus cuniculus, West's Hist. Tas. Vol. I., p. 325 (1852).

Bettongia cuniculus, Thomas, Cat. M. & M. Brit. Mus., p. 106 (1888), who gives the following synonymy:—

Bettongia setosa, Gray, Charlesw. Mag. N.H., i., p. 584 (1837) (nec Ogilb.); id., Grey's Aust., App. ii., p. 403 (1841); id., List Mamm. B.M., p. 93 (1843). Hypsiprymnus cuniculus, Ogilb., P.Z.S., 1838, p. 63; Waterh., Cat. Mamm. Mus. Zool. Soc., p. 65 (1838); id., Jard. Nat. Libr., Mamm., xi., p. 186 (1841); Wagn. Schr. Säug. Supp., iii., p. 101 (1843), v., p. 291 (1855); Schinz, Syn. Mamm., i., p. 543 (1844); Gieb., Odontogr., p. 43, pl. xix., fig. 13 (teeth) (1855); id., Säug., p. 687 (1859); id., Bronn's Kl. U. Ordn. vi., Abth. v., pl. xlvii., fig. 24 (teeth) (1876). Bettongia cuniculus, Gould, Mon. Macrop., pl. xxix. (animal) (1842); id., Mamm. Aust., ii., pl. lxiii. (animal) (1854); Gerrard, Cat. Bones Mamm. B.M., p. 128 (1862); Krefft, Cat. Mamm. Austr. Mus., p. 47 (1864); id., notes Faun. Tasm., p. 4 (1868); id., Mamm. Austr. text to pl. xi., p. 5 (1871); Higg. & Pett., P.R. Soc. Tasm., 1883, p. 196; Jent., Cat. Ost. Leyd. Mus., p. 325 (1887). Hypsiprymnus (Bettongia) cuniculus, Waterh., N.H. Mamm., i., p. 200 (1846); Gunn, P.R. Soc. Tasm., ii., p. 86 (1852).

Type specimen in the British Museum.

The remarkable distinction of the Bettong is its more or less prehensile tail. It is the only terrestrial animal that has a tail formed for grasping. It makes use of its tail in order to carry grass to form its nest. General colour grey, under surface white. Head and body measure about eighteen inches and the tail about fifteen inches long.

Potorous tridactylus (apicalis).

Common Rat-Kangaroo.

Potorous tridactylus, Br. As. Ad. Sc. Handbk., p 49 (1914);
Lucas & Le Souëf, An. of Aust., p. 64 (1909).

Bettongia tridactylus, Smith, Nat. Tas., p. 85 (1909) (Ogilby Cat. Mamm., p. 40).

Hypsiprymnus murinus, West's Hist. of Tas. Vol. I., p. 325 (1852);
Pict., Mus. An. Nat., p. 18 & pls. 80-82 (An., teeth and skull).

Potorous tridactylus, Thomas, Cat. M. & M. Brit. Mus., p. 117, who gives the following synonymy:—

Kangaroo Rat, Phillip, Voy. Botany Bay, p. 277, pl. xlvii. (animal) (1789). Poto-roo, White, Journ. Voy. N.S.W., p. 286, pl. lx. (animal) (1790); Vicq-d'Azyr, Syst. Anat. Quadr. (Encycl. Méth.), ii., p. 545 (1792). Didelphis tridactyla, Kerr, Linn. An. K., p. 198 (1792); Turt., Linn. S.N., i., p. 67 (1806). Didelphis potoru, Meyer, Syst. Uebers. Zool. Entd., p. 13 (1793). Yerboa potoru, Bechst., Syst. Uebers. Vierf. Thiere, ii., pp. 356 & 686 (1800). Didelphis murina, Cuv., Tabl. Elem., p. 126 (1789) (nec Linn.); Desm., N. Dict. d'H.N. (1), xii., p. 385 (1803). Macropus minor, Shaw, Gen. Zool., i., pt. 2, p. 513, pl. cxvi. (animal) (1800); Fisch., Syn. Mamm., p. 280 (1829); G. Cuv., Anat. Comp., ii., pls. 180-182 (myology) (1849); Schleg., Dierent., p. 171 (1872). Potorous murinus, Desm., N. Dict. d'H.N. (1), xxiv., Tabl. Méth., p. 20 (1804); id., op. cit. (2), xxviii., p. 80 (1819); id., Mamm., i., p. 271 (1820); F. Cuv., Dict. Sci. Nat., xliii., p. 155 (1826); Gray, Griff. Cuv. An. K., v., p. 201 (1827); Higg. & Pett., P. Roy. Soc. Tasm., 1883, p. 196. Kangurus murinus, Tiedem., Zool., p. 435 (1808). Hypsiprymnus potoru, Ill., Prodr. Syst. Mamm., p. 79 (1811). Kanguru potoroo, G. Fisch., Zoogn., iii., p. 20 (1814). Hypsiprymnus minor, G. Cuv., R.A., i., p. 181 (1817); F. Cuv., Dent's Mamm., p. 133, pl. xlii. (teeth) (1825); Gray, Charlesw. Mag. N H., i., p. 584 (1837); id., Grey's Aust., App., p. 403 (1841); id., List Mamm. B.M., p. 94 (1843); Gerrard, Cat. Bones Mamm. B.M., p. 130 (1862). Hypsiprymnus murinus, Goldf., Handb. Zool., p. 477 (1820); Schinz, Cur. Thierr., i., p. 262 (1821); Pand. & D'Alt., Vergl. Osteol. Beutelth., pl. iii. (skeleton & skull) (1828); Burm., Lehrb. Naturg., p. 548 (1830); Ogilb., P.Z.S., 1838, p. 63; Waterh., Jard. Nat. Libr., Mamm., xi., p. 175 (1841); Less., N Tabl. R.A., Mamm., p. 193 (1842); Wagn., Schr. Säug. Supp., iii., p. 101 (1843); v., p. 297 (1855); Schinz., Syn.

Mamm., i., p. 539 (1844); Desm., Dict. Univ. d'H.N., x., p. 448 (1849); Gould, Mamm. Austr., ii., pl. lxvii. (animal) (1854); Gieb., Säug., p. 689 (1859); Krefft, Cat. Mamm. Austr. Mus., p. 44 (1864); id., Mamm. Austr. text to pl. xi., p. 5 (1871); Garrod, P.Z.S., 1875, p. 58; Schmidt, P.Z.S., 1880, p. 305; Brehm., Thierl., ii., p. 598, fig. (animal) (1880); Flow. & Gars., Cat. Ost. Coll. Surg., ii., p. 725 (1884); Jent., Cat. Ost. Leyd. Mus., p. 324 (1887). Hypsiprymnus peronii, Quoy & Gaim, Voy. Uranie, Zool., p. 64 (1824); Less., Man. Mamm., p. 223 (1827); Desm., Dict. Univ. d'H.N., x., p. 449 (1849). Macropus peronii, Fisch., Syn. Mamm., p. 281 (1829). Hypsiprymnus setosus, Ogilb., P.Z.S., 1831, p. 149; Less., H.N. Mamm. (Compl. Buff), v., p. 375 (1836); Waterh., Cat. Mamm. Mus. Z.S., p. 65 (1838); Wagn., Schr. Säug. Supp., iii., p. 99 (1843); Gulliver, P.Z.S., 1844, p. 9, 1875, p. 494, pl. lv., fig. 51 (blood-corpuscle); Desm., Dict. Univ. d'H.N., x., p. 449 (1849). Hypsiprymnus myosurus, Ogilb., P.Z.S., 1838, p. 62; Waterh., Cat. Mamm. Mus. Z.S., p. 65 (1838); Wagn., Schr. Säug. Supp., iii., p. 99 (1843). Perameles tuckeri, Gray, Ann. Mag. N.H., v., p. 150 (1840); Wagn., Schr. Säug. Supp., iii., p. 62 (1843); Schinz, Syn. Mamm., i., p. 518 (1844). Hypsiprymnus (Potorous) murinus, Waterh., N.H. Mamm., i., p. 224, pl. viii., figs. 2, 3 (skull) (1846); Gunn, P.R. Soc. Tasm., ii., p. 86 (1852). Hypsiprymnus apicalis, Gould, Mamm. Austr., pl. lxviii. (animal) (1851); Krefft, Notes Faun. Tasm., p. 4 (1868); id.. Mamm. Austr., text to plate xi., p. 5 (1871). Potorus rufus, Higg. & Pett., P. Roy. Soc. Tasm., 1883, pp. 181, 196.

Type specimen unknown.

The "Kangaroo-rat" also occurs in N.S.W., Vic., and S.A. The general colour of the body is greyish-brown, the under surface being whitish. Head and body measure about sixteen and a half inches, and the tail, which has not a crest, is nine inches long.

Dromicia nana, Des.

Common Dormouse-Phalanger.

Dromicia nana, Br. As. Ad. Sc. Handbk., p. 51 (1914);
Lucas & Le Souëf, An. Aust., p. 108 (1909);
Ogilby, Cat. Aust. Mamm., p. 36 (1892).

Dromicia nana, Thomas, Cat. M. & M. Brit. Mus., p. 144 (1888), who gives the following synonomy:—

Phalangista nana, Desm., N. Dict. d'H.N. (2), xxv., p. 447 (1817); id., Mamm., i., p. 268 (1820); F. Cuv., Dict. Sci. Nat. xxxix., p. 415 (1826); Temm., Mon. Mamm., i., p. 9 (1827); Gray, Griff. Cur. An. K.V., p. 198 (1827); Less., Mon. Mamm., p. 218 (1827); id., Dict. Class d'H.N., xiii., p. 334 (1828); J. B. Fisch, Syn. Mamm., p. 276 (1829); Less., H.N. Mamm. (Compl. Buff), iv., p. 466 (1830); Waterh., Cat. Mamm. Mus. Z.S., p. 68 (1838); Waterh., Jard. Nat. Libr. Mamm., xi., p. 279, pl. xxvi. (animal) (1841); Less., N. Tabl. R.A., Mamm., p. 188 (1842); Schinz, Syn. Mamm., i., p.

530 (1844); Gieb., Säug., p. 699 (1859); Gulliver, P.Z.S., 1875, p. 491. Phalangista gliriformis, Bell, Trans. Linn. Soc., xvi., p. 121, pls. xiii. and xiv. (animal, feet, etc.) (1828); J. B. Fisch., Syn. Mamm., p. 383 (1829); Less., H.N. Mamm. (Compl. Buff), iv., p. 467 (1830); id., N. Tabl. R.A. Mamm., p. 188 (1842); Wagn. Schr. Säug. Supp., iii., p. 82 (1843), v., p. 276 (1855); Owen, Odontogr. Atl., pl. c., fig. 3 (skull) (1845). Dromicia nana, Gray, Grey's Austr., App. ii., p. 401 (1841); id., List Mamm. B.M., p. 85 (1843); Gerv. H.N. Mamm., ii., p. 275 (1855); Gerrard, Cat. Bones Mamm. B.M., p. 121 (1862). Dromicia gliriformis, Gray, List Mamm. B.M., p. 85 (1843); Gould, Mamm. Austr., i., pl. xxix. (animal) (1845); Gerrard, Cat. Bones Mamm B.M., p. 120 (1862); Krefft, Notes Faun. Tasm., p. 4 (1868); id., Mamm. Austr. text to pl. vii., p. 3 (1871). Phalangista (Dromicia) nana, Waterh., N.H. Mamm., i., p. 309 (1846); Gunn, P. Roy. Soc. Tasm., ii., p. 85 (1852). Dromicia unicolor, Krefft, P.Z.S., 1863, p. 49; Gould, Mamm. Austr. (Introd.) i., p. xxvi. (1863); Krefft, Cat. Mamm. Austr. Mus., p. 42 (1864).

Type in Paris Museum.

Dromicia nana and *D. lepida* are confined to Tasmania. They are not often met with. The common Dormouse-Phalanger has thick and soft fur of a greyish fawn colour, under surface being paler. Head and body measure about four inches.

DROMICIA LEPIDA, Thos.

Tasmanian Lesser Dormouse-Phalanger.

Dromicia lepida, Br. As. Ad. Sc. Handbk., p. 51 (1914);
Lucas and Le Souëf, An. Aust., p. 108 (1909);
Ogilby, Cat. Aust. Mamm., p. 36 (1892);
Thomas, Cat. M. & M. Brit. Mus., p. 142 (1888).

Type in British Museum.

The Lesser Dormouse-Phalanger has its fur of a brighter fawn colour on the upper surface than *D. nana*. It measures slightly less than three inches over head and body.

PETAURUS BREVICEPS, Waterh.

Lesser Flying-Phalanger ("Flying Squirrel").

Petaurus breviceps, Br. As. Ad. Sc. Handbk., p. 51 (1914);
Lucas & Le Souëf, An. Aust., p. 105 (1909);
Ogilby, Cat. Aust. Mamm., p. 34 (1892).

Petaurus sciureus, West Hist. Tas. Vol. I., 324 (1852);
Gunn, P. & P. Roy. Soc. Tas., p. 253 1851), p. 85 (1852).

Petaurus breviceps, var. *typicus*, Thomas, Cat. M. and M. Brit. Mus., p. 156 (1888), who also gives the following synonymy:—

Petaurus (Belideus) breviceps, Waterh., P.Z.S., 1838, p. 152; id., Jard. Nat. Libr. Mamm., xi., p. 290, pl. xxix. (animal) (1841); id., N.H., Mamm., i., p. 324 (1846). Petaurus breviceps, Gray, Grey's Austr. App. ii., p. 402 (1841); id., List Mamm. B.M., p. 83 (1843); Wagn., Schr. Säug. Supp., iii., p. 90 (1843), v., p. 279 (1855); Schinz, Syn. Mamm., i., p. 532 (1844); Gieb., Säug., p. 702 (1859); Gerrard, Cat. Bones Mamm. B.M., p. 119 (1862); Coll.. Zool. Jahib., ii., p. 931 (1887). Belideus breviceps, Less., N. Tabl. R.A., Mamm., p 189 (1842); Gould, Mamm. Aust., i., pl. xxv. (animal) (1849); Krefft, Cat. Mamm. Austr. Mus., p. 40 (1864); id., Mamm. Austr. text to pl. vii., p. 3 (1871). Belideus ariel, Gould, P.Z.S., 1842, p. 11; id., Mamm. Austr., i., pl. xxvii. (animal) (1849); Krefft, Cat. Mamm. Austr. Mus., p. 41 (1864); id., Mamm. Austr. text to pl. vii., p. 3 (1871). Petaurus ariel, Gray, List Mamm. B.M., p. 84 (1843); Schinz, Syn. Mamm., i., p. 534 (1844); Wagn., Schr. Säug. Supp. v., p 279 (1855); Gerrard, Cat. Bones Mamm. B.M., p. 119 (1862); Gieb., Z. ges. Nat., xxvii., p. 394 (1866). Petaurus sciureus, Gunn (nec Shaw), P. Roy. Soc. Tasm. i., p. 253 (1851). (Introduction into Tas.) Petaurus (Belideus) notatus, Peters, M.B., Ak. Berl. 1859, p. 14. Belideus notatus, Gould, Mamm. Austr., i., pl. xxvi. (animal) (1860).

Type in British Museum.

The Flying-Phalanger was introduced into Tasmania from the Mainland in the early thirties of last century. From Launceston as a centre it has spread over the whole island. The fur is very soft, of a pale grey colour on the upper surface and whitish below. Length of head and body seven inches, tail about eight inches.

Pseudochirus cooki, Des.

Tasmanian Ring-tail Phalanger ("Ring-tail Opossum").

Pseudochirus cooki, Br. As. Ad. Sc. Handbk., p. 51 (1914); Lucas & Le Souëf, An. Aust., p. 101 (1909); Smith, Nat. Tas., p. 86 (1909); Ogilby, Cat. Aust. Mamm., p. 29 (1892).

Phalangista, or *Hepoona cooki*, West, Hist. Tas. Vol. I., p. 324 (1852).

Pseudochirus cooki, Thomas, Cat. M. & M. Brit. Mus., p. 176 (1888), who also gives the following synonymy:—

Opossum, Cook, Third Voyage, i., p. 109, pl. viii. (animal) (1784). Phalangista cooki, Desm., N. Dict. d'H.N. (2), xxv., p. 476 (1817); id., Mamm., i., p. 268 (1820); Schinz, Cur. Thierr., i., p. 258 (1821); Temm., Mon. Mamm., i., p. 7 (1827); Gray, Griff. Cur. An. K., v., p. 198 (1827); Less., Man. Mamm., p. 218 (1827); id., Dict. Class. d'H.N., xiii.,

p. 334 (1828); J. B. Fisch., Syn. Mamm., p. 277 (1829); Gunn, Ann. Mag. N.H., i., p. 102 (1838); Gray, Ann. Mag. N.H., i., p. 107 (1838); Wagn., Schr. Säug. Supp., iii., p. 78 (1843), v., p. 274 (1855); Owen, Odontogr., Atl., pl. c., fig. 2 (teeth) (1845); Gunn, P. Roy. Soc. Tasm., ii., p. 84 (1852); Gieb., Odontogr., p. 42, pl. xviii., fig. 2 (teeth) (1855); Schleg., Dierent., p. 166 (1872). Petaurus cooki, F. Cuv., Dent's Mamm., pp. 129, 253 (1825); id., Dict. Sci. Nat., xxxix., p. 417 (1826). Trichosurus cooki, Less., N.H. Mamm. (Compl. Buff.), iv., p. 471, pl. xxviii. (animal) (1830). Phalangista viverrina, Ogilb., P.Z.S., 1837, p. 131; Waterh., Cat. Mamm. Mus. Z.S., p. 67 (1838); Schinz, Syn. Mamm., i., p. 529 (1844); Hombr. & Jacq., Voy. Pôle Sud, Zool., iii., pp. 31, 33, Atl., pls. xiv. (animal & skull), xv. (animal, albino, and skull) (1845-53); Gould, Mamm. Austr., i., pl. xix. (animal) (1856); Gerrard, Cat. Bones Mamm. B.M., p. 122 (1862); Krefft, Cat. Mamm. Austr. Mus., p. 37 (1864); id., Notes Faun. Tasm., p. 4 (1868); id., Mamm. Austr. text to pl. vii., p. 2 (1871). Hepoona cooki, Gray, Grey's Austr., App. ii., p. 402 (1841); id., List Mamm. B.M., p. 84 (1843); Gerrard, Cat. Bones Mamm. B.M., p. 121 (1862). Phalangista (Pseudochirus) viverrinus, Waterh., Jard. Nat. Libr. Mamm., xi., p. 277, pl. xxiv. (animal) (1841). Trichosurus viverrinus, Less., N. Tabl. R.A., Mamm., p. 189 (1842). Phalangista incana, Schinz, Syn. Mamm., i., p. 530 (1844).

Type specimen unknown.

The common "ring-tail." This species is confined to Tasmania. The fur is brown on upper surface and whitish below. Head and body fourteen inches. The tail, which is tipped white, is about the same length.

TRICHOSURUS VULPECULA, var. FULIGINOSUS, Ogilby.

Tasmanian Phalanger ("Brush Opossum").

Trichosurus vulpecula, Br. As. Ad. Sc. Hbk., p. 50 (1914).

Trichosurus vulpecula, var. *fulginosus*, Br. As. Ad Sc. Hbk., p. 50 (1914).

Trichosurus vulpecula, Lucas & Le Souëf, An. Aust., p. 96 (1909);
Smith, Nat. Tas., p. 86 (1909).

Trichosurus vulpecula, var. *fuliginosus*, Ogilby, Cat. Aust. Mamm., p. 28 (1892).

Phalangista fuliginosa, Pict. Mus. An. Nat. Vol. I., p. 19 & pl. 95.

Phalangista vulpina, West. Hist. Tas. Vol. I., p. 324 (1852).

Trichosurus vulpecula, var. *fuliginosus*, Thomas, Cat. M. & M. Brit. Mus., p. 190 (1888), who also gives the following synonymy:—

Phalangista fuliginosa, Ogilb., P.Z.S., 1831, p. 135; Gunn, Ann. Mag. N.H., i., p. 102 (1838); Waterh., Cat. Mamm. Mus. Z.S., p. 67 (1838); id., Jard. Nat. Libr., Mamm., xi.,

p. 267 (1841); Gray, Grey's Austr., App. ii., p. 401 (1841); Less., N. Tabl., R.A., Mamm., p. 188 (1842); Gray, List Mamm. B.M., p. 85 (1843); Wagn., Schr. Säug. Supp., iii., p. 77 (1843); Schinz. Syn. Mamm., i., p. 527 (1844); Gould, Mamm. Austr., i., pl. xv. (animal) (1849); Gunn, P. Roy. Soc. Tasm., ii., p. 83 (1852); Gerrard, Cat. Bones Mamm, B.M., p. 121 (1862); Krefft, Cat. Mamm. Austr. Mus., p. 38 (1864); id., Notes Faun. Tasm., p. 4 (1868); id., Mamm. Austr. pl. ix (animal) (1871). Phalangista fuliginosa, var. grisea, Gray, Grey's Aust., App. ii., p. 401 (1841). Phalangista felina, Wagn., Schr. Säug. Supp., iii., p. 76 (1843), v., p. 270 (1855); Schinz, Syn. Mamm., i., p. 527 (1844).

Type in British Museum.

The Phalangers are usually referred to as Opossums, but the designation is not strictly correct.

This species has been greatly reduced in numbers owing to the value placed on its fur. General colour rufous-grey or deep umber-brown. Head and body about twenty-four inches, the tail, which is very bushy, is about fifteen inches long. It is sometimes questioned if we have not two species, but I prefer to treat them as one. In this connection see notes by Ronald Gunn, p. 84, P. & P. Roy. Soc. Tas., 1852.

PHASCOLOMYS URSINUS, var. TASMANIENSIS.

Tasmanian Wombat.

Phascolomys ursinus, Lucas and Le Souëf, An. Aust., p. 111 (1909);
Camb. Nat. Hist. Mamm., p. 145 (1902);
Ogilby, Cat. Aust. Mamm., p. 25 (1892).

Phascolomys wombat, Pict. Mus. An. Nat., Vol. I., p. 22 and pls. 90-91;
West, Hist. Tas., Vol. I., p. 324 (1852).

Phascolomys tasmaniensis, Spencer and Kershaw, Mem. 3. Nat. Mus. Melb. (1907).

Phascolomys ursinus, Thomas, Cat. M. & M. Brit. Mus., p. 215 (1888), who gives the following synonymy:—

Wombat, Collins, New South Wales, ii., p. 153, plate (animal) (1802); Home, Phil. Trans. 1808, p. 304, pl. ix. (anat). Didelphis ursina, Shaw, Gen. Zool., i., pt. 2, p. 504 (1800). Wombatus fossor, Desm., N. Dict. d'H.N. (1) xxiv., p. 20 (1803); Sevast. Mém. Ac. Pétersb., i., p. 445 (1807); Tiedem. Zool., p. 433 (1808); G. Fisch, Zoogn., iii., p. 15 (1814). Phascolomys fusca (Geoff.), Ill., Prodr. Syst. Mamm., p. 78 (1811); Desm., N. Dict. d'H.N. (2), xxv., p. 500 (1817); Owen, Cyclop. Anat. Phys., iii., p. 267, figs. 93. 94, & 105 (skull & skeleton) (1840). Amblotis fossor, Ill. Prodr. Syst.

Mamm., p. 77 (1811). Opossum hirsutum, Perry, Acana, letterpress & plate (animal) (1811). Phascolomys vombatus, Leach, Zool. Misc., ii., p. 102, pl. xcvi. (animal) (1815); Owen Odontogr., pl. c., fig. 9 (teeth) (1845); Gray, P.Z.S., 1847, p. 41; Owen, Tr. Z.S., iii., p. 303, pl. xxxvii., figs. 1-3 (skull) (1849); id., Cat. Ost. Coll. Surg., i., p. 330 (1853); id., Phil. Trans., 1872, pp. 173 & 241, et seqq., figs. 1 & 2, pls. xix., xxi., to xxiii. & xxxix. (skull, teeth, etc.); id., Tr. Z.S., viii., p. 345 et seqq., pls. l. to lvii. (skull) (1872); id., Tr. Z.S., viii., p. 483 et seqq. (1874). Phascolomys wombat. Pér. & Les. Voy. Terr. Aust., ii., p. 13, Atl., pl. xxviii. (animal) (1816); Desm., Mamm., i., p. 276 (1820); id., Dict. Sci. Nat., xxxix., p. 450 (1826); Gray, Griff. Cur. An. K.V., p. 206 (1827); Less., Dict. Class. d'H.N., xiii., p. 352 (1828); Fisch., Syn. Mamm., p. 285 (1829); Less., H.N. Mamm. (Compl. Buff), iv., p. 500, pl. xxxvii. (1830); Owen, P.Z.S., 1836, p. 49 (Anat); Benn., Cat. N.H., Austr. Mus., p. 2 (1837); Waterh., Cat. Mamm. Mus. Z.S., p. 68 (1838); Gunn, Ann. Mag. N.H. (1), i., p. 103 (1838); Gulliver, P.Z.S., 1841, p. 51; Waterh., Jard. Nat. Libr. Mamm., xi., p. 302, pl. xxxii. (animal) (1841); Owen, Tr. Z.S., ii., p. 408, pl. lxviii. (skeleton) & pl. lxxi., fig. 6 (skull) (1841); Less., N. Tabl. R.A. Mamm., p. 192 (1842): Schinz, Syn. Mamm., i., p. 568 (1844); Waterh., N.H. Mamm., i., p. 246, pl. iii., fig. 1 (skull), and pl. xii., fig. 7 (sole) (1846); Gerv., Dict. Univ. d'H.N., ix., p. 723 (1849); Gunn, P. Roy. Soc. Tasm., ii., p. 85 (1852); Gould, Mamm. Austr., i., pls. lv. & lvi. (animal) (1855); Gerv., H.N. Mamm., ii., p. 267, fig. (animal & teeth) (1855); Gieb., Odontogr., p. 43, pl. xix., fig. 4, 6 & 7 (teeth) (1855); Schleg., Dierk., p. 144 (1857); Angas, P.Z.S., 1861, p. 269; Krefft, Cat. Mamm. Austr. Mus., p. 54 (1864); Murie, P.Z.S., 1865, p. 853, fig. 2 (skull); id., P.Z.S., 1867, p. 798 et seqq; McCoy, Tr. Roy. Soc. Victoria, viii., p. 267, fig. B. (nasals) (1868); Krefft, Notes Faun. Tasm., p. 4 (1868); id., Mamm. Austr., pl. v. (animal) (1871); Schleg., Dierent., p. 172, fig. (animal) (1872); Gulliver, P.Z.S., 1875, p. 491, pl. lv., fig. 50 (blood-corpuscle); Schmidt, P.Z.S., 1880, p. 305; Higg. & Pett., P. Roy. Soc. Tasm., 1883, p. 196; Flow. & Gars., Cat. Ost. Coll. Surg., ii., p. 696 (1884); Lyd., Cat. Foss. Mamm. B.M., v., p. 147, fig. 26 (dentition) (1887); Jent., Cat. Ost. Leyd. Mus., p. 307 (1887). Phascolomys ursinus, G. Cuv., R.A., i., p. 185 (1817); F. Cuv. H.N. Mamm. (fol.) livr. x. (animal) (1819); Schinz, Cuv. Thierr., i., p. 266 (1821); F. Cuv., Dents Mamm., p. 139, pl. xliv. (teeth) (1825); Burm., Lehrb. Naturg., p. 547 (1830); Gray, Grey's Austr., App. ii., p. 404 (1841); id., List Mamm. B.M., p. 95 (1843); Gerrard. Cat. Bones Mamm. B.M., p. 131 (1862): Gray, Ann. Mag N.H. (3), xi., p. 458 (1863). Phascolomys bassi, Less., Man. Mamm., p. 229 (1827). Phascolomys fossor. Wagn., Schr. Säug. Supp., iii., p. 132 (1843), v., p. 333 (1855); Gieb., Säug., p. 669 (1859); id., Bronn's Kl. U. Ordn. vi., Abth. v., pl. xxi., figs. 1-3 (skull) (1874); Brehm, Thierl, ii., p. 601, fig. (animal & skeleton) (1880).

Head and body measure about thirty-eight inches. The colour varies from dark brown to grizzled grey. This inoffensive animal has been greatly reduced in numbers, and is now only met with in the less settled parts of the State.

In 1907 Professor Sir Baldwin Spencer and Mr. J. A. Kershaw, in Memoir 3 of the National Museum, Melb., showed that the Tasmanian form differed from the form met with in the Islands of Bass Straits. As it was originally described from the latter locality the specific designation *ursinus* was reserved for the island form, and the name *tasmanansis* given to the Tasmanian species. The position is open to further research with a long series of adult bones, and in the present instance I prefer to treat the Tasmanian form as a variety only.

PERAMELES OBESULA, Shaw.

Short-nosed Bandicoot.

Perameles obesula, Br. As. Ad. Sc. Handbk., p. 52 (1914);
Lucas and Le Souëf, An. Aust., p. 136 (1909);
Ogilby, Cat. Aust. Mamm., p. 23 (1892);
West, Hist. Tas., Vol. I., p. 324 (1852).

Perameles obesula, Thomas, Cat. M. & M. Brit. Mus., p. 231 (1888), who gives the following synonymy:—

Didelphis obesula, Shaw, Nat. Misc., viii., p. 298 (animal) (circa 1793); id., Gen. Zool., i., pt. ii., p. 490 (1800); Turt., Linn. Syst. Nat., i., p. 68 (1806). Perameles obesula, Geoff., Ann. Mus., iv., p. 64, pl. xlv. (animal and skull) (1804); G. Fisch., Zoogn., iii., p. 13 (1814); Desm., Mamm., i., p. 265 (1820); Schinz, Cuv. Thierr., i. p. 256 (1821); Gray, Griff. Cuv. An., K., v., p. 195 (1827); Less., Man. Mamm., p. 217 (1827); id., Dict. Class. d'H.N., xiii., p. 200 (1828); J. B. Fisch., Syn. Mamm., p. 274 (1829); Less., H.N. Mamm. (Compl. Buff.), iv., p. 487 (1830); Waterh., Cat. Mamm. Mus. Z.S., p. 65 (1838); id., Jard. Nat. Libr., Mamm., xi., p. 159, pl. xiv. (animal) (1841); Gray, Grey's Austr., App. ii., p. 401 (1841); Owen, Tr. Z.S., ii., p. 320 (1841); Wagn., Arch. f. Nat., vii., pt. 1, p. 290 (1841); Less., N. Tabl. R.A. Mamm., p. 191 (1842); Gray, List. Mamm. B.M., p. 96 (1843); Wagn., Schr. Säug. Supp., iii., p. 59 (1843), v., p. 211 (1855); Schinz., Syn. Mamm., i., p. 516 (1844); Waterh., N.H. Mamm., i., p. 368, pl. xx., fig. 2 (skull) (1846); Gunn, P. Roy. Soc. Tasm., ii., p. 83 (1852); Gieb., Odontogr., p. 40, pl. xviii., fig. 7. (teeth) (1855); Gould, Mamm. Austr., i., pl. xii. (animal) (1856); Schleg., Dierk., p. 138 (1857); Gieb., Säug. p. 721 (1859); Gerrard, Cat. Bones Mamm. B.M., p. 132 (1862); Krefft, Cat. Mamm. Austr. Mus., p. 34 (1864); id., Notes Faun. Tasm., p. 1 (1868); id., Mamm. Austr. text to pl. xi., p. 6 (1871); Schleg., Dierent., p. 164 (1872); Gieb., Bronn's Kl. U. Ord. vi., Abth. v., pl. xix., fig. 7 and pl. xlvii., fig. 30 (skull and teeth) (1874-76); Flow. and Gars., Cat. Ost. Coll. Surg., ii., p. 736 (1884); Lyd., Cat. Foss. Mamm. B.M., p. 256 (1887); Jent., Cat. Ost. Leyd. Mus., p. 306 (1887). Thylacis obesula, Ill., Prodr. Syst. Mamm., p. 76 (1811). Isoodon obesula, Desm., N. Dict. d'H.N. (2). xvi., p. 409 (1817); F. Cuv., Dict. Sci. Nat., xxxviii., p. 416 (1825); Desm., Dict. Univ. d'H.N., ix., p. 579 (1849). Perameles fusciventer, Gray, Grey's Austr. App. ii., p. 407 (1841); id., List. Mamm.

B.M., p. 96 (1843); Gerrard, Cat. Bones Mamm. B.M., p. 132 (1862). Perameles affinis, Gray, List Mamm. B.M., p. 96 (1843).

Type unknown.

The Bandicoots are common throughout Tasmania. This species, which also occurs all over the south of Australia, measures about 14 inches over head and body.

PERAMELES GUNNI, Gray.

Tasmanian Striped Bandicoot.

Perameles gunni, Br. As. Ad. Sc. Handbk., p. 52 (1914);
Lucas and Le Souëf, An. Aust., p. 135 (1909);
Ogilby, Cat. Mamm. Aust., p. 22 (1892);
West, Hist. Tas. Vol. I., p. 324 (1852).

Perameles gunni, Thomas, Cat. M. & M. Brit. Mus., p. 245 (1888), who also gives the following synonymy:—

Perameles gunni, Gray, P.Z.S., 1838, p. 1; id., An. Mag. N.H., i., p. 107 (1838); Gunn, Ann. Mag. N.H., i., p. 102 (habits) (1838); Owen, Tr. Z.S., ii., p. 320 (1841); Gray, Grey's Austr., App. ii., p. 401 (1841); Waterh., Jard. Nat. Libr. Mamm., xi., p. 156, pl. xv. (animal) (1841); Less., N. Tabl. R.A., Mamm., p. 191 (1842); Gray, List Mamm. B.M., p. 95 (1843); Wagn., Schr. Säug. Supp., iii., p. 61 (1843), v., p. 214 (1855); Schinz, Syn. Mamm., i., p. 517 (1844); Waterh., N.H. Mamm., i., p. 376 (1846); Desm. Dict. Univ. d'H.N., ix., p. 579 (1849); Gunn, P. Roy. Soc. Tasm., ii., p. 83 (1852); Schleg., Dierk., p. 138 (1857); Gould, Mamm. Austr., i., pl. ix. (animal) (1859); Gieb., Säug., p. 722 (1859); Gerrard, Cat. Bones Mamm. B.M., p. 132 (1862); Krefft, Notes Faun. Tasm., p. 4 (1868); id., Austr. Vert., p. 13 (1871); Schleg., Dierk., p. 163 (1872); Jent., Cat. Ost. Leyd. Mus., p. 306 (1887).

Type in British Museum.

This species, which also occurs in Victoria, is slightly larger than *P. obesula*, and has a more elongated muzzle. The white bands on the rump are distinctive. These bands are particularly prominent in the young.

THYLACINUS CYNOCEPHALUS, Harris.

Tasmanian Marsupial Wolf ("Tiger").

Thylacinus cynocephalus, Br. As. Ad. Sc. Handbk., p. 53 (1914);
Lucas and Le Souëf, An. Aust., p. 132 (1909);
Smith, Nat. Tas., p. 95, and fig. 23 (1909);
Camb. Nat. Hist. Mamm., p. 150 (1902);
Ogilby, Cat. Aust. Mamm., p. 19 (1892);
West, Hist. Tas., Vol. I., p. 322 (1852).

Thylacinus cynocephalus, Thomas, Cat. M. & M. Brit. Mus. p. 255 (1888), who also gives the following synonymy:—

Didelphys cynocephala, Harris, Tr. Linn. Soc., ix., p. 174, pl. xix., fig. 1 (animal) (1808). Dasyurus cynocephalus, Geoff., Ann. Mus., xv., p. 304 (1810); G. Cuv., R.A., i., p. 175 (1817); Desm., N. Dict. d'H.N. (2), ix., p. 136 (1817); Geoff., Dict. Sci. Nat., xii., p. 510 (1818); Desm., Mamm., i., p. 262 (1820); Desmoul., Dict. Class. d'H.N., v., p. 338 (1824); Gray, Griff. Cuv. An. K., v., p. 192 (1827). Thylacinus harrisi, Temm., Mon., Mamm., i., p. 63, pl. vii., figs. 1-4 (skull) (1827); Less., Man. Mamm., p. 216 (1827); id., Cent. Zool., p. 14, pl. ii. (animal & skull) (1830); Kaup, Thierr., i., p. 239 (1835); Less., H.N. Mamm. (Compl. Buff), v., p. 367, pl. xxvi. (animal) (1836); Waterh., Cat. Mamm. Mus. Z.S., p. 64 (1838); Owen, P.Z.S., 1838, p. 121, et seqq.; id.. Tr. Z.S., ii., pp. 317 & 408, pl. lxx., fig. 1 (skull) (1841); id., P.Z.S., 1843, p. 148; id., Odontogr., Alt., pl. xcviii., fig. 1 (teeth) (1845); id., Todd's Cyclop. Anat. Phys., iii., p. 258, fig. 80 (teeth) (1847); Less., N. Tabl. R.A. Mamm., p. 190 (1842). Thylacinus cynocephalus, Fisch., Syn. Mamm., p. 270 (1829); Pearson, J.A.S.B., iv., p. 572, pl. xlviii., fig. 49 (dentition) (1835); Gunn, Ann. Mag. N.H. (1), i., p. 101 (1838) (habits); Gray, Grey's Austr., App. ii., p. 400 (1841); Waterh., Jard. Nat. Libr., Mamm., xi., p. 123, pl. v. (animal) (1841); Wagn., Schr. Säug. Supp., iii., p. 19 (1843), v., p. 193 (1855); Schinz., Syn. Mamm., i., p. 489 (1844); Waterh., N.H. Mamm., i., p. 456, pl. xvii., fig. 2 (animal) & xxi., fig. 3 (skull) (1846); Gunn, P.Z.S., 1850, p. 90, pl. xviii. (animal); Gould, Mamm. Austr., i., pls. liii., liv. (animal) (1851); Gunn, P. Roy. Soc. Tasm., ii., p. 80 (1852); Crisp, P.Z.S., 1855, p. 188 (anat); Gerv., H.N. Mamm., ii., p. 280, figs. (skeleton, teeth & animal) (1855); Gieb., Odontogr., p. 39, pl. xviii., fig. 10 (teeth) (1855); Schleg., Dierk., p. 134 (1857); Gieb.. Säug., p. 734 (1859); Gunn, P.Z.S.. 1863, p. 103 (habits); Krefft, Notes Faun. Tasm., p. 4 (1868); id., Austr. Vert., p. 14 (1871); Schleg. Dierent., p. 157 & fig. (animal) (1872); Scott, P.Z.S., 1872. p. 355; Gieb.. Bronn's Kl. U. Ordn. vi., Abth. v., pl. xix., figs. 2 & 3 (skull) (1874); Cunningham, J. Anat. Phys., xii.. p. 427 (1878) (Anat. limbs); id., Rep. Voy. "Challenger," Zool., v., pt. 2, pls. i.-xiii. (1882) (Anat.); Brehm, Thierl., ii., p. 545 & figs. (skeleton & animal) (1880); Dobs., J. Anat. Phys., xvii., p. 154 (1882) (Anat. feet); Flow., Encycl. Brit. (9), xv., p. 380, fig. 26 (animal) (1883); Higg. & Pett., P. Roy. Soc. Tasm., 1883, p. 197; Flow. & Gars.. Cat. Ost. Coll. Surg., ii., p. 745 (1884); Gent., Cat. Ost. Leyd. Mus., p. 305 (1887). Lycaon cynocephalus, Wagl., Syst. Amph. Säug., p. 24 (1830). Dasyurus lucocephalus, Grant, Glean. Sci., iii., p. 175 (1831). Thylacinus striatus, Warlow. J.A.S.B., ii., p. 97 (1833). Peracyon cynocephalus, Gray, List. Mamm., B.M., p. 97 (1843); Gerrard, Cat. Bones Mamm.. B.M., p. 133 (1862). Thylacinus breviceps, Krefft, An. Mag. N.H. (4), ii., p. 296, pl. xvii. (skull) (1868); id., Notes Faun. Tasm., p. 4 (1868); id., Austr. Vert., p. 14 (1871).

Type specimen unknown.

Owing to their partiality for killing sheep, a war of extermination has been waged against the "Tigers." They are now rare, and are only found in the most rugged parts of the island. The value of a specimen is at present about £20.

It is interesting to note that fossil remains of this genus are found on the mainland, but the animal itself has been extinct there for many years.

Head and body measure about 45 inches, the fur being yellowish grey, and barred on the lower portion of the back by about 16 or 18 dark brown bands. At one time it was considered that there were two distinct species, but the second, *T. breviceps*, has since been disallowed.

Sarcophilus ursinus, Harris.

Tasmanian Devil.

Sarcophilus ursinus, Br. As. Ad. Sc. Handbk., p. 52 (1914);
Lucas & Le Souëf, An. Aust., p. 130 (1909);
Smith, Nat. Tas., p. 97 & fig. 24 (1909);
Ogilby, Cat. Aust. Mamm., p. 18 (1892);
Camb. Nat. Hist. Mamm., p. 151.

Dasyurus ursinus, West, Hist. Tas., Vol. I., p. 323 (1852).

Sarcophilus ursinus, Thomas, Cat. M. & M. Brit. Mus., p. 259 (1888), who also gives the following synonymy:—

Didelphys ursina, Harris, Tr. Linn. Soc., ix., p. 176 pl. xix., fig. 2 (animal) (1808) (nec Shaw). Dasyurus ursinus, Geoff., Ann. Mus., xv., p. 305 (1810); G. Cuv., R.A., i., p. 175 (1817); Desm., N. Dict. d'N.H. (2), ix., p. 137 (1817); Geoff., Dict. Sci. Nat., xii., p. 510 (1818); Desm., Mamm., i., p. 263 (1820); Desmoul., Dict. Class d'H.N., v., p. 338 (1824); Gray, Griff. Cuv. An. K., v., p. 192 (1827); Temm., Mon. Mamm., i., p. 68, pl. viii., figs. 1-5 (skull) (1827); Less., Man. Mamm., p. 214 (1827); Fisch., Syn. Mamm., p. 271 (1829); Less., H.N. Mamm. (Compl. Buff.), v., p. 372 (1836); Gunn, Ann. Mag. N.H., i., p. 103 (1838) (habits); Owen, P.Z.S., 1838, p. 121 et seqq.; id., Tr. Z.S., ii., pp. 389 & 408, pl. lxx., fig. 5 (skull) (1841); Waterh., Jard. Nat. Libr. Mamm., xi., p. 128 (1841); Wagn., Schr. Säug. Supp., iii., p. 22 (1843), v., p. 193 (1855); Schinz., Syn. Mamm., i., p. 490 (1844); Owen, Odontogr., Alt., pl. xcviii., fig. 2 (teeth) (1845); id., Todd's Cyclop. Anat. Phys., iii., p. 259, fig. 81 (teeth) (1847); Gunn, P. Roy. Soc. Tasm., ii., p. 81 (1852); Gieb., Odontogr., p. 39, pl. xvii., fig. 6 (teeth) (1855); Schleg., Dierk., p. 135 (1857); Gieb., Säug., p. 732 (1859); Flow., P. Geol. Soc., 1868, p. 313, figure (skull); Schleg., Dierent., p. 159 (1872); Brehm, Thierl., ii., p. 547, fig. (animal) (1880); Flow., Encycl. Brit. (9), xv., p. 379, fig. 24 (skull) (1883); Flow. & Gars., Cat. Ost. Coll. Surg., ii., p. 743 (1884); Jent., Cat. Ost. Leyd. Mus., p. 305

(1887). Sarcophilus ursinus, F. Cuv. H.N. Mamm. (fol.), iv., livr., lxx. (animal) (1837); Less., N. Tabl. R.A. Mamm., p. 190 (1842); Mayer, D'Alton's Zeitschr. Zool. Pal., i., p. 181 (1849) (Anat.); Gould, Mamm. Austr., i., pl. xlviii. (animal) (1851); Gerv., H.N. Mamm., ii., p. 282 (1855); Krefft, Cat. Mamm. Austr. Mus., p. 25 (1864); id., Notes Faun. Tasm., p. 4 (1868); id., Austr. Vert., p. 14 (1871); Chatin, Bull. Soc. Philom. (6), xii., p. 54 (anatomy of anal glands) (1877); Higg. & Pett., P.R. Soc. Tasm., 1883, p. 197. Diobolus ursinus, Gray, Grey's Austr., App. ii., p. 400 (1841); id., List. Mamm. B.M., p. 97 (1843); Gerrard, Cat. Bones Mamm. B.M., p. 134 (1862). Dasyurus (Sarcophilus) ursinus, Waterh., N.H. Mamm., i., p. 448, pl. xxi., fig. 4 (skull) (1846); Vrolik, Tijdschr. Wis. & Natuurk. Wet. Amsterd., iv., p. 153 (1851) (Anat).

Type specimen unknown.

This species is confined now to Tasmania, although fossil remains of nearly related species are found on the mainland. It well merits its designation, being exceedingly quarrelsome. Head and body measure about 30 inches. The fur is thick and black, with irregular patches of white, one of which usually forms a collar under the neck. It is now only met with in the rugged unsettled districts.

DASYURUS MACULATUS, Kerr.

Tiger Cat.

Dasyurus maculatus, Br. As. Ad. Sc. Handbk., p. 51 (1914);
Lucas & Le Souëf, An. Aust., p. 129 (1909);
Smith, Nat. Tas., p. 87 (1909);
Ogilby, Cat. Aust. Mamm. p. 17 (1892);
West. Hist. Tas., Vol. I., p. 323 (1852).

Dasyurus maculatus, Thomas, Cat. M. & M. Brit. Mus., p. 263 (1888), who also gives the following synonymy:—

Spotted Marten, Phillip, Voy. Botany Bay, p. 276, pl. xlvi. (animal) (1789). Viverra maculata, Kerr, Linn. An. K., p. 170 (1792); Shaw, Gen. Zool., i., pt. ii., p. 433 (1800); Turton, Linn, S.N., i., p. 56 (1806). Mustela novæ-hollandiæ, Meyer, Syst. Uebers. Zool. Entd., p. 27 (1793). Dasyurus macrourus, Geoff., Ann. Mus., iii., p. 358 (1804); Tiedem., Zool., p. 428 (1808); Péron, Voy. Terres Austr. (2), pl. xxxiii. (animal) (1811); Desm., N. Dict. d'H.N. (2), ix., p. 138 (1817); G. Cuv., R.A., i., p. 175 (1817); Geoff., Dict. Sci. Nat., xii., p. 510 (1818); Desm., Mamm., i., p. 263 (1820); Desmoul., Dict. Class d'H.N., v., p. 338 (1824); F. Cuv. Dent's Mamm., p. 75, pl. xxiii., B. (teeth) (1825); Gray, Griff. Cuv. An. K., v., p. 193 (1827); Less., Man. Mamm., p. 214 (1827); Temm., Mon. Mamm., i., p. 69 (1827); Fisch., Syn. Mamm., p. 271 (1829); Burm., Lehrb. Naturg., p. 548 (1830); Owen, P.Z.S., 1835, p. 7 (Anat.); Less., H.N. Mamm. (Compl. Buff), v., p. 372, x., p. 366 (1836); Waterh., Cat. Mamm. Mus. Z.S., p. 65 (1838); Owen, P.Z.S., 1838, p. 121 et seqq.; id., Tr. Z.S., ii., pp. 389, 408, pl. lxx., fig. 4 (skull) (1841); Waterh., Jard. Nat. Libr., Mamm. xi., p. 130, pl. vi. (animal) (1841); Less., N. Tabl. R.A., Mamm., p. 190 (1842); Wagn., Schr. Säug. Supp., iii., p. 23, pl. clii., B. a (animal) (1843), v., p. 196 (1855); Schinz., Syn. Mamm., i., p. 490 (1844); Gieb., Odontogr., p. 39, pl. xvii., figs. 1 & 3 (teeth) (1855); Dobs., J. Anat. Phys.. xvii., p. 153 (1882) (Anat. feet). Dasyurus maculatus, G. Fisch., Zoogn., ii., p. 584 (1813); Gray, Grey's Austr., App. ii., p. 400 (1841); id., List Mamm. B.M., p. 98 (1843); Waterh., N.H. Mamm., i., p. 439, pl. xxi., fig. 2, skull (1846); Gould, Mamm. Austr., i., pl. xlix. (animal) (1851); Gunn, P. Roy. Soc. Tasm., ii., p. 81 (1852); Schleg., Dierk., p. 135 (1857); Gieb., Säug., p. 731 (1859); Gerrard, Cat. Bones Mamm. B.M., p. 135 (1862); Krefft, Cat. Mamm. Austr. Mus., p. 25 (1864); id., Notes Faun. Tasm., p. 4 (1868); id., Austr. Vert., p. 14 (1871); Schleg., Dierent., p. 158 (1872); Higg. & Pett., P. Roy. Soc. Tasm., 1883, p. 197; Flow. & Gars., Cat. Ost. Coll. Surg., ii., p. 741 (1884); Jent., Cat. Ost. Leyd. Mus., p. 304 (1887); Coll. Zool. Jahrb., ii., p. 854 (1887). Dasyurus ursinus, Gieb., Bronn's Kl. U. Ordn. vi., Abth. v., pl. xviii., figs. 4 & 5 (skull) (1874) (nec Harris).

Type specimen unknown.

The great spotted-tailed Native Cat, or as it is more commonly called, the "Tiger Cat," is found from Queensland to Tasmania. It is much larger than the following species, measuring over twenty-four inches over head and body, and the tail nineteen inches. Fur brown, tinged orange (never black), with large white spots. Under surface white, tinged yellow.

Dasyurus viverrinus, Shaw.

Common Native Cat.

Dasyurus viverrinus, Br. As. Ad. Sc. Handbk., p. 51 (1914);
Lucas & Le Souëf, An. Aust., p. 128 (1909);
Smith, Nat. Tas., p. 87 (1909);
Ogilby, Cat. Aust. Mamm., p. 16, (1892);
West, Hist. Tas., Vol. I., p. 323 (1852).

Dasyurus viverrinus, Thomas, Cat. M. & M. Brit. Mus., p. 265, who also gives the following synonymy:—

Spotted Opossum, Phillip, Voy. Botany Bay, p. 147, pl. xv. (1789). Tapoa tafa, spotted variety, White, Journ. Voy. N.S.W., p. 285, pl. lix. (1790). Didelphis maculata, Kerr, Linn. An. K., p. 199 (1792) (nec viverra maculata. id., op. cit., p. 170); G. Cuv. Tabl. Elem., p. 125 (1798); Wiedem., Cuv. Naturg. Thiere, i., p. 179 (1800); Turton, Linn. Syst. Nat. i., p. 68 (1806). Didelphis viverrinus, Shaw, Gen. Zool., i., pt. ii., p. 491, pl. cxi. (1800). Dasyurus viverrinus, E. Geoff. Ann. Mus., iii., p. 360 (1804); Sevast., Mem. Ac. Petersb., i., p. 443 (1807); Ill., Prodr. Syst. Mamm., p. 77 (1811); G. Fisch., Zoogn., ii., p. 585 (1813); G. Cuv. R.A., i., p. 176 (1817); Desm., N. Dict. d'H.N. (2), ix., p. 139 (1817); Geoff., Dict. Sci. Nat., xii., p. 511 (1818); Desm., Mamm., i., p. 263 (1820); Desmoul., Dict. Class. d'H.N., v., p. 339 (1824); Gray, Griff. Cuv. An. K., v., p. 193 (1827); Less., Man. Mamm., p. 215 (1827); Temm., Mon. Mamm., i., p. 72 (1827); J. B. Fisch., Syn. Mamm., p. 272 (1829); Less., H.N. Mamm. (Compl. Buff.), v., p. 373, pl. xxv., 1836; Waterh., Cat. Mamm. Mus. Zool. Soc., p. 65 (1838); Gunn, Ann. Mag. N.H. (1), i., p. 104 (1838); Gould, P.Z.S., 1840, p. 151; Owen, Tr. Z.S., ii., p. 408, pl. lxx., fig 2 (skull) (1841); Gray, Grey's Austr. App. ii., p. 400 (1841); Less., N. Tabl. R.A., Mamm., p 190 (1842); Gray, List Mamm. B.M., p. 97 (1843); Wagn., Schr. Säug. Supp., iii., p. 33, 1843, v., p. 194 (1855); Waterh., N.H., Mamm., i., p. 442, pl. xii., fig. 1 (soles of feet) (1846); Gould, Mamm. Austr., i., pl. l. (animal) (1851); Gunn, P. Roy. Soc. Tasm., ii., p. 81 (1852); Gerv., H.N. Mamm., ii., p. 282 (1855); Schleg., Dierk., p. 135 (1857); Gieb., Säug., p. 731 (1859); Gerrard, Cat. Bones Mamm. B.M., p. 134 (1862); Krefft, Cat. Mamm. Austr. Mus., p. 26 (1864); id., Notes Faun. Tasm., p. 4 (1868); id., Austr. Vert., p. 14 (1871); Schleg., Dierent., p. 159 (1872); Brehm. Thierl., ii., p. 549 (1880); Higg. & Pett., P. Roy. Soc. Tasm., 1883, p. 197; Flow. & Gars., Cat. Ost. Coll. Surg., ii., p. 742 (1884); Jent., Cat. Ost. Leyd. Mus., p. 304 (1887); Thos., Phil. Trans., clxxvii., p. 461, pl. xxvii., fig. 5 (teeth), 1887; Leyd., Cat. Foss. Mamm. B.M., v., p. 268 (1887). Dasyurus maugei, Geoff., Ann. Mus., iii., p. 359 (1804); Tiedem., Zool., p. 429 (1808); G. Fisch., Zoogn., ii., p. 584 (1813); Desm., N. Dict. d'H.N. (2), ix., p. 138 (1817); Geoff., Dict. Sci. Nat., xii., p. 511 (1818); Desm., Mamm., i., p. 263 (1820); Goldf., Handbk. Zool., ii., p. 449 (1820); Desmoul., Dict. Class d'H.N., v., p. 339 (1824); F. Cuv. H.N. Mamm. (fol.), iii., livr. xliv. (animal) (1824); Quoy & Gaim., voy. Uranie, p. 54, pl. iv. (animal and skull) (1824); Gray, Griff. Cuv. An. K., v., p. 193 (1827); Temm., Mon. Mamm., i., p. 71, pl. vii., figs. 5-8 (skull) (1827); Less., Man. Mamm., p. 214 (1827); J. B. Fisch., Syn. Mamm., p. 271 (1829); Less., H.N. Mamm. (Compl. Buff.), v., p. 373, pl. xxxvi. (animal) (1836); Benn., Cat. N.H. Austr. Mus., p. 2 (1837); Owen, P.Z.S., 1838, p. 121 et seqq.; Waterh., Cat. Mamm. Mus. Zool. Soc., p. 65 (1838); Gould, P.Z.S., 1840, p. 151; Owen, Tr. Z.S., ii., pp. 397, 408, pl. lxx., fig. 3 (skull) (1841); Waterh., Jard., Nat. Libr., Mamm., xi., p. 133, pl. vii. (animal) (1841); Less., N. Tabl. R.A., Mamm., p. 190 (1842); Wagn., Schreb. Säug. Supp., iii., p. 24, pl. clii., B. b. (animal) (1843); Schinz, Syn. Mamm., i., p. 491 (1844); Gieb., Odont., p. 39, pl. xvii., fig. 8 (teeth) (1855). Dasyurus guttatus, Desm., N. Dict. d'H.N. (1), xxiv., p. 10 (1804).

Type specimen unknown.

The common native cat may be coloured either grey or black, spotted with white in both cases. Head and body measure eighteen inches, and the tail, which is bushy, twelve inches. This species also occurs in N.S.W. and Vic.

PHASCOLOGALE SWAINSONI, Waterh.

Swainson's Pouched Mouse.

Phascologale swainsoni, Br. As. Ad. Sc. Handbk. p. 52 (1914);
Lucas & Le Souëf, An. Aust., p. 125 (1909);
Ogilby, Cat. Aust. Mamm., p. 14 (1892).

Phascologale swainsoni, Thomas, Cat. M. & M. Brit. Mus., p. 285 (1888), who gives the following synonymy:—

Phascogale swainsoni, Waterh., Mag. N.H. (2). iv., p. 299 (1840); Wagn., Schr. Säug. Supp., iii., p. 36 (1843), v., p. 199 (1855); Schinz, Syn. Mamm., i., p. 493 (1844); Gieb., Säug., p. 727 (1859); Gent., Cat. Ost. Leyd. Mus., p. 303 (1887). Phascogale (Antechinus) swainsoni, Waterh., N.H. Mamm., i., p. 411 (1846); Gunn, P. Roy. Soc. Tasm., ii., p. 82 (1852). Antechinus swainsoni, Gould, Mamm. Austr., i., pl. xxxiv. (animal) (1854); Gerrard, Cat. Bones Mamm. B.M., p. 136 (1862); Krefft, Cat. Mamm. Austr. Mus., p. 30 (1864); id., Notes Faun. Tasm., p. 4 (1864); id., P.Z.S., 1866, p. 432; id., Austr. Vert., p. 15 (1871); Gray, Voy. Ereb. Terr. Mamm., p. 12c, pl. xxv., fig. 1 (animal) (1875); Dobs., J. Anat. Phys., xvii., p. 153 (1882); Higg. & Pett., P. Roy. Soc. Tasm., 1883, p. 196. Antechinus niger, Higg. & Pett., P. Roy. Soc. Tasm., 1882, p. 172. Antechinus moorei, Higg. & Pett., op. cit., 1883, p. 182, and var. assimilis, t.c., p. 185.

Type in British Museum.

Swainson's Pouched Mouse also occurs in Victoria. The general colour is deep rufous brown. Head and body measure five inches, and the tail four inches. Higgins's and Petterd's *A. niger*, *A. moreii*, and *var. assimilis* are considered identical with *P. swainsoni* by the British Museum.

PHASCOLOGALE MINIMA, Geoff.

Little Pouched Mouse.

Phascologale minima, Br. As. Ad. Sc. Handbk., p. 52 (1914);
Lucas & Le Souef, An. Aus., p. 125 (1909);
Ogilby, Cat. Aust. Mamm., p. 13 (1892).

Phascologale minima, Thomas, Cat. M. & M. Brit. Mus., p. 287 (1888), who gives the following synonymy:—

Dasyurus minimus, Geoff., Ann. Mus., iii., p. 362 (1804); Tiedem, Zool., p. 429 (1808); G. Fisch., Zoogn., ii., p. 586 (1813); Desm., N. Dict. d'H.N. (2), ix., p. 140 (1817); Geoff., Dict. Sci. Nat., xii., p. 511 (1818); Desm., Mamm., i., p. 264

(1820); Desmoul., Dict. Class. d'H.N., v., p. 338 (1824); Gray, Griff. Cuv. An. K., v., p. 194 (1827); J. B. Fisch., Syn. Mamm., p. 273 (1829). Phascogale minima, Temm., Mon. Mamm., i., p. 59 (1827); Less., Man. Mamm., p. 215 (1827); id., H. N. Mamm. (Compl. Buff.), v., p. 371 (1836); Gray, Grey's Austr. App., ii., p. 401 (1841); Waterh., Jard. Nat. Libr. Mamm., xi., p. 140 (1841); Less., N. Tabl. R.A. Mamm., p. 191 (1842); Wagn., Schr. Säug. Supp., iii., p. 38, pl. clii., B. e. (animal) (1843), v., p. 202 (1855); Schinz., Syn. Mamm., i., p. 495 (1844); Schleg., Dierk., p. 137 (1857); Jent., Cat. Ost. Leyd. Mus., p. 304 (1887). Didelphys minima, Wagl., Syst. Amphib. Säug., p. 25 (1830). Phascogale affinis, Gray, Grey's Austr. App., p. 406 (1841); id., List Mamm. B.M., p. 99 (1843). Antechinus minimus, Gray, List Mamm. B.M., p. 99 (1843); Higg. & Pett., P. Roy. Soc. Tasm., 1883, p. 196. Phascogale (Antechinus) minima, Waterh., N.H. Mamm., i., p. 419 (1846); Gunn, P. Roy. Soc. Tasm., ii., p. 82 (1852). Antechinus affinis, Gerrard, Cat. Bones Mamm. B.M., p. 136 (1862); Krefft, P.Z.S., 1866, p. 432; Gray, Voy. Ereb. Terr., Mamm., p. 12b, pl. xxv., fig. 3 (animal) (1875). Antechinus rolandensis, Higg. & Pett., P. Roy. Soc. Tasm., 1882, p. 171. Antechinus concinnus, Higg. & Pett., op. cit., 1883, p. 184.

Type in Paris Museum.

The Little Pouched Mouse is confined to Tasmania and the adjoining islands. General colour, grey, tinged rufous. Under surface whitish. Yellow patch on front and outside of hips. Head and body five and a half inches. Tail three and a half inches long. The British Museum Authorities consider *A. rolandensis* and *A. concinnus* of Higgins and Petterd to be synonymous with *Phascologale minima.*

SMINTHOPSIS LEUCOPUS, Gray.

White-footed Pouched Mouse.

Sminthopsis leucopus, Br. As. Ad. Sc. Handbk., p. 52 (1914);
Lucas and Le Souëf, An. Aust., p. 122 (1909);
Ogilby, Cat. Aust. Mamm., p. 11 (1892).

Sminthopsis leucopus, Thomas, Cat. M. & M. Brit. Mus., p. 302 (1888), who gives the following synonymy:—

Phascogale leucopus, Gray, Ann. Mag. N.H., x., p. 261 (1842); Schinz, Syn. Mamm., i., p. 496 (1844). Antechinus leucopus, Gray, List Mamm. B.M., p. 100 (1843); Gould, Mamm, Aust., pl. xxxv. (animal) (1860); Gerrard, Cat. Bones Mamm., B.M., p. 136 (1862); Gray, Voy. Ereb. Terr. Mamm., p 12b, pl. xxvii., fig. 2 (animal) (1864); Higg. & Pett., P. Roy. Soc. Tasm., 1883, p. 196. Phascogale (Antechinus) leucopus, Waterh., N.H. Mamm., i., p. 423 (1846); Gunn, P. Roy. Soc. Tasm., ii., p. 82 (1852). Antechinus ferrugineifrons, Gould, Mamm. Austr., i., pl. xxxvi. (animal) (1854); Krefft, Cat. Mamm. Austr. Mus., p. 32 (1864); id., P.Z.S., 1866, p.

432. Podabrus leucopus, Krefft, P.Z.S., 1866, p. 433. Podabrus mitchelli, Krefft, P.Z.S., 1866, p. 433; id., Austr. Vert., p. 15 (1871). Podabrus ferrugineifrons, Krefft, Aust. Vert., p. 15 (1871). Antechinus leucogenys, Higg. & Pett., Roy. Soc. Tasm., 1882, p. 172.

Type in British Museum.

The White-footed Pouched Mouse measures about four inches over head and body. It is found from Cape York to Tasmania. Fur, above greyish brown, under white. Hands and feet pure white. Higgins and Petterd described (7) a separate species as *Antechinus leucogenys*, but the validity of this has not been recognised by the British Museum.

Sub-class III. *MONOTREMATA*.

Order MONOTREMATA.

This order is represented in Tasmania by two families, Ornithorhynchidæ and Echidnidæ.

A single representative of each family occurs, *O. anatinus* representing the former and *E. aculeata* var. *setosa* the latter.

Echidna aculeata var. setosa, Shaw.

Echidna ("Porcupine Anteater").

Echidna aculeata var. *typica*, Br. As. Ad. Sc., p. 54 (1914).

Echidna aculeata var. *setosa*, Lucas & Le Souëf, An. Austr., p. 146 (1909).

Echidna setosa, Ogilby, Cat. Aust. Mamm., p. 3 (1892).

Echidna aculeata var. *setosa*, Thomas, Cat. M. & M. Brit. Mus., p. 381 (1888), who gives the following synonymy:—

"Another species of Ornithorhynchus," Home, Phil. Trans., 1802, p. 364, pl. xiii. (animal). Echidna setosa, E. Geoff., Cat. Mus., p. 226 (Note) (1803) (ex Home); id., Bull. Soc. Philom., iii., "No. 77," p. 226 (misprinted 126), pl. xv. (animal) (1803); Desm., N. Dict. d'H.N. (1), xxiv., Tabl. Meth., p. 27 (1804); id., op. cit. (2), x., p. 53 (1817); G. Cuv. R.A., i., p. 226 (1817); Schinz, Cuv. Thierr, i., p. 339 (1821); Desm., Mamm., ii., p. 379 (1822); F. Cuv. Dict. Sci. Nat., xxxvi., p. 448 (1825); Gray, Griff. Cuv. An. K.V., p. 284 (1827); Quoy & Gaim., Voy. Astrolabe, Zool., i., p. 118 Atl., pl. xxi. (beak, etc.) (1830); Less., N. Tabl. R.A., Mamm., p. 196 (1842); Gray, List Mamm. B.M., p. 192 (1843); Waterh., N.H. Mamm., i., p. 47, pl. i., figs. 7-9 (beak and feet) (1846); Gould, Mamm. Austr., i., pl. iii. (animal) (1849); Gunn, P.

(7) Pap. and Pro. Roy. Soc. Tas., 1882.

Roy. Soc. Tasm., ii., p. 89 (1852); Gieb., Säug., p. 399 (1859); Gerrard, Cat. Bones Mamm. B.M., p. 289 (1862); Krefft, Cat. Mamm. Austr. Mus., p. 55 (1864); Gray, Handl. Edentates, p. 31 (1873); Jent., Cat. Ost. Leyd. Mus., p. 326 (1887). Echidna breviaculeata, Tiedem., Zool., i., p. 592 (1808). Tachyglossus setosus, Ill., Prodr. Syst. Mamm., p. 114 (1811); Goldf., Zool., p. 409 (1820); Glog., Handb. Naturg., i., p. 116 (1842); Wagn., Schr. Säug. Supp., iv., p. 244 (1844). Echinopus setosus, G. Fisch, Zoogn., iii., p. 694 (1814). "Echidna brevicaudata, Tiedem," Gray, P.Z.S., 1865, p. 386. Echidna aculeata setosa, Thos., P.Z.S., 1885, p. 338, pl. xxiii., figs. C. & D. (skull) & pl. xxiv., figs. A., B., C., and E. (skull and claws).

Type specimen unknown.

The "Porcupine," or Hairy Ant-eater, has a scattered range. It is met with all over the island, but nowhere appears to be plentiful. *Var. setosa* is confined to Tasmania, but closely allied forms are found in Australia and New Guinea. The Tasmanian variety can be easily distinguished by its larger size, being about twenty inches long, and by the hair being so long as to almost conceal the spikes. The male is larger than the female.

ORNITHORHYNCHUS ANATINUS, Shaw.

The Platypus.

Ornithorhynchus anatinus, Lucas & Le Souëf, An. Aust., p. 143 (1909);
Camb. Nat. Hist. Mamm., p. 113 (1902);
Ogilby, Cat. Aust. Mamm., p. 2 (1892).
West, Hist. Tas., Vol. I., p. 327 (1852).

Ornithorhynchus paradoxus, Br. As. Ad. Sc. Handbk., p. 53 (1914).

Ornithorhynchus anatinus, Thomas, Cat. M. & M. Brit. Mus., p. 388 (1888), who gives the following synonymy:—

Platypus anatinus, Shaw. Nat. Misc., x., pls. 385 and 386 (animal, beak, etc.) (1799); id., Gen. Zool., i., pt. i., p. 229, pls. 66 and 67 (animal, etc.) (1800); Turt., Linn. S.N., i., p. 30 (1806); Gerrard, Cat. Bones Mamm. B.M., p. 288 (1862); Gray, P.Z.S., 1865, p. 385; id., Handl. Edentates, p. 29 (1873). Ornithorhynchus paradoxus, Blummenb., Voight's Mag. Naturk., ii., p. 205 (1800); Home, Phil. Trans., 1800, p. 432, pls. xviii. and xix. (beak, skull, etc.); id., op. cit., 1802, p. 67, pls. ii.-iv. (anat); Calkoen, Nat. Verh. Bat., Maatsch-Wet. ii., pt. i., p. 177 (1803); Desm. N. Dict. d'H.N. (1), xxiv., Tabl. Méth., p. 27 (1804); Blumenb., Abbild. Nat. Gegenst., No. 41 (animal) (1810); G. Fisch, Zoogn., iii., p. 689 (1814); G. Cuv. R.A., i., p. 227 (1817); F. Cuv. Dent's

Mamm, p. 202, pl. lxxiii. (horny plates) (1825); E. Geoff., Ann. Sci. Nat., ix., p. 451 (1826); id., Meckel's Arch. f. Nat., x., p. 14 (1827); Gray, Griff, Cuv. An. K., iii., p. 265 (1827); Less., Man. Mamm., p. 319 (1827); J. B. Fisch, Syn. Mamm., p 402 (1829); Wagl., Syst. Amph Säug., p. 59 (1830); Maule, P.Z.S., 1832, p. 145 (habits); Benn., P.Z.S., 1834, p. 141; id., Tr. Z.S., i., p. 229, pl. xxxiv. (animal) (1834) (habits); Kaup., Thierr., i., p. 251 (1835); Less., H.N. Mamm. (Compl. Buff.), v., p. 386, pl. liii. (animal) (1836); Waterh., Cat. Mamm. Mus. Z.S., p. 68 (1838); id., Jard., Nat. Libr., Mamm., xi., p. 309, pl. xxxiv. (animal) (1841); Glog., Handbk. Naturg., i., p. 115 (1842); Less., N. Tabl. R.A. Mamm., p. 196 (1842); Wagn., Schr. Säug. Supp., iv., p. 262 (1844); Gieb., Odontogr., p 62, pl. xxv., figs. 4 & 8 (dental plates) (1855); id., Saug., p. 392 (1859); G. F. Benn., P.Z.S., 1877, p. 161 (habits); Armit., J. Linn. Soc., xiv., p. 413 (1878). Dermipus anatinus, Wiedem., Arch. Zool., i., pt. i., p. 180, pl. iii. (animal) (1800). Ornithorhynchus rufus et fuscus, Pér. & Les., Voy. Terres Austr., Atl., pl. xxxiv. (animal) (1807); Tiedem., Zool., p. 589 (1808); Ill., Prodr. Syst. Mamm., p. 115 (1811); Leach, Nat. Misc., ii., p. 136, pl. cxi. (animal) (1815); Desm., N. Dict. d'H.N., xxiv., p. 131 (1818); Goldf., Handbk. Zool., p. 408 (1820); Schinz. Cuv, Thierr., i., pp. 340 & 341 (1821); Desm. Mamm., ii., p. 380 (1822); Van Der Hoeven, N. Act. Acad. Leop., xi., p. 361, pl. xlvi. (animal, beak, etc.) (1823); F. Cuv., Dict. Sci. Nat., xxxvi., p. 443 (1825); Gray, Griff. Cuv. An. K., pp. 284 & 285; Schinz, Syn. Mamm., ii., p. 327 (1845). Ornithorhynchus brevirostris, Ogilb., P.Z.S. 1831, p. 150; Schinz. Syn. Mamm., ii., p. 327 (1845). Ornithorhynchus crispus et lævis, Macgillivray, Mem. Wern. Soc., vi., pp. 128 & 132 (1832). Ornithorhynchus anatinus, Gray, List Mamm. B.M., p. 191 (1843); Waterh., N.H., Mamm., i., p. 25, pl. i., figs. 1-6 (beak, feet, etc.); Gunn, P. Roy. Soc. Tasm., ii., p. 89 (1852); Gould, Mamm. Austr., i., pl. i. (animal) (1855); Bennett, P.Z.S., 1859, p. 213, pl. lxxi. (beak); Krefft, Cat. Mamm. Austr. Mus., p. 56 (1864); id., Vert. Lower Murray, p. 22 (1865); id., Mamm. Austr., pl. xv. (animal) (1871); Flow. & Gars., Cat. Ost. Coll. Surg., ii., p. 753 (1884); Jent., Cat. Ost. Leyd. Mus., p. 325 (1887); Coll., Zool. Jahrb., ii., p. 940 (1887).

Type in British Museum.

The Platypus is still to be met with in the distant lakes and streams, but it is gradually becoming rarer, owing to the inroads of "trappers" and others. The male, which is much larger than the female, measures over head and body about eighteen inches. The fur is amber coloured above, and greyish white below, and is very short and "velvety." The Platypus also occurs in Eastern and South-Eastern Australia.

THE THALLUS OF THE GENUS *PARMELIA*

By John Shirley, D.Sc.

(With 6 plates and 12 figures).

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Introduction.

In the ordinary works on Lichenology, the main object of the author is to give such a description of a species as will enable a student to determine a plant by himself, by examination of the thallus with a pocket lens, and of the apothecia and spores by the aid of a microscope. The spermagonia and spermatia may be briefly referred to, but other matters are usually ignored. In this paper no reference will be made to a macroscopic study of the thallus, or to the histology of the apothecium, its paraphyses or spores. For those who require this information any ordinary work on Lichenology will sufficiently meet their requirements.

In such works as Goebel's "Outlines of Classification and Special Morphology," Green's "Manual of Botany," Vine's "Text-Book of Botany," etc., the same illustrations of thalline structures are repeated with wearisome regularity, and with little addition to existing knowledge.

In preparing the material for this paper, serial sections of the following lichens were cut, stained, and mounted for examination:—*Parmelia tiliacea*, Ach., *P. tinctorum*, Despr., *P. perlata*, L., *P. limbata*, Laur., *P. laxa*, M.A., *P. perforata*, Ach., *P. latissima*, Fee, *P. placorhodioides*, Nyl., *P. mundata*, Nyl., *P. olivacea*, L., *P. cetrata v. sorediifera*, Wain., and *P. saxatilis v. signifera*, M.A.

Twelve photo-micrographs illustrating these are submitted with this paper. It may be noted that Dr. Jean Muller of Aargau regarded *P. placorhodioides* and *P. mundata* as varieties of *P. physodes*, and *P. laxa* as a variety of *P. conspersa*, Ach.

Of the material examined, the whole of the specimens are Australian with the exception of *P. cetrata v. sorediifera*, Wain., which was chosen for special study of the development of soredia, and also for comparison with Australian species.

The microscopic examination was made, and will be set down in order under the following heads:—(1) Absorption pores; (2a) Upper Cortex; (2b) Lower Cortex; (3) Hyphæ; (4) Algæ or Gonidia; (5) Rhizinæ; (6) Spermagonia; (7) Alliances with other genera.

For comparison under the last named head, examination was made by means of stained and mounted serial sections, 3-7μ in thickness of the following species:—*Heterodea mulleri*, Nyl., *Sticta demutabilis*, Krph., *S. pulmonacea*, Ach., *Stictina suborbicularis*, M.A., *S. retigera*, M.A., *Physcia hypoleuca*, Tuck., *Pyrine cocoes*, *Evernia furfuracea*, Mann, and *E. prunastri*, Ach., also of species of *Cladonia*, *Clathrina*, *Collema*, *Synechoblastus*, and *Ramalina*. In all 192 serial slides 3in. x 1½in. were made, each carrying from 30 to 264 serial sections.

1. *Absorption Pores.*

The first plant examined in detail was *Parmelia tiliacea*, Ach., and it was found that the whole thallus was pierced with minute pores with well defined walls, usually presenting a smaller opening on the upper surface of the thallus than on the under side, as a rule slightly oblique to the parallel cortices, but always simple and unbranched. These might well be overlooked, and taken for folds in the minute thalline section, did they not repeat themselves on each serial slice, with such alterations in outline as would be expected from parallel sections of a cylinder. (See Plate II., fig. 1.)

In the walls of these pores the hyphæ usually radiate from the centre upwards and downwards towards the outlets, and form the inner lining of the perforation. The algal cells—Cystococcus—lying just beneath the hyphal sheath in the gonidial zone are larger and more closely beset with hyphæ than in any other portion of the thallus examined.

Under an inch objective (Watson) with No. 5 eyepiece, and a magnification of 120 diameters, the pores could be seen in general parallel lines across the section. Under the ⅙ objective and No. 5 eyepiece, with a magnification of 720 diameters, the pores show as blotches when the rest of the section is in focus, and the objective has to be focussed down to bring the walls of the pore into perfect view, when the cut edges show as black lines and the rest of the lichen section is thrown out of focus. In measurement they are .02-.04 x .007-.018 mm.

Most curious pores exist in *P. placorhodioides*, Nyl. They are very narrow and usually at right angles to the surfaces; when they occur beneath an apothecium they are continued through its hypothecium and hymenium to the surface, and in the hymenium increase in cross diameter, so that in this portion of their course they are conical, while in the thallus itself they are cylindrical, the whole having the form of a funnel with an extra long tube. In other cases they are conical and larger, reaching .07 x .0035 mm. (Plate II., fig. 2.) Pores of similar infundibuliform shape are also characteristic of *P. tinctoria*, L., in which species they abound in all parts of the thallus.

In *P. olivetorum*, Ach. (s. *P. tinctorum*, Despr.), the pores are usually perpendicular to the cortices, but are very narrow, .004-.005 mm., and are readily distinguished by their lining hyphæ crossing the hyphæ of the medulla at right angles. (Plate III., fig. 3.)

The pores of *P. limbata*, Laur., are .026 x .013-.019 mm. in size.

They are usually wider where they open on the upper surface of the thallus, and diminish to about two-thirds of that diameter at their lower aperture. In some cases they are seen to arise from above the rhizinæ which in this lichen are unusually long and stout, .26 x .09 mm. These rhizoids are hollow and formed of hundreds of parallel hyphæ; the tips, however are not porous. From the fact that the algal cells are more numerous, and penetrate the thallus more deeply in and along the walls of the pores, and that in *P. limbata* the canals are connected with hollow rhizinæ; and since, when viewed in reflected light, the pores show on the upper surface not as perforations, but as shallow closed pits, it seems doubtful that the function of these organs is merely to supply the plant with gaseous food, but that they may also take in water for the use of both symbionts, and inorganic food substances for the supply of the chlorophyll-containing algæ. (See Plate III., fig. 4.)

An examination of the thallus of *Parmelia laxa*, Mull Arg., shows that it possesses oblique capillary tubes, not more than .009 mm. in cross section, and difficult to find, if it were not for the transverse direction of the lining hyphæ, and the fact that those threads, forming the inner surface of each perforation, stain more deeply than the hyphæ forming the medullary layer. (Plate IV., fig. 5.)

An American lichen, *P. cetrata v. sorediifera*, Wain., shows the pores that form such a marked feature of the genus. There are .06 x .02 mm., usually cylindrical and oblique to the thallus, and in several instances were seen, as in *P. limbata*, Laur., to be in communication with the large hollow rhizoids. Occasionally they are conical, and in this case the apex of the cone is always at the upper cortex, while the broad base is in connection with a rhizina. The thallus of this lichen is frequently covered, on the upper side, by colonies of a Sirosiphon, and hyphal threads are seen to project from the cortex into the sheath of the Sirosiphon. (Plate IV., fig. 6.)

The thallus of *P. latissima*, Fee, strongly resembles that of *P. perlata*, Ach., of which species it is by some authors regarded as a variety; but it differs essentially in one respect, it is much more freely supplied with absorption pores. These are .05 x .016 mm. in their cross diameters, and are usually oblique to the surface. As in *P. laxa*, hyphæ lining the inner surface of the canals stain more deeply with Delafield's hæmatoxylin than those of the medulla, and thus aid in revealing the pores. In searching for these canals it is better to use a high than a low power, a $\frac{1}{6}$ for choice, with an eyepiece that will give a magnification of 500-700 diameters. The pores are then out of focus, and appear as blotches when the rest of the thalline section is in good view. The pores seem to be higher developments from the cyphellæ of the genera Heterodea and Sticta, and when an oblique section shows only the lower opening of a pore it can hardly be distinguished from that form known as *Cyphellæ veræ*, which are lined by the hyphæ, and appear under the lens as minute urceolate or thelotremoid depressions. The pores, however, are much more minute, and are not to be confused with the perforations of the thallus of *Parmelia pertusa*, Schaer., which are 1-2 mm. in diameter, or with the perforations in the apothecia of *P. perforata*, Ach., which are also visible to the unaided eye. As several species of Stictaceæ are without cyphellæ, either true cyphellæ or pseudo-cyphellæ, an examination was made of the thalli of *S. pulmonaria*, L., and *S. retigera*, Ach., which belong to the section Ecyphellatæ, and it was found that they also possess the absorption pores of the Parmeliaceæ. It seems clear from this that whatever function is performed for the genera Heterodea and Sticta by the cyphellæ is performed for the lichens of the genus Parmelia, and for the ecyphellate Stictas by the absorption pores. (Plate V., fig. 7.)

The Parmelias grow on rocks, fences and trees, and apply themselves close to the surface to which they are usually attached by rhizoids. The upper surface is usually more heated than the under surface, while the rain water, absorbed by the substratum, is in contact with the lower cortex. The capillary tubes already described, which can give off excess of moisture as vapour from the upper part of their water column, will be replenished from below as long as the supply continues, inorganic salts will be supplied to the alga, and saprophytic matter absorbed by the fungus.

A living specimen of *Parmelia tiliacea*, Ach., whose upper surface was examined in reflected light under a low power (90 diameters), showed the pores as shallow pits, lighter in colour than the other parts of the thallus but *closed*. The plant (symbiotic) structure has therefore the power of closing the pores, but these are always open in thalli killed by chromo-acetic mixtures.

That these pores, as also the cyphellæ of the Stictaceæ, are not breathing pores only, seems certain from the facts already stated, as also from their position. In higher plants, when the lower surface of the leaf, the part usually provided with stomata, floats on water, the breathing pores are on its upper surface. In Anthoceros so-called stomata are found on the lower surface of the thallus, but their function is to secrete mucilage, and, as Goebel states, they are better named as mucilage pits. In Marchantia the pseudo-stomata are all in the upper cortical layer and not in the cortex that rests on the substratum. That the cyphellæ, and their offspring the absorption pores, should function as breathing pores only, and be placed on the surface closely attached to the bark or rock, is possible, but is unusual in the plant world. It must also be remembered that the pores can be closed above, but are open below, certainly in those species with hollow rhizoids.

To ascertain the true purpose of the cyphellæ of lichens, and of the absorption pores which are believed to be derived from them, the following experiments were made—the plant chosen being *Heterodea mulleri*, Nyl., selected on account of its terrestrial growth. The plants were gathered with a sufficient quantity of the soil of the substratum to prevent injury to the rhizinæ.

(I.) The plants were placed in a desiccator over calcium chloride and left for a space of three months, July to October, 1911. The upper surface and gonidial layer were the most deeply affected, and the drying of these portions caused the curling up of the thallus, so as to hide the upper cortex and show the brown underside. At the end of thirteen weeks, the plants, very dry and crumbly, were placed on absorbent paper, in their natural position, and water was poured from a can in a circle round them. The paper conveyed the water to the plants, it was absorbed by their under surfaces, and in 5-7 minutes from the water reaching them each thallus was green and expanded.

(II.) The plants, now healthy and normal, were divided into two equal portions, and one half was placed on several folds of newspaper, still with a small layer of soil adherent to each thallus, and watered in the same manner as in the first experiment, so that no water was applied to the upper cortex. The water was supplied from an ordinary can, tinned over, but rusted in one or two places, so that the only nourishment came from the tap water, the iron and the soil. These plants were healthy and normal under this treatment in January, 1912.

(III.) The second half of the plants left over from Experiment II. were placed in a japanned dish, and supplied with tap water, sufficient to cover them, which was changed daily. For six weeks they remained healthy and unchanged, but at the beginning of the seventh week they became gummy, as marine algæ do, that are placed in fresh water, and assumed an unhealthy, dark green tint. Taken from the water and placed on soil and paper, and treated as in Experiment II., they recovered, but never quite resumed their normal appearance.

In the first experiment, the loss of food matters, other than gaseous food—carbon dioxide—was felt most severely by the algal symbiont, and the shrinkage in the algal layer caused the curling inwards and upwards of the thallus. The loss of organic food, saprophytic fluids, did not severely affect the hyphæ, as they had the supply of organic food in the gonidia to draw upon.

In the third experiment the supply of gaseous food was cut off, except such quantities as were dissolved in the tap water, and the inorganic food was reduced to a minimum. The algal cells continued beautifully green throughout this experiment, and the thallus kept its normal shape, but the hyphæ became slimy and partly lost their vitality.

In the second case, when supplied with plenty of air, such inorganic foods as can be obtained from the soil, and water absorbed through the lower cortex only, both symbionts were able to develop normally.

As all species of Sticta and Parmelia are provided with upper and lower cortices, this would lead one to infer that the cyphellæ of Stictaceæ, and the absorption pores of Parmeliaceæ are means by which water and dissolved food matters enter the thallus and are carried by the hyphæ to the Cystococcus cells. Under the conditions of the second experiment, the rain water would not only carry inorganic food for the alga, but also organic matter from the humus of the soil, or the decay of cortical matter for the support of the fungus. This last would be additional to that taken from the alga by the haustoria of the fungus.

2. *The Cortex.*

The cortex, where not carrying apothecia, spermagonia or rhizinæ, usually constitutes 30-50 per cent. of the thickness of the thallus. The upper cortex is usually the thicker of the two rinds, and is not seldom twice or thrice the thickness of the lower covering. It takes an artificial stain better, the cells of the lower coat being more deeply tinted with a natural brown or brown-black pigment, resembling the phæophyll or phycophæin of the brown seaweeds. The hyphæ of the medulla have the power possessed by conidiophores of forming chains of cells by abstriction from their extremities. This power is seen in the formation of the cortices, of the haustoria surrounding gonidia, of the walls of the spermagonia, and of the sporiferous hyphæ. This change of hyphal threads into chains of cells can well be studied in the pseudo-cyphellæ of the Stictaceæ, where the ends of the hyphæ protrude loosely in minute necklaces into the cavities of the false cyphellæ, the terminal cells becoming white or yellow. These coloured cells were once regarded as soredia, but are only loosely arranged and partly used up cortical cells.

(A.) In the upper cortex of the Parmelias there are three different methods in which the thickened cells may be arranged. The first is shown in *P. limbata*, *P. tiliaceæ* and *P. saxatilis*, in which the cells are abstricted to form minute necklaces standing at right angles to the upper surface. The second as exemplified in *P. mundata* and *P. olivacea*, in which the cellular ends of the hyphæ strike the surface of the thallus obliquely, and the third in which the chains of cells are parallel to the surface, as in *P. tinctorum*.

The first series, with cells at right angles to the surface, has a cortex made up of larger units than those of the two following series. It is usually a mass of oval-oblong cells, .005-.006 mm. long, with a small lumen, not more than .0015 mm. in transverse diameter, and with very thick walls. The structure of the cortex in such lichens as *P. limbata* and *P. saxatilis* reminds one of the formation of similar tissues in the brown algæ Hormosira and Fucus, but in these the lumen of each cell is larger in proportion to the wall.

Although not belonging to Parmeliaceæ, this type of cortex can best be studied in *Thamnolia vermicularis*, Sw., in which the hyphæ of the medulla are loose, parallel and horizontal, on each side of the central cavity, but in the algal layer they turn outwards at right angles, surrounding the gonidia, and are continued beyond them to form the cortex. The same arrangement holds good for Parmelias of the *P. limbata* type, but the hyphæ are not as discrete and easy to follow as in Thamnolia, nor are they as wholly parallel and longitudinal in the centre. In *P. limbata* the upper rind is 5-6 cells in thickness.

The second series, typically shown in *P. mundata* and *P. olivacea*, has still smaller cells, but with thinner walls, these have 3-5 cells to the chain in each hyphal termination, and average .004 mm. in length. The obliquity of each thread is affected by curves and depressions of the surface, but, as a rule, the oblique threads are raised at their outward terminals towards the apex of the thallus.

The third type is best studied in *P. tinctorum*. In this lichen the hyphæ ramify in and around the small segregated masses of gonidia, and above and outside these run parallel to the surface. In dividing into necklaces of cells there is no enlargement by means of thickened walls as in the two preceding species. This form gives the most delicate cortex to be found in the family.

(B.) The lower cortex is continued into and supplies the lining hyphæ for the rhizinæ. These rhizinal threads are usually undivided into cellules, except those forming the outer layer in solid rhizinæ, and the outer and inner layers in hollow rhizinæ. Like the hyphal threads of the medulla which adjoin them, the cells of the lower cortex are arranged parallel to the surface, except in the neighbourhood of a rhizina, where they turn parallel to its walls.

The cellules of the lower cortex are equal in size to those of the upper layer in lichens of the first and second divisions, but in the third type, exemplified in *P. tinctorum* and *P. laxa*, the cells of the lower layer are larger, and possess thicker walls than those of the upper rind.

Where the cell-wall is thinner than usual, and less provided with the dense brown colour, as in the lower cortex of *P. tiliacea*, the cellules are seen to be uninucleate or binucleate.

In *P. perlata* the two cortices are of equal thickness, but the cellules of the upper layer are oblique to the surface, while those of the lower layer are parallel to the substratum. *Parmelia perforata* differs from all others of its genus in having the cellules of both the lower and upper cortices set at right angles to the horizontal surface. The long axis of the cell lumen is the guide in determining the direction of the cellules.

3. *The Hyphæ.*

These are best studied in *Parmelia placorhodioides* (Plate V., fig 8), in which they are the largest of the genus, reaching .002 in transverse diameter. As a rule they lie in the thallus longitudinally, but, as before stated, they turn at right angles to the medulla in the algal or gonidial layer, and reach the upper surface in various ways as described in the last subdivision. Each hypha is multinucleate, and, by long staining in Delafield's hæmatoxylin, the nuclei may be made visible in many species. The medullary hyphæ of *P. placorhodioides* and *P. mundata* are also remarkable for presenting an apparently cellular appearance. This is due to their containing oval masses of protoplasm, revealed through the gelatinised walls. Sometimes these oval masses are larger than usual, and bulge out the hyphal wall. These larger masses are single or occasionally in pairs and recall in their position and relative size the heterocysts of Nostoc and its allies. It was probably through being misled by these appearances that Minks and his school combated the theory of the dual nature of lichens, and strove to prove that the gonidia were produced from the hyphal threads. This appearance is figured by Willey in his "Introduction to the Study of Lichens," p. 60, Plate II., as micro-gonidia.

In the algal (gonidial) layer the hyphæ put out fine branches which adhere to the coat of the alga, joining it like the stalk joins a cherry, and from this stalk branches of much less diameter than the medullary hyphæ surround each algal cell. These branches have the same necklace appearance, from a division into cellules, as has the cortical weft. When, in sectioning, a gonidium has been displaced, a cavity lined with these smaller hyphæ is disclosed.

In illustrations of thalline structures, small gonidia are often shown scattered through the gonidial layer. These supposed gonidia are usually the cut ends of hyphæ, which, by an optical illusion, are made to appear, when viewed end on, as if they were of greater diameter than the hyphæ of which they are transverse sections.

Although, as shown above, the hyphæ branch repeatedly in surrounding the Cystococcus cells, they divide very sparingly in the central or medullary layer. The branches in any given lichen usually fork at about the same angle, varying from 45 deg.-60 deg. in *P. placorhodioides* to 75 deg.-90 deg. in *P. mundata*. The hyphæ of the former branch in the central portion of the thallus very sparingly, in the latter rather more freely.

4. *The Algæ or Gonidia.*

With an exception to be given later, the algal layer in Parmeliæ is confined to the stratum immediately beneath or within the upper cortex. It has already been stated that the medullary hyphæ turn from their parallel longitudinal course in the centre of the thallus, and pass at right angles to their former direction to penetrate between the gonidia, and form a close cellular weft around them. This weft is then continued to the surface to form the upper cortex. The algæ lie loosely among these cortical threads at their inner extremity, or are ordinarily gathered into small groups probably derived from a common ancestral cell.

In some species, as *P. placorhodioides*, the algal cells below the apothecia are few and colourless, or nearly so, and look as if they were exhausted or dying; but in these situations a second algal layer is produced near the lower cortex, of vigorous cells well supplied with protoplasm. They are .008 mm. in diameter in *P. placorhodioides* and .006 in *P. limbata*. (Plate VII., fig. 12). In *P. latissima* the Cystococcus (Pleurococcus) cells are thickly packed between the necklace-like rows of cells of the superior cortex, and are not more than .004-.005 mm. in diameter. They are difficult to study, as they seldom show below the cortical threads, which surround and hide them.

However carefully the tissue may be treated before sectioning, many of the algal cells become plasmolysed. The best killing mixture is chromo-acetic, Schaffner's formula, and the species that permits the best study of its gonidia is *P. tiliacea*. These are scattered singly through the thallus, are promptly killed by the solution, and show no relative shrinking of the protoplasm, although there is a shrinkage as a whole, since they no longer fill the hyphal cavity. In the Cystococcus cells of this lichen the nucleus and single chloroplast can be studied. The nucleus usually occupies a central position in the alga, and occasionally bands of protoplasm radiate from it towards the circumference, in which are set rather large chromatophores, presenting an arrangement, more apparent than real, as if they were in circles round the nucleus.

Algal cells in the act of dividing are not frequently observed, but they may be found by careful searching, and by the fact that two of these cells, or more rarely four, enclosed in the same plexus, have flat surfaces where they face one another. (Plate VI., fig. 9.)

The best stain for algal cells, as also for lichen spores, is methylene blue.

5. *Rhizinæ.*

Of the ten species of Parmelia examined, all are provided with rhizinæ except *P. placorhodioides* and *P. mundata*, which belong to the section classified by Nylander, Synopsis, p. 400, as "Stirps Parmeliæ physodis, Thallus subtus glaber."

The rhizinæ in Parmelias differ markedly from those of their allies the Stictas. In the latter they are composed of comparatively few hyphæ, which separate readily, and disclose their ultimate structure of cylindrical cellules, bounded by rather thin walls. These cellules contain the curious protoplasmic pyrenoids, which Willey, Minks, and Jean Muller classed as micro-gonidia.

In Parmelia the rhizinæ are formed of dense multitudes of hyphæ lying parallel to the long axis of the rootlet, derived from the hyphæ of the medulla, and encased by a continuation of the cortical threads, which coat them externally, and when they are hollow as in *P. limbata* and *P. cetrata*, also form an inner layer to the tubular rootlet. The walls of the rhizinal hyphæ are dense, and the threads are by no means discrete as in the genus Sticta. The outer threads have the thick walls and necklace-like structure of the cortical hyphæ, the lumen of each cell being small in contrast to its diameter.

In the central threads which show no division into cellules, the so-called "micro-gonidia" can be clearly distinguished.

Parmelia perforata differs from its allies in having rhizinæ wholly composed of hyphæ made up of tubular cellules whose course in the rootlet is less parallel than those of kindred species.

The Parmelias inhabit stones, rocks, fences, and trees, in situations where there are, in Australia, strong contrasts of temperature and rainfall. The Stictas inhabit scrubs and brushes, where shade and rain are plentiful. With the steady drip of rain and dew on the tree trunks and branches, moisture is always available to a Sticta, and its rhizinal system is simple and delicate. The Parmelia has to face more difficult circumstances; its rhizinæ are thicker, the threads have stronger walls to prevent desiccation, the hyphæ are more numerous to take advantage of every particle of water, and to cling to every crevice, and the cortical system of each rhizina keeps the unseptate threads from loss of imbibed water by evaporation, and from interference with their functions.

It has been shown that, in two species at least, *P. limbata* and *P. cetrata*, the hollow rhizinæ are in connection with absorption pores, and this gives an additional reason for believing the pores to be used for taking in liquid food.

6. *The Spermagonia.*

These are small conceptacles, sunk in the thallus, and varying from circular to ovate or obovate in transverse section, ranging from .3-.7 mm. in diameter. They arise as small coils of hyphæ in the medullary part of the thallus, without pores or connection with the upper or lower cortex. At first occupying a central position, growth develops more rapidly on the side towards the upper cortex. The hyphæ forming the wall of the spermagonium are brown and recall in appearance those of the rhizinæ. At an early stage the original coil is lost sight of under the outer layer of numerous brown threads, but a section which cuts these away renders the now enlarged coil visible. (Plate VI., fig. 10.)

As soon as the wall of the spermagonium has grown into touch with the upper cortex, the portion of the spermagonial wall in contact becomes raised into a papilla, which breaks through the cortex (Plate VII., fig. 11), and then opens to form a pore for the discharge of the spermatia. The lip of the ostiole is the thickest portion of the wall. In a few instances the upper cortex was observed to increase in thickness by downward growth towards the spermagonium, the two dark-brown mass s of hyphæ interwove, and a pore developed by separation of the hyphæ in the cortical filaments that now form part of the spermagonium. The centre of the ostiole is depressed, with raised circular lips. The opening may appear on the surface of the thallus as a black or brown speck, or may be concolorous with the upper cortex.

The jointed sterigmata, the stalks that bear the spermatia, the supposed male germ-cells, radiate from all parts of the inner wall towards the centre. In Parmelias they are .02-.04 x .002-.0008 mm. in cross diameters, and usually composed of 5-7 jointed cylindrical cellules. By some authors these jointed sterigmata are called arthrosterigmata, but l y others this term is restricted to those spermatial supports that have cellules broader than they are long.

The study of the sterigmata is difficult from the fact that they are bound together by a gelatinous substance; which, in sections of spermagonia parallel to the sterigmata, cause the section to appear as if homogeneous. This appearance is further aided by the colourless or faintly yellow colour of the threads.

The spermatia of Parmelias are of two types, the first series possess acicular spermatia with slightly fusiform apices, as in *P. perlata*, *P. perforata*, and their allies. This form of spermatium is also characteristic of the genera Sticta and Stictina. The second section have acicular-cylindrical spermatia, as in *P. laceratula*, *P. polytropa*, *P. placorhodioides* and other Australian species. In this respect they resemble the genus Physcia.

The spermatia in the genus Parmelia are .005-.008 x .006-.001 mm. in diameter, and are colourless and do not stain readily. They are found either *in situ* on the sterigmata, or loose and embedded in the gelatinous substance, or ejected from the spermagonium in myriads, and still immersed in the same gelatinous substance.

7. *Alliances with other Genera.*

The great lichenologist, Nylander, made his classification depend mainly on the thallus, the apothecia and the spermagonia. On p. 57 of the Synopsis, he says, "Toutes les parties des Lichens, le thalle, les apothécies et les spermagonies, peuvent offrir des caractères servant à la distinction des espèces, et tantôt c'est l'une, tantôt l'autre de ces parties qui decide le diagnostic dans des cas ambigus. Mais lorsqu'il s'agit des lichens inferieurs, il faut avoir recours au microscope pour chercher dans la texture des tissus et la conformation des éléments, soit du thalle, soit du fruit ou des spermagonies, les signes qui caractérisent les espèces. On ne doit cependant pas oublier que les caractères microscopiques, dans certain espèces, sont aussi sujets à varier que les autres. Ainsi le nombre des spores dans les theques, le nombre des cloisons dans les spores, la couleur de ces dernières, leur grandeur, varient souvent dans les espèces polymorphes, tandis que les mêmes caractères offrent une grande fixité dans d'autres. Les spermaties et leurs stérigmates serviront aussi quelquefois à la distinction des formes douteuses ou des échantillons manquant de fruits."

Of these tests for specific and generic differences that of the spermatia and sterigmata has, since Nylander's time, fallen out of use. In the last great work on Lichenology—"A Monograph of the British Lichens, Part II., by Annie L. Smith," published by the authorities of the British Museum, although the characters of the spermatia are given for the orders, and generally for the genera, there is seldom a reference to these organs in the specific descriptions, even when, as in the characteristics of the genus Lecidea, p. 10, the spermatia are described as "acicular, straight, rarely arcuate or shortly cylindrical."

In the Monograph referred to above the classification does not lean greatly on the symbiosis of alga and fungus, for though the gonidia are spoken of throughout as "algal cells," yet such statements are common as p. 206, "algal cells, Trentepohlia or Palmellaceæ," p. 275, "algal cells, Pleurococcus or Palmella," etc.

In this extremely important work the classification depends almost wholly on the microscopic structure of the fruit. As Miss Smith states in her Introduction, "More importance is assigned to the microscopic structure of the fruit than was allowed by Nylander and Crombie in their scheme of classification. The systematic value of the form, colour and septation of the spores had, however, been recognised by Massolongo and other continental Lichenologists, and by Mudd in our own country."

The system adopted is, in fact, that devised by my correspondent of many years, the late Dr. Jean Muller of Geneva, and perfected by Dr. Zahlbrückner in Engler and Prantl's Pflanzen-familien. To show the want of concordance under this system, let us look at the place assigned to Parmelia by a few of the great modern lichenologists :—

(1) A. M. Hue, Nouvelles Archives du Museum d'hist. Nat. 3e series. T. II., unites Evernia, Everniopsis, and Anzia with Parmelia under Parmeliei, but separates from these Sticta and Stictina.

(2) Jatta, in "Lichenum Italiæ Meridionalis," places under Parmelias—Cetraria, Peltigera, Nephroma, Solorina, Sticta, Imbricaria, Parmelia, and Physcia.

(3) Dr. Jean Muller, "Lichenes Ernstiani," Hedwigia, Band XXXIV., 1895, etc., etc., unites under Parmeliæ—Sticta, Stictina, Parmelia, Anzia, Pseudo-physcia (or Anaptychia), and Physcia.

(4) Fink, in the "Lichens of Minnesota," pp. 190-210, groups under Parmeliaceæ—Parmelia, Cetraria, Evernia, Ramalina, Alectoria, and Usnea.

It is evident that dependence on the microscopic structure of the apothecium may separate species but will not give the major feature of classification.

To divide the genera into orders a microscopic examination of the thallus is also necessary. In Sticta, Stictina, and Parmelia both an upper and a lower cortex are present; and the thalli are provided with cyphellæ or absorption pores. In Sticta and Stictina there are, besides the cyphellæ, openings in the upper cortex. These are not joined to the cyphellæ by tubes, but by air passages of irregular shape ramifying through the thallus, and best studied in *S. suborbicularis*.

Physcia and Solorina have an upper cellular cortex, but in *Physcia hypoleuca* and *Solorina bispora* there is a lower pseudo-cortex of hyphæ passing into rhizinæ. The former is also provided with absorption pores, the latter has curious slender tufts of contorted paraphyses scattered through the hymenium, that probably serve the same purpose. In *S. bispora*, where an apothecium rises from the upper cortex, the pseudo-cortex of hyphæ of the lower surface is replaced by a true cellular cortex.

Heterodea has the thallus of Parmelia and the apothecium of Cladonia. It is of considerable phylogenetic importance as it forms a link between the two families.

Taking all the histological factors into consideration, Evernia is best placed with Alectoria, Ramalina, and other fruticose species under Usnaceæ, as in Zahlbrückner's classification; and with these I would also range Cetraria on account of the frequently subpodicellate apothecia, and because of the close relationship of the fruticose species to Usnea. Peltigeraceæ should be restricted to Peltigera, Nephroma and Solorina, in which the algal symbiont is provided by the Cyanophyceæ-Polycoccus or Dactylococcus; while Parmeliaceæ should include Sticta (comprising also Lobaria and Ricasolia), Stictina, Parmelia, Physcia, Pseudo-physcia or Anaptychia, and Anzia. This last order, Parmeliaceæ, should be divided into two sections, the first made up of genera with both upper and lower cortex—Sticta, Stictina and Parmelia, the second formed of the remaining genera with upper cortex and lower pseudo-cortex.

CRITICAL REMARKS ON THE TABLE CAPE FOSSIL MOLLUSCA IN THE JOHNSTON COLLECTION, WITH FIGURES.

By W. L. May.

(With 4 plates and 21 figures).

[Received 30th August, 1918. Read 9th September, 1918.]

The late R. M. Johnston, Government Statistician, by his will bequeathed his natural history collections to the Royal Society of Tasmania; and the portion containing the recent and fossil mollusca is already at the Museum. The Council of the Society has kindly allowed me, not only to carefully examine these collections, but also granted me permission to have on loan some of the type and other specimens, for the purpose of figuring them. This I have now accomplished, and they will illustrate my paper, which I hope may be of distinct value to those who are, or may be, studying the Table Cape Molluscan fauna.

In these proceedings for 1876 the late J. E. Teniscn-Woods described a large number of new species from Table Cape which were supplied to him by R. M. Johnston, by whom they had been collected. None of these species were figured at that time, and a number have remained unfigured until now. In addition to this some were unrepresented by any type or authentic specimen.

There is in the Tasmanian Museum a collection of types of this series, but it is by no means complete, and it has been difficult, and in some cases impossible, for workers to identify the species from the descriptions alone. In this connection the Johnston collection is of distinct value, as it is found to contain a large number of co-types (some are probably types) of Woods' species, carefully labelled. These specimens have enabled me to clear up several uncertainties, which are recorded below.

In these proceedings for 1879 Johnston described an additional number of fossil Mollusca, and most of his types are still in the collection, although a few seem to be missing. None of these are marked as "type," and some have only the generic name attached, but in most cases they can be easily identified as being the types; several were figured by the author in his "Geology of Tasmania," and others by Professor Tate, but some still remain to be dealt with, and I am able to further reduce this number by several additional figures. I have also taken the opportunity of figuring two of Tenison-Woods' types from the Museum collection. In the following critical remarks, I deal not only with the species figured, but also with some that appear to be synonyms or unrecognisable.

In all cases I give the author's original generic names.

Emarginula transenna, Tenison-Woods.

From a Johnston co-type, which measures 8 mm. high and 12 x 8 mm. in diameter. A noteworthy feature not mentioned by the author is that the slit is situated in a strong rib. (Plate VIII., fig. 1).

Gibbula clarkei, Tenison-Woods.

The type lot in the Johnston collection contains a number of specimens of various sizes; they vary much from each other in the strength of the spiral ornament. I have selected one of the most perfect for figuring, which measures 3 x 5 mm. in diameter, and it may stand as the type. (Plate VIII., fig. 2).

Gibbula æquisulcata, Tenison-Woods.

From a Johnston co-type, measuring 11 mm. wide and 9 mm. high. (Plate VIII., fig. 3.)

Gibbula crassigranosa, Tenison-Woods.

From a Johnston co-type (or possibly type) measuring 11 mm. in diameter and 12 mm. high. From a comparison with the type, and another in the Johnston collection of *Astralium* (*Calcar*) *ornatissimum*, Tenison-Woods, this would seem to be scarcely distinct; in the former the nodules have developed into short spines, but there seems otherwise no appreciable difference. (Plate VIII., fig. 4).

Solarium (*Torinia*) *gibbuloides*, Tenison-Woods.

From one of Johnston's co-types. (Plate VIII., fig. 5).

Delphinula tetragonostoma, Tenison-Woods.

Johnston's two specimens are probably the type, and a co-type. They show the species to be an undoubted *Crossea*, and a beautiful addition to that interesting genus. As neither of these specimens was in a sufficiently perfect state of preservation to make a good figure, I have drawn it from one of my own compared with the above. (Plate IX., fig. 6).

Trochus josephi, Tenison-Woods.

From a Johnston co-type, which measures 6 mm. in diameter and 7 mm. in height, and so is much larger than the author's measurements, and even this may not be adult. It may be a variety of *Thalotia alternata*, Tenison-Woods, of which I have seen no authentic specimen. (Plate IX., fig. 7).

Zizyphinus blaxlandi, Tenison-Woods.

This species remains unidentified. A small specimen so named in the Johnston collection must, I think, be an error, as I cannot in any way fit it to the description.

Margarita kekwickii, Tenison-Woods.

From a Johnston specimen, without any label, but I think there can be no doubt that it represents this species. It measures 7 mm. in diameter and 6 mm. in height. It is a member of the genus *Minolia*. (Plate IX., fig. 8).

Adeorbis lævis, Johnston.

From the type, which shows it to be a *Cirsonella*, very closely related to *C. weldii*, Tenison-Woods, from which it principally differs by a larger umbilicus. (Plate IX., fig. 9).

Euchelus woodsii, Johnston.

From the type, which is considerably broken. (Plate IX., fig. 10).

Liotia roblini, Johnston.

There are two specimens in the author's collection, from "Muddy Creek." It has been well figured by Harris in his Cat. Aust. Tert. Moll. Plate VIII., figs. 4 a, b, and c. I have no doubt whatever that this is a synonym of *Liotia lamellosa*, Tenison-Woods.

Liotia annulata, Tenison-Woods.

Two fossil specimens of this recent species are in the Johnston collection, from Table Cape.

Astralium (Calcar) flindersi, Tenison-Woods.

From a specimen in my collection, which I believe to be this species. This is not represented amongst the Tenison-Woods types, nor in the Johnston collection. (Plate X., fig. 11).

Pleurotoma pullulascens, Tenison-Woods.

From a specimen in my collection, compared with Johnston's co-type. (Plate X., fig. 12).

Pleurotoma sandleroides, Tenison-Woods.

From a specimen in my collection, compared with the type, and co-types. (Plate X., fig. 13).

Daphnella columbelloides, Tenison-Woods.

From a specimen in my collection, compared with Johnston's co-types, and also with the type, and co-types of *Thala marginata*, Tenison-Woods, which I consider synonymous. None of these specimens are perfect, most of them much the reverse; usually the columella plates are absent by erosion, or only slightly in evidence. The axial ribbing varies much in different individuals; it may be present only on the first two adult whorls, or may extend onto the body-whorl. (Plate X., fig. 14).

Daphnella gracililirata, Tenison-Woods.

From one of Johnston's co-types, and compared with the broken type. (Plate X., fig. 15).

Columbella cainozoica, Tenison-Woods.

From the type, which is a small broken specimen, and probably in a juvenile state. (Plate XI., fig. 16).

Columbella oxleyi, Tenison-Woods.

From the type. Although I have not the material to entirely bridge the gap, I feel satisfied that this is the adult stage of the last species. (Plate XI., fig. 17).

Rissoa dubia, Johnston.

No specimen of this was present. As the name is preoccupied and there is no authentic specimen, and the author's figure in "Geology of Tasmania" shows a shell that could hardly belong to the *Rissoidiæ*, the species had better be abandoned.

Rissoina tateana, Tenison-Woods.

I have figured a specimen in the Johnston collection, which is probably the type, as the figure in Geo. Tas. is very poor. This belongs to the genus *Haurakia* near *H. descrepans*, Tate and May (*Rissoa*). (Plate XI., fig. 18).

Rissoina varicifera, Tenison-Woods.

From one of Johnston's lot, so named, and probably co-types. This agrees fairly with the description, except for the complete absence of varices on any of the specimens. The author remarks, "the varices are not always visible," but I doubt if this species would ever have true varices. It is a member of the genus *Estea* and not far from *E. tasmanica*, Tenison-Woods (*Eulima*). (Plate XI., fig. 19).

Rissoina johnstoni, Tenison-Woods.

From a co-type. This common species appears to be unfigured. It has long been recognised that the author's generic location was at fault, and that the species is a form of *Bittium*. (Plate XI., fig. 20).

Pyramidella polita, Johnston.

From the type. The specimen is only labelled "Pyramidella," but I think there can be no doubt as to its identity. It comes near *Syrnola infrasulcata*, Tate, but is smaller, narrower, and lacks the basal sulci. (Plate XI., fig. 21).

Pyramidella sulcata, Johnston.

Specimens labelled "Pyramidella," which agree well with the description, show it to be only the juvenile state of his *Ringicula lactea*, which has precedence.

Pyramidella roberti, Tenison-Woods.

Johnston's specimen, probably the type, shows this to be a *Turritella*. The shell is small, and smooth, and probably in a juvenile state. I advise that it be abandoned as too uncertain.

Pileopsis navicelloides, Johnston.

The type is crushed to powder. I consider the species unrecognisable, and advise its abandonment.

Cucullea minuta, Johnston.

Type crushed; probably a young shell. I advise its abandonment also.

THE FOUNDATION OF THE NATIONAL PARK.

By Clive E. Lord,

Hon. Secretary National Park Board.

[Received 2nd September, 1918. Read 14th October, 1918.]

As in years to come the National Park will probably be of considerable interest to natural history students, a brief resumé of its foundation may be considered worthy of placing on record.

Several attempts have been made in the past to secure a sanctuary for the fauna and flora of Tasmania, but these have not been a success. In one instance, however, a reserve was proclaimed of the Freycinet Peninsula, on the East Coast, but, owing to the fact that it was easily accessible from the sea, and that no provision was made for a permanent ranger, the fauna was soon reduced. When the Tasmanian Field Naturalists' Club held its Easter Camp at Wineglass Bay in 1908 (1) certain of the *Marsupialia* were plentiful, but on visiting the locality six years later (2) very few representatives of this order could be seen.

Several years ago Mr. W. Crooke drew attention to the advisability of forming a reserve at Mount Field. Meetings and deputations were organised, and a special association, known as the National Park Association, was formed, in order to support the plan for a National Park. The bodies who were prominently represented in the movement were the Royal Society of Tasmania, the Tasmanian Field Naturalists' Club, the University of Tasmania, the Hobart City Council, the Fisheries Commissioners, the New Norfolk Council, and the A.N.A.

After protracted negotiations the then Minister of Lands (Hon. E. Mulcahy) agreed to a reserve of 500 acres being set aside near the Russell Falls. This did not give satisfaction to the promoters, and a change of Government gave an opportunity for further negotiations. The outcome of these was that the Minister of Lands at that time (Hon. J. Belton) agreed to the reservation of an area of 27,000 acres for a National Park. The area proclaimed embraces practically the whole of the Mount Field Range,

(1) Tas. Field Nat. Club. Easter Camp Report, 1908.
(2) Id. 1914.

the Russell and Lady Barron Falls, several lakes, including Lakes Fenton, Webster, and Seal. In addition, there are numerous small tarns.

The area, which is situated about 50 miles from Hobart, on the Derwent Valley Railway, includes a variety of country, the elevation varying from 500ft. above sea level at the entrance to over 4,500ft., the highest point being Mount Field West, 4,721ft. The general flora and fauna are well represented in the area, and with the additions that will be made from time to time, provided adequate supervision is maintained, the area should prove an invaluable store-house of examples of Tasmania's natural history for years to come.

The management of the Park was vested in a special Board (3), the members of which are to hold office for three years, at the end of which period the question of management will be reviewed by the Government.

The members of the first National Park Board were appointed on January 26th, 1917, the members being:—

The Chairman of the Scenery Preservation Board (Mr. E. A. Counsel).

The Engineer-in-Chief (Mr. T. W. Fowler).

The Government Botanist (Mr. L. Rodway, C.M.G.).

Representatives of the following bodies:—

The Royal Society of Tasmania (Hon. Henry Dobson).

The Tasmanian Field Naturalists' Club (Mr. Clive Lord).

The Tourist Branch, Railway Department (Mr. E. T. Emmett).

The Fisheries Commissioners (Mr. P. S. Seager, I.S.O.).

The University of Tasmania (Professor Flynn).

The City Council (Dr. W. E. Bottrill).

The New Norfolk Council (Mr. Henry Shoobridge).

The National Park Association (Mr. W. Crooke).

The Australian Natives' Association (Mr. V. E. Wettenhall).

The Board immediately began development work, and on October 13th, 1917, the National Park was officially opened (4) by His Excellency the Governor, Sir Francis Newdegate, K.C.M.G.

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(3) Gazette, Jan., 1917.

(4) Hobart "Mercury," October 15th, 1917.

NOTES ON THE SNAKES OF TASMANIA.

By Clive E. Lord.

Tasmanian Museum.

[Received 2nd September, 1918. Read 14th October, 1918.]

While the several species of snakes met with in Tasmania have received careful study in some respects, in conjunction with their mainland congeners, the information is to a certain extent scattered in numerous works. The mis-use of vernacular terms has led to considerable confusion, and the object of these notes is to make more widely known the correct nomenclature and characteristics of the species.

There are only three terrestrial species recorded from Tasmania. I have heard reports on several occasions of another supposed species, but have never yet had a specimen produced. This reported species is spoken of as being about three to four feet long, and very slender, like a whip snake.

The valid species are (1) *Denisonia superba* (Copper-headed or Superb Snake); (2) *Denisonia coronoides* (White-lipped Whip Snake); (3) *Notechis scutatus* (Tiger Snake). In addition to these three there is a species of ringed sea snake (*Platurus laticaudatus*), which is occasionally met with on the Tasmanian coasts. *Denisonia flagellum* (Little Whip Snake) has also been reported (1) from Tasmania, but this is undoubtedly an error. The wording of the sentence describing the whip snakes in "The Animals of Australia" (Lucas and Le Souëf) is also slightly misleading, but the intention is that *D. flagellum* is common in Victoria. Mr. Le Souëf informs me that he knows of no record of this species from Tasmania.

Brachysoma bimaculata (now *Furina bimaculata*), Verreaux's Snake, and *B. calonotus* (now *F. calonota*), Spotted Snake, were at one time considered to be found in Tasmania. The error apparently arose through Duméril and Bihron recording them (1854) as occurring in Tasmania, having been discovered here in 1844 by M. Verreaux. No other specimen of either species has since been procured in the island, and it is safe to assume that the original record is in error as regards locality. They were recorded in the British Museum Catalogue of 1858 as occurring in Tasmania, but in the 1896 Catalogue their habitat is given as West Australia.

(1) British Assocn. Ad. Science, Tas. Handbook, 1914.

It is of interest to notice the remarks concerning the snakes of Tasmania by Ronald Gunn (2) in 1852:—"The number of species is still undetermined, but there are believed to be at least ten, although it is probable that the young of some kinds may be mistaken for distinct species."

Krefft supplied a more exact description, as he stated (3) "Snakes abound, but the number of species is limited to two highly venomous kinds, and a small one, venomous but not dangerous."

CLASSIFICATION.

Class REPTILIA.

Order OPHIDIA.

Family *COLUBRINÆ*.

Section *Proteroglypha*.

Div. ELAPINÆ.

Genus DENISONIA.

1. DENISONIA SUPERBA (Superb or Copper-headed Snake).
2. DENISONIA CORONOIDES (White-lipped Whip Snake).

Genus NOTECHIS.

1. NOTECHIS SCUTATUS (Tiger Snake).

Div. HYDROPHINÆ.

Genus PLATURUS.

PLATURUS LATICAUDATUS (Wandering Sea Snake).

Denisonia superba.

Superb or Copper-headed Snake.

Denisonia superba, Boulanger, Cat. Sn. Brit. Mus. Vol. III. p. 335 (1896);
Waite, Aust. Snakes, p. 55 (1898);
Smith, Naturalist in Tas. p. 89 (1909);
Lucas and Le Souëf, An. Aust. p. 177 (1909);
Brit. Assocn. Ad. Sc. Tas. Hbk. p. 89 (1914).

Hoplocephalus superbus, Günther, Brit. Mus. Cat. p. 217 (1858);
Krefft, Sn. Aust. p. 54 (1869);
McCoy, Prod. Zoo. Vic. Vol. I. p. 7 (1878).

Pawerak of the Aboriginals.

(2) West's History of Tasmania, Vol. 1., p. 333.
(3) P. & P. Roy. Soc. Tas., 1868, p. 102.

Vernacular synonymy:—Superb = Copper-headed = Large-scaled = "Diamond Snake."

Habitat:—Tasmania, Victoria, New South Wales.

Description:—Central scale on head about twice as long as broad, sides concave. Scales in rows of 15-17. Abdominal plates 150-160. One anal plate. Sub-caudals in one series, approximately 50. Average length from 3ft. 6in. to 5ft. Head pointed. V-shaped copper coloured markings at back of head. Colour of body variable.

The Superb or Copper-headed Snake is not nearly so common in Tasmania as the Tiger Snake (*N. scutatus*). It is usually referred to as the "Diamond Snake," but this should not be so, as the true Diamond Snake (*Python variegatus* var. *spilotes*) is a python and a variety of the true Carpet Snake, and does not occur in Tasmania. *D. superba* is also referred to as the Large-scaled Snake. This species is known on the mainland as the Copper-headed or Superb Snake. I consider the latter designation the more preferable for several reasons. It more closely approaches the scientific designation, and its use would eliminate considerable confusion. If all the specimens met with conformed to the type, in which the copper-coloured markings are most distinct, it might be a different matter. However, as with all the Tasmanian snakes, there is a great diversity of colour. While this species usually frequents swampy country, it is also found in more open country. During the Tasmanian Field Naturalists' Club's excursion to Port Arthur during Easter, 1918, I secured a specimen of this species on the rocks at the summit of Brown Mountain.

Denisonia coronoides.

White-lipped Whip Snake.

Denisonia coronoides, Boulanger, Cat. Sn. Brit. Mus. Vol. III. p. 336 (1896);
Waite, Aust. Snakes. p. 55 (1898);
Smith, Nat. Tas. p. 89 (1909);
Lucas and Le Souëf, An. Aust. p. 177 (1909);
Brit. Assocn. Ad. Sc. Tas. Hbk. p. 89 (1914).

Hoplocephalus coronoides, Günther, Cat. Sn. Brit. Mus. p. 215 (1858);
Krefft, Sn. Aust. p. 62 (1869);
McCoy, Prod. Zoo. Vict. Vol. I. p. 8 (1878).

Habitat:—Tasmania, Victoria.

Description:—Central scale on head three times as long as broad. Scales in 15 rows. Abdominal plates 138-150. One anal plate. Sub-caudals 38-50. Average length 1ft. 3in. to 1ft. 9in. Body elongated and rounded. Head and tail not distinct from trunk. Distinctive white streak on lip. General colour very variable.

The White-lipped Whip Snake is well named, for its most distinctive feature consists of white markings on the lip extending some distance back behind the eyes. In some of the older works this species is referred to as the "black-bellied snake." The true black-bellied snake (*Denisonia signata*) does not occur in Tasmania, but is found in New South Wales and Queensland. The White-lipped Whip Snake is therefore the correct and also the most appropriate designation. The only reason I can advance for the synonym "black-bellied" is that the under surface becomes dark in specimens preserved in spirit, while the upper surface is inclined to fade.

This species may be met with in all localities. I have observed it on the sea shore and on the tops of mountains over 4,500ft. elevation. Its variety of habitat is only equalled by its variety of colours, which may be white, dark brown, green, red, or any intermediate shade. Perhaps the most fashionable colour scheme is brown. It can readily be identified by the white markings on the lip, which, however, show considerable variation. Also by the long narrow central shield on the head.

While this snake is usually treated with all the respect due to its class, it is doubtful if there is an instance of its bite proving fatal. The Tasmanian variety grows to a larger size than the mainland form. Krefft has stated (4) "This snake, even when handled, seldom, if ever, offers to bite, and the wound caused by it is not as bad as the sting of a bee."

Notechis scutatus.

Tiger Snake.

Notechis scutatus, Boulanger, Cat. Sn. Brit. Mus. Vol. III. p. 351 (1896);
Waite, Aust. Snakes, p. 60 (1898);
Lucas and Le Souëf, An. Aust. p. 81 (1909);
Br. Assocn. Ad. Sc. Tas. Hbk. p. 89 (1914).

(4) P. & P. Roy. Soc. Tas., 1868.

Hoplocephalus curtus, Günther, Cat. Sn. Brit. Mus. p. 216 (1858);
Krefft, Sn. Aust. p. 53 (1869);
McCoy, Prod. Zoo. Vict. Vol. I. p. 11 (1878);
Smith, Nat. Tas. p. 89 (1909).

Loina of the Aboriginals.

Vernacular synonymy:—Tiger Snake = Brown-banded = Black Snake (Dark var.) = Carpet Snake (Light var.).

Habitat:—Tasmania, Australia.

Description:—Central scale on head shield shaped and almost as broad as long. Scales in 15-18 rows. Abdominal plates 160 or more. 1 anal plate. Sub-caudals, in one series 40-55. Average length 3ft. 6in. to 5ft. Head distinct from neck, body cylindrical. Colour variable, from black to sand colour, with more or less prominent yellowish bands.

This species is more common in Tasmania than *Denisonia superba.* It is the most deadly of all Australian snakes, and care must be taken when dealing with a representative of this species. The Vernacular nomenclature, like that of the rest of the Tasmanian snakes, has been so abused that it is very difficult in some cases to know which species is referred to. In the first place bushmen usually refer to the dark coloured specimens as Black Snakes and the lighter ones as Carpet Snakes. This is courting confusion, for the true Black Snake (*Pseudechis porphyriacus*) does not occur in Tasmania, nor does the true Carpet Snake (*Python variegatus*). The latter is a non-poisonous python growing to a length of 14 feet, and is met with on the mainland. The correct name "Tiger" should always be given to this snake, no matter what its colour. The various hues cannot be regarded in the classification of species.

If a snake above the size of a whip snake is met with in the Tasmanian bush it will be found that on the average almost two out of every three are Tiger Snakes. If disturbed in the ordinary way it will usually attempt an immediate retreat, but if disturbed while mating or annoyed, its truly vicious temper is soon manifested. It spreads out its neck to a large extent until the dark skin can be seen between the scales, and assumes the offensive readily. In this characteristic it shows its similarity to its closely related species, the cobra of India.

While it may be found in all localities it prefers, as a rule, dryer country than *D. superba*. Its main item of food consists of lizards, which are varied with frogs and other small animals.

While the average size is from three to five feet in length, larger specimens are often met with. The largest specimen of this species in the Tasmanian Museum measures no less than 6ft. 2½in.

This species produces fifty or more young each season, and the young show the same diversity of colour as the adults. On some occasions a very large number of young are produced, especially by the Tasmanian species. One specimen forwarded to the Tasmanian Museum was found on dissection to contain no less than 109 young.

Platurus laticaudatus.

Wandering Sea Snake.

Platurus laticaudatus, Boulanger, Cat. Sn. Brit. Mus. Vol. III. p. 307 (1896);
Waite, Aust. Snakes, p. 68 (1898);
Lucas and Le Souëf, An. Aust. p. 188 (1909).

Habitat:—Bay of Bengal to China Seas and S.W. Pacific.

Description:—"Scales in 19 rows. Ventals not keeled 210-240. Sub-caudals 25-45. Olive above, yellowish beneath, with 29-48 black annuli, which are as broad or broader than the interspaces between them. Total length 970 millimetres, tail 90 mm."—B.M. Cat.

This species has, on rare occasions, been found on the East Coast of Tasmania. There are records of its occurrence in the Proceedings of the Royal Society of Tasmania, and there is one specimen from Tasmania in the British Museum.

NOTES ON TASMANIAN EUCALYPTS.

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(With 1 plate and 2 figures).

[Received 19th Sept., 1918. Read 14th Oct., 1918.]

A visit to Tasmania in February-March of the present year, has enabled me to look into some doubtful points, and also to consult Mr. Rodway, to whom I am very grateful, although he is not responsible for my statements. The notes are in alphabetical order of species' names. C.R. means my "Critical Revision of the Genus Eucalyptus."

1. *E. aggregata* Deane and Maiden. *Journ. Roy. Soc. N.S.W.* xlvii., 230.

See C.R. xxv., 85, also this Journ. 1914, p. 30.

Rodway, this Journ. 1917, p. 20, refers to the Tasmanian tree as Black Gum (a name it shares with the typical New South Wales form). His reference to *E. Stuartiana* is to one of the three trees successively named *E. Stuartiana*, and the Tasmanian tree is the one that I have distinguished under the name *Stuartiana prima* (see C.R. xxi., p. 4). Seedlings from seeds sent to me by Mr. Rodway from Tasmania in December, 1917, precisely match those of typical *aggregata*.

I gave some attention to this species on my recent visit to Tasmania. Juvenile leaves vary from narrowish to broadish. There are minor differences in the Tasmanian as compared with the New South Wales specimens, but nothing that seems important to me, nor not easily explained by an environment a thousand miles away from the type.

I collected it 15 miles from the Ouse (Victoria Valley P.O.), on the Dee road. Here I got buds, flowers, and fruits of a flaky barked gum, the tree being of small size.

At the Dee this grows into shapely trees of good size. They have a fibrous bark on the butt, with smooth branches; small fruits. A local resident called it Black Peppermint, but I think this name should be reserved for *E. amygdalina*. My informant had probably heard it called Black Gum and corrupted the name.

2. *E. cordata* Labill.

C.R. Part xix., Plate 84.

Rodway, this Journ. p. 19 (1917), has drawn attention to the juvenile condition of the leaves being maintained throughout the life of the tree. In view of the fact that *E. cordata* is one of the few remaining species with homoblastic leaves (and investigation is gradually reducing their number), I would invite the further attention of collectors to this tree, in order that they may search, especially near the tops, both cultivated specimens, and trees in their native habitats, for pedicellate, lanceolate leaves. The nearest I have got to this state is in a specimen (2c of Plate 84 C.R.) collected by Labillardière himself.

3. *E. coriacea* A. Cunn. (*E. pauciflora* Sieb.)

White Gums, with more or less flaky bark. Spreading out in a number of stems on the rocky surface, and occasionally in single stems.

At the Dee, erect rather than pendulous. It is desirable to collect specimens, and make notes on the spot, in regard to this species, in order to ascertain the extent of its variation. Rodway, *op. cit.*, p. 15, concurs that it is variable in habit.

4. *E. linearis* Dehnhardt.

Following is an extract from my February, 1906, note-book, written in front of the trees at Adventure Bay.

"Trees of medium size, say up to 100 feet, with smooth, slightly ribbony bark (the smooth portion of a yellowish cast) and very little scaly bark except perhaps a little at the lowest portion of the butt.

"Clean looking trees, with clean looking branches and light tops of narrow leaves. The foliage rather erect, certainly not pendulous, although occasionally slightly so.

"This is White Peppermint according to the Adventure Bay people and also Mr. Rodway.

"These trees differ from *E. amygdalina* as we know it, in two important points.

1. An erect, smooth-barked (not rough-barked) tree.
2. Foliage erect, not pendulous."

One need, however, not go as far as Adventure Bay to see good specimens, for there are plenty in the Domain, Hobart, of fair size. Trunks of 1-2 feet. They are gums with more or less flaky bark. The linear juvenile foliage is very evident (Feb., 1918).

5. *E. nitida* Hook. f. *Fl. Tas.*, i., 137, t. 29.

Bentham (B. Fl. iii., 203) reduced this to a variety (*nitida*) of *E. amygdalina*.

In B. Fl. iii., 203, we have the observation: "In the dried specimens the variety (*nitida*) appears to pass into the variety *elata* of *Risdoni*." This remark is interesting in view of the fact that a seedling of *E. nitida* from Blackheath, N.S.W., about 9 inches high, cannot be distinguished by me from a seedling of the same size raised by Rodway named by him *E. Risdoni* var. *hypericifolia*. This is additional evidence of the inter-relations between members of this group, which, from this aspect, I propose to go fully into when I deal comprehensively with the seedlings of the genus.

I followed Bentham's example as to the status of *E. nitida* in C.R. Part vi., p. 158. At p. 163 of the same work, I announced the discovery of this (variety) species at Mt. Victoria, N.S.W.

Mr. Cambage and I (*Proc. Linn. Soc. N.S.W.*, xxx., 192, 1905), in recording it from Blackheath, a few miles from Mount Victoria (both in the Blue Mountains), said, "We now raise the question that *E. nitida* Hook. f., may be a valid species after all."

We (*Proc. Roy. Soc. N.S.W.*, xlviii., 415, 416, 1914) definitely expressed the opinion that *E. nitida* is a good species, and we record a specimen from Kydra, via Nimitybelle, in the extreme south of New South Wales, as connecting the Blue Mountains, N.S.W., specimens with the Tasmanian (home of the type).

Let me also draw attention to Mr. Cambage's Tasmanian specimens referred to in the last four lines of p. 416. They have juvenile (sucker) leaves, which have neither been described nor figured before, although collected in February, 1911, and it will be observed that their width alone sharply separates them from those of *E. amygdalina*.

Opposite or slightly alternate, sessile, orbicular, ovate to elliptical lanceolate, interspersed with spreading veins on both sides, somewhat rough, branches angular or compressed, red brown, tuberculate with prominent oil glands, internodes distinctly dilated at the base of the leaves, caused by the fusion of the petioles. (See Plate XII).

Mr. L. C. Irby collected this species near Devonport, 17.6.12, and I am indebted to Mr. Rodway for a sight of the specimen, and of Mr. Irby's note:—

"A shrub or stunted tree. Bark scaly, and, I think, like any young Black Peppermint (*amygdalina*). Leaves very variable, frequently over 1 inch wide and with the diverging venation and general appearance of *E. viminalis.* The other leaves on the same tree are normal *amygdalina.* Rather rigid. Fruits as in *E. amygdalina* or *E. linearis.*" It would appear that typical *amygdalina* has longer pedicels to the fruits, but the species are close to each other.

Rodway, *this Journ.* p. 14 (1917), concurs in restoring *E. nitida* to specific rank, though with some doubt, refers to it as "Broad-leaved Peppermint," and says it has the habit and white bark of *E. linearis.* He describes (with some reservation) the juvenile leaves of a specimen collected by Mr. Irby at Guildford Junction as "broad, oblong," and the bark "scaly or semi-fibrous." He has kindly shown me the specimen, and it is *E. nitida.* It has the broadish juvenile leaves of the species and hemispherical fruits, the rim of which is remarkably truncate or horizontal, i.e., in a plane at right angles to the axis.

To recapitulate, some of the Blue Mountains, N.S.W., specimens seem to be in no way different from the Tasmanian type. The Kydra specimens although not altogether typical are very close; the buds are a little more clavate, and the fruits slightly more pedicellate, otherwise this form is identical with the type. It is of course always to be borne in mind that we have limitations arising out of the imperfection of the material presented by the type and of the specimens compared with it, and a certain amount of change is to be expected in the case of specimens far away from the environment of the type.

Some Blackheath specimens (marked B in the Maiden-Cambage paper of 1914) vary from the type in that the leaves are narrower and more rigid; buds very long (or longer than the type); fruit sub-globose or barrel-shaped, with a convex rim, all apparently 3-celled. The fruits of the type are hemispherical, truncate, with a prominent red rim.

6. *E. obliqua* L'Her. (Stringy-bark.)

Very abundant in the Dee Scrub. The young trees have whitewashed tops or branchlets, and in this respect are strongly reminiscent of *E. Sieberiana* as seen in New South Wales.

I also noticed, around the Dee Scrub in particular, that the young stringy-bark trees have more or less red (bleeding heart) leaves, which, in transmitted light, look very beautiful. I did not see these leaves on other local trees, and they are therefore, in this district at least, characteristic.

7. *E. ovata* Labill.

At the Ouse are very large trees, mainly on the flats, but also on the sides of the rises. They have rough butts, with flattish ribs of fibrous bark, reminiscent of *Syncarpia laurifolia* Ten. (the Turpentine of New South Wales).

Branches smooth, but they are rough-barked trees on the whole.

8. *E. Perriniana* F.v.M.

A planted tree at Ellislea, on the Dee, was (March, 1918) bearing fruit in an extraordinary quantity rarely seen in the genus. It is semi-pendulous, and the branches brittle; the timber is, therefore, inferior in value. Purplish glaucous branchlets, diameter 2 feet 6 inches; height 50 feet. On the Strickland it grows on poor sandy soil and is scrubby, rarely attaining the size of the Ellislea tree.

There is a cultivated tree in the garden of Dr. Clarke, Macquarie Street, Hobart. It is only (February, 1918) about 10 feet high. As growth proceeds, the rhachises increase in diameter and stretch the bases of the perfoliate leaves. The leaves are persistent for a long time, and leave circular scars on the branches, and even on the main trunk. This phenomenon is rare in Eucalyptus.

9. *E. Risdoni* Hook. f. (in *Hook. Lond. Journ. Bot.* vi., 477, including 1. *E. hypericifolia* R. Br., Herb. which = 2. *E. amygdalina* Labill. var. (?) *hypericifolia* Benth. in B. Fl. iii., 203).

Through the kindness of Dr. A. B. Rendle, F.R.S., of the British Museum (Natural History), London, I have received a specimen of the type, labelled "*Eucalyptus hypericifolia* R. Br., in coll. saxos prope Risdon Cove, R. Brown." This was subsequently given the number 4789.

E. Risdoni was figured by Hooker fil. himself in *Fl. Tas.* i., t. 24, so we know what it is. I also figured it in C.R., Plate 32.

The name *hypericifolia*, either as species or variety, has been a good deal referred to by botanists. See pp. 173, 174, Part vi., C.R.. But, so far as I am aware, it has never been figured, and I figure the type. (See Plate XII).

In his paper "Notes on *Eucalyptus Risdoni* Hooker," by L. Rodway, this Journal, 1910, p. 367, the species or variety *hypericifolia* is dealt with. Mr. Rodway provisionally refers 4 forms (a, b, c, d,) to it, and figures form c (upper portion of Plate xi.) and form d (lower portion of Plate xii.) together with first year seedling of for d (upper portion of Plate xii.) second year seedling of form d (lower portion of Plate x.), third year seedling of form d (upper portion of Plate x.).

In his 1917 paper on "Tasmanian Eucalypts," p. 13, he states that *E. hypericifolia* is "Cabbage Gum," and that the juvenile leaves differ from those of *E. Risdoni* in being more lanceolate and long.

At one time I thought that the narrow leaved forms of *E. Risdoni* (var. *elata* and var. *hypericifolia*) could be combined as one narrow-leaved form, but Rodway, at p. 368 of his 1910 paper, shows that this cannot be safely done in the present state of our knowledge. Some day a leisured Tasmanian botanist, with adequate field and horticultural opportunities, may collect large series of specimens, connect them with their seedlings in all stages, and work out the phylogeny of this interesting little group.

10. *E. rubida* Deane and Maiden.

See C.R. Part xxvi., the Tasmanian references at p. 120.

From the Ouse to the Dee I frequently came across this species, closely approximating to the type.

11. *E. unialata* Baker and Smith, this *Journ* 176, with a Plate (1912). Syn. 1. *E. viminalis* Labill., var. *macrocarpa* Rodway; 2. *E. antipolitensis* Trabut, *Bull. de la Stat. de Rech. Forest du N. de l'Afr.* i., 151, with pl. xv. *bis* (1917).

This is referred to as *E. viminalis* var. *macrocarpa* by Rodway in "The Tasmanian Flora," p. 57 (1903), where it is first suggested as a cross between *E globulus* and *E. viminalis*.

In this *Journ.* p. 29 (1914) I suspended my judgment as to its systematic position until I could see the trees growing naturally. Rodway, this *Journ.* p. 17 (1917), again refers to the tree.

In February, 1918, under Mr. Rodway's guidance, I observed a number of the trees in the Domain at Hobart. I may say that I had long been satisfied that the trees were different from *E. viminalis* and *E. globulus*, but I had understood that they had only been found in a plantation, and were not spontaneous; I desired to see them before I wrote again. I am quite satisfied that they are spontaneous, and that they are natural hybrids, and that it is expedient that they should have a distinctive name. I therefore concur in Messrs. Baker and Smith's action.

The Domain trees are large, and there are many of them. They also occur at Nelson's Range, near Sandy Bay, and Mr. Rodway informs me that they are not uncommon at Colebrook (late Jerusalem), on the Main Line, 25 miles from Hobart. In all cases *E. unialata* occurs intermixed with *E. globulus* and *E. viminalis*. Doubtless they will be found in many other localities.

Mr. Rodway's observation that it is a hybrid between these two species (first recorded in 1905) is quite obvious, and it is one of the simplest cases of natural hybridisation in the genus known to me. The cross is seen in the tree generally, in juvenile leaves, buds and fruits.

12. *E. viminalis* Labill.

C.R. Part xxviii.

The Dee, near Ellislea house. A "White Gum." An erect tree of 80 feet, 3 feet in diameter. Covered with thinnish lenticular, flaky, deciduous bark. On a gentle slope in the grass and far from any water,. Fruit rather large and with a conical top to the capsule. This is an example of large fruited *viminalis* which led me at first sight to think I had a different species.

In C.R. Part xxviii., p. 168, I draw special attention to the width of the juvenile leaves in this species. As regards Tasmania, I did not do justice to the breadth of them; I had put some broad specimens aside, and inadvertently they were not figured. They include:—

1. Near to Chimney Pot Hill, 4½ miles from Hobart, (L. Rodway, May, 1910). Several of these cordate leaves are over 3 cm. broad and 4 cm. long.

2. Sheffield, growing on basalt (R. H. Cambage, No. 4098, 1st February, 1911). Here we have even broader juvenile leaves, for they are as broad as they can be, for some are 5 cm. long and 5 cm. broad and others 6 cm. long and 6 cm. broad. The fruits are large in this form.

It would be absurd to speak of such specimens having narrow juvenile leaves, and we must therefore say that in *E. viminalis* the juvenile leaves may be narrow to broad, with many intervening forms, although they are rather narrow in the type.

ERRATUM SLIP.

The whole of the passage from page 89, from line 6, "It is testimony . . ." to page 90, line 6, . . . "to ensure propagation," should be inserted just before No. 12. *E. viminalis*, at page 88.

In a few cases it has been possible to demarcate narrow and broad-leaved forms, placing them under different species, but, so far as I can see, the leaves of varying width in *E. viminalis* form a quite uninterrupted series.

It is testimony to the sound judgment of the late M. Naudin of the Villa Thuret, Antibes, in the south of France, that he detected it as something different from *E. viminalis*, and only last year M. Trabut described it as new, under the name *E. antipolitensis*, and I append a translation of his description. This is not the first occasion I have had the pleasure of drawing attention to the excellent Eucalyptus work of these French botanists.

"At the Villa Thuret at Antibes where there is a collection of Eucalypts made by Naudin, I have especially observed a very fine subject worthy of propagation. Naudin had provisionally labelled it *E. viminalis* var. *longifolia*. The examination of the organs of reproduction as of vegetation leave no doubt as to the parentage of this form with *E. globulus*. I propose to call it the Antibes Eucalyptus.

"*E. antipolitensis*, n. sp. (Plate xv. *bis*).

"A tall tree, trunk covered with fissured bark; branches smooth by reason of the falling of the old bark; young leaves sessile, alternate, opposite, often in threes on the same branch, broad and obtuse at the base of the branch, then oval, glaucescent with the odour of *E. globulus*; adult leaves thick, long-lanceolate, falciform, dark green, dotted with large essential oil dots, umbels axillary with three flowers and short peduncle, buds sessile, verrucose, hoary, calyx-tube angular, operculum slightly longer than the calyx-tube, hemispherical, mucronate, fruit from 12 mm. in diameter, with 3-4 valves not erect or very slightly so; fertile seeds black, angular, without appendages. Villa Thuret, Antibes.

"This Eucalyptus was shown by Naudin very probably as *E. viminalis*; he called it var. *longifolia*.

"At first sight it is distinguished from *E. viminalis* by its habit, its stem, its foliage reminding one of *E. globulus*. The buds and the fruits are much larger than those of *E. viminalis* and strongly resemble those of *E. globulus*; the fruits are much smaller than in this species, always in threes; they are slightly verrucose, and show a slightly different mode of dehiscence. The young leaves resemble those of *E. globulus* and have the same odour, but they are distinguished from it, however, in not being stem-clasping; the branches which bear it are angular, but not nearly so quadricular as in *E. globulus*

"*E. antipolitensis* is a very fine tree which has not yet been propagated; it has numerous capsules in which the number of the fertile seeds is restricted, but quite sufficient to ensure propagation."

13. *E. viminalis* var. *racemosa* F.v.M.

Mr. Rodway drew my attention to a straggly, scrambling tree of medium size, rough bark to branches, inflorescence racemose, in the Reserve in front of the University, Hobart. The tree is supposed to have been planted.

This is Mueller's var. *racemosa*, and I have figured it at fig. 9b., Plate 118, Part 28, C.R., from Port Phillip, Victoria. It is identical with R. Gunn's No. 1090 (*op. cit.* p. 174) from the Circular Head sand-hills, Tas., a portion only of the inflorescence of which was figured at fig. 6b., Plate 117. I do not look upon it as a useful variety without further information. The Circular Head sand-hills and the localities across Bass's Straits should be further searched for *E. viminalis* with rough bark and *racemose* inflorescence, when the matter can be reconsidered.

Reference to Plate XII:—

1. Type of *E. hypericifolia* R. Br., from Risdon Cove, Hobart, collected by Robert Brown in 1802. One fruit shown.

2. Broad juvenile leaves of *E. nitida* Hook. f., Guildford Junction, Tas. (collected by R. H. Cambage). *E. nitida* is of course figured in Hooker's Fl., Tas.

TWO NEW AUSTRALIAN *PYCNOGONIDA.*

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(With 2 plates and 6 figures).

[MSS. in full received 31st October, 1918. Read in abstract 12th August, 1918.]

(1) Introduction.

There is no doubt that the interest shown in the Antarctic forms of *Pycnogonida*, and the problems raised by the study of this remarkable group of animals in the Southern Polar Regions, have made it advisable, or even necessary, that detailed attention and study should be given to the Australian forms. However, no work has been published on the *Pycnogonida* of the Australian Coast since Professor Haswell's paper (1) in 1884, except a short paper written by myself (2) on *Halosoma haswelli.*

I have, therefore, no hesitation in presenting a description of two new Australian forms, more especially as they represent genera not previously described from this part of the world, and they distinctly help in settling certain problems of distribution, especially in relation to the genus *Ammothea.* These new species belong to the genera *Pycnogonum*, Brunn., and *Ammothea*, Leach. The only *Pycnogonum* recorded from Australia is *P. australe*, Grube (3), described in 1869. I have not seen the original description of this species, but it is mentioned in Hoek's (4) list and also in Haswell's. Loman (5) points out, with good reason, that the species is not recognisable from the description. It was founded upon a larval form with three pairs of legs and traces of a fourth pair. It was also described as possessing like *P. pusillum*, Dohrn (6) small accessory claws. The species of *Ammothea* described as new in the present communication, is the first of the genus recorded as being found in Australia. Haswell's *Ammothea assimilis* (1) from Port Jackson will now rank as an *Achelia* and his *Ammothea longicollis* (1) as an *Ascorhynchus.**

* For the privilege of examining Professor Haswell's types, of which I propose shortly to issue a redescription, I am indebted to the Trustees of the Australian Museum, and to their courteous Director and Curator, Mr. Robert Etheridge, Jun.

(2) Pycnogonum aurilineatum, sp. nov.

Plate XIII., figs. 1-2; plate XIV., fig. 3.

Description.—Colour, dark brown with a longitudinal mid-dorsal band of yellow, two thirds of a millimetre wide, extending from behind the ocular tubercle to the posterior edge of the penultimate trunk segment, also with various flecks and spots of yellow on the body and limbs. The distal third or so of the propodus of each leg is also of the same colour.

The species belong to the group which have a "shagreened" appearance (Bouvier, [7]). Here and there only—for example, on the proboscis—does any of the reticulation found in some other forms of the genus appear.

Body is extremely stout, strong and broad; the segments are strongly marked dorsally and ventrally. Dorsally each segment of the trunk except the last culminates in an obtusely rounded median projection, placed at the hinder border of the segment. In this, *P. aurilineatum* resembles *P. gaini*, Bouvier ([8], [9]), but in the latter there are four such elevations, each less rounded than in *P. aurilineatum*. The median tubercle found in the last segment of the trunk of *P. gaini* is absent in the species now under discussion. In Plate XIII., fig. 2, showing a side view of *P. aurilineatum*, the elevation behind the third trunk eminence, and which appears at first sight to correspond with the most posterior trunk eminence of *P. gaini*, belongs really to the fourth cruriger of the right side.

The cephalon has its anterior border almost entirely undeveloped, the comparative smallness of this portion being remarkable when compared with the similar region in a form like *P. littorale* (Ström). The first pair of crurigers is almost entirely fused with the lateral borders of the cephalon, practically the whole of the antero-internal edge of each of these crurigers being included.

Each segment of the trunk except the last ends posteriorly in a high and prominent round edge. The last trunk segment is peculiar. Instead of being a broad band like the other segments, it is practically only the meeting place of the posterior pair of crurigers.

The crurigers are broad and stout. The anterior pair are almost entirely fused with the cephalon. The crurigers are separated by well defined intervals, that between the third and fourth pairs being the greatest. At the distal end of the second, third, and fourth crurigers, small elevations occur. These are largest in the case of the fourth pair, but they do not approach, even in this case, the size of the trunk eminences.

The ocular tubercle is placed a little distance away from the anterior border of the cephalon, and points slightly forward. It is somewhat conical with the apex sharply rounded off. The posterior side of the ocular tubercle passes over into the anterior side of the first trunk eminence by means of a shallow curve. Visual elements are not well marked.

The proboscis is about two-thirds the length of the trunk, and points somewhat obliquely downwards. The basal half or so is of greater diameter than the distal portion. Proceeding from its base, the proboscis very gradually expands to a maximum, after which it suddenly contracts, there being here a wide shallow groove encircling it. From this groove to the rounded mouth extremity there is a very slight taper.

A lateral view shows that the dorsal lip projects slightly beyond the others.

The abdomen arises from the posterior end of the last trunk segment between the last pair of crurigers. It is longer than the first coxa of the hind limb, and this joint closely flanks it on either side. It has a slight tendency upward from the horizontal, and increases slightly in width from before backwards. It ends in an almost straight margin surmounted by a small median tubercle.

The legs are strong and stout. The three coxal joints are short and thick. The second is the longer of the three. In the case of the last limb only, the first and second coxæ bear each a small dorsal tubercle at the distal end. In this position on the coxæ of *all* the legs is a yellowish spot of circular outline. This, as Bouvier suggests for *Pentapycnon charcoti* (9), possibly represents a gland of some sort. Posterior to this spot in *Pycnogonum aurilineatum* on the second coxa of each of the posterior pair of limbs is the rounded reproductive aperture. The femur is very stout and of a complicated shape. At its coxal end it is narrow, but soon expands and presents, on its ventral side, a prominent tubercle. It then curves towards the dorsal side, where there is another distinct elevation, much better developed than is the case of the former one. It then curves ventrally and bears at its distal end two rounded tubercles, only one of which can be seen in the lateral view shown in the figure. The first tibia is a little shorter than the femur and is somewhat similar in shape to that of *Pycno-*

gonum gaini, but rather more nodular and having a low dorsal elevation at its distal end. The second tibia is peculiar. It is very short and very thick. It is also immoveably fused with the tarsus. The line of union is distinct but movement between the two joints is impossible. The tarsus is very small, somewhat swollen ventrally, wedge-shaped, with a very limited portion visible on the dorsal surface. The ventral side of the tarsus bears a number of rudimentary spines. The propodus is somewhat curved and tapers slightly towards the distal end. It bears ventrally a number of small spines. The terminal claw is strong, blunt and slightly curved.

Measurements:—

Overall length (tip of proboscis to end of abdomen)	10.3	mm.
Proboscis, length	3.6	,,
,, max. diameter	1.76	,,
Cephalon, width	2.36	,,
Body, length	5.4	,,
,, width at level of second pair of crurigers	2.9	,,
,, width, including second pair of crurigers	4.94	,,
Abdomen, length	1.50	,,
Third right leg—first coxa	1.1	,,
,, ,, ,, second coxa	1.6	,,
,, ,, ,, third coxa	1.33	,,
,, ,, ,, femur	3.65	,,
,, ,, ,, first tibia	3.0	,,
,, ,, ,, second tibia	.81	,,
,, ,, ,, tarsus and propodus	2.45	,,
,, ,, ,, claw	.1	,,

Affinities.—The species certainly seem somewhat closely allied to *Pycnogonum gaini*, Bouvier ([9]), from the Antarctic, but differs from it in having three dorsal eminences instead of four, in the shape of the proboscis and ocular tubercle, and in the proportions of the joints of the legs, especially in the shortness of the second tibia.

Occurrence.—Port Arthur (South Eastern Tasmania) in shallow water entangled in the spines of an echinoid (undetermined); collected by Mr. E. Mawle. Two specimens were collected, both females, one (the holotype) a little larger than the other. The smaller one (co-type) reproduces, in all but very minor details, the characteristics of the larger one.

Holotype, one female, Tasmanian Museum Collection, Nos. C 1667-71. The Holotype consists of one spirit specimen and four microscope slides representing the four right legs.

Co-type, one female, Biological Museum Collection, University of Tasmania.

3. Ammothea australiensis, sp. nov.

Plate XIV., figs. 4, 5, and 6.

The specimen is very minute, and was collected amongst sponges and mussels at Shark Island, Port Jackson, N.S.W. Unfortunately, in tearing apart two closely adhering mussel shells, the little animal was considerably damaged. The result is that the left palp and the third right and left legs are missing. In addition to this there is a considerably older injury of somewhat more serious consequences. At some time or other the ovigers have been broken or torn apart in a curiously symmetrical way, only the basal three joints and a part of the fourth joint on each side remaining. The broken ends have been rounded off and healed showing that the injury is of some standing.

Description.—Colour brownish yellow (in life and after preservation in alcohol).

Body stout with intersegmental divisions strongly marked. The transverse ridges of the body, dorsal and ventral, are very distinct. Dorsally each culminates in an acutely pointed median elevation. None of these is as high as the ocular tubercle. The crurigers are separated from one another by distinct but varying distances. This distance is greatest between the second and third pair.

The cephalon is expanded and is shield-shaped. The first pair of crurigers is united with the cephalon, almost the whole of the anterior border of each of these being continuous with the postero-lateral border of the cephalon. A slight projection of the cephalon gives support for the basal joint of each palp, and there is a much more pronounced ventro-lateral eminence for the attachment of the oviger. Separating these elevations on each side is an obliquely running groove.

The ocular tubercle, situated about the middle of the cephalon, is erect, with a rounded summit surmounted by a sharply pointed apex. It is of greater height than any of the trunk eminences, with well marked visual elements, anterior pair a little larger than the posterior.

Proboscis has the form and appearance associated with many of the members of this genus. Its shape is roughly that of a long ellipse, the narrow end of which is inserted moveably into the ventral side of the cephalon. At about one-third the distance from its proximal end there is a shallow transverse groove running circularly round the proboscis. In front of this, the proboscis expands greatly and then contracts, ending in a rounded anterior extremity.

Chelifori short, a little less than one-third the length of the proboscis; scape smooth and one-jointed, chela reduced to a single terminal joint.

Palpi longer than proboscis, nine jointed, first joint small, second very long, third a little longer than the first, fourth joint is about equal in length to the second but is a little stouter and slightly curved, fifth is shorter than the fourth but longer than the third. The remaining joints are all small, but the sixth is the longest. All joints are smooth.

Ovigers.—These are damaged as mentioned above, there being only the basal three joints and part of the fourth joint left. First joint is much swollen and of moderate length, the second is longer, narrow and curved, the third is shorter than the second and is also somewhat curved.

Abdomen semi-erect, rising from the posterior border of the penultimate trunk segment; its base is expanded and is very little less in width than the segment of the trunk. The abdomen narrows and again expands fusiformly, ending in a rounded extremity. In side view it presents the appearance of a tube of somewhat even diameter.

Legs.—Owing to the loss of the third leg on each side, the custom which has been adhered to by most writers, of describing and measuring the third leg of the right side, cannot be maintained in this case, and so the measurements here given will refer to the second right leg.

The first coxa is squarish and slightly expanded distally. The second coxa is more than twice as long as the first and is slightly curved. While it is expanded at the distal end it is not so stout as the first coxa. The third coxa is short and thick, a little longer than the first coxa. The armature of the coxal region shows nothing very characteristic. The femur is stout and straight, its length is not as great as that of the coxal region. The first tibia is about equal in length to the femur, is somewhat narrow at its proximal end but expands more towards the distal end. The femur and tibia are armed with small scattered spines. The tarsal joint is small and bears ventrally a series of small spines crowded together; dorsally there is a single larger spine. The propodus is stout and curved. It is armed with a stout claw with two well-developed auxiliary claws. Dorsally, it bears a number of short spines. Ventrally, the heel is not sharply marked off, but this region is indicated by the possession of four or five short but stout spines, while the sole possesses about twelve, which are much more minute.

Measurements :—

Overall length (from anterior extremity of proboscis to end of abdomen)	4.2	mm.
Proboscis, length	2.0	,,
,, greatest diameter	.92	,,
Cephalon, length	.9	,,
,, breadth in front	.60	,,
Trunk, length	1.12	,,
,, width (level of second pair of crurigers)	.64	,,
,, width (including second pair of crurigers)	1.46	,,
Abdomen, length	.7	,,
Second right leg—		
,, ,, ,, first coxa	.43	,,
,, ,, ,, second coxa	.9	,,
,, ,, ,, third coxa	.55	,,
,, ,, ,, femur	1.72	,,
,, ,, ,, first tibia	1.63	,,
,, ,, ,, second tibia	1.76	,,
,, ,, ,, tarsus and propodus	1.03	,,
,, ,, ,, claw	.30	,,
,, ,, ,, aux. claw	.23	,,

The specimen is a mature female and the general apertures are present on the second coxæ of all the legs.

Affinities.—This certainly seems to be the smallest member of the genus *Ammothea* now known. Following out Bouvier's key ([9]), the natural group to which *Ammothea* *australiensis* belongs is the one which includes *A. striata*, Mobius, and *A. glacialis*, Hodgson. It is, however, easily distinguished from either of them in its bodily form, especially in the shape of the proboscis and the proportion which the length of this organ bears to that of the trunk and in many other points. The species which nearest approach *A. australiensis* in size are *A. minor*, Hodgson, and *A. gracilipes*, Bouvier, and there is also some resemblance in the character of the trunk eminences, but the differences, which are many and fundamental, lie in the relatively shorter and stouter nature of the legs, the different shape of the proboscis, differences in the proportions of the various joints of the palps and ovigers, etc.

Occurrence.—Shark Island, Port Jackson, N.S.W., found at low tide among mussels and sponges.

Holotype, one female, Australian Museum Collection, consisting of one spirit specimen and three microscope slides of the first, second, and fourth right legs.

(4) The distribution of the genus AMMOTHEA.

In 1908, Loman (5) showed that Leach's genotype (*Ammothea carolinensis*) described in 1814, agreed rather with the genus *Leionymphon* (Mobius, 1899) (10) than with the majority of forms placed at that time in the genus *Ammothea*. This suggestion was adopted by Bouvier and Hodgson, the genus *Leionymphon* (Mobius) being replaced by *Ammothea* (Leach) while the old and disused *Achelia* of Hodge (11) was revived and used to distinguish those Ammotheidæ possessing eight jointed palps. The genus *Ammothea* contains up to the present some eleven species. The distribution of these species is somewhat remarkable, all of them except the original genotype coming from antarctic or sub-antarctic regions.

Leach's original type specimens came from South Carolina, in the United States, and since then no similar specimen has been found in the temperate regions of the Northern and Southern hemispheres.

Calman (12) has suggested that a mistake was made in the locality from which Leach's specimen came and that "South Georgia" should have been written instead of South Carolina.

The discovery of another species of this genus in Port Jackson, well within the temperate zone, certainly leads to the suggestion that this genus may be looked for outside the South Polar regions, and that specimens may still be found in the temperate regions of the two hemispheres. Calman's suggestion, therefore, that "it is justifiable to disregard his (Leach's) statement as to the origin" should be regarded with caution.

There is no doubt, however, that appearances point to the Southern Polar Regions as the headquarters of this genus, from which the various species may have radiated northward, in which case Leach's original locality may still be wrong.

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EXPLANATION OF PLATES.

Plates XIII. and XIV.

Figs. 1, 2, and 3. *Pycnogonum aurilineatum*, holotype, ♀, 10.3 mm. from extremity of proboscis to end of abdomen, from Port Arthur, Tasmania.

Fig. 1. Dorsal view of entire animal.

Fig. 2. View of right side with legs removed.

Fig. 3. Terminal portion of leg.

Figs. 4, 5, and 6. *Ammothea australiensis*, holotype, ♀, 4.2 mm. from extremity of proboscis to end of abdomen, from Shark Island, Port Jackson, N.S.W.

Fig. 4. Dorsal view of animal with second right leg.

Fig. 5. View of right side with legs removed.

Fig. 6. Terminal portion of leg.

A REVISED CENSUS OF THE MOLLUSCA AND BRACHIOPODA IN THE TABLE CAPE BEDS.

By W. L. May.

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As there is no complete list of the Mollusca and Brachiopoda described from, or attributed to, the Table Cape Tertiary deposits, it seems desirable that such a list, as complete as possible, and on an up-to-date classification, should be issued; more particularly for the convenience of local workers; the references given with each species will also be a useful guide to the study of the original descriptions, and also figures where such have appeared. The best list which has been published is that by R. M. Johnston in these proceedings for 1886, pp. 131-138, in which about 170 named species of Molluscs and 14 of Brachiopods are attributed to Table Cape. In the Pro. Roy. Soc. Vict. for 1896, G. B. Pritchard in a valuable contribution to this study has listed about 218 Molluscs and 17 Brachiopods.

A very complete catalogue of Southern Australian and Tasmanian species, was prepared by J. Dennant and A. E. Kitson, on a greatly improved nomenclature, and published in the Geographical Survey of Victoria for 1903. This is most helpful, and has been largely followed; some species have been added on their authority, which seem not yet to have been recognised by local workers. I have also been enabled to consult the British Museum Catalogue of Tertiary Mollusca, Part I., 1897, by G. F. Harris.

I am now able to add some additional species, principally through the industry of my friend, the veteran Conchologist, Mr. E. D. Atkinson, who has done so much exploration at Table Cape, and whose interest and enthusiasm are unabated. I have to thank him for the gift and loan of many specimens, and much assistance in various directions.

Whilst a certain number of supposed species have been sunk in synonymy, a larger number have been added, so that the present record includes 249 Molluscs and 10 Brachiopods. With respect to the latter I have followed Tate and Dennant in the species they attribute to our fauna; both Johnston and Pritchard add a number of others, but I consider that in the present state of our knowledge, these records are not sufficiently confirmed, and they are omitted.

The species described by Tenison-Woods in 1876 were not figured at that time, some were afterwards illustrated by Professor Tate, but many remained unfigured until recently, when I was able to deal with a considerable number. Several of his species still remain doubtful, and this is also the case with a few of R. M. Johnston's species described in 1879. For further information on these matters, the student is referred to my paper in the present volume of these proceedings. A few of the species are rather doubtfully placed in their present generic location, this applies more particularly to those forms included in the *Turridæ* = *Pleurotomidæ*.

In conclusion it is known that there are a number of additional forms in these beds which are unidentified; probably many are undescribed, and I hope at some future date to deal with some of these.

LIST OF SPECIES.

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2. *N. atkinsoni*, Johnston, *Portlandia*, Pro. Roy. Soc. Tasm. for 1879, p. 39. Tate, *op. cit.*, p. 127, Pl. IV., fig. 3a, 3c.
3. *N. fenestralis*, Tate, *op. cit.*, 1887, p. 129, Pl. IV., fig. 4.
4. *Nuculana apiculata*, Tate, *Leda*, *op. cit.*, 1887, p. 131, Pl. IX., figs. 4a, 4b.
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6. *N. fontinalis*, Pritchard, *Leda*, Pro. Roy. Soc. Vict. 1901, p. 28, Pl. III., figs. 3, 3a.
7. *N. huttoni*, Tenison-Woods, *Leda*, Pro. Lin. Soc. N.S.W., 1879. Vol. III., p. 239, Pl. XXI., fig. 2. Tate, *op. cit.*, p. 130, Pl. VI., fig. 4.
8. *N. prælonga*, Tate, *Leda*, *op. cit.*, 1887, p. 132, Pl. XII., figs. 4a, 4b.

9. *N. vagans*, Tate, *Leda, op. cit.*, IX., 1887, p. 188 (*nom. mut.*) = *L. lucida*, Tenison-Woods, *op. cit.*, 1879, p. 3, Pl. I., fig. 5 (*non* Lovén, 1846). Tate, *op. cit.*, p. 131, Pl. VI., figs. 7a, 7b.
10. *N. woodsi*, Tate, *Leda, op. cit.*, p. 133, Pl. IX., fig. 8 = *Leda inconspicua*, Tenison-Woods (*non* A. Adams).
11. *Cucullæa corioensis*, McCoy, Prod. Pal. Vict., 1876, Dec. III., Pl. XXVII., figs. 3-5.
12. *Limopsis belcheri*, Adams and Reeve, *Pectunculus*, Voy. Samarang, 1850, p. 76, Pl. XXII., fig. 5. A doubtful determination.
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14. *Arca celleporacea*, Tate, *op. cit.*, 1887, p. 141, Pl. X., fig. 10.
15. *A. limatella*, Tate, *op. cit.*, p. 141, Pl. X., fig. 2.
16. *A. pseudonavicularis*, Tate, *op. cit.*, p. 139, Pl. XI., fig. 8.
17. *Glycymeris cainozoicus*, Tenison-Woods, *Pectunculus*, Pro. Roy. Soc. Tasm. for 1876, p. 111. Type Hobart. Tate, *op. cit.*, p. 136, Pl. X., figs. 8a, 8b.
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27. *Spondylus gaderopoides*, McCoy, *op. cit.*, Dec. IV., p. 27, Pl. XXXVIII. figs. 1-1d.
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33. *L. linguliformis*, Tate, *op. cit.*, 1887, p. 118, Pl. III., figs. 1a, 1b.
34. *Limatula jeffreysiana*, Tate, *op. cit.*, p. 119, Pl. IV., fig. 8.
35. *Limea transenna*, Tate, *op. cit.*, p. 119, Pl. IX., figs. 6a, 6b.
36. *Monia sella*, Tate, *Placunanomia*, *op. cit.*, p. 102, Pl. V., figs. 1a-1c.
37. *Crenella globularis*, Tate, *op. cit.*, p. 126, Pl. X., figs. 3a, 3b.
38. *Myodora æquilateralis*, Johnston, Pro. Roy. S. Tas., 1879, p. 40. Type Hobart. Tate, *op. cit.*, p. 179, Pl. XVII., fig. 8. Distinct from *M. brevis*, Stutch.
39. *M. australis*, Johnston, *op. cit.*, p. 40. Tate, *op. cit.*, p. 174, Pl. XVII., figs. 10a, 10b. Type Hobart.
40. *Cleidothærus albidus*, Lamarck, *Chama*, An. S. Vert. VI., 1819, p. 96. Chenu., Illus. Conch. 1845, Pl. I.=*Chamostrea crassa*, Tate, P.R.S. Tas., 1884, p. 228.
41. *Crassatellites communis*, Tate and Dennant, T.R.S. S. Aus., 1893, p. 224, *nom. mut.*=*C. astartiformis*. Tate, *op. cit.*, 1886, p. 147, Pl. XI., figs. 12-15 (*non* Nyst).

42. *C. oblonga*, Tenison-Woods, Pro. Roy. S. Tasm., 1875 (1876), p. 25, Pl. II., fig. 11. Type Hobart. =*C. aphrodina*, Tenison-Woods, *op. cit.*, p. 24, Pl. III., fig. 12. Type Hobart.
43. *Carditella lamellata*, Tate, *Gouldia*, *op. cit.*, 1887, p. 148, Pl. II., fig. 17.
44. *Cardita platicostata*, Johnston, *Mytilicardia*, Pro. Roy. S. Tasm. for 1879, p. 40.
45. *Venericardia gracillicostata*, Tenison-Woods, *Cardita*, Pro. Roy. S. Tasm. for 1876, p. 112. Type Hobart. Tate, *op. cit.*, p. 152, Pl. II., figs. 6-8.
46. *V. scabrosa*, Tate, *Cardita*, *op. cit.*, p. 152, Pl. XI., fig. 4.
47. *V. tasmanica*, Tate, *Cardita*, *op. cit.*, p. 154, Pl. XII., fig. 13.
48. *V. trigonalis*, Tate, *Cardita*, *op. cit.*, p. 157, Pl. II., fig. 1.
49. *Chama lamellifera*, Tenison-Woods, Pro. Roy. S. Tasm. for 1876, p. 114. Type Hobart. Tate, *op. cit.*, p. 149, Pl. XIV., figs. 5a, 5b.
50. *Lucina planatella*, Tate, Pro. Roy. Soc. Tasm. for 1884, p. 229. *Id.*, Tran. Roy. Soc. S. Aust. 1887, p. 146, Pl. XII., fig. 11.
51. *Diplodonta balcombensis*, Pritchard, Vict. Nat. 1906, p. 117, *nom. mut.*=*D. subquadrata*, Tate, *op. cit.*, 1887, p. 147, Pl. XIV., figs. 10a-10b. (*non* Carpenter, 1855).
52. *D. suborbicularis*, Tate, *Sacchia*, *op. cit.*, p. 147, Pl. XVIII., figs. 10a-10c.
53. *Protocardium hemimeris*, Tate, *Cardium*, *op. cit.*, p. 152, Pl. XIV., figs. 14a, 14b.
54. *Cardium pseudomagnum*, McCoy, Pro. Pal. Vict. Dec. V., 1877, Pl. XXIV., fig. 1.
55. *C. septuagenarium*, Tate, *op. cit.*, p. 151. Johnston, Geo. Tasm., p. 234, Pl. XXXII., figs. 15-16.
56. *Dosinia densilineata*, Pritchard, Pro. Roy. S. Vict. 1896, p. 135, Pl. IV., figs. 5-7.
57. *Meretrix submultistriatus*, Tate, *op. cit.*, p. 160, Pl. XVIII., figs. 6-8.
58. *M. tenuis*, Tate, *op. cit.*, p. 159, Pl. XIV., fig. 16.
59. *Chione allporti*, Tenison-Woods, Pro. Roy. Soc. Tasm. for 1875, p. 26, Pl. III., fig. 10. Type Hobart.

60. *C. cainozoica*, Tenison-Woods, *op. cit.*, for 1876, p. p. 113. Type Hobart. Tate, *op. cit.*, p. 156, Pl. XVI., figs. 3-3b.

61. *C. hormophora*, Tate, Pro. Roy. S. Tasm. 1884, p. 120. *Id.*, Tran. Roy. Soc. S.A. 1887, p. 155, Pl. XV., figs. 1-1b.

62. *C. multilamellata*, Tate, *op. cit.*, p. 154, Pl. XV., figs. 6a, 6b.

63. *C. multitæniata*, Tate.

64. *C. propinqua*, Tenison-Woods, *op. cit.*, p. 113. Type? Hobart. Tate, *op. cit.*, p. 157, Pl. XIV., figs. 7-8.

65. *Tellina cainozoica*, Tenison-Woods, *op. cit.*, p. 113. Tate, *op. cit.*, p. 164, Pl. XVIII., fig. 5.

66. *T. masoni*, Tate, *op. cit.*, p. 160, Pl. XVI., figs. 6a, 6b.

67. *Gari æqualis*, Tate, *op. cit.*, p. 168, Pl. XVI., fig. 10.

68. *G. hamiltonensis*, Tate, *op. cit.*, p. 167, Pl. XVI., fig. 13.

69. *Mactra howchiniana*, Tate, *op. cit.*, p. 171, Pl. XVII., figs. 3-3b.

70. *Solecurtus legrandi*, Tenison-Woods, *op. cit.* for 1875, p. 25, fig. 14. Type Hobart. Tate, *op. cit.*, p. 181, Pl. XVII., fig. 15.

71. *Corbula ephamilla*, Tate, Pro. Roy. S. Tasm. for 1884, p. 129. Tate, Tran. Roy. S.S.A. 1887, p 176, Pl. XVII., figs. 13a-b, and 14.

72. *C. pyxidata*, Tate, *op. cit.*, p. 177, Pl. XVII., figs. 12a-b.

73. *Panope agnewi*, Tenison-Woods, *Lyonsia*, Pro. Roy. S. Tasm. for 1875, p. 25, fig. 13. Type Hobart.

74. *P. orbita*, Hutton, Quart. Jour. Geo. Sci. 1885, Vol. 41, p. 551. Tate, *op. cit.*, p. 179, Pl. XVIII., fig. 3.

75. *Solecurtus legrandi*, Tenison-Woods, *op. cit.*, p. 25, fig. 14. Type Hobart. Tate, *op. cit.*, p. 181, Pl. XVII., fig. 15.

76. *Zenatopsis fragilis*, Pritchard, Pro. Roy. Soc. Vict. 1896, p. 139, Pl. IV., figs. 3-4.

77. *Phragmorisma anatinæformis*, Tate. Pro. Roy. Soc. N.S. Wales 1893, p. 189, Pl. XII., fig 1.

78. *Chiton fossicius*, Ashby and Torr, Pro. Roy. Soc. S. A. 1901, p. 140, Pl. IV., fig. 4.

79. *C. paucipustulosus*, Ashby and Torr, *op. cit.*, p. 141, Pl. IV., fig. 2.

80. *Lorica duniana*, Hull, Pro. Lin. Soc. N.S.W. 1910, p. 654, Pl. XVII., figs. 1-2.

81. *Loricella atkinsoni*, Hull, *op. cit.*, 1914, p. 856, Pl. XCIV., figs. 3-3a.

82. *L. magnifica*, Hull, *op. cit.*, p. 855, Pl. XCIV., figs. 1-1a.

83. *L. octoradiata*, Hull, *op. cit.*, p. 856, Pl. XCIV., fig. 2.

84. *Pleurotomaria bassi*, Pritchard, Pro. Roy. Soc. Vic. 1903, p. 85, Pl. XIII., figs. 1-2.

85. *Tugalia crassireticulata*, Pritchard, *op. cit.*, 1896, p. 125, Pl. III., figs. 4-5.

86. *Emarginula transenna*, Tenison-Woods, Pro. Roy. Soc Tas. 1876-7, p. 103. May, P.R.S. Tasm. 1918, p. 70, Pl. VIII., fig. 1. Co-type Hobart.

87. *Megatebennus malleata*, Tate, Tran. Roy. Soc. S.A. 1882, p. 146. *Id.*, Pro. Roy. Soc. Tas. 1884, p. 211. Harris, Cat. Tert. Moll. Pt. I., 1897, p. 287, Pl. VIII., figs 5a-c.

88. *Puncturella hemipsila*, Tate, Pro. Roy. Soc. N.S. Wales for 1897, p. 406, Pl. XX., figs. 8a-b.

89. *Haliotis ovinoides*, McCoy, Pro. Pal. Vic., Dec. III., p. 24, Pl. XXV., figs. 2-2b.

90. *Margarita clarkei*, Tenison-Woods, *Gibbula*, *op. cit.*, 1876, p. 114. May, *op. cit.*, 1918, p. 70, Pl. VIII., fig. 2. Type Hobart.

91. *M. æquisulcata*, Tenison-Woods, *op. cit.*, p. 98, *Gibbula*, May, *op. cit.*, p. 70, Pl. VIII., fig. 3. Type Hobart.

92. *Minolia kekwicki*, Tenison-Woods, *Margarita*, *op. cit.*, p. 97. May, *op. cit.*, p. 71, Pl. IX., fig. 8. Type Hobart.

93. *Calliostoma alternata*, Tenison-Woods, *Thalotia*, *op. cit.*, p. 97.

94. *C. atomus*, Johnston, Pro. Roy. Soc. Tas. 1879, p. 38.

95. *C. blaxlandi*, Tenison-Woods, *Zizyphinus*, *op. cit.*, p. 96.

96. *C. latecarina*, Pritchard, Pro. Roy. Soc. Vict. 1896, p. 120, Pl. III., figs. 10-11.
97. *C. serratulus*, Pritchard, *Cantharidus*, *op. cit.*, 1904, p. 331, Pl. XIX., figs. 5-8.
98. *C. tasmanica*, Johnston, *op. cit.*, p. 38. Type Hobart.
99. *Infundibulum latisulcatum*, Tate, Pro. Roy. Soc. N.S. Wales 1898, p. 404, Pl. XX., figs 10a-b.
100. *Delphinula gibbuloides*, Tenison-Woods, *Solarium*, *op. cit.*, p. 97. Pritchard, *op. cit.*, 1896, p. 122. May, Pro. Roy. Soc. Tas. 1918, p. 70, Pl. VIII., fig. 5.
101. *D. imparigranosa*, Pritchard, *op. cit.*, p. 121, Pl. III., figs. 8-9.
102. *Euchelus woodsi*, Johnston, *op. cit.*, p. 38. May, *op. cit.*, p. 71, Pl. IX., fig. 10. Type Hobart.
103. *Turbo atkinsoni*, Pritchard, *op. cit.*, p. 118, Pl. III., fig. 12.
104. *T. etheridgei*, Tenison-Woods, *op. cit.*, p. 98. Type Hobart.
105. *Astræa crassigranosa*, Tenison-Woods, *Gibbula*, *op. cit.*, p. 98. May, *op. cit.*, p. 70, Pl. VIII., fig. 4. Type Hobart.
106. *A. flindersi*, Tenison-Woods, *Astralium*, *op. cit.*, p. 95. May, *op. cit.*, p. 71, Pl. X., fig. 11.
107. *A. hudsoniana*, Johnston, *Imperator*, Geo. Tas, 1888, Pl. XXIX., figs. 12-12a. = *Astralium johnstoni*, Pritchard, *op. cit.*, p. 116. Type Hobart.
108. *A. ornatissima*, Tenison-Woods, *Astralium*, *op. cit.*, p. 96. Type Hobart. May, *op. cit.*, p. 70.
109. *Cirsonella lævis*, Johnston, *Adeorbis*, Pro. Roy. Soc. Tas. 1879, p. 33. May, *op. cit.*, p. 71, Pl. IX., fig. 9. Type Hobart.
110. *Collonia otwayensis*, Pritchard, Pro. Roy. Soc. Vict. 1904, p. 331, Pl. XVIII., figs. 6-7.
111. *Liotella annulata*, Tenison-Woods, *Liotia*, *op. cit.*, 1877, p. 121. Tryon, Man. Conch. X., 1888, p. 111, Pl. XXXVI., fig. 20. May, *op. cit.*, p. 71.
112. *Liotina lamellosa*, Tenison-Woods, *Liotia*, *op. cit.*, 1876, p. 96. = *L. roblini*, Johnston, *op. cit.*, p. 39. Harris, Cat. Tert. Moll. 1897, p. 284, Pl. VIII., figs. 4a-c. May, *op. cit.*, p. 71.
113. *Fossarus refractus*, Tate, Pro Roy. Soc. N.S. Wales 1897, p. 400, Pl. XIX., fig. 9.

114. *Rissoa? stephensiana*, Tenison-Woods, *op. cit.*, p. 100.

115. *Haurakia tateana*, Tenison-Woods, *Rissoina*, *op. cit.*, p. 114. Johnston, Geo. Tas., Pl. XXXI., fig. 18. May, *op. cit.*, p. 72, Pl. XI., fig. 18. Type Hobart.

116. *Estea varicifera*, Tenison-Woods, *Rissoina*, *op. cit.*, p. 101. May, *op. cit.*, p. 73, Pl. XI., fig. 19, Types? Hobart.

117. *Rissoina concatenata*, Tenison-Woods, *op. cit.*, 1877, p. 155. Type Hobart.

118. *Sigapatella subtabulata*, Tate, *Calyptræa*, Tran. Roy. Soc. S.A. 1893, p. 332, Pl. VII., fig. 1.

119. *Calyptropsis umbilicata*, Johnston, Pro. Roy. Soc. Tasm. 1884, p. 232, figures. Type Hobart.

120. *Crepidula hainsworthi*, Johnston, *op. cit.*, p. 232, figures. Type Hobart.

121. *Brittium johnstoni*, Tenison-Woods, *Rissoina*, *op. cit.*, 1876, p. 101. May, *op. cit.*, p. 73, Pl. XI., fig. 19. Type Hobart.

122. *Cerithium pritchardi*, Harris, Cat. Tert. Moll. 1897, p. 225, Pl. VII., fig. 3, *nom. mut.*=*P. semicostatum*, Tate, Pro. Roy. Soc. Tasm. 1884, p. 226 (*non* Deshayes).

123. *Potamides wynyardensis*, Tate, *nom. mut.*=*P. pyramidale*, Tate, *op. cit.*, p. 226.

124. *Triphora tasmanica*, Tenison-Woods, *op. cit.*, 1875, p. 28. Type Hobart. Hedley, Pro. Lin. Soc. N.S.W. 1894, p. 612, Pl. XXXII., fig. 22. Specimen collected by Mr. E. D. Atkinson.

125. *Turritella acricula*, Tate, Tran. Roy. Soc. S.A. 1893, p. 339, Pl. VIII., fig. 4, and Pl. IX., figs. 4, 7, 12.

126. *T. conspicabilis*, Tate, *op. cit.*, p. 339, Pl. VIII., fig. 7.

127. *T. murrayana*, Tate, Pro. Roy. Soc. Tasm. 1884, p. 227. *Id.*, Tran. Roy. Soc. S.A. 1893, p. 340, Pl. VIII., fig. 3.

128. *T. tristria*, Tate, 1884, p. 227, *op. cit.* *Id.*, *op. cit.*, 1893, p. 338, Pl. VIII., fig. 8, and Pl. X., fig. 3.

129. *T. warburtoni*, Tenison-Woods, Pro Roy. Soc. Tas. 1876, p. 99. Type Hobart. Tate. *op. cit.*, p. 337, Pl. VIII., fig. 2.=*T. sturtii*, Tenison-Woods, *op. cit.*, p. 99. Tate, *op. cit.*, p. 338, Pl. VIII., fig. 6.

130 *Crossea princeps*, Tate, *op. cit.*, 1890, p. 220. *Id.*, 1892, Pl. VIII., figs. 6-6a.

131. *C. sublabiata*, Tate, *op. cit.*, p. 221. *Id.*, 1892, Pl. VI., fig. 9.

132. *C. tetragonostoma*, Tenison-Woods, *Delphinula*, *op. cit.*, p. 96. May, Pro. Roy. Soc. Tasm. 1918, p. 70, Pl. IX., fig. 6. Type Hobart.

133. *Vermicularia conohelix*, Tenison-Woods, *op. cit.*, p. 100. Tate, *op. cit.*, 1893, p. 343, Pl. IX., fig. 11. Type Hobart.

134. *V. rudis*, Tate, *op. cit.*, p. 343, Pl. IX., fig. 8.

135. *Siliquaria occlusus*, Tenison-Woods, *op. cit.*, p. 100. Type Hobart.

136. *Tylospira coronata*, Tate, *Pelicaria*, *op. cit.*, p. 171, Pl. X., figs. 6-13. Harris, Cat. Tert. Moll. I., p. 222, Pl. VI., figs. 9a-b.

137. *Zemira præcursoria*, Tate, *op. cit.*, 1888, p. 163, Pl. XI., fig. 5.

138. *Epitonium foliosa*, Tate, *Scalaria*, *op. cit.*, 1889, p. 226. *Id.*, 1891, Pl. XI., fig. 4.

139. *E. inornata*, Tate, *Scalaria*, *op. cit.*, p. 232, Pl. X., fig. 6.

140. *Strombiformis johnstoniana*, Tate, *Leiostraca*, Pro. Roy. Soc. Tas. 1884, p. 227.

141. *Cymatium abbotti*, Tenison-Woods, *Triton*, Proc. Roy. Soc. Tasm. 1874, p. 24, Pl. I., fig. 8. Type Hobart.

142. *C. crassicostatus*, Tate, *Triton*, Tran. Roy. Soc. S.A. 1888, p. 125, Pl. XI., fig. 4.

143. *C. tortirostris*, Tate, *Triton*, *op. cit.*, p. 128, Pl. V., fig. 7.=*Triton minimum*, Tenison-Woods, *op. cit.*, 1876, p. 107 (*non* Hutton).

144. *C. woodsi*, Tate, *Triton*, Pro. Linn. Soc. N.S.W. 1880, p. 15, Pl. III., figs. 1-2. *Id.*, Tran. Roy. Soc. S.A. 1888, p. 119, Pl. V., figs. 4-6.

145. *Rapana aculeata*, Tate, *op. cit.*, p. 113, Pl. II., fig. 8.

146. *Phalium sufflatum*, Tenison-Woods, *Cassis*, *op. cit.*, 1876, p. 23. Tate, *op. cit.*, 1889, p. 166, Pl. VIII., fig. 2. Type Hobart.

147. *Morio gradata*, Tate, *Cassidaria*, *op. cit.*, p. 169, Pl. VIII., fig. 1.

148. *Natica sub-noæ*, Tate, *op. cit.*, 1893, p. 320, Pl. VI., fig. 1.

149. *N. vixumbilicata*, Tenison-Woods, *op. cit.*, p. 111. Tate, *op. cit.*, Pl. X., fig. 9. Type Hobart.

150. *N. wintlei*, Tenison-Woods, *op. cit.*, 1875, p. 23, Pl. I., fig. 3.

151. *Friginatica polita*, Tenison-Woods, *Natica*, *op. cit.*, p. 23, Pl. I., fig. 4. Type Hobart.

152. *Cypræa archeri*, Tenison-Woods, *op. cit.*, p. 23, Pl. I., fig. 9. Tate, *op. cit.*, 1890, p. 205, Pl. VI., fig. 1.

153. *C. consobrina*, McCoy, Prod. Pal. Vic. Dec. V., 1877, Pl. XLIV., figs. 2-2c.

154. *C. eximia*, G. B. Sowerby, Strzelecki's Phys. N.S. Wales, etc., 1845, p. 296, Pl. XIX., figs. 1-3.

155. *C. leptorhyncha*, McCoy, *op. cit.*, Pl. XLIV., figs. 1-1c.

156. *C. ovulatella*, Tate, *op. cit.*, 1890, p. 208, Pl. VI., figs. 7-7a.

157. *C. platypyga*, McCoy, *op. cit.*, Dec. III., p. 40, Pl. XXX., figs 2-2c. *Var. angustior*, Pritchard, Pro. Roy. Soc. Vict. 1896, p. 107, Pl. IV., figs. 8-9.

158. *C. platyryncha*, McCoy, *op. cit.*, Pl. XXX., figs. 2-20.

159. *C. sphærodoma*, Tate, *op. cit.*, p. 209, Pl. VIII., fig. 5.

160. *C. subsidua*, Tate, *op. cit.*, p. 204. *Id.*, 1892, Pl. V., fig. 3.

161. *Trivia avellanoides*, McCoy, *op. cit.*, Dec. III., p. 36.

162. *Erato duplicata*, Johnston, Geo. Tas., Pl XXXI., fig. 14. Tate, *op. cit.*, 1890, p. 217.

163. *E. minor*, Tate, *op. cit.*, 1890, p. 215. *Id.*, 1892, Pl. XIII., figs. 10-10a.

164. *Volutilithes anticengulatus*, McCoy, *op. cit.*, Dec. I., p. 24, Pl. VI., figs. 2-4.

164a. *Var. indivisa*, McCoy, *op. cit.*, p. 25.

164b. *Var. persulcata*, McCoy, *op. cit.*, p. 25.

165. *Voluta ancilloides*, Tate, Tran. Roy. Soc. S.A. 1889, p. 126, Pl. III., fig. 7.

166. *V. alticostata*, Tate, *op. cit.*, p. 122, Pl. V., fig. 7.

167. *V. atkinsoni*, Pritchard, Pro. Roy. Soc. Vict. 1896, p. 100, Pl. III., fig. 1.

168. *V. halli*, Pritchard, *op. cit.*, p. 101, Pl. II., figs. 1-3.

169. *V. lirata*, Johnston, Pro. Roy. Soc. Tas. 1879, p. 37. *Id.*, Geo. Tas., Pl. XXX., fig. 10.

170. *V. maccoyi*, Tenison-Woods, Pro. Roy. Soc. Tas. 1876, p. 95. Tate, *op. cit.*, p. 126, Pl. II., fig. 1.

171. *V. macroptera*, McCoy, Prod. Pal. Vic. Dec. I., Pl. VIII., figs. 1-4.

172. *V. mortoni*, Tate, *op. cit.*, p. 124, Pl. IX., figs. 1-2.

173. *V. pellita*, Johnston, *op. cit.*, p. 36. *Id.*, Geo. Tas., Pl. XXX., fig. 2. Type Hobart.

174. *V. stephensi*, Johnston, *op. cit.*, p. 35. *Id.*, Geo. Tasm., Pl. XXX., fig. 1. Type Hobart.

175. *V. spenceri*, Pritchard, *op. cit.*, p. 98, Pl. IV., fig. 1-2.

176. *V. strophodon*, McCoy. Pro. Pal. Vic. Dec. IV., p. 25, Pl. XXXVII., figs. 2-4c.

176a. *Var. stolida*, Johnston, *op. cit.*, p. 36. *Id.*, Geo. Tas., Pl. XXX., figs. 4-4a. Type Hobart.

177. *V. tateana*, Johnston, *op. cit.*, p. 37. *Id.*, Geo. Tas., Pl. XXX., figs. 3-3d. Type Hobart.

178. *V. weldii*, Tenison-Woods, *op. cit.*, 1875, p. 24, Pl. I., fig. 2. Type Hobart.

178a. *Var. angustior*, Pritchard, P.R.S. Vict. 1913, p. 194, Pl. XX., figs. 4-5.

178b. *Var. intermedia*, Pritchard, *op. cit.*, p. 194, Pl. XX., figs. 2-3.

179. *V. wynyardensis*, Pritchard, *op. cit.*, 1913, p. 200, Pl. XXI., figs. 1-2.

180. *Lyria semiacuticostata*, Pritchard, *op. cit.*, 1896, p. 91, Pl. II., fig. 8.

181. *Ancilla hebera*, Hutton, Cat. Tert. Moll. 1873, p. 6. Tate, Tran. Roy. Soc. S.A. 1889, p. 147, Pl. VII., fig. 5. Johnston, Geo. Tas., Pl. XXXI., fig. 12.

182. *A. orycta*, Tate, *op. cit.*, 1889, p. 146, Pl. X., fig. 5.

183. *A. pseudaustralis*, Tate, *op. cit.*, p. 148, Pl. VI., fig. 13, and Pl. VII., fig. 1.

184. *Marginella inermis*, Tate, Tran. Phil. Soc. S. Aust. 1878, p. 93.

185. *M. octoplicata*, Tenison-Woods, Pro. Roy. Soc. Tasm. 1876, p. 109. Johnston, Geo. Tas., Pl. XXXI., fig. 6.

186. *M. strombiformis*, Tenison-Woods, *op. cit.*, p. 109. Johnston, *op. cit.*, Pl. XXXI., figs. 4-4a. Type Hobart.

187. *M. wentworthi*, Tenison-Woods, *op. cit.*, p. 109. Johnston, *op. cit.*, Pl. XXXI., figs. 5-5a. Type Hobart.

188. *Cancellaria etheridgei*, Johnston, Pro. Roy. Soc. Tas. 1879, p. 32. Tate, Tran. Roy. Soc. S. Aus. 1889, p. 157, Pl. IX., fig. 6. Type Hobart.

189. *Terebra additoides*, Tenison-Woods, *op. cit.*, p. 95. Type Hobart. = *T. prægracilicostata*, Pritchard, Pro. Roy. Soc. Vict. 1896, p. 104, Pl. II., fig. 9.

190. *T. simplex*, Tenison-Woods, *op. cit.*, 1875, p. 21, Pl. I., fig. 1. Type Hobart.

191. *Conus complicatus*, Tate, *op. cit.*, 1890, p. 195, Pl. VIII., fig. 8.

192. *Bathytoma paracantha*, Tenison-Woods, *Pleurotoma*, *op. cit.*, 1876, p. 105. Type Hobart.

193. *Surcula johnstoni*, Tenison-Woods, *Pleurotoma*, *op. cit.*, p. 105.

194. *S. pullulascens*, Tenison-Woods, *op. cit.*, p. 104. May, Pro. Roy. Soc. Tas. 1918, p. 72, Pl. X., fig. 12. Type Hobart.

195. *S. wynyardensis*, Pritchard, Pro. Roy. Soc. Vict. 1896, p. 109, Pl. II., figs. 12-13.

196. *Drillia crenularoides*, Pritchard, *op. cit.*, p. 110, Pl. III., fig. 6-7.

197. *D. sandleroides*, Tenison-Woods, *Pleurotoma*, *op. cit.*, p. 104. Type Hobart. May, *op. cit.*, 1918, p. 72, Pl. X., fig. 13.

198. *Daphnobela gracillima*, Tenison-Woods, *Daphnella*, *op. cit.*, p. 106. Type Hobart. Harris, Cat. Tert. Moll. Pt. I., 1897, *Teleochilus gracillimum*, p. 65, Pl. III., figs. 12a-d.

199. *Buchozia columbelloides*, Tenison-Woods, *Daphnella*, *op. cit.*, p. 105. Co-types Hobart. = *Thala marginata*, Tenison-Woods, *op. cit.*, p. 108. Type Hobart. May, *op. cit.*, p. 72, Pl. X., fig. 14.

200. *Cordiera conospira*, Tate, Pro. Roy. Soc. N.S. Wales for 1897, p. 396, Pl. XIX., fig. 12.

201. *Bela tenuisculpta*, Tenison-Woods, *Daphnella*, *op. cit.*, p. 106. Type Hobart. Tate, *op. cit.*, 1894, p. 221.

202. *B. woodsi*, Tate, *op. cit.*, 1888, Pl. IV., fig. 3. = *Cominella cancellata*, Tenison-Woods, *op. cit.*, 1876, p. 107. Type Hobart.

203. *Fasciolaria decipiens*, Tate, *op. cit.*, 1888, p. 150, Pl. VIII., fig. 1.

204. *F. johnstoni*, Tenison-Woods, *Fusus*, *op. cit.*, p. 94. Tate, *op. cit.*, p. 136, Pl. XII., figs. 4a-4b. Harris, *op. cit.*, p. 142, *Fasciolaria*.

205. *Latirus affinis*, Tate, *Peristernia*, *op. cit.*, 1888, p. 157, Pl. XI., fig. 7.

206. *L. aldingensis*, Tate, *Peristernia*, *op. cit.*, p. 156, Pl. VIII., figs. 8-8b.

207. *L. murrayana*, Tate, *Peristernia*, *op. cit.*, p. 155. *Id.*, 1889, Pl. IV., fig. 4. *Var. costata*, Pritchard, *op. cit.*, p. 87, Pl. II, fig. 4.

208. *L. semiundulata*, Pritchard, *Peristernia*, *op. cit.*, p. 89, Pl. II., figs. 10-11.

209. *L. transenna*, Tenison-Woods, *Fusus*, *op. cit.*, 1876, p. 94. Tate, *op. cit.*, p. 157, Pl. XI., fig. 10.

210. *Columbarium acanthostrephes*, Tate, *op. cit.*, p. 133, Pl. VII., fig. 7.

211. *C. craspedotum*, Tate, *op. cit.*, p. 133, Pl. VII., fig. 4.

212. *Latirofusus cingulata*, Pritchard, Pro. Roy. Soc. Vict. 1896, p. 136, Pl. II., figs. 5-6.

213. *Verconella roblini*, Tenison-Woods, *Fusus*, *op. cit.*, 1875, p. 22, Pl. I., fig. 7. Type Hobart.

214. *Fusinus dictyotis*, Tate, *Fusus*, *op. cit.*, 1888, p. 135, Pl. VII., figs. 2 and 6.

215. *F. meredithæ*, Tenison-Woods, *Fusus*, *op. cit.*, p. 22, Pl. I., fig. 6. Type Hobart.

216. *F. senticosus*, Tate, *Fusus*, *op. cit.*, p. 135, Pl. VII., fig. 3.

217. *Clavilithes tateana*, Tenison-Woods, *Fusus*, *op. cit.*, 1876, p. 94. Type Hobart. Tate, *op. cit.*, *Clavella*, p. 141, Pl. XIII., fig. 5.

218. *Ficus altispira*, Pritchard, *Pyrula*, Pro. Roy. Soc. Vict. 1896, p. 85, Pl. III., figs. 2-3.

219. *Conomitra anticoronata*, Johnston, *Mitra*, Pro. Roy. Soc. Tas. 1879, p. 34.

220. *Mitra dictua*, Tenison-Woods, Pro. Linn. Soc. N.S. Wales 1879, Pl. III., fig. 7. Tate, *op. cit.*, 1889, p. 137, Pl. IV., fig. 9.

221. *Fusus tasmanicus*, Johnston, *Triton*, *op. cit.*, p. 33. Type Hobart. Tate, *op. cit.*, 1888, p. 165, Pl. XI., fig. 6, *Colubraria*.

222. *Sistrum purpuroides*, Johnston, *Ricinula*, *op. cit.*, p. 33. Type Hobart. Tate, *op. cit.*, 1888, p. 165, Pl. XI., fig 6.

223. *Phos liracostatus*, Tenison-Woods, *Cominella*, *op. cit.*, 1876, p. 103. Type Hobart. Tate, *op. cit.*, 1888, p. 165, Pl. XI., fig. 12.

224. *Lorotaphrus fragilis*, Tenison-Woods, *Buccinum*, *op. cit.*, 1876, p. 107. Type Hobart. = *Trophon selwini*, Pritchard, Pro. Roy. Soc. Vict. 1896, p. 79, Pl. II., fig. 7.

225. *Pyrene cainozoica*, Tenison-Woods, *Columbella*, *op. cit.*, p. 110. Type Hobart. May, Pro. Roy. Soc. Tas. 1918, p. 72, Pl. XI., fig. 16. = *Columbella oxleyi*, Tenison-Woods, *op. cit.*, p. 111. Type Hobart. May, *op. cit.*, p. 72, Pl. XI., fig. 17.

226. *Retizafra gracililirata*, Tenison-Woods, *Mangelia*, *op. cit.*, p. 106. Type Hobart. May, *op. cit.*, p. 72, Pl. X., fig. 15.

227. *Murex calvus*, Tate, *op. cit.*, 1888, p. 96, Pl. I., fig. 11.

228. *M. camplytropsis*, Tate, *op. cit.*, p. 105, Pl. III., fig. 2.

229. *M. eyeri*, Tenison-Woods, *op. cit.*, p. 93. Tate, *op. cit.*, p. 103, Pl. IV., fig. 8.

230. *M. irregularis*, Tate, *op. cit.*, p. 102, Pl. VI., fig. 3.

231. *M. legrandi*, Johnston, *op. cit.*, p. 32. Type Hobart. Tate, *op. cit.*, p. 104, Pl. XI., fig. 9.

232. *M. minutus*, Johnston, *op. cit.*, p. 32. Tate, *op. cit.*, p. 107, Pl. X., fig. 14.

233. *M. vilificus*, Tate, *op. cit.*, p. 95, Pl. I., fig. 8.

234. *Typhis mccoyi*, Tenison-Woods, *op. cit.*, 1875, p. 22, Pl. I., fig. 1. Type Hobart.

235. *Acteon scrobiculatus*, Tenison-Woods, *op. cit.*, 1876, p. 102. Type Hobart. Cossmann, Tran. Roy. Soc. S.A. 1897, p. 1, Pl. I., figs. 1-2.

236. *Syrnola microlirata*, Johnston, *Odostomia*, *op. cit.*, 1884, p. 223.
237. *S. polita*, Johnston, *Pyramidella*, *op. cit.*, 1879, p. 34. Type Hobart. May, *op. cit.*, 1918, p. 73, Pl. XI., fig. 21.
238. *Odostomia puteolata*, Pritchard, *Actæon*, Pro. Roy. Soc. Vict. 1896, p. 124, Pl. IV., figs. 10-12.
239. *Turbonilla liræcostata*, Tenison-Woods, *op. cit.*, 1876, p. 101.
240. *T. pagoda*, Tenison-Woods, *op. cit.*, p. 101.
241. *Ringicula lactea*, Johnston, *op. cit.*, p. 34. Cossmann, *op. cit.*, p. 16, Pl. II., figs. 23-24 = *Pyramidella sulcata*, Johnston, *op. cit.*, p. 34. Type Hobart. May, *op. cit.*, p. 73.
242. *Cylichnella exigua*, Tenison-Woods, *Cylichna*, Pro. Linn. Soc. N.S. Wales 1883, p. 19, Pl. II., fig. 6. Cossmann, *op. cit.*, p. 10, Pl. I., figs. 31-33.
243. *C. woodsi*, Tate, *Cylichna*, Pro. Roy. Soc. Tas. 1884, p. 228. Cossmann, *op. cit.*, p. 16, Pl. II., figs. 6-7.
244. *Rhizorus tatei*, Cossmann, *Volvulella*, *op. cit.*, p. 8, Pl. I., figs. 26-27.
245. *Retusa aptycha*, Cossmann, *Tornatina*, *op. cit.*, p. 8, Pl. I., figs. 22-23.
246. *Dentalium lacteolum*, Tate, Tran. Roy. Soc. S.A. 1900, p. 264.
247. *D. mantelli*, Zittel, Pal. von New Seeland, 1865, p. 45, Pl. XIII., fig. 7.
248. *D. pictile*, Tate, *op. cit.*, p. 263, Pl. VIII., fig. 8 = *D. lacteum*, Tenison-Woods, Pro. Roy. Soc. Tas. 1875, p. 17 (*non* Deshayes).
249. *D. subfissura*, Tate, *op. cit.*, 1887, p. 191, Pl. XX., figs. 4a-4b.

BRACHIOPODA.

1 *Terebratula tateana*, Tenison-Woods, P.R.S. N.S. Wales 1878 p. 29. Tate, T. Phil. S. S. Aus. 1880, p. 150, Pl. VIII., fig. 2.
2 *T. vitreoides*, Tenison-Woods, *op. cit.*, p. 78, figs. 4a-4d. Tate, *op. cit.*, p. 144, Pl. VIII., fig. 5.
3. *Magellania garibaldiana*, Davidson, Geologist Vol. V., 1862, p. 466, Pl. XXIV., fig. 9.
4. *M. grandis*, Tenison-Woods, T.R.S. S. Aus. 1865, Pl. II., fig. 1. Tate, *op. cit.*, p. 13, Pl. XI., fig. 4.

5. *Terebratulina catinuliformis*, Tate, T.R.S. S.A. 1896, p. 130, *nom. mut.*
6. *T. scoulari*, Tate, *op. cit.*, 1880, p. 158, Pl. VIII., figs. 3-3d.
7. *Terebratella woodsi*, Tate, *op. cit.*, p. 161.
8. *Magasella woodsiana*, Tate, *op. cit.*, p. 163.
9. *Rhynconella squamosa*, Hutton, Cat. Tert. Moll. N.Z. 1873.
10. *Crania quadrangularis*, Tate, P.L.S. N.S. Wales 1893, p. 191, Pl. XI., figs. 12-12a.

PRELIMINARY NOTE UPON THE DISCOVERY OF A NUMBER OF TASMANIAN ABORIGINAL REMAINS AT EAGLEHAWK NECK.

By Clive E. Lord,

Curator of the Tasmanian Museum.

On the eve of this issue of the Papers and Proceedings going to press a singular discovery of Tasmanian Aboriginal remains was made. Its importance appeared to the Council of the Society to warrant the publication of a short preliminary note, and I was accorded the honour of placing a few facts relating to this discovery on record.

On January 15, 1919, Mr. T. I. Brister called at the Museum in order to have several pieces of bone identified. These proved to be human, and as far as could be judged from the small fragments they appeared to be aboriginal. Owing to the fact that Mr. Brister stated that there were numerous similar bones buried in the sand hills where he had obtained the fragments it was resolved to pay an immediate visit to the site.

Upon arrival at Eaglehawk Neck, in company with Mr. Brister and Mr. W. H. Clemes, I found that a slight sandslip had occurred on the south-eastern face of one of the large sand dunes forming Eaglehawk Neck. A number of small bones appeared on the surface, and after collecting these a start was made to examine below the surface. Upon excavation a number of larger bones and several skulls were revealed. Owing to the fact that the dune in question was covered with Boobialla (*Myoporum insulare*) and the roots in many cases completely filled the cavities of the bones, the task of exhuming these relics of a bygone race was one of considerable difficulty. The work was made more so as we were excavating along the slope of the sand dune, which caused periodical downfalls of sand. Added to this, the bones, owing to their burial in the sand for probably a century, were exceedingly brittle. Many were completely decayed, but others were in a perfect state of preservation. Until the task of relegating the various fragments to their correct positions is completed and a detailed examination is made it is impossible to enter into details. A superficial examination discloses that the bones are certainly those of aboriginals, evidently of a whole party, probably numbering a score, who met their death at this spot.

All ages are represented, there is a clavicle of a child barely two years old, a lower jaw of a child of between seven and nine years, others denoting the age to have been still young at the time of death, while there are other various grades through to old age. As regards the skulls, two immediately attract attention. The first on account of its abnormal size, and the second because of its exceptional thickness. One lower jaw recovered shows enormous development. The teeth, with the exception of two which are missing, are in a remarkable state of preservation and are worn down in an exceptionally level manner.

Exactly what the discovery will lead to remains to be proved by subsequent detailed observation, but there can be no doubt of its extreme value from an ethnological standpoint. In a comprehensive list of Tasmanian crania, published in 1909, * the number of such skulls known to science was shown to be 120. Since that time several additional skulls have been acquired by the Tasmanian Museum from hitherto unknown sources, and the present discovery will add very considerably to the previous total. Further, taking into consideration the paramount importance to science of the study of the Tasmanian aboriginals, the need for a complete and detailed examination can be realised and its value assessed.

Before closing this short note I would like to express my thanks, as Curator of the Tasmanian Museum, to Mr. T. I. Brister, of Hobart, first for bringing the matter under my notice, and secondly for his enthusiastic assistance in the work of the removal of these valued osteological specimens to the Museum.

*Berry and Robertson. Proc. Roy. Soc. Victoria 22 (N.S.), Pt. I., 1909, p. 47.

ABSTRACT OF PROCEEDINGS

1918.

The Annual General Meeting was held at the Museum on 11th March.

His Honor the Chief Justice (Sir Herbert Nicholls, K.C.M.G.) occupied the chair.

The annual report and statement of accounts were read and adopted.

The following were elected as members of the Council for 1918:—Dr. A. H. Clarke, M.R.C.S., Messrs. W. F. Dennis Butler, B.Sc., LL.B., W. H. Clemes, B.A., B.Sc., L. Dechaineux, T. W. Fowler, J. A. Johnson, M.A., L. H. Lindon, M.A., L. Rodway, C.M.G.

Mr. R. A. Black was appointed auditor for the year.

The following were elected members of the Society:—Messrs. H. S. Innes, T. W. Robertson.

Papers.

The following papers were read:—

1. Observations regarding accumulated Capital and Wealth, by R. M. Johnston, I.S.O., F.S.S.

2. Discovery of Fossil Fruit near Derby by R. M. Johnston, I.S.O., F.S.S.

Illustrated Lecture.

Mr. E. T. Emmett, Director of the Government Tourist Bureau, delivered an illustrated lecture on "The Caves of Tasmania."

Conversazione.

After the business of the meeting concluded, an adjournment was made to the Art Gallery, where a conversazione was held.

15th April, 1918.

The monthly meeting was held at the Museum on 15th April. His Excellency, Sir Francis Newdegate, K.C.M.G., presided.

His Excellency, as President of the Society, appointed Major E. L. Piesse and Mr. R. M. Johnston as Vice-Presidents for the year.

Lectures.

Mr. L. H. Lindon delivered an illustrated lecture upon New Zealand mountains.

Mr. J. W. Beattie delivered a short illustrated lecture on the newly discovered caves at Hastings.

13th May, 1918.

The monthly meeting was held at the Museum at 8 p.m., Dr. A. H. Clarke presiding.

Before the business of the meeting was proceeded with, the chairman referred to the severe loss that the Society had sustained owing to the death of one of the Vice-Presidents, Mr. R. M. Johnston, and also Col. Legge.

Mr. Johnston was elected a member of the Society in 1873, and had contributed no less than 103 papers to the journal. At the time of his death he was senior Vice-President of the Society, and during the whole period of 45 years during which he had been connected with the Society he had been an active member. His chief work was the "Geology of Tasmania."

Col. W. V. Legge was elected a member in 1873, and contributed 17 papers to the journal. His chief work was "The Birds of Ceylon."

The Chairman moved, "That this meeting wishes to place on record its sense of the great loss the Royal Society has sustained in the deaths of Colonel W. V. Legge and the Vice-President, Mr. R. M. Johnston."

The motion was carried, all members standing.

Mr. H. E. Bellamy was elected a member.

Lecture.

Mr. A. J. Taylor delivered an illustrated lecture upon "A Trip to Europe."

10th June, 1918.

The monthly meeting was held at the Museum at 8 p.m., His Excellency, Sir Francis Newdegate, K.C.M.G., presiding.

On the recommendation of the Council, His Excellency, the President, appointed Mr. L. Rodway, C.M.G., as a Vice-President of the Society in the place of the late R. M. Johnston.

The Chairman drew attention to the loss that the Society had sustained by the death of Mr. Augustus Simson, of Launceston.

Dr. Heyward and Mr. C. C. Thorold were elected members of the Society.

His Excellency, the President, presented, on behalf of the Royal Society of New South Wales, the Clarke Memorial Medal for 1918 to Mr. L. Rodway, C.M.G.

Illustrated Lecture.

Mr. Clive Lord delivered an illustrated lecture on "The Mammals of Tasmania," and an interesting discussion took place at the conclusion of the lecture.

8th July, 1918.

The monthly meeting was held at the Museum at 8 p.m., His Excellency, Sir Francis Newdegate, K.C.M.G., presiding.

The evening was devoted to a discussion concerning the English "Education Bill." Mr. J. A. Johnson delivered a short address on the measure, and the discussion was continued by His Excellency the President, Dr. Clarke, Messrs. Brooks, Copland, and Dechaineux.

12th August, 1918.

The monthly meeting was held at the Museum on 12th August at 8 p.m., Mr. L. Rodway, C.M.G., Vice-President, presiding.

Reference was made to the unfortunate accident which had befallen His Excellency the Governor.

Paper.

"Two new Australian Pycnogonidæ," by Professor Flynn.

Illustrated Lecture.

Mr. T. W. Fowler delivered an illustrated lecture on "Tasmania from a scenic standpoint."

9th September, 1918.

The monthly meeting was held at the Museum on 9th September at 8 p.m., Mr. L. Rodway, C.M.G., Vice-President, presiding.

Mrs. H. L. Roberts delivered a short address upon the fauna of Tasmania and moved the following resolution, which was carried unanimously:—"That the Royal Society of Tasmania bring under the notice of the Government the urgent need for the better protection of our native Fauna and the need for an amendment of the 'Game Protection Act.'"

Papers.

1. "The Thallus of the Genus Parmelia," by Dr. J. Shirley.

2. "Critical remarks upon the Table Cape Fossil Mollusca (Johnston Collection, Tasmanian Museum)," by Mr. W. L. May.

3. "Notes on the Mammals of Tasmania," by Mr. Clive Lord.

14th OCTOBER, 1918.

75th Anniversary of the Society.

The 75th Anniversary meeting of the Society was held at the Museum on 14th October, 1918, His Honor the Chief Justice (Sir Herbert Nicholls, K.C.M.G.) presiding.

Congratulatory messages from various kindred societies were read.

The exhibits included a complete set of the Society's publications and numerous interesting items dealing with its early history.

Lecture.

Mr. L. Rodway, C.M.G., delivered an illustrated lecture upon the early history of Tasmania and its connection with the Society.

Members.

The following new members were elected:—Messrs. J. R. Bryer, H. Gillett, A. E. Bennett, W. H. Cummins, A. Conlon, A. F. Weber, T. W. H. Clarke, F. Ellis, C. E Fletcher, John Taylor, E. A. Bennison, H. W. Knight, J. Avery, F. Burbury, M.H.A., George Finlay, Norman Nicolson, A. E. Mansell, Alfred Burbury, F. C. Pitt, L. Q. Kermode, Percy Walch, J. W. Gould, J. Bowling, C. E. L. Knight, W. Watt, R. L. Gatenby, L. Evans, Colonel Martin, V.D., Lieut.-Colonel G. E. Harrap.

Conversazione.

Those present then adjourned to the Art Gallery, where a conversazione was held.

18th NOVEMBER, 1918.

The monthly meeting was held at the Museum on 18th November, 1918, at 8 p.m., Mr. L. Rodway, C.M.G., Vice-President, presiding.

The Chairman referred to the death of the Hon. Henry Dobson, who was one of the oldest members of the Society and the Society's representative on the National Park Board.

Members.

The following new members were elected:—Sir Herbert Nicholls, K.C.M.G., Messrs. T. Murdoch, D. McKinnon, E. O. Bisdee, E. O. Rowland, W. E. Taylor.

Lecture.

Professor Flynn delivered a lecturette upon "Some Rare Tasmanian Whales."

Owing to the lateness of the hour, Mr. Rodway's lecture on "Edible and other Tasmanian Fungi" was postponed.

ANNUAL REPORT

The Royal Society of Tasmania

1918

Patron:

HIS MAJESTY THE KING.

President:

HIS EXCELLENCY SIR FRANCIS NEWDEGATE, K.C.M.G.,
GOVERNOR OF TASMANIA.

Vice-Presidents:

MAJOR E. L. PIESSE, B.Sc., LL.B.
L. RODWAY, C.M.G.

Council:

(Elected March, 1918).

A. H. CLARKE, M.R.C.S., L.R.C.P. *(Chairman.)*
W. F. D. BUTLER, B.A., M.Sc., LL.B.
W. H. CLEMES, B.A., B.Sc.
L. DECHAINEUX.
T. W. FOWLER
J. L. GLASSON, M.A., D.Sc.
J. A. JOHNSON, M.A.
L. H. LINDON, M.A.
L. RODWAY, C.M.G.

Hon. Treasurer:

L. RODWAY.

Auditor:

R. A. BLACK.

Secretary and Librarian:

CLIVE E. LORD.

LIST OF MEMBERS.

Honorary Members:

David, T. W. Edgeworth, C.M.G., B.A., F.R.S., F.G.S. Professor of Geology and Physical Geography in the University of Sydney. The University, Sydney.

Mawson, Sir Douglas, B.E., D.Sc. Adelaide.

Shackleton, Sir Ernest H., Kt., C.V.O., F.R.G.S., F.R.A.S. 9 Regent-street, London, S.W., England.

Spencer, Sir W. Baldwin, K.C.M.G., M.A., F.R.S. Professor of Biology in the University of Melbourne. The University, Melbourne.

Ordinary, Life, and Corresponding Members:

"C," Corresponding Member.
"L," Member who has compounded subscriptions for life.
*, Member who has contributed a Paper read before the Society.

Year of Election.		
1916		Ansell, M. M., B.A. The Registrar the University, Hobart.
1918	L	Avery, J. Electrolytic Zinc Co. Risdon.
1908	L	Baker, Henry D. C/o American Consulate, Hobart.
1887		Barclay, David. 143 Hampden Road, Hobart.
1890		*Beattie, J. W. 1 Mount Stuart Road, Hobart.
1918		Bellamy, Herbert. City Engineer. Town Hall, Hobart.
1901	C	Benham, W. B., M.A., D.Sc., F.R.S., F.Z.S. Professor of Biology, University of Otago. Dunedin, New Zealand.
1903		Bennett, W. H. "Ashby," Ross.
1918		Bennett, A. E. "Ashby," Ross.
1900		Bennison, Thomas. 29 Cromwell Street, Hobart.
1918		Bennison, E. A. Napoleon Street, Battery Point.
1918		Bisdee, E. O. Lovely Banks, Melton Mowbray.
1912		*Black, R. A. Chief Clerk, Department of Agriculture. 50 High Street, Queenborough.
1909		*Blackman, A. E. Franklin.
1913		Bottrill, W. E., LL.D. 7 Elphinstone Road, Hobart.

Year of Election.		
1918		Bowling, J. "Clovelly," Risdon Road.
1892	C	Bragg, W. H., M.A., F.R.S. Professor of Physics in University College, London.
1900		*Brettingham-Moore, G. E. 294 Davey Street, Hobart.
1917		Brettingham-Moore, Dr E., M.B., Ch.M. Macquarie-street, Hobart.
1911		Brooks, G. V. Master of Method, Elizabeth Street Practising School, Hobart. Main Road, New Town.
1907		Brownell, F. L. "Leura," Main Road, Moonah.
1918		Bryer, J. R. Taroona.
1918		Burbury, Alfred. "Glen Morey," Antill Ponds.
1918		Burbury, Frederick, M.H.A. "Ashgrove," Andover.
1909		*Butler, W. F. D., B.A., M.Sc., LL.B. Bishop Street, New Town.
1917		Butters, J. H. Chief Engineer and Manager State Hydro-Electric Department, Hobart.
1912		Chapman, J. R. Holebrook Place, Hobart.
1901	C	Chapman, R. W., M.A., B.C.E. Elder Professor of Mathematics and Mechanics in the University of Adelaide. The University, Adelaide.
1913		Chepmell, C. H. D. Clerk of the Legislative Council. 23 Swan Street, Hobart (A.I.F.).
1896		*Clarke, A. H., M.R.C.S., L.R.C.P. Macquarie Street, Hobart.
1918		Clarke, T. W. H. Quorn Hall, Campbell Town.
1887		Clemes, Samuel. Principal of Leslie House School. Clare Street, New Town.
1910		Clemes, W. H., B.A., B.Sc. Leslie House School, Argyle Street, New Town.
1918		Conlon, A. Agricultural Department, Hobart.
1917		Copland, D. B., M. A. Lecturer in History and Economics, the University, Hobart.
1917		Cullen, Rev. John. Macquarie Street, Hobart.
1918		Cummins, W. H. Greenlands Avenue, Sandy Bay.
1884		Davies, The Hon. C. E., M.L.C. "Lyndhurst," New Town Road, New Town.
1908		Dechaineux, Lucien. Principal of Technical School, Hobart.
1903		Delany, Most Rev. Patrick. Archbishop of Hobart. 99 Barrack Street, Hobart.

Year of Election.		
1892	C	Dendy, A., D.Sc., F.R.S., F.L.S. Professor of Zoology in the University of London (King's College). "Vale Lodge," Hampstead, London, N.W.
1916		Downie, W. A. Headmaster, Central School, Hobart.
1918		Ellis, F. Education Department, Hobart.
1918		Evans, L. Acting Director of Agriculture, Hobart.
1902		Finlay, W. A. 11 Secheron Road, Hobart.
1918		Finlay, G. W "Baskerville," Campbell Town.
1918		Fletcher, C. E. Education Department, Hobart.
1909		*Flynn, T. Thomson, B.Sc. Ralston Professor of Biology in the University of Tasmania.
1890	L	Foster, H. D. 137 Hampden Road, Hobart.
1905	L	Foster, J. D. "Fairfield," Epping.
1913		Fowler, T. W., M.C.E. Clare Street, New Town.
1918		Gatenby, R. L. Campbell Town.
1908		*Giblin, Major L. F., D.S.O., B.A. 326 Macquarie Street, Hobart, and "Cobbler's End," Cambridge (A.I.F.).
1918		Gillett, Henry. "Wetmore," Ross.
1913		*Glasson, J. L., M.A., D.Sc. Lecturer in Physics in the University of Tasmania. The University, Hobart.
1907		Gould, Robert. Longford.
1918		Gould, J. W. Tramway Department, Hobart.
1905	L	Grant, C. W. "High Peak," Huon Road.
1913		* Hardy, G. H. Hurlstone. C/o Australian Museum, Sydney.
1918		Harrap, Lieut-Colonel G. E. Launceston.
1898		Harrison, M. W. Glenorchy.
1893		Harvey, W. A., M.B. 154 Macquarie Street, Hobart.
1902	C	Haswell, William, M.A., D.Sc., F.R.S., F.L.S. Challis Professor of Biology in the University of Sydney. The University, Sydney.
1913		Hawson, Edward. "Remine," 174 Argyle Street, Hobart.
1915		*Heaton, Herbert, M.A., M. Comm. Lecturer in History and Economics in the University of Adelaide, S.A.

Year of Election.		
1915		Hickman, V. V., B.Sc. Garden Road, Albert Park, Moonah. (A.I.F.)
1914		Hitchcock, W. E. Moina.
1908		Hogg, G. H., M.D., C.M. 37 Brisbane Street, Launceston.
1909		*Hutchison, H. R. 1 Barrack Street, Hobart.
1913		Ife, G. W. R., LL.B. Summerhill Road, Hobart.
1912		Inglis, C. J. A.M.P. Buildings, Elizabeth Street, Hobart.
1898		*Ireland, E. W. J., M.B., C.M. Launceston General Hospital.
1918		Innes, H. S. 71 Davey Street, Hobart.
1919		Irwin, H. D. Hutchins School, Hobart.
1906		*Johnson, J. A., M.A. Principal of the Philip Smith Training College, Hobart. "Wharepuke," Argyle Street, New Town.
1911		Keene, E. H. D. Tantallon, Tarleton (A.I.F.).
1910		Kermode, R. C. "Mona Vale," Ross.
1918		Kermode, Lewis Q., B.A. Birkdale, Lancashire, England.
1905		Kerr, George. 165 Campbell Street, Hobart.
1913		Knight, J. C. E. "Windermere," Claremont.
1918		Knight, C. E. L. Claremont.
1918		Knight, H. W. High Street, Sandy Bay.
1887		Lewis, Sir Neil Elliott, K.C.M.G., M.A., B.C.L., LL.B., M.H.A. "Werndee," Augusta Road, New Town.
1912		Lindon, L. H., M.A. "The Lodge," Park Street, Hobart.
1900		Lines, D. H. E., M.B., Ch.B. Archer Street, New Town.
1875	C	Liversidge, Professor Archibald, M.A., LL.D., A.R.S.M., F.R.S., F.I.C., F.C.S., F.G.S., F.R.G.S. "Fieldhead," Coombe Warren, Kingston, Surrey, England.
1913		*Lord, Clive E. Curator and Secretary of the Tasmanian Museum, Hobart. "Cliveden," Mt. Nelson Road, Sandy Bay.
1912		McAlister, Miss M. K. Rosetta.
1893		*McAulay, Alexander, M.A. Professor of Mathematics in the University of Tasmania. The University, Hobart.
1918		McKinnon, Donald. "Dalness," Evandale.
1902	C	*Maiden, J. H., I.S.O., F.R.S., F.L.S. Director of Botanic Gardens, Sydney, and Government Botanist of New South Wales. Botanic Gardens, Sydney.

Year of Election.		
1918		Mansell, A. E. Melton Mowbray.
1918		Martin, Colonel W., V.D. Launceston.
1913		Mather, J. F. 1 Mount Stuart Road, Hobart.
1917		Mackay, J. H. Professor of Engineering. The University of Tasmania, Hobart.
1895		*May, W. L. "Forest Hill," Sandford.
1909		Millen, J. D. Mount Bischoff Mine, Waratah.
1907		Miller, Lindsay S., M.B., Ch.B. 156 Macquarie Street, Hobart.
1894	L	Mitchell, J. G. "Ellesmere," Jericho.
1913		Mitchell, P. H., B.A. Headmaster of the State High School, Hobart. 2 Ashfield Street, Queenborough.
1911		Montgomery, R. B. Park Street, New Town.
1918		Murdoch, Thomas. Montpelier Road, Hobart.
1882		Nicholas, G. C. "Cawood," Ouse.
1918		Nicholls, Sir Herbert, K.C.M.G. Chief Justice of Tasmania. Pillinger Street, Queenborough.
1910		Nicholls, H. Minchin. Government Microbiologist, Department of Agriculture. Macquarie Street, Hobart.
1917		Oldham, N., J.P. New Town.
1908		Parsons, Miss S. R. 190 Davey Street, Hobart.
1902		*Piesse, Major E. L., B.Sc., LL.B. "Neika," Bay Road, New Town.
1910		Pillinger, James. 4 Fitzroy Crescent, Hobart.
1918		Pitt, F. C. "Glen Dhu," The Ouse.
1908		Pratt, A. W. Courtney. "Athon," Mt. Stuart Road, Hobart.
1917		Raamsdonk, I. N. Lecturer in Modern Languages, the University, Hobart.
1864		Roberts, H. L. "Beaumaris," Montpelier Road, Hobart.
1918		Robertson, T. W. Box 93, G.P.O., Hobart.
1884		*Rodway, Leonard, C.M.G. Government Botanist of Tasmania. Macquarie Street, Hobart.
1913		Ross, Hector. Sheriff of Tasmania. Elphinstone Road, Hobart.
1915		Ross, J. Head Teacher, New Town School, New Town (A.I.F.).
1918		Rowland, E. O. Secretary Public Service Board, Hobart.
1896		Scott, R. G., M.B., Ch.M. 172 Macquarie Street, Hobart.

Year of Election.		
1892	C	*Shirley, John, D.Sc. Inspector of Schools, Queensland. "Colarmie," Brunswick Street, New Farm, Brisbane.
1901		Shoobridge, Canon G. W. 3 Molle Street, Hobart.
1917		Slaytor, C. H., F.I.C. Woodbourne, Davey Street, Hobart.
1901	C	Smith, R. Greig-, D.Sc. Linnean Hall, Elizabeth Bay, Sydney.
1896	L	*Sprott, Gregory, M.D., C.M. 134 Macquarie Street, Hobart.
1896	L	Sticht, Robert, B.Sc., E.M. Mount Lyell Mining and Railway Co. Ltd., Queen Street, Melbourne.
1913		Susman, Maurice. 88 Murray Street, Hobart.
1907		Tarleton, J. W. 108 High Street, Queenborough.
1887		*Taylor, A. J. Librarian of the Tasmanian Public Library. 28 D Arcy Street, Hobart.
1918		Taylor, John. "Winton," Campbell Town.
1918		Taylor, Walter E. Elboden Street, Hobart.
1892	C	*Thomson, G. M., F.L.S. Dunedin, New Zealand.
1918		Thorold, C. C., M.A. Hutchins School, Hobart.
1896		*Twelvetrees, W. H., F.G.S. Government Geologist. Geological Survey, Launceston.
1918		Walch, Percy. King Street, Sandy Bay.
1901	C	Wall, Arnold, M.A. Professor of English Language and Literature in Canterbury College. Christchurch, New Zealand.
1913		Wardman, John. Superintendent of the Botanical Gardens. Botanical Gardens, Hobart.
1918		Waterhouse, G. W., B.A., L.L.M. Cantab. Messrs. Ritchie and Parker, Alfred Green and Co., Launceston.
1918		Watt, W. The Observatory, Hobart.
1918		Weber, A. F. Lands Department, Hobart.
1901		Wise, H. J. Lambert Avenue, Sandy Bay.

Members are asked to inform the Secretary of any change of address or othe necessary correction.

ANNUAL REPORT, 1918.

In accordance with Rule 39, the Council present a report of the proceedings of the Society for 1918.

The Council and Officers.

At the Annual General Meeting held on 11th March, the following were elected Members of the Council for the year:—Dr. A. H. Clarke, Dr. J. L. Glasson, Messrs. W. F. D. Butler, W. H. Clemes, L. Dechaineux, T. W. Fowler, J. A. Johnson, L. H. Lindon, and L. Rodway.

The Council at its first meeting elected the following officers:—Dr. Clarke (Chairman), Mr. L. Rodway (Hon. Treasurer), Mr. Clive Lord (Secretary and Librarian).

The Council elected Dr. Clarke, Messrs. Clemes, Dechaineux, Johnson, Lindon, and Rodway to be Trustees of the Tasmanian Museum and Botanical Gardens.

Meetings.

Nine ordinary meetings of the Society were held during the year and two special meetings. Many interesting papers were read by members and visitors during the session. The special lectures delivered by Professor Berry caused such interest that a larger hall had to be engaged owing to the fact that the Society's Lecture Hall was not large enough for the audiences. The 75th Anniversary of the Society was celebrated on 14th October.

Members.

The membership of the Society has materially increased during the year as 36 members were elected. We lost 6 members through death or resignation. The number of ordinary members at the end of the year was 112; life members, 8; corresponding members, 13; and honorary members, 4.

Library.

During the year 254 volumes, in addition to hundreds of pamphlets, were added to the library, and our thanks are due to many kindred institutions for many and valuable donations. The total number of volumes (apart from pamphlets) in the library on the 31st December, 1918, was 13,054. As the work of the Society is so intimately connected with the Tasmanian Museum, the policy adopted last year of appointing the Curator of the Museum, Secretary and Librarian of the Society, has been found to work very satisfactorily. One problem that will have to be faced in the near future is that of additional space. The increasing additions to the present library have already filled it to overflowing.

Education Section.

President—G. V. Brooks, Esq.

Hon. Secretary—W. H. Clemes, Esq., B.A., B.Sc.

Number of Members—Twelve.

Six meetings were held during the year, at which the following papers were read and discussed:

"Fisher's Education Bill," by Mr. J. A. Johnson.

"The Prefect System in the English Public Schools," by Mr. C. C. Thorold.

"The Training of the Individual," by Mr. G. V. Brooks.

"Artisan Education," by Mr. L. Dechaineux.

RECEIPTS AND EXPENDITURE, 1918. GENERAL ACCOUNT.

RECEIPTS.

		£ s. d.
Balance Brought Forward		49 0 0
Subscriptions—		
Current, 80 at £1/1/-	£84 0 0	
Arrears, 3 at £1/1/-	3 3 0	
Advance, 27 at £1/1/-	28 7 0	
		115 10 0
Payments for use of Society's Room		13 15 0
Contributions to Printing Fund		9 17 6
Contribution to Binding Fund		15 0 0
Miscellaneous		3 15 0
Government Grant		100 0 0
		£306 17 6

PAYMENTS.

		£ s. d.
Salaries		33 5 0
Papers and Proceedings—		
1917 (Part)	£24 3 6	
1918 (Part)	75 4 0	
		99 7 6
Library—		
Insurance	4 16 9	
Binding	55 17 9	
Purchases	31 18 8	
Miscellaneous	8 4 0	
		100 17 2
Meetings—Notices, Advertising, etc.		26 6 0
Light and Fuel		3 16 1
Lantern and Operator		6 10 0
Postages		7 10 0
Miscellaneous		9 0 5
		£286 12 2
Credit Balance		20 5 4
		£306 17 6

Audited and found correct,

R. A. BLACK,
Auditor.

January 2nd, 1919.

L. RODWAY, Hon. Treasurer.

CLIVE E. LORD, Secretary.

MORTON ALLPORT MEMORIAL FUND* ACCOUNT, 1918.

RECEIPTS.		£ s. d.	PAYMENTS.	£ s. d.
Balance Brought Forward 1st Jan., 1918 ...		30 4 3	Balance to 1919	39 19 3
Interest received from Perpetual Trustees Co.—5 per cent. on £200 Cascade Brewery Co. Debentures	£10 0 0			
Less Trustees Co. Commission ...	0 5 0			
		9 15 0		
		£39 19 3		£39 19 3

* £200 was raised by Public Subscription in 1878 to establish a Memorial to the late Morton Allport. The Fund was invested in the name of the Perpetual Trustees, Executors, and Agency Co. of Tasmania Ltd., and the income is used for the purchase of Books for the Library of the Society.

LIFE MEMBERSHIP ACCOUNT, 1918.

RECEIPTS.	£ s. d.	PAYMENTS.	£ s. d.
Life Composition Fee	15 0 0	Contribution to Binding Fund	15 0 0
	£15 0 0		£15 0 0

Audited and found correct,
R. A. BLACK,
Auditor.

January 2nd, 1919.

L. RODWAY, Hon. Treasurer.
CLIVE E. LORD, Secretary.

Obituary.

R. M. Johnston, I.S.O., F.S.S.

Robert Mackenzie Johnston was born at Connage, Inverness-shire, Scotland, in 1845. Of humble parentage, but possessed with a keen desire for knowledge, he left home early in life in order to make his way in the world. He obtained employment in the Scottish Railways, and while there devoted his spare time to study. As a young man he resolved to come to Australia, and eventually arrived after an adventurous passage. He crossed to Tasmania in 1870, and was employed organising the accountants and audit branch of the Launceston and Western Railway. In 1872 he transferred to the Government service, and in 1880 was appointed chief clerk in the Auditor-General's office, and two years later he obtained the position of Registrar-General and Government Statistician, which position he held until his death.

On several occasions Mr. Johnston had opportunities for improving his position by obtaining high appointments on the Mainland, but he preferred to remain in Tasmania.

In addition to his official duties, Mr. Johnston served the State in many ways. In 1882 he was appointed a Commissioner to inquire and report upon the fisheries of Tasmania, and was also a member of the several boards relating to fisheries. In 1888, the Government published Mr. Johnston's standard work, "A Systematic Account of the Geology of Tasmania."

Mr. Johnston was President of Section F, "Economic and Social Science and Statistics," at the meeting of the Australian Association for the Advancement of Science in 1890, was an honorary fellow of the Royal Statistical Society, a fellow of the Royal Geographical Society of Australia, a fellow of the Linnean Society of London, and for many years one of the most prominent members of the Royal Society of Tasmania.

List of Papers contributed to the Royal Society of Tasmania by R. M. Johnston, I.S.O., F.S.S.

1871.

1. Regarding the composition and extent of certain Tertiary beds in and around Launceston.

1874.

2. The Launceston Tertiary Basin.

1876.

3. Further notes on the Tertiary Marine Beds of Table Cape.

1878.

4. Further notes on the Freshwater Shells of Tasmania (with a description of new species).

5. Notes on certain Tertiary and Post-Tertiary deposits on Flinders', Barren, Badger, and other Islands in Bass's Straits.

1879.

6. Note on discovery of the Habitat of *Amnicola* (*Ampullaria*?) *Tasmanica*—Tenison-Woods—with a new description of *Helix*.

7. Note on the discovery of *Spondylostrobus Smithii*, and other fossil Fruits in the Deep-lead drift at Brandy Creek Goldfield.

8. Table of the distribution of the Fossil Flora of Australia, Tertiary Period.

9. Third contribution to the Natural History of the Tertiary Marine Beds of Table Cape, with a description of 30 new species of Mollusca.

10. Notes on the distribution and variability of Tasmanian Land Shells.

11. Table showing the general distribution of Tasmanian Land Shells, compiled from the collections made at various times by W. Legrand, W. F. Petterd, Capt. Beddome, T. R. Atkinson, the Compiler, and others.

12. Notes on the relations of the yellow Limestone (Travertin) of Geilston Bay, with other Fluviatile and Lacustrine deposits in Tasmania and Australia, together with descriptions of two new fossil *Helices*.

1880.

13. Description of a new species of *Helix* found fossil in a calcareous sandstone deposit at Kent's Group.

14. Description of two new species of Fishes (*Trachichthys Macleanyi* and *Mendosoma Allportii*), caught in the estuary of the Derwent.

1881.

15. Notes showing that the estuary of the Derwent was occupied by a fresh-water lake during the Tertiary period.

16. Description of a species of Sea Bream (*Girella tricuspidata*), from Southport, Tasmania.

1882.

17. General and critical observations on the Fishes of Tasmania; with a classified Catalogue of all the known species.
18. Note and description of the first discovered representative of the genus *Pupa* in Tasmania.
19. Note on *Clinus despicillatus—Richardson* and *Bovichthys variegatus*.
20. Description of a new species of Fish caught near Emu Bay, Tasmania.

1883.

21. Notice of recent additions to the list of Tasmanian Fishes.

1884.

22. Description of a new species of *Vitrina* from the Travertin Beds, Geilston.
23. Additions to the list of Table Cape fossils, together with further remarks upon certain fossil shells supposed to be identical with living species.
24. Discovery of *Entomostraca* in the upper members of the Travertin Beds, Geilston, and a description of a new species of *Cyprus*.
25. Discovery of a Cone, probably of a species of *Lepidostrobus*, in the sandstones of Campania.
26. Description of a new species of *Odax*.
27. Description of a new fossil Shell from the Eocene beds, Table Cape.
28. Description of a new species of *Crepidula* from the Eocene Beds, Table Cape.
29. Notes on the discovery of two rare species of Ferns new to Tasmania.
30. Remarks on the observed periodicity of the Death-rate, with suggestions as to its possible relation with the periodicity of solar and other super-terrestrial phenomena.
31. Observations on six rare Fishes recently captured in Tasmanian waters.
32. A Rejoinder to Mr. A. B. Biggs' criticism on observations made in respect of the "Observed Periodicity of the Death-rate," etc.
33. Notes regarding certain Fossil Shells occurring at Table Cape, supposed to be identical with living species.

1885.

34. Fresh contributions to our knowledge of the character and relationship of the Upper Palæozoic and Mesozoic formations of Tasmania, and the associated diabasic rocks.
35. General observations regarding the classification of the Upper Palæozoic and Mesozoic rocks of Tasmania, together with a full description of all the known Tasmanian Coal Plants, including a considerable number of new species.
36. Description of some Fossil Leaves from Mt. Bischoff.
37. Note regarding the Silurian Fossils of the Gordon limestones, with generic descriptions and a specific list of the organisms already named and classified.
38. Descriptions of new species of fossil leaves from the Tertiary deposits of Mt. Bischoff, belonging to the genera *Eucalyptus*, *Laurus*, *Quercus*, *Zamia*, etc.

1886.

39. Contributions to the Palæontology of the Upper Palæozoic Rocks of Tasmania.
40 Notes on the Geology of Bruny Island.
50. Reference List of the Tertiary Fossils of Tasmania.
51. Remarks regarding Coal Seam opened out by Mr. Brock at Compton, Old Beach.
52. Fresh Contributions to our Knowledge of the Plants of Mesozoic Age in Tasmania.
53. Table Showing Approximately the Known Distribution in time of Genera of Plants occurring in the Upper Palæozoic and Mesozoic Rocks of Australasia.
54. Notes on the Geology of the King River, with a brief account of the History of Gold Mining in Australasia.
55. Notes and descriptions of *Crinoidea* from the Upper Palæozoic Rocks of Tasmania.

1887.

56. How far can the general death rate for all ages be relied upon as a comparative index of the health or sanitary condition of any community.
57. An account of two rare Tasmanian Fish.
58. On the lower coal measures of Port Cygnet.
59. Notes on the Fingal Basin from the operations of a trial bore.
60. Notes with respect to Fishes, the land and fresh water molluscs of King's Island.

61. Observations with respect to the nature and classification of the Rocks of the Tertiary period, more particularly relating to Tasmania.

1888.

62. Results of the various attempts to acclimatise the *Salmo salar* in Tasmanian Waters.
63. The Problem of Malthus stated.
64. Critical Observations on the recent Contributions to our knowledge of the freshwater shells of Tasmania.
65. Tabular History of the Classification of Tasmanian freshwater shells.
66. Observations on the variability of the Tasmanian *Unio*.

1889.

67. The Iron Blow at the Linda Goldfields.
68. Macquarie Harbour Leaf Beds.
69. Observations regarding Pyramid Numbers.
70. Additions to the list of Tasmanian Fossils of Upper Palæozoic Age.
71. Root Matters in Social and Economic Problems.

1890.

72. Root Matters in Social and Economic Problems, 2nd series.

Further Observations on the Fishes and Fishing Industries of Tasmania, together with a revised list of Indigenous Species.

73. Provisional Aid to the Study of Tasmanian Mollusca.
74. Observations on the influence of Strikes upon Real Wages.
75. General Increase of Wages falls upon Consumers of Products and in no way encroaches upon rent or profits of Capitalists.
76. Description of a Fern (*Blechnum cartilagineum*) new to the Tasmanian List.
78. Tabular List indicating the Local Habits and General Distributions of all the known Ferns, Club-mosses, and Pillworts of Tasmania.

1891.

79. Notes on a Collection of Plant Impressions from the Henty River.
80. Observations on the causes of Elevation and Subsidence of the Earth's Crust.

1892.

81. Notes on the Natural Limits to Occupation of the Land.
82. What are the Conditions which determine the Just and Equitable Representation of the People.

1893.

83. Taxation and the Cost of Living in Tasmania.
84. The Glacier Epoch of Australasia.
85. Notes on the Geology of Lake St. Clair and its immediate Neighbourhood, together with Observations regarding the Probable Origin of Our Numerous Tasmanian Lakes and Tarns.
86. Further Contributions to the Fossil Flora of Tasmania.

1895.

87. Notes on some Fossil Plants new to Tasmania.
88. The Primary Law of Value or Price.

1897.

89. The Health of Hobart.
90. Tertiary Leaf Beds.
91. Observations of the Working Results of the Hare System of Election in Tasmania.

1899.

92. Are all the Colossal Igneous Caps of Tasmanian Tiers and of the lofty Mountain Plateaux true sills?

1900.

93. Further notes on the Permo-Carboniferous Fossil Cliffs at Darlington, Maria Island.
94. Notes on Coal Discovery at Wynyard, Tasmania.

1903.

95. Notes on Reidle Bay Conglomerates, Maria Island.
96. Notes on Fossil Tree, Barnes Bay.
97. Conditions upon which the healthy growth of young colonies depend.
98. List of Flowering Plants collected at Kettering.

1904

99. The Ethical, Economical, and Practical Aspects of Old Age Pensions.

1905.

100. Observations regarding some Economic Aspects of the Eisenach Social Equality Programme.

1908.

101. State Borrowing and Sinking Funds.

1918.

102. Observations regarding Accumulated Capital and Wealth.

103. Notes on the discovery of a new Fossil Fruit from the Deep-lead Tin Drifts at Derby, Tasmania.

Colonel W. V. Legge.

Colonel W. V. Legge was born at Cullenswood, Tasmania, seventy-eight years ago. He went to England as a child, and was educated both there and in France and Germany. He obtained his Commission in the Royal Artillery in 1862, and served for 5 years. In 1867 and 1868 he was in Melbourne with the Imperial troops. Upon their withdrawal, he went to Ceylon, and it was while he was there that he did all the collecting and much of the MSS. of his standard work on "The Birds of Ceylon." Leaving Ceylon in 1877 he returned to England, and served at Portsmouth. In 1883 he was offered, and accepted, the command of the Tasmanian Forces. Except for several short periods he held this command until 1902. During this time considerable re-organisation was effected. Colonel Legge was an active member of the Society for many years, his chief interest being ornithology. In addition he was generally interested in the fauna and flora of the island, and was an authority upon forestry. He was instrumental in having investigations carried out by members of this Society concerning the height of certain peaks on Ben Lomond. The result went to show that one of them, Legge Tor, is the highest point in Tasmania.

Papers contributed to the Royal Society of Tasmania by the late Colonel W. V. Legge.

1873.

1. On the Weaver Bird (*Ploceus baya*) in Ceylon.

1874.

2 Notes on some species of Tasmanian Birds.

1886.

3. Systematic List of the Tasmanian Birds.
4. On the Position of the Genus Ephthianura.

1887.

5. A First List of the Birds of Maria Island.
6. The Highlands of Lake St. Clair.
7. On the Breeding of Some Sea Birds on the Actæon Island and adjacent islets.

1888.

8. Occurrence of *Chibea bracteata* Gould, in Tasmania.

1889.

9. Protection of Tasmanian Owls.
10. Protection of the Cape Barren Goose.
11. Notes on the Australian Curlew and its closely-allied Congeners.

1892.

12. Note on a Tasmanian Acanthiza,. On the occurrence of some Australian Ardeidæ.

1895.

13. Notes on Timber found beneath Alluvial Drift at Swansea, Tasmania.
14. Notes on the Fan-tailed Cuckoo in Tasmania (*Cuculus flabelliformis*).

1903.

15. Rainfall and Water Supply of the Great Lake (*cum* H. C. Kingsmill).
16. Notes on Stone Knives of Tasmanian Aboriginals found at Cullenswood Estate.

1913.

17. Rectification of the Cartography of North-East Tasmania.

AUGUSTUS SIMSON.

"Mr. Augustus Simson was the oldest and best known of all the local naturalists in Northern Tasmania; he in truth maintained the title of 'Naturalist' in its fullest meaning, having little in common with the "Nature Students" of to-day. His methods were of the old school of steady plodders, who collected, arranged, and classified with scrupulous care and neatness, while his field was the whole realm of nature! Insects—especially Coleoptera—found a large share of his collected treasures, but shells and plants filled many of his trays and cabinets. Deeply impressed with the utility of the Rev. W. W. Spicer's key to the Tasmanian Flora, Mr. Simson early made himself master of this dichotomous system, and all his botanical taxonomy followed the lines laid down by that writer. As a scientific man, Mr. Simson was best known to the general public through his connection with the 'Northern Tasmanian Natural Science Association,' of which he was one of the founders and most enthusiastic supporters. As Secretary of the Society, he was particularly well placed, his wide knowledge of the Tasmanian Fauna and Flora supplying all the elements for a successful officer. Some few of the younger workers still recall collecting trips at which he attended, but of recent years the study, rather than the field, claimed the lion's share of his attention. Mr. Simson's collections have been sold to well-known scientific Institutions, including the Rothschild Museum at Tring. He was a member of the Linnean Society of New South Wales; Royal Society of South Australia; Société Entomologique of Brussels; and the Royal Society of Tasmania. He died at a ripe old age on 21st May, 1918."

H. H. SCOTT.

Hon. Henry Dobson.

The Hon. Henry Dobson was elected a member of the Society in 1861. Owing to the keen interest which he displayed in his professional and political life, he was unable to devote much time to the details of the Society's activities. Among his many public works, perhaps, his ardent enthusiasm in advancing the claims of Tasmania as a tourist resort stands out paramount. He never tired in his endeavour to advertise the beauty spots of the Island, and to assist in making them accessible to the public. His work in the early days of the Tourist Association will ever be remembered. Mainly on account of his work in this direction he was elected as the Society's representative on the National Park Board, upon the foundation of that body. His worth was immediately recognised, for he was selected as the first chairman of the Board, and held the position until his death. His interest continued until the last, and although far from well he continued to take a deep interest in the development of the Park, and in his capacity as chairman of the Board he gave very detailed consideration to all proposals for the development and management of the area.

INDEX.

Titles of Papers, and New Genera and Species in **Heavy Type.**
Synonyms in *Italic.*

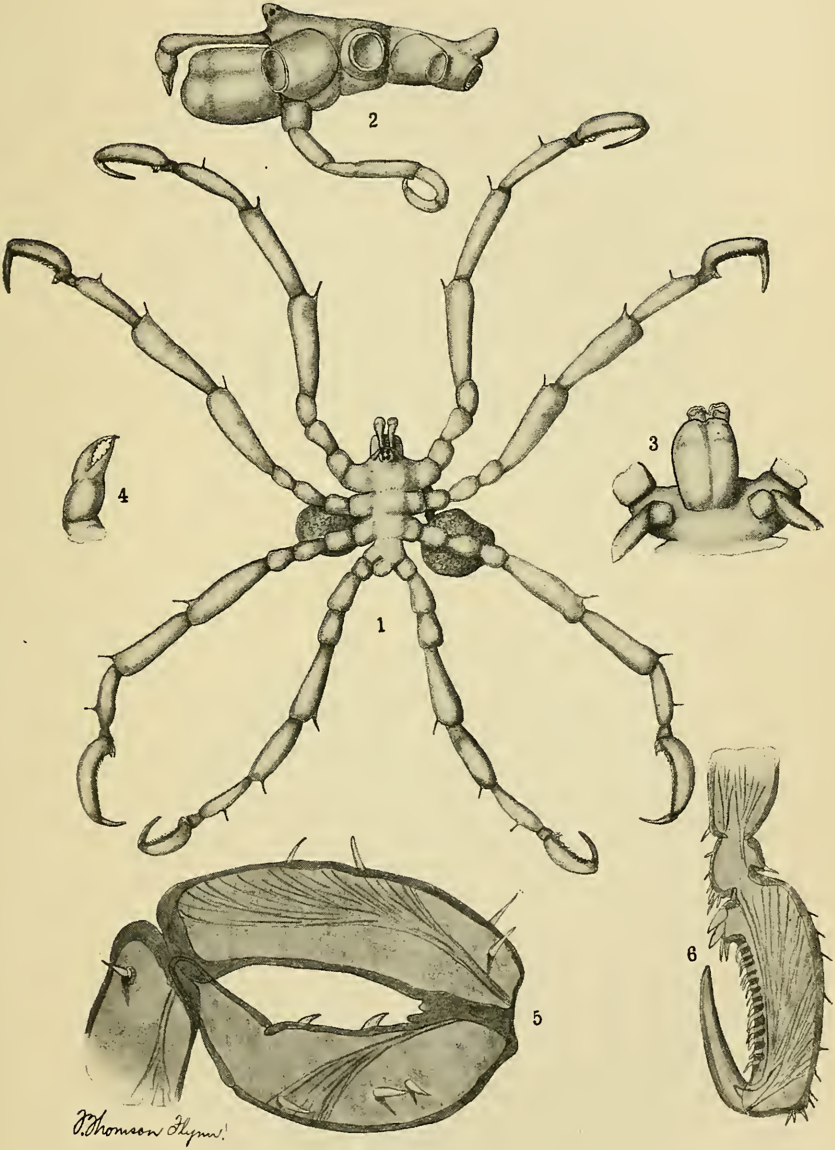

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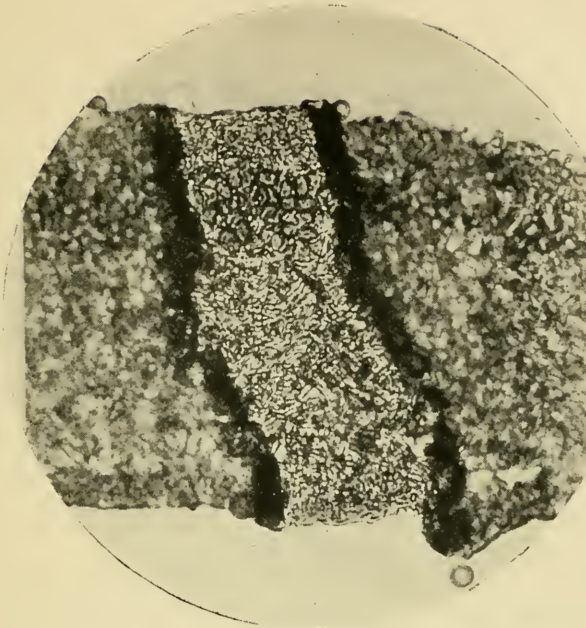
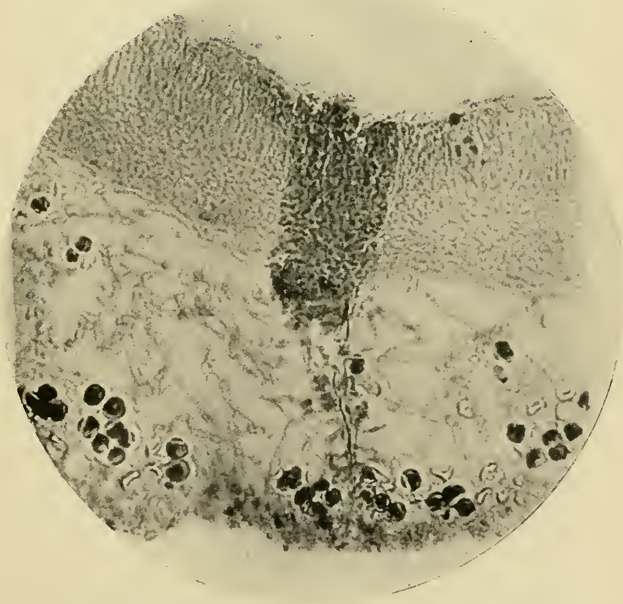
Figure 1.



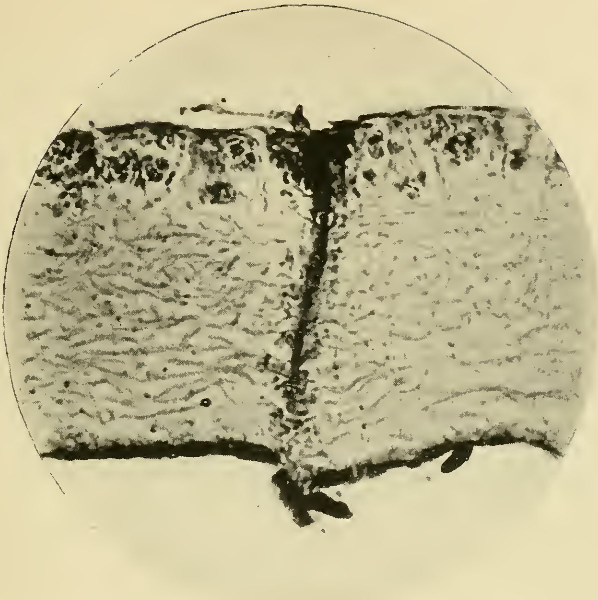
Absorption pore of *Parmelia tiliacea*, Ach., x 300.

Figure 2.



Absorption pore of *Parmelia placorhodiodes*, Nyl., x 300.

Figure 3.



Absorbent pore of *Parmelia tinctorum*, L., x 300.

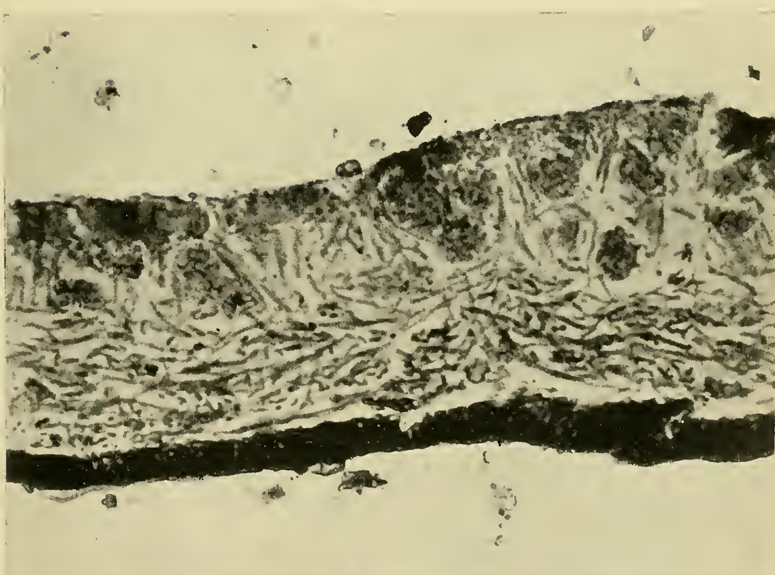
Figure 4.

Absorbent pore of *Parmelia limbata*, Laur., x 300.

Figure 5.

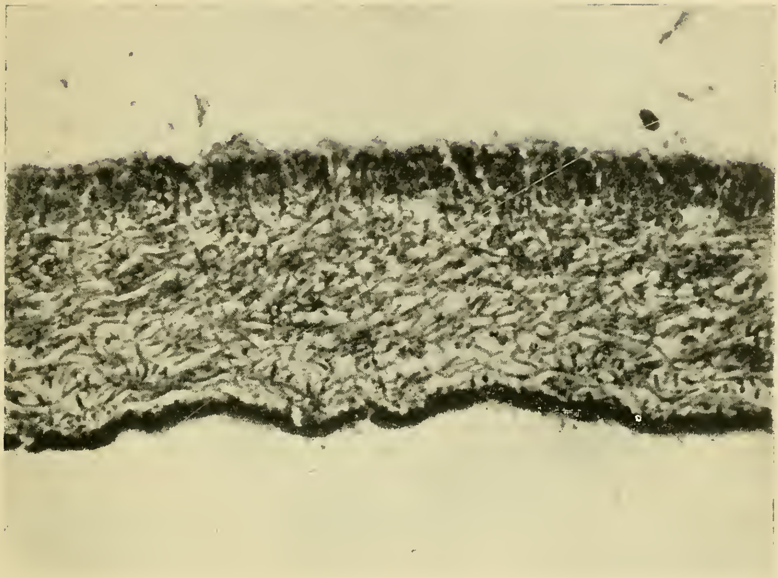
Thallus of *Parmelia laxa*, Mull. Arg., x 300.

Figure 6.



Thallus of *Parmelia cetrata v. sorediifera*, Wain., x 300.

Figure 7.

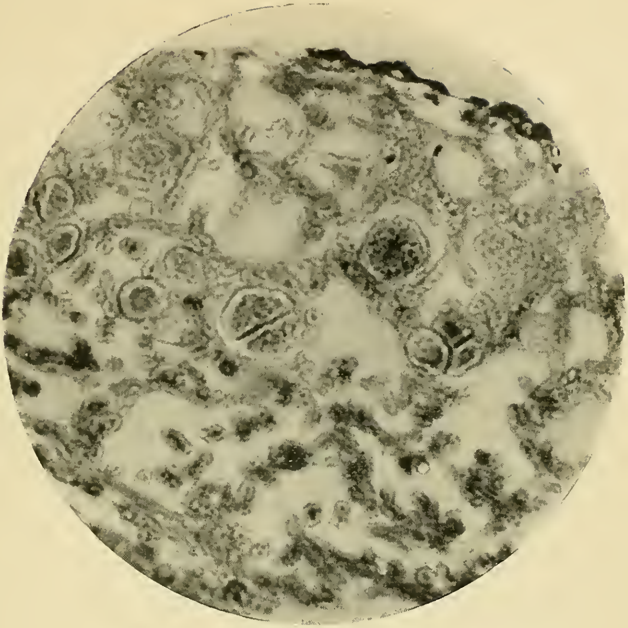


Thallus of *Parmelia latissima*, Fee, x 300.

Figure 8.

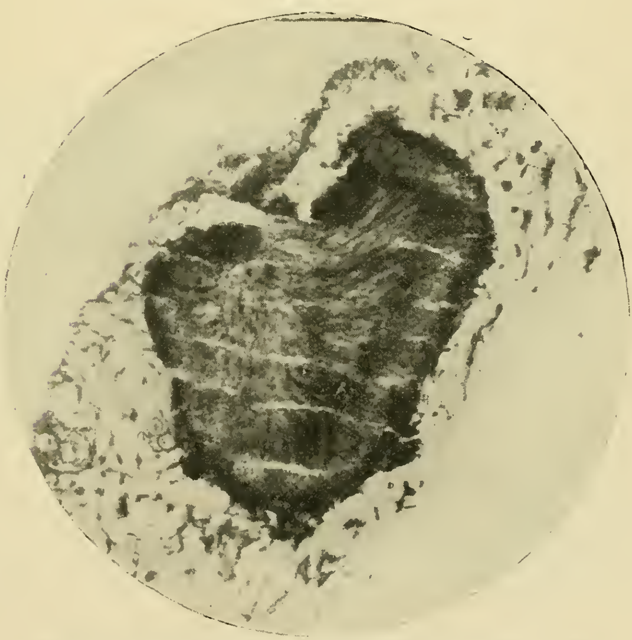
Symbiosis of hyphæ and gonidia, *Parmelia placorhodioides*, Nyl.

Figure 9.



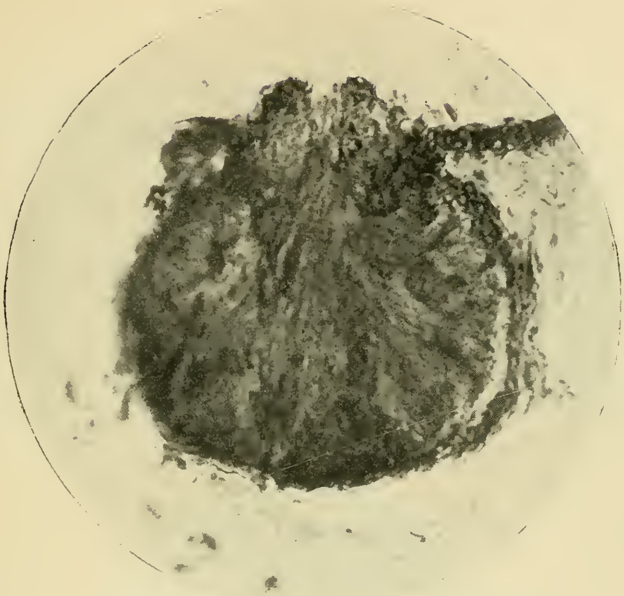
Gonidia (*Polycoccus*) in the act of dividing, x 770.

Figure 10.



Section of Spermagonium, showing wall and remains of the original hyphal coil or scolecite, x 300.

Figure 11.



Spermagonium showing Ostiole, x 300.

Figure 12.

Apothecium of Lichen with double layer of Algæ.

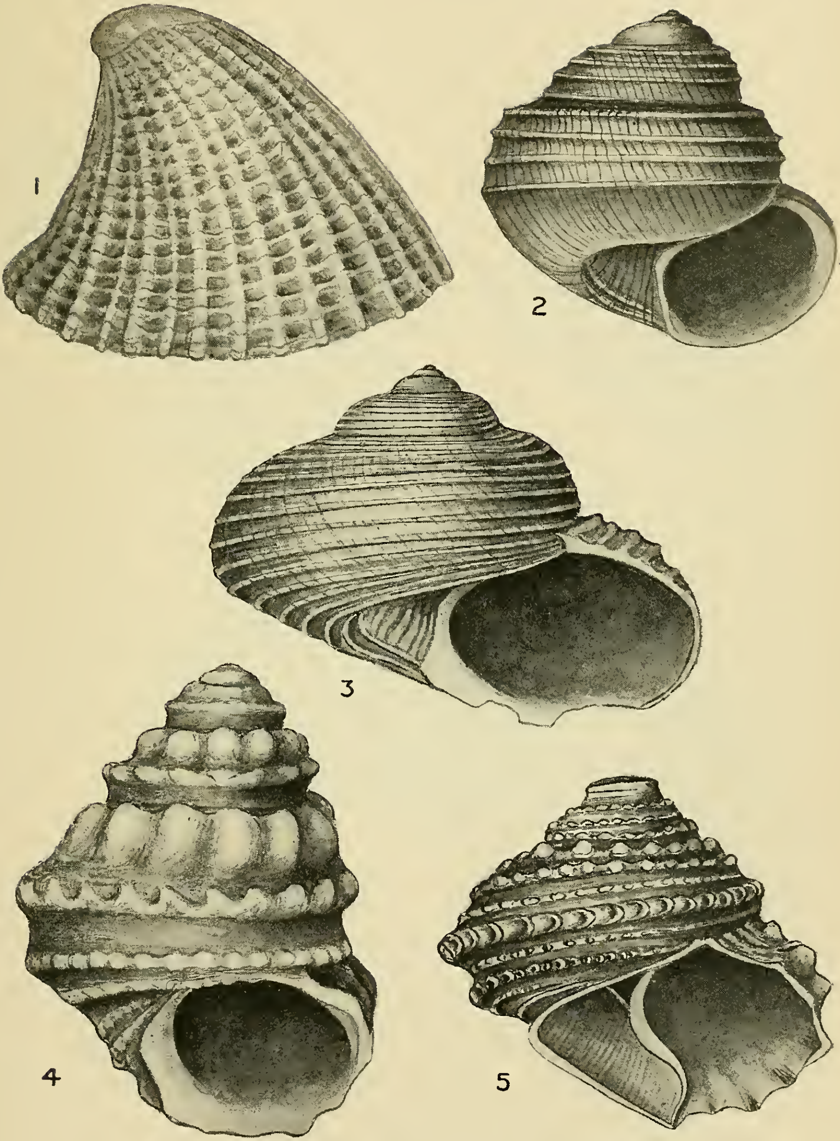
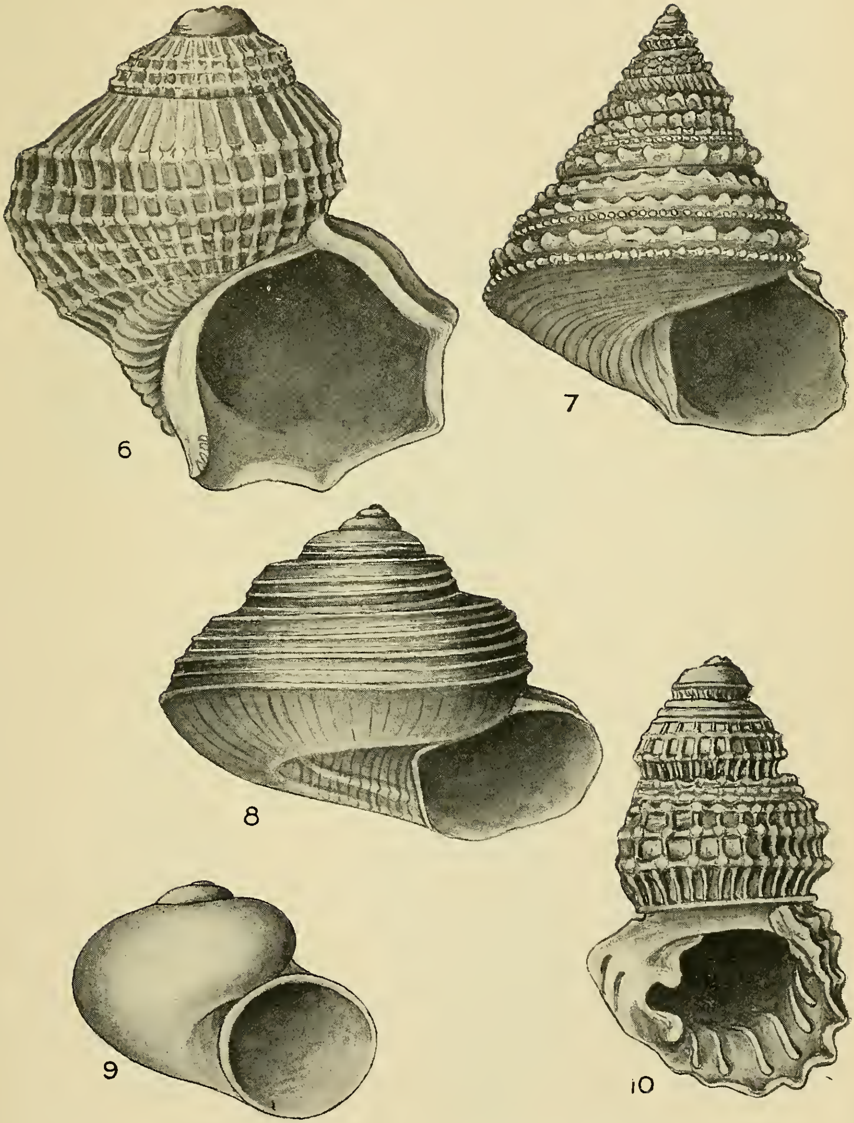


Figure 1—*Emarginula transenna*, Tenison-Woods
,, 2—*Gibbula clarkei*, Tenison-Woods
,, 3—*Gibbula æquisulcata*, Tenison-Woods
,, 4—*Gibbula crassigranosa*, Tenison-Woods
,, 5—*Solarium (Torinia) gibbuloides*, Tenison-Woods



6

7

8

9

10

Figure 6—*Delphinula tetragonostoma*, Tenison-Woods

,, 7—*Trochus josephi*, Tenison-Woods

,, 8—*Margarita kekwicki*, Tenison-Woods

,, 9—*Adeorbis lævis*, Johnston

,, 10—*Euchellus woodsii*, Johnston

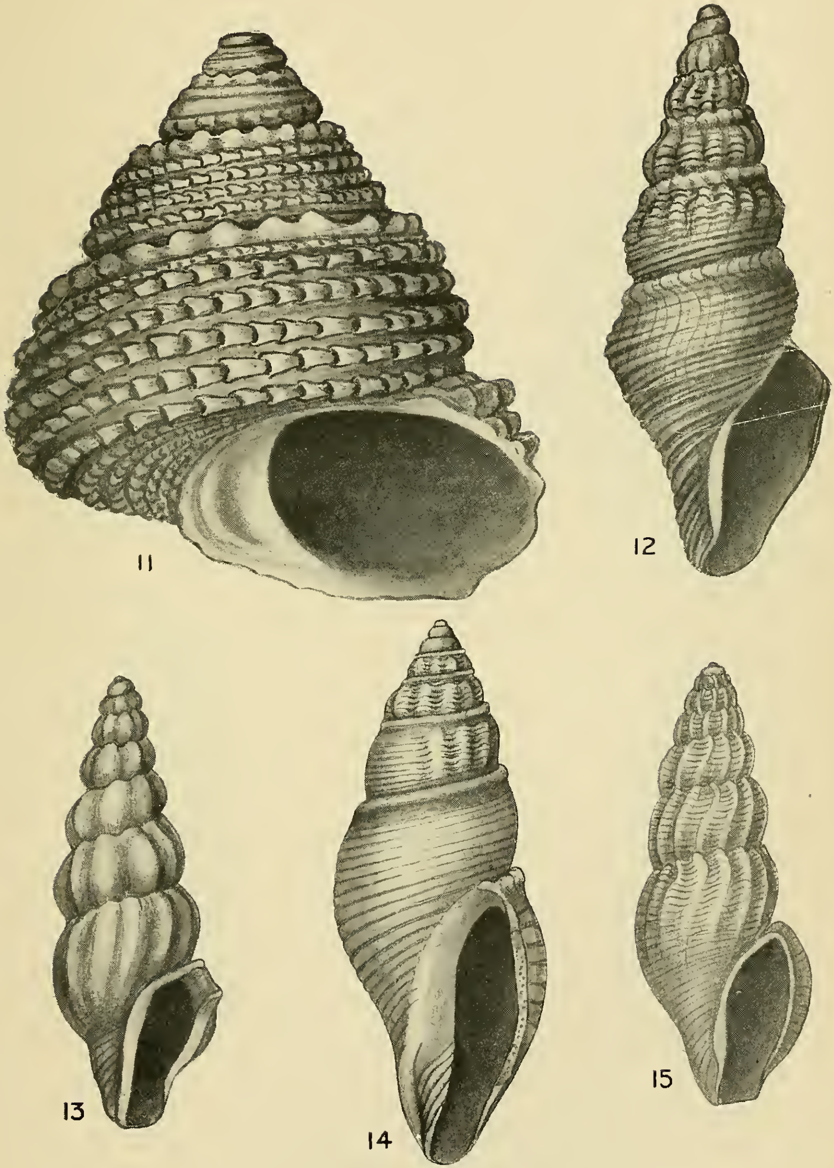


Figure 11—*Astralium (Calcar) flindersi*, Tenison-Woods
,, 12—*Pleurotoma pullulascens*, Tenison-Woods
,, 13—*Pleurotoma sandleroides*, Tenison-Woods
,, 14 -*Daphnella columbelloides*, Tenison-Woods
,, 15—*Daphnella gracililirata*, Tenison-Woods

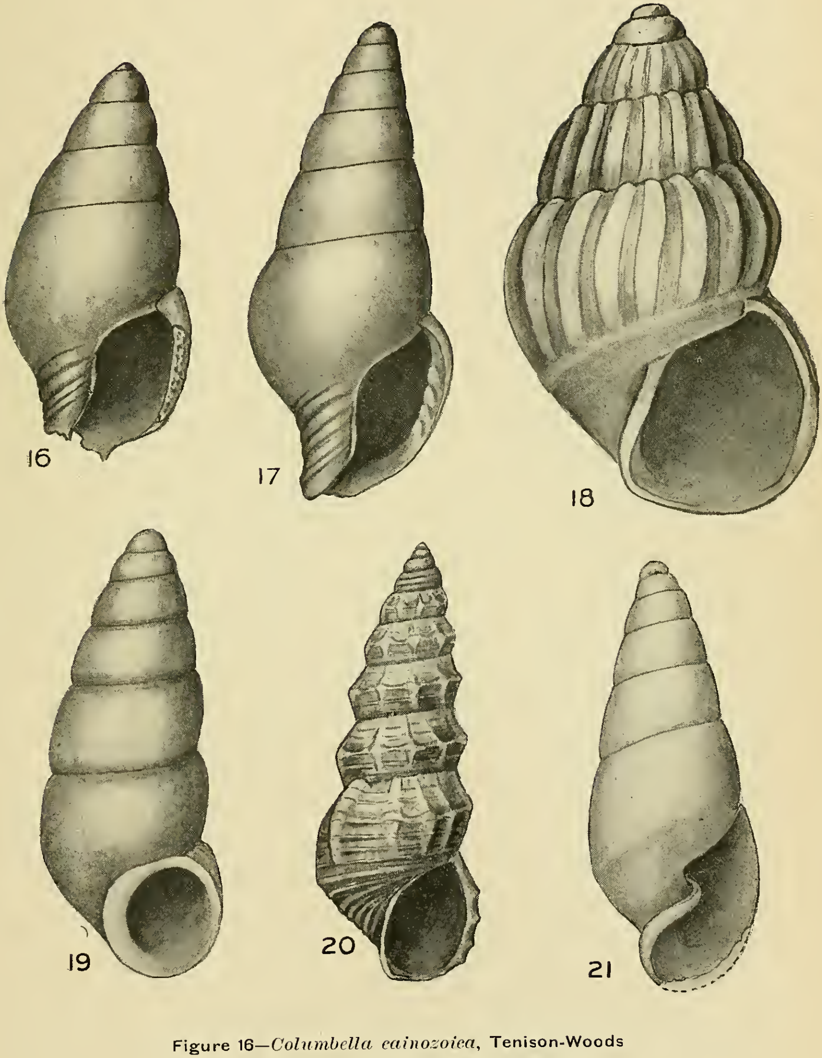


Figure 16—*Columbella cainozoica*, Tenison-Woods
,, 17—*Columbella oxleyi*, Tenison-Woods
,, 18—*Rissoina tateana*, Tenison-Woods
,, 19—*Rissoina varicifera*, Tenison-Woods
,, 20—*Rissoina johnstoni*, Tenison-Woods
,, 21—*Pyramidella polita*, Johnston

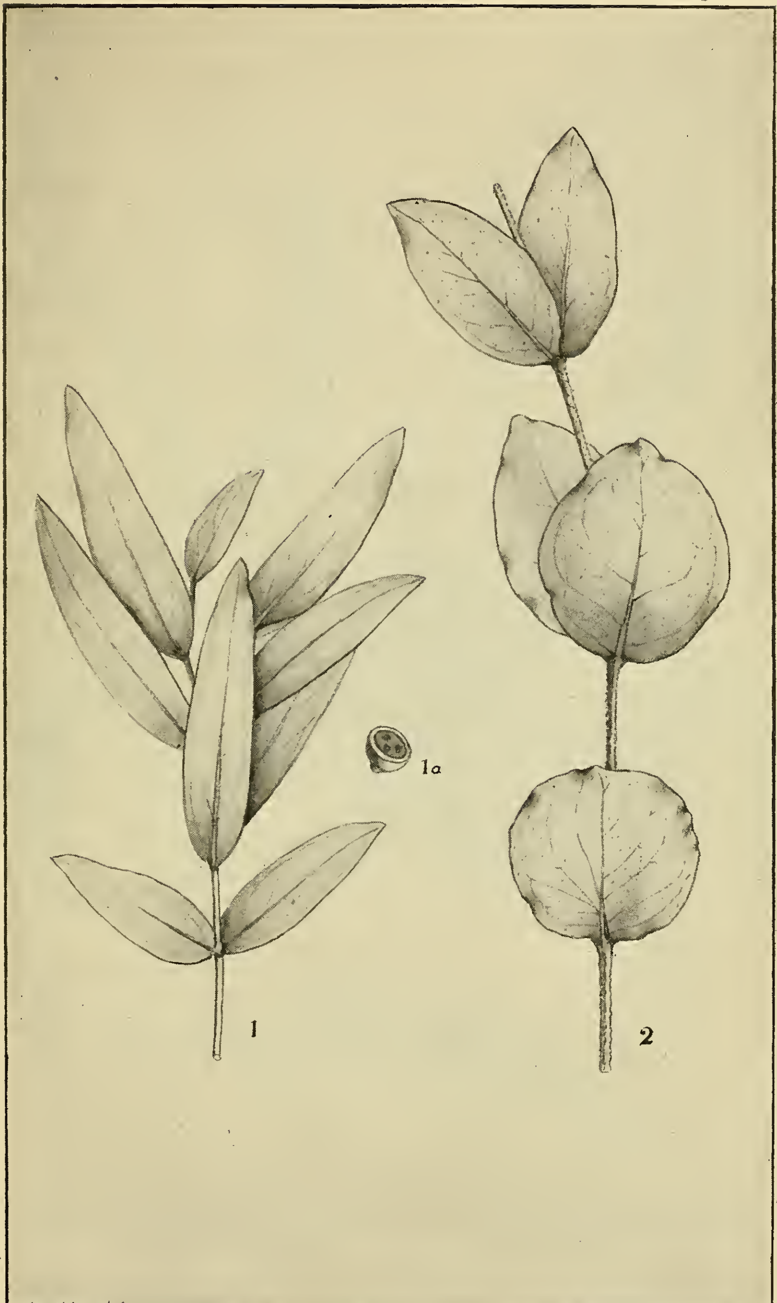
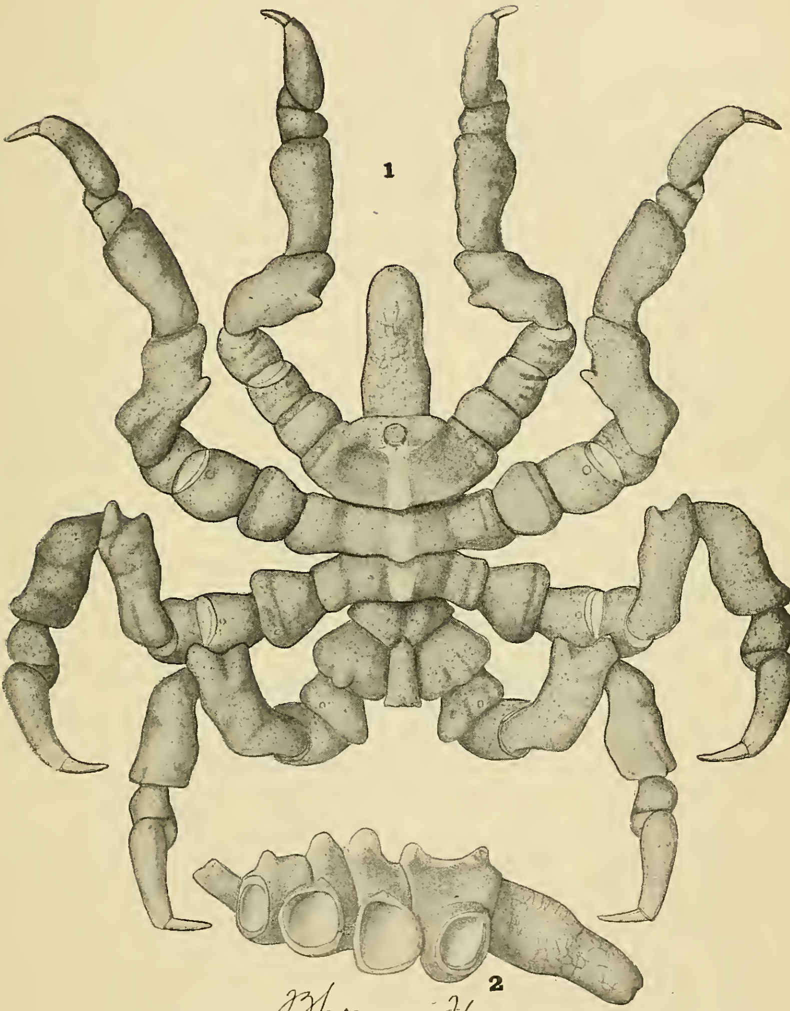
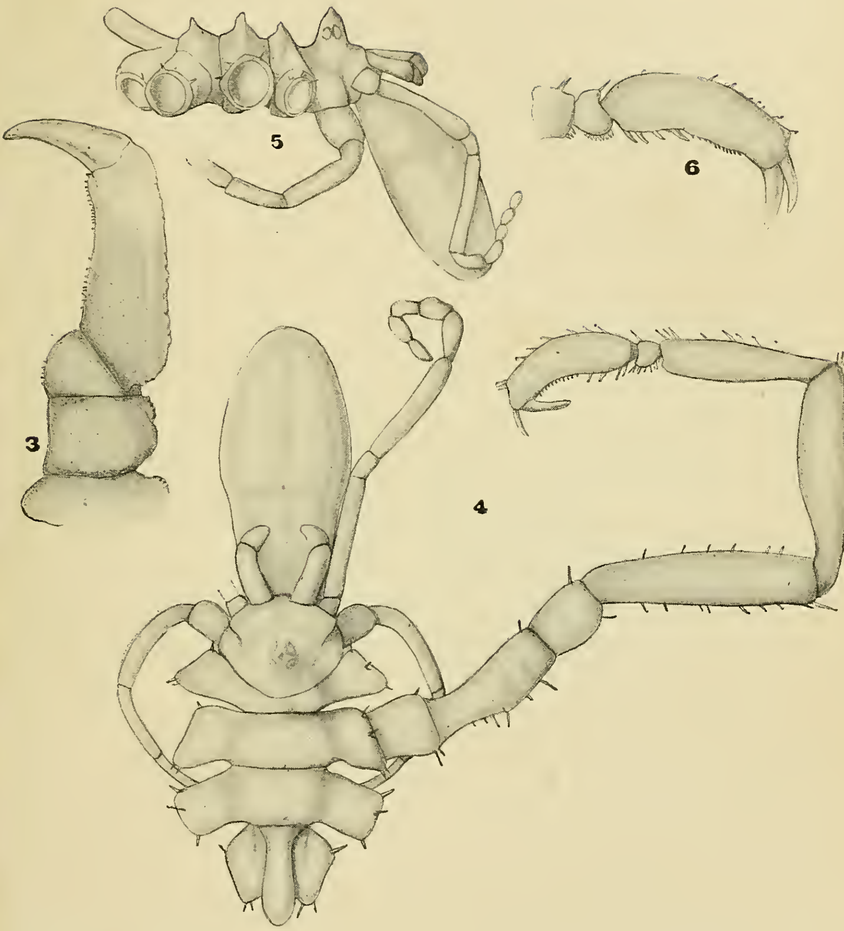


Figure 1—Type of *Eucalyptus hypericifolia* R. Br.
Figure 2—Broad juvenile leaves of *E. nitida* Hook. f.



T Thomson Flynn.

PYCNOGONUM AURILINEATUM.



T. Thomson Flynn

Figure 3—PYCNOGONUM AURILINEATUM.

Figures 4, 5 and 6—AMMOTHEA AUSTRALIENSIS.

PAPERS & PROCEEDINGS

OF THE

ROYAL SOCIETY

OF TASMANIA

FOR THE YEAR

1919

With 27 Plates and 2 Text-Figures.

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The responsibility of the statements and opinions in the following papers and discussions rests with the individual authors and speakers; the Society merely places them on record.

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THE ROYAL SOCIETY OF TASMANIA.

The Royal Society of Tasmania was founded on the 14th October, 1843, by His Excellency Sir John Eardley Eardley Wilmot, Lieutenant Governor of Van Diemen's Land, as "The Botanical and Horticultural Society of Van Diemen's Land." The Botanical Gardens in the Queen's Domain, near Hobart, were shortly afterwards placed under its management, and a grant of £400 a year towards their maintenance was made by the Government. In 1844, His Excellency announced to the Society that Her Majesty the Queen had signified her consent to become its patron; and that its designation should thenceforward be "The Royal Society of Van Diemen's Land for Horticulture, Botany, and the Advancement of Science."

In 1848 the Society established the Tasmanian Museum; and in 1849 it commenced the publication of its "Papers and Proceedings."

In 1854 the Legislative Council of Tasmania by "The Royal Society Act" made provision for vesting the property of the Society in trustees, and for other matters connected with the management of its affairs.

In 1855 the name of the Colony was changed to Tasmania, and the Society then became "The Royal Society of Tasmania for Horticulture, Botany and the Advancement of Science."

In 1860 a piece of ground at the corner of Argyle and Macquarie streets, Hobart, was given by the Crown to the Society as a site for a Museum, and a grant of £3,000 was made for the erection of a building. The Society contributed £1,800 towards the cost, and the new Museum was finished in 1862.

In 1885 the Society gave back to the Crown the Botanical Gardens and the Museum, which, with the collections of the Museum, were vested in a body of trustees, of whom six are chosen from the Society. In consideration of the services it had rendered in the promotion of science, and in the formation and management of the Museum and Gardens, the right was reserved to the Society to have exclusive possession of sufficient and convenient rooms in the Museum, for the safe custody of its Library, and for its meetings, and for all other purposes connected with it.

In 1911 the Parliament of Tasmania, by "The Royal Society Act, 1911," created the Society a body corporate by the name of "The Royal Society of Tasmania," with perpetual succession.

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His Majesty the King is Patron of the Society; and His Excellency the Governor of Tasmania is President.

ROYAL SOCIETY OF TASMANIA

PAPERS AND PROCEEDINGS, 1919

CONTENTS

PAPERS

OF THE

ROYAL SOCIETY OF TASMANIA

1919

STUDIES OF TASMANIAN CETACEA.

Part I.

(*Orca gladiator*, *Pseudorca crassidens*, *Globicephalus melas*)

By

H. H. Scott, Curator of the Victoria Museum, Launceston,

and

Clive E. Lord, Curator of the Tasmanian Museum, Hobart.

Plates I.-IX.

(Received 17th March, 1919. Read 14th April, 1919.)

PRELIMINARY.

As the present paper is the outcome, in the main, of presentations made to scientific societies by one who was intimately connected with the Tasmanian whaling industry, it has been thought fit to commence with a brief historical review of this interesting period. Also, in view of the fact that this paper is intended to serve as an introduction to further studies of the *Cetacea* which we hope to mutually conduct in the future as opportunities present themselves. The chief references in the accounts of the early voyages relate to the pursuit of the "black whale" (an unfortunate vernacular name at best). As far as Tasmania is concerned the industry began to assume commercial importance about the year 1818, and at that time it was no uncommon sight to see whale hunts in the Derwent. As the industry increased the whales were driven further afield, but they still continued to visit the coast at stated intervals. The season usually lasted from May, or June, until November, and as the men engaged in this branch of the industry formed small stations at the coastal bays and there awaited the whales, this method of securing the cetaceans became known as "bay whaling."

There is one instance recorded of a female whale ascending the River Derwent as far as New Norfolk, 24 miles above Hobart, and being killed there (1).

(1) Bischoff. Sketch History of V.D.L. (1832), p. 27.

Henderson, writing in 1832 (2), states that the "black whale" and the "black fish" are found on the Southern Coasts of N.S.W. "The latter are frequently observed "collected in shoals, at a great distance from any land, "lying motionless upon the surface, as if basking in the "sun beams; while the former resort, during their breeding "seasons, to the deep estuaries of rivers, and particular "bays around Van Diemen's Land, and Bass's Straits, "etc." (3).

The initial system of whaling was continued until 1841, when the "black whales" almost ceased to visit the coast. Attention was then paid to the sperm whales, which usually kept further out to sea as they passed from the westward—often followed by numbers of "black whales." Up till this period the system of ocean whaling had been carried on by vessels from overseas, but the Colony had now to provide its own whaling fleet if it was to derive any profit from the industry. The first of the Tasmanian fleet was the *Maria Orr*, built at Macquarie Point (River Derwent) in 1839. This vessel's career was a limited one as she was wrecked on the Actæons two years later.

As the industry increased, Hobart became a great refitting centre, and as many as thirty or forty whaling vessels have been in port at the same time. The refitting usually took considerable time owing to the lack of docking facilities and the old method of "heaving down" having to be resorted to. This trouble was overcome in 1854 by the erection of a patent slip at Battery Point (4).

In 1857 the late Dr. W. L. Crowther fitted out an expedition to whale in high southern latitudes, and Kerguelen Island was selected as a suitable locality, Captain Robinson being placed in command. His barque—*Offey*—was in charge of the expedition, but owing to the failure of the tenders (the brigantine *Flying Squirrel* and the schooner *Elizabeth Jane*) to keep him supplied with provisions, the venture was not very successful.

In 1860 there were about thirty vessels engaged in the Tasmanian whaling industry, but in ten years this number had diminished by half. In 1870 the rise in price of sperm oil to £120 per tun caused a revival, and many

(2) Henderson. Observations on the Colonies of N.S.W. and V.D.L. (1832), p. 136.

(3) When Mr. Lord and a party were engaged in a collecting trip in D'Entrecasteaux Channel in November, 1916, a whale was noticed in shallow water in Ford Bay. Upon closer investigation it was found to be a female *Balænoptera* together with a calf.

(4) Erected by Mr. John Ross at Secheron. Afterwards removed by Mr. Ross in 1868, and subsequently purchased by Kennedy and Sons. Messrs. McGregor and Co. also laid down a slip at the Domain.

ships were fitted out. This revival lasted for about fifteen years, and then the decline commenced until in the early nineties the whaler *Waterwitch* was the sole vessel engaged.

It is of interest to recall the fact that William Lanny ("King Billy"), the last Tasmanian male aboriginal, followed the calling of a whaler. He made his final voyage in the *Runnymede*, and was paid off on February 26th, 1869, and died a few days later (4a).

INTRODUCTION.

Students of the Tasmanian Cetacea have for many years been in search of some Tasmanian records relating to the munificent osteological presentations made to several English scientific institutions by the late Dr. W. L. Crowther. Since the year 1902 Mr. Scott has been working on the Tasmanian *Cetacea* (5), and has been most anxious to obtain Tasmanian records relating to the late Dr. Crowther's collections for the purpose of investigating the question of the comparative anatomy of certain species. Upon Mr. Lord's appointment as Curator of the Tasmanian Museum a thorough overhaul of the Museum store specimens was made with the result that a series of hitherto undescribed specimens were brought to light. As certain of these were undoubtedly portion of the Crowther collection a thorough investigation was decided upon. Upon this being made a considerable amount of interesting data was obtained, which appeared well worthy of being placed on record, and the following notes are therefore the result of our observations.

Between the years 1866 and 1871 the late Dr. W. L. Crowther, of Hobart, who was interested in the whaling industry, collected a large number of skeletal remains of various Tasmanian *Cetacea*, and presented them to several English Museums. Some of these specimens still claim folios in the Catalogues of the British Museum and the Royal College of Surgeons' Museum. Mr. Scott made an effort in 1902 to trace some of Dr. Crowther's specimens in the State, as he was then engaged in publishing a series of articles on this subject. At that time his inquiries did not meet with success, but the matter was always kept in mind. Owing to the recent revision of the Basement stores of the Tasmanian Museum some old boxes which had evidently been stored away from the time they were moved from the old Museum of the Royal Society to the present building

(4a) Bonwick. The Last of the Tasmanians, p. 395.

(5) Scott, Launceston Courier, 1902. Scott. Notes on a fossil whale from Wynyard, Pap. and Proc. Roy. Soc. Tas., 1913, p. 167.

were discovered. These were found to contain interesting osteological specimens, the majority of which related to the Crowther presentations.

A rough examination disclosed that the collection consisted of three more or less complete skeletons probably relating to *Globicephalus*, the skull and portion of a skeleton of a killer whale. Also included there were two skeletons (without skulls) of the Dugong (*Halicore australis*). In addition to the foregoing a skull from the Museum store collection labelled "*Epidon chathamensis*" (6) was examined for purposes of comparison, and also an articulated skeleton of a "Killer," made in 1868, together with a larger skull.

When we recall the fact that the late Dr. W. L. Crowther from the year 1866 onward continued to collect and forward to the Museum of the Royal College of Surgeons a wonderful series of Cetacean remains—that in total embraced 34 Catalogue folios and in Classification 8 genera of whales—it would have been remarkable if he had not presented some specimens to the local Museum. The late Dr. Crowther's gifts to the greatest Museum of comparative anatomy in the world, included no less than 15 full skeletons of whales—splendidly prepared and ready for articulation upon arrival in England. The Tasmanian Scientific world seems to have largely lost sight of the enthusiasm thus manifested by one who lived and worked amongst us, and we wish to appreciatively recall Dr. Crowther's extensive and practical studies among the Tasmanian *Cetacea*.

Before concluding these introductory remarks it is of interest to note that Dr. Crowther forwarded from Tasmania to the Museum of the Royal College of Surgeons a representative of the genus *Clymenia*. As this species has not been placed on the Tasmanian list the donation by Dr. Crowther is worthy of attention, and efforts should be made to trace this species in Tasmanian seas. There is a chance, however, that the specimen forwarded to England may have been obtained by one of Dr. Crowther's whalers on the high seas many miles from Tasmania.

The particular species referred to is figured in the Zoology of the Voyage of the Erebus and Terror, Mammalia, Vol. I., Pl. 15, and is there designated *Delphinapterus peronii*. It is notable for the absence of the dorsal fin, and the fact that the beak, pectoral fins, and under part of the body are white.

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(6) Lord. Notes Mammals of Tasmania, P. and P. Roy. Soc. Tas., 1918, p. 29.

CONSPECTUS.

In the present instance our investigations extended to the following specimens of the Tasmanian Museum collections: —

1. One complete articulated skeleton which was labelled "Skeleton of Killer (*Orca pacifica*) from Adventure Bay, Tasmania. Prepared and articulated by T. Roblin, Curator of the Museum 1868."

2. One skull complete with lower jaw, which was labelled "*Pseudorca meridionals,* Donor, W. L. Crowther, Esqr."

This specimen was in a splendid state of preservation.

3. One skull, similar character to No. 2, but not in such a good state of preservation. The lower jaw and teeth are missing.

4. A large portion of the skeleton belonging to the previous skull.

5. Complete skeleton, including skull of *Globicephalus melas.* (Adult male.)

6. Ditto. (Immature male.)

7. Ditto. (Female—skull missing.)

8. Skull of *Globicephalus melas.*

9. Skull of Beaked whale labelled "*Epidon chathamensis.*"

In the present instance we have dealt with the first eight of this series, and it is our intention to consider the characteristics of the remainder in future papers, together with such facts relating to other members of the Tasmanian *Cetacea* as may be obtained from time to time.

PSEUDORCA CRASSIDENS

(Plate No. I.)

Phocæna crassidens, Owen, British Fossil Mammals and Birds, p. 516 (1846).

Pseudorca crassidens, Reinhardt, Recent Memoirs of Cetacea, Ray Society (Nov. 7th, 1862).

Orca meridionalis, Flower, Proc. Zoological Society of London, p. 420 (1864).

Attention was first paid to specimen No. 1, which consisted of a complete articulated skeleton bearing the label "Skeleton of Killer" (*Orca pacifica*) from Adventure Bay, Tasmania. (Prepared and Articulated by T. Roblin, Curator of the Museum 1868).

Upon a comparison being made of the two skulls (Specimens No. 2 and 3) with this articulated specimen, and an examination of the leading generic characters of both, it was resolved to make a rough comparison between this skeleton and the dimensions given in the original description (7) of the *Pseudorca crassidens* of Reinhardt. The results showed such a striking similarity between the two specimens that a series of comparative measurements were made, as shown in the following tables. These proved conclusively that the articulated skeleton was a good example of *Pseudorca crassidens*. As we know it came from Adventure Bay it is almost certain to be portion of the Crowther collection and to be one of the mixed school which came ashore there. It is known that the school consisted of representatives of the following species:—*Globicephalus melas*, *Orca gladiator*, and *Pseudorca crassidens*. At the time when these specimens were being prepared in Tasmania (the latter '60s) communication with the centres of scientific research was a matter of months and not of weeks as at the present day. We can well imagine that there was some confusion as regards the exact nomenclature of the species, not only on account of the difficulties of correspondence, but also on account of several specimens of different species being obtained from the same locality at the same time. Further, we must remember, that at the time when these specimens were collected the authorities in England appeared to be accentuated by a keen desire to create species. Many of these were based upon slender evidence, and were due to sex and age characteristics and not to specific distinctions. The Tasmanian form, for instance, was at first raised to specific rank as *O. meridionalis* but has since been merged into *Pseudorca crassidens*. Furthermore, the vernacular designations of the whaling fraternity were undoubtedly the cause of further confusion, as several genera and species of whales were loosely grouped under the term "Blackfish" (8). This all assisted to confuse the issue which in some respects, especially in regard to our local specimens of these species, needed clearing up even at the present time. With the examination of the specimens under review and the tabulated results given in this paper before them the students of Tasmanian Cetacea will, we hope, find the exact classification of certain of our local species an easier task in the future, than it has been in the past. The articuated specimen of *P. crassidens* in the Tasmanian Museum appears to be a very typical representative of its species for use as a comparative model, as

(7) Trans. Recent memoirs of Cetacea. Ray Society 1864.

(8) Among others the pigmy sperm whale.

well as being an extremely valuable Museum exhibit. (See Plate No. I.)

PSEUDORCA CRASSIDENS.

General osteological notes upon the Tasmanian skeleton, and a comparative table of measurements of the largest, lumbar vertebræ of that skeleton, with Reinhardt's male from Middlefart.

The skull in a wide sense is that of a small "*Orca*," and the teeth conform to the *Orca* type, in having recurved crowns, but of course are much smaller, as indicated by the following comparison with a true *Orca's* teeth, measured directly for this special purpose.

PSEUDORCA.		ORCA.
	inches	inches
(9) Total length of the largest tooth in the upper jaw	1	2
Girth of same	$3\frac{3}{8}$	$3\frac{3}{4}$
(9) Length of largest tooth in the lower jaw ...	$1\frac{1}{8}$	$2\frac{1}{4}$
Girth of same	$3\frac{7}{8}$	4

The parietal, and squamosal moieties of the fossæ temporalis in the *Pseudorca* are quite unlike those of *Orca*, being compounded in the following way. The squamosal contributes a narrow practically, even strip, about 2 inches wide, set at an angle, and continued to near the vertex. In the *Orca* the squamosal is wide, and irregular, and takes a larger share in the formation of the fossa (upon either side). One *Orca* skull, however, in the Museum collection, makes a nearer approach to *Pseudorca* in this respect. The parietal wings of *Pseudorca* are bent backwards at a slight angle, to the line of the skull, exactly as in *Tursiops*, while in the *Orca*, the whole boundary walls of these fossæ bend outwards, as continuous outgrowths of the occiput.

In the skeleton it may be noted that five of the cervical vertebræ are strongly ankylosed together, and two are quite free.

A metapophysis appears—faintly indicated—upon the second dorsal, and well marked one upon the fourth. The seventh dorsal develops these processes at the upper level of the neural arch, in other words at the base of the neural spine. Unlike the smaller dolphins, these processes are not eliminated from the vertebræ in the region of the dorsal fin, but continue to gradually decrease after the

(9) This is ex-alveolar, enamel surface measurement.

sixth lumbar has been reached, eventually ending, *in toto*, at the ninth vertebra from the caudal extremity. The manus is wider than that of such dolphins as Globicephalus and Tursiops, and the longest finger only develops seven phalanges, instead of eighteen, as in the case of *Globicephalus*. The ossicles present are apparently the following:—

Proximal row—Scaphoid. Lunare. Cuneiform.

Distal row—Trapezoid. Magnum. Unciform.

In each hand the cuneiform is closely attached by immersed cartilage, to the ulna, and as the whale was immature it might have ankylosed later in life had the animal continued to live.

Pseudorca crassidens.

Comparative skulls of well authenticated specimens.

Skull and skeleton in Tasmanian Museum, Hobart, Tasmania.		Adult skull in the Royal College of Surgeons' Museum, London.	Skull of Reinhardt's Specimen ♂	Prof. Owens fossil skull.
SKULL.		SKULL.	SKULL.	SKULL.
	inches	inches	inches	inches
Beak to condyles	24	$23\frac{1}{4}$	24	mutilated *circa* 24
Maxillary notch to tip of beak	12	$11\frac{1}{4}$	11	$12\frac{1}{2}$
Breadth across the zygomatic processes of the squamosal	15	13	14 1-12	No data given
Height at vertex of the skull	10	$8\frac{3}{4}$	No data	No data
Breadth across ridges of fossæ temporalis	$8\frac{3}{4}$	No data	$8\frac{1}{4}$	No data
Breadth of beak at notch ...	$7\frac{3}{4}$	$7\frac{1}{4}$	8 1-12	$8\frac{1}{2}$
Breadth across the beak in region of third tooth from end of series...	$7\frac{1}{2}$	No data	$7\frac{1}{2}$	8
Breadth of the intermaxillaries and the intervening space	$5\frac{3}{8}$	$4\frac{1}{2}$	No data $5\frac{1}{2}$	$5\frac{1}{2}$
Length of right ramus of the mandible, tip to posterior edge of last tooth	$9\frac{1}{2}$	$9\frac{3}{4}$	9 5-12	10
Length of the dental series of the upper jaw	10	No data	$9\frac{3}{4}$	10
Height of right ramus at the coronoid process	$5\frac{3}{8}$	5	No data	No data
Total length of the right ramus of the mandible ...	$19\frac{1}{4}$	19	$18\frac{1}{3}$	21

Pseudorca crassidens.

Comparative measurements of the Tasmanian and North Sea specimens.

— *Skeletons.* —

Tasmanian Specimen from Adventure Bay.			Reinhardt's male specimen from Middlefart.	
	feet	inches	feet	inches
Total length of the skeleton ... (10)	14	6	13	5
Length of seven cervical vertebræ ...	0	$3\frac{1}{4}$	0	$3\frac{1}{6}$
Length of lumbar series to the vertebræ with the first hæmapophysis ...	3	$5\frac{3}{4}$	3	5
Total length of caudals ... ... (10)	5	$8\frac{1}{2}$	5	$3\frac{1}{2}$
Breadth of the largest lumbar	1	$0\frac{7}{8}$	1	0 5-6
Height of scapula from middle of articular cavity to middle of suprascapular rim	0	$8\frac{1}{6}$	0	$7\frac{1}{2}$
Greatest breadth of the scapula ...	0	$11\frac{1}{8}$	0	10 5-6
Length of Humerus	0	$4\frac{1}{2}$	0	$4\frac{1}{2}$
Do. of Radius	0	5	0	4 7-12
Do. of Ulna...	0	5	0	$3\frac{1}{2}$
Distal width of both arm bones... ...	0	$5\frac{7}{8}$	0	$5\frac{1}{6}$
Length of the manus in a recent and undried condition	no data		1	0

ORCA GLADIATOR.

(*Orca capensis.*)

PLATES II., III., IV., V., VI., VII., VIII.

For detailed synonymy see :—

Gray, B.M. Cat. Seals and Whales (1866), p. 278-290.

The prevailing opinion seems to favour the reduction of the representatives of this genus to one species—*Orca gladiator*. We have adopted this view and made *Orca capensis* a synonym of *Orca gladiator*. Should, however, *capensis* be again raised to specific rank we are of opinion that the Tasmanian forms should be included, as they appear to have the characters at one time allotted to *capensis* in order to separate it from *gladiator*. We formed this opinion after comparing the Tasmanian skulls with the figured ones of *Orca capensis* reproduced by Gray in the Zoology of the Voyage of the Erebus and Terror. (Plate IX.)

Unfortunately portions of the skeleton examined by us had disappeared. This is greatly to be regretted, es-

(10) In this articulated skeleton (Plate I.), the intervertebral pads are thick, in fact exceptionally so, and if this excess is allowed for, the two skeletons are of almost similar length.

pecially as the mandible was one of the missing portions. As a recompense, however, there was a second complete skull, in a splendid state of preservation, which permitted a series of comparative measurements being taken. This skull formed part of the Crowther collection, and bore eloquent testimony regarding the confusion of species previously alluded to. It was labelled "*Pseudorca meridionalis*—Donor, W. L. Crowther, Esqr," but there can be no doubt that its correct classification is that of *Orca*. Whether *gladiator*, or *capensis*, is a matter of individual opinion, but we would again draw attention to the fact that whales vary greatly as regards sex and age characteristics, and far too many species in the past have been created on insufficient evidence. We desire particularly to refrain from adding further to the confused nomenclature, and prefer to treat the present example as a member of the cosmopolitan species *O. gladiator*.

Orca gladiator.

A detached skull, and a skull with many of the associated bones of the skeleton, exist in the Museum collection, and unless otherwise stated the notes given herewith relate to the latter.

Skull.

The skull is extremely heavy in build, following the general contour of the true dolphins with wide, even massive, squamosal regions, notched beak, and maxillary bosses two inches—or more—in thickness. The vertex gives characters that by reason of its squared ridges distinguish it immediately from *Globicephalus*, and in part from the *Pseudorca*.

This skull—which unfortunately is devoid of a mandible—is three feet three and a half inches long, two feet two inches wide, and one foot five and a half inches high, from the par-occipital processes to the vertex. Its greatest maxillary width is in the region of the pre-orbital process of the frontal, where it yields a measurement of twenty-two inches, it then contracts to twenty inches at the notch (if we still follow the outline of the skull). Across the actual notch itself, we get a measurement of twelve inches nearly—and rather more at the middle of the beak.

Viewed from below, it is of interest to note, that the intermaxillaries appear in the palate as a well marked pair of wedge shaped strips, some fourteen inches long—or half of the total palatal length. The vomer appears for four inches only, its apex being eleven inches from the tip of the beak. In *Globicephalus* the intermaxillaries only obtrude upon the palate for three inches, out of a total length of fourteen, and the vomer is continued outwards to within two and a quarter inches of the tip of the beak. As far as it is possible to determine from the articulated skeleton of *Pseudorca*, this latter whale followed the *Orca*, and not *Globicephalus* in this respect, in any case it certainly followed *Orca* in having fairly extensive palatine moieties instead of the palatal bones being reduced to the merest strips as in *Globicephalus*. This character alone is sufficient to quickly separate skulls of *Pseudorca* from those of *Globiocephalus*.

The second skull in the Museum collection (Plate II.) is an extremely well prepared specimen, evidently cleaned under Doctor Crowther's strictest instructions—the teeth are all *in situ*, the membrane of the hard palate having been left for the purpose of their protection—nothing could exceed this method of making a museum specimen, as far as it relates to the teeth, but a central area left open to reveal the vomer, and intermaxillaries, would be a desideratum. In point of size, this second skull closely resembles the one just passed in review, but as it is in much better condition the table of measurements appended was compiled from it, and not the skull with the associated appendicular bones.

Skull of an Orca, presented by Dr. W. L. Crowther, F.R.C.S.

Plate II.

	ft.	in.
Total length	3	$1\frac{3}{4}$
Width at maxillary notch	1	$1\frac{1}{2}$
Width at pre-orbital process of the frontal	2	$2\frac{1}{4}$
Width of maxillary at this point	1	10
Height from par-occipitals to vertex	1	$5\frac{1}{2}$
Greatest width of palate inside teeth	0	$10\frac{1}{2}$
(Midway between the last two)		
Width at seventh pair of teeth	0	$9\frac{1}{2}$
Total length of tooth line	1	$1\frac{1}{2}$
Width of pterygoids	0	$6\frac{3}{4}$
Tips of pterygoids to the occipital condyles	1	$1\frac{1}{2}$
Width of fossa temporalis	0	6
Height of fossa temporalis	0	$6\frac{1}{2}$
(Both of the above taken from the palatal aspect.)		
Total length of malar bone	0	$11\frac{1}{4}$
Diameter of blowers taken from the palatal aspect —antero-posterior measurement	0	$4\frac{1}{4}$
Transverse measurement	0	$5\frac{5}{8}$

	ft.	in.
Occipital condyles along the curve—vertical measurement	0	8
Ditto transverse measurement	0	4¼
Total width of the articular and space taken along the curve	0	10½

Skeleton.

The cervical vertebræ, and the first dorsal, make such a compact series that for both illustrative and descriptive purposes they are here considered together (Plate III.). The first three cervicals are completely ankylosed, and the rest are quite free, this is in contrast to the *Pseudorca*, and *Globicephalus*, in which whales all the series are welded together into a solid mass. The neural spine of the axis slopes backwards at an angle of 45 degrees, and being some five inches in length, approaches the spine of the dorsal to within an inch and a quarter. The whole block measure nine and a quarter inches in antero-posterior extension, and the first pair of diapophyses yield a measurement of fifteen and a half inches across. The neural canal, taken through the atlas, is three and a half inches wide, and two and three-quarters high, and the first dorsal vertebra gives practically similar results.

For the general contour of this block of vertebræ see the illustration, it being only necessary to add that the block is ten inches high, to the top of the neural spines.

Dorsal Series. (Plate IV.)

Four vertebræ of the dorsal series are illustrated to show general outline, and the progressive rise of the metapophyses upon the neural spines. The length of this block is twelve and three-fourth inches for the three, and the height of the neural spine of the tallest vertebra is thirteen and three-quarter inches, from the keel of the centrum. The reversed vertebra is that which of the series is nearest to the skull, and therefore the transverse processes (Diapophyses) are extremely short. As a guide to size, it may be said that the neural canal of this vertebra is four inches across, and the centrum measures four and three-quarters in either direction.

Lumbars. (Plate V.)

Four early lumbars are shown, and a sequent fifth, reversed as in the other illustrations. These vertebræ do not carry hæmapophyses (Chevrons), and are, of course, ribless. The metapophyses are still strongly developed, although from their position they perhaps might be called zygapophyses.

In the evolution of whales, the true zygapophyses on the dorsal series have been overlapped by the metapophyses, that have in consequence suffered a complete atrophy.

Chevron-bearing Vertebræ. (Plate VI.)

These vertebræ beautifully illustrate the reduction of the metapophyses upon the neural spines as we advance tailward. Hæmad, they carry bony arches to protect the extensive blood vessels that go to nourish the powerful tail—such bones which relate to the vertebral hæmal arch may be designated either "hæmal arches," or chevron bones.

Sternum of Orca. (Plate VII.)

An excellent illustration of the sternum of this Orca is depicted. As will be noted the anterior moiety (manubrium) is penetrated by a fossa, an inch and seven-eighths long, and one inch wide. The articular facets of four ribs are manifest, the next few pairs being articulated by cartilage to the distal (or ziphoid) end of the sternum. This arrangement is to be seen in the articulated skeleton of the pseudorca shown in connection with the description of that animal.

Ribs. (Plate VIII.)

To practically illustrate the awful fights that "Killers" indulge in, and their incidental results, some of the ribs of this Orca have been photographed. These ribs are paired, and therefore the mutilated rib can be directly compared with its normal congener. Apparently this particular specimen was unusually unlucky, for having early in life broken several ribs upon one side, and tided over the misadventure, he lived to face a second similar, but more extensive, fracture upon the other side. This second accident was responsible for the awful distortions shown in the picture.

GLOBICEPHALUS MELAS.

(For detailed Synonymy see Gray, B.M. Cat. Whales, p. 313, *et seq.*).

The specimens representing *Globicephalus* (Nos. 5, 6, 7 and 8) consisted of three skeletons, of which two were complete, and a non-associated skull (Plate IX.). These are undoubtedly specimens presented by the late Dr W. L. Crowther, and were evidently carefully prepared in order to show certain essential data. The three specimens may be classed as follows:—

A. (No. 5) shows the characters of an adult male.

B. (No. 6) shows the characters of an adult female.

C. (No. 7) shows the characters of an immature *Globicephalus.*

As the sex characters of all whales need working out, these specimens will supply data of extreme interest, and it is felt that the comparative tables given in the following pages will prove useful to students of the *Cetacea* in the future.

It is of interest to note that the immature characters are well marked off from the mature. Of this characteristic little or nothing has previously been published as far as we are aware.

In the past whales belonging to the genus *Globicephalus* have been confused with specimens of *Pseudorca.* When they are compared casually this is not to be wondered at. Their similar size, colour, and general external appearance all lend their aid to the confusion which has undoubtedly existed. Even Ziphoid whales have at times been incorporated.

While the examination of the present series will, it is confidently hoped, prove of value, it is to be regretted that there are certain missing links. For the last fifty years apparently these valuable specimens have been stowed away. From time to time there have been alterations in the stores, and there is evidence which goes to show that a number of the missing parts relating to these skeletons were evidently stored separately, and were disposed of some years ago as useless odd examples. This is greatly to be regretted, but sufficient remains, especially in the case of this species, to allow an examination of its chief characteristics, both as regards sex and age.

Globicephalus melas. (Plate IX.)

As *Globicephalus* skulls have been confounded with those of the *Pseudorca*, it is important that their comparative osteology should be made clear. The palatine character given under the heading of *Orca*, in this paper, will always serve to separate the skulls unless extreme mutilation (as in the case of a fossil specimen) makes it impossible to apply this test—under such extreme circumstances the following data may be consulted.

Comparative Characters.

(1) In *Globicephalus* the maxillary wings practically cover the frontal upon all its faces, except at the vertex, where a narrow strip is left exposed.

(2) In *Pseudorca* the frontal is well exposed all round, namely, for anything from half to three-quarters of an inch, the greater amount being at the vertex, and the lesser along the orbit and fossa temporalis.

(3) In *Globicephalus* the pre-frontal moieties are

large, well rounded bosses, even in immature skulls, but in Pseudorca they are small, and are closely associated with the frontals—and we strongly suspect in old skulls would ankylose to extinction with the frontals.

In point of comparative sizes, it may be said—An immature *Globicephalus* whale, in whose skeleton the epiphyses are quite free, will have a skull as large as that of an adult *Pseudorca*, in which all the vertebral epiphyses are ankylosed to extinction.

As has been pointed out, in the introduction to the osteology of the *Orcas'* skull, in the Museum collection, many valuable cetacean remains have been rejected in past years, and as the skulls belonging to Dr. Crowther's specimens were too large to store in the cases that carried the skeletons, they were either put on view in the Museum, as detached exhibits, or else stored at the back of the Museum (somewhat exposed to the weather!). In this way, the skull of the matured female of Crowther's donation became lost, and the matured male's skull was disassociated from its skeleton, and the same happened with the immature skull. Both of the latter have now been restored to their respective skeletons, and a third (old male) non-associated skull has been brought to light. As a result therefore of this confusion the adult female of Crowther's donation is minus its skull, while a spare male skull is available. The following table will show the comparison between the two adult male skulls, and that of the immature *Globicephalus*.

Comparative skulls of *Globicephalus*

In the collection of the Tasmanian Museum, Hobart.

	Dr. Crowther's specimen ♂ associate of the skeleton.	Adult ♂ skull non-associate of any other remains available.	Dr. Crowther's specimen immature skull.
	inches	inches	inches
Greatest length	26	26	23½
Height	13¾	14	11
Greatest width	19¼	19⅛	15¼
Width at notch	10½	11	8¼
Across anterior nares	7½	7¾	5¾
Width of fossa temporalis	5	5	3⅜
Height of fossa temporalis	5¾	5¾	4¾
Width of palatines as they contribute moieties to the true palate, to compare with an orca, giving 2½ inches from the tips of the pterygoids	1*	1¼	½

* Rather mutilated.

In the above notes it has been our object to supply actual data, and not to repeat the published characters. (11).

General Notes upon the Skeletons.

ADULT MALE.	ADULT FEMALE.	IMMATURE. ♂
All cervicals ankylosed, but not to sutural extinction, last two open. No super ossification. (Animal almost adult—compare size of skull with that of the other male.)	All cervicals ankylosed, not to extinction, last two open, much super ossification. Spine of the axis blending strongly with those of the rest of the series.	Cervicals ankylosed—lightly, but firmly, except the 7th, which is loose. Five sutures wide open. Right neurapophysis has not blended with its fellow moiety.
Twelve dorsal vertebræ measure, in antero-posterior extension—3ft. 2in.	Twelve dorsals measure—2ft. 7in.	Twelve dorsals measure—2ft. 5½in.
Epiphyses not ankylosed to centra of vertebræ.	Epiphyses of all vertebræ ankylosed to centra, and sutures extinct.	All epiphyses quite free from the centra.
Total length of vertebral series, minus skull—14ft. 6in.	Length of vertebral series—10ft. 10in	Length of vertebral series—10ft. 10½in.

ADULT MALE.		ADULT FEMALE.		IMMATURE. ♂	
Ribs, 11 to 12 pairs.		Ribs, 11 to 12 pairs.		Ribs, 11 to 12 pairs.	
	inches		inches		inches
Twentieth vertebra from skull, width across diapophyses ...	15	Twentieth vertebra from skull, width across diapophyses ...	11	Twentieth vertebra from skull, width across diapophyses ...	13
Length of body..	4	Length of body ...	3½	Length of body...	3¼
Height to tip of spine	11½	Height to tip of spine...	9½	Height to tip of spine	9½
Across centrum	3⅞	Across centrum ...	3	Across centrum	3⅜
Vertical	3½	Vertical	2¾	Vertical	3⅛
Scapula.		Scapula.		Scapula.	
Glenoid to suprascapular rim ...	10½	Glenoid to scapular rim	9½	Glenoid to scapular rim	8½
Transverse ...	15¼	Transverse	13½	Transverse ...	12½

From the above comparative measurements it will be manifest that the adult male exceeds the adult female, in size, by anything up to four feet, or over, and that an im-

(11) Such as already given by Beddard in *A Book of Whales* and *The Cambridge Natural History* (*Mammals*), etc.

mature male, with all the epiphyses of the vertebræ open, is close to the stature of the female. The following characters were noted, as marking the female off from the mature and immature males.

1. Diapophyses of the dorsal ribs longer than in the other two animals.

2. First, cervical, neural spine covers more vertebræ.

3. No bicipital groove between head and trochanter of the humerus. Articular surfaces set at a more oblique angle (12).

4. Supra scapular rim was centrally elevated, and not depressed, and the pre, and post, scapular fossæ made a nearer approach to the roughened fossæ of *Tursiops* than either of the other specimens here detailed.

We hope in our next paper to give exhaustive data relating to sex variations in the genus *Tursiops*, and the notes here supplied will receive added value from the light thus thrown upon a vexed question.

In conclusion, we desire to express our thanks to Mr. John Arnold, Chief Assistant of the Tasmanian Museum, for the willing and courteous assistance rendered to us during the examination of the specimens.

DESCRIPTION OF PLATES.

Plate I.

Articulated skeleton of *Pseudorca crassidens* from Adventure Bay, Tasmania.

Plate II.

Skull of *Orca gladiator*.

Plate III.

Cervical vertebræ and first dorsal of *Orca gladiator*.

Plate IV.

Four vertebræ of the Dorsal Series (*O. gladiator*).

Plate V.

Five vertebræ of the Lumbar series (*O. gladiator*).

Plate VI.

Four chevron bearing vertebræ (*O. gladiator*).

Plate VII.

Sternum of *Orca gladiator*.

Plate VIII.

Series of Ribs of *Orca gladiator* (showing broken ribs).

Plate IX.

Skull of *Globicephalus melas*.

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(12) These arm bones are only provisionally associated with this skeleton, and may not belong to it. Various dolphin remains—evidently odd scraps of later date than Dr. Crowther's specimens—had been added to the box from time to time; these included some *Tursiops* bones of no value.

NOTES ON THE GEOLOGY OF WINEGLASS BAY.

By W. H. Clemes, B.A., B.Sc.

[Received 20th March, 1919. Read 14th April, 1919.]

During a recent visit to Wineglass Bay I was enabled to make a cursory examination of the neighbourhood, and, as the locality has not been described in any detail, a few notes may be useful as a guide to future workers.

Wineglass or Thouin Bay is situated on the eastern side of the isthmus joining Freycinet Peninsula to Schouten Main, which, together with Schouten Island, form the eastern boundary of Oyster or Fleurieu Bay. The whole consists of a magnificent series of granite peaks, extending for 12 miles in a north and south direction, the highest, Mount Freycinet, rising to the height of 2,014ft. above the sea. This granite occurs in a meridional line, extending from Flinders Island to the Hippolyte Rocks, off Tasman Peninsula, and is contemporaneous with the granite massifs of the West Coast. It is to be found penetrating all rocks earlier than the Permo-Carboniferous, but has not been seen intrusive in strata of a later age. It is usually distinguished from the earlier granites and syenites by its uncrushed character, though in places it has been subjected to a certain amount of dynamic stress.

The granite at Wineglass Bay varies considerably. The normal rock is a coarse-grained granite, pink with flesh-coloured orthoclase. The chief constituents are orthoclase, quartz and biotite. The latter appears in green chloritised crystals, and is quite subordinate in quantity. In large boulders at the northern end of the beach appears a medium-grained biotite-granite, the composition of which is quartz, biotite and felspar. Much of the latter will probably be found to be plagioclastic. This is the more typical East Coast granite. Running through this are veins of granite porphyry, in which the ground mass looks quartzose, with scattered crystals of quartz, biotite and muscovite throughout. In other veins there is a concentration of the biotite. A wide vein of this biotite-granite was reported as running up the hill from the water's edge on the northern side of the bay, but I did not come across it. A broad vein about 20ft. wide is found on the south side of the bay. This is also a granite porphyry of magnificent appearance. It consists of pink orthoclase and quartz in a quartzose ground mass. The ferro-magnesian constituents are very few. Running through the boulders on the sides of Mt. Hazard are to be found narrow veins of microgranite, a very fine-grained variety composed of felspar, biotite and quartz. On the northern side of the bay also occurred a highly porphyritic granite with large crystals of felspar (orthoclase?), also quartz, biotite and muscovite.

Numerous quartz veins traversed the rock in a more or less north and south direction, and varied considerably in size. They varied also in colour from rose to white, and there were numerous nests of rock crystals. There was no evidence of the greisenised zone, carrying tin, found at the northern end of Schouten Main.

At intervals along the south side of the bay are parallel dykes of dark rock, running approximately north and south. This rock has previously been referred to by Dr. Milligan, who thought that it was greenstone, and certainly it somewhat resembles diabase or dolerite to the naked eye. But microscopically it is resolvable into a combination of plagioclase, felspar, and hornblende, and is therefore a diorite. Some biotite is also present. The felspars in lath-shaped sections exhibit both albite and Carlsbad twinning, and from the extinction angles belong to the oligoclase-andesine series. The biotite where not chloritised is brown in colour. The hornblende is irregular in form and green. It is mostly chloritised to some extent, during which process iron oxide has separated out abundantly. Diorite is a rock which is met with in more than one form of occurrence. It may exist in dyke form, or as a separate rock mass, or finally as a facies of granite. The structure of the present rock is consonant with its occurrence either as a facies or a dyke. Evidently it has genetic connection with the granite rock of Freycinet Peninsula. In one vein close to the water's edge large crystals of felspar were to be seen embedded in the diorite, which there appeared more grey in colour. I was not able to examine it closer owing to its position and the lack of time, but it appeared as if some absorption of the constituents of the granite had taken place, leading one almost to suppose that the dyke theory was more probable, but there is not sufficient data to dogmatise about the matter. They certainly appear to be xenocrysts rather than phenocrysts.

Most of the hills appear as great boss-like masses with rounded surfaces, curiously streaked by the descending waters charged with mineral matter. These hills descend right into the sea, with little or no foreshore. Along the east coast great cliffs have been formed, seamed with cracks and joints, and showing traces in parts of columnar structure on the outer and upper faces. The structures seen in many of the cliffs indicate that there has been intense dynamic stress taking place in part during consolidation, but mostly subsequently. The sinking of the land to the East, approximately along this line of granite, may have tended to weaken the structure. The deformation of the granite on Maria Island appears to have been of a more intensive nature, though not nearly so severe as in the earlier granites.

Very few traces of the older or subsequent strata are to be found. The rate of denudation and sea erosion is and has been very great. Silurian slates appear at Blue Stone Bay. Cretaceous diabase is found at Buckley's, on the south side of Hazard Bay, and on Schouten Island, the two latter deposits being fringed with Mesozoic sandstones. In speaking of Oyster Bay. Mr. Twelvetrees reports:—"The form of Oyster Bay illustrates the eroding force of the waves on a large scale. We must believe that the surviving fringe of diabase on the E. side of the bay at Hepburn's Point, on the S.W. of the Peninsula, and on Schouten Island, was once continuous with the sea-front of the same rock on the Swansea side of the bay. The fragmentary deposits of Mesozoic sandstone (freestone) associated with the diabase indicate that it, too, extended across the bay to Kelvedon. It follows, accordingly, that the present Oyster Bay has been scooped out of the coal measures, sandstones and diabase, the eroding process being, perhaps, assisted in its initial stages by the weakness of the strata along the contact line of the diabase with granite on the eastern shore of the bay. The excavating process has extended to a depth of 12 fathoms, on the average. The present depth of the bay does not represent the sum total of erosion since the coal period, for it has probably been reduced by deposition in Tertiary times of sediments, which have since been denuded as the land has risen again. The Tertiary deposits in the lower part of the valleys of the Swan and the Apsley illustrate the depression and subsequent elevation of the land during that period, observed frequently elsewhere in Tasmania."

The sand forming the beach at Wineglass Bay is very white, being composed almost entirely of quartz and small rounded particles of felspar. In Hazard Bay, however, it is more yellow in colour, and contains much felspar and many shell fragments. The isthmus itself is composed of a broad flat, fringed with high sandhills, and somewhat hollowed in the centre, forming a large shallow lagoon. The general appearance would lead one to suppose that it is the result of subsidence rather than the result of the accumulation of drifting sand, though the rapid disintegration would account for abundance of material. An interesting field of study would be the formation of the tied-islands and isthmuses of S.E. Tasmania. The amount of evidence here is very little, and no definite conclusions could be formed without further examination. There is no doubt that the peninsula was separated from Schouten Main just as at present Schouten Island is separated from the peninsula, and also that the different character of the rocks on the north and south side of the bay would lead to the conclusion that they represent two quite distinct intratelluric intrusions, which were, however, approximately contemporaneous, but further investigation must be left to a subsequent visit. In conclusion, I must express my indebtedness to Mr. Twelvetrees, who gave me valuable assistance in checking the constituents of the rocks found, and especially in determining the composition of the diorite.

ON THE OCCURRENCE IN TASMANIA OF *HYDRUS PLATURUS*, Linn. (1)

By Clive E. Lord,

Curator of the Tasmanian Museum.

(Received 5th May, 1919. Read 10th June, 1919.)

Tasmania is usually credited with three terrestrial and one aquatic snake. The latter species—*P. laticaudatus* —has only been noted on rare occasions. It is interesting, therefore, to record that a second aquatic species has been found on the Tasmanian Coast. A specimen recently forwarded to the Museum from Scamander, on the East Coast, proves to be a typical example of the Spotted-tailed Sea Snake (*Hydrus platurus*). This is the first record of this species for Tasmania, and it may be of interest to quote certain particulars regarding its discovery.

Mr. J. Stanley Hodgson, who kindly forwarded the specimen to the Museum, has (5/3/1919) given me the following information:—"My daughter and self found the "snake at Shelly Point, about two miles north of Scamander. He was basking in the sun, laid on a heap of "seaweed. At first I took him for an eel, and killed him "with the intention of eating him, but on picking him up "I soon found that there was nothing of the eel about "him, and, as nobody seemed to know exactly what he "was, I sent him to you."

The range of this snake is usually given as the Tropical and Sub-Tropical Pacific, and I know of no previous record of its occurrence in Tasmanian seas. The present record should, therefore, be of interest.

(1) Ref.—Boulanger; Cat. Snakes, Brit. Mus. (1896), Vol. III., p. 26.

STUDIES OF TASMANIAN CETACEA.

Part II.

(*Ziphius cavirostris.*)

By

H. H. Scott (Curator of the Victoria Museum, Launceston) and

Clive E. Lord (Curator of the Tasmanian Museum, Hobart).

Plate X.

(Received 18th June, 1919. Read 14th July, 1919.)

INTRODUCTION.

We had contemplated dealing with the genus *Tursiops* in the first portion of the present paper, but, owing to several unforeseen circumstances, we propose to place on record certain data compiled in relation to the species *Ziphius cavirostris* before proceeding to deal with *Tursiops tursio* as a Tasmanian species.

ZIPHIUS CAVIROSTRIS, Cuvier.

For detailed synonymy see:—

Gray, Brit. Mus. Cat. Seals and Whales, *Epidon*, p. 340 *et seq.* (1865).

And for later nomenclature, etc.:—

True, Bulletin 73, U.S. Nat. Museum, p. 30 (1910).

As with the majority of the Cetacean order, the nomenclature is involved, and the species described are numerous. Fortunately, in this instance it was recognised rather sooner than in others that there was probably only one species, and that this was practically cosmopolitan in distribution.

Mr. F. W. True has given an excellent account of this species, (1) and we have pleasure in the present instance in adding to the existing knowledge by describing a skull in the collection of the Tasmanian Museum.

(1) True, Bulletin 73, U.S. Nat. Museum, 1910.

This skull was obtained from the Tasmanian Coast. This fact is of interest, for, although the species under review has on several occasions been recorded from New Zealand, [2] we are aware of no previous record from Australian seas. It is an unfortunate fact that the Tasmanian skull has been stored away for many years without any reference being made to it. In the latest work dealing with zoogeography [3] the following reference to this species occurs. In dealing with the mammals of the North Atlantic:—

> "Cuvier's beaked whale (*Ziphius cavirostris*), "although but seldom met with, appears to be "of world-wide distribution. It is distinguished "by the two conical teeth at the tip of the lower "jaw, as well as by the circumstance that only "the first three vertebræ of the neck are fused "together." [4]

And in dealing with the Indo-Pacific and its shores:—

> "Cuvier's beaked whale (*Ziphius cuvieri*) is also "probably an inhabitant of the Indo-Pacific." [5a]

There can be no doubt that the same species is intended, but it is unfortunate that the nomenclature should not agree, even in the same work, for this cetacean. The synonymy is sufficiently involved without such additions as these. Another point to be noticed is that the ankylosis of the first three cervical vertebræ mentioned by Lydekker is not a constant feature for this species. It probably varies with age.

Dr. S. F. Harmer has recently given an account [5b] of *Ziphius cavirostris* from the Irish Coast, and also stated his intention of publishing a further account, but we are not aware if this has yet appeared. In dealing with the distribution of *Ziphius* he states that the best available evidence "leads to the conclusion that *Ziphius cavirostris* is "a cosmopolitan species which inhabits the open oceans "of the world, and is occasionally stranded."

True has recorded [6] where more than three of the cervical vertebræ have been ankylosed. Except in such instances as *Hyperoodon*, where all the cervical vertebræ are ankylosed, the fusing of more or less of the cervicals does not appear to be a generic constant.

Considerable research has yet to be done in order to

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(2) For instance, see Trans. N.Z. Institute, Vol. 9.
(3) Lydekker, Wild Life of the World.
(4) Lydekker, Wild Life of the World, Vol. II., p. 246.
(5a) *Id.* Vol. III., p. 327.
(5b) Proc. Zoo. Soc. of London, 1915, p. 559.
(6) True, Bulletin 73, U.S. Nat. Mus., p. 38 (1910).

exactly establish the exact generic and specific characters of the ziphoid whales in general. It may be taken for granted, however, that representatives of such genera as *Ziphius*, *Hyperoodon*, *Mesoplodon*, and *Berardius* visit Tasmanian seas, but probably only at rare intervals. Owing to the rugged nature of our coasts and the failure to report stranded whales to the proper authorities, it is only on very rare occasions that specimens are obtained for scientific investigation.

HISTORY OF THE TASMANIAN MUSEUM SPECIMEN OF *ZIPHIUS CAVIROSTRIS*. (TAS. MUS. REG. NO. D 589.)

When the revision of the basement stores of the Museum took place (previously alluded to in Part I. of this series) this skull was brought to light. At a later stage the mandible also was found. Fortunately, the records relating to the specimens could be traced, and the following facts show the locality and date whence the skull was obtained.

The Museum records show that this skull (classified as *Epiodon chathamensis*) was presented by J. Boyd, Esq., in 1868. It was obtained at Port Arthur (on the South-East Coast of Tasmania). Apparently the specimen has been stored away for fifty years, and the knowledge of this species' occurrence in Australian seas withheld from the scientific world for a corresponding period.

OSTEOLOGY.

Skull.

Before attempting to discuss the osteology of this specimen, it is necessary to point out a homological error that the late Sir Julias Von Haast fell into, in his paper on *Epiodon Novæ-Zealandiæ* [(7)], which is a synonym of *Ziphius cavirostris*, as already pointed out. This published statement of Von Haast's has been copied by other authors, without question, and, therefore, it is necessary to correct it, the more so as he cited Prof. Owen as his authority, while Owen's writings do not substantiate, and,

(7a) Trans. N.Z. Institute, Vol. 9, p. 430.

(7b) In connection with the New Zealand specimen of *Ziphius cavirostris* in the Canterbury Museum, we desire to express our thanks to Mr. R. Speight, the Curator of that Institution. In order to assist us with the comparative osteology, Mr. Speight had several excellent photographs taken for our benefit. These were of material assistance to us, and we, therefore, have pleasure in placing on record our appreciation of Mr. Speight's action in this matter.

in fact, contradict it! Von Haast says:—"The pre-fron- " tals (of Owen) begin 6.50 inches from the anterior point of " the rostrum." This is the *vomer*, and was never called anything else by Prof. Owen. Owen's use of the words *pre-frontals*, as applied to whales, can only be understood by recalling the fact that he restricted the word *ethmoid* to the nasal sense capsules, and the term pre-frontals to the whole of the ethmoidal elements that remained. Now let us look for Owen's *pre-frontals* in the toothed whale. In his description of *Orca brevirostris* (cited by Gray) (8a), Owen says:—" The *vomer* extends to within 1½ inch of the " end of the pre-maxillaries, and behind these intervenes " upon the bony palate between the maxillaries, along a " strip of 2 inches and three lines across the broadest part. " This palatal part of the vomer is the lower convexity of " the canal formed by the spout-shaped bone; the hollow " of the canal is exposed at the upper interspace of the " pre-maxillaries. Here also is seen 2 inches *behind* the " fore end of the *vomer* the rough, thick anterior border " of the coalesced *pre-frontals*, which contracts as it passes " into their upper border, forming the septum of the nos- " trils, expanding below and behind to form the back " wall of the nasal passages."

It will be obvious that Owen here uses the terms *vomer* and *pre-frontals* for the bones named by Flower, *vomer* and *ethmoid*, and also that while the *vomer* extends forward almost to the tip of the beak, the *ethmoid* or *pre-frontals* are enclosed by the *vomer*, which latter is drawn backwards at the base of the skull to cover the spheno-sphenoidal suture. As touching the nasal cavity, the nasal moieties of the *vomer* extend nearly half-way to the vertex, and here coalesce with the *ethmoid* or *pre-frontals*, whichever we care to call them.

True, in his exhaustive monograph on the *Ziphiidæ*, missing this point, says (Bulletin 73, U.S. Nat. Mus., pp. 50 and 51):—" The proximal end of the *vomer* is anky- " losed with the anterior face of the nasals, and reaches up " to the nasal bosses, etc." This should have been the proximal ends of the pre-frontals, ankylose with the anterior face of the nasals.

As a second proof that Owen never confounded the vomer with the pre-frontals, he says at p. 425, of his Anatomy of the Vertebrates, Vol. 2:—" The pre-frontals in the *Beluga* are large, and ascend into view at the back part of the nostrils, where they coalesce with the frontals." This is the common condition in the order *Delphinidæ*,

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(8a) Gray, Brit. Mus., Cat. Seals and Whales, p. 285.

and as the pre-frontals at times (as we will deal with in a later paper) coalesce with the nasals, it is wise to call these bones—so marvellously reduced in size—*pre-fronto nasals*. In our skull of *Ziphius cavirostris* the pre-frontals do not reach the nasal bosses by an interval of 30 mm. in the medium line, a condition of things always found bridged in dolphins' skulls by cartilage (8b), until late in life, after which ossification takes place. A glance at the Tasmanian skull is enough to show that a cartilaginous bridge existed there also, but was lost by cleaning and bleaching.

This note of immaturity in our skull takes us naturally to another point, viz., the non-ossification of the ethmo-vomerine cartilage, which apparently is also dependent upon age factors, and not sexual ones. Culling a note from the human subject, we find that the ossific centre that gives rise to the ethmo-vomerine cartilage (as far as it is touched by ossification), the *crista galli*, and the cribriform plate does not complete its activities until half the period of adolescence has been passed. In whales, the sense of smell has atrophied, and the ossific powers of the centre named turns its activities upon the ethmo-vomerine cartilage—in the ziphoid whales—but apparently not till late in life. In most of the *Delphinidæ* the cartilage remains as such throughout life, but in very old dolphins it may manifest some ossification at its proximal end.

This question of the reduction of the senses in whales is one of the things that warrants considerable attention being paid to it, if we are to unravel the complexities that surround the group origins of the *Cetacea* as a whole. Briefly it may be said in passing that the retention of the nasal organs in whales cuts them off from dolphins, and that the *Ziphiidæ*, to some extent, are midway between them. To bring our specimen into line with the ten ziphoid skulls that True listed, and monographed, we will here quote the description of the specimen that comes nearest to our own, viz., his specimen No. 20971. This was the skull of a female whale that was captured at Barnegat, New Jersey, U.S.A. Of this True says:—"Adult female. "Majority of sutures open, but those on superior surface "of rostrum between maxillæ and pre-maxillæ partly anky-"losed. Vomer nearly all ankylosed to rostral portion of "pre-maxillæ. It presents a slight median elevation, but "there is *no mesirostral ossification*. Right pre-maxillæ "in front of nares flat and horizontal; left, nearly so, but "with a quite broad longitudinal groove. Opposite maxil-

(8b) We have evidence as to the origin of this cartilage, and shall in due course deal with the same.

"lary notches, pre-maxillæ nearly on a level with adjacent "parts. Orifice of anterior nares level with the lower "end of the nasal boss. End of rostrum quite acute and "broader than deep. Rudimentary alveolar groove dis- "tinct distally. Proximal end of vomer (*Sic!*) is anky- "losed with anterior face of nasals and reaching up to "nasal boss, which has a sharp median ridge completing "the nasal septum superiorly. Anterior face of nasal "boss slightly concave on each side of the median "line." (9) In our skull the alveolar groove can be traced throughout its length, but everything else is duplicated in True's description. Apparently this American animal was slightly older at the time it came ashore than our specimen was when captured in Tasmania, for the reason stated, when dealing with the cartilaginous bridge between the pre-frontals and the other elements at the vertex of the skull. In the matter of the ethmo-vomerine cartilage, both skulls yield similar evidence, and in a word True's data makes it absolutely manifest that the ossification of the rostral cartilage has been pushed to an extreme point, as a factor of taxonomy, since the real truth is that it may or may not ossify, and if it does, it is usually late in life in the female sex—but slightly earlier and more strongly in the male. There is a temptation to hazard the guess that the almost total reduction of the dental apparatus in ziphoid whales and the consequent diversion of nutriment and nerve energy to a more central line may have had something to do with the extra ossific energy that acted upon the ethmo-vomerine cartilage. At the tip of the beak, upon the right side, there is a foraminal groove, most likely vestigial, and obviously the remaining one of a pair, that at one time were functional. This groove ended about an inch from the functional foramen that passed facial nerves to the beak during the life of the individual under study. The alterations to the beak areas by the reduction of the tooth line and its alveoli have caused the nerves to traverse the beak superficially and the bony tissue is grooved to receive them. A very slight pressure upon the probe (10) that was passed into the vestigial canal caused it to carry through and appear in the fossa in front of the functional foramen. These canals are functional (and symmetrical) in dolphins' skulls, and apparently relate to the teeth. In the higher mammals the vomer and its incidental pressure upon part of the septal cartilage determines the amount that ossifies—extra pressure causing reduction and suspension of the ossific activ-

(9) True, Bull. 73, U.S. Nat. Mus., pp. 50-51.

(10) This probe was at the time it appeared externally 17½ inches through the bony tissue of the beak.

ity. The skulls of the ziphoid whales are loosely constructed, and the ethmo-vomerine cartilage would accordingly receive far less pressure than obtains among the *Delphinidæ*. This is merely a suggestion in passing, and is not regarded by us as being more than a tentative note.

Owing to mutilations in our skull, we are unable to compare the whole of True's cranial measurements with our specimen, but a considerable number are hereunder appended, and none of these involved any restorations. If, by the most careful deductions that can be made by comparative osteology, we restore the mutilated portions of our skull, we find them to fall into line with True's data in a most remarkable way, and even a casual glance at the table supplied will show the similarity of the two specimens.

Some of the mutilations referred to, as, for instance, the sawing off of the occipital condyles and part of the occiput, evidently pre-dated the gift of the skull to the Museum, but the loss of the pterygoids, ear bones, and all the teeth suggests unfair usage in the days when this and other whales' skulls were left to weather in the backyard, owing to want of proper storage space.

AMERICAN AND TASMANIAN SKULLS OF *ZIPHIUS CAVIROSTRIS.*

Name of the measurement made.	True's American specimen.		Tasmanian specimen in Hobart Museum.		Remarks.
	MM.	Inches.	MM.	Inches.	
Total length	945	$37\frac{3}{8}$	890	35	Our specimen is devoid of occipital condyles.
Length of the rostrum ...	550	$21\frac{3}{4}$	540	$21\frac{1}{4}$	Our measurement is from the pre-orbital foramen to tip of beak.
Breadth between centres of the orbits	476	$18\frac{3}{4}$	465	$18\frac{1}{4}$	
Breadth between zygomatic processes	503	$19\frac{3}{4}$	485	$19\frac{1}{8}$	
Breadth between temporal fossæ	302	$11\frac{7}{8}$	297	$11\frac{5}{8}$	
Breadth of rostrum at its base	307	$12\frac{1}{4}$	307	$12\frac{1}{4}$	
Rostrum in the middle (width)...	112	$4\frac{3}{8}$	102	4	
Width of pre-maxillæ at the same point ...	62	$2\frac{3}{8}$	54	$2\frac{1}{8}$	
Depth of rostrum at middle	77	3*	77	3*	*Approximately.
Breadth of the pre-maxillæ in front of nares...	176	$6\frac{7}{8}$	166	$6\frac{1}{2}$	
Greatest breadth of anterior nares	76	3*	70	$2\frac{3}{4}$	*Approximately.
Greatest length of temporal fossæ	143	$5\frac{5}{8}$	145	5 11-16	True gives the mandibular symphysis of another skull as 170 mm., and one at 176 mm., the latter being, upon the whole, the most reliable, as it was of the same species, but a male instead of a female.
Greatest depth of temporal fossæ	80	$3\frac{1}{8}$	80	$3\frac{1}{8}$	
Anterior end of orbit to the maxillary notch ...	82	3 3-16	82	3 3-16	
Length of the mandibular symphysis	No data		170	$6\frac{5}{8}$	

GENERAL NOTES.

The *Ziphiidæ* manifest a primitive character that has apparently less in common with the *Prozeuglodonts*, than it has with the hypothetical generalised, ungulate progenitor of Professor Flower. This is the presence of both a malar plate (as well as the jugal style common to dolphins) and a lachrymal bone, of extensive area. Nothing akin to this is found in the carnivora, but the like is common to existing ungulates, and in the genus BOS, the malar plate overlaps the lachrymal in a similar way to that obtaining in the cetacean skull. The lachrymal is always an important face bone in ungulates, being, where necessary, modified to meet the needs of the scent glands, but in the hippopotamus, which Flower regarded as the nearest living congener of the pro-ungulates, the lachrymal is a fairly solid plate-like bone, well up to the middle line of the face.

Our illustration of the skull is sufficiently good to supply all the ordinary data for a comparative study of *Ziphius*, with other whales, but it may be wise to add the following notes:—

1. The overhanging pre-fronto-nasal bosses, of *Ziphius*, cut it off from *Berardius*.
2. The shorter and stouter skull segregates it from *Mesoplodon*.
3. The males, according to True, have—in addition to the ossified rostral cartilage—wide narial basins, and teeth with roots 25 to 30 mm. across, as against 10 to 14 mm. for females.
4. Ziphoid whales have lower jaws longer than the upper, by anything up to 60 mm.—measured in position.
5. The pterygoids are extremely large and thin, but in our skull they are sadly mutilated.

NOTES TO STUDENTS.

(1) The origin of the Cetacea is not a solved problem, and, in spite of a vast amount of writing in this direction, even the group origin still awaits solution. Any information that can be culled from the crania of the existing whales (that relates to the pro-mammalian skull) should be useful data, and years ago Mr. Scott set out to prepare Dolphins' skulls by a long and roundabout process, having for its object the preservation of cartilaginous and imperfectly ossified vestiges, that are not commonly pre-

served in Cetacean skulls as prepared for museum specimens. In dealing with the Tasmanian Dolphins such data as we have collected will be passed in review.

(2) In times past the Ziphoid whales must have visited the shores of Tasmania, much as they do to-day, and it is of interest to note that, in this connection, the miocene strata of Table Cape has yielded an arm bone and some mutilated vertebræ of one of these whales. Although obviously nearer to *Ziphius* than to the genus *Mesoplodon*, it does not fit in with either genus, and it may be possible to extract more material from this specimen than that already published in the proceedings of the Royal Society of Tasmania in 1913. For the present, it is of interest to note that these ancient whales have a place upon our Tasmanian lists that relate to the Natural History of the past.

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NOTES ON THE GEOLOGY OF MARIA ISLAND.

By W. H. Clemes, B.A., B.Sc.

Plates XI., XII.

(Received 2nd June, 1919. Read 14th July, 1919.)

These notes are intended as an incentive to future study rather than as a complete record of the geology of this interesting locality. They are the result of several holidays spent on the island, and particularly of two yachting trips undertaken recently. In many places the record is meagre, as I was unable to land and examine the rock formations in detail, but had to rely on observations made while sailing along, often in somewhat troubled waters. Still the description is complete enough to be of value, especially as no previous record has been made, with the excepton of the late R. M. Johnston's description of the Fossil Cliffs in his Geology of Tasmania. There is brief mention of a paper read by him before the Royal Society on Riédlé Bay, but unfortunately it was not printed and his valuable observations have been lost.

Maria Island is situated on the East Coast, almost opposite to Spring Bay and Orford. The passage between it and the mainland varies in width from three to eight miles. In the narrowest part, off Long Point, is Lachlan Island, a small diabase rock covered with sparse vegetation. This passage is the result of excessive wave-erosion acting on the sandstones and diabase which are now found fringing either shore. There is little doubt that the Orford sandstones were once continuous with the sandstones at the Crayfish Rock, a little to the south of the Settlement, and those on the flank of Mt. Maria. The passage itself is extremely shallow with a moderately flat floor, the average depth being about six fathoms. A shoal stretches across from the Sandspits to beyond Lachlan Island, the water on which is in places only one fathom in depth. The sediment here deposited was largely brought down by the Sandspits River, which has, at the same time, built up a large alluvial flat and ti-tree swamp covering many acres. The ti-tree is growing on soft oozy mud, which quivers and shakes as one passes over, and it is quite easy to shake a considerable area and make the trees bob and curtsy in a rather alarming fashion. There is a fine beach here ending in a long sandy hook. In northerly and southerly weather an ugly sea gets up quickly owing to the shallowness of the water.

Maria Island is one of those curious "tied-islands" to be found in Tasmania. The reason for their formation has not yet been determined, though it is usual to ascribe it to the sinking of the land, and, though not sufficient data has been collected to dogmatise on the matter, there is no reason to suppose that there have been any other forces in operation. It is interesting to note that at the present time the shore is sinking both in Shoal Bay and also at Orford, on the opposite side of the passage. The same thing is taking place near the mouth of the Huon at Garden Island Creek, and at Kelly's Basin, Port Davey. The isthmus is narrow, low-lying, and sandy, and scarcely raised above sea-level. Shoal Bay is very shallow, though there is a deep channel off its south-western extremity. At the head of the bay is a beach, the sand of which is largely composed of shell-fragments. Riédlé Bay is much deeper, and well scoured by the south-easterly gales. Its beach is composed almost entirely of quartz grains from the granites that fringe its shores. The most prominent feature of the North Island is the great central mass of Mt. Maria and the Bishop and the Clerk, the highest point of which is about 3,000 feet high, and from which the land slopes, in parts precipitously, in parts gently, down to the sea. High hills also cover the South Island, which is smaller and not so elevated. The coast line is most irregular with high cliffs on the north, south, and east, and low-lying rocks to the west, interspersed with fine white beaches.

The densest vegetation is to be found on the slopes of Mt. Maria, especially on the east where it intercepts the breezes from the sea. Here the Oyster Bay pine is a prominent feature. The rest of the island is well-wooded with eucalypts and she-oaks, though thinning out on the poorer soils of the granite areas.

The geology of the east is quite distinct from that of the west. The rocks on the western half of the island are almost entirely made up of Mesozoic sandstone and diabase of the usual type, while on the east Permo-Carboniferous mudstones and conglomerates are interspersed with Devonian granites and older quartzites. The south-western end of the island, Cape Péron, ends in a magnificent pillar and archway of diabase, from which it runs back to a pyramidal peak above. The diabase continues in a north-easterly direction as a steeply-sloping and precipitous hill-side for about a mile where it junctions with the granite of Barren Head. This forms bold headlands and rocky islands round the coast to Riédlé Bay and Cape Maurouard. It is generally massive in formation, but varies in places and becomes highly jointed and, in consequence, much hollowed by the waves, Sea Elephant or Crayfish Bay being a notable example. As far as I could judge the granite was of the usual type, though somewhat coarser grained, in which orthoclase felspar predominated, giving it a distinct reddish tinge.

Riédlé Bay is of surpassing interest to the geologist as well as to the artist and the lover of beauty in Nature. The granites of Cape Maurouard are succeeded by Permo-Carboniferous marine mudstones. These first appear as a narrow band lying horizontally on the low coastal cliff of granite but rise later to a cliff, beautifully laminated, fully 100 feet in height, extending for about a mile along the shore and resting on a shelf of granite. Later the mudstones disappear, the granite rises up to a cliff about 40 feet in height, on which is resting a narrow layer of coarse pebbly conglomerate, of which mention will be made later on. Then the granites give place to earlier quartzites, which have been tilted up on edge and otherwise deformed by the intruding granite. The highly crystalline nature of this rock testifies to the intensity of the metamorphosing action. With the limited time at my disposal I was unable to collect sufficient material to determine the age of these rocks, and can only say that they are earlier than the granite. The rocks in the same meridional line to the north are given in the Geological Map of Tasmania as Silurian, and there is no reason to suppose that these are of an earlier horizon than that. They form the outer edge of a well-sheltered corner, whose beach continues over the isthmus to the northern side of the bay. Here it is met by an immense heaped-up pile of boulders, mostly of diabase, an eloquent tribute to the force of the southerly gales. The diabase is again succeeded by a very coarse-grained granite, on the top of whose wave-worn surface are stranded great diabase boulders, which at first sight appear to have been hurled there by the force of the waves, but later examination leads one to suppose that they are either a talus from the high diabase cap of Mt. Maria behind, or perhaps a small sill or dyke sent from the same source. As we approach Boat Harbour there appears to be another occurrence of the quartzites which were found on the opposite side of the bay. Here they are resting on the granites but tilting steeply southwards. These are succeeded by the gritty basal beds of the Permo-Carboniferous series with its embedded ice-borne detritus. Above there is a magnificent cliff of conglomerate about 40 feet high consisting of pebbles and boulders set in a matrix of calcareous and felspathic sandstone, which has decomposed by the action of percolating water and formed numerous stalactitic growths descending from the overhanging projections. The pebbles are mostly quartzose, ranging in size from the tiniest particles up to large boulders, interspersed with boulders of granite and pieces of slate, schist, and quartzite of the older formations. It is resting in a kind of pocket scooped out in the granite, and is no doubt contemporaneous and homogeneous with the conglomerates across the bay. A dyke of diabase comes right through the middle and a sill of the same material is resting on the top. The granite of Boat Harbour is a very coarse-grained tourmaline granite of handsome appearance. The felspar crystals which predominate are often two to three inches long, and the crystals of the other constituents are correspondingly large. This granite should make a valuable commercial product quite equal to any of the imported article. It is very striking in appearance and should take a splendid polish. It is by far the finest granite I have seen on the East Coast. It extends round Cape des Tombeaux and passes under the Permo-Carboniferous basal beds which appear in the next little bight, and which are themselves capped by Cretaceous diabase which forms an overlying spur from Mt. Maria. Between the next point and Cape Mistaken, usually known as Ragged Head, the granite has suffered a certain amount of deformation, but whether during consolidation or subsequently is hard to determine. The jointing is most irregular and in places highly contorted. Around Cape Mistaken, a bold granite headland, we come in sight of a magnificent panorama. The great mountain-mass of the Bishop and the Clerk here approaches the sea, and slopes precipitously from its summit down to the water's edge. It consists of Permo-Carboniferous limestones and marine mudstones, resting on a bed of granite, and capped by Cretaceous diabase exhibiting columnar structure in the cliffs along its summit, forming the cockscomb-like Bishop and Clerk.

Right under the eastern end of the latter mountain the granite gives way to a series of rocks which Dr. Clarke informs me are quartzites. These will probably then be of the same horizon as those of Riédlé Bay. They have been highly contorted by the intruding granite; anticlines and synclines are frequent and the plications are most intricate. Where not folded the strata are all standing on edge. Great blocks are also to be seen embedded in the granite, showing conclusively that they belong to an earlier age, but to what age is a matter for future investigation. Permo-Carboniferous limestones are resting unconformably above them, and, on the far side, come down below sea-level, the granites having finally disappeared. They continue round the corner of Cockscomb Head and form a huge semi-circle of cliffs extending almost to Cape Boullanger and the Ile du Nord, which are of diabase. These cliffs are the finest example of the Lower Marine beds that we have in Tasmania. They are regular and almost horizontal, though one or two examples of lenticular deposition are apparent. There are no striking examples of faulting or deformation such as appear at Eaglehawk Neck and other localities. The cliffs slope down gradually to the west from a height of about 1,000 feet, with flat ledges underneath almost buried in a huge talus of fallen blocks, some of which weigh many tons. These rocks and the cliffs around them are studded with fossils, brought into relief by weathering, and are simply one solid compact mass of shell-remains, among which the Eurydesmas with their thick globose forms predominate. "Blocks of 40 and 50 tons weight seem to be simply made up of a compacted conglomerate of this genus" (R. M. Johnston). The basal beds are the usual gritty mudstones more highly studded than usual with ice-borne detritus; some of the granite blocks embedded in the mud of this old sea-floor must weigh many tons. Their angular nature shows that they have been transported by ice-action, as that is the only agency which could have carried them for such a distance and preserved their shape intact. The way in which the surrounding mud has been pressed up around their edges also proves that they have been dropped from melting floes and sunk to their present resting place.

Three zones are represented:—

1. Eurydesma Zone.
2. Fenestella Zone.
3. Crinoidal Zone.

The first two zones have been well described by the late R. M. Johnston in his Geology of Tasmania and so I need not elaborate on them here.

The principal families represented in the first zone are *Spirifers*, *Pachydomus*, *Eurydesma*, *Notomya*, *Aviculopecten*, *Stenopora*, and *Favosites*. In the second the *Fenestellas* and *Protoretepora* are interspersed with *Spirifers*, *Productus*, *Strophalosia*, etc. The Crinoidal Zone is composed almost entirely of a compacted mass of

Crinoid remains. No traces of the flower-like head have been found but fossils of the main stem and branching arms are very frequent. It would appear as if these remains had collected on some outlying reef where the waves had broken them up into fragments and destroyed the softer parts. It makes a splendid crystalline limestone, exceeding hard to quarry out, which was at one time worked for lime, but the collapse of the kilns led to its abandonment. The limestones seem to persist along the western base of the mountain, and resting on them is a band of Mesozoic sandstones, and above those the diabase cap so frequently found in Central and South-Eastern Tasmania. Frequently between the limestone and sandstone is a band of Permo-Carboniferous gritstone.

The only other feature of interest is a curious reddish coloured stone appearing under the diabase near the jetty at Shoal Bay, and at Bloodstone Point on the other side of Long Point. It has the appearance of a highly decomposed granite. If so, it is the most westerly exposure on Maria Island.

THE EARLY HISTORY OF MARIA ISLAND, EAST COAST, TASMANIA.

By Clive E. Lord.

(Curator of the Tasmanian Museum).

Plate XIII.

(Received 2nd June, 1919. Read 14th July, 1919.)

Historically speaking, the discovery of Tasmania is of recent date, but even so, we lack many details of the early expeditions, and there were probably many early navigators of Australian seas of whom we know nothing. Even in modern days, navigation is not exempt from danger, although all the main routes have been carefully charted, and the advent of steam power has revolutionised the art of seamanship. The early explorers, however, sailed their small vessels along unknown coasts, and amidst uncharted reefs. How many perished we know not, but even of those expeditions that returned a large percentage of their company were lost by the way. Scurvy was responsible for a tremendous death roll, in addition to the other dangers of the voyage. It must also be remembered that the discoveries of many of the early explorers were not made known to the world for many years. Each expedition was working for its own country or company, and in some cases the results of the voyages were carefully guarded for the sake of self interest from a national standpoint. It was not for many years after his death that Tasman's work as an explorer became known, and the details of his stay at Tasmania, and incidentally the discovery of Maria Island, were given to the world.

The exploring ships coming from the west—the more settled portions of the old world—nearly all followed on Tasman's tracks. Making their landfall on the rugged coasts of the south-western portion of Tasmania, or, as it was known of old, as the southern portion of Terra Australis, and then sailing east until they reached the quieter waters of our east coast. Maria Island will always be connected with the early era of discovery, and the more one visits this locality, the greater the desire becomes to gain some knowledge of its early history. This was so in my own case, and what information I have gathered has been incorporated in the present paper in order that others who are interested may have the information available should they desire to take advantage of it.

As far as European navigators are concerned, Maria Island was first sighted on the evening of December 1st, 1642, when Abel Janszoon Tasman sailed up the East Coast and anchored near Green Island, to the south of Marion Bay. This anchorage was about fifteen miles to the southward of Maria Island, which Tasman named. The intrepid Dutch explorer left this anchorage on December 4th, and his chart shows that he sailed up the coast on the ocean side of the island, which he charted as "Maria's Eylandt." .(1)

For more than one hundred years the aboriginals were undisturbed by visitors from overseas. On March 5th, 1772, however, the ill-fated Marion du Fresne, following on Tasman's charts, anchored his vessels in almost the same locality as where the *Heemskirk* and *Zeehan* had been a century previously. Marion remained for five or six days, during which time there occurred an unfortunate encounter with the natives, in which several of the aboriginals were wounded, and at least one killed. Crozet's narrative of the voyage (2) does not give details of their stay, but it is probable that boats from the ships visited the island. (3)

The third European and the first British navigator to sight Maria Island was Furneaux, but he was in error as regards the position of the island, and probably mistook the Maria Island of Tasman for part of "The Schoutens." Captain Cook, in the *Resolution*, and Captain Furneaux, in the *Adventure*, became separated in a storm on the 7th of February, 1773. This was Cook's second voyage to the South Seas, and he sailed to New Zealand, while Furneaux called in at Adventure Bay before rejoining his captain. On the 9th of March, Furneaux sighted Tasmania, or, as it was then called, the south coast of New Holland. He mistook the points, and took the entrance to the present D'Entrecasteaux Channel to be Storm Bay. When he first anchored on the 10th of March, he thought he was near the Frederick Henry Bay of Tasman, and it is this error which led to such subsequent confusion. Furneaux called the bay Adventure Bay, after his ship, and considered Tasman's Frederick Henry Bay to be a few miles north. The present Tasman's Peninsula was called by Furneaux

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(1) Tasman, Abel Janszoon.—Journal of a Voyage in 1642 Amsterdam 1898.

Maria Island was named after the wife of Anthony Van Diemen, the Governor of Batavia, and not after his daughter, as is often stated.

(2) Crozet's Voyage to Tasmania, New Zealand, etc., 1771-72 Trans. by Ling Roth. Lond. 1891.

(3) See Copies of Marion's Charts. P. and P. Roy. Soc. Tas. 1889.

the Maria Island of Tasman. His description of the anchorage in Adventure Bay is as follows:—

"At seven o'clock in the evening we anchored in "seven fathoms of water, with the small bower, and "moored with the coasting anchor to the westward, "the North point of the Bay N.N.E. $\frac{1}{2}$ E. (which we "take to be Tasman's Head), and the Easternmost "point (which we named Penguin Island, from a "curious one caught there (4)) N.E. by E. $\frac{3}{4}$ E.; the "watering place W. $\frac{1}{2}$ N.; about one mile from shore "on each side; Maria's Island, which is about five or "six leagues off, shut in with both points; so that you "are quite landlocked in a most spacious harbour." (5).

Furneaux stayed five days in Adventure Bay, and having completed taking in wood, water, and grass, he set sail. He records passing "Maria's Islands" on the 16th, and the Schoutens Islands on the 17th, and after proceeding further north he stood away to New Zealand. (6) Furneaux's mistakes led to considerable confusion, and even at the present time the result of his investigations may be seen in the misleading nomenclature, which is still in general use.

Captain Cook, during his third voyage in 1777, anchored in Adventure Bay in January of that year. He failed to notice Furneaux's error, as he records bearings from his anchorage in Adventure Bay to the points of "Maria's Island."

The first detailed examination of the island was made by Captain John Henry Cox, during a voyage in the brig *Mercury*, in 1789 (7). On the 3rd of July he sighted the coast of Tasmania, and at one p.m. was abeam of S.W. Cape (8). At six in the evening the brig was brought to anchor in a deep bay (9), the Mewstone bearing S. by E. A little water was obtained, and signs of the natives were seen. A heavy sea set into the bay on the morning of 5th July, and some difficulty was experienced in weighing the anchor, owing to an accident to the winch, which injured several of the crew. The

(4) "Probably the first record of *Eudytales chrysocome* (Crested "Penguin)."

(5) Cook's Voyages

(6a) Cook's Voyages.

(6b) Forster, in describing Furneaux's anchorage in Adventure Bay, states:—"Several islands in the offing to the N.E. along shore were of moderate height, and likewise covered with wood. Tasman probably took them for one great island, which in his charts bears the name Maria's Island." A Voyage round the World. Dublin. 1777.

(7) Cox's voyage was undertaken for motives of discovery, but an examination of the fur trade of the N.W. Coast of America was its ultimate object. The *Mercury* was a copper bottomed vessel of 152 tons, designed and built by Stalkaart especially for the voyage.

(8) In 1773 Furneaux had mistaken S.W. Cape for Tasman's South Cape.

(9) Now known as "Cox's Bight."

cable was eventually cut, and the anchor left behind. At nine the next night the boat was off Tasman's Head, and on the night of the 7th they worked to windward, and imagined they were working into Adventure Bay, where it was proposed to secure wood, and complete taking in water. When day dawned, however, they found that they were farther north than they imagined, and "were among the Maria Islands." At 8 a.m. Cox set out in one of the small boats, and examined the shore to the South West in search of fresh water, but he did not meet with any more success than Marion had. Later he examined Maria Island, and landed in a deep bay, with a fine sandy beach. Cox named this Oyster Bay. He found a small stream of water, and plenty of good wood in the south east corner of the bay, which is situated between the North and South portions of the island, a low sandy neck being the only connecting link at this place. The brig was signalled to, and came to anchor in the bay at 3 p.m. on the 8th of July, 1789. The crew were immediately sent on shore to procure wood and water. They found traces of human inhabitants, as the trees were hollowed out by fire, and great quantities of shells heaped about them. They also noticed roughly constructed huts of bark.

On the 9th smoke was seen on the opposite side of the bay, and an attempt was made to interview the natives. The third mate approached them, alone and unarmed, and although he made every sign of friendship his fancy could suggest, they only mimicked his actions exactly, and laughed heartily, but would not stay. As fast as he advanced they withdrew, and were soon lost in the bush. On the morning of July 10th, the natives were again seen, several standing about a fire, while others were walking in the bush with spears and lighted pieces of wood in their hands. They allowed the seamen to approach, but seemed very timid, although they accepted gifts of biscuits, penknives, etc. This party consisted of 14 or 15 men or women, who were all entirely naked "except one "man, who had a necklace of small shells, and some of the "women, who had a kind of cloak or bag thrown over "their shoulders." Several were observed to be scarred, and their bodies daubed with reddish earth (10). Mortimer sums the natives up thus:—"Upon the whole they seemed "to us to be a timorous, harmless race of people, and "afford a fine picture of human nature in its most "rude and uncultivated state."

(10) There is a large outcrop of reddish earth at Bloodstone Point to the north of Long Pt., to the N.W. of Oyster Bay, which might have served the natives of this locality for the usual red ochre with which the aboriginals were so fond of decorating themselves.

Later in the day several of the officers went ashore, and although they found a recently deserted "camp," they did not succeed in interviewing the natives. A number of parrots were noticed, a variety of small birds, and numerous sea fowl—"particularly a large white bird, "sometimes bigger than a swan, with black tips to its "wings, and an enormous sized beak" (11). Most of the birds were very shy, from which fact it was presumed that the natives regularly hunted them.

Although it was the depth of winter (July), the weather was mild and pleasant, the thermometer keeping 51deg.-56deg. during the period the brig was in the bay.

On the 10th, having secured a sufficient stock of wood and water, and being ready for sea, "all hands "were sent on shore to wash their linen and amuse them-"selves as they thought proper." On the 11th the brig sailed, with a light breeze from the N.N.W., "out of "Oyster Bay bv a passage to the southward, opposite to "that by which we came in." (12) (13)

In 1792 Admiral Bruny D'Entrecasteaux, in command of the *Recherche* and *Esperance*, anchored in the channel which he then discovered, and which now bears his name. He returned again in the following year, and while anchored near the centre of the Channel, on February 16th he sent Beaupré, the "engineer geographer," to explore the estuary of the present River Derwent, and also the shore to the Eastward. He was particularly instructed to discover "whether the island of Maria was "really separated from the land of New Holland; for "this had not been sufficiently resolved by Marion, or "even by Captain Cook." On the return of the boats, Beaupré stated that he had seen the channel which separates the island of Maria from the mainland. His charts clearly show the track of the boats and his "Chan-"nel" would be the low lying land connecting Forestier's Peninsula, for it must be remembered that Furneaux's error was now bearing fruit, and that the Peninsula was being mistaken for the Maria Island of Tasman. (14)

When Sir John Hayes visited Tasmania in 1793, in the *Duke of Clarence* and the *Duchess*, he did not explore the East Coast, his main surveys being in the Channel and

(11) Pelican.

(12) From an examination of the chart and the wording of this passage it would appear that the *Mercury* sailed up the eastern coast of the island and entered the strait between the island and the mainland at its northern end.

(13) Mortimer, Lieut. G.—Voyage in Brig *Mercury*, commanded by John Henry Cox.

(14) Labillardiere.—Voyage in search of La Perouse.

the Derwent. He probably only saw Maria Island at the time of his departure for New Guinea. (15) (16).

Bass and Flinders, in the *Norfolk*, (17) during the historic voyage in which they conclusively proved the existence of Bass Straits, were the next to sight the island. After leaving Storm Bay on January 3rd, 1799, they opened up Cape Raoul and Cape Pillar. Flinders states that "These two high columnar Capes are the extreme "points of the land which Captain Furneaux took to be "Maria's Island." (18)

After rounding Tasman's Island, the true Maria Island was sighted at 5 p.m., and they hauled in close to the shore, but the squally wind drove them off. The next morning the island appeared as if divided in two. (19) At ten o'clock the wind veered round, and they tacked towards the island, but as the day wore on the wind increased, and as it was impossible to get near Maria Island before dark, they bore away to the northward.

The next explorer to visit Tasmania was the French Admiral, Baudin, in command of the *Geographe* and *Naturaliste*. After investigating the Channel, they sent out a boat expedition towards the East, in order to discover if they could sail the ships through the strait between Furneaux's "Maria Island" and the mainland. M. Faure, the "engineer geographer" of the expedition, spent eleven days exploring and charting the coasts. He noted the misplacement of Frederick Henry Bay, and that the "Maria Island" of Furneaux, or the "Isle d'Able Tasman" of D'Entrecasteaux was a peninsula.

On the 17th of February the ships sailed out of the Channel, and about five in the evening of the 18th, anchored in the strait between the mainland and Maria Island.

At daybreak next morning the long boat was sent with orders to circumnavigate Maria Island, to make a chart of its coast, and to ascertain if there was any fresh

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(15) Lee.—Commodore Sir John Hayes.

(16) The following passage *re* Risdon from Mrs. Lee's book is worth repeating:—"It has often been stated in print that the name "originated in Restdown as being the place where the first British "settlers under Lieutenant Bowen, R.N., rested after their stormy "voyage in 1803, a legend which has come to be regarded as the "truth. Risdon, however, was the second officer of the *Duke of Clar-* "*ence.*"

(17) The *Norfolk* was a small boat of 25 tons, built at Norfolk Island in 1798. She was built and equipped by the settlers in order to provide communication with Sydney. When the boat arrived at Port Jackson, however, Governor Hunter commandeered her for use by Bass and Flinders. In 1808 the majority of the Norfolk islanders were removed to Tasmania, hence the names New Norfolk, Norfolk Plains, etc.

(18) Flinders.—Voyage Terra Australis. Intro. p. cxc.

(19) A very low and narrow sandy neck connects the northern and southern portions of the island.

water. The boat, which was under the command of M. Maurouard, included in its complement, M. Boullanger, geographic engineer, and M. Péron, the naturalist and historian. Skirting along the southern coast, the extremity was named Cape Péron, and the granite outcrop ahead of this the Pyramid. Progressing up the east coast, they charted the point at the southern end of the large bay Cape Maurouard, after the cadet in charge of the boat, who also assisted M. Boullanger in his geographic studies. The bay itself was named Riédlé, in honour of a naturalist of the expedition, who had died at Timor.

The explorers landed at Riédlé Bay about two o'clock, and it was here that Péron found the famous example of the aboriginal tomb. This was a structure of bark, covering the remains of an aboriginal whose body had been cremated.

On the 20th the boat continued its journey, passing the Cape Mistaken of Cox, and rounding the northern cape, which was named Boullanger, after the hydrographer of the expedition. The small island off the north extremity of Maria Island they named Islet du Nord. Along this part of the coast the growth of kelp greatly astonished the explorers, and considerably hampered their progress. On the western side the explorers gave the name Point Leseur [20] to the point at the head of Oyster Bay, and Middle Island [21] to the island half way between this point and the mainland.

As it was growing dark, the explorers proceeded to land, but at the sight of about thirty aboriginals, they proceeded further into the bay, and landed without being approached. The next day they surveyed Oyster Bay, and were just leaving when the sound of guns from the ship announced the fact that M. Maugé, the surgeon, was dead. [22] The boat returned to the ships on the evening of the 21st.

During the following days parties from the ship visited the island, and several interviews with the natives were held. Péron does not seem to have been impressed with the Maria Island tribe. During the time that the exploration of the island was in progress, several other

(20) Now Long Point.

(21) Now McLaughlan's or Lachlan Island.

(22) "The last of my colleagues, M. Maugé, was certainly no more, "and his remains had at that moment been committed to the earth. "He died the day after we left the ship, universally regretted by all "on board both vessels. . . . His body was interred on Isle "Maria at the foot of a large *Eucalyptus*, against which a plate of lead "was fixed, whereon was inscribed the sad particulars of his death, "and the name of Point Maugé was given to the part of the island "where the remains of our unfortunate companion are deposited." Péron.

parties had been sent out surveying. The first, under the command of M. Freycinet, Senior, surveyed the coast south of Cape Bernier, which they named. This expedition was absent eight days, and they showed that Frederick Henry Bay was actually situated as shown by Tasman, and that Marion Bay was only a long open bay on the ocean side of the true Frederick Henry Bay, (23) the two bays being separated by a long sandy isthmus, the only connection by water being a narrow opening at the south corner. They found that there was no appearance of the Channel shown on the charts of D'Entrecasteaux. Flinders' charts were more correct in showing Tasman's Peninsula, but his location of Frederick Henry Bay was incorrect. The northern peninsula was named Forestier's Peninsula.

The second boat expedition, under the command of M. Freycinet, Junior, was absent three days, and explored the East Coast, from Cape Bernier to Fleurieu Bay. This bay was so named (24) by the third expedition, which explorod the Schoutens. They found that instead of the five or six islands which had previously been shown on the chart, there was only one, and that what had previously been taken for islands were the high hills of the peninsula, which are separated in several cases by low, sandy necks of land. The peninsula was called Freycinet's Peninsula.

The French devoted some time to the study of the natural history of Maria Island. They particularly remark upon the immense beds of kelp fringing the shores, the great shoals of dolphins and whales, and the "innumerable legions" of seals.

Baudin sailed from his anchorage on the 27th of February. Owing to the unfavourable weather, their progress up the coast was slow, and the ships became separated from one of the ship's boats, which had been sent out exploring near Thouin, or Wineglass Bay. (25)

On the 10th of March when bearing towards the straits a small ship was sighted which was on the way to Maria Island to catch seals. This vessel may well be regarded as one of the first of the moderns. The old era of exploration

(23) Unfortunately the true Fredrik Henry Bay of Tasman is now known as Blackman's Bay.

(24) "In honour of the illustrious scholar to whom France and "her navy are so much indebted for so many valuable and honourable "works." Péron.

(25) This boat later met the British vessel, *Harrington*, Captain Campbell, who supplied them with provisions. They fell in with the *Naturaliste* in Bass Straits, and later rejoined the *Geographe* in Sydney.

The *Geographe* also met an English Brig on the 8th March. She was named the *Endeavour*, having been built at Port Jackson. Her hull was "of the wood of the *Casuarina* and her masts of the *Eucalyp-"tus*."

from a geographical standpoint was past and Commerce was following quickly upon the heels of Discovery. From now onward the island was continually visited by sealing and other vessels, both from the mainland and from the settlement at the Derwent. (26)

In the early years of the colony's history Maria Island was mainly used by those engaged in the whaling and sealing industry, and several localities are now pointed out which in the early days were the resort of "bay whalers."

In 1825, however, a new era began. The Government considered that the island would make an excellent convict station, as not only was it a "natural penitentiary" but appeared to be a suitable locality in which to grow flax. Particular attention was being paid to the cultivation of that plant at this time. Accordingly on the 4th of March, 1825, the first vessel sailed from Hobart with a draft of prisoners. The first Commandant was Lieutenant Peter Murdoch of the 35th Regiment, and he held office until the 26th of August, when he was succeeded by T. D. Lord, who had charge of the station for some years following. Among the early officers at the settlement may be mentioned Assistant-Surgeon J. Griffith, Storekeeper T. J. Lempriere, and Principal Overseer R. Dodsworth. The guard was composed of men of the 40th Regiment. The island, however, did not come up to expectations as far as being a natural penitentiary was concerned, for there were numerous escapes. In one instance six men vacated the island by means of a rough raft of bark, etc.

The settlement, which had been named Darlington (27) was, however, extended, and several out stations were created. In 1830 a woollen factory was erected for the manufacture of rough cloth. Two years later the cloth was one of the main productions of the station, which, it was considered, was about self-supporting. The cloth production was valued at 8s. per yard, and as on an average 100 yards were woven weekly the value, per annum, was about £2,000. In addition 4,000 pairs of shoes were made each year, which at 5s. per pair added another thousand pounds to the revenue. However, the authorities did not seem satisfied with the station, and soon after the foundation of Port Arthur (28) the settlement at Maria Island was vacated. (29)

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(26) First settlement at the Derwent—September 7th, 1803.

(27) Mr. H. Wright, Librarian of the Mitchell Library, Sydney, to whom I am indebted for certain information in this paper, considers that Darlington was probably named after Governor Darling.

(28) The Port Arthur Settlement was founded in 1831.

(29) Maria Island was vacated as a penal establishment, for the first time, in 1832.

In 1841 Lord Stanley's Probation System came into force and the station was again occupied under the new scheme for dealing with the convict population. The sttlement was extended, and in 1845 there were about six hundred prisoners on the island, these being divided into four classes. The main buildings at Darlington, in which the convicts were housed, consisted of six large rooms containing 66 men each, 20 huts of various sizes, capable of holding from 3 to 24 men each and about 100 separate apartments (30). The position at the settlement at this time does not appear to have been at all satisfactory. (31)

Among the people exiled to the isle were several of the Maori chiefs who had been concerned in the New Zealand rebellion. At a later date some were allowed to return to their native land, but one at least died on the island, for in the neglected cemetery of the old station may be seen a stone stating that—

Here lie the remains of

HOHEPA TE UMUROA

a native of Wanganui, New Zealand,

who died July 9th, 1847.

There are several other interesting epitaphs in this old graveyard, which is situated on the north-western point of the island. The spot is unfortunately much neglected and many of the graves are overgrown with boobialla. At the present rate of progress it will not be many years before all trace is lost, except perhaps for a few of the larger tombstones, of the records of those who died and were buried at the settlement of Darlington in the early days of its history.

On October 29th, 1849, the brig *Swift*, 360 tons, 6 guns, commanded by Captain Aldham, arrived at Hobart from London. She had on board several of the Irish State prisoners. Among the number was Smith O'Brien, and as he refused to accept a ticket-of-leave, Governor Denison, who had visited Darlington in January (32), decided to send him to Maria Island. Here O'Brien apparently tried every means of making a martyr of himself, and his friends devised a plan for his escape. A priest communicated the details to O'Brien (33), and he was ready when the schooner *Victoria* anchored off the coast and sent a boat ashore. Before O'Brien could reach the boat, however, a constable appeared and arrested the boat's crew at the point of his

(30) Boyd to Hampton, 31st Dec., 1845.
(31) Syme.—Nine Years in V.D.L., p. 270.
(32) Denison.—Varieties of Vice-Regal Life, p. 104.
(33) Denison.—Varieties of Vice-Regal Life, p. 144.

musket. O'Brien was so furious at the failure of the plan that he refused to walk back to the station, and had to be carried there by the men who had come to rescue him [34]. After this O'Brien [35] was transferred to Port Arthur, and eventually he accepted a ticket-of-leave.

Transportation was soon to cease, however, and Darlington was finally vacated as a convict station in 1850.

There is an amusing account [36] of how the H.M.S. *Havannah*, unaware that the settlement had been vacated, put in there at Christmas time, 1850, and awaited a welcome due to such a Queen's ship. However, "the tall flag-"staff was buntingless, the windmill sailless, the pretty cot-"tages and gardens seemed tenantless, not a drum was "heard in the military barracks, and the huge convict "buildings seemed minus convicts. At length, through a "telescope, was observed one canary coloured biped, in the "grey and yellow livery of the doubly and trebly convicted "felon. . . . Presently a whaleboat came slowly off and "there appeared on the quarter-deck a hawk-eyed and "nosed personage about six feet and a half high, who seem-"ed as if he had long lived in indifferent society, for his "eyes had a habit of sweeping round his person as though "he was in momentary danger of assault. This was an "overseer left in charge of the abandoned station with a "few prisoners to assist him."

This now brings us to the end of the early period of the island's interesting history and the one with which we will conclude. We have seen how the early romantic era of geographical exploration gave place to commerce as represented by the sealers and "bay whalers." And how when these men had exterminated their stock in trade the island became a home for the reformers of society—and their patients. During the century the island was to witness yet another commercial era due to the activities of Signor Bernacchi's Maria Island Company, but this is beyond the scope of our present investigations. Maria Island will always be of interest, not only from a scientific standpoint owing to its peculiar geological formation, but from the more general fact of its charming scenery and ideal climate. Closely interwoven with the other attractions of the island are the interesting facts relating to its early his-

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(34) Denison.—Varieties of Vice-Regal Life, p 145.

(35) Some said O'Brien was betrayed. However, the *Victoria* was captured by a boat from the settlement, and the master Ellis was tried at Hobart, and his share of the vessel forfeited. In spite of this he managed to get away with the vessel. Later, some of the Irish prisoners who had reached America met Ellis at San Francisco, and an immediate Lynch law trial took place. The "jury," however, acquitted Ellis on the charge of betraying the plan of escape. Fenton, History of Tasmania, p. 216.

(36) Mundy.—Our Antipodes, p. 474.

tory. I have been privileged to recall a few of these in the foregoing pages, but there are doubtless many more even more interesting ones which I am not aware of but which will I hope be placed on record by those in possession of them before the records relating to them are forgotten. Sufficient has been written, I think, in order to show what interesting periods of history this island has seen.

NOTES ON THE NOMENCLATURE.

Cape Boullanger. This was named after a member of Baudin's expedition, as shown by the following passage:

> "En effet à peine on a doublé le cap Nord, qui, du "nom de notre ingénieur, été appelé *Cap Boullanger*. " . . . En evant du cap Boullanger, se présente "un grosse roche, qui se rattache à l'île Maria par une "traînée de récifs dangereux; cette roche est precédé "d'un gros ilot granitique, peu élevé, stérile, et qui "laisse entre la terre et lui un passage practicable "seulement pour le petites embarcations. Nous "l'appelâmes *Ilot du Nord*."

On Baudin's Charts (Carte d'une parte de la Côte orientale de la Terre de Diemen dressé par L. Freycinet d'après ses observations et celles de MM. Faure et Boullanger. Février 1802). Cap Boullanger is unmistakably shown as the northern point of Maria Island, thus bearing out the description in the text. On Flinders' Chart (South Coast, sheet 6), "C. Boullanger or Coxcomb Head" appears east of its true location. The present maps issued by the Lands Department show Cape Boullanger as the point near the Bishop and Clerk. This is by no means its correct position, and it should be transferred back to its original place—the extreme north point of Maria Island, opposite the I. du Nord (37). The point where it appears on the present day maps is generally known as "The Bishop and Clerk" after the prominent mountain of that name which projects boldly seawards at this point. This is the "cock's-comb-like" head referred to by Flinders.

By some strange alteration "Coxcomb's Head," which appears upon Flinders' Charts of 1798-9 (published 1814) as a synonym of Cape Boullanger, now appears on the Lands Department's Charts as a synonym of Cape Mistaken. But even this latter Cape has been misplaced, as I shall show later.

Cape Mistaken. So named by Captain John Henry Cox of the Brig *Mercury* in 1789. The name on modern

(37) The I. du Nord is variously called locally "North Id.," "Green Id.," "Rabbit Id.," or "Goat Id."

maps appears too far to the south. Péron refers to this Cape as follows:—

"Après avoir doublé la point Nord de la baio "Riédlé, nous vîmes la terre courir à l'E.N.E. jusque "par le travers du cap *Mistaken* (ainsi nommé par le "Capitaine Cox, qui reconnut *Oyster's Bay* en 1789), "qui forme le point le plus oriental de l'île."

Upon the present day maps of the Lands Department the most eastern point of the northern portion of Maria Island is designated Ragged Head. The same name is given to a point a mile or so North-West. A few miles to the south of this there is a point marked Cape Mistaken or Cock's-comb's Head. (On Flinders' Charts Coxcomb's Head appears as a synonym for Cape Boullanger.) There can be no doubt, after an examination of Cox's and the other early charts, that the name Cape Mistaken was given by Cox to the most eastern point of the island, and that the present position assigned to it on the Lands Department's maps is incorrect. It must further be remembered that it was after rounding this Cape when Cox discovered he was not working into Adventure Bay that he gave the name Cape Mistaken to this point.

Flinders gives (38) details of his observations when coasting along the shores of Maria Id. as follow:—

"At daylight, Maria's Island appeared to be divided "into two, Schouten's Island was visible, and the prin-"cipal bearings taken were as follow:

"Tasman's small island (39)	S. 24° W.
"A deep bight in the coast	S. 56 W.
"South Head of Frederik Hendrik's Bay.	S. 72 W.
"Maria's Island, south part	N. 64° to 43 W.
"——, north part	N. 39 to 19 W.
"Schouten's Island	North to N. 5 E.

"The wind shifted to north at ten o'clock, and we "tacked towards Maria's Island. At noon the north-"east extreme, a cock's-comb-like head was distant four "or five miles, but the island lying off it in Mr. Cox's "chart was not visible nor yet the isthmus which con-"nects the two parts of the island.

"Observed latitude	42° 41½" S.
"South Head of Frederik Hendrik's Bay...	S. 40 W.
"Maria's Island, south part	Clouded.
" ——, north part	S. 82° to N. 64 W.
"Schouten's Island, dist. 4 leagues.	N. 3 W. to 8 E.

(38) Flinders.—Voyage to Terra Australis. Intro. p. cxc.

(39) It must be remembered that until Flinders examined the French and later charts, after his imprisonment at Mauritius, he considered Tasman's Peninsula was an island.

"We had squally weather in the afternoon, with wind "at north-west; and being unable to get near Maria's "Island before the evening, bore away northward, having a fresh breeze at W.S.W."

I have plotted Flinders' position and taken into consideration his remark: "At noon the north-east extreme, a "cock's-comb-like head was distant four or five miles," and I do not think that there is the slightest doubt that the headland referred to by Flinders is the prominent projection formed where the Bishop and Clerk mountain abruptly falls to the sea. My personal recollections of the eastern aspect of the Coast strengthen this opinion. If any further evidence was desired one has to examine Flinders' own charts. On these Cape Boullanger has been moved from the low lying northern point to the massive buttress of the north-eastern promontory, and is marked "C. Boullanger or Coxcomb's Head."

CAPE MAUROUARD. Named after a member of Baudin's expedition.

"Parvenus à la pointe de 'Est, que nous nommée "*Cap Maurouard*, du nom de l'aspirant recommand- "able qui partageoit alors avec M. Boullanger le soin "des travaux géographiques, nous vîmes la côte se "diriger au N.N.O."

On Baudin's charts (Freycinet's) the location of this Cape is clearly shown as the most eastern point of the southern portion of Maria Island. Flinders also gives it this position. On the Tasmanian Land Department's present maps the name is given to the northern point of Crayfish Bay, while the most eastern point of the southern section of the island is designated Cape Bald.

CAPE PERON. Named after the naturalist and historian of Baudin's expedition.

"Bientôt nous atteignîmes le cap le plus Sud de "cette île, que nos géographes ont nommé *Cap Peron*. "En evant de cette cap, s' élève un rocher granitique "solitaire de 150 à 200 pieds de hauteur, déchiré par "les flots, imitant assez bien, sous ce rapport, un sorte "d'obélisque: il fut nommé *la Pyramide*." (40)

LONG POINT. This is the "Leseur Point" of the French explorers. The designation Long Point first appears on the chart of 1837. Leseur was one of the French artists.

MARIA ISLAND. So named by Tasman in 1642, in honour of the wife of Anthony Van Diemen (and not after his daughter as is often stated).

(40) Voyage de Découvertes aux Terres Australes. Vol. 1., p. 263.

Mauge Point. Named after the surgeon of Baudin's expedition, who was buried on Maria Island at this place. Care must be taken to discriminate between Point Maugé on Maria Island and Monge Bay (now generally spoken of as Pirates Bay) on the outer side of Eaglehawk Neck. Monge Bay was also named by Baudin, but was so called after a French scientist. (41)

Oyster Bay. Named by Captain Cox in 1789, who brought the brig *Mercury* to anchor there in order to take in supplies of wood and water. On present day maps the name Oyster Bay is reserved for the Outer Bay and the inner portion designated Shoal Bay (often referred to locally as Chinaman's Bay).

Riedle Bay. So named by Baudin's expedition in 1802. It was named after one of the naturalists of the expedition, who had died at Timor in 1801.

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[Since the above paper was read before the Society, the officials of the Lands Department have taken a kindly interest in the question of the nomenclature, and I am glad to note that there is every prospect of the names being restored to their original positions.—C.E.L.]

NEW SPECIES OF TASMANIAN MOLLUSCA, WITH CRITICAL REMARKS ON SEVERAL DESCRIBED SPECIES, AND ADDITIONS TO THE LIST.

By W. L. May.

(Received 20th June, 1919. Read 11th August, 1919.)

Plates XIV.-XVII.

The species here described include no startling novelties, but are more or less closely related to previously known forms. They have come from various parts of our coasts, and from low water mark down to one hundred fathoms, and may be described as the balance from several years collecting left after more striking species have been dealt with. The types of the new species will be presented to the Tasmanian Museum.

June. 1919.

Callochiton elongatus, sp. nov.

Shell very small, narrowly elongate, girdle rather broad; rather elevated; the valves distinctly beaked. Colour—Purplish-brown, lighter on the dorsal area, giving the appearance of a longitudinal pale band. A co-type has the 6th and 7th valves mostly pale green and the 2nd valve with a large whitish blotch dorsally.

Anterior valve semi-circular, slightly beaked, covered with minute pustules; median valves with lateral areas distinctly raised, the pleural and dorsal areas are not separated, except that the low pustules that cover the whole valve become finer and more longitudinal towards the ridge. Tail valve with mucro about one-fourth from the adjoining valve differentiated from the rest of the valve by a small ridge and very slightly elevated. Girdle covered with imbricating, elongated, sharp-pointed scales, and similarly coloured to the valves, but of a lighter shade, sometimes with paler blotches.

Length 7.4; breadth, 3.6 mill.

Habitat. Norfolk Bay and Port Arthur (E. Mawle). Seven or eight specimens collected. This beautiful little species is a very much smaller and *narrower* shell than *C. platessa*, Gould; *C. rufus*, Ashby, the type of which I have seen, is broader still. The present species has for its size coarser sculpture than *platessa*. It varies much in colour-ing, but the ground colour seems always to be some shade of purplish-brown. It may be blotched with green and whitish in various degrees of pattern.

Pl. XIV., figs. 1a, 1b.

APATURRIS COSTIFERA, sp. nov.

Shell small, fusiform, white with a broad chestnut band on the centre of the body-whorl. Whorls 5½ rounded, the first two being quite smooth, the rest sculptured with strong, rounded axial ribs, fourteen on the penultimate, sixteen on the body whorl, they fade away a little below the periphery. The base being encircled by numerous fairly strong spiral liræ; the ribs are crossed by very fine, sharp spiral threads. Aperture fairly large, pointed above, broad at the base, where it scarcely becomes a canal; columella excavate, bearing two low tubercles, outer lip rounded and simple.

Length, 4.5; breadth, 2 mill.

Habitat. Type, with five others from about 40 fathoms East of Thouin Bay.

This species closely resembles *Mitromorpha axicostata* Verco. It is, however, a narrower shell, with more rounded whorls, and the spiral liræ are much less strong; it has, too, a more bluntly rounded apex.

Pl. XIV., fig. 2.

NEPOTILLA DIAPHANA, sp. nov.

Shell small, thin, of a semi-transparent texture, colour yellowish-brown, pinkish towards the apex, broadly fusiform, whorls five, including a prominent two-whorled protoconch, which is strongly spirally lirate; the adult whorls much rounded, and strongly cancellate. There is a hollowed space below the suture, corresponding with a shallow sinus, and ornamented by curved growth lines; strong axial ribs cross the whorls and are separated by spaces of about their own width: they number about twenty on the body whorl and fade away below the periphery; they are crossed on the spire by three spirals, less strong than the ribs and about equally spaced, so that square meshes are formed, producing small nodules at the junction. These spirals continue on the base, where they are smaller and closer together. Aperture broad, with a very short open canal, columella excavate, with a narrow callous lip, outer lip rounded, corrugated by the sculpture, with a broad rather shallow sinus at the suture.

Length 4.4; breadth, 2 mill.

Habitat. The type, with five others from Frederick Henry Bay, two others from Thouin Bay, East Coast. All the specimens have been taken from the roots of the giant kelp and have much the appearance of young shells.

It resembles *N. legrandi*, Beddome, more than any other, but is entirely distinct from that species, which is much more strongly sculptured, and has many more spirals.

Pl. XIV., fig. 3.

Polinices catenoides, sp. nov.

Shell of moderate size, rotund, with a small but sharp spire; umbilicate. Whorls five, rapidly increasing, the last very large, rounded, with a slight depression below the suture. Aperture roundly lunate, rather produced in front, lip thin. Columella a little concave, with a callus partly covering the umbilicus, and developing into a pad where it joins the lip above; the callus has a distinct groove crossing it, at the upper edge of the umbilicus, which latter is of moderate size, deep and perspective. The colour appears to be yellowish-brown, paler below the suture, and on the base, and there are indications of chestnut flames crossing the sutural band, and patches of the same colour on the body whorl. Diameter and height, each 15 mm.

Type with 10 others, mostly small, from about 60 fathoms South of Port Arthur and one from 100 fathoms East of Cape Pillar.

This species is remarkably like *P. catena*, da Costa, from Northern Europe, so much so, that it is at first difficult to see any differences. However, the umbilicus is rather smaller, and the front of the columella more produced; it is rather broader, has a depression below the suture, a furrow on the columella, and probably the colour is different. Compared with *P. aulacoglossa*, Pils. and Van., it is a much rounder shell, and lacks the heavy pad over the umbilicus, besides being much smaller. I have known this species for a considerable time, but hesitated to describe it, hoping for better examples; such, however, have not yet come to hand. All my specimens are "dead," and most have lost their colour, but some show traces of coloration as above described. It is possible it reaches a considerably larger size, as none of mine appear to be quite adult. Its station would appear to be from about 50 to 100 fathoms.

Pl. XIV., fig. 4.

Marginella obesula, sp. nov.

Shell very small, broadly ovate, translucent white, with a distinct, but blunt spire of two whorls. Aperture narrow above, but widening rapidly towards the rounded front. Columella convex; the first plait, which is a continuation of the front of the shell, is large, strong, and curved. The next above is much smaller and rather close to the first, above are four minute plaits, which reach quite two-thirds up the columella. Outer lip thickened, incurved in the middle, where it is armed with about nine minute teeth.

Length, 2; breadth, 1.4 mill.

Types, with six others, from Frederick Henry Bay, one other from Port Arthur. Whilst this resembles such relatives as *M. shorehami*, Prit. and Gat., it nevertheless has some good points of difference, and these are emphasised by the very peculiar animal, which, showing through the translucent shell, exhibits a bright orange colour, curiously netted with white lines, each bordered with black, empty shells show no traces of this peculiar ornamentation, which must belong to the animal. In our other small species the animal usually appears black or horny.

The habitat is also peculiar. Most of the specimens have been taken from roots of the giant kelp, showing it to inhabit rocky bottoms.

Pl. XIV., fig. 5.

Marginella ringens, sp. nov.

Shell very small, broadly pyriform, pure white, semi-transparent, with an exsert, but very small spire of two whorls, which has a tilt towards the right. Aperture broad, especially towards the rounded front. Outer lip solid, shouldered, and much curved above, but straight on its inner side, where it bears about six small denticles rather irregular in size and spacing. Columella convex, but rather straight in its middle part, and carries about six plaits, of which the first is a long, upward sweep from the base; the next two are well developed, those above being much smaller.

Length, 1.8; breadth, 1.2.

Type from Kelso, Tamar Heads, collected by the late Aug. Simson; another exactly similar from the Petterd collection, probably from the same locality; and eight others from 40 fathoms off Thouin Bay, which differ slightly in having more minute denticles on the lip, but are otherwise the same.

This is very close to *M. angasi*, Crosse, of which it may be a variant. It is more broadly shouldered, with a larger aperture, and has the toothed outer lip.

Pl. XIV., fig. 6.

MARGINELLA MULTIDENTATA, sp. nov.

Shell small, white, broadly-ovate, spire hidden, aperture rather wide. Columella convex, bearing about nine main plications, of which the anterior three are the strongest; there are several small subsidiary teeth between the upper ones. Outer lip rises above the summit; is strongly thickened and armed inside with about ten minute denticles.

Length, 1.5; breadth, 1.2 mill.

Type, with three others from about ten fathoms, between Gordon and South Bruny, D'Entrecasteaux Channel.

This species is nearest related to *M. thouinensis*, May; it differs in being shorter and broader, having a wider aperture, stronger dentition, and the crenated outer lip. The small intercalated teeth have not been noticed in any other Tasmanian Marginella.

Pl. XIV., fig. 7.

MARGINELLA INCERTA, sp. nov.

Shell minute, smooth, white, opaque, ovate; spire small but distinct, of two whorls. Aperture narrow above, almost linear for half its length, then widening to the rounded front. Outer lip moderately thickened, slightly curved, smooth within. Columella convexly rounded, with two distinct plaits, rather near together, of which the anterior is the stronger.

Length, 2; breadth, 1.6 mm.

Type, with five others, from about 40 fathoms off Thouin Bay. This species closely resembles *M. freycineti*, May, in size and shape; it has more spire, is broader, with a more curved columella, and only two plaits.

Pl. XIV., fig. 8.

Iredale in Trans. N.Z. Inst. for 1914, p. 457, proposed a new genus *Estea* for a Rissoid group, and mentions *Rissoa columnaria*, Hedley and May, as a good representative. We have a large number of species, which seem to fall naturally into Iredale's genus. There are some seventeen Tasmanian named species, and others not yet described, that I can so place, only two or three of which are somewhat abberante. Amongst them is a little sub-group of four species, closely allied to each other, upon which I now offer some observations, describing one as new.

ESTEA TUMIDA, Tenison Woods.

Described in these proceedings for 1875, p. 147, as *Diala tumida*, a figure was given by Tate and May for this species, Pl. xxvi., fig. 67, which, however, is not correct, but represents a nearly related species, which I am dealing with later.

A careful examination of the types (two specimens) preserved in the Hobart Museum, and which are very bleached, show it to be a good species, and of which I have taken a fair number of specimens, always from the roots of the giant kelp; fresh shells are of a pinkish tinge, and have a narrow chestnut band below the suture, and two on the body whorl, one at the periphery, and the other on the base. These bands are characteristic.

The ribs are also broad, strong, and oblique. I present a figure from a specimen compared with the type.

Pl. XV., fig. 9.

ESTEA OLIVACEA, Dunker (*Rissoa*).

Rissoa diemenensis, Petterd, is an absolute synonym, as Tate and May correctly determined, the type being preserved in the Hobart Museum. This species differs from *E. tumida* in its more squat shape, and more numerous ribs, which are narrower and straight; they also form a nodular bead below the suture. It is common at Tamar Heads, but seems absent from the South, where its place is taken by the next species.

Pl. XV., fig. 10.

ESTEA KERSHAWI, Tenison Woods (*Rissoina*).

Rissoina kershawi, Tenison Woods, P.R.S. Vict., 1877, p. 57. This was united with *E. tumida*, by Tate and May, but examination of the types in Melbourne Museum shows it to be a distinct, but closely related species. It has three adult whorls, instead of four, the ribs are straighter, and much more numerous, and the mouth is not so round, and it lacks the colour bands; the usual colour is yellowish-brown, with a pale band below the suture. It is found in the Derwent Estuary and D'Entrecasteaux Channel, and is common at Tamar Heads, with *E. olivacea*, which it closely resembles, but may be distinguished by its more cylindrical form, more numerous ribs, and the absence of the sutural bead.

Pl. XV., fig. 11.

ESTEA MICROCOSTA, sp. nov.

Shell small, rather pupoid, solid, pinkish, the apical whorls are the darkest, the last half of the body whorl nearly white. Whorls five, rounded. The first two form a smooth proto-conch; the three adult whorls are regularly axially ribbed, with very fine sharp ribs, which are somewhat oblique, and become evanescent on the base. Aperture almost round, lip expanded all round.

Length, 2.5; breadth, 1.2 mill.

Type, with a number of others, from 100 fathoms seven miles East of Cape Pillar. This is closely related to *E. kershawi*. It differs principally in the much more numerous and finer ribs, and rounder mouth, and its rather more cylindrical form. *E. tasmanica*, Tenison Woods (*Eulima*), is much larger, more pyramidal, with excavate sutures.

Pl. XV., fig. 12.

ESTEA PERPOLITA, sp. nov.

Shell small, white, highly polished, elongate, blunt, the apex being much flattened. Whorls four and a half, rounded, especially the penultimate; suture well impressed; mouth roundly ovate, lip a good deal expanded.

Length, 1.8; breadth, 1 mill.

Type, with 12 others, from 50 fathoms off Thouin Bay, and three from 100 fathoms off Cape Pillar.

A species principally distinguished by its rounded whorls, flattened summit, and high polish, and differs from its near relative *E. rubicunda*, Tate and May, in being shorter and blunter.

Pl. XV., fig. 13.

ESTEA LABROTOMA, sp. nov.

Shell minute, conical, solid, yellowish-brown, smooth, shining. Whorls four, rounded, suture well impressed, the body whorl being rather restricted below the suture. Aperture roundly ovate, oblique, surrounded by a very broad expanded lip, which has a curious deep indentation where it joins the body whorl. This remarkable feature is diagnostic.

Length, 1.4; breadth, .7 mill.

Type, with 14 others from Frederick Henry Bay, taken from roots of the giant kelp.

Pl. XV., fig. 14.

MERELINA SCULPTILIS, sp. nov.

Shell solid, broadly ovate, cream coloured, imperforate; whorls five, rounded, the first two forming a smooth proto-conch. Suture well defined by a deep channel. The adult whorls are crossed by radials, which are strong, and predominate on the two upper whorls, but grew finer and much more numerous on the body whorl. These are crossed by spirals, which from being at first inferior, become on the body much the stronger. The body whorl carries about thirteen spirals, of which the upper three are large, rounded, and noduled by the axials. The lower spirals are narrow, and scarcely affected by the ribs, which fade at the periphery. Seven spirals cross the ribs on the middle whorl, of which the one above the lower suture, and the two below the upper suture are the stronger, the latter forming rows of nodules; the third whorl is similar. Aperture ovately-pyriform, the columella, which is not continuous, is rather expanded anteriorly; outer lip thin, dentated by the sculpture.

Length, 3; breadth, 1.5 mill.

Type, with three others, from 50 fathoms off Thouin Bay.

From its nearest relative *R. filocincta*, Hedley, it may be distinguished by its flatter whorls, much more numerous axials, the strong beaded spirals on the shoulder, the channelled sutures, the discontinuous peristome, and the sharp outer lip.

Pl. XV., fig. 15.

HAURAKIA SUPRACOSTATA, sp. nov.

Shell small, rather elongate, yellowish white, semitransparent; whorls four, rounded, suture deeply impressed. The apical whorl is small, dome shaped, and smooth; the next is tabular and finely spirally grooved; the last two axially ribbed with strong oblique ribs, which bend towards the left at the suture. There are about six on a half-turn of the whorls; they fade away below the periphery, and are crossed by fine distant liræ, which are scarcely raised, and show as white opaque lines on the translucent shell. Aperture roundly pyriform, lip expanded and continuous, projecting beyond the whorl posteriorly.

Length, 1.7; breadth, .8 mill.

Type, Frederick Henry Bay, taken from a root of the giant kelp. Three others from 40 fathoms off Thouin Bay;

a very distinct little species. I place this in *Haurakia* with some diffidence, but it seems to come closer to such species as *H. strangei* than any other forms.

Pl. XV., fig. 16.

AMPHITHALAMUS LUTEOFUSCUS, sp. nov.

Shell minute, turbinate, smooth, lustrous red-brown, with the first half of the body whorl and mouth, yellow, also a light band below the suture. Whorls four, much rounded, body whorl large in proportion. Aperture: The actual opening is small, oval, and set very obliquely to the spire; it is surrounded by a raised edge or keel. The peristome, which is continuous, is broadly pyriform, expanded and planulate, recessed towards the aperture; it is projected somewhat from the base of the shell, which is sub-umbilicate. The operculum is thin, semi-transparent, and appears to be subspiral.

Length, 1; breadth, .6 mill.

Habitat. Type, with several others, from Kelso, near Tamar Heads, collected by Augustus Simson.

This minute shell is in size and general appearance similar to *A. jacksoni*, Brazier, but differs sufficiently in the details of the mouth, and also in the coloration; it is in some respects still more like *A. atropurpurea*. That, however, is a much more ventricose and massive shell, which does not seem to have been heretofore recognised as a member of this genus, although it is extremely characteristic, and closely allied to *A. jacksoni*.

Pl. XVI., fig. 17.

NOTOSETIA PURPUREOSTOMA, sp. nov.

Shell minute, bluntly turbinate, smooth, polished, pale rose colour, lip rose-purple. Whorls three, much rounded, suture impressed. Aperture, roundly oval, lip continuous, with a thickened edge, and reflexed on the columella side.

Length, 1; breadth, .8 mill.

Type, with a dozen others, from Penguin, in shell sand. It has a superficial resemblance to *Amphithalamus atropurpurea*, Frauenenfelt, from which the latter's typical aperture at once separates it.

Pl. XVI., fig. 18.

RISSOPSIS BREVIS, sp. nov.

Shell very small, cylindrical, blunt, smooth, pure white, pellucid. Whorls, four and a half, rather rounded, suture impressed, apical whorls much flattened. Aperture pyriform; outer lip thin and sharp, somewhat expanded anteriorly.

Length, 2; breadth, .8 mill.

Type, with two others, from 40 fathoms off Thouin Bay, one other from off Arch Island, D'Entrecasteaux Channel.

I place this with *Rissopsis*, as it seems congeneric with the species assigned to that genus by Professor Tate, a location which I think requires confirmation.

Pl. XVI., fig. 19.

LIPPISTES CONSOBRINA, sp. nov.

Shell small, whitish, smooth, pyramidal, umbilicate. Whorls four or five, including a smooth proto-conch of about two turns. The adult whorls are encircled by two strong keels, the upper of which is the larger, and is a little above the centre of the whorl. These keels are separated by a furrow of about their own width. There are two additional keels on the base, the anterior of which encircles the umbilicus, which is deep, but rather narrow, and separated from the aperture by a strong columella pillar. Aperture rounded, outer lip strongly dentated by the keels.

Length, 3; breadth, 1.5 mill.

Type, with three others, from 40 fathoms three miles East of Schouten Island.

In these proceedings for 1910, p. 309, I recorded this species as *L. gracilenta*, Brazier. I have since had an opportunity of examining Brazier's type, which shows that the two forms are specifically distinct, *gracilenta* being much larger and more attenuate in the spire. Our shell comes between this and *L. zodiacus*, Hedley, which is similarly sculptured, but is only half the length, and has a different apex.

Pl. XVI., fig. 20.

CERITHIOPSIS APICICOSTA, sp. nov.

Shell small, elongate, or narrowly pyramidal, whitish. Whorls eleven, including a three-whorled proto-conch, which is strongly axially ribbed. Adult whorls moderately rounded, suture well impressed; sculpture, three nodulous keels of about equal size and distance encircle the whorls. They are separated by a deep groove, across which the nodules are connected by low axial ridges. There is a smooth keel on the base, which is otherwise plain. Aperture subquadrate? (rather broken), with a short anterior canal. Outer lip dentated by the sculpture.

Length, 7; breadth, 1.6 mill.

Type, from 100 fathoms seven miles East of Cape Pillar. Several others, mostly juvenile, from about 40 fathoms off Thouin Bay. This species is rather nearly related to *C. trisculpta*, May, which was described from a half-grown shell. It is narrower, with weaker sculpture and a different, though somewhat related proto-conch, which seems to separate it from all other species.

Pl. XVI., figs. 21, 21a.

Cerithiopsis mamilla, sp. nov.

Shell small, pale brown, pyramidal. Whorls nine and a half, rounded, including a smooth, bulbous proto-conch of about two whorls. Adult sculpture consists of three main keels, which are more or less nodulous, the central one being rather the largest. They are separated by equal sized, smooth spaces. There is a small smooth keel below the others, which shows very distinctly on the base, which is smooth. Aperture subquadrate, inner lip very concave, outer lip dentated by the keels. There is a short anterior canal. The keels on the upper whorls are almost or quite smooth. As growth proceeds they become faintly, irregularly nodulous. On the three last whorls the nodules are more distinct.

Length, 5; breadth, 1.4 mill.

Type, with ten others, from about 40 fathoms off Thouin Bay, East Coast.

Whilst the shape of the shell is fairly constant, and the pullus always the same, co-types show considerable variation in the sculpture; whilst most are similar to the type, they may be almost destitute of nodules, or there may be three strongly nodulous keels on all the adult whorls.

Pl. XVI., fig. 22.

Orbitestella iredalei, sp. nov.

Shell minute, discoidal, smooth, white, spire flat. Whorls about three and a half, square in section, bicarinate, the upper carina at the angle being the largest, and forming a spiral keel on the flat summit to the apex. The flattened part of the whorl between the angle and the suture is roundly elevated; base margined by the lower keel, otherwise smooth except for lines of growth, which are in evidence over the whole shell, broadly, perspectively umbilicate to the apex. Aperture roughly quadrangular, wider than the height of the shell; at the outer edge bidentated by the keels.

Diameter, 1; height, about .4 mill.

Type, with a few others, from Frederick Henry Bay, taken from the roots of the giant kelp.

This minute shell has a considerable resemblance to *Cyclostrema bastowi*, Gatliff, the type of *Orbitestella*, and I consider it congeneric; probably *C. mayii*, Tate, should also be included in this genus.

Note.—The specimen from which the drawings were made was accidentally destroyed.

Pl. XVI., figs. 23, 23a, 23b.

Patelloida corrodenda, sp. nov.

Shell roundly oval, rather depressed, apex one-third from the anterior end, exterior furnished (in the type), with 20 radiating, smooth ribs, irregularly spaced, which extend from the summit to the margin, and several shorter ones, intercalated near the margin. The ribs are but slightly raised, dull white, the wider interspaces being black, apex eroded. Interior margin black, bearing white triangular spots opposite the ribs, with their sharper points towards the edge. Behind these is a narrow purplish ring, then bluish, with a brownish-white centre.

Length, 14; breadth, 11; height, 5 mill.

Type, from the western shore of Frederick Henry Bay.

While fairly constant in shape, it varies much in the number of ribs, sometimes being nearly twice as numerous as given above. The shell is often so much corroded that the sculpture only remains on the marginal third. The species is common at a spot near my home living on large diabase boulders, at about half-tide. I have not yet noticed it elsewhere; it long escaped notice, as it is associated with *Siphonaria diemenensis* of about the same size and general appearance. As they are exposed to the air for several hours at every tide, they suffer extremely from erosion, even quite small ones being badly affected. It resembles *P. flammea*, Quoy and Gaim, in general shape. That species is destitute of ribs, but has fine axial striæ, and a different interior coloration, and lives near low water mark.

Pl. XVII., figs. 24, 24a.

COCCULINELLA TASMANICA, sp. nov.

Shell small, white, thin, smooth, narrowly oval, pyramidal, apex subcentral, margin much raised at each end. There is no sculpture, except faint growth lines.

Length, 5; breadth, 2.6; height, 2 mill.

Type, with a number of others, from forty to seventy fathoms along the East Coast.

This species is a near ally of *C. compressa*, Suter, from New Zealand, and *C. coercita*, Hedley, from New South Wales. It is nearer the former, which is rather narrower, higher, and has fine radial sculpture. The latter is narrower, flatter, and has an almost flat base. Probably they are local forms of one variable species, in which perhaps some peculiarity in their place of attachment has determined the form of the base; straight in one case, much curved in the others.

All the specimens taken have been "dead" shells, but there are indications that in life they would be glassy and semi-transparent.

Pl. XVII., fig. 25.

EULIMA APHELES, Tenison Woods.

Described in these proceedings for 1878, p. 40.

The type was missing for many years, but was lately discovered, having been mislaid in the Tasmanian Museum. I here present a figure from the type, which is so marked by the author. I consider it to be an absolute synonym of *Eulima augur*, Angas.

Pl. XVII., fig. 26.

EULIMA MARGINATA, Tenison Woods.

Described with the last and also recovered with it, and marked as type by the author. This specimen I have also figured. It is given by Tate and May, P.L. Soc., New South Wales, for 1901, p. 381, as a prior name for *Stylifer lodderæ*, Petterd. This identification was incorrect. It is a true *Eulima*, and I believe it to be only a short, stumpy form of the variable *E. augur*, Angas.

Pl. XVII., fig. 27.

COMINELLA LINEOLATA, Lamarck.

This is a very common mollusc on most parts of our coast, and varies much in size, form, and colour. On the western side of Frederick Henry Bay, in a rather exposed situation, a short, thick-set banded form is plentiful. On December 15th of last year, I noticed they were spawning under fairly large stones. The egg capsules formed dense masses, closely clustered together. The method adopted is for single capsules to be firmly attached at some distance apart; then three or four others are fastened to the upper edges of these, giving the combination somewhat the appearance of the growth of the prickly pear. The colour is ivory-white, the stalks whiter. I present drawings, which will give a better idea of the form than much description. The height of the single specimen is about 9 mm., that of the cluster about 15 mm.

Pl. XVII., figs. 28, 28a.

I can also add to our list the following seven species and one variety already described by various authors.

1. *Arca metella*, Hedley, P.L. Soc. N.S. Wales, 1917, p. 681, Pl. li., f. 36-37. About a dozen single valves taken in 100 fathoms off Cape Pillar, and a few from other places on our East and South Coasts, from 10 fathoms downwards.

2. *Pseudarcopagia botanica*, Hedley, Roy. S. N.S. Wales, 1918, Supp. p. 27. This species seems confined to our Eastern and Southern Coasts, where it takes the place of *P. victoriæ*, Gatliff and Gabriel, which is found in Bass Straits, and perhaps does not occur South East of the Furneaux Group, where I found it in profusion.

3. *Zalapais lissa*, Suter, *Cyclostrema*, P. Mall. Soc., viii., p. 25, pl. ii., f. 10-11. A number of examples taken in Frederick Henry Bay from kelp roots.

4. *Triphora mamillata*, Verco; *T. albovittata*, Hedley, var. *mamillata*, Verco, T.R. Soc. S.A., 1909, p. 285. I recorded this in these proceedings for 1910, p. 309, as *albovittata*, but our shells are Verco's variety, which I consider is quite sufficiently distinct to be given specific rank. It has also been taken in 40 fathoms off Thouin Bay.

5. *Turritella atkinsoni*, Tate and May, var. *medioangulata*, Verco, *op. cit.*, 1910, p. 125, pl. xxx., fs. 8-9. Several from 50 fathoms North of Maria Island.

6. *Estea janjucensis*, Gatliff and Gabriel, *Rissoa*, P.R. Soc. Vic., 1913, p. 67, pl. viii., f. 2. Three specimens from Penguin, North Coast, identified by Mr. Gabriel.

7. *Diala translucida*, Hedley, P.L.S. N.S. Wales, xxx., 1906, p. 522, pl. xxxiii., f. 35. Tate and May, *op. cit.*, 1901, p. 388, record this in error as *D. picta*, A. Adams. A few examples have been taken in D'Entrecasteaux Channel, in about 10 fathoms.

8. *Segmentina victoriæ*, Smith, P.L.S., 1881, p. 296, pl. vii., f. 2. A number of specimens in my possession were collected many years ago by Mr. E. P. Harrisson in Lake Tiberias, and are exactly the same as Victorian shells. This makes an interesting addition to our fresh water fauna.

A RE-EXAMINATION OF PROFESSOR HASWELL'S TYPES OF AUSTRALIAN *PYCNOGONIDA*.

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Plates XVIII.-XXII., figs. 1-26.

(Received 8th July, 1919. Read 11th August, 1919.)

Diagnostic methods in the case of the interesting group of Pycnogonida have so far altered in the last thirty years, that it needs no apology on my part for attempting a revision of the descriptions of Australian Pycnogonida published by Professor Haswell in the early eighties. This revision has been made possible by the courtesy of the trustees and curator of the Australian Museum, who placed the holotypes at my disposal, and to whom I tender my best thanks. I have also to thank Professor S. J. Johnston of Sydney for the loan of other specimens collected for the use of his department.

In the following description the specimens from the Australian Museum are indicated by the collection number.

It is necessary to state that the holotypes have been preserved as microscope slides, and while this is a convenient method of preservation it has its disadvantages in the case of subsequent examinations. It is sometimes impossible, for example, to make out with any degree of certainty the arrangement and structure of the spines of the ovigers or even of its joints when, as is often the case, it is tucked under the body of the Pycnogonid on a microscope slide. Further, while every care has been taken with the measurements it must be remembered that the flattening of the specimen necessary in preparing a miscroscopic slide, alters very definitely the relation of breadth to length.

Many of the works cited in the following pages are not procurable in Tasmania, and in these cases I have to depend on notes made when on a visit to Sydney.

RHOPALORHYNCHUS TENUISSIMUS, Haswell.

(Pl. XVIII., figs. 1-3.)

1884, *Colossendeis tenuissima*, Haswell, 1884, p. 1029, pl. 56, figs. 5-8.

1893, *Rhopalorhynchus clavipes*, Carpenter, 1893, p. 24, pl. II., figs. 1-10.

1908, *Rhopalorhynchus tenuissimus*, Loman, 1908, p. 24.

1909, *Rhopalorhynchus tenuissimus*, Thompson, 1909, p. 533.

Specimen.—Australian Museum Collection, G5195, holotype, male, Port Denison, Queensland.

Description.—It is only necessary to supplement in a small degree Prof. Haswell's account of this species.

Cephalon is short and narrow, not expanded in front. Segmentation is distinct.

Ocular tubercle is situated on the posterior portion of the cephalon. It is cylindrical with a small rounded cone at the apex.

Abdomen is present, but as usual in this genus is quite minute.

Palps are ten jointed. The first joint is short and thick and expanded at the extremity; the second is very small; the third joint is very long and slender; the remaining joints are as described by Haswell.

Ovigers.—The character of the spines of the last few joints cannot be determined with accuracy as the joints had not been cleaned before the specimen had been mounted originally. The spines, however, seem to be long and sharp and arranged in several rows.

Measurements:—

	mm.
Proboscis, length	4.41
maximum diameter	1.05
Trunk, length	5.28
width behind first crurigers...	.29
,, ,, second ,, ...	.32
width across ,, ,, ...	1.58
Palp, first joint	.12
second ,, ...	.07
third ,, ...	2.92
fourth ,, ...	.19
fifth ,, ...	1.53
sixth ,, ...	.31
seventh,, ...	.38
eighth ,, ...	.42
ninth ,, ...	.40
tenth ,, ...	.38

		mm.
Leg,	second coxa	.48
	third ,, ...	.33
	femur	5.76
	first tibia	5.47
	second ,, ...	4.94

Remarks.—The holotype was taken in Port Denison, Queensland (depth not given).

There is no doubt in my mind that *R. clavipes* (Carpenter) must be regarded as a synonym of *R. tenuissimus* (Hasw). The lengths and proportions of the joints of the trunk, palps, and legs agree perfectly in the two species. The proportion of the length of the proboscis to the trunk is 1:1.2 in *R. tenuissimus.* In *R. clavipes* it is 1:1.1. The somewhat different shape of the proboscis in *R. tenuissimus* is no doubt due to the distortion caused by the specimen being mounted as a microscope slide.

It is possible that the cheliform arrangement of the terminal portion of the oviger may be confined to the male.

Further, both species come from the Australian region of the Tropics.

Nymphon æquidigitatum, Haswell.

(Pl. XVIII., figs. 4-5; pl. XIX., fig. 6.)

1884, *Nymphon æquidigitatum*, Haswell, 1884, p. 1022, plate 56, figs. 1-5.

1889, *Nymphon æquidigitatum*, Whitelegge, 1889, p. 233.

1908, *Nymphon æquidigitatum*, Loman, 1908, p. 38.

Specimens:—Australian Museum Collection, No. G5196, holotype, ♂, Pt. Jackson; Australian Museum Collection, No. G5198, paratype, ♂; Australian Museum Collection, No. G5197, paratype, ♀, Broughton Island.

In addition, several spirit specimens from Port Jackson and from Shark Island, Port Jackson, contained in the Australian Museum collection and that of the Zoological laboratory of the University of Sydney.

In view of the fact that this genus is an extraordinarily large one, comprising very many species distinguished from one another by relatively insignificant characters, I have thought it desirable to re-describe Haswell's species in some detail.

Description:—*Body.*—Fairly broad and stout, suture lines distinct, *crurigers* well separated, each a little longer than broad—*cephalic segment* large, its length being greater than that of the other segments together. *Cephalon* is much expanded in front, neck fairly narrow but not particularly long.

Proboscis large and stout, expanded in mid-region and tapering towards each end, the whole organ somewhat pear-shaped with smaller end forward.

Chelifori well developed, scape uni-articulate, expanded distally, about same length as proboscis, hand powerfully developed with fingers shorter than the palm, fingers crossing at the apex and possessing a large number of fine teeth.

Palps five-jointed, first joint very small, second joint longest equalling the third and fourth taken together, fourth less than half the third, fifth joint long but a little shorter than the second, fourth and fifth joints finely setiferous, occasional spines on other joints specially towards end of third.

Ovigers.—Ten-jointed with terminal claw, situated on slight ventral outgrowth in front of first pair of legs. The proximal joints increase in length from the first, which is small, to the fifth, which is the largest joint of the limb; fourth joint is rather swollen and expanded distally; the fifth joint is long and narrow bearing distally a fringe of long delicate hairs, as does also the sixth. This joint is about one third the length of the fifth. The seventh, eighth, ninth and tenth joints are about equal in length, all gently curved and bearing pinnate spines. These spines vary in shape. In the ovigerous male they are arranged in a single row on each joint. The middle spines of each row are long and stiletto-like, finely toothed on each edge, while at either end of row they may become worn to a rounded apex. On the terminal joint, the spines become particularly worn. The terminal spine is long, simple and hook-shaped.

Ocular tubercle low and rounded, visual elements large and of equal size.

Abdomen cylindrical, slightly tapering posteriorly, and projecting upwards.

Legs.—The proportions of the joints vary somewhat from those given in the original descriptions. The length of the first and second coxæ are as stated by Haswell; the third coxa is a short joint less than half the length of the second; femur over six times the length of the third coxa and a little shorter than the first tibia, femur swollen (especially so in the female) and slightly curved; first tibia is as usual long and narrow; second tibia extremely long, being equal in length to the femur and first tibia together;

tarsus is short; propodus somewhat longer; terminal claw stout and curved; auxiliary claws slenderer but about equal in length to the main claw. Minute spines occur scattered over the legs. These are sparse on all joints up to the second tibia but are plentiful on the tarsus and propodus. Distal fringes occur on all joints but the last three. A well-marked lateral line is present on each leg.

Sexual apertures.—These are easily seen in the female in which they are large and oval and present on all four legs. In spite of the examination of a number of specimens I have not been able to see them in the male.

Measurements:—

	Holotype ♂	Paratype ♂	Paratype ♀
Proboscis—	mm.	mm.	
length	1.7	1.82	
greatest diameter ..	1.1	1.16	
Trunk, length...	2.4	2.86	
Cephalon—			
length	1.5	1.58	
greatest width... ...	1.04	1.10	
Neck, width ...	.24	.3	
Trunk—			
width between 1st and 2nd pair of crurigers ...	.70	.76	
width across 2nd pair of crurigers ...	1.50	1.60	
Abdomen—			
length	.32	.40	
Third leg—			
first coxa ...	.48	.52	
second coxa...	1.56	1.66	
third coxa ...	.60	.68	
femur	3.90	4.08	
first tibia ...	4.12	4.50	
second tibia...	6.86	8.64	
tarsus	.52	.54	
propodus... ...	.94	.96	
claw	.20	.20	
auxiliary claw	.20	.20	

Palp—	R.	L.	R.	L.	R.	L.
second joint..	.84	.92	1.06	1.04	1.30	
third ,, ...	.54	.60	.70	.74	.90	.90
fourth ,, ...	.24	.28	.30	.30	.35	.35
fifth ,, ...	.70	.70	.76	.62	.94	.90

Remarks.—Judging by its relative abundance in the collection of the Australian Museum, and of the Zoological Department of the University of Sydney, this must be the most common pycnogonid found in Port Jackson.

Affinities.—I find on consulting my notes that Loman (1908, p. 38) suggests that this species is closely allied to *N. giraffa* from the Strait of Macassar and possibly also to the insufficiently described *N. longiceps* (Grube, 1869) from the China Sea.

Pallene (?) valida, Haswell.

(Plate XIX., figs. 7-8.)

1884, *Nymphon validum*, Haswell, 1884, p. 1024, pl. 54, figs. 6-9.

1908, *Parapallene valida*, Loman, 1908, p. 48.

Specimens.—Australian Museum Collection, G5199, marked "type, Port Stephens"; Australian Museum Collection, G5200, marked "Type ♀, Port Stephens." These are two microscope slides. The former of the specimens is a male, the latter, in spite of its being marked female, is also a male.

Description.—Body is fairly robust with all segments distinctly separated. The *crurigers* are separated from one another by less than their own diameter.

Cephalon is expanded with a prominent anterior margin projecting over the proboscis. Above the base of each chelophore on the cephalon is a prominent tubercle with two spines. The neck is well developed and short but fairly wide.

Ocular tubercle is situated just behind the neck, immediately anterior to the level of the first pair of crurigers. There are four well developed eyes. The shape of the ocular tubercle is not determinable with accuracy, but it appears to be low and rounded.

Abdomen is short and rounded.

Proboscis is short and cylindrical directed obliquely downwards. It is somewhat constricted in the middle, obtusely conical in front with a wreath of very delicate bristles round the mouth. The proboscis is inserted into the ventral side of the cephalon some distance behind its anterior margin.

Chelophores have a simple scape with ovoid palm and short stumpy fingers. The hand is turned inwards in front of the mouth. The fingers are provided with many small teeth. The scape and palm possess a number of short hairs.

Palps are four-jointed. They are much shorter than the chelophores, but extend well beyond the proboscis. The basal joint is short and thick, the next joint longer, the third joint longest. The fourth joint is shorter than the third but longer than the second. There are scattered hairs on all the joints, but on the last there is a well marked ventral fringe of setæ.

Ovigers.—These are ten-jointed and do not possess a terminal claw. Haswell's description is accurate except in relation to the length of the sixth joint, which is longer than any of the other distal joints.

Legs.—There is nothing to add to Haswell's description of these.

Cement glands are small and numerous.

Male genital apertures occur on all limbs.

Measurements, holotype, male, G5199.

	mm.
Proboscis, length	.81
greatest diameter	.58
Trunk, length	2.71
width behind first crurigers	.64
,, ,, second ,,	.53
width across ,, ,,	1.74
Cephalon, length	1.19
width	.91
Neck, width	.38
Abdomen, length	.31
Palp, first joint	.18
second ,,	.20
third ,,	.30
fourth ,,	.20
Third leg, first coxa	.47
second ,,	.94
third ,,	.63
femur	2.40
first tibia	2.80
second ,,	2.40
tarsus and propodus	1.29
claw	.60
auxiliary claw	.20

Remarks.—The specimens were obtained by dredging in Port Stephens, New South Wales, but the depth is not given.

I have provisionally placed this specimen in the genus *Pallene.* It does not agree with Hodgson's definition of this genus (1910 page 225) and just as little with that given by Schimkewitsch (1909, pp. 8-9). The presence of the four-jointed palp in the male is a feature in which the present species resembles *Pallene dimorpha*, Hoek, with which it also agrees in the following points—the independence of the posterior trunk segments, the forms of the spines on the ovigers, the finely-toothed chelophores, and the possession of auxiliary claws. *Pallene dimorpha*, however, possesses a terminal claw on the oviger, which is absent in *P. valida* (see Loman, 1908, page 40).

The presence of the palps, in my opinion, would not allow of this species being included in the genus *Parapallene* as proposed by Loman.

If, as Thompson suggests (1909, p. 538) a new genus should be created, founded upon Hoek's description of *Pallene dimorpha*, then it is worthy of consideration that the new genus should be so defined as to include the species under discussion.

PSEUDOPALLENE PACHYCHEIRA, Haswell.

(Pl. XIX., fig. 9; pl. XX., figs. 10-11.)

1884, *Pallene pachycheira*, Haswell, 1884, p. 1030, pl. 57, figs. 6-9.

1908, *Parapallene pachycheira*, Loman, 1908, p. 47.

Specimen.—Australian Museum Collection, G5194, holotype ♂, Port Jackson.

Description.—*Body* is robust, smooth, with segments distinct.

Crurigers are separated by small interspaces.

Cephalon is expanded, strongly cleft in front.

Neck is short and wide.

Ocular tubercle is low and rounded, placed on posterior portion of neck.

Proboscis is inserted ventrally into the cephalon, directed obliquely downwards, very short, cylindrical at the base, conically pointed in front with a fringe of delicate setæ round the mouth.

Abdomen is short, tapering posteriorly.

Chelophores are strong and powerful. Scape is single, palm greatly developed with fingers hanging in front of mouth. Both fingers are wide, blunt, and untoothed. but bearing on each inner edge a single central rounded projection.

Palps are absent.

Ovigers possess ten joints and a claw. First joint is short, second, third, and fourth are progressively longer. Fifth joint is long curved and slender, distally expanded with a peg like process at this end, the process being crowned with a number of short setæ. Sixth joint is short, and the seventh, eighth, ninth, and tenth are progressively shorter. The last four joints are provided with a few bent compound spines arranged in a single row. The terminal claw is long and sharp and is ornamented with fine teeth on the distal half of its inner edge and on the distal third of its outer edge.

Legs.—The first and third coxæ are short and subequal. The second is as long as the other two together and is distally expanded. The femur is a long joint a little longer than the combined coxæ. The first tibia is a little shorter and expands distally. The second tibia is a little longer than the femur. The femur, first tibia, and second tibia are approximately divided into thirds by shallow transverse constrictions. All these joints are minutely spinous. The tarsus is short with a very small dorsal spine and a bunch of closely crowded ventral spines. The propodus is very stout, minutely spinous. On the sole, proximally, there are some four or five well developed spines. The distal half of the sole has smaller spines. The claw is large, strong, and curved, and is equal to more than two-thirds the length of the propodus.

Measurements, holotype ♂, G5194.

	mm.
Proboscis, length	.90
diameter	.56
Cephalon, length	.78
greatest width	.91
Neck, width	.54
Trunk, length	2.05
width between first and second crurigers	.45
width across second crurigers ...	1.44
Third right leg, first coxa	.45
second ,, ...	1.09
third ,, ...	.44
femur ,, ...	2.05
first tibia	1.82
tarsus and propodus	.93
claw	.51

Locality.—Port Jackson (depth not given).

Remarks.—The general bodily form, the shape of the short proboscis with its wreath of delicate hairs round the mouth, and the form of the chela fingers with their bud-like projections mark this species as belonging to the genus *Pseudopallene*, Wilson, rather than *Parapallene*, Carpenter, as suggested by Loman (1908, page 47). Haswell states that this species is related to *Pallene lævis*, Hoek. As a matter of fact the two differ in a very fundamental point since in *Pallene lævis*, each chelophore has a two-jointed scape, while in the present species the scape is simple.

ANOPLODACTYLUS TUBIFERUS, Haswell.

(Pl. XX., figs. 12-14; pl. XXI., fig. 15.)

1884, *Phoxichilidium tubiferum*, Haswell, 1884, p. 1032, pl. 57, figs. 1-5.

1889, *Phoxichilidium tubiferum*, Whitelegge, 1889, p. 233.

1908, *Anoplodactylus tubiferus*, Loman, 1908; p. 72.

1910, *Anoplodactylus tubiferus*, Cole, 1910, p. 288.

Specimens.—Aus. Mus. Collection, No. G5202, holotype ♂, Port Jackson; Sydney University Zool. Collection, 2 Micro. slides, ♂, P.J.; Sydney University Zool. Collection, 1 Micro. slide, ♀ P.J.; Sydney University Zool. Collection, 3 Spirit specimens labelled "Woollahra Point 2 or 3 fathoms."

There is very little to add to Haswell's description of the holotype The following is to be regarded as supplementary to the original description:—

Body narrow, *crurigers* well separated, longer than wide and expanded distally. *Trunk* is widest at anterior end, while each succeeding segment is narrower than the one immediately preceding it. In old animals segments are completely fused, in young ones only the hindmost two. Two characteristic dorsal spines occur on the body at the level of the second and third pair of crurigers.

Proboscis is of the shape described by Haswell. It is inserted into the ventral side of the cephalic segment which is continued beyond the insertion into the long well-defined and constricted neck characteristic of the genus *Anoplodactylus.* In front of this neck the *cephalon* is slightly expanded. Upon this expanded portion an extraordinarily high *ocular tubercle* arises. This is not mentioned by Haswell in his description, but is shown by him in plate 57, fig 1, lying just alongside the right cheliforus. The presence of this long cylindrical tubercle no doubt has suggested the name of the species. At the apex of this column are four distinct eyes.

Abdomen and *chelifori* are as described by Haswell.

Palps absent.

Ovigers absent in the female. In the male each oviger is six-jointed, and the joints have the proportions stated by Haswell. The third joint, however, has a slight constriction at about one-fifth the length of the joint from the proximal end. A few simple spines occur on the last few joints. Noteworthy is the presence of a peculiar bent spine on the ventral side of the penultimate joint about one-third the distance from the proximal end.

Legs.—These are as described by Haswell. The only alteration I have to suggest is that the particular spine of the second tibia is situated on a tubercle some little distance from the distal end.

Nervous system.—The nervous system of the species is well shown in some of the slides from the Sydney University Collection, and it is of interest to point out that the arrangement of this system varies a little from that indicated by Loman (1917, p. 83). He figures *Anoplodactylus* with but four ganglia, whereas most other pycnogonida have five, and suggests that owing to the reduction or disappearance of the ovigers and the absence of palps the anterior ganglion which innervates these two organs has fused with the succeeding ganglia. In the species under discussion, however, the anterior ganglion, although small, is present, but is in contact with the next succeeding ganglion.

Genital openings.—Male openings occur on small tubercles at distal end of second coxæ of the two posterior pairs of legs. *Female openings* on all the pairs of legs.

Measurements, holotype, male.

	mm.
Proboscis, length	1.36
greatest diameter	.38
Trunk, length	1.90
width across first pair of crurigers...	1.56
,, behind ,, ,, ,, ,, ...	.30
,, behind second ,, ,, ...	.30
,, ,, third ,, ,, ...	.19
Abdomen, length	.74
width near base	.13
Neck, width	.12

		mm.
Ocular tubercle,	height	.58
	width near base	.12
Third right leg,	first coxa	.36
	second ,, ...	.66
	third ,, ...	.42
	femur	1.28
	first tibia	1.24
	second tibia	1.12
	tarsus and propodus	.66
	claw	.44

Remarks.—This pycnogonid has only been recorded from Port Jackson, where it occurs in various localities.

Affinities.—Loman (1908, p. 72) suggests that this species resembles his *Anoplodactylus stylops* from the Banda Sea.

Ascorhynchus longicollis, Haswell.

(Pl. XXI., figs. 16-17.)

1884 *Ammothea longicollis,* Haswell, 1884, p. 1028, pl. 56, figs. 1-4.

1889 *Ammothea longicollis,* Whitelegge, 1889, p. 233.

1908 *Ascorhynchus longicollis,* Loman, 1908, p. 32.

1909 *Eurycyde longicollis,* Thompson, 1909, p. 533.

Specimens.—Australian Museum Collection, G5195, holotype, female, Port Jackson; Australian Museum Collection, G5174, spirit specimen, probably male (ovigers missing), Port Jackson.

Description.—*Body* is long and slender with segmentation well marked. The *crurigers* are well separated from one another, and are much longer than broad. The third and fourth pairs are a little closer than any of the preceding pairs. The posterior pair are directed somewhat backward. Each cruriger possesses a well marked dorsal tubercle at the distal end.

Cephalon is very slightly expanded in front, and is continued backwards into a long and narrow neck. Above the base of each chelophore is a small tubercle. A little more than half the distance along the neck occur two prominent lateral "cervical processes" to which the ovigers are attached. Just dorsal to these is the *ocular tubercle,* a fairly prominent rounded eminence with visual elements poorly developed and not pigmented. Behind this the neck is slightly wider than in front.

Proboscis has the shape of a long oval and possesses a short scape. It is directed downwards.

Abdomen is long and narrow and slightly expanded at the apex.

Chelophores are as described by Haswell.

Palps consist of ten joints, not of nine as stated by Haswell. As Loman has suggested, the single basal joint in the original description really consists of two joints. The most proximal is short and thick, the next is quite small. The remainder agree with Haswell's description, except of course that in numbering the joints allowance must be made for the missing segment.

Ovigers are ten jointed. Unfortunately they are missing in the case of the spirit specimen. The length of the joints agrees with Haswell's account.

Legs.—Genital openings, female, occur on the coxæ of all legs. For the rest, there is nothing to add to Haswell's description.

Measurements, holotype, female G5195.	mm.
Proboscis, length	3.08
greatest diameter	1.41
Cephalon, greatest length	2.55
anterior width	.74
Neck, anterior width	.35
posterior ,,	.52
Trunk, length	5.23
width behind first crurigers	.57
width across second crurigers	3.30
Abdomen, length	1.54
Palp, first joint	.33
second ,,	.06
third ,,	1.45
fourth ,,	.48
fifth ,,	.92
sixth ,,	.22
seventh ,,	.44
eighth ,,	.48
ninth ,,	.33
tenth ,,	.36
Third leg, first coxa	.87
second ,,	1.10
third ,,	.80
femur	2.55
first tibia	3.96
second tibia	2.42
tarsus	1.18
propodus	1.10
claw	1.18

Remarks.—This species has only been recorded from Port Jackson (depth not stated). Although Thompson (1909, page 533) suggests that this specimen belongs to the genus *Eurycyde*, nevertheless the slender body, the large proboscis, and the simple scape of the chelophores, put it undoubtedly in the genus *Ascorhynchus*.

NYMPHOPSIS gen. Haswell.

Genotype *Nymphopsis armatus*—Australian Museum Coll. G5201.

1884 *Nymphopsis*, Haswell, 1884, p. 1025.

1887 *Nymphopsis*, Schimkewitsch, 1887, p. 272.

1906 *Nymphopsis*, Cole, 1906, p. 218.

1908 *Nymphopsis*, Loman, 1908, p. 49.

1909 *Nymphopsis*, Thompson, 1909, p. 534.

1912 *Nymphopsis*, Loman, 1912, p. 3.

1915 *Nymphopsis*, Loman, 1915, p. 204.

This genus was first defined by Haswell. His description is as follows:—

"*First pair of appendages well developed, cheliform,* "*second pair well developed, palpiform with nine joints.* "*Third pair with seven joints, none of them provided with* "*compound spines.*"

In 1887 Schimkewitsch obtained another species (*N. korotnewi*) referable to this genus, and by comparing the characters of his own species with Haswell's description of *N. armatus*, came to the conclusion that Haswell's specimen was immature. Schimkewitsch therefore re-defined the genus as follows:—

"*Ce genre présente les mandibules (I.) triarticulées, pas* "*cheliformes, les extremités II. 10 articulées, les extremités* "*III. 10 articulées, privées du crochet et des épines plumi-* "*formes, l'article tarsale (8) des extremités IV. - VII. est* "*muni d'épines basales et de crochets secondaires tout à fait* "*rudimentaires (au moins chez notre espèce).*"

Loman's (1908) definition goes much further, and in substance is as follows:—

"*Body segments quite coalescent, lateral processes separate* "*Proboscis large, thick, and moveable; chelifori delicate, shaft* "*two jointed, pincers delicate, occasionally rudimentary in* "*older animals. Palps nine jointed, second and fourth joints* "*longest, the remainder short. Ovigers of male slender, fourth* "*joint very long also the second and fifth, distal joints small,* "*terminal joint long. No toothed spines, only hairs or plates.*

"*Female oviger short, particularly the middle joints, feet powerful. Cement gland as in Ammothea, accessory claws small or absent. Female genital openings on all pairs (?), male openings on posterior two pairs of legs. Eggs small, larvæ with two large pincers without byssus gland and byssus spine.*"

The genotype is an adult female with fully developed eggs in the two distal coxæ and femora of all the legs.

So far as can be made out (with exception of the ovigers referred to in the description of the species) Haswell's specimen agrees with Loman's definition of the genus.

Genus *Nymphopsis* includes the following species:—

Nymphopsis armatus, Haswell, 1884, p. 1025, Port Molle, 15 fathoms.

Nymphopsis korotnewi, Schimkewitsch, 1887, Iles de la Sonde, East Coast of Timor, 34 metres.

Nymphopsis muscosus, Loman, 1908, East Indies, 16-130 metres; Japan, 50-130 metres.

Nymphopsis armatus, Haswell.

(Pl. XXI., figs. 18-20; pl. XXII., fig. 21.)

1884, *Nymphopsis armatus*, Haswell, 1884, p. 1025, pl. 55, figs. 1-4.

1908, *Nymphopsis armatus*, Loman, 1908, p. 49.

Specimen.—Australian Museum Collection, G5201, holotype, female, Port Molle.

Description.—*Trunk* is quite smooth tubular and tolerably slender. The portion behind the third pair of crurigers is narrower than that in front. Segmentation is absolutely suppressed. *Crurigers* are well separated at the base and diverge towards their extremities. The posterior pair extend almost directly backward. Each cruriger is distally expanded with a single dorsal spine.

Cephalon is very small.

Ocular tubercle is situated on the level of the first pair of crurigers and arises by a wide base narrowing above to form a fairly high almost perpendicular tube terminating in a bluntly conical apex. The eyes are large and strongly pigmented, the posterior pair being the smaller.

Proboscis is of large size. It arises by a wide base on the ventral side of the trunk at the level of the first pair of crurigers. It projects diagonally downwards. Its shape is that of an ellipse with the narrower end forward and truncated.

Chelophores are remarkable in shape. The shafts of the two chelophores arise from the anterior margin of the abbreviated cephalon, but are separated from one another by a distinct interval. The division of the scape into two joints is not apparent in the holotype. Each scape is longer than the proboscis and is quite narrow at the base, but expands distally to form a cup into which the terminal portion of the scape is involuted. To the bottom of this cup on the inside is attached the chela. The rim of the cup has a characteristic armature consisting of a series of some eight spines. Of these spines those of the ventral portion of the rim are short and simple, those on the dorsal side being larger and possessing each at its base a pair of short auxiliary spines. The chela is delicate; the palm is small, the fingers curved and untoothed. The movable finger is external. The fingers enclose a wide space, and their points cross at the apex.. In its natural position the chela is more than half hidden in the cup. The involution is held in place by muscle fibres. It is possible that the chela can be protruded. (In the holotype slide the right chela cup has been evaginated, having broken from its fastening evidently under the influence of the pressure used in making the slide.)

Abdomen is a cylindrical tube extending almost vertically upwards. Its posterior side is somewhat concave—on the anterior side, near the apex, is a pair of papillæ each bearing a long simple spine.

Palps are evidently normally nine jointed, although the right palp only possesses eight joints. The palps arise laterally to and below the chelophores. The following description applies to the left palp:—The second and fourth joints are longest, the first and third short. The fourth joint is curved and possesses a distinct tubercle about one-third the distance from the distal end. On this opens the duct of the palp gland which lies in this joint (Hoek, 1881, p. 105). The remainder of the joints of the palp are all small, the sixth being the longest of them. It forms an angle with the shorter fifth joint. The seventh, eighth, and ninth joints are all small. In the palps, the first and second joints are devoid of spines, the third and fourth have occasional spines and a distal fringe. The remainder of the joints are well provided with spines.

Ovigers.—It is a matter for regret that in the slide these appendages are so broken that it is impossible to count the joints. One portion which has altogether come apart from the animal consists of seven joints, but this is manifestly incomplete. The terminal joints are rolled up and seem to be provided with long hairs.

Legs.—First coxa is of normal length, second about twice as long—third a little longer than the first. All the coxæ are narrow proximally and distally expanded. The second coxa bears a well developed tubercle at its distal end, on which opens the female genital pore. This tubercle bears two long simple spines. The first and third coxæ have similar tubercles but not so well developed.

Femur is long and stout, slightly expanded at the distal end. Its spinous armature is very regular in arrangement. At one quarter the length from the proximal end there is on the ventral side a pair of small spines. About half way there are two larger spines each on a tubercle. At the distal dorsal angle there are a couple of pairs on tubercles, one of which is particularly large. All these have small subsidiary spines at their base. In nearly every case the simple looking spines on the coxæ and femur are found under the highest powers to be very minutely toothed.

First tibia is stout and not quite as long as the femur. It bears from ten to fifteen compound spines on the dorsal side. They are larger and more numerous on the anterior legs than on the posterior. Each spine consists of two segments. The proximal of these is long and cylindrical with large processes and also possessing a microscopic serration. The distal segment is long, sharp, and microscopically toothed.

The second tibia is about equal in length to the first tibia but is slenderer. It has about fifteen compound spines on its dorsal surface. These decrease in size and become simpler in structure towards the distal extremity. In addition to the spines mentioned above the first and second tibiæ possess a more obscure surface spination consisting of fine spines arranged in approximately longitudinal rows.

Tarsus is small, dorsal spine is absent, but there are some simple ventral spines.

Propodus is strong and curved with about a dozen long simple spines on the dorsal surface. The sole is armed with a number of spines varying in number from twenty-one on the anterior foot to fifteen on the posterior. These are re-curved spines, decreasing in size towards the distal end. Claw is long strong and curved. The auxiliary claws are rudimentary.

The *genital apertures*, female, occur on the second coxæ of all the legs.

Measurements, holotype, female.

	mm.
Proboscis, length	2.25
greatest diameter	.97
Trunk, length	2.40
width behind first crurigers	.56
,, ,, second ,,	.53
,, ,, third ,,	.44
greatest width across second crurigers	2.75
Cephalon, breadth	1.05
Ocular tubercle, height	.72
diameter	.24
Abdomen, height	1.46
smallest diameter	.19
Chelophore shaft, length	1.6
width at base	.24
greatest width	.67
Right palp, first joint	.10
second ,,	.87
third ,,	.06
fourth ,,	.76
fifth ,,	.22
sixth ,,	.20
seventh ,,	.10
eighth ,,	.06
ninth ,,	.05
Third right leg, first coxa	.65
second ,,	1.35
third ,,	1.04
femur	3.35
first tibia	3.30
first tibia, longest spine	1.17
second tibia	3.04
second tibia, longest spine	1.20
tarsus and propodus	1.56
claw	.97

Remarks.—This species was found by Haswell in Port Molle, Queensland, at a depth of fifteen fathoms.

Achelia assimilis, Haswell.

(Plate XXII., figs. 22-26.)

1884, *Ammothea assimilis*, Haswell, 1884, p. 1026, pl. 55, figs. 1-5.

1899, *Ammothea assimilis*, Whitelegge, 1889, p. 233.

1908, *Ammothea assimilis*, Loman, 1908, p. 59.

1913, *Achelia assimilis*, Bouvier, 1913, p. 140.

Specimens.—Australian Museum Collection, G5220, one microscope slide labelled "type." This contains three specimens, all immature, one of doubtful sex, the others female. Zoological Collection, Sydney University, one microscope slide containing two specimens (adult), both males.

As Loman has pointed out, Haswell's description of this species, published in the early days of Pycnogonid research, is not critical enough for present day purposes. I have, therefore, decided to give a full account of the species.

The slide in the Australian Museum marked "type" contains only immature specimens with chelate chelophores and immature ovigers. I cannot suppose that it was upon these specimens that Haswell's original description was based. The specimens from the University of Sydney were certainly the originals of Haswell's drawings, and no doubt it is an oversight that these were not designated as the types.

Description.—The *body* is disc like and broad, segmentation practically non-existant, *crurigers* closely approximated with no space between.

Cephalon is very slightly developed.

Ocular tubercle is situated near anterior edge of cephalon and is of medium length, rounded at apex, with eyes large, distinct, and pigmented.

Abdomen is of medium length, semi-erect, tubular, tapering and ornamented with a few spines towards apex.

Chelophores are imperfect in adult specimens. Scape is simple, chela rudimentary. The whole organ measures considerably less than half of the length of the proboscis.

Palps are eight-jointed, second and fourth joints are longest, remainder small. The last five joints are provided with hairs.

Ovigers (male) ten jointed. First joint small and about as long as wide, the second, third, fourth, and fifth are progressively longer, the remainder are small, the tenth being particularly so. The last four joints bear simple spines and there is a terminal spine. The five terminal joints are twisted into a spiral.

Legs.—The three coxæ are short, the second being a little longer than the others. The first coxa bears terminally a few simple spines each set upon a papilla. In the succeeding coxæ a distal fringe is present consisting of many delicate spines without papillæ. In the male the genital apertures occur on the second coxæ of the two posterior pairs at the apices of large genital tubercle. Femur is stout, expanded at distal end, a little shorter than the combined coxæ. The femoral gland ends on a well marked papilla situated distally and bearing a prominent spine. Some small spines occur with occasional longer ones on the dorsal surface. First tibia is also short and expanded armed in a similar fashion to the femur, to which it is about equal in length. The second tibia is stout, slightly curved, and about equal to each of the two preceding segments. The tarsus is small with a single dorsal spine and a ventral bunch of hairs. Propodus is stout, curved, sole being ornamented proximally with three large spines separated by a space, for the rest with about five or six spines which decrease in size towards extremity. Terminal claw is stout and curved, less than half the length of the propodus. Auxiliary claws are well developed.

Genital openings (male) are situated on genital tubercles on the two posterior pairs of limbs.

Measurements:—

		mm.
Proboscis, length		.70
	greatest diameter	.36
Cephalon, greatest width		.47
Trunk, length		.70
	width across second crurigers	.78
Abdomen, length		.27
Chelophore, length		.31
Third right leg,	first coxa	.19
	second ,,	.25
	third ,,	.22
	femur	.55
	first tibia	.56
	second ,,	.58
	tarsus and propodus	.52
	claw	.20
	auxiliary claw	.12
Palp, second joint		.27
	third ,,	.05
	fourth ,,	.24
	fifth ,,	.08
	sixth ,,	.06
	seventh ,,	.07
	eighth ,,	.08

Remarks.—Whitelegge (1889, page 233) records the locality of the species as Clark Island, Port Jackson.

Affinities.—Haswell suggests that this species is nearly related to *Achelia* (*Ammothea*) *langi*, Dohrn.

It is necessary to point out some errors in Haswell's description and drawings of this species. Fig. 5 shows the proboscis and palps, not the *first* pair as stated by Haswell. The basal joint of the palp is omitted. Fig. 6 shows the terminal joints of the palps, not of the first pair. Fig. 7 is evidently a representation of the oviger (third pair) not of the palp (second pair). This drawing is not quite accurate. There is an evident oversight in the description of the second pair (palps). This commences with an account of the structure of the palps but merges into a description of the ovigers.

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EXPLANATION OF FIGURES.

Plate XVIII.

Figs. 1-3.—*Rhopalorhynchus tenuissimus*, Hasw., holotype male.

Fig. 1.—Cephalon, dorsal view.

Fig. 2.—Leg.

Fig. 3.—Palp.

Figs. 4-5.—*Nymphon equidigitatum*, Hasw. (from spirit specimen).

Fig. 4.—Dorsal view, ovigers, palps and legs not shown.

Fig. 5.—Third right leg.

Plate XIX.

Fig. 6.—*Nymphon equidigitatum*, Hasw. (from spirit specimen).

Fig. 6.—Lateral view, legs removed.

Figs. 7-8.—*Pallene* (?) *valida*, Hasw., holotype, male.

Fig. 7.—Dorsal view, with third right leg.

Fig. 8.—Ventral vein of anterior portion of body (one chelophore not shown).

Fig. 9.—*Pseudopallene pachycheira*, Hasw., holotype, male.

Fig. 9.—Ventral view (legs and chelophores not shown).

Plate XX.

Figs. 10-11.—*Pseudopallene pachycheira*, Hasw., holotype, male.

Fig. 10.—Dorsal view (legs not shown).

Fig. 11.—Third right leg.

Figs. 12-14.—*Anoplodactylus tubiferus*, Hasw. (from spirit specimen).

Fig. 12.—Ventral view (♂), with third right leg.

Fig. 13.—Terminal joints of oviger.

Fig. 14.—Sexual aperture (♂).

Plate XXI.

Fig. 15.—*Anoplodactylus tubiferus*, Hasw., female.

Fig. 15.—Lateral view, legs removed.

Figs. 16-17.—*Ascorhynchus longicollis*, Hasw., holotype, female.

Fig. 16.—Dorsal view, with third left leg.

Fig. 17.—Oviger (female), spines not shown.

Figs. 18-20.—*Nymphopsis armatus*, Hasw., holotype, female.

Fig. 18.—Dorsal view, showing third left leg.

Fig. 19.—Spine from rim of chelophore.

Fig. 20.—Palp gland.

Plate XXII.

Fig. 21.—*Nymphopsis armatus*, Hasw., holotype, female.

Fig. 21.—Simple spine from leg.

Figs. 22-6.—*Achelia assimilis*, Hasw., male (drawn from slide in Dept. of Zoology, University of Sydney).

Fig. 22.—Dorsal view, showing third right leg.

Fig. 23.—Oviger (male).

Fig. 24.—Terminal joints of oviger (male).

Fig. 25.—Cement gland.

Fig. 26.—Gland from 2nd tibia.

NOTE ON THE OCCURRENCE IN TASMANIA OF THE FRESHWATER CRAB, *HYMENOSOMA LACUSTRIS*, CHILTON.

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(Communicated by Professor T. Thomson Flynn.)

(Received 8th July, 1919. Read 11th August, 1919.)

Professor T. Thomson Flynn, of the University of Tasmania, of Hobart, has been good enough to send me some specimens of a small crab obtained by him in North-West Tasmania, which he thought belonged to the species *Hymenosoma lacustris*, Chilton, though they appeared to differ from the published descriptions in the shape of the rostrum and in some other points. The few specimens he collected were found nestling in the crevices of rotting wood in a very small creek in the middle of an open paddock near Flowerdale.

This species was originally described from specimens obtained in Lake Takapuna, near Auckland, New Zealand, and has since been recorded from other localities in New Zealand, also from Norfolk Island, Lord Howe Island, and from two localities in Victoria, Australia. Its occurrence in Tasmania is additional evidence of its wide distribution, and its antiquity. I have compared the Tasmanian specimens with those from the other localities, and consider that they should be placed in the same species. The rostrum is more sharply depressed than in the Victorian specimens, more truncate at the end, and its lateral margins are more raised, showing prominently in dorsal view. In the Victorian specimens the rostrum is more nearly horizontal, its margins are less prominent, and the end is somewhat narrowly rounded. The Norfolk Island specimens have the rostrum, on the whole, similar to that of the Victorian, but the end is more broadly rounded; in the Lake Takapuna specimens the rostrum is much depressed, and the margins are sharply raised, but the end narrows to a blunt point, instead of being regularly rounded.

Other differences between the specimens then known in the lateral teeth on the carapace, the hairiness of the carapace and appendages, and in the teeth or tuberculations on the chelipeds of the male were pointed out in 1902 by Fulton and Grant. The Tasmanian specimens resemble those from Norfolk Island in having the lateral teeth almost entirely absent, the anterior one being only faintly indicated; in Lake Takapuna specimens both teeth are fairly distinct, the anterior one being prominent, though bluntly rounded at the end. The Victorian specimens show a somewhat intermediate condition. The male specimens from Tasmania are small, and have the chelipeds smooth, but this may be due to immaturity. After examining a number of specimens Fulton and Grant found that the various characters mentioned were not constant, and I agree with their statement that a large number of adult males from each locality must be examined before we are in a position to divide them into separate species or sub-species. The special characters of the Tasmanian specimens are, in my opinion, not sufficiently distinct to warrant their separation from the others, and they only help to show how difficult it will be to find constant combinations of characters by which to distinguish the different forms. Any investigation of this kind can, however, be safely left for future solution: the important point at present is that we have the same form of freshwater crab still existing in lands now widely separated. I have drawn attention to the importance of this fact in a previous paper (Trans. N.Z. Inst., Vol. 47, p. 316).

For the convenience of Tasmanian zoologists I give below the chief references dealing with the subject, and also the general description of the crab, which I published in 1915.

HYMENOSOMA LACUSTRIS, Chilton.

Elamena (?) *lacustris*, Chilton, Trans. N.Z. Inst., vol. 14, p. 172.

Hymenosoma lacustris, Chilton, l.c., vol. 15, p. 69, pl. 1, fig. 2 a to e; vol. 47, p. 316; and P.Z.S. for 1906, p. 703.

Hymenosoma lacustris, Fulton and Grant, Proc. Roy. Soc. Victoria, vol. 15, p. 59, pl. 8.

"Carapace nearly circular, rather broader than long; "flat, naked, or with a few scattered hairs. Rostrum "broad, strongly depressed, its upper surface concave from "side to side, extremity in form of an obtuse angle. "Antero-lateral margins of the carapace with 2 obscure "teeth. Cheliped of male small, propod only slightly "broader than the carpus, hairy. Ambulatory legs some-

"what densely covered with long hairs, tarsi long, slender, "compressed, densely haired. Last pair of legs somewhat "shorter than the preceding. Abdomen of male of 5 "joints subequal in length, 3rd rather narrower than the "1st and 2nd, 4th nearly as wide as the 3rd, last "broadly rounded at the end; margin fringed with very "short hairs, some longer ones being scattered on the "surface. Abdomen of female with slight median ridge "along its whole length."

STUDIES OF TASMANIAN CETACEA.

Part III.

Tursiops tursio.

Southern Form.

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and

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Plates XXIII.-XXV.

(Received 21st July, 1919. Read 1st September, 1919.)

In foregoing papers we have dealt with (i.) *Orca gladiator*, *Pseudorca crassidens*, *Globicephalus melas*, and (ii.) *Ziphius cavirostris*. In the present instance we desire to place on record certain data relating to *Tursiops tursio*, and to show reasons why it should be included as an inhabitant of the Australian Zone. In a succeeding paper we hope to publish certain facts concerning *D. delphis*.

The genus *Tursiops* should not be confounded with that of *Tursio*, which latter genus, with very little readjustment, might well be relegated to mere specific rank, for it is closely involved with other genera—for example, *Prodelphinus*.

Gray used the designation *Tursio* in 1862, but, as it had been previously used by Wagler for another genus, Gray's designation lapsed, and *Tursiops* was substituted. *Tursio*, however, is still retained for its correct genus, which explains why care must be taken to differentiate between the two genera.

In all lists of Australian Cetacea the representative of the genus *Tursiops* inhabiting these seas is given as *T. catalania*, the species being founded by Gray in 1862. (1) As has been observed by several authorities (2) of the numerous species described of this genus, it is very difficult to satisfactorily differentiate them from the main form of *T. tursio*. In this connection we would again draw attention to the remarks made in our previous

(1) Gray; *Delphinus catalania*, Proc. Zoo. Soc. Lond., 1862, p. 144.
,, *Tursio catalania*, B.M. Cat. S and W., 1866, p. 262.

(2) Among others by Beddard, Camb. Nat. Hist. Mammalia, p. 379.

paper concerning the manner in which both genera and species of the Cetacean order have been created in the past. (3) These remarks apply with added force to the *Delphinidæ,* as pointed out in strong terms by Professor Flower, (4) when writing concerning Dr. Gray's tendency to multiply species.

Since Gray published his original description it has been usual to refer to the Australian form of *Tursiops* as *T. catalania,* and to eliminate *T. tursio* as an Australian species. We propose to show that *T. tursio* is to be found in the Australian Zone, and, further, that we have certain material which may relate to the species *catalania.* Our present opinion regarding this second species is mainly based on a study of the vertebræ, which differ in a remarkable manner from the typical *Tursio.* Unfortunately, Gray's original description of *catalania* is founded mainly on a rather vague description of the osteology of the skull. We hope to gather further material in the future regarding this presumably second species, and to place our observations on record. In the present instance we will confine our attentions to showing that there is in Australian seas a species which simulates very closely that of the European *T. tursio.* The distribution of this species is evidently cosmopolitan, but, in order to make a slight local distinction, we propose to refer to the species in the vernacular as "The Southern Form."

As Gray's original description is not readily available to many Australian students, it has been considered advisable to refer to portions of it in detail. Particularly so as it has an important bearing on the present paper. Gray stated (5) *inter alia*:—

"Mr. John Macgillivray has sent to Mr. Cuming, who " has transferred them to the British Museum collection, " two skulls of a species of Dolphin or Bottlenose which he " regards as probably new. These skulls were accompanied " by the following notes:—

"Delphinus, N.S. The larger of the two skulls be- " longed to an individual killed off Cape Melville (within " the Great Barrier Reefs), north-east coast of Australia, " September 5th, 1860. It was a female, 7½ feet in length. " . . . The smaller of the two skulls represents another of the " same species. It was considerably smaller than the " first one, being only 6¾ feet in length. . . The two skulls " differ in shape and size. No 1 is 17 inches long; the " beak to the notch is 10 inches, and the upper teeth-bone

(3) Pap. and Proc. Roy. Soc. Tas., 1919, p. 6.

(4) Flower, Proc. Zoo. Soc. Lond., 1883, p. 466.

(5) P.Z.S., 1862, p. 143.

" 8½ inches long; the front lower teeth are worn away and " truncated, like the teeth of the common *Delphinus* " *tursio*, which was described as *D. brunatus* by Montague. " There are twenty-seven teeth on each side in the upper, " and twenty-five teeth on each side in the lower jaw. No. " 2 is seventeen inches long; the beak 9½, and the upper " tooth-bone 8 inches long. The teeth, twenty-four above " (perhaps one on each side is deficient, as the end of the " jaw is very tender), twenty-three or twenty-four below. " The front teeth are slightly truncated, but this skull " differs from No. 1, being rather more convex and rather " narrower, especially in the hinder part, from the middle " of its length."

Gray continues:—"I have compared these skulls with " those of the different species of Bottlenoses (*Tursio*) in the " British Museum; and they are perfectly distinct from any " of them. The species may be called *Delphinus catalania*. " It is smaller in size, and has a much smaller brain cavity " than *D. cymodice* (Gray, Zool. Erebus and Terror, t. 19) " and *D. metis* (Gray, Zool. Erebus and Terror, t. 18), and " the beak is not so tapering as in these species, and the " teeth are rather more numerous. It is equally distinct " from *Delphinus eurysome* (Gray, Zool. Erebus and Terror, " t. 17), believed to be from the North Sea. It is not easy " to point out the distinction of these species in words; but " there cannot be a doubt about them when they are com- " pared together."

In 1883 Professor Flower [6] devoted considerable attention to the genus under review, and made several observations regarding the sex characters of *T. tursio*. We desire to quote certain of Professor Flower's remarks, and also to place in italics the portions which agree with our own observations. In this manner will be seen the remarkable similarity which exists between the Tasmanian form and the species examined by Flower, who stated *inter alia*:—"*In the males the rostrum is larger and compara-* " *tively narrower. The intermaxillaries are mor prominent* " *and convex, especially in their posterior half; in this region* " *the external border of the maxillaries is almost parallel to the* " *corresponding portion of the intermaxillaries;* the crests of " the cranium are more elevated and less sloping laterally. " *The heads of the females are remarkable for the breadth of the* " *rostrum at its base and its middle point; the rostrum conse-* " *quently has a more triangular form; the intermaxillaries are* " *more flattened; the exterior border of the posterior portion of* " *the maxillaries is not parallel to the external border of the*

(6) Flower; P.Z.S., 1883.

"*intermaxillaries, but has a rounded projection outwards. The*
"*cranium of the female is relatively a little broader than that*
"*of the male;* its height is the same in the two sexes. *The*
"*mandible is a little more elongated in the male.*"

Professor Flower summed up his remarks on the genus as follows:—

"1. *T. tursio,* including those that have been named "*Metis, Eurysome, Cymodice, Aduncus,* and *Gilli,* some "of which may be specifically distinct, but, if so, are very "closely allied, and still require definite elucidation of "their characters, the principal differences observed in "the skulls depending on the comparative breadth of the "rostrum, a character much influenced by sex. *T aduncus* "(*T. abusalam,* Gray) differs from the rest only in its "superior size."

"2. *T. catalania,* of smaller size than any of the "others, and with smaller and more numerous teeth. "There is truth in the remark with which Dr. Gray "concludes his original description."

One of the most recent reviews of this genus which we have had the opportunity to see is that by Dr. Beddard (7) in 1900. He points out *T. tursio* is the only satisfactory type of the genus, and gives as apparent synonyms *Delphinus truncatus,* Montagu; *D. metis,* Gray; *D. cymodice,* Id.; *D. eurynome.* He allows, with certain provisional remarks, *T. catalania,* Gray; *T. abusalam,* Ruppell; *T. gilli* and *T. parvimanus.*

As regards *T. catalania,* Dr. Beddard points out that the species is of small size, and the colour is the same as *T. tursio,* except that the sides are covered with blotches of darker colour. The beak is also relatively longer. The species is admitted both by Sir W. Flower and Mr. True.

We would like to draw attention to the fact that, although *T. catalania* was originally described from two specimens obtained from the north-east coast of Australia, successive writers have included it as the representative of genus for the whole Australian Zone, and have not included *T. tursio.* We have not had the opportunity of examining specimens from the type locality and other sections of the Australian coasts, but there can be no question concerning the occurrence of a Southern form of *T. tursio* in Tasmanian seas. As regards the second species, as stated elsewhere, we hope to gather further material.

The question of external colouration is worthy of mention, but we are of opinion that too much attention

(7) Beddard; A Book of Whales, p 273.

should not be paid to variability of colour as regards specific classification. The usually accepted definition as regards the external colour of *T. tursio* is that the upper surface is lead colour and the under surface white. Beddard, however, quotes [8] an instance mentioned by Van Beneden of specimens which were intense black, except for a white streak on the ventral surface. The two specimens with which this paper chiefly deals were of deep and polished black on the upper surfaces, and slate coloured on the under surfaces. The colour being the same in both sexes.

As regards the vertebral formula, our specimens showed C. 7; D. 13; L. 17; Ca. 28-65.

INTRODUCTORY AND PHYLOGENETIC.

As Anthropotomists are apt to refer rather loosely to "vestiges of the cartilaginous cranium," we wish to make our position quite clear prior to introducing the several data that go to make up the present section of our paper. If we assume that the history of the cartilaginous skull has, in the main, been correctly read, we still have to face the fact that a cartilaginous tract, that by ostosis has taken its place in the bony skull, may revert to its former cartilaginous condition if the pressure of external evolutionary conditions so compels it. In an instance such as this is, it would be manifestly incorrect to call such a structure "a vestige of the cartilaginous cranium," since that summary method of dismissing the case would occlude all the interesting facts of its racial history. As it is, in this latter connection, that we have to deal with, part of a cartilaginous tract, in the Dolphin's skull, we desire to avoid any ambiguity—hence this statement.

Between the ossified pre-frontal bone (Ethmoid, of Flower, and others), the frontal, and in part the nasals, of a common Dolphin's skull there remains a strip of cartilage that may, or may not, ossify. It is a moiety of the ethmo-cartilage, but is not a relic of the cartilaginous skull, since, as far as our researches go, it relates to the ethmo-turbinals, which always ossify in part in intra-uterine life, and, *in toto*, at a very early period—certainly before the septal portion of the ethmoid, or, as we here term it, the coalesced pre-frontals. If no whale ever ossified this cartilaginous tract, and, therefore, never showed any ethmo-turbinals at all, we might assume this to be a pre-mammalian racial character, and push the ancestry of the whales back to an early date, and call

(8) Beddard; A Book of Whales, p. 275.

this cartilage a chondro-cranial relic, or anything else of a like nature, but the Rorquals show well developed ethmo-turbinals, and other whales also in part develop the sense capsules. Accordingly we are really dealing with a suspension of ostosis, under pressure of racial evolutionary needs. Retaining this thought in the mental foreground, we set out to examine this cartilage in various Dolphins' skulls, with the following results.

1. We are impressed with the fact that the enormous variation of a Dolphin's skull in the nasal regions, must have first retarded the ostosis of a considerable area; next, the ossific processes acting upon the now changed, and modified area, accelerated ostosis in some parts, and retarded it in others. As an illustration of accelerated and extended ossific energy, we may cite the vomer in Dolphins' skulls. Its basic position insures an early ossification of all its parts, which is sufficiently complex, by the way, to rule out the term "azygous bone," since it not only extends enormously forwards, but posteriorly expands over the whole sphenoid element, and even reaches the basi-occipital. Looking to other vertebrates, we find that Tonkoff, in 1902, saw its paired origin indicated in the bird, although frequently overlooked. In the crocodile it practically has three centres, two giving rise to the palatine moieties, and a third to a central portion that is embraced by the pterygoids. Traces of this latter appear in Dolphins' skulls, while to crown all we get the additional extension backwards just cited. Sir W. Flower was always careful to point out that so-called "azygous bones" were only those whose compound origin was so remote as to be uneasy to trace, a fact our studies have served to recall.

3. As an instance of retarded ostosis, we may name the ethmo-nasal regions of Dolphins' skulls.

4. In very young Dolphins' skulls the whole of this area, including the pre-frontal, and nasal regions, retains the condition of a more or less semi-cartilaginous state, showing its recent evolutionary remoulding. The same skulls, however, will have the vastly extended vomer, completely, and perfectly ossified (including even its basi-sphenoidal plate).

5. The manner in which the bony elements at the vertex of Dolphins' skulls blend, and inter-blend, according to the various factors of genera, is extremely interesting, as note.

In *Delphinus*, the nasals early fuse with two lateral strips of the ethmoid cartilage, and so extend down the sides of the coalesced pre-frontals, that line the back of the nose. This is an ethmo-nasal ankylosis.

In some skulls these lateral ethmo, bony moieties, remain distinct, showing that they are not really parts of the nasals; this, however, is rare, and quite individual. The rest of this cartilage, that is the central portion, may remain as cartilage throughout, or ossify to both nasals, and pre-frontals. This latter is an ethmo-naso-pre-frontal ankylosis.

In *Tursiops*, the nasals early in life remain as two bosses at the vertex of the skull, and always show this basic character. Whatever may happen, later, will follow lines well marked off from those obtaining in the true Dolphins' skulls. We may cite the following, by way of illustration.

The ethmo-cartilage in skulls of *Tursiops*, is less compressed than in those of *Delphinus*, and in the centre it may ossify as two tongue-like strips, that appear above the upper end of the pre-frontals. These are very suggestive of the ethmo-turbinals, and accordingly we so name them. We have skulls that show this very well, indeed. The assumption here is, that the arrested ossific power is returning to earlier evolutionary states, much in the same way that Wormian ossicles appear in human skulls. Exactly how much, or how little, this strip of ethmo-cartilage will manifest definite ossific moieties, will depend upon various circumstances, one of which appears to be the effect of pressure. Still dealing with *Tursiops*, we may note that the vertex of a most carefully prepared skull will show the following bones, in addition to the maxillæ and frontals.

1. Two ossicles that represent the Interparietal and Pre-interparietal. (9)

2. The two true nasals, which combine with any, or all of the other moieties in that region of the skull, according to individual, and sex variations.

3. Two, Ethmo-turbinals.

4. Two, more or less plate-like lateral moieties that fuse with the pre-frontals, the frontals, and nasals, in various ways. These may fuse to extinction upon one side, and remain distinct upon the other.

(9) Pre-interparietal not always present.

5. If they fuse, they may do so either most strongly to the frontal, or similarly to the pre-frontal. Again, the whole mass at the vertex may fuse to extinction, and the ethmo-turbinals remain as cartilage.

The latter state is nearest to the skull of *Ziphius cavirostris*, as represented in the Hobart Museum Osteological collection. By the usual methods adopted in cleaning Museum cetacean crania, either this region of a Dolphin's skull is left, immersed in muscle and cartilage, or else it is so mutilated in the attempt to remove such animal matter, that it is useless to a student. Our notes are made from skulls that took at least two years to prepare, every microscopic fragment of bony tissue being retained in position, and every microscopic fragment of animal matter having been removed by isolated maceration, thus avoiding a chance blow from other bones. In this way only is it possible to retain spongy bone, and to define the bounding lines of ostotic action. Beach worn specimens often help to elucidate a point, here and there, better than imperfectly macerated ones, but it is sure to happen that the very piece most urgently needed has been ground away.

To correctly work out all these points it is essential to disarticulate a young *Tursiops* skull, and trace the respective elements into the cranial cavity, and unless the fronto-occipital sutures are carefully separated, some of the evidence will be lost.

Phylogenetically, all this means that the ancestor of the Dolphin group manifested well-developed ethmoidal sense capsules, the ossific processes relating to which were arrested. A cartilaginous remoulding took place, and later on a partial ossification of some parts, with a tendency to reproduce others, in a state similar to that of the Wormian ossicles of human crania. We close these notes as we began them, by saying these are not vestiges of the cartilaginous cranium.

TURSIOPS TURSIO.

Southern Form.

The males of this genus closely approach the size attained by the females of the genus *Globicephalus*, and, although the maximum size has still to be recorded, it is certain that they reach eleven feet. The females, in our opinion, never exceed ten, the vast majority being a full foot shorter.

Tursiops furnishes a most useful text for an osteological study, as the genus—in point of size—is midway between the Orcas upon the upgrade, and the porpoises upon the down grade. The common Dolphin, which ranges in our seas up to eight feet in length, presents osteological characters worthy of a separate study, and, therefore, in this paper it is proposed to present a comparative study of the male and female *Tursiops*, rather than to contrast with *Globicephalus* or *Delphinus*, as would most commonly obtain.

MALE SKULL.

The occipital condyles are very heavy in appearance, and divergent upon their upper margins, so that the space between them and the magnum foramen—with which their upper ends terminate—is exactly two inches, while three-quarters of an inch below the foramen they have so contracted that the intervening space is only three-eighths of an inch. From this point, however, they again diverge in a rounded curve to their bases—a fourth of an inch lower down. The magnum foramen is buried away under the overlapping condyles, which latter form two hollow grooves along its margins, terminating above in two deeply marked pits. The foramen itself measures $1\frac{3}{4}$ x $1\frac{3}{4}$ inches, and is arched, rather than notched, upon its upper border in the individual skull here used for descriptive purposes. Some male skulls, however, available to us, show the notch most distinctly, while female skulls, apparently, have the magnum foramen transversely oval, and quite devoid of either notch or distinct arch. When large numbers of these skulls, of various ages, and both sexes, are available for direct comparison, it will most probably be shown that the following facts obtain:—

1. All young *Tursiops*' skulls have a transversely oval magnum foramen.

2. The majority—if not all—females retain this form throughout life.

3. Adolescent males show the inception of the upward enlargement of the foramen, in the immediate centre of the upper wall, and thus constitute "a notch."

4. Later in life, the edges of the notch become absorbed, as the needs of the medulla oblongata demand, and the "arched" upper edge of the foramen is the result.

Thus it will be noted that a transversely oval foramen —and, therefore, one of unequal measurement—is converted into one whose central measurements are equal in both directions.

If a line is drawn horizontally across the vertex of the skull, it will be found to be exactly five inches above the upper wall of the magnum foramen.

The par-occipital processes have thickened borders, are concave as they contribute moieties to the otocrane— they are notched for the passage of the nervus vagii. Mesiad—they are confluent with the basi-occipital, and basi-sphenoidal plates of the otocrane. A ridge marks the occipito-sphenoidal suture, but the spheno-sphenoidal suture is overlapped by the enormously extended vomer. The whole of the vertex of the skull is rough and granulated, even at times raised into bony callosities, and the sutures proper to this region stand out as ossified ridges. The line of the super-occipital—as viewed in profile—is that of an "ogee," hollow above the magnum foramen, and rounded higher up. A line vertical to the basis crani, and made to touch the occipital condyles, would stand away from the deepest part of the curve of the ogee, an inch and three-quarters.

The temporal fossæ are largely composed of the parietals, which are ridged above, and continued posteriorly as two wings that extend a quarter of an inch beyond the line of the super-occipital. These ridges slope backward and downward, finally losing themselves at the exoccipito-squamosal sutures, having upon all their faces, made open parabolic curves. In macerated skulls these curves are very symmetrical, but in old beach-worn specimens they always suffer much mutilation. The pre-maxillaries expand over the maxillaries at their upper ends, and form two hollow grooves. The maxillaries cover the whole of the frontals, except a wedge-shaped strip on either side of the skull, the bases of these wedges being turned towards the "blowers." In point of size, the frontal strip thus exposed does not exceed one and a half inches, but may vary considerably within this limit in individual skulls. When a line is drawn—mesiad—from the tip of the skull beak to the vertex, the upper edges of the maxillary wings subtend angles of 78 degrees to it. Over the zygomatic arches, the maxillary wings are much thickened—in male skulls of this genus—as much so relatively as in *Globicephalus* and *Orca*, but female skulls show very little super-ossification in this region. As far as our knowledge goes, no female *Tursiops* skull ever shelves here, as obtains in *Delphinus*. It is simply a matter of less super-ossication, incidental to lower muscular power. The post-orbital processes of the frontals make such shallow curves, anteriorly, that it is best to regard them as lines, and, as such, they subtend angles of 60 degrees to the tops of the arches, formed by the united surfaces of the maxillo-frontal elements. On either side of the skull, the frontals are seen to protrude beyond the maxillaries in this region. The post-orbital processes approximate the zygomatic processes of the squamosals to within a quarter of an inch. As in all the *Delphinidæ* of the normal type, the malar bones have been disrupted, and are functionally superseded by the powerful bony arches, composed of the orbital moieties of the frontals, maxillaries, and incidentally the zygomatic processes of the squamosals. The malar bones are six inches long, measured in a straight line from their ant-orbital junctions, with the super-orbital plates of the maxillaries, to their terminations at the zygomatic processes of the squamosals.

In male skulls—such as those under review—the pre-maxillaries, when viewed in profile, give the following results. From the narial basin they arise with a well-marked curve to the middle of the beak, next depress to form a well marked hollow, elevate again, and, lastly, slowly shelve off to the tip. In female skulls, the beak is much more depressed, and unless one had noted these curves in the male skull they would hardly be looked for. Having once noted the well-marked profile of the male, the more easy curves of the female manifest themselves quite naturally, although so slightly marked.

The pterygoid bones are separated in male skulls by the very small space of one-sixteenth of an inch.

As in the skulls of *Globicephalus*, the pre-maxillary and vomer appear in the palate.

The broken and spongy alveoli (here and there absorbed) suggest the following dental formula:—

$$\frac{24 \;.\; 24}{20 \;.\; 22}$$

In a general way anything up to 25 teeth may be present, and even in old animals some of the posterior teeth never function, as we have evidence to show.

As we hold perfect skeletons of the two sexes of the Tursiops, we propose to give comparative measurements, this being, in our case, an exceptionally fine opportunity for such a method of presenting the facts, since both animals were obtained in the flesh. Both animals were fully matured as their skeletons prove, the male was ten feet eight and a half inches, between vertical rods, and the female was exactly nine feet in length.

Having dissected these animals, and prepared their skeletons, we have every confidence in saying they represent normal sex types of the genus, and that the data may be relied upon accordingly.

COMPARATIVE SKULLS.

Character of Measurement.	Male Skull. in.		Female Skull. in.
From tip of beak to occipital condyles	21	...	19
Internal length of the brain cavity	$6\frac{3}{4}$	...	6
Maxillary notch to tip of the beak	11	...	11
Tip of beak to superior nares	14	...	14
Length of palate in a middle line	$12\frac{3}{4}$	...	$12\frac{3}{4}$
Tip of beak to end of alveolar margin	10	...	$9\frac{3}{4}$
Height of skull at vertex	$8\frac{3}{4}$	...	8
Breadth at squamosal processes	$11\frac{1}{2}$	...	10
Breadth of brain case at parietals	8	...	$7\frac{1}{2}$
Ditto of brain superorbital ridge	10	...	10
Ditto across beak at base	$5\frac{1}{2}$	...	5
Ditto across middle of beak	4	...	$3\frac{3}{4}$
Ditto of pre-maxilla	2	...	$1\frac{7}{8}$
Width of condyles	$4\frac{3}{4}$	...	$4\frac{1}{2}$
Height of foramen magnum	$1\frac{3}{4}$	...	$1\frac{3}{8}$
Width of foramen magnum	$1\frac{3}{4}$	...	$1\frac{7}{8}$
Length of ramii of lower jaws	$19\frac{1}{2}$	...	$16\frac{1}{4}$
Height of ramii at coronoid processes	$4\frac{1}{2}$	...	$3\frac{3}{4}$
Length of tooth line	$9\frac{1}{2}$	...	$9\frac{1}{2}$
Length of symphysis	$2\frac{1}{4}$	...	$2\frac{1}{2}$

A glance at this table will show the curious manner in which the male and female skulls simulate each other in the vast majority of their measurements, and yet sharply contrast in the length of the lower jaws. A single ramus can without fear be sexed so constant is this character; the ramii of adult males nearly reach 20 inches, and the females as nearly reach 17 inches. The notes already given as to the skulls and their profiles will serve to sex the crania.

Our data respecting the living animals supply the information that the lower jaws of the males protrude at least an inch and a half beyond the upper maxillæ. This accounts for fifty per cent. of the excess of ramal length, and explains the reason for the male and female crania being similar in most of their measurements, and yet showing so sharp a contrast in the matter of their mandibles. Our photo will make this partly evident, as the rod is sloped to touch both jaws. The following notes upon the skeletons of the adult sexes will aid the student in the determination of fragmentary elements and even single bones.

COMPARATIVE CERVICAL VERTEBRÆ.

Measurement Made.	Male. in.		Female. in.
Width across the processes of the axis	$6\frac{3}{4}$	...	$6\frac{1}{4}$
Total length of cervical series	$3\frac{1}{2}$	...	$3\frac{1}{4}$
Width across centrum of cervical No. 7	$2\frac{3}{4}$	...	2
Vertical measurement of same	$2\frac{5}{8}$	...	$1\frac{3}{4}$

DORSAL VERTEBRÆ.

Measurement Made.	Male. in.		Female. in.
Greatest height of dorsal No. 6 along angle subtended by the spine	$5\frac{3}{8}$	...	$5\frac{1}{8}$
Across diapophyses of same	$5\frac{1}{2}$	...	$4\frac{3}{8}$

LUMBAR VERTEBRÆ.

Measurement Made.	Male. in.		Female. in.
Total length of lumbars, 6, 7, 8, 9, 10, 11, 12, 13, 14	$15\frac{1}{8}$	...	$12\frac{1}{4}$
Greatest width across diapophyses	$12\frac{1}{8}$	...	$9\frac{1}{4}$
Greatest height of neural spine	$6\frac{7}{8}$	...	$5\frac{1}{4}$
Greatest length of body of vertebra	$1\frac{3}{4}$	...	$1\frac{1}{4}$

SCAPULÆ.

Measurement Made.	Male. in.		Female. in.
Greatest scapular height	$7\frac{1}{2}$	...	$6\frac{1}{2}$
Greatest scapular width	12	...	$8\frac{7}{8}$

ARM BONES.

Measurement Made.	Male. in.		Female. in.
Length of humerus	$3\frac{3}{4}$	...	$3\frac{1}{4}$
Length of radius	$4\frac{1}{4}$	...	$4\frac{1}{4}$
Length of ulna (including the olecranon process)	$3\frac{1}{2}$	...	$3\frac{1}{2}$
Width of radius and ulna (distal)	$3\frac{7}{8}$	...	$3\frac{1}{2}$

Vertebral formula. Cervicals 7, the first two fused to extinction in all skeletons handled by us. Dorsals 13. Lumbars 17. Candals 28. Total 65. Ribs 13 pairs, five of which reach the sternum, which latter is always in a single piece.

HISTORY.

The two whales chiefly noted in this paper, both came into the Tamar River (the male some years prior to the female), and were thus captured; both were in ill-health. The male had just escaped from some titanic battle, and was torn and mutilated. The female ascended the North Esk to Hobblers' Bridge, and died there, but the male still showed fight, and was killed in the Cataract Gorge, and afterwards exhibited in Brisbane-street.

Both were similar in external outlines, and also in colour. In the matter of the lower jaws, the mandibular symphysis protruded more in the male than in the female.

The upper parts of these Dolphins were deep black, richly polished, with slate-coloured tints below. We hold skulls and parts of skeletons from King Island, Flinders, and the North-West Coast of Tasmania, and there is some evidence in favour of admitting a second species of *Tursiops*, but for the present we regard *Tursiops tursio* as being alone certain. If a second species is shown to exist, we think a curious twisting of the neural spines of the lumbar vertebræ and the moderate length of some eight feet odd, will largely enter into its specific characters. Twice we have traced such items, but we are still awaiting the evidence obtainable from the dissection of a complete specimen.

In conclusion, we may just point out that as far as our evidence goes the *Tursiops* of Australian seas very closely simulates that of European waters, and, upon the whole, justifies the retention of a single classification for both parts of the globe. It might be wise, however, to retain for our Dolphins the additional distinctive title—"Southern Form"— as we suggested in the early part of our paper.

NOTES AND ADDITIONS TO THE FUNGUS FLORA OF TASMANIA.

By L. Rodway, C.M.G.
Government Botanist.

Plate XXVI.

(Received 25th August, 1919. Read 1st September, 1919.)

Of the Agarics which may be gathered in Tasmania we have but a poor record. The reason is not far to seek; they are incapable of satisfactory preservation. The softness of their structure causes such a distortion in drying that means of critical comparison are lost. Certainly they may be preserved in spirits or formaline, but then the colour will go, and colour in this group of plants is of first importance. The only satisfactory way to proceed is to make a faithful water-colour copy, also accurate notes of all features, and trust that some expert may recognise and name them.

The following four species may certainly be added:—

Collybia protracta, Fr. Solitary, dark brown, almost black. Pileus to 5 cm., convex to plane, umbonate, smooth; gills deep, dark gray often with a lighter edge; stem long, slender, solid fibrous. Spores smooth, hyaline 9 x 6 μ. Distinguished by its black colour, and very broad, crowded gills.

Found occasionally in partially shaded places.

Collybia butyracea, Bull. Pileus convex to plane, smooth, rather hygrophanous, mostly 5-10 cm., watery flesh coloured, browner when old; gills very numerous, delicate, white, receding with a decurrent tooth; stem cartilaginous, stuffed usually expanding at the base. Spores hyaline, smooth, 6 x 3 μ.

Common, chiefly amongst wattle trees.

Flammula prasina, C. et M. Pileus convex. subumbonate, mostly 5 cm., dull green in centre fading to dull yellow towards the margin; gills fairly numerous dull yellow, receding with a decurrent tooth; stem bold, 5-10 cm., pale yellow, solid, pithy in middle. Spores brown, smooth, 8 x 4 μ.

Common in forests.

Pholiota adiposa, Fr. Pileus convex, 5-10 cm., glutinous, yellow with darker squarrose scales; gills broad yellow then ferruginous, adnate slightly rounded; stem long, often bulbous, yellow, surface floccose, ringed.

Very common on dead wood.

Of other Hymenomycetous Fungi not hitherto recorded as Tasmanian:—

Hydnum cyathiforme, Sch. With a central stem, squamous, very like a Thelephora, dark gray to white; spines short, white, crowded. Spores hyaline, globose, 3 μ.

Radulum molare, Fr. Resupinate, waxy developed into irregular blunt tubercles; dull yellowish.

On dead wood.

Phlebia reflexa, Berk. Resupinate, upper margin reflexed, purplish brown, waxy, raised into irregular obtuse wrinkles more or less radiating.

On dead wood.

Boletus badius, Linn. A large coarse Bolet which only appears under introduced Pine trees. Surface brown, tubes yellow, becoming greenish blue when bruised.

Merulius aureus, Fr. Very thin and closely adhering, golden yellow, margin mycelioid, paler.

On dead wood.

Hymenochœte purpurea, C. et Mor. Distinguished from the other members of the genus found in Tasmania by its purple colour.

On dead wood.

Clavaria rosea, Fr. Solitary or in small tufts, up to 2 cm., obtuse, rosy, slender below, spores globose, 3 μ.

On the ground.

Hydnangium australiense often has the sterile base carried through the gleba to the apex, assuming the appearance of an obsolete stem. When this is so the pileus is generally open below, exposing the gleba, giving the plant all the characters of a *Secotium.*

Hydnangium microsporium, n.s. Globose, 6 mm. diameter, white to pale ochre. Peridium rather thick and tough. Gleba dense, orange, cavities small, packed with spores. Spores hyaline, globose, armed with short spines or warts, 5-6 μ. diameter.

Mt. Nelson Range.

Apparently near *Hydnangium Brisbanensis*, differing mainly in colour and density of gleba.

Hydnangium densum, n.s. Globose, pale ochre, 1 cm. diameter. Peridium very thick and tough. Gleba marbled with black from the small spore cavities which are about 0.3 mm. diameter and densely packed with spores. Spores globose, brown, minutely echinulate, 9 μ.

Mt. Nelson Range.

A very curious species. In section the thick peridium and black spore cavities and general dense structure differ from other members of the genus.

Hydnangium alveolatum, C. et M. Subglobose, pale ochre, 5-10 cm. diameter. Peridium thin fleshy, gleba dense, cells pale ochre numerous, about 0-2 mm. diameter, dense; spores globose, minutely alveolate, 10-12 μ. diameter.

Valley at foot of Mt. Wellington.

Hysterangium atratum, n.s Subglobose, 1.5-2 cm. diameter, dark brown, viscid. Peridium fleshy, tough, thin; gleba dark brown, canals small but very numerous. Spores dark brown, nearly globose 12 x 11 μ., minutely alveolate.

Very like *H. neglectum*, but with very different spores.

Mt. Nelson Range.

Hysterangium obtusum, n.s. Irregularly globose 2 cm., violet when fresh. Peridium thick violet not easily separating from the gleba. Gleba pale slatey olive. Spores oblong, very obtuse, smooth, hyaline, 9 x 4 μ.

Differing from the *H. affine* in peridium and spores.

Mt. Nelson Range.

Hymenogaster fulvus is described in P. et P. R.S. Tas., 1917, p. 109, as being black. It becomes so when old, but is pale gray when young.

Secotium ochraceum, n.s. Underground subglobose, 1-2 cm. diameter. Pale ochre-brown, surface verrucose, peridium very thin, hardly apparent; stem short, extending to the upper surface, but not produced laterally on the pileus. Gleba ochraceous, canals bold tortuous, dissepiments thin. Spores elliptic, subacute at both ends, pale-brown, smooth, 16 x 8 μ.

Very like forms of *S. gunnii*, but spores twice as long.

Cascades, Hobart.

Crucibulum simile, Mass. Usually many together, 5-10 mm. high, mouth expanding becoming revolute; externally tomentose. Spores colourless, subglobose, 4 x 3 μ.

Tremella vinosa, Mass. This plant was described in the Kew Bulletin in October, 1899, from specimens gathered in Tasmania, but does not appear to have been recorded locally. The following is Massee's description:—

> Gelatinous, soft, gyroso-plicate, glabrous, vinous, 1-2 cm. broad. Basidia globose, sterigmata 4. Spores subglobose, hyaline, smooth 10 μ.
>
> Allied to *T. corrugata, Sch.*

On dead wood. Distinguished from all other Tasmanian Tremellas by the dark vinous colour.

Puccinia obtegens, Tul., also known as *Puccinia suaveolens, Rostr.* This is a rust fungus, which appears to be parasitic only on the California Thistle. It has recently appeared in Tasmania, and is showing much activity. Plants attacked by it become sickly, and do not flower. It may have, in the future, considerable value as a means of controlling the weed.

Amongst *Ascomycetes* the following may be recorded:—

Chlorosplenium æruginosum, Tul. Like other members of the genus it is of dark blue-green colour, and extends this colour to the wood on which it grows. The cups are thin, and often irregular in shape. It differs from our commoner *Chlor. omniverens*, by the spores being shorter and narrower, being 12-14 x 3-4 μ.

Trichopeziza sphærula, Sacc. A minute yellow peziza, hairy on the external surface, growing on the bark of She and Bulloak.

Ciboria firma, Pers. In the description of the genus, the sporophore is stated to be borne on a long stem. Though the long-stemmed form is common in Tasmania, it is sometimes met with a stem so short as to approximate with the genus *Helotium*.

Helotium nigripes, Pers., is referred to in Cooke as the stem turning blackish, and the spores 5 x 1-5 μ. long. A very common form, which is usually considered to be typical, has the whole external surface more or less black, and the spores 11 x 3 μ.

Humaria bovina, *Sacc.* Concave to plane wavy, soft-fleshy, umber, with a dull greenish tint, smooth 5-10 mm. Spores oblong smooth 19-22 x 9-11 μ.

On cowdung, together with *Lachnea stercorea*, *Ascobolos furfuraceus*, etc.

Dasyscypha eucalypti, *Berk.*, is much more variable than indicated in Cooke's Handbook. It grows on all sorts of dead twigs and leaves, sometimes attains 4 mm. diameter, the disk is livid when fresh, deep orange when dry. Spores 16-24 x 4.5-8 μ.

Orbilia crystalina, *n.s.* Globose, waxy, gregarious, orange, 1-2 mm. diameter, surface crystalline, with large, prominent, pellucid cells. Hymenium at first covered with a crystalline membrane; as the hymenium expands the membrane bursts in the middle, and remains as a toothed margin; hymenium expands till it is broad, flat, to convex. Asci cylindric-clavate 9 μ. diameter. Paraphyses few, filiform, yellow, 2.3 μ. Spores uniseriate, hyaline, smooth, elliptic with acute ends, 18 x 7 μ. The broad spores readily distinguish it.

Cascade estate, Hobart.

Spragueola mucida, *n.s* Ascophore sessile, subglobose, vaguely nodulose, about 5 mm. diameter, subterranean, growing on buried wood, white. Hymenium covering the entire surface. Asci cylindric. Spores 8, globose, coarsely echinulate, 18 μ. diameter, uniseriate, paraphyses greatly exceeding the asci, filiform attenuate at apex, immersed in dense jelly. At maturity the jelly increases to 1-2 cm., carrying paraphyses and asci with it.

Underground. Mt. Nelson Range.

The genus is founded upon one rare American species—"only two specimens are known; these are in "the Kew Herbarium" (Massee). Our plant differs from the type in having globose instead of elliptical spores and the development of jelly is unique. The sessile habit of the genus is not common amongst *Geoglosseæ*, but the reduction of hypothecium and total absence of excipulum indicates its relation. The round spores suggest *Neolecta*, but habit and copious paraphyses are against it.

Cenangium furfuraceum, *De Not.* Cæspitose and erumpent from a common base, everywhere black. Ascophores about 5 mm. high and broad, cupshaped but much distorted from mutual pressure, tough, externally rough. Asci clavate, spores hyaline, spindle shaped with obtuse ends, slightly curved, 12 x 2 μ

On dead eucalypt.

The hymenium in the typical European form is described as cinnamon, while ours is at least very dark brown, but otherwise there appears no distinction.

Paurocotylis niveus, n.s. In the definition of the genus, Berkeley gives no description of the spore formation, but under *P. pila* he refers to the spores being formed on pellucid peduncles. In the Tasmanian plant the spores are born singly in globose asci.

Subterranean or emerging, globose, pure white mostly 3-6 mm. diameter; dense and tough, canals very irregular. Asci globose 30-50 μ., numerous, entirely filling the canals, each on a long slender peduncle, and containing a single globose strongly echinulate spore 16 μ. diameter, epispore very thick.

On the ground Cascade estate, Hobart.

Sphærosoma tasmanica, n.s. Subterranean, then partially emerging, globose-convolute, ochre to nearly white 1 cm. diameter, fleshy-cartilaginous, hollow, closed or opening on one side towards the base; hymenium covering the internal surface, wall 1.5 mm. thick. Asci linear, spores 8 uniseriate, elliptic, obtuse, coarsely echinulate 24 x 16 μ. Paraphyses filiform, with a globose tip.

Cascade estate, Hobart.

Very like *Hydnocystis cyclospora*, only very different spores, and not opening above.

Aulographum eucalypti, C. et M. Linear black apothecia, many on livid spots.

On leaves of *Euc. obliqua*, and other Eucalypts.

Microthyrium amygdalinum, C. et M. A shield shaped flat perithecium, superficial.

On the surface of leaves of *Euc. amygdalina* and others.

Erysiphe polygoni, D.C., also known as *Erysiphe communis, Grev.*, is a mildew that is making its presence felt amongst garden flowers, especially Sweet Peas.

Hypocrea sulfuria, Schw. C. G. Lloyd writes that our plant, commonly referred to *H. citrina, Pers.*, is erroneously determined; should be as above.

Cordyceps gracilis, Grev. A specimen of this has recently been gathered on Mt. Nelson Range. Two clubs emerged from a larva; stipes pale, about 1 cm., head oblong, yellow, about 4 mm. long.

Mr. Olliff, once Government Entomologist of New South Wales, renamed this as *C. scottianus*, but there was no apparent justification. As he also named a form of *C. robertsii* as new, under the name of *C. selkirkii*, and another as *C. coxii*, and further resuscitated a plate of *C. taylori, Berk.*, which had appeared in Hooker's Journ. Bot. N.S., Vol. II., 1843, and made it the type of a new species, under the name *C. trictenæ*, his suggested new species have not been generally accepted.

Cordyceps robertsii, Hook. The well known Vegetable Caterpillar of New Zealand has been recently gathered in a gully at the foot of Mt. Wellington. It is easy to overlook this, and probably diligent search will bring more to light.

Cystopus tragopogonis, Schr. Occurs on many different Composites, but is particularly abundant on the leaves of *Lagenophora emphysopus*, forming conspicuous white patches.

Amongst the Incompletæ, the following interesting forms may be recorded:—

Dendrodochium molle, n.s. Subglobose from a broad base, 2-4 mm. diam., soft waxy-gelatinous, dull white. Conidiophores verticillate, conidia single, terminating long slender branches, 5 x 4 μ.

Common on dead wood, collapsing when dry into a flat scale.

Verticillium lateritium, Berk., forming broadly effused velvety orange-red or vermilion coloured patches. Sporophores erect, verticillately branched, conidia elliptic, red, 4-6 x 3 μ.

Common on dead vegetable substances.

Stilbum erythrocephalum, Ditm. Stem thick, tomentose, whitish, terminating in a turbinato-globose. rosy or deep red head; conidia elliptical, 4-6 x 2-2.3, hyaline, borne on slender septate, colourless conidiophores that are nodulose at the apex, 50-60 x 3-3.5 μ. (Massee).

On rabbit's dung.

EXPLANATION OF PLATE XXVI.

SPRAGUEOLA MUCIDA, n.s.

1. Tuber x 10. 2. Section. 3. Ascus and Paraphysis, Spore.

AUSTRALIAN *RHYPHIDÆ AND LEPTIDÆ* (*DIPTERA*).

By G. H. Hardy.

Plate XXVII.

(Received 24th June, 1919. Read 1st September, 1919.)

Owing to the discovery that the well known *Rhyphus brevis*, Walker, is a synonym of Macquart's *R. dubius*, which was misplaced by the latter author with doubt in the genus *Chrysopilus* (*Leptidæ*), and as Walker's name is now generally used in literature, it is necessary that an early notification of this change of name be published.

This opportunity is taken to revise the *Rhyphidæ*, which family contains but one known species in Australia.

Fam. RHYPHIDÆ

This family may be described as follows:—Slender insects with filiform antennæ containing 16 joints, the two basal differentiated, the flagellum (3-16) tapering apically; with two basal and a discoidal cell complete, anal cell widely open, all veins simple, not forked; five posterior veins; macrotrichia (at least in the Australian species) on the membrane of the wing. Abdomen with 7 segments.

The following is rendered from Kertesz' key in Term. Fuz. xxv., page 4, 1902:—

Key to the Genera of Rhyphidæ.

1. Radial vein curved, marginal cell open on border. *Rhyphus.*
   Radial vein straight, closing marginal cell by meeting the subcosta at costa. 2.
2. Radial vein rising from cubital anterior to the transverse cross-vein, almost opposite the base of the discoidal cell. Eyes bare. *Olbiogaster.*
   Radial vein rising from the cubital at the transverse cross vein. Eyes hairy. *Lobiogaster.*

Genus *Rhyphus*, Latr., has a wide distribution, occurring in Europe, Africa, India, Java, Australia, New Zealand, and America (North and South); genus *Olbiogaster*, Ost-Sack., is only known from the Southern parts of North America; and genus *Lobiogaster*, Phil., occurs in Chili.

Genus Rhyphus, Latreille.

Latr. Hist. Nat. Crust. et Ins. xiv. 291., 1804.

Kertesz. Cat. Dipt. Vol. 1., pg. 304, 1902 (which see for synonymy).

Characters as described under the family; radial vein curved, eyes in ♀ separate, in ♂ contiguous, bare. Abdomen cylindrical, elongate tapering. Legs simple, slender, spines at most only indicated by strong hairs on the posterior tibiæ; anterior tibiæ with one, intermediate and posterior tibiæ with two apical spurs.

Rhyphus dubius, Macq.

Chrysopilus dubius, Macq., Dipt. Exot. suppl. 4, pg 104, tab. 9, fig. 18, 1850.

Rhyphus brevis, Walk., Ins. Saund. Dipt. i., pg. 449, 1856.

Macquart's so called *Chrysopilus dubius* is a *Rhyphid*. The description from a mutilated specimen and the figure of the wing show conspicuous evidence that this is the case, since the wing markings and the wide anal cell agree with those of the common Rhyphid known as *R. brevis*. The figure shows the cubital vein forked, but the description would lead one to suppose otherwise, as only one submarginal cell is mentioned; indeed, such discrepancies are not unusual in Macquart's work. The type specimen is from East Australia, and Walker's type is Tasmanian; a comparison of Sydney and Tasmanian specimens shows them to be identical.

Easily recognised by its brownish colour, wings much spotted and macrotrichia on the membrane of the wing as well as on the veins. Dr. Tillyard records these macrotrichia in P.L.S. N.S.W. xliii., pp. 627-641, text figures and plate, 1918.

Yellowish brown. Eyes bare, black; ocellar tubercle black; flagellum of antennæ black. Thorax with three broad black stripes, the central stripe reaching neck. Abdomen more or less stained black. Thorax and scutellum have bristles, or hair-like bristles which are not always easy to differentiate. The following, according to their position and size, are undoubtedly bristles:—2 dorso-scutellar, 4 notoplural, 1 supra-alar, 2 interalar; dorsocentral and acrostichal bristles indicated by conspicuous bristles posteriorly which become more hair-like anteriorly, and other anterior hair-like bristles can be traced on the thorax. Wings hyaline, slightly fuscous at base, fuscous spots at humeral and median cross veins, and distinctly irregular fuscous bands (very spot like) from costa;

one band through base of discoidal cell to the tip of the 5th posterior vein; a second from stigma through tip of discoidal to apex of 4th posterior; a third half way between this to the tip of the wing, reaching into the 3rd posterior cell; and finally the wing is bordered fuscous from the apex to the anal vein. The sexes are very similar, the eyes contiguous in ♂, and widely separate in ♀. In respect of the former the abdomen is much more slender and cylindrical.

Length ♂ 5-6 mm., ♀ 4-7 mm.

Hab. Tasmania, Hobart, September to November; New South Wales, Sydney, June; Western Australia, Perth.

The specimen utilised for the above description is in the Australian Museum, and was captured at Neutral Bay, Sydney, on the 7th June, 1917. (Collector.—A Musgrave.)

The species is abundant during part of the year, and will probably be found to have a wide distribution in Australia.

Fam. LEPTIDÆ.

The known Australian genera may be characterised as follows:—

Thorax, scutellum, and abdomen without bristles, the bristles of the legs if present are either thin or small. Abdomen either elongate and tapering, or conical. Anal cell closed, or at most narrowly open at border; cubital vein forked; 4 or 5 posterior veins, all reaching margin except in genus *Spaniopsis*, where the third posterior vein is stunted if present. Antennæ three jointed at least, the third joint bearing an appendage of apical joints in the form of an arista thickened and composed of more than one joint, thickened basally and unjointed, or hairlike. Tibiæ with or without apical spurs.

Metoponia rubriceps, Macq., belongs to the *Stratiomyiidæ*.

Chrysopilus dubius, Macq., belongs to, and is treated in, the *Rhyphidæ* above.

The following key will separate the known Australian Genera:—

Key to the Genera of Australian Leptidæ.

1.	Five posterior cells	2.
	Four posterior cells	5.
2.	Fourth posterior cell closed	*Clesthenia.*
	Fourth posterior cell open	3.

3. Antennæ with unjointed arista, eyes touching in ♂ widely separate in ♀. 4.
   Antennæ with arista jointed and thickened, eyes separate in both sexes. *Atherimorpha.*
4. Eyes bare, abdomen elongate, anterior tibiæ without spurs, intermediate with two, and posterior with one spur. *Chrysopilus.*
   Eyes pubescent, abdomen conical, short, anterior tibiæ with one, intermediate and posterior tibiæ with two spurs. *Dasyomma.*
5. Wings hyaline, indications of the third posterior vein usually present, fourth posterior vein rising from the discal cell about ¼ length from base. Blood-sucking. *Spaniopsis.*
   Wings spotted, 3rd posterior vein rising from ¾ length of discal cell, no trace of the fourth posterior vein present. Non blood-sucking. *Austroleptis.*

Genus Clesthenia, White.

White, P. & P. Roy. Soc. Tasm., pg. 45, text fig. 3 (wing) 1914.

This genus is characterised by:—Five posterior cells, fourth and anal cell closed: antennæ three jointed with a short thickened two jointed (apparently) terminal style: legs with all tibiæ two spurred; thorax arched, and abdomen conical. Eyes bare, separate in both sexes, short bristles on intermediate and posterior tibiæ.

Clesthenia aberrans, White.

(Pl XXVII., fig 1.)

White, P. & P. Roy. Soc. Tasm., pg. 46, text fig. 3, 1914.

Hab. Tasmania; Hobart, Mangalore, Mt. Wellington, Dunalley.

Type in the British Museum.

Genus Atherimorpha, White.

White, P. & P. Roy. Soc. Tasm., pg. 41, text fig. 1, 1914.

Five posterior cells open, anal cell narrowly open or closed; antennæ three jointed with a jointed thickened style, anterior tibiæ without spurs, intermediate and posterior tibiæ with two spurs, abdomen elongate tapering, eyes separate in both sexes, bare; tibiæ with conspicuous bristles.

Atherimorpha vernalis, White

(Pl. XXVII., fig. 2).

White, P. & P. Roy. Soc. Tasm., pg. 42, text fig. 1, 1914.

Hab. Tasmania; Geeveston, Mt. Wellington, Hobart, Sandford, Bagdad, Cradle Mt. White states that a near ally occurs in New South Wales. Victoria; Ringwood 19th Oct., 1918, one ♂ specimen (C. E. Cole).

At Cradle Mt. a yellow brown variety was taken as well as the ordinary form.

Type in the British Museum.

Atherix pusilla, Macq.

Macquart, Dipt. Exot. suppl. 5, pg. 88, pl. 2, fig. 13, 1854.

The description and the figure of the wing of this species are nearest to *Chrysopilus æqualis*, Walker, but it is inconceivable that Macquart would place a species of the genus *Chrysopilus* into the genus *Atherix*. Possibly the species belongs to the genus *Atherimorpha*.

Macquart's description is short, and as follows:— "Length 2 lines. ♀. Black (denuded), with traces of "white pubescence. Legs black, tibiæ fawn. Wings grey; "stigma brown. Adelaide.

Genus Chrysopilus, Macq.

Chrysopilus, Macq., Recueil Soc. Sci. Agric. Lille, pg. 403, 1826.

Kertesz, Cat. Dipt. Vol. 3. pg. 317, 1908 (which see for synonymy).

White, P. & P. Roy. Soc. Tasm., pg. 39, 1914.

Five posterior cells open, anal closed; antennæ three jointed with a hair-like terminal arista; anterior tibiæ without spurs, intermediate with two, posterior with one spur; abdomen slender; eyes contiguous in ♂, separate in ♀, without pubescence; tibiæ without bristles.

Chrysopilus æqualis, Walk.

(Plate XXVII., figs. 3, 4.)

Leptis æqualis, Walker, List. Dipt. B.M. i., pg. 216, 1848.

? Froggatt, Austr. Ins., pg. 296, 1907.

Chrysopilus æqualis, Kertesz, Cat. Dipt. iii., pg. 317, 1908.

Chrysopila rufipes, Macquart, Dipt. Exot. suppl. 4, pg. 103, pl. 9, fig. 17, 1849.

Chrysopilus rufipes, White, P. and P. Roy. Soc. Tasm., pg. 40, 1914.

Chrysopilus antipodes, Bigot, Soc. Zool. France, xii., pg. 105, 1887.

Chrysopilus tasmaniensis, White, P. and P. Roy. Soc. Tasm., pg. 40, 1914.

Specimens of *Chrysopilus* are represented in most of the collections examined by me, and they invariably belong to this variable species, two forms of which White separated on colour and habits in Tasmania.

An extreme form is common at Trevallyn, Launceston, which has an extra wide head, and the wings are suffused with black anteriorly from the base and reach to two thirds of the length of the costa. Mr. C. E. Cole took a specimen approaching this form at Eltham, Victoria.

Macquart's species from Tasmania was evidently correctly identified by White, and Bigot's species is probably identical. White's type of *C. tasmaniensis* only differs in the colour of the legs and probably this is the form described by Walker from Australia as *Leptis æqualis.*

A long series of specimens shows these forms merging into each other and therefore they cannot be considered distinct species.

Hab.—Tasmania: Mt. Wellington, Hobart, Bagdad Valley, Eaglehawk Neck, Mt. Maria, Launceston, Cradle Mt. It has a wide distribution throughout Tasmania and occurs from October to April.

Victoria: One specimen, Eltham, 26th October, 1918. (Collector.—C. E. Cole.)

New South Wales: One specimen from behind Sublime Point, Thirroul, 30th March, 1918. Also a number in the Macleay Museum.

The type of *C. tasmaniensis*, White, is in the British Museum.

Chrysopilus auratus, Fabr.

Atherix auratus, Fabr., Syst. Ant., pg. 73, 1805.

Chrysopilus auratus, Kertesz. Cat. Dipt. iii., pg. 318, 1908 (which see for further references).

Rhagio atrata, Meig., Klass. Ins. 302, 1805.

Chrysopila atrata, Macq., Dipt. Exot., suppl. 2., pg. 50, 1847; Walk., Ins. Saund. Dipt. i., pg. 164, 1852.

This species is European, and the Australian records are evidently incorrect. Neither Macquart nor Walker gave any definite descriptions, and it is impossible to determine what species they actually had before them.

Genus Dasyomma, Macq.

Macq., Dipt. Exot. 2. i., pg. 31, 1840.

Five posterior cells open, anal cell narrowly open; antennæ three jointed with a terminal unjointed arista which is slightly thickened basally; tibiæ without bristles, anterior with one, intermediate and posterior with two apical spurs; abdomen conical; eyes pubescent, contiguous in the ♂, widely separated in the ♀.

Hitherto this genus was only known from Chili. Macquart separated it from *Leptis* by the pubescent eyes. This record of Australian allies to the Chilian species is of special interest, parallel to that of genus *Pelecorhynchus* (*Tabanidæ*).

Key to Genus Dasyomma.

1. Wings spotted, eyes thickly pubescent. *maculipennis.*
   Wings suffused with black, not spotted, eyes scantily pubescent. 2.
2. Antennæ reddish, abdomen entirely black. *dissimilis.*
   Antennæ black, abdomen brown, with apex of segments black. *dissimilis var.*

Dasyomma maculipennis, sp. nov.

Eyes thickly pubescent; wings suffused with brown, with dark spots.

♂. Shining black, face with tracings of greyish or brownish grey tomentum, eyes contiguous, thickly pubescent; antennæ with black hair on the two basal segments, beard yellowish grey, with a little black anteriorly nearest antennæ. Thorax with two grey tomentose median stripes and obscurely grey laterally, but these markings may be entirely obsolete; hairs yellowish mixed with a little weak black hair, similar hairs on scutellum and abdomen. Femora black, anterior and median with longish white hairs below; tibiæ reddish black, apically stained black; tarsi reddish, all joints apically black; wings dark, very brownish basally and along costa to tip of the radial vein, dark spots at the apex of the two basal and discoidal cells and also at base of the cubital fork.

♀. Similar but lighter in the thorax; head yellowish brown with the thickly pubescent eyes widely separated; third joint of antennæ, ocellar tubercle, and a moderately large frontal tubercle black; legs yellowish, all apices of joints stained black.

Varieties:—The above descriptions are taken from the ♂ holotype and ♀ allotype; the paratypes vary to a considerable degree in colour and markings; any part may be more brownish than black, and in the ♀ the abdomen is sometimes brown with apical margins of segments black, and the thorax may appear brown with three black stripes, the centre being sometimes obscure, or the lateral ones interrupted.

Length, 5-6 mm.

Holotype and allotype in the Australian Museum.

Hab. Tasmania:—Cradle Mt., 9 ♂, 2 ♀, 11th to 21st Jan., 1917; Launceston, 2 ♀; 28th Oct., 1916, and 7th Jan., 1917.

Dasyomma dissimilis, sp. nov.

(Pl. XXVII., figs. 5, 6.)

Very similar to *D. maculipennis*, but easily distinguished by the apparently bare eyes, which, however, are found to be scantily pubescent when seen under a low power microscope; the wings without spots, suffused with brown.

♂. Thorax and abdomen shining black, head covered with brownish grey tomentum, the first two joints of the antennæ reddish. palpi brownish black with black hairs; proboscis and third joint of antennæ black; hairs on thorax, scutellum and abdomen black; femora shining black or brown, tibiæ and tarsi brownish with black apices, the legs are, however, variable in colour.

Length, 6 mm.

♂ var. This variety, which may possibly represent a distinct species, has the abdomen brown, with apices of segments black; the legs much darker, and the antennæ entirely black; the general appearance of the insect is distinct, but there seem to be no characters other than colour and size between it and the typical form.

Length, 5 mm.

♀. Evidently belongs to the above variety, and is similar in colouration to the brownish form of *D. maculipennis*. The frontal and ocellar spots are united, the thorax stripes are obscured with blackish, and nearly all hairs black. It also differs by having only scanty pubescence on the eyes.

Brown; ocelli, frontal tubercle, third joint of antennæ, three obscure stripes on thorax, apices of joints of legs, apical borders of abdominal segments, hair of thorax, abdomen, antennæ, palpi, a little on other parts of head and legs, black.

Length, 5 mm.

Holotype, allotype, and the holotype var. in the Australian Museum.

Hab. Tasmania:—Cradle Mt., holotype 16th Jan., 1917; holotype var. and allotype 16th Jan., 1917; paratype, 16th Jan., 1917; paratype var. 21st Jan., 1917. Mt. Wellington, paratype, 6th Jan., 1916. In all 6 specimens.

Genus Spaniopsis, White.

White, P. & P., Roy. Soc. Tasm., pg. 43, text fig. 2, 1914.
Ferguson, J. & P., Roy. Soc. N.S.W., vol. 49, pg. 233, plate 26, 1915.

Antennæ with the first and second joints small, the third large, terminally produced into a thickened jointed appendage. Wings with only four posterior cells, the third posterior vein being reduced to a stump which is occasionally absent; the fourth posterior branches from about one quarter the length of the discoidal cell; the lower branch of the cubital fork ends at the tip of the wing; anal cell closed before the border of the wing; eyes bare, in the female separate (♂ unknown); abdomen conical; tibiæ without bristles, the anterior and posterior without spurs, the intermediate with two spurs.

The female has blood-sucking habits.

Dr. Ferguson has given a key to the identification of the species founded on colour which is very reliable and easy for use. The following key is founded on structure:—

Key to Genus Spaniopsis.

1. Terminal appendage of antennæ twice the length of the three basal joints. *longicornis.*
   Terminal appendage of antennæ about as long as the three basal joints. 2.
2. The third joint of antennæ swelling away from its terminal appendage towards the base much more dorsally than ventrally. 3.
   The third joint of antennæ swelling from its terminal appendage more or less uniformly above and below. 4.
3. Terminal appendage of antennæ a little longer than the length of the three basal joints. *marginipennis.*
   Terminal appendage of antennæ a little shorter than the length of the three basal joints. *clelandi.*

4. A small species from N.S.W., 3 mm. long. *vexans.*
A larger species 5 mm. long from Tasmania. *tabaniformis.*

Spaniopsis tabaniformis, White.

White, P. & P. Roy. Soc. Tasm., pg. 44, text fig. 2, 1914.
Ferguson, J. & P. Roy. Soc. N.S.W., xlix., pg. 238, Pl. 26, fig. 11, 1915.

Hab. Tasmania. The only specimen taken, since the original 13 from Freycinet's Peninsula in 1914, was captured by Mr. C. Cole at Wedge Bay, during Easter, 1917.

Spaniopsis vexans, Ferg.

Ferguson, J. & P. Roy. Soc. N.S.W. xlix., pg. 238, pl. 26, figs. 6 and 10, 1915.

Hab. New South Wales:—Heathcote, June, 1917, and Thirroul (Sublime Point), 30th March, 1918. 2 specimens.

Spaniopsis clelandi, Ferg.

Ferguson, J. & P. Roy. Soc. N.S.W., xlix., pg. 240, pl. 26. figs. 5 and 9, 1915.

Hab. New South Wales:—2 specimens, Thirroul (Sublime Point), 30th and 31st March, 1918.

Spaniopsis marginipennis, Ferg.

Ferguson, J. & P. Roy. Soc. N.S.W., xlix., pg. 239, pl. 26, figs. 2, 4, and 8, 1915.

Hab. New South Wales:—Heathcote, June, 1917, about 40 specimens, very common at the bottom of a gully; Hornsby, June, 1917.

Spaniopsis longicornis, Ferg.

Ferguson, J. & P. Roy. Soc. N.S.W., xlix., pg. 242, pl. 26, figs 1, 3, and 7, 1915.

Hab. New South Wales:—Heathcote, June, 1917, 3 specimens.

Genus AUSTROLEPTIS, gen. nov.

Antennæ 7 jointed, composed of two more or less equal basal joints, both about as wide as long, third swollen and much compressed, and a terminal complex of four closely fitting but distinct joints, which under a coddington lens often looks like only three. The venation is somewhat similar to *Spaniopsis* in appearance, but entirely different structurally; there are only four posterior cells, the third posterior vein (coincident with the fourth) branches from beyond half the length of the discal cell; the lower branch of the cubital fork runs to or above the tip of the wing; anal cell closed by the true fifth (apparent fourth) posterior vein a little before the border of the wing; the transverse vein situated about one third the length of the discal cell. The wings much marked with spots. Tibiæ without conspicuous bristles, at most with a few weak ones on the anterior legs; intermediate and hind tibiæ with two apical spurs, which can only be seen with difficulty under a lens; abdomen conical; eyes bare, contiguous in the ♂, separate in ♀.

Type of the genus.—*A. rhyphoides*, sp. nov. . . . . Tasmania.

Austroleptis rhyphoides, sp. nov.

(Pl XXVII., figs 7, 8, 9.)

♂. Black; head with scanty hairs, palpi with black hairs, eyes smooth, ocelli on a raised tubercle, with black hairs, back of head with few black hairs and thin bristles; thorax with long black hairs, and with scanty traces of brownish grey tomentum, scutellum with long black hairs; base and apex of femora, tibiæ, and base of tarsi yellowish; abdomen with base of segments black, apically yellowish brown; long bristly black lateral hairs; underside similar; wings hyaline, basal half more or less yellowish, a black spot on fork of radial and subcostal veins, another at stigma, reaching the base of the cubital fork, a small spot at apex of lower branch of cubital vein; two spots along the first posterior vein situated at middle and sub-apex, two spots on second and third posterior veins situated at base and sub-apex; a spot at discal cross vein, and another on the fifth posterior vein where it runs into the anal vein. There are other, but indefinite, indications of black on the wings.

♀. Yellowish brown; head brown, proboscis black, apex of antennæ black, front blackish centrally extending to two black spots near eyes; thorax with three median and two lateral black stripes, central stripe faint; tip of scutellum black; black hair on thorax and scutellum, shorter than in ♂. Legs yellowish, femora darker, tips of tarsi black, all hairs black; abdomen similar to ♂, but more brown. Wings as in ♂.

Length, ♂ $3\frac{1}{2}$-5 mm.; ♀ 5-6 mm.

Holotype and allotype in the Australian Museum.

Hab. Mt. Wellington, Tasmania. Holotype (♂), allotype (♀), 2nd December, 1916. 13 ♂ paratypes, from 25th November to 4th December. 1 ♀ paratype, 31st December, 1917; also a long series in Mr. Clive Cole's collection.

This species occurs near "The Springs" (2,000ft.), where the ♂ can be taken on fallen logs, the ♀ (rare) can be taken by sweeping. The fly appears in quantities for about a fortnight, after which it becomes excessively rare; ♀ ♀ are rare at all times.

Austroleptis multimaculata, sp. nov.

(Pl. XXVII., fig. 10.)

♂. Differs from *A. rhyphoides* chiefly in the spots of the wings, the entirely black abdomen, darker legs, and finally the hairs on face, thorax, and abdomen are lighter.

Wings. Costal cell with one spot at basal cross vein, one at half length, and the apical quarter is suffused black; apical half of marginal cell suffused black; spots in submarginal at base, middle and three quarters length; second submarginal cell spots at base, quarter, middle, and three quarters; 1st posterior with spot at base; followed by six others; 2nd, 3rd, and 4th posterior cells have two spots each; auxiliary cell with three spots; discal cell with two spots; there are indications of other spots more or less present. The veins between the 2nd and 3rd posterior and discal cells, between discal and basal cells, between fourth posterior, 2nd basal, and anal cells, suffused black.

Length, 3½ mm.

Holotype in the Australian Museum.

Hab. Tasmania:—Cradle Mt., 1 specimen, ♂, 22nd Jan., 1917.

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ILLUSTRATIONS.

Fig. 1. Antennæ of *Clesthenia aberrans*, White. ♂.

Fig. 2. Antennæ of *Atherimorpha vernalis*, White. ♂.

Fig. 3. Antennæ of *Chrysopilus æqualis*, Walker, ♂.

Fig. 4. Abdomen of *Chrysopilus æqualis*, Walker, ♂.

Fig. 5. Abdomen of *Dasyomma dissimilis*, sp. nov. ♂ (the two lower plates at apex of abdomen are exaggerated in the figure).

Fig. 6. Antennæ of *Dasyomma dissimilis*, sp. nov. ♀.

Fig. 7. Wing of *Austroleptis rhyphoides*, sp. nov. ♂ (from a micro-slide prepared by Dr. Tillyard).

Fig. 8. Antennæ of *Austroleptis rhyphoides*, sp. nov. ♂ (as seen *in situ*).

Fig. 9. Antennæ of *Austroleptis rhyphoides*, sp. nov. ♂ (from a micro-slide prepared by Dr. Tillyard).

Fig. 10. Wing of *Austroleptis maculipennis*, sp. nov. ♂ (from the holotype).

NOTES ON TASMANIAN WHALING.

By W. Lodewyk Crowther, D.S.O., M.B.

(Read 10th November, 1919. MSS. in full received 24th December, 1919.)

PRELIMINARY.

During the last twelve months three very interesting communications by Messrs. Scott and Lord have been read before the Society.

These were entitled "Studies of Tasmanian *Cetacea*," and described particularly, some skeletons preserved in the Tasmanian Museum, which had been overlooked for nearly half a century.

Certain of these remains had been presented to the Museum by my grandfather (the late Hon. Dr. W. L. Crowther) about 1866-1871, when he was collecting and forwarding such skeletons both to the British Museum and that of the Royal College of Surgeons, England.

In view of the scientific value of the work thus accomplished by him, I trust I may be pardoned for adding a brief account of his life work, before I pass to the consideration of Whaling proper.

Born in 1817, he arrived in Hobart with his father, William Crowther, M.R.C.S., by the ship "Cumberland" in 1824. His education took place at Norfolk Plains (Longford), which meant walking overland to school and returning in the same way to Hobart Town for his holidays. As a boy he was a very keen naturalist, and on one of these trips between school and home he shot a Tasmanian emu, which, he informed my father, was the only specimen of the same he had ever seen, and which I understand was one of the last remaining in V.D.L. By trapping and shooting he got together a very fine collection of skins of the Fauna of Tasmania, and these, with a large number of live animals and birds, he took with him to England by the ship "Emu" in 1839. On arrival, the collection was purchased by Lord Derby for the Zoological Society, and the proceeds of the sale gave my grandfather his medical education at St. Thomas' Hospital.

Returning to V.D.L. in 1841, he joined the Tasmanian Society, and was one of the thirty-six resident members when it became the Royal Society in 1843. In England he had begun his lifelong friendship with Sir William Flower, the great comparative anatomist, who filled successively the positions of Conservator and Hunterian Professor of the Museum of the Royal College of Surgeons, Director of the Natural History Museum, and President of the Zoological Society. Sir William about 1860 commenced his studies on the "*Cetacea*," and enlisted the aid of my grandfather, who during the late 50's and 60's had a whaling fleet cruising with varying success through the different whaling grounds of Oceania. The latter first sent two skeletons of Orca, which Sir William classfiied as *Orca meridionalis*. (P.Z.S. 1864). Other specimens were sent at intervals for several years to the Museum of the Royal College of Surgeons. They embraced 34 catalogue folios and 8 genera of whales, and included 15 full skeletons. Among others the large adult skeleton of the male Sperm whale which dominates the Museum of the College of Surgeons was forwarded in 1869. In this year my grandfather was awarded the Fellowship of the Royal College of Surgeons and their Gold Honour Medal. I believe the first occasion on which it had been conferred on an Australian. In 1878 he was Premier of the Colony, and died on the 12th of April, 1885. The fortunes of his whaling ships I shall touch on later in my paper.

INTRODUCTION.

I shall not attempt any scientific classifications of the whales met with and taken in Southern waters. The names employed are those used by the Whaling Captains for the various whales they met with while at sea.

They all, however, fall into one of two families:—

(1) Mystacoceti, i.e., Whale Bone Whales.

(2) Odontoceti, i.e., Tooth Whales.

Odontoceti.

"*Sperm Whale*" (*Physeter macrocephalus*). This will be dealt with fully under deep sea whaling. Ranging through the Southern Ocean and up to 80 feet in length the adult gave on an average 9 tuns of Oil. One taken by the "Marengo" gave 15½ tuns, valued at £1,500, and another taken by the "Elizabeth Jane" off the S.W. Cape, 13 tuns. The oil a clear amber colour, one-third of which came from the head.

"*Black Fish*" (*Globicephalus melas*). Pilot or Caaing whale. Not as a rule more than 20 feet in length, and giving 2 - 3 barrels of dark oil.

"*Killers*" (*Orca gladiator*), giving a clear oil. The only whale whose oil mixes, and is indistinguishable from that of the Sperm whale. Being both fierce and active, these whales were as a rule not molested by the boat's crews.

MYSTACOCETI.

"*The Right*" or "*Southern Black*" (*Balæna australis*) like the Sperm ranges very widely through the Pacific Ocean. In size up to 80 feet in length and gives 8 - 9 tuns of black oil from the blubber and tongue. The "Baleen" or Whale bone is a very valuable product from this whale, and as much as 5 cwt has been taken from a large "fish." From June to November Right whales used to frequent certain coasts and inlets to calve, and were taken by the Bay whalers. To this date at Twofold Bay and Norfolk Island such Bay Whaling Stations exist.

"*Hump Back*" (*Megaptera longimana*) gave short whalebone and 6 - 7 tuns of poor black oil. A deep sea whale which, though pursued by the American and Sydney ships, was not sought after by those of Hobart Town.

"*Fin Back*" (*Balænoptera*), frequently sighted from the ships, gave both whale bone and black oil, but, being difficult to approach and fasten to, was not usually pursued.

"*Sulphur Bottom* (*Balænoptera australis*). A Black Whale which gave black oil and bone. Not as a rule worth taking.

"*Grampus*" and "*Cow Fish*," with other members of the Dolphin tribe, were terms applied loosely, and probably should be classed under the *Odontoceti*.

The oil taken was either:—

(1) Clear Amber colour, as from the "Sperm" and "killer."

(2) Black or Southern Oil from the "Right" whale; "Humpback," etc.

Both darker in colour and less valuable than that of the "Sperm" whale.

In ships from Hobart Town the "take" of oil was always measured by the "Tun," in American ships by the "Barrel."

The Royal Kalendar for 1849 states:—1 Tun = 8 barrels = 252 gals.

Whale Bone or "Baleen": from the mouth of the "Right" and other Black Whales, was a valuable product, and up to 5 cwt. was taken from that of a large whale.

As we divide the whales into two divisions, so also we find two distinct methods of whaling.

It was the habit of the "Right" whales in the winter months to come to the coasts of New Zealand and Australia to calve and feed. Some Bays were more favoured than others, and on these, shore establishments were fitted out for "Bay Whaling." Such places in the early decades of last century were Cloudy Bay, Foveaux Straits in New Zealand, and the East Coast of Tasmania, etc.

The "Sperm" whale, on the other hand, kept to the open sea in pursuit of his food, the "squid," and to take the Cachalot, ships were fitted out for lengthy cruises on the high seas.

In succession, then, will be considered these two methods of whaling, i.e.,

(1) The Black Whale Fishery ("Bay" whaling).

(2) The Sperm Fishery.

The former was carried out either (a) by a land establishment with boat crews, or (b) by small vessels, cruising around the Coast and Bays of V.D.L. The latter by larger ships fitted out for prolonged cruises on the high seas.

THE BLACK WHALE FISHERY.

It is very difficult to find definite data dealing with the commencement of Bay whaling in V.D. Land. It was of a different type from that of New Zealand, where the ships from U.S.A., England, or Australia selected a bay, where they landed their shore parties, the latter doing all their work from the shore stations, and the ship when full returning to its home port.

In V.D.L. it was more the practice for a station to be established at a selected Bay and for the Oil taken to be shipped by a tender to Hobart Town and thence to England. One or more boats' crews were stationed at the establishment, and a lookout posted on a favourable position. On a whale being sighted the crew pulled away, and, if possible, made themselves fast to the whale, killed it, and, often after a very long and laborious tow, brought their catch to the shore. There, there was fitted a rough tripod scaffolding, to the base of which the whale was secured, and by the aid of which the blubber was stripped from the whale and taken on shore to be boiled down. (A most interesting painting of the station at Wineglass Bay, Freycinet's Peninsula, is in the Tasmanian room of the Museum.)

It is very difficult to obtain accurate particulars of the early history of Bay whaling in V.D.L.. The Press of that day gives only a scanty paragraph from time to time, when something of more than ordinary interest is noted. No records are available before 1816, when the Government *Gazette* was first printed, and copies of the earliest papers are not in the Government Archives. From Fenton's History we read that "between 1813-1815, under "Governor Davey, the whale fishery was carried on with "profitable results and a lucrative trade in seal skins from "the Bass Straits Islands was established." Bent, in the *H. T. Gazette* for June 24th, 1816, writes as follows in his local news:—"A great number of whales have already "made their appearance in Frederick Henry Bay, some few "have been seen as high as Sullivan's Cove (i.e., the present "location of the Hobart Wharves). Preparations are being "made by Mr. D. McCarthy and coadjutors to begin the "Fishing." The Editor adds the following:—"The very "elements contribute to our prosperity when industry leads "the way." During this year whales were taken in the Derwent proper.

In 1822 whales were again very numerous around our Southern Coast, and even in the estuary of the Derwent (Fenton).

Between 1820 and 1830, as readers of McNab's works will remember, the coasts of New Zealand were constantly visited by whaling ships from England, France, and U.S.A. (particularly the latter). These ships, observing the regular winter arrival of the "Right" whales, to favoured Bays and Inlets, gradually relinquished the deep-sea pursuit of the "Sperm" whale for the easier takings of the "Right" whales off these Bays. This whaling was done at first from the ship, which lay at anchor, and sent her boats' crews away in pursuit, the whale when captured being towed back to the ship and "tried out" on board. From this method was evolved the shore station proper, with the parties landed and living there, and trying-out their catch on shore.

Maori villages sprang up adjacent to the tents and supplied labour, food, and crews for the boats. This cosmopolitan gathering of whalers was made possible by the fact that New Zealand was "No Man's Land" and not annexed to the Crown, and in a chosen locality as Cloudy Bay ships from Salem, Bristol, Le Havre, and Sydney lay together for months taking their catch and often assisting each other. V.D.L. being a Crown possession, as such, gave no facilities for ships or crews other than British, except for re-fitting and re-victualling. Oil taken in American and foreign ships paid a duty in England of £26 12s. per tun Imperial, whereas the duty on British Oil was 1s. per tun Imperial. The following certificate had to accompany the Oil, and was required upon the entry at the Customs House, London.

> "*V.D.L.* This is to certify to all whom it may "concern that the oath required by the Act of Geo. "IV. C. 69, sec. 25, has been made before me (describe "here the person administering the oath) by A.B., "shipper of casks of Oil by the "British ship for London. That the same "was bona fide the produce of fish, of creatures living "in the sea actually caught and taken wholly by His "Majesty's subjects, carrying on the Fishery from here "and actually residing in this Colony. (*H. T. Gazette*, "August 13th, 1825)."

The discrimination was even greater with Whalebone, on which foreign ships paid a duty of £95, compared to our ships £1, its value at this date being £160 - £190 per tun.

By this year (1825) the "Derwent Whaling Club" had been formed, its members being:—

James Kelly, Esq.
William Wilson, Esq.
W. Angus Bethune, Esq.
C. Ross Nairne, Esq.

A prize of 8 dollars was given to the first person giving information as to a whale being in the River. Profits were divided into 7 shares, 4 to the Members, 1 to Charitable purposes, and 1 to the Native youth who displayed the greatest expertness as a headsman.

In the *Gazette*, August 13th, 1825, appears the following, which seems to show that the quantity of the train oil from V.D.L. did not compare too favourably with that from other sources:—

"The Southern Whale and Sea horse oil imported from "V.D.L. is generally found to be of dark colour and of less "value than that oil which is paler, from its burning quality "being impaired; this is chiefly owing to want of care in "the boiling of the blubber. The method in use on board "the British South Seamen for producing the oil of good "colour and quality is mainly to keep the contents of the "boiler stirred with a pole, to the end of which is attached "a chain about 20 inches in length. This prevents the "dregs from burning to the bottom of the boiler, and which "precaution, if neglected, will eventually cause the oil to "become dark and of a heavy consistency."

In this year, 1825, although no Hobart Town Ships had departed for the South Sea Fishery, the intermediate step had been taken between it and Bay Whaling; that is to say, local vessels had commenced to take the whales around our coasts and inlets.

The Schooner "Sally" (Capt. Lovett), owner Capt. J. M. Wilson, sailed on July 9th for a Whaling cruise in D'Entrecasteaux Channel; 12 days later news came that she had already taken 2 whales. On August 21st the *Hobart Town Gazette* reports among the arrivals "The "Schooner 'Sally' from D Entrecasteaux Channel with oil, "as she was in the Harbour on Wednesday morning, she "heeled and filled with water immediately, she has since "been got up."

Evidently the ship was none the worse, as on October 13th the "Sally" is reported as leaving under Capt. Lovett with 17 men on a sealing cruise to New Zealand. Melville (Ed. *Colonial Times*) in a retrospect writes as follows on the rise of our Bay whaling:—

"Another invaluable asset to the Colony, as an export, "is oil, and which is referred particularly to, both by the "circumstances that attend its acquisition, and by its being "a branch of a trade not capable of being over done. It "may be remarked that the situation of the Island and the "numerous nooks or Bays with which it abounds, render "it such a place of resort for whales throughout the winter, "that the equipment of a few boats, and the erection of "a boiler or two upon shore for rendering down the oil, "are nearly sufficient, as the outfit of what may be con-"sidered with tolerable certainty a profitable enterprise. "The consequence is that each winter, fresh parties, emu-"lating those of longer establishment, fit out whaling ex-"peditions, and the success that has invariably attended "them, is a strong inducement both to them and others, to "return with energy in future seasons.

"Thus almost at our very door and threshold are we "provided with the means of becoming rich with little com-"parative trouble or exertion; and at the same moment "we are rearing up a fine and manly race of native youths, "in a manner that would qualify them to contest the palm "of superiority on the water with the inhabitants of any "existing upon the whole face of the globe." (Melville, *V.D.L. Annual*, 1813).

The oil for export by 1826 was of considerable value in the Infant Colony. The value of it exported in the last quarter of the year was £1,180. (*H. T. Gazette*, 1826.) Mr. Meredith, of Great Swan Port, in the same year, is mentioned (*H.T.G.*, 1827) as having taken a whale with blood red blubber, which when boiled down gave Oil of the same colour, also five tons of casks arrived for him in order to bring his Oil to Hobart Town for lading in the "Persian."

The ship "Governor Sorell" during the year is reported as having been wrecked going to Slopen Island to pick up Oil—which indicates a station being situated there (*H.T.G.*, 1826).

The *Gazette* mentions "nearly every Bay and Inlet "around the coast are swarming with whales, particularly "at Circular Head."

The Editor adds that there was some difficulty in obtaining casks for the export of Oil, and also a tending for the Bay Trade to cause neglect of the Sperm Fishery—"which should be the mainstay of the Trade."

The prices of Oil in London for the year were—Sperm £65, Southern £25 per tun.

One other extract from the *Gazette*, dated May 6th, 1825, is of interest, and is given in the Editor's own words:—

"The Whale alluded to in our last as having been seen "up the River as high as New Norfolk, has since been "killed on the beach at that Township above the punt "ferry. It is no less remarkable than evident that this "animal was bewildered, having actually run itself aground "—a circumstance perhaps never before heard of on this "Island.

"It was not a Specimen of the Whales usually caught "in and near the Derwent, but one of that specimens of "fish frequently taken at sea, and known as the 'Fin Back.' "It was 90 feet in length, and will produce a considerable "quantity of Oil."

During the same week a Mr. Innes, an expert harpooner, killed a 4-tun whale off Hobart Town, and the Editor remarks:—"Our river and bays are at this moment full "of whales." An account of a trip to the South Cape taken in this year mentions the whaling station of Messrs. Kelly and Bethune located on Bruny Island, probably at N. Bruny.

By 1830, in addition to local whaling, our H.T. Ships had commenced to sail to the High Seas, and Ross, *H. T. Almanack*, 1830, states that in this year the "Clarence" was despatched to the Whale Fishery. This was the first H. T. Vessel to do this, and one of her officers was the late Captain McArthur (father of Capt. McArthur, the Shipping Master of Hobart). There is no word of the result of her voyage.

On October 2 of this year the Brig Deveron arrived from Cloudy Bay, New Zealand, with 200 tuns of Oil and 20 tons of bone. While there she had the misfortune to lose in a squall six men, including the first and third mates, one of the former being a native of Hobart Town, named Williams.

The value of the Cargo obtained on the six months' voyage was £5,000, and she was owned by Captain Wilson. These two ships are mentioned as Bay Whalers, as their catch was taken off the coast of New Zealand, and not on the high seas. The industry continued to be very successful both locally and at N.Z.

The "Dragon" in 1831 obtained a full catch in N.Z. waters, and in 1833 the same ship, which had been concerned with the Brig Elizabeth of Sydney in the massacre of Maoris, was burned by the natives. Two whales were followed into an inlet, where the crews were massacred and eaten by the Maoris and the ship burned. In the same year the "Marianne" arrived at Hobart Town from New Zealand with the splendid catch of 260 tuns of Oil (100 barrels Sperm) and 15 tons of whalebone. Only 7 months at sea, her cargo was valued at £4,500. The owners were Messrs. Hewitt and Gore. This success led to proposals to form a settlement from Hobart Town on the South Island of New Zealand, but nothing eventuated.

The following extract is of interest, particularly as it shows the rise of Launceston and its importance from the whaling standpoint, by 1834:—

"In this year there were 7 ships and 24 boats employed "in the Black Whale Fishing from Hobart Town, which "caught 207 whales, producing Oil and whalebone to the "value of £14,373.

"From Launceston there were 16 ships and 53 boats "employed, which caught 130 whales and produced Oil and "whalebone to the value of £10,921. At Great Swan Port "there was one ship and four boats employed, which caught "19 whales, value £900, and 50 barrels of Bream, value "£150." (*H. T. Almanack*, Ross, 1835.)

The indication of the great activity of the Launceston ships conveyed by the above is of especial interest, and I hope it may stimulate someone from the Northern City to investigate the whaling history of that harbour.

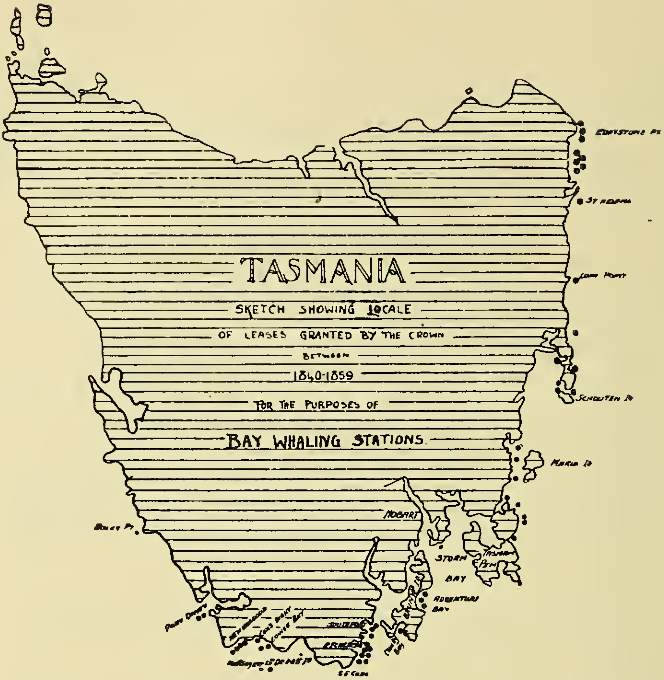
In 1834 the *Hobart Town Courier* (June 13th) states that "Our whaling establishment has, we rejoice to say, "been already more successful than at the same advance "of the season of any former year. By August 15th "Messrs. MacLachlan and Young's establishment had al-"ready caught no less than 60 whales, from which nearly "400 tuns of Oil has been obtained, and other parties have "been proportionately successful." (*H. T. Courier*, August 15th.)

Capt. Kelly on October 17th lost his vessel the "Australian" on Bruny Island.

To give an idea of the value to the Colony of this industry in 1838, the total value of Oil exported for the year was £137,000, compared with £172,000 for wool. (Fenton, *History of Tasmania*, page 9 - 148.)

In 1840 and 1841 there were many applications to the Lands Office to lease areas on various favoured Bays and Inlets. Thirty-five such applications were granted in 1840-41, and six refused. The latter were due for the most part to the fact that such areas were not granted when in the vicinity of Convict or Probation Stations, as at Maria Island and Forestier's Peninsula. Again others were refused owing to no advanced payment of rent. The terms for such leases were not severe, i.e., 3 acres, a frontage on the sea of 3 chains, and for this a yearly rental of 5s. A map is attached showing the approximate locations of these grants. Among those who applied were:—

Capt. Chamberlain.	Askin Morrison.
Ed. and W. Fisher.	Charles Seal.
Edward Garth.	William Young.
James Kelly.	Thomas Lucas.



In 1840 the Bay Whaling had begun to decline—only 13 more leaseholds were granted in the next 18 years. Among the applicants were:—

William Johnstone.	Neal Lewis.
James Kelly.	George Watson.

Owing to the continued pursuit and harrying of the whales, or perhaps for other reasons, the Black whale, after 1841, practically ceased to visit our coast, and Bay Whaling languished. Attention was transferred to the Sperm Whale, which passed our South-Western Coasts from time to time, and vessels were fitted out first to cruise off the S.W. Cape, and later to range over the various whaling grounds of the Pacific.

In the next section the rise and fall of the Sperm Fishing will be considered.

SPERM WHALING.

When considering the Black Whale fishing it will be remembered that, starting with shore stations only, attended with boats' crews and no ships, the industry developed until in 1834 there were many sea-going ships employed around the Tasmanian coast, and occasionally in New Zealand waters. Although primarily fitted out for the Black whaling, naturally if the chance arose the more valuable Sperm whale would be taken.

From the Forties, however, the ships were fitted for Blue Water cruising, with the Sperm as their objective and not the Right whale. Occasional references to the Sperm whaling are found in the early V.D.L. publications, rarely, however, with much detail.

The first ship to have rounded Cape Horn and taken whales in the Pacific appears to have been a ship from New Bedford (U.S.A.) in the year 1790 (Beddoe, *Book of Whales*).

In 1803 the "Albion," with Bowen's expedition on board, took three Sperm whales off the East Coast, and in the succeeding year the "Alexander" took Right whales in the estuary of the Derwent.

In 1816 the English whaler "Adamant" refits at Hobart Town before leaving for the whaling ground. (*H. T. Gazette*, 1816.)

The years between 1816 and 1830, as already shown, were devoted by the Hobart Town ships almost entirely to local *Black* whale fishing. The Editor of the *Gazette* in the issue of September 1st expresses the hope that the profits of this successful year will induce V.D.L. business men to take up the pursuit of the Sperm whale, which he realises to be the mainstay of whaling. (*H. T. Gazette*, September 1st, 1827.)

The tendency to sail oversea from V.D.L. coasts culminated in 1830 with the despatch of the "Clarence" to the Sperm fishing, the first Tasmanian ship to do so. (Ross, *H. T. Almanack*, 1830.)

By 1831 the overseas movement had gained more impetus. Ross states (*H. T. Almanack*, 1831):—"Several "additions have been made to our Colonial shipping during "the past year, and the present spirit for embarking in "the Sperm Whale Fishing is likely to increase still more."

In addition to the "Deveron" already mentioned the following ships are found on the register as having arrived back to Hobart Town during the year:—

January 1st, "Clarence," Capt. Lindsay, from N.Z., Sperm Oil.

January 24th, "Caroline," Capt. Smith, from Whaling voyage, Sperm Oil.

October 22nd, "Caroline," Capt. Smith, from Whaling voyage, Black Oil and whale bone.

December 17th, "Industry," Capt. Griffiths, Bass Straits, Seal Skins.

(Ross, *H. T. Almanack*, 1831.)

Captain Kelly, the first Harbour Master of Hobart Town, in 1832 sailed his ship, the "Venus," to the Islands of the South of New Zealand. Evidently unsuccessful in his quest for Seal Skins, he struck south to Macquarie Island, to find there no Seals, and thence to the Campbell Island grounds. Still without success, he sailed south as far as 72 degrees, eventually reaching Sydney on December 31st, 1832. Without any skins or sea-elephant Oil (R. McNab, *Early Whaling Days.*) The vicissitudes of the H. T. ship "Mary Elizabeth" when captured by Maoris in 1834 have been already alluded to, the Maoris quarrelling over the sharing of the "loot" and enabling the crew to recapture the ship.

Sperm Oil was quoted in this year at £57 a tun, Southern or Black Oil at £19 - £22 a tun, and whale bone £80 - £85. The paper of that date mentions the following ships as being due to return to the port from the South Sea whaling, i.e., "Caroline," "William IV.," "Adelaide," "Hetty," "Penelope" (at Macquarie Island for Seals and sea-elephant Oil, of which not a single barrel was obtained, the Seals having completely disappeared), "Royal William," "The Marianne," and "Lang." (*H. Town Courier*, March 27, 1834.)

Other ships mentioned during the year as discharging Oil were the "Lindsay," "Cheviot," and "Mary Elizabeth." Thus we see by this year whaling both Sperm and Black firmly established, and the year's work most successful and prosperous.

The export of Oil, computed at Colonial prices, was £45,513 for the year, compared with £43,765 for wool; and whalebone accounted for an additional £8,217. This will give an idea of the value of the industry to the Infant Colony. (Ross, *H. T. Almanack*, 1835, p 49.)

The indomitable Capt. Kelly is again noticed in the fore this year, where his small ship, the "Australian," was lost off Bruny Island. (*H. T. Courier*, October 13th, 1834.)

The industry as shown was now on a firm basis, and I do not intend to dwell on the thirties and forties, but to pass on to the "Great Age" of Hobart Town's Sperm

Whaling, viz., 1850-60 and 70. Mention, however, must be made of the "Maria Orr." This vessel, built at Macquarie Point, 1839, has been claimed as the first Tasmanian whaler to be built and manned out of Hobart Town. Her career was not a long one. About 1841 she was bought by Charles Seal, Esq., of Hobart Town, and a little later wrecked off the Acteon Reef, and became a total loss. Captain McArthur, who was in command, then returned to England, and brought out the "Aladdin" for Mr. Seal, and commanded her for several cruises.

As showing the extent of whaling by 1847, on Good Friday of that year there were no less than 37 whalers anchored in the Derwent refitting, the bulk of them being American.

In 1850 the great prosperity of Tasmanian Sperm whaling had commenced. Hobart Town was building its own vessels, and, more than that, manning them with seamen of the first quality. Whaling had cast its spell over the community, and there was no lack of either money to fit out the ships, or of men to man and sail them. The crew signed on according to the "Lay" or Share of the catch, which was proportional to the amount of Oil taken.

Mr. R. R. Rex has a copy of such an agreement, which is here given:—

ARTICLES of AGREEMENT made at Hobart Town in Van Diemen's Land BETWEEN George Chase of the first part and the several seamen whose names are hereto subscribed of the second part WHEREAS the several seamen have respectively agreed to engage in the Whale Fishery in the service of the said George Chase for the consideration hereinafter mentioned NOW THESE PRESENTS WITNESS that each of them the several seamen for himself agrees with the said George Chase that in consideration of the Lay or Share hereinafter mentioned and hereunder written opposite to his name he will at such time during the now approaching whaling voyage or voyages as he shall be required proceed in such vessel or boat as the said George Chase may direct to any River Creek or Place on or near the Coast of this Island New Holland New South Wales New Zealand or elsewhere on the High seas as the said George Chase or his agents may require for the purpose of killing and taking whales and trying down the same and obtaining and preserving the Oil and whalebone thereof and that he will continue in the employment of the said George Chase during the whole of the whaling voyage or voyages (or from the first day of September one thousand eight hundred and fifty five and up to and until the thirty first day of August one thousand eight hundred and fifty six if so long required) and each of the several seamen hereby promises that he will diligently and faithfully do his duty by day and by night during the continuance of his term of service under this agreement and obey the lawful commands of the said George Chase or of the officer or officers from time to time appointed over him and that he will take care of all matters and things from time to time committed to his charge and assist in carrying them as he may be required AND it is distinctly agreed that in case any such seaman shall on any pretence unlawfully desert from the service of the said George Chase before the term of service hereby agreed for shall be fully ended he shall forfeit the whole of the said Lay or Share or proportion of Oil and Whale bone and all right to remuneration of any kind under this agreement or otherwise AND it is agreed that absence from the vessel or boats to which any such seaman shall for the time be attached for more than twelve hours without lawful excuse shall be deemed a total desertion and shall render the person so absent liable to such forfeiture AND it is agreed that at the close of the said term of service and as soon as the quantity of Oil and whale bone procured by the said George Chase's whaling vessel to which such seamen shall belong shall have been ascertained and shall be ready for exportation (whether landed at its final port of exportation or not) the said George Chase shall pay to the said seaman for the said Lays or Shares of and in such Oil and whalebone at the rate of Fourteen Pounds for every marketable tun of Black Oil Forty Pounds for every tun of Sperm Oil and Forty Pounds for every ton of clean and marketable whalebone and the said seamen agree to accept the same in payment of such Lays or Shares and in lieu of all wages or other compensation IT BEING UNDERSTOOD NEVERTHELESS that out of such Lays or Shares the said George Chase may deduct all advances previously made to the parties in money clothing stops or tobacco PROVIDED that in every case the seamen shall be bound (if required so to do) to assist in the actual shipment of all such Oil and whalebone or in conveying the same to Hobart Town Launceston (as the case may be) for such shipment and the service under this agreement shall not be deemed completed until such shipment or conveyance (if so required) shall have been effected LASTLY the said George Chase agrees to provide for and supply to each seaman weekly during the said term of service the following provisions and other necessaries of good quality viz. 12 lbs of beef or mutton or ten pounds of pork twelve pounds of bread or flour one and a half pounds of sugar and a quarter of a pound of tea. All extras to be chargeable against the said seamen as in the case of clothes or money. Any wilful or negligent destruction or loss of any of the owner's property or other misconduct on the part of any seaman to the owner's damage may be set off against the Lay or Share or other claim for wages under this agreement. It is agreed that the said George Chase's whaling vessel shall man two boats.

DATED in Hobart Town this first day of September 1855.

(Signed) GEORGE CHASE.

Name.	Capacity.	Lay or Share on Sperm Oil	Lay or Share on Black Oil & Whale Bone.	Witness to Signature.
John M. Luke	Ship Keeper	30th	20th	J. Suter, J.P., 1st Sept., 1855
George Tilley	Boat Steerer & Carpenter	25th	20th	J. Suter, J.P., 1st Sept., 1855
Robert Jeffrey	Boat Steerer	30th	20th	J. Suter, J.P., 1st Sept., 1855
Henry Madge	Seaman	50th	40th	J. Suter, J.P., 1st Sept., 1855
George Cafley (X) Witness, George Hawthorne	Seaman	50th	40th	J. Suter, J.P., 1st Sept., 1855
Thomas Storey (X) Witness, Geo. Hawthorne	Seaman	55th	40th	— 3rd Sept., 1853
John Duncan (X) Witness, Geo. Hawthorne	Seaman	55th	40th	G. W. King, J.P., 7th Sept., 1855
Sydney William Ellery	Seaman	55th	40th	G. W. King, J.P., 7th Sept., 1855
George Gillham	Seaman	55th	40th	G. W. King, J.P.. 10th Sept.,1855
Samuel Miles	Cook & Seaman	50th	40th	G. W. King, J.P., 10th Sept.,1855
William Gubby	Seaman	55th	40th	G. W. King, J.P., 10th Sept.,1855
John Scutchings	Seaman	80th	70th	G. W. King, J.P., 10th Sept.,1855
Laurence Millar	Seaman	55th	40th	G. W. King, J.P., 13th Sept.,1855
Alex. Donaldson	Boat Steerer	30th	—	—

A skilful and determined Captain was a priceless asset to any owner, and such a man usually could command the best boat-steerers and crews, in whose interests it was to follow a successful Captain and a lucky ship. The crews after signing on were given an advance of pay, and the ships anchored in mid-stream, and then the difficulty began. The men had to be dragged, often drugged and drunk, from the hotels to the ship, and when all (or sufficient) had been collected, the cruise, which might last two years or over, commenced.

Some of these cruises were short and highly profitable, on others a ship after months and even years at sea might make Hobart Town a "clean ship," i.e., with no oil. An instance of the former was the fitting of the barque "Asia" for sea in 1870. The cost of the ship, fitting, all stores and advances paid to the crew amounted to £6,750 18s. In ten months she had returned to Hobart with 68 tuns of sperm oil at £90 per tun of a total value of £6,120. Endless examples of unsuccessful voyages can also be given.

Among owners and ships during these three decades 1850-60-70 the names of the following owners and ships may be noticed. The list, however, is not intended to be full or complete and only touches lightly the full tally.

Such names include:—

Charles Seal, Esq.,
Prince Regent
Maria Orr (lost 1841)
Aladdin
Sussex
Southern Cross
Pride (Brig)

McGregor Bros.
Flying Childers
Derwent Hunter
Asia
Emily Downing

H. Bayley, Esq.,
Runnymede

—. Johnston, Esq.,
Othello

Dr. W. L. Crowther,
Elizabeth Jane, Schooner, Captain Abbott
Offley, Barque, Captain Robinson
Sapphire, Barque, Captain Sanderson
Velocity, Schooner
Flying Squirrel, Schooner
Isabella, Barque, Captain Chamberlain

A. Sherwin, Esq.,
Marie Laurie
Louisa
Zephyr

Capt. E. Lucas,
Isle of France

H. Hopkins, Esq.,
Nautilus

The "Othello" being perhaps the most consistently lucky and successful ship sailing out of Hobart.

Captain A. B. Robinson, who commanded in succession the "Velocity," "Emily Downing," and "Othello," is living now at Glenorchy, and it is to him I am greatly indebted for much of the information in reference to the Whaling grounds and taking of the Sperm whales.

In 1855, the late John Ross completed his patent slip at Secheron, and Messrs. McGregor also laid down a slip at the Domain Yards. This enabled repairs to be carried out, and gave a tremendous impetus to Hobart Town whaling.

In 1857 the Brig "Grecian" (Chas. Seal, owner) when cruising off the South West Cape "rose" Sperm Whales. The boats were lowered in chase, and that of R. Marney, the chief mate, made fast to one. The whale at once made away, towing the boat after it. Night came on rapidly, and during the darkness flares were lit from the "Grecian" and guns let off. However, no trace was ever again found of the boat or its crew.

In the same year the late Dr. W. L. Crowther fitted out an expedition to take Sea elephant oil from Kerguelen Island (Desolation Land). The "Offley" (barque), Capt. J. W. Robinson, sailed for her destination, Christmas Harbour, Kerguelen Island, with shore parties on board and fitted out at great expense. The sea elephants were to be taken from Hurd's Island, which had no Harbour, and only one open roadstead. For the expedition to be successful a tender to land the shore parties and supplies, and to bring off the barrels of oil to the larger ship was essential. The Schooner "Elizabeth Jane" was despatched to the rendezvous at Christmas Harbour for this purpose. The "Offley" made the Harbour in good time and waited for her tender. The latter, meeting heavy weather, leaked a little, and, putting into Mauritius, was condemned and sold. To take her place the "Flying Squirrel" (schooner) was at once fitted out and despatched; the crew, however, mutinied and returned to Hobart. By this time the "Offley," after months of delay, had "mated" with the "Mary Powell," an American Schooner, landed her shore party at Hurd's Island and collected much oil. Eventually when 400 tuns had been got on the "Mary Powell," a sudden storm arose, the ship was driven on shore, and the crew were only saved by a miracle. The "Offley," with 100 tuns on board, then returned to Hobart Town, and the venture financially was a very big loss to my grandfather.

On the other hand, the "Elizabeth Jane," a small schooner and two boat ship, had in a short cruise of a few weeks off the South West Cape, some years previously, returned to port with £2,600 worth of Sperm oil.

Dwelling as I have on the voyages of individual ships, I have neglected to write of the pursuit of the Sperm

Whale itself. The Whale was found particularly in the neighbourhood of the S.W. Cape as it passed East and West in its pursuit of the "Squid." The smaller ships from Hobart Town cruised off the Cape and towed the Whales they secured into Port Davey or Recherche to "try" them out. The larger ships passed by way of the South West Cape to the various whaling grounds, i.e.—

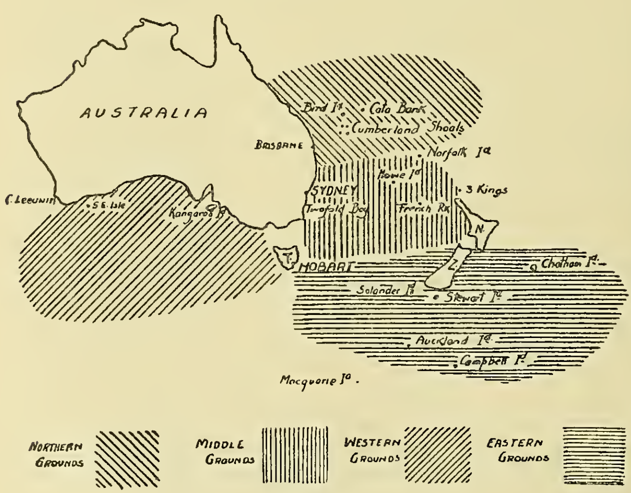
Middle Grounds—Which lay between Sydney and New Zealand and South of Norfolk Island. The famous "Three Kings" and French Rock lay within the Middle Grounds.

Northern Grounds—Which were north of Norfolk Island and between the Australian Coast and New Caledonia. These included Cato's Banks, Woodlark Island, St. Christoval's, and the Cumberland Shoals.

Western Grounds—From South West Cape to the Leeuwin, and including Kangaroo Island, South East Island, Portlock's Reef, and Grindley's Island (at West and East end of Great Australian Bight).

Eastern Grounds—The Solanders, west of Foveaux Straits, and Chatham Islands (in whaling times the Pyramid).

DIAGRAM OF WHALING GROUNDS
OF HOBART-TOWN SHIPS
Circa 1850-60-70



LEGEND.

W.L. Crowther 5.12.19.

A Diagram attached illustrates these various grounds. The Captains of the ship worked as a rule from ground to ground. In a log of the "Othello," Capt. A. B. Robinson, every one of the four was visited in turn, resulting in an excellent catch.

In the ship's log entries were made of all whales seen from the masthead, with special notes for Sperm.

One reads from day to day of the following having been sighted:—Sperm, Humpback, Finback, Sulphur bottom, Black Fish, Killers, Grampus, Cow fish, and Sunfish. The two first named only were pursued by the Tasmanian ships.

The Sperm whales moved singly or in "pods," i.e., groups of two or three with Bulls on the outside. The Sperm whale was approached very quietly from behind, and made fast by one or more lances being darted into him. Once fast more were secured to the whale until it was dead. The Boat's steerer who "darted" the lances endeavoured to make fast well forward and to avoid hitting a rib. If not secured in a vital spot the whale either sounded or ran, and in the former case might go so deeply as to take all the lines and then be lost. Bombs from guns were used as well as lances, in order to kill the whale.

The Right whale was approached head to head by the boat's crew. Once killed the boat's crew waited for the ship to run down to them and make fast to the whale, and the "cutting-in" commenced. The first stage was to remove the whale's head and get it on board. This was done, because in the Sperm whale one third of the total quantity of Oil is found in the head. The latter consisted of two parts—the "Case" and the "Junk."

The "Case" contained the clear oil and head matter. This was called the "Spermaceti" (Spermatozoa of the Whale) under misapprehension as to its function. It was contained in a boney cavity outside the cranium proper. The oil from the case is a clear amber colour and amounts to one third of the total from the whale. A hole was cut into the cavity and the oil bailed direct into barrels placed for that purpose on either side of the gangway. From these barrels it was taken to the "Try Works" and used later to commence the process of trying out.

The "Junk." The remaining portion of the head contained a large amount of Oil in its cellular tissues, which was comparable to Honey in the Comb. This substance the Sailors called "white horse." The Junk when cut up was taken at once to the blubber room to prevent the loss of its Oil, its own weight causing it to ooze from the tissues.

The "Body." After the removal of the head the Body was treated and the blubber removed as follows:—Hooks were lowered from a yard and secured in the blubber. On traction being made men with sharp spades cut long strips from the body. These "Blanket pieces," a couple of feet in breadth, when five to six feet long, were cut off and hove into the blubber room, and there divided into much smaller pieces. These small pieces were then taken to the Mincer near the "Try Works" and then when the Oil in the pot was heated, thrown in, and boiled down. When boiled the oil was bailed out into "Coolers" on either side of the Try Works, thence to the tanks, and from the tanks to casks and stowed below.

For the above description of "Trying-out" a Sperm whale I again have to thank Captain A. B. Robinson.

During this year the Australian and New Zealand whaling grounds were populous with ships, particularly in well known whaling localities. Every Captain logged any whaler spoken to, giving his catch and time at sea, and this information was published on his return to port, and so the public were given some idea of the fortunes of the ships still at sea.

The following entry in the "Othello" log for Saturday, November 20th, 1869, gives some idea of the number of ships in the neighbourhood of Norfolk Island:—"Light "Easterly and variable winds—at 9.30, and we ran off shore "to the West." The following named ships are either at the Island or have been here very lately. I give the report as furnished by Mr. Fred. Young of N.Z.

B.k. Hunter, Captain Chase, 23 months; 1,650 barrels of Sperm.

B.k. The Ionia, Captain Norton, 30 months; 500 barrels of Sperm, 600 Black Oil.

B.k. Highland Mary, Captain French, a long time; 15 barrels of Sperm.

Abraham Barker, 36 months; 2,900 barrels of Sperm.

Corral, Captain Potter, 15 months; 500 barrels of Sperm, 1,000 Black Oil.

Northern Light, Captain Baker, 1,200 barrels of Sperm, 450 Black Oil.

Napoleon, 17 months; 750 barrels of Sperm.

Petrel, Captain Worth, 40 months; 1,100 barrels of Sperm.

Europa, Captain Rye, 24 months; 900 barrels of Sperm, 800 Black Oil.

Onward, Captain Allen, 8 months; 180 barrels of Sperm, 25 Black Oil.

Fanny Fisher, Captain Mayhew, 1 month; clean.

The American ships away 2 - 3 years from Salem or New Bedford carried little or no money. It was their custom to pay for fresh food and stores with American Agricultural Implements, as ploughs, etc., in this way helping the trade of U.S.A.

In 1870 Sperm Oil was £120 a tun, causing a revival in the trade, which had been on the decline for a few years.

After 1886 the trade fell away until only the "Water-witch" was left. An attempt was made in 1893 to revive the industry, and the barque "Helen" was fitted out. She went to the Campbell Islands, where the Black whale was said to have its quarters, but the venture was not a financial success.

In writing the latter part of these notes I have received the greater part of information from gentlemen who have been interested in or connected with the old whaling fleets. Particularly I wish to thank my father (Dr. E. L. Crowther), Captain A. B. Robinson, R. R. Rex, Esq., A. C. Hume, Esq., and Captain McArthur for their assistance and great help.

ABSTRACT OF PROCEEDINGS

1919

Annual Meeting.

The Annual General Meeting was held at the Museum on 10th March.

Mr. L. Rodway, C.M.G. occupied the chair.

The Annual Report and Statement of Accounts were read and adopted.

There being 11 nominations for 9 vacancies on the Council, an election was held, the following being elected as the Council for 1919:—Dr. A. H. Clarke, Dr. Glasson, Messrs. W. H. Clemes, L. Dechaineux, T. W. Fowler, J. A. Johnson, L. H. Lindon, L. Rodway, C. C. Thorold.

Mr. R. A. Black was appointed Auditor.

The following were elected members of the Society:— Lieut.-Col. R. E. Snowden, Dr. E. A. Elliott, Messrs. W. N. Crawford, G. A. Jackson, Miss F. Stevenson.

Mr. Clive Lord exhibited a specimen of the spotted-tailed Sea Snake (*Hydrus platurus*). This being the first record of this species from Tasmania.

Mr. H. H. Scott (Curator of the Launceston Museum) delivered an interesting lecturette upon certain osteological features of Tasmanian Cetacea.

Illustrated Lecture.

Mr. E. T. Emmett (Director of the Tourist Bureau) delivered an illustrated lecture on "The River Gordon and the West Coast of Tasmania."

Conversazione.

After the business of the meeting was concluded, an adjournment was made to the Art Gallery, where a conversazione was held.

14th April, 1919.

The Monthly Meeting was held at the Society's Room, Museum, at 8 p.m., His Excellency Sir Francis Newdegate, K.C.M.G., presiding.

The following members were elected:—Mrs. G. O. Smith, Messrs. G. O. Smith, A. D. Chapman, W. E. Masters.

Papers.

The following papers were read:—

1. "Studies of Tasmanian Cetacea. Part I." *Orca gladiator*, *Pseudorca crassidens*, *Globicephalus melas*, by H. H. Scott and C. E. Lord.
2. "The Geology of Wineglass Bay," by W. H. Clemes.

Illustrated Lecture.

Mr. Walter H. Cummins, A.I.A.C., delivered an illustrated lecture on "The Newspaper World."

12TH MAY, 1919.

The Monthly Meeting was held at the Society's Room, Museum, at 8 p.m.

Mr. L. Rodway presiding.

The following members were elected:—Captain Riggall, D.S.O., Messrs. Charles Burbury, Gerald Burbury, T. J. Burbury, Robert Headlam, and Charles F. Pitt.

Mr. Clive Lord exhibited a series of ornithological specimens.

Mr. T. W. Fowler delivered an illustrated lecture entitled, "Notes on Irrigation."

10TH JUNE, 1919.

Special Meeting.

A Special Meeting of the Society was held at 8 p.m. The object of the meeting was to consider the following additions to the Rules which had been recommended by the Council.

"55 b. The Council may, at its discretion, upon "the receipt of a request from a sufficient number of "members resident in any district, create a local as-"sociation of members of the Society in such district, "and the Council shall also have power to dissolve "such local association at any time after it has been "formed."

"55 c. Every such association shall be carried "on in accordance with rules and regulations to be "laid down from time to time by the Council."

"55 d. The Council may, at its discretion, con-"tribute towards the expenses of any local association "in any year a sum not exceeding one-third of the "subscriptions received during such year from mem-"bers who are also members of such local associa-"tion."

The Chairman, Mr. Rodway, briefly explained the object of the new rules, and after a short discussion the rules as recommended were unanimously adopted.

10TH JUNE, 1919.

General Meeting.

The Monthly Meeting was held at the Museum at 8.15 p.m., Mr. L. Rodway, C.M.G., presiding.

The Secretary tabled a file of correspondence received from Mr. L. A. Evans, relating to a supposed tunnel at the River Gordon.

Illustrated Lecture.

Mr. Rodway delivered an illustrated lecture on "Tasmanian Fungi."

14TH JULY, 1919.

The Monthly Meeting was held at the Museum at 8 p.m., His Excellency Sir Francis Newdegate, K.C.M.G., presiding.

Papers.

1. "The Geology of Maria Island," by W. H. Clemes, B.A., B.Sc.
2. "Studies of Tasmanian Cetacea, Part II.," by H. H. Scott and C. E. Lord.
3. "The Early History of Maria Island," by C. E. Lord.

Illustrated Lecture.

An illustrated lecture on Maria Island was given by Messrs. Clemes and Lord.

11TH AUGUST, 1919.

The Monthly Meeting was held at the Museum at 8 p.m., Mr. L. Rodway presiding.

Member.

Mr. A. N. Lewis was elected a member of the Club.

Papers.

1. "Additions to Tasmanian Mollusca," by W. L. May.
2. "Revision of Professor Haswell's types of Australian Pycnogonidæ," by Professor Flynn.
3. "Notes on a rare Tasmanian Crustacean," by Professor Chilton.

Illustrated Lecture.

Mr. Rodway delivered an illustrated lecture on Tasmanian Cordyceps.

SEPTEMBER AND OCTOBER.

Owing to the influenza epidemic it was impossible to hold the usual meetings of the Society during September and October. A meeting of the Council was held on 1st September, at which several papers were read.

10TH NOVEMBER, 1919.

The Monthly Meeting was held at the Museum at 8 p.m., Mr. L. Rodway presiding.

Before the business of the meeting was proceeded with, reference was made to the severe loss that the Society had sustained owing to the death of Mr. W. H. Twelvetrees, Government Geologist of Tasmania.

Mr. Lord drew attention to the fact that the English Blackbird had been found nesting in Tasmania. He suggested that steps should be taken to prevent this species becoming a pest to fruitgrowers. It was resolved to write to the Government concerning the matter.

Lecture.

Dr. W. L. Crowther delivered an instructive lecture on Tasmanian Whaling.

15TH DECEMBER, 1919.

A meeting was held at the Museum at 4.30 p.m.

The following members were elected:—

Rt. Rev. R. S. Hay, Bishop of Tasmania, Messrs. J. R. Irby, H. Warlow-Davies, T. H. Leahy, A. D. Mackay, and T. H. Williams.

ANNUAL REPORT

The Royal Society of Tasmania

1919

Patron:

HIS MAJESTY THE KING.

President:

HIS EXCELLENCY SIR FRANCIS NEWDEGATE, K.C.M.G.,
GOVERNOR OF TASMANIA.

Vice-Presidents:

E. L. PIESSE, B.Sc., LL.B.

L. RODWAY, C.M.G.

Council:

(Elected March, 1919).

A. H. CLARKE, M.R.C.S., L.R.C.P. *(Chairman)*

W. H. CLEMES, B A., B.Sc.

W. E. L. CROWTHER, D.S.O., M.B. (elected August, 1919)

L. DECHAINEUX

T. W. FOWLER

J. L. GLASSON, M.A., D.Sc.

J. A. JOHNSON, M.A.

L. H. LINDON, M.A. (resigned, July, 1919)

L. RODWAY, C.M.G.

C. C. THOROLD, M.A.

Hon. Treasurer:

L. RODWAY.

Auditor:

R. A. BLACK.

Secretary and Librarian:

CLIVE E. LORD

LIST OF MEMBERS.

Honorary Members:

David, T. W. Edgeworth, C.M.G., B.A., F.R.S., F.G.S. Professor of Geology and Physical Geography in the University of Sydney. The University, Sydney.

Mawson, Sir Douglas, B.E., D.Sc. Adelaide.

Shackleton, Sir Ernest H., Kt., C.V.O., F.R.G.S., F.R.A.S. 9 Regent-street, London, S.W., England.

Spencer, Sir W. Baldwin, K.C.M.G., M.A., F.R.S. Melbourne.

Ordinary, Life, and Corresponding Members:

"C," Corresponding Member.
"L," Member who has compounded subscriptions for life.
*, Member who has contributed a Paper read before the Society.
†, Member who has been elected a member of the Council.

Year of Election.		
1916		Ansell, M. M., B.A. The Registrar. The University, Hobart.
1918	L	Avery, J. Electrolytic Zinc Co. Risdon.
1908	L	Baker, Henry D. C/o American Consulate, Hobart.
1887		Barclay, David. 143 Hampden Road, Hobart.
1890		*Beattie, J. W. 1 Mount Stuart Road, Hobart.
1918		Bellamy, Herbert. City Engineer. Town Hall, Hobart.
1901	C	Benham, W. B., M.A., D.Sc., F.R.S., F.Z.S. Professor of Biology, University of Otago. Dunedin, New Zealand.
1903		Bennett, W. H. "Ashby," Ross.
1918		Bennett, A. E. "Ashby," Ross.
1900		Bennison, Thomas. 29 Cromwell Street, Hobart.
1918		Bennison, E. A. Napoleon Street, Battery Point.
1918		Bisdee, E. O. Lovely Banks, Melton Mowbray.
1912		*Black, R. A. Chief Clerk, Department of Agriculture. 50 High Street, Queenborough.
1909		*Blackman, A. E. Franklin.
1918		Bowling, J. "Clovelly," Risdon Road.
1892	C	Bragg, W. H., M.A., F.R.S. Professor of Physics in University College, London.

Year of Election.		
1917		Brettingham-Moore, Dr E., M.B., Ch.M. Macquarie-street, Hobart.
1911		Brooks, G. V. Director of Education. Education Department, Hobart.
1907		Brownell, F. L. "Leura," Main Road, Moonah.
1918		Bryer, J. R. Taroona.
1918		Burbury, Alfred, "Glen Morey," Antill Ponds.
1919		Burbury, Charles. "Inglewood," Andover.
1918		Burbury, Frederick. "Holly Park," Parattah.
1919		Burbury, Gerald. "Syndal," Ross.
1919		Burbury, T. J. "Park Farm," Jericho.
1909		†*Butler, W. F. D., B.A., M.Sc., LL.B. Bishop Street, New Town.
1917		Butters, J. H. Chief Engineer and Manager State Hydro-Electric Department, Hobart.
1919		Chapman, A. D. 105 Macquarie Street.
1912		Chapman, J. R. Holebrook Place, Hobart.
1901	C	Chapman, R. W., M.A., B.C.E. Elder Professor of Mathematics and Mechanics in the University of Adelaide. The University, Adelaide.
1913		Chepmell, C. H. D. Clerk of the Legislative Council. 23 Swan Street, Hobart.
1896		†*Clarke, A. H., M.R.C.S. L.R.C.P. Macquarie Street, Hobart.
1918		Clarke, T. W. H. Quorn Hall, Campbell Town
1887		†Clemes, Samuel. Principal of Leslie House School. Clare Street, New Town.
1910		†*Clemes, W. H., B.A., B.Sc. Leslie House School, Argyle Street, New Town.
1918		Conlon, A. Agricultural Department, Hobart.
1917		Copland, D. B., M. A. Lecturer in History and Economics, the University, Hobart.
1919		Crawford, R. N. Secretary for Education. Education Department, Hobart.
1917		Cullen, Rev. John. Macquarie Street, Hobart.
1918		*Cummins, W. H., A.I.A.C. Greenlands Avenue, Sandy Bay.
1919		†*Crowther, W. L., D.S.O., M.B. Macquarie Street, Hobart.
1884		Davies, The Hon. C. E., M.L.C. "Lyndhurst," New Town Road, New Town.

Year of Election.

1919 Davies, H. Warlow-, C.E. "Abermere," Mount Stuart.

1908 †Dechaineux, Lucien. Principal of Technical School, Hobart.

1903 Delany, Most Rev. Patrick. Archbishop of Hobart. 99 Barrack Street, Hobart.

1892 C Dendy, A., D.Sc., F.R.S., F.L.S. Professor of Zoology in the University of London (King's College). "Vale Lodge," Hampstead, London, N.W.

1916 Downie, W. A. Headmaster, Central School, Hobart.

1919 Elliott, E. A., M.B. Macquarie Street.

1918 Ellis, F. Education Department, Hobart.

1919 Erwin, H. D., B.A. Christ's College, Hobart.

1918 Evans, L. Acting Director of Agriculture, Hobart.

1902 Finlay, W. A. 11 Secheron Road, Hobart.

1918 Finlay, G. W. "Baskerville," Campbell Town.

1918 Fletcher, C. E. Education Department, Hobart.

1909 †*Flynn, T. Thomson, B.Sc. Ralston Professor of Biology in the University of Tasmania.

1890 L Foster, H. D. 137 Hampden Road, Hobart.

1905 L Foster, J. D. "Fairfield," Epping.

1913 †Fowler, T. W., M.Inst.C.E. Clare Street, New Town.

1918 Gatenby, R. L. Campbell Town.

1908 †*Giblin, Major L. F., D.S.O., B.A. Government Statistician, Davey Street.

1918 Gillett, Henry. "Wetmore," Ross.

1913 †*Glasson, J. L., M.A., D.Sc. Lecturer in Physics in the University of Tasmania. The University, Hobart.

1907 Gould, Robert. Longford.

1918 Gould, J. W. Tramway Department, Hobart.

1905 L Grant, C. W. "High Peak," Huon Road.

1913 * Hardy, G. H. Hurlstone. C/o Australian Museum, Sydney.

1918 Harrap, Lieut-Colonel G. E. Launceston.

1898 Harrison, M. W. Glenorchy.

Year of Election.		
1893		Harvey, W. A., M.B. 154 Macquarie Street, Hobart.
1902	C	Haswell, William, M.A., D.Sc., F.R.S., F.L.S. Challis Professor of Biology in the University of Sydney. The University, Sydney.
1913		Hawson, Edward. "Remine," 174 Argyle Street, Hobart.
1919		Hay, Rt. Rev R. S. Bishop of Tasmania. Bishopscourt, Hobart.
1919		Headlam, Robert. "Glen Esk," Conara.
1915		Hickman, V. V., B.Sc. Garden Road, Albert Park, Moonah.
1919		Higgins, Dr. P. Campbell Town.
1913		Hills, Loftus, M.Sc. Government Geologist. Launceston.
1914		Hitchcock, W. E. Moina.
1908		Hogg, G. H., M.D., C.M. 37 Brisbane Street, Launceston.
1909		*Hutchison, H. R. 1 Barrack Street, Hobart.
1913		Ife, G. W. R., LL.B. Summerhill Road, Hobart.
1919		Irby, J. R. Conservator of Forests. Lands Department, Hobart.
1898		*Ireland, E. W. J., M.B., C.M. Launceston General Hospital.
1918		Innes, H. S. 71 Davey Street, Hobart.
1919		Jackson, Geo. A. Tregear's Building, Collins Street.
1906		*Johnson, J. A., M.A. Principal of the Philip Smith Training College, Hobart. "Wharepuke," Argyle Street, New Town.
1911		Keene, E. H. D. Tantallon, Tarleton (A.I.F.).
1910		Kermode, R. C. "Mona Vale," Ross.
1918		Kermode, Lewis Q., B.A. Birkdale, Lancashire, England.
1905		Kerr, George. 165 Campbell Street, Hobart.
1913		Knight, J. C. E. "Windermere," Claremont.
1918		Knight, C. E. L., B.Sc. Claremont.
1919		Knight, H. W. National Mutual Buildings, Macquarie Street.
1919		Leahy, F. T. Electrolytic Zinc Company, Risdon.
1887		†Lewis, Sir Neil Elliott, K.C.M.G., M.A., B.C.L., LL.B., M.H.A. "Werndee," Augusta Road, New Town.

Year of Election.		
1912		†Lindon, L. H., M.A. "The Lodge," Park Street, Hobart.
1900		Lines, D. H. E., M.B., Ch.B. Archer Street, New Town.
1875	C	Liversidge, Professor Archibald, M.A., LL.D., A.R.S.M., F.R.S., F.I.C., F.C.S., F.G.S., F.R.G.S. "Fieldhead," Coombe Warren, Kingston, Surrey, England.
1913		†*Lord, Clive E. Curator and Secretary of the Tasmanian Museum, Hobart. "Cliveden," Mt. Nelson Road, Sandy Bay.
1912		McAlister, Miss M. K. Rosetta.
1893		*McAulay, Alexander, M.A. Professor of Mathematics in the University of Tasmania. The University, Hobart.
1902	C	*Maiden, J. H., I.S.O., F.R.S., F.L.S. Director of Botanic Gardens, Sydney, and Government Botanist of New South Wales. Botanic Gardens, Sydney.
1918		Mansell, A. E. Melton Mowbray.
1918		Martin, Colonel W., V.D. Launceston.
1919		Masters, W. E., B.A., LL.B. Box 22, G.P.O., Hobart.
1913		Mather, J. F. 1 Mount Stuart Road, Hobart.
1917		Mackay, J. H. Professor of Engineering. The University of Tasmania, Hobart.
1919		Mackay, A. D., B.Sc., M.M.E. 4 Fawkner Street, South Yarra, Victoria.
1895		*May, W. L. "Forest Hill," Sandford.
1909		Millen, J. D. Mount Bischoff Mine, Waratah.
1907		Miller, Lindsay S., M.B., Ch.B. 156 Macquarie Street, Hobart.
1894	L	Mitchell, J. G. "Ellesmere," Jericho.
1913		Mitchell, P. H., B.A. Headmaster of the State High School, Hobart. 2 Ashfield Street, Queenborough.
1911		Montgomery, R. B. Davey Street, New Town.
1918		Murdoch, Thomas. Montpelier Road, Hobart.
1882		Nicholas, G. C. "Cawood," Ouse.
1918		Nicholls, Sir Herbert, Kt. Chief Justice of Tasmania. Pillinger Street, Queenborough.
1910		Nicholls, H. Minchin. Government Microbiologist, Department of Agriculture. Macquarie Street, Hobart.

Year of Election.		
1919		Nicolson, Norman. "Streanshalh," Campbell Town.
1917		Oldham, N., J.P. New Town.
1919		Oldmeadow, H. E. R. "Lowes Park," Woodbury.
1908		Parsons, Miss S. R. 190 Davey Street, Hobart.
1902		†*Piesse, E. L., B.Sc., LL.B. 39 Broadway, Camberwell, Victoria.
1910		Pillinger, James. 4 Fitzroy Crescent, Hobart.
1918		Pitt, Frank C. K. "Glen Dhu," The Ouse.
1919		Pitt, C. F. Campbell Town.
1908		Pratt, A. W. Courtney. "Athon," Mt. Stuart Road, Hobart.
1917		Raamsdonk, I. N. Lecturer in Modern Languages, the University, Hobart.
1919		Riggall, Captain A. Hortin, D.S.O. Tunbridge.
1919		Robertson, J. Moore. Sandy Bay.
1918		Robertson, T. W. Box 93, G.P.O., Hobart.
1919		Rowland, E. O. Secretary Public Service Board, Hobart.
1884		†*Rodway, Leonard, C.M.G. Government Botanist of Tasmania. Macquarie Street, Hobart.
1913		Ross, Hector. Sheriff of Tasmania. Elphinstone Road, Hobart.
1915		Ross, J. Head Teacher, New Town School, New Town (A.I.F.).
1896		Scott, R. G., M.B., Ch.M. 172 Macquarie Street, Hobart.
1919		Sharland, A. Campbell Town.
1892	C	*Shirley, John, D.Sc. Principal, Teachers' Training College, Queensland. "Coot-tha," Bowen Hills, Brisbane.
1901		Shoobridge, Canon G. W. 3 Molle Street, Hobart.
1917		Slaytor, C. H., F.I.C. Haxey, Doncaster, England.
1919		Smith, G. O. Town Hall, Hobart.
1919		Smith, G. O., Mrs.
1901	C	Smith, R. Greig-, D.Sc. Linnean Hall, Elizabeth Bay, Sydney.
1919		Snowden, Colonel R. E. "Minallo," West Hobart.
1896	L	*Sprott, Gregory, M.D., C.M. Macquarie Street, Hobart.

Year of Election.		
1919		Stevenson, Miss F. "Leith House," New Town.
1896	L	Sticht, Robert, B.Sc., E.M. Mount Lyell Mining and Railway Co. Ltd., Queen Street, Melbourne.
1913		Susman, Maurice. 88 Murray Street, Hobart.
1907		Tarleton, J. W. 108 High Street, Queenborough.
1887		*Taylor, A. J. Librarian of the Tasmanian Public Library. 28 D Arcy Street, Hobart.
1918		Taylor, Walter E. Elboden Street, Hobart.
1892	C	*Thomson, G. M., F.L.S. Dunedin, New Zealand.
1918		Thorold, C. C., M.A. Hutchins School, Hobart.
1918		Walch, Percy. King Street, Sandy Bay.
1901	C	Wall, Arnold, M.A. Professor of English Language and Literature in Canterbury College. Christchurch, New Zealand.
1913		Wardman, John. Superintendent of the Botanical Gardens. Botanical Gardens, Hobart.
1918		Waterhouse, G. W., B.A., LL.M. Cantab. Messrs. Ritchie and Parker, Alfred Green and Co., Launceston.
1918		Watt, W. The Observatory, Hobart.
1918		Weber, A. F. Lands Department, Hobart.
1919		Williams, T. H. Electrolytic Zinc Company, Risdon.
1901		Wise, H. J. Lambert Avenue, Sandy Bay.

Members are asked to inform the Secretary of any change of address or other necessary correction.

ANNUAL REPORT.

In accordance with Rule 39, the Council present a report of the Proceedings of the Society for 1919.

The Council and Officers.

The Annual General Meeting was held on the 10th March. Eleven nominations being received for membership of the Council, an election was held, with the result that the following nine members were elected as the Council for 1919:—Dr. A. H. Clarke, Dr. J. L. Glasson, Messrs. W. H. Clemes, L. Dechaineux, T. W. Fowler, J. A. Johnson, L. H. Lindon, L. Rodway, C. C. Thorold.

The Council at the first meeting elected the following officers:—Dr. Clarke (Chairman), Mr. L. Rodway (Hon. Treasurer), Mr. Clive Lord (Secretary and Librarian).

The Council elected Dr. Clarke, Messrs. Clemes, Dechaineux, Johnson, Lindon, and Rodway, to be trustees of the Tasmanian Museum and Botanical Gardens.

During the year Mr. Lindon resigned, and Dr. W. L. Crowther was elected in his place.

Eleven Council meetings were held during the year, the attendance being as follows:—Mr. Rodway 11, Mr. Johnson 10, Mr. Fowler 9, Mr. Clemes 8, Mr. Thorold 8, Dr. Clarke 7, Dr. Glasson 6, Mr. Dechaineux 6, Mr. Lindon (resigned July) 6, Dr. Crowther (elected August) 3.

Meetings.

Eight ordinary meetings and one special meeting were held during the year. The outbreak of pneumonic influenza in September and October interfered with the programme of lectures, but notwithstanding this the session, generally speaking, was a successful one. Many instructive papers were read, and the meetings were well attended.

Membership.

It is satisfactory to record a substantial increase in the membership of the Society. The roll at the end of the year showed that there were four honorary members, eleven corresponding members, seven life members, and one hundred and forty-two ordinary members. A number of the new subscriptions do not become due until next year, but when they are received they will add very materially to the financial strength of the Society.

Library.

The Library of the Society now contains over 13,000 volumes, in addition to a large number of pamphlets and other documents. Many of these are of great value, and the upkeep of the Library is becoming an increasing tax on the Society's resources. An extension of the present Library accommodation is becoming a necessity. Owing to the risks of transportation no books have been purchased for several years past with the money derived from the Morton Allport Memorial Fund, but next year it is proposed to acquire a number of volumes with the income obtained from this fund.

Education Section.

Chairman: L. Dechaineux.

Hon. Sec.: W. H. Clemes, B.A., B.Sc.

Owing to the Influenza Epidemic only four meetings of this Section were held. The following papers were read and discussed:—

"The Training of the Emotions and the Will at the Primary Stage," by L. Dechaineux.

"The Training of the Emotions," by J. A. Johnson, M.A.

"The Training of the Will," by S. Clemes.

Obituary.

It is with regret that the Society has to record the death of the following members during the past year:—

H. L. Roberts, of "Beaumaris," Hobart. (Elected a member in 1864.)

W. H. Twelvetrees, of Launceston. Government Geologist of Tasmania. (Elected a member in 1896.)

G. E. Brettingham-Moore, of Hobart. (Elected a member in 1900.)

Donald McKinnon, of "Dalness," Evandale. (Elected a member in 1918.)

John Taylor, of "Winton," Campbell Town. (Elected a member in 1918.)

W. H. Twelvetrees, F.G.S.

W. H. Twelvetrees was born in Bedfordshire, England, in 1848. In 1871 he was employed at the Viskrensensky copper mines and smelting works in Eastern Russia, and remained there for nine years. He was stationed at the

Lidjessie silver mines in Asia Minor from 1882 until 1884. He then became general manager of these mines, and remained in the district until 1891, when he came to Tasmania. He soon began to take an interest in public affairs, and was secretary of the first exhibition at Launceston, which was held in the Albert-hall in 1892. In 1899 he was appointed Government Geologist and Chief Inspector of Mines. He carried out the duties of the combined officers until 1914, when the inspection of mines was made a separate branch of the Mines Department. Since 1914 he held the position of Government Geologist and Director of the Geological Survey of Tasmania, and continued his work practically to the time of his death.

During his regime, the work in his branch of the Department grew in volume and importance. The Geological Gallery, at Launceston, established in connection with the Geological Survey, will always stand as a memorial to his enthusiastic work.

His connection with various scientific societies is well known, and his many valuable contributions in the shape of scientific writings will ever serve to remind geologists and others of his work.

Owing to his death the State has lost a valuable servant, this Society a prominent member, and many of the remaining members have lost a personal friend. Mr. Twelvetrees's kindly nature led him to be honoured and respected by all classes of people, and his loss will be felt far beyond the realm of the scientific world.

ROYAL SOCIETY OF TASMANIA

RECEIPTS AND EXPENDITURE, 1919. GENERAL ACCOUNT.

RECEIPTS.				£	s.	d.
Balance brought forward				20	5	4
Subscriptions :—						
Current, 83 at £1/1/-... ...	£87	3	0			
Arrears, 1 at £1/1/-	1	1	0			
Advance, 1 at £1/1/-	1	1	0			
				89	5	0
Government Grant in aid of Printing				100	0	0
Miscellaneous...				19	4	9
				£228	15	1
Dr. Balance, 1919				50	18	5
				£279	13	6

PAYMENTS.				£	s.	d.
Salaries				33	5	0
Papers and Proceedings :—						
1918 (Part)	£61	16	0			
1919 (Part)	105	13	4			
				167	9	4
Expenses of Meetings				26	5	2
Library				19	10	11
Light and Fuel				1	14	0
Lantern and Operator				2	0	0
Postages and Petty Cash				8	5	10
Miscellaneous...				18	9	0
Bank Charges, etc.				2	14	3
				£279	13	6

MORTON ALLPORT MEMORIAL FUND ACCOUNT,* 1919.

RECEIPTS.				£	s.	d.
Balance brought forward 1st Jan., 1919				39	19	3
Interest received from Perpetual Trustee Co.—						
5 per cent. on £200 War Loan	£10	0	0			
Less Trustee Co. Commission ...	0	5	0			
				9	15	0
				£49	14	3

PAYMENTS.	£	s.	d.
Balance to 1920	49	14	3
	£49	14	3

* £200 was raised by Public Subscription in 1878 to establish a Memorial to the late Morton Allport. The Fund was invested in the name of the Perpetual Trustees, Executors, and Agency Co. of Tasmania Ltd., and the income is used for the purchase of Books for the Library of the Society.

Audited and found correct,
R. A. BLACK, Hon. Auditor.
15th Jan., 1920.

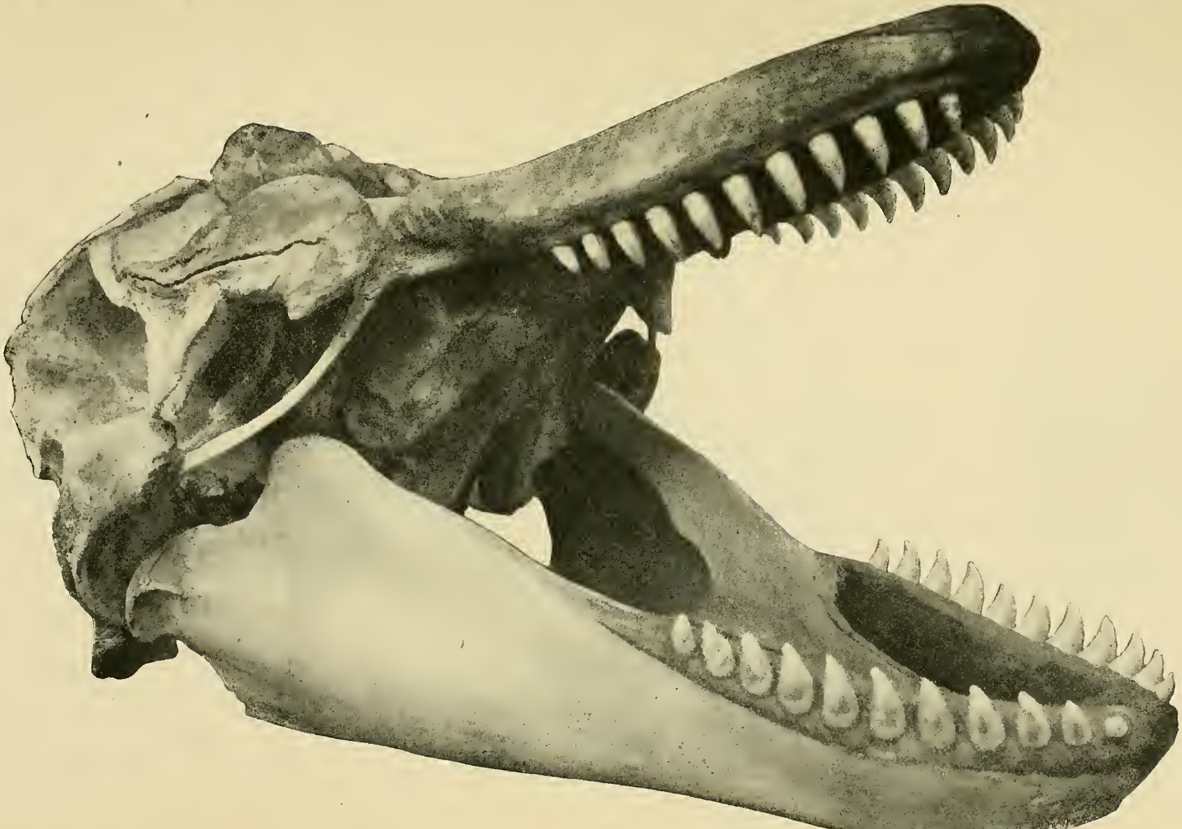
L. RODWAY, Hon. Treasurer.
CLIVE LORD, Secretary.
January 7th, 1920.

INDEX.

Titles of Papers, and New Genera and Species in **Heavy Type.**

Synonyms in *Italic.*

PSEUDORCA CRASSIDENS.



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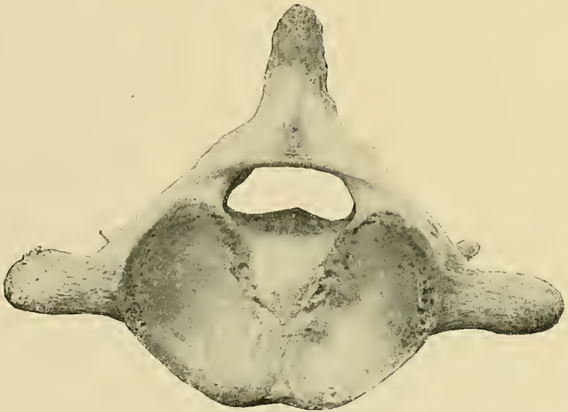

Anterior Cervicals.

First Dorsal.

Posterior Cervicals.

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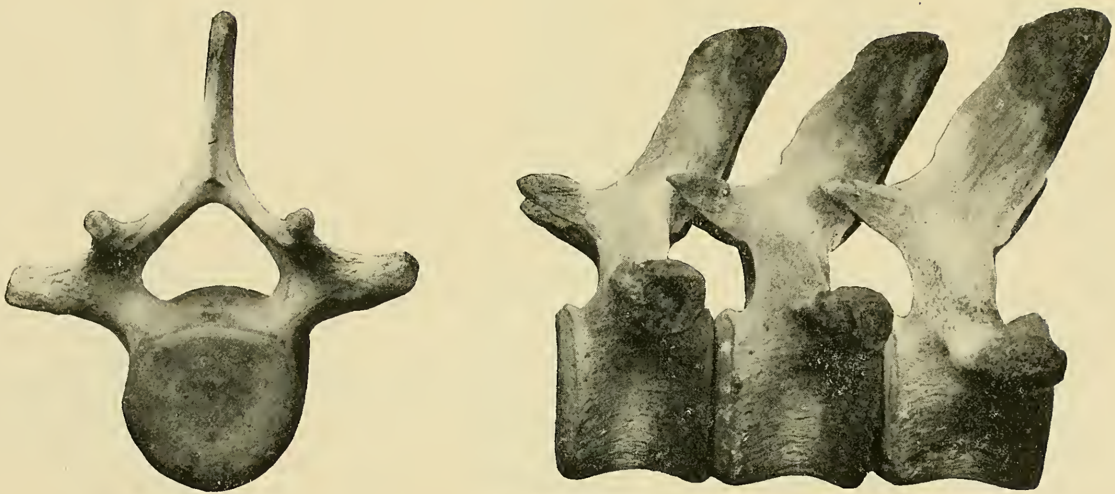

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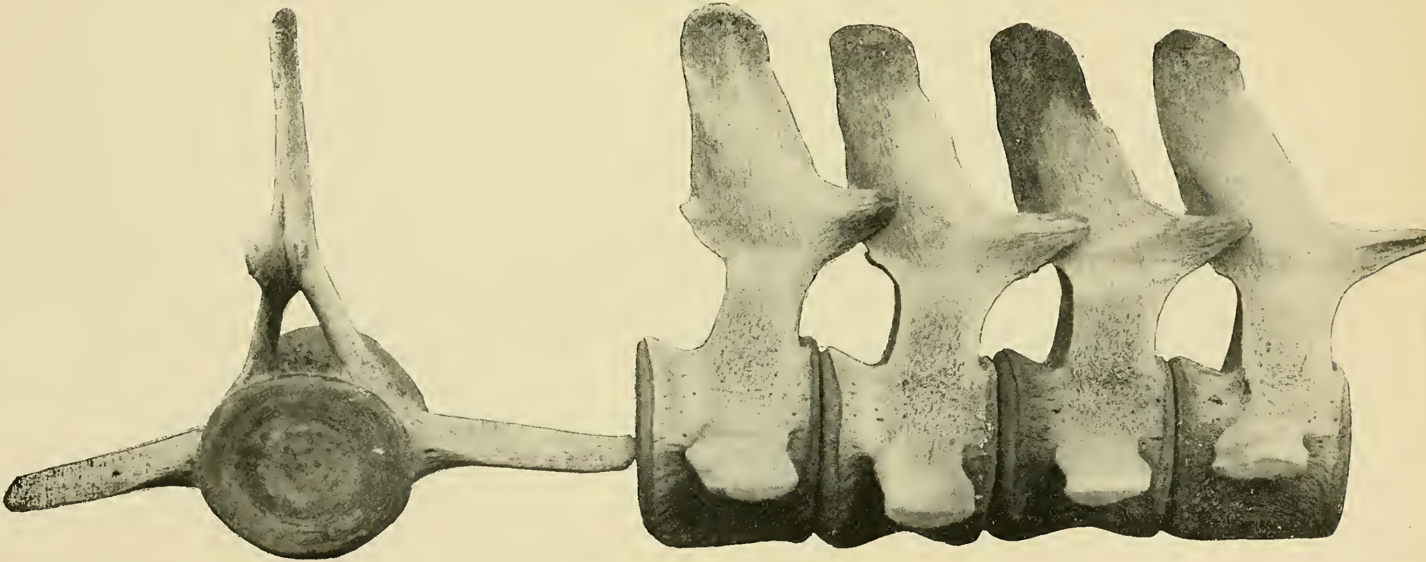

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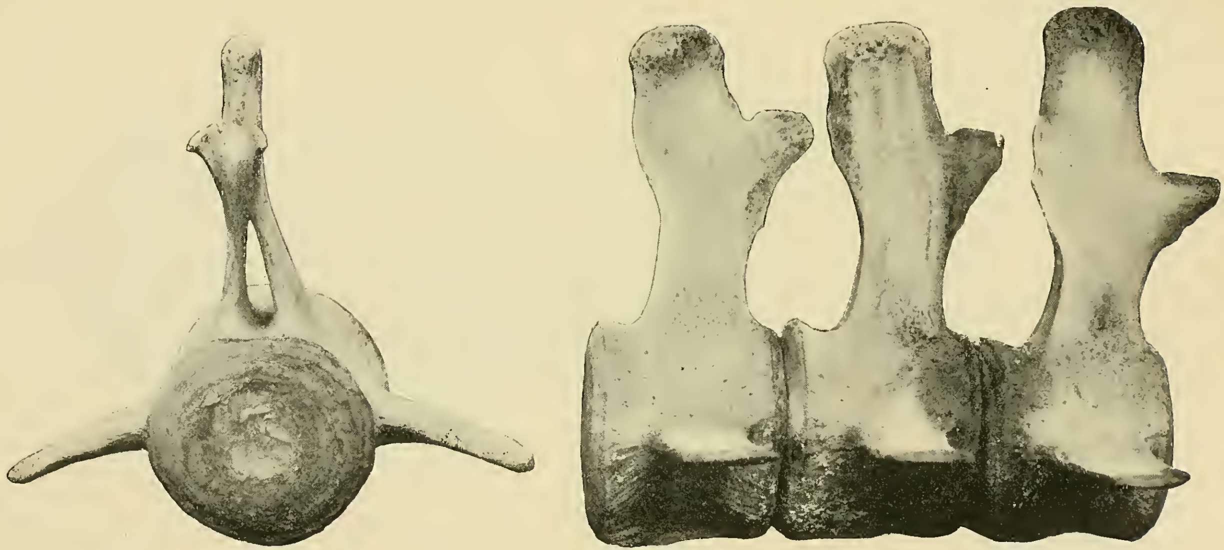

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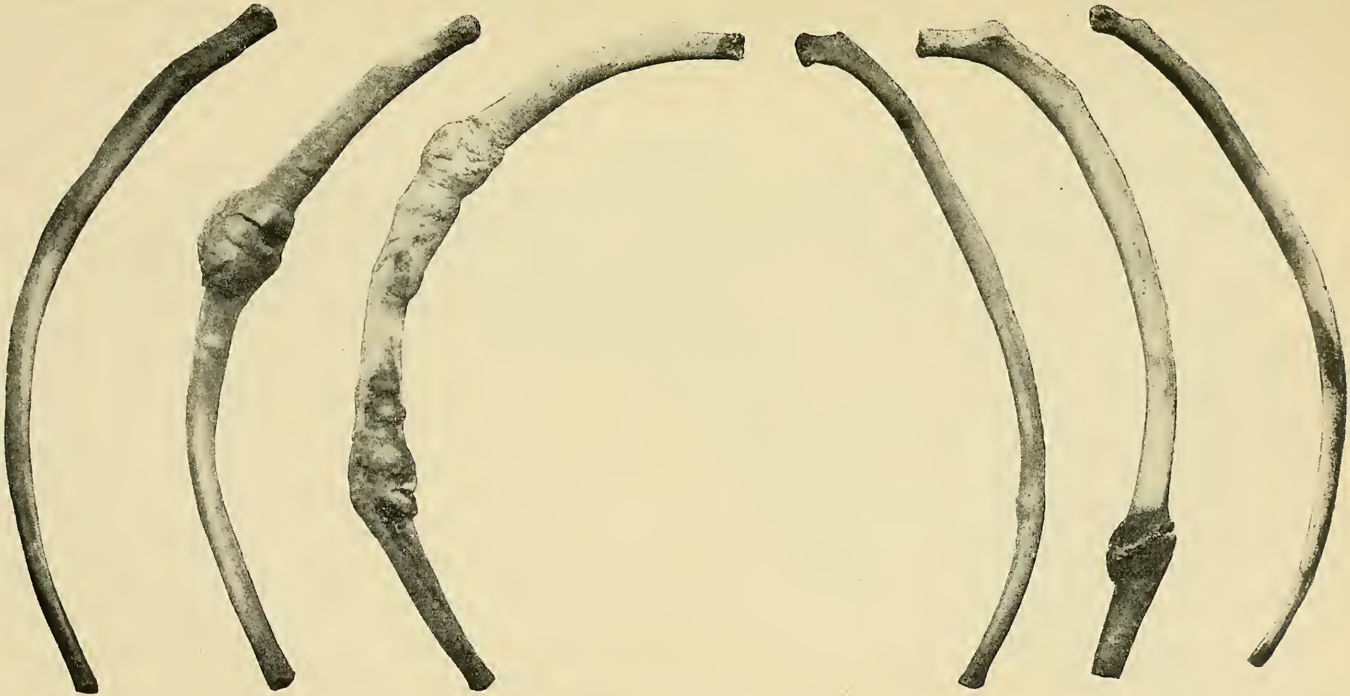

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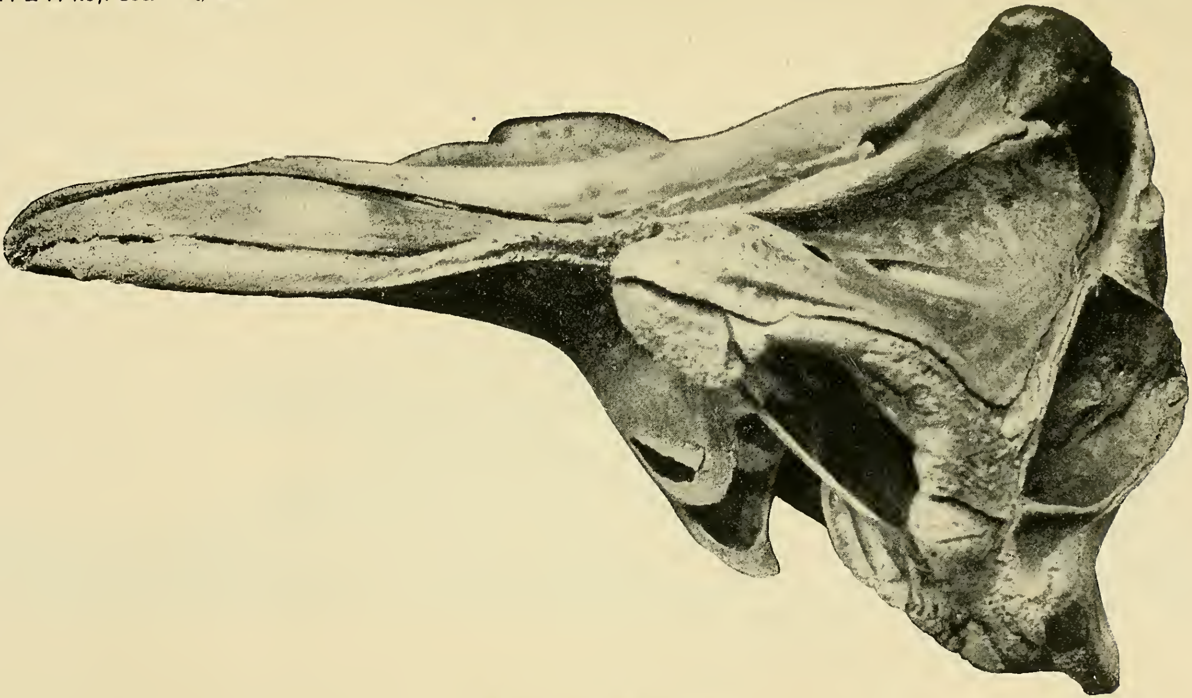
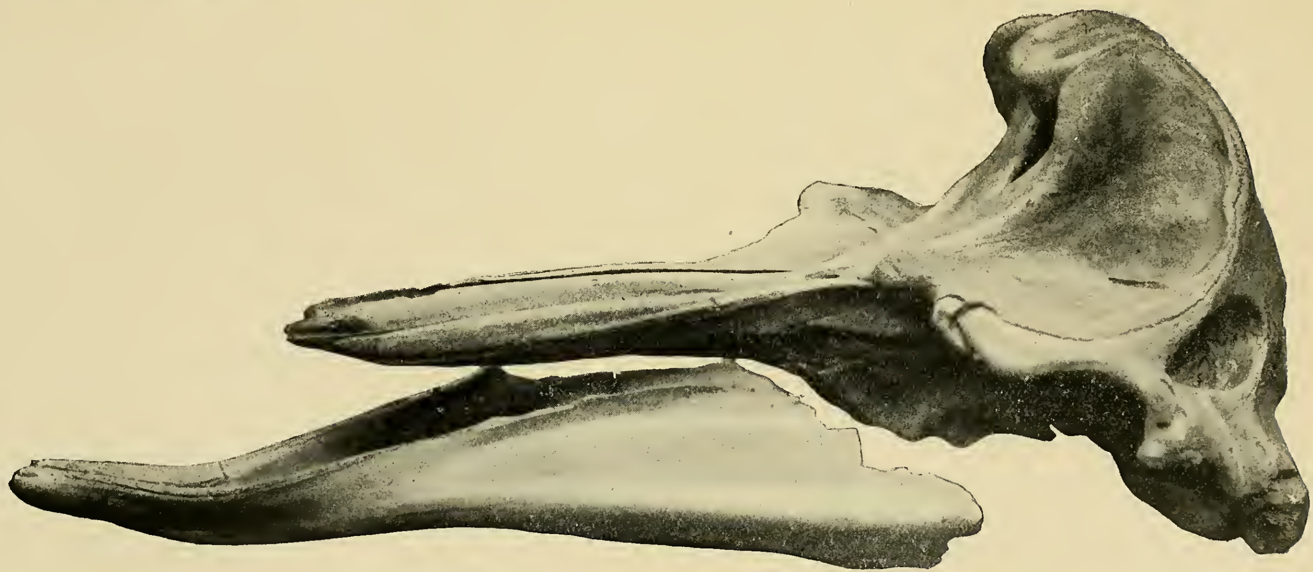
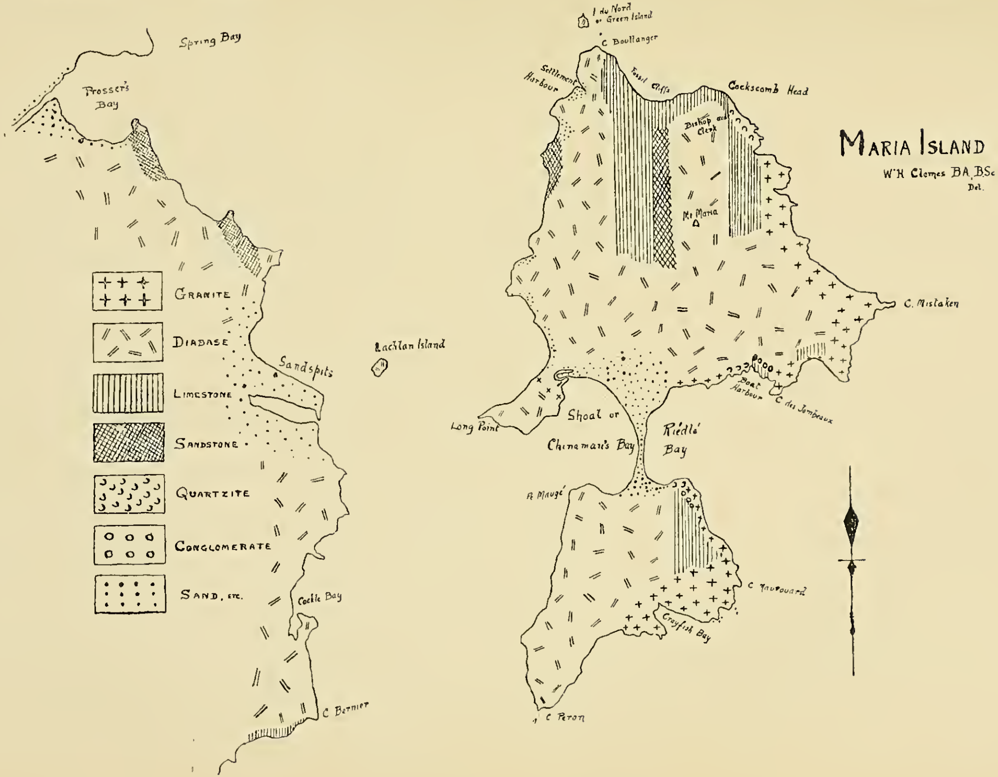


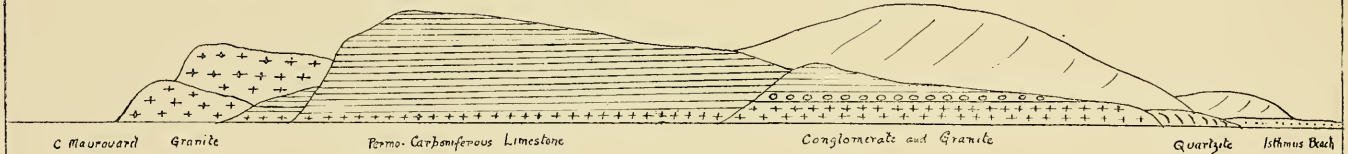
GLOBICEPHALUS MELAS.

Plate X.



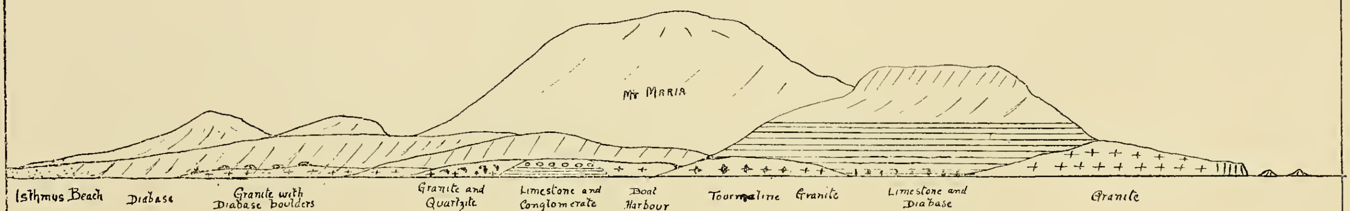
ZIPHIUS CAVIROSTRIS.


MARIA ISLAND
W. H. Clemes BA, BSc
Del.
Spring Bay
Prosser's Bay
Granite
Diabase
Limestone
Sandstone
Quartzite
Conglomerate
Sand, etc.
Sandspits
Lachlan Island
Cockle Bay
C Bernier
I du Nord or Green Island
C Boullanger
Settlement Harbour
Fossil Cliffs
Cockscomb Head
Bishop and Clerk
Mt Maria
C. Mistaken
Boat Harbour
C des Tombeaux
Long Point
Shoal or Chinaman's Bay
Riedle Bay
Pt Maugé
C Peron
Crayfish Bay



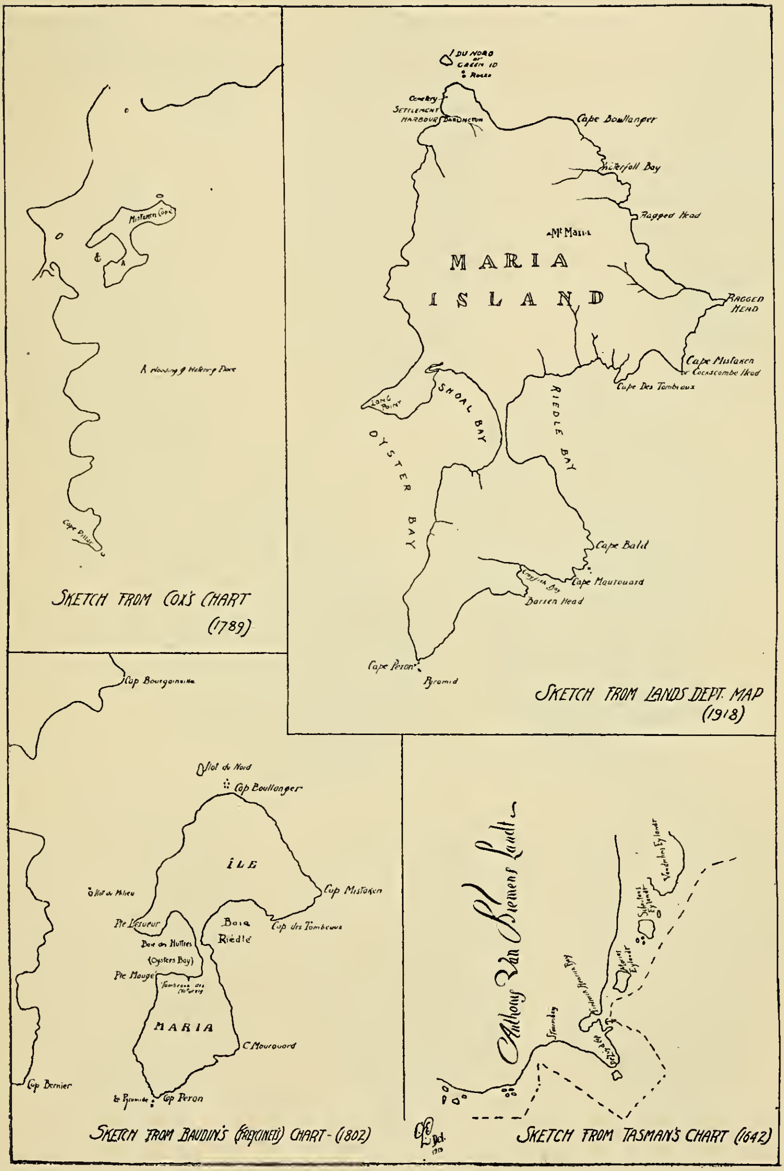
South Riédlé Bay Maria Island

W.H.C. del



North Riédlé Bay Maria Island

W.H.C. del

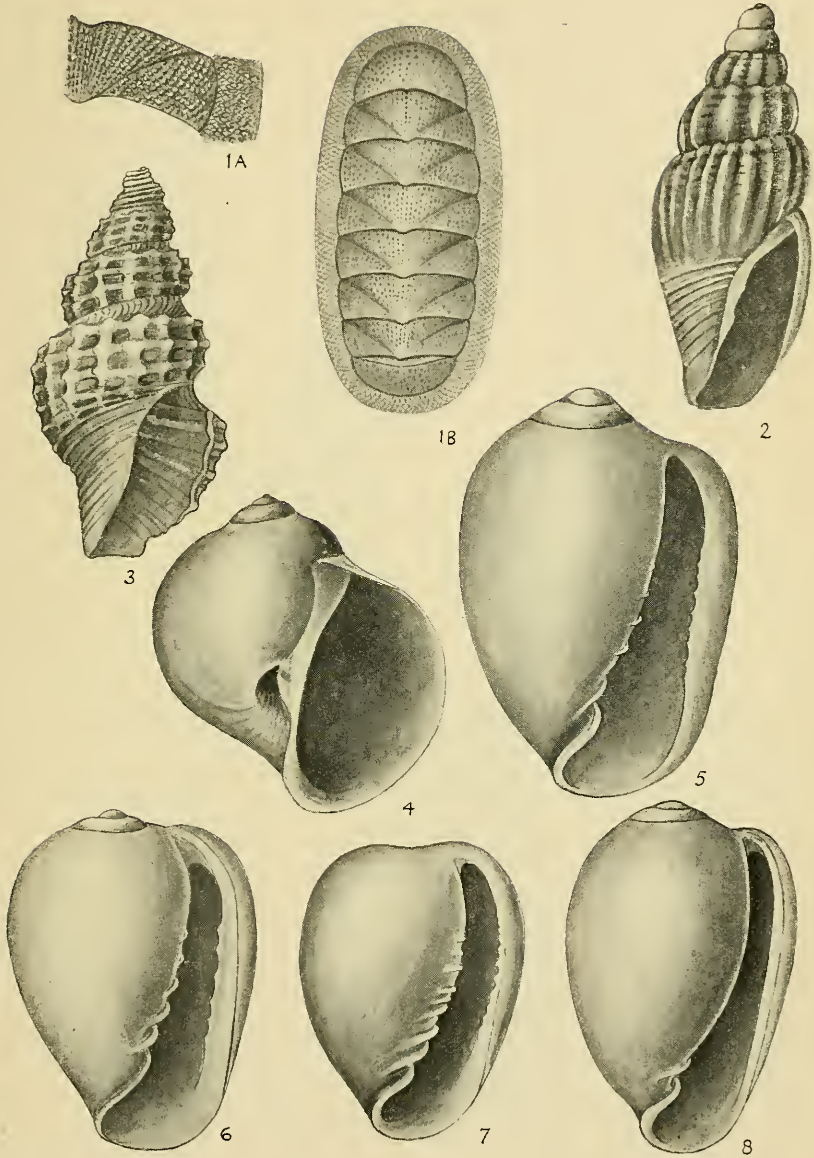


SKETCH FROM COX'S CHART (1789)

SKETCH FROM LANDS DEPT. MAP (1918)

SKETCH FROM BAUDIN'S (FREYCINET) CHART - (1802)

SKETCH FROM TASMAN'S CHART (1642)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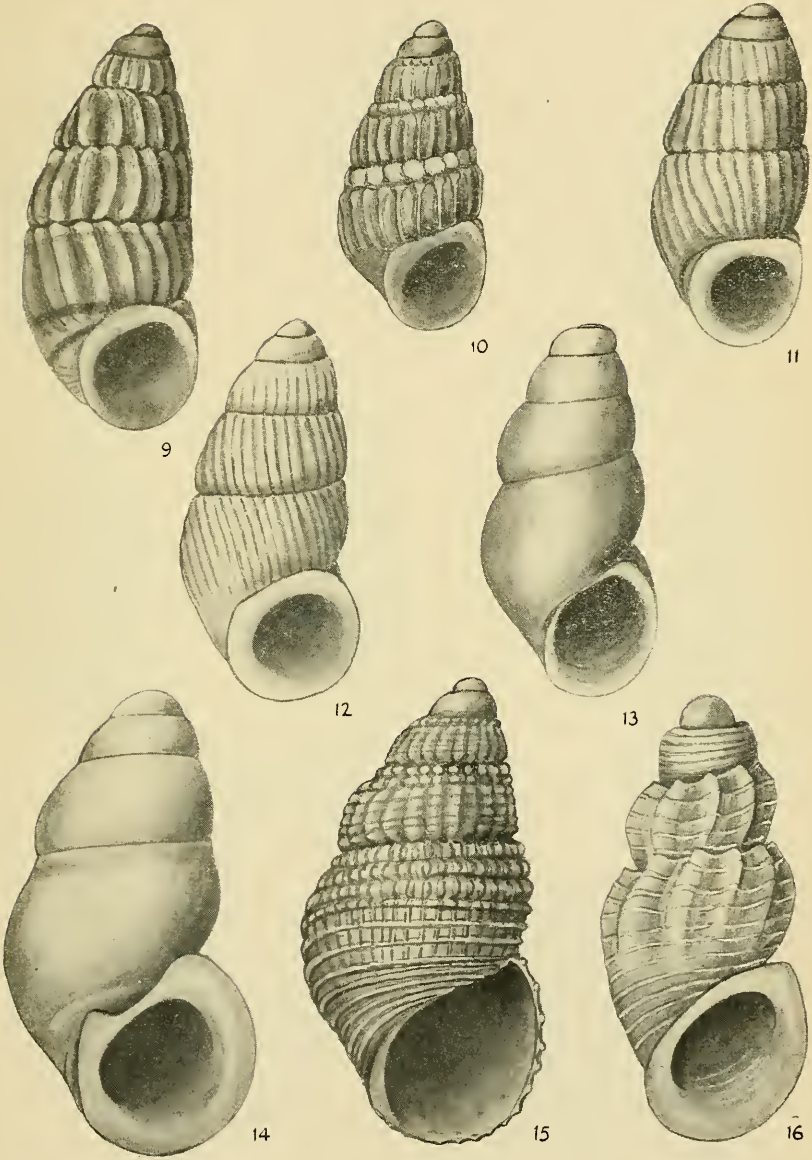
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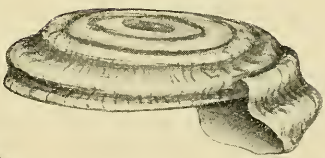
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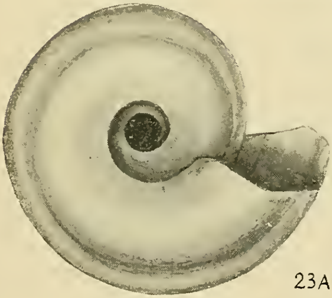
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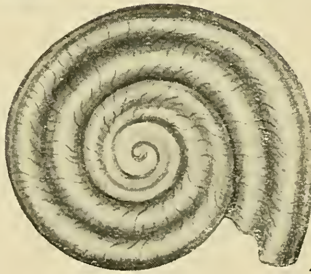
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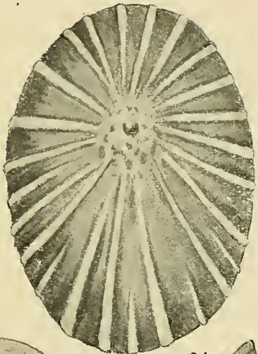
24


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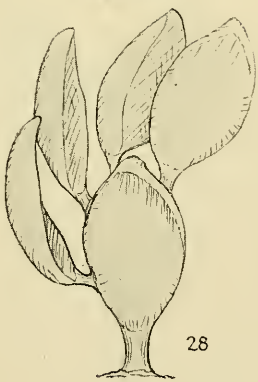
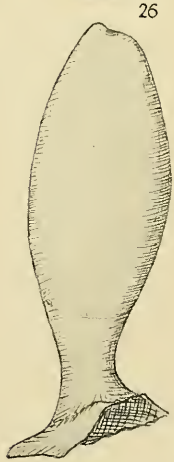

28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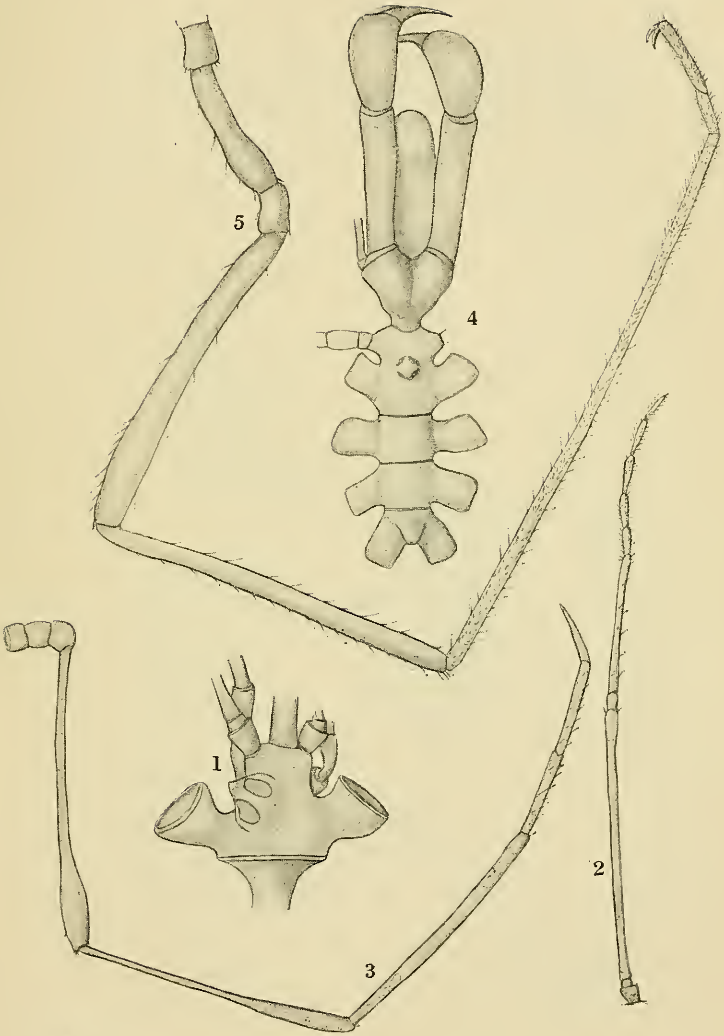
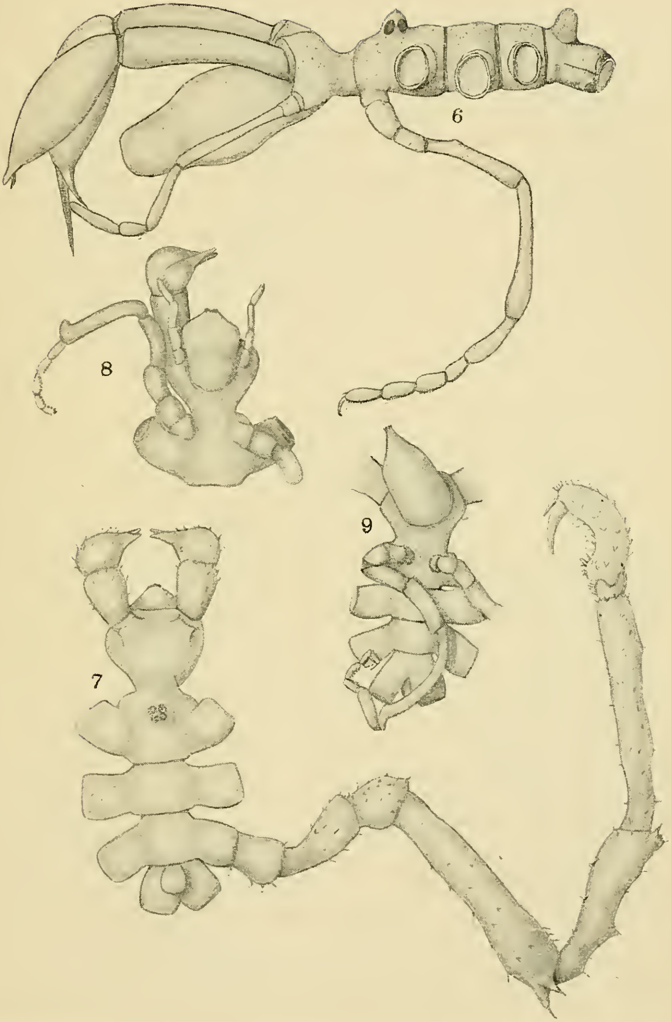


T. T. F. del.

Rhopalorh,nchus tenuissimus, figs. 1-3
N\mphon æquidig tatum, figs. 4-5



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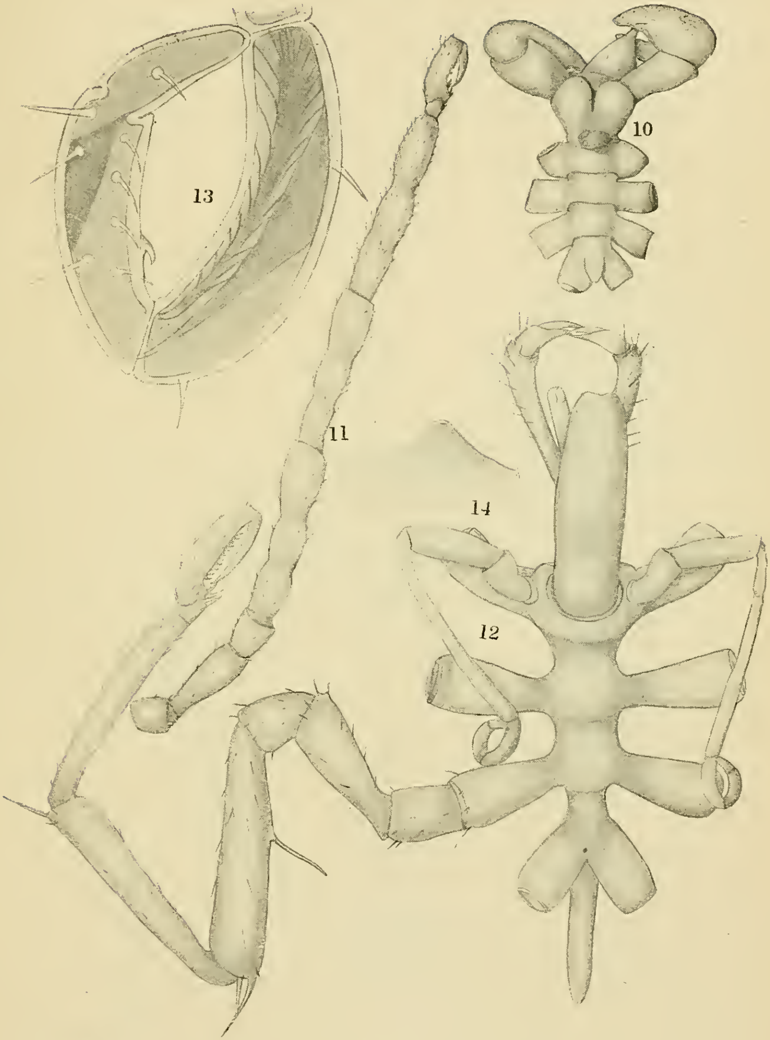
Nymphon æquidigitatum, fig. 6
Pallene (?) valida, figs. 7-8
Pseudopallene pachycheira, fig. 9



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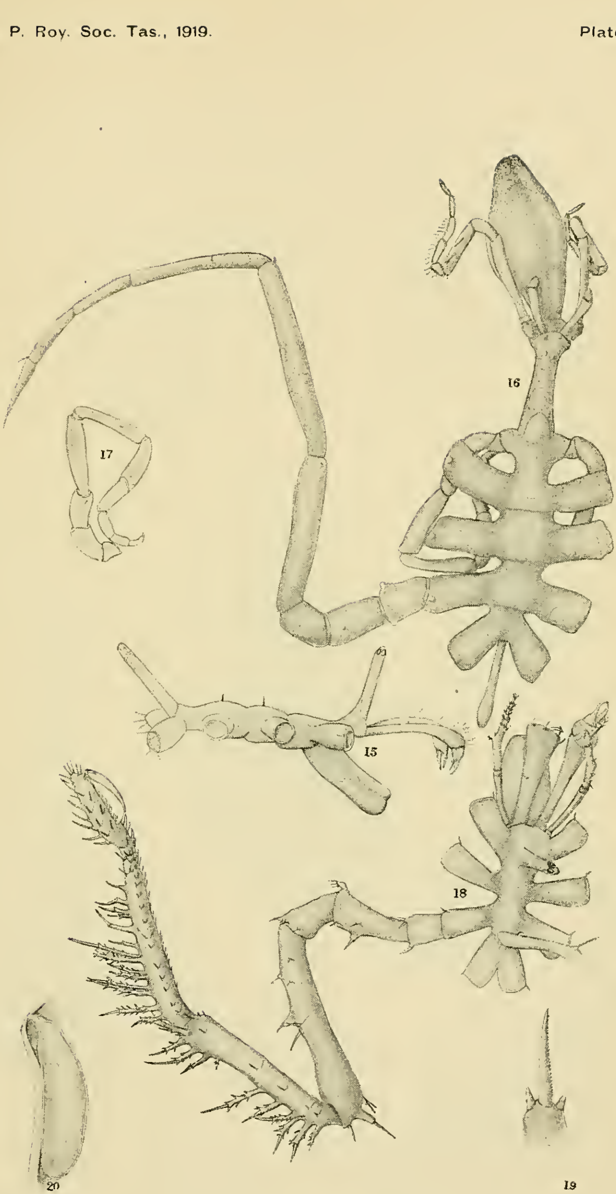
Pseudopallene pachycheira, figs 10-11
Anoplodactylus tubiferus, figs. 12-14



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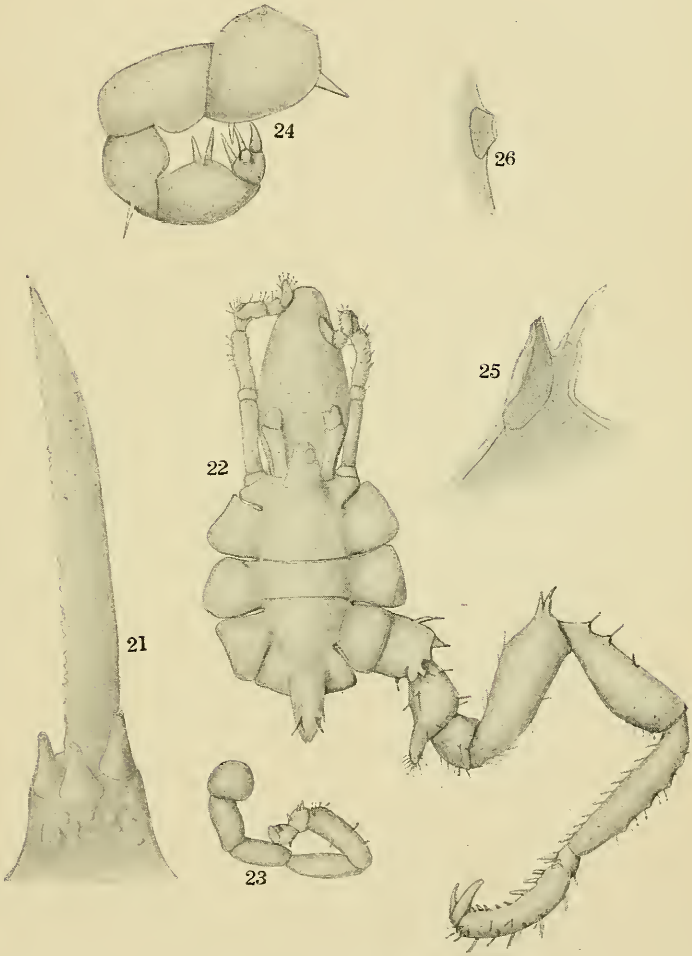
Anoplodactylus tubiferus, fig. 15
Ascorhynchus longicollis, figs. 16-17
Nymphopsis armatus, figs. 18-20



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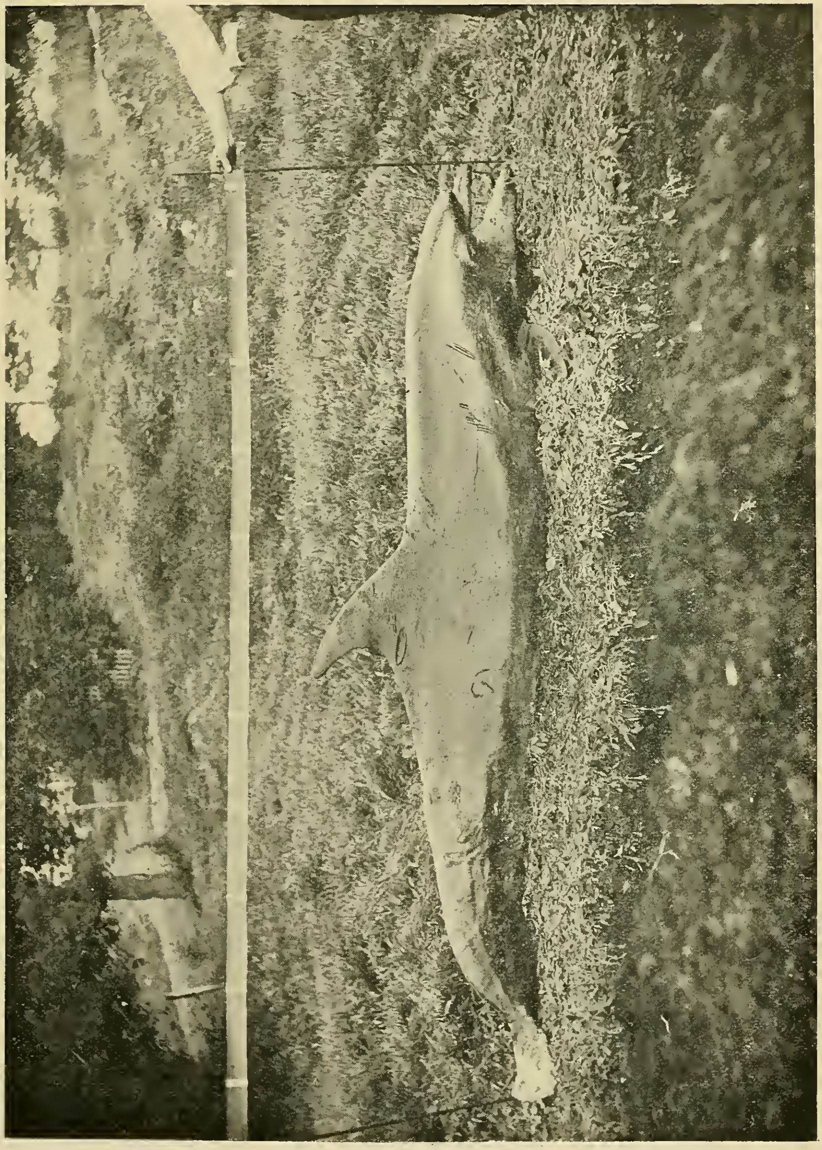
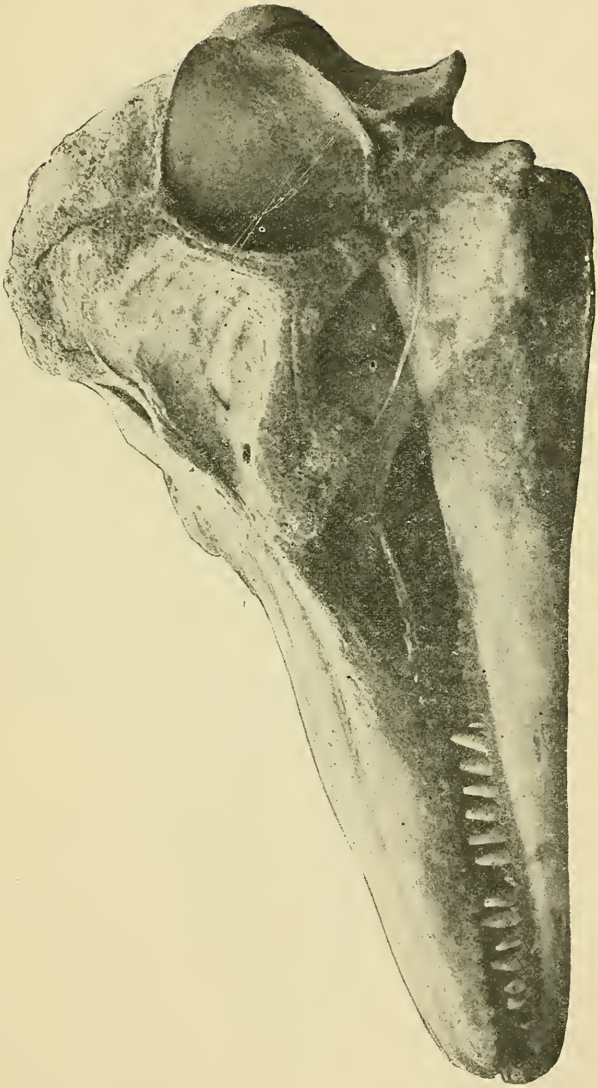
Nymphopsis armatus, fig 21
Achelia assimilis, figs. 22-26



TURSIOPS TURSIO.



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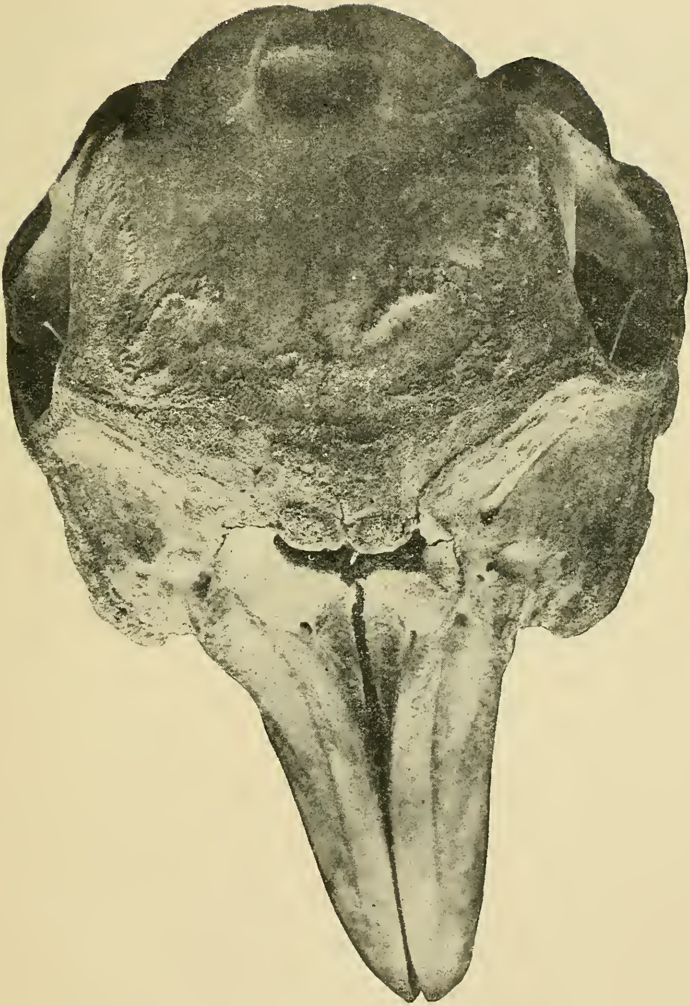

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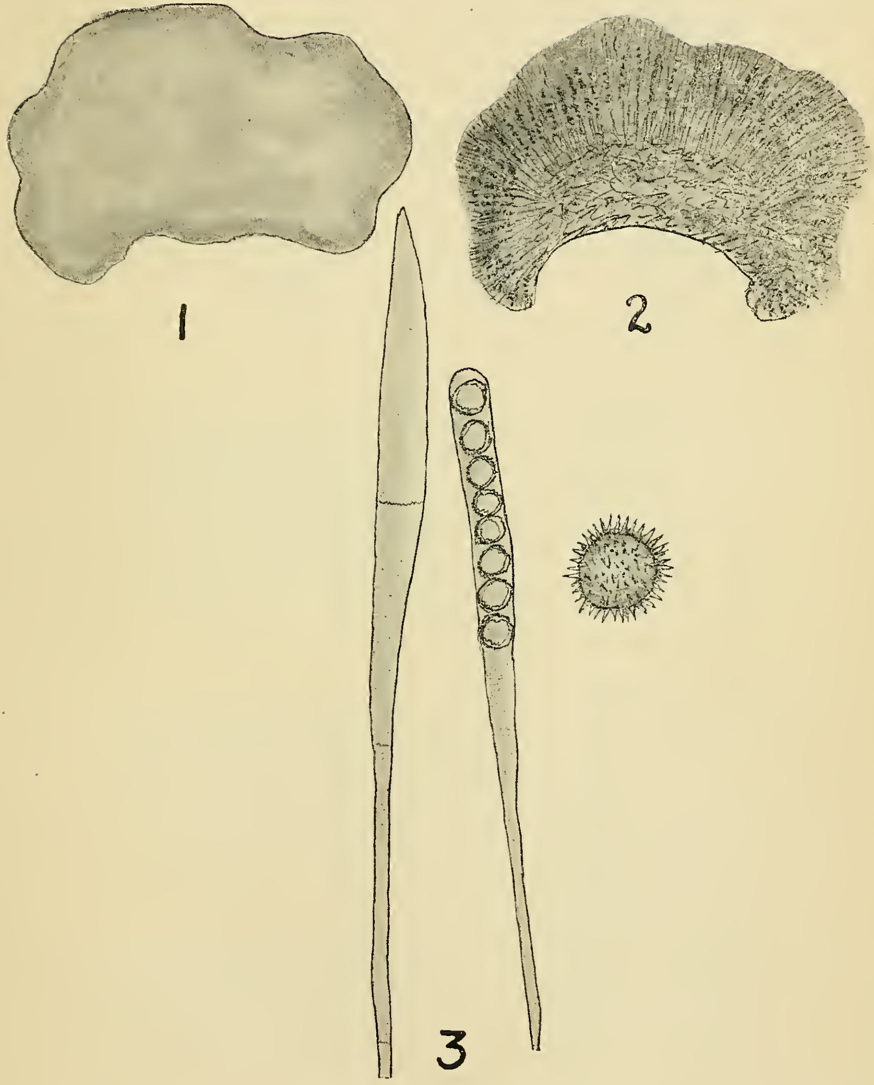

SPRAGUEOLA MUCIDA, n.s.

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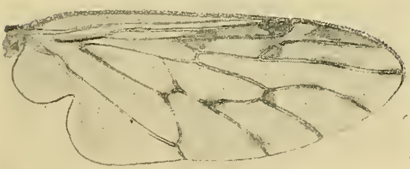

7

10

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