ROYAL SOCIETY
OF
TASMANIA

PAPERS & PROCEEDINGS

OF THE

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OF TASMANIA

FOR THE YEAR

1920

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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.

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, 1920

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PAPERS

OF THE

ROYAL SOCIETY OF TASMANIA

1920

STUDIES OF TASMANIAN CETACEA.

Part IV.

Delphinus delphis

(The Common Dolphin.)

By

H. H. Scott (Curator, Victoria Museum, Launceston)

and

Clive E. Lord (Curator, Tasmanian Museum, Hobart).

Plates I.-V.

(Read 12th April, 1920.)

As with other members of the *Cetacea* the synonymy of this species is involved. Beddard [1] states that the following appear identical with *Delphinus delphis*: *D. major*, *D. fulvofasciatus*, *D. fosteri*, *D. janira*, *D. pomeegra*, *D. baindii*, *D. moorei*, *D. walkeri*, *D. nova zelandiæ*, *D. albimanus*, *D. marginatus*, *D. fusens*, *D. souverbianus*, *D. variegatus*, *D. balteatus*, *D. algæ ienis*, *D. moschatus*. While agreeing in general terms with this combination of synonyms we wish to qualify it with certain remarks later in this paper.

The dolphin is common around the Tasmanian Coast and in the estuaries of the larger rivers, sometimes ascending them for many miles from the open sea. During the currency of the Easter Camp of the Tasmanian Field Naturalists' Club at Port Arthur we were fortunate in observ-

(1) Beddard: A Book of Whales (1900), p. 234.

ing a large number of dolphins in Maingon Bay, Tasman's Peninsula. There were several hundred dolphins in the bay and their evolutions in the surf were watched with interest by many of the Naturalists for the greater part of Easter Monday. It appeared as if the animals were mating. The greater majority kept out in the waters of the bay beyond the line of breaking ocean combers that broke rank after rank upon the coast. Every now and then, however, a score or more would come dashing towards the shore, their outlines showing clearly in the incoming breaker. Just at the moment the wave broke and it appeared as though the dolphins would be cast against the rocks or flung far up on the sandy shore, they would turn suddenly, dive through the crest of the breaker, spring

several feet in the air, and once more swim seawards. Such a sight needs to be actually observed before one fully realises the immensity of the swimming power possessed by these aquatic mammals. The enormous force of the breaking waves, the various cross currents and undertows incidental to such a surf seemed to have no effect upon the evolutions of the dolphins. Although accustomed as we were to observe the swimming powers possessed by these animals from vessels and on other occasions from time to time, yet it needed such an observation as the foregoing to fully realise the power of these animals in their natural element. (See Plate I. and text fig. 1.)

EXTERNAL CHARACTERS.

Although it is here assumed that the modern method of reducing all the smaller dolphins to a single species (that of the type) is a more or less wise one, it must still be claimed that such a proceeding leaves certain outstanding facts unaccounted for. In a word such a species as that of "*Delphinus fosteri*," having apparently well marked external characters, and some slight skeletal ones, does not agree in all respects with the large eight feet dolphins that frequent our coasts, and of which we hold a complete skeleton, and a set of notes made upon the animal prior to dissection. Perhaps the best that can be done at present is to regard the better defined species of former classifications as being sub-races, and to sink *in toto* all the ill-defined ones. The more one studies the *Cetacea* the more the conviction grows that we are dealing with a rapidly evolving order of marine mammals, and that within certain limits, taxonomy is tentative and certainly unworkable if pushed to extremes. We herewith detail the external appearances of two animals, one a mature male of eight feet in length, and the other an immature male of six and a half feet in length—exact measurements being included.

Mature Male.

Between the dorsal fin and the head the animal was jet black. From the constriction of the beak to the eye ran a curved black line—outlined and washed with white. From the eye to a line drawn vertically with the back of the dorsal fin was a curved line, above which the animal was black, and below which the colour shaded from dirty grey to white. In the tail regions a good deal of iron grey appeared, and it was assumed that, in young animals, the grey, white, and iron grey, would appear as yellow, thus giving rise to such a vernacular name as "yellow sided dolphin." The actual flukes of the tail were black.

Immature Male.

In the arrangement of the several colour areas this young male simulated the adult animal, but the white of the underparts was replaced by yellow, or more correctly, yellowish white. This animal came from the Derwent River and was as nearly adult, in point of measurement, as nine and a half is to twelve. Smaller animals, from the same river, in the collection of the Hobart Museum, show much deeper yellow tinting along the underparts—

thus pretty clearly showing that yellow sided dolphins are immature animals. Individually, the young male here under description manifested two, irregularly oval, white marks in the region of the tail, but otherwise conformed to the adult tinting, except in the matter of yellow replacing white upon the under parts—as already stated.

Food.

During the dissection of the adult animal the stomach was turned out, and found to contain a fair amount of semi-digested food, and an enormous number of the horny beaks of cuttlefish, also a few worms. The immature animal had apparently been feeding upon *Echinoderms*, as large quantities of *Spatangus* spines were found, and were the only undigested elements met with.

Ribs and Scapula.

As the scapulæ are frequently misplaced in articulated dolphins' skeletons, a measurement was made prior to the removal of the scapulæ of the immature animal to exactly fix its position. The numerical result was—from tip of beak to anterior rim of scapula = $21\frac{1}{2}$ inches when the arm was at a right angle to the line of the body. As a guide to articulation, therefore, the hamular process should just overlap the edge of the first rib. In the matured dolphin the dorsal ribs (five) that reach the sternum, were retained in natural articulation, to set at rest the exact positions of the tubercula and capitula in each pair of ribs. It is an excellent plan to keep at least one such thorax in every comparative collection as it forms a court of appeal when cetacean skeletons are in process of mounting.

External Measurements

Name of Measurement	Adult Male		Immature Male	
	Feet	Inches	Feet	Inches
Total length between vertical rods	8	1	6	5
Girth at dorsal fin	3	8	No	data
Width of tail	1	$9\frac{1}{2}$	1	3
Tip of beak to constriction	0	6	0	6
Size of the eye	0	$1\frac{1}{4} \times \frac{3}{4}$	0	$1\frac{1}{4} \times \frac{3}{4}$
Length of pectoral fin along a middle line ...	0	$8\frac{1}{2}$	0	8
Height of dorsal fin	0	$8\frac{1}{2}$	0	8

During the dissection of these two animals various data were collected that are of greater individual than general utility, and they are therefore not detailed in the present text. By way of giving a comprehensive survey of the skull characters, available to us, a large comparative table has been drawn up and is hereunder appended. Two young dolphins in the collection of the Hobart Museum, which measure four feet two, and four feet four respectively, are available to us. They were captured in the Derwent, and prepared by Mr. Arnold of the Museum Staff. Mounted specimens are notoriously untrustworthy, as to outline, but a curious mobility of the snout from the constriction upwards suggests an outline that is actually approached in life when dolphins are racing at full speed through the water. It is, as far as our observations go, a prelude to a thoracic flexure, and a distinct shiver can be seen to run from stem to stern of this living ship—and then follows the enormous caudal effort that completes the action. The head and thorax of a dolphin are less immobile than is commonly supposed, and cephalic, thoracic, and caudal flexures can be distinctly observed, in clear sunlit seas, when dolphins in sportive mood are swimming around a ship. (Plate II.)

COMPARATIVE SKULLS OF DOLPHINS. *(Delphinus delphis.)*

Specimen Number ... / Ownership	No. 1 Hobart Museum.	No. 2 Launceston Museum.	No. 3 Launceston Museum.	No 4 Hobart Museum.	No. 5 Launceston Museum.	No. 6 Launceston Museum.	No. 7 Launceston Museum.	No. 8 Hobart Museum.	No. 9 Launceston Museum.
Parts of skeleton available	Complete skeleton ♂ called "*D. fosteri.*" Skull.	Skull only. ♂ Imperfect.	Skull only. ♂ Imperfect.	Skull only. ♂ Reg. 4680.	Skeleton Adult. ♂ Mature.	Skull only. ♂ Mature.	Skeleton Immature. ♂	Skull only. Mature ♀ Reg. 4425.	Skull only. Mature ♀
Name of the bone and measurement made ...	Skull.	Skull.	Skull.	Skull	Skull.	Skull.	Skull.	Skull.	Skull.
Total length without mandible	464 mm. (18¼ in.)	460 mm. (18⅛ in.)	462 mm. * (18 3/16 in.	440 to 445 mm. (17¼ in.) *	483 mm. (19 in.)	457 mm. * (17 7/16 in.)	443 mm. (15 5/16 in.)	437 mm. (17 3/16 in.)	448 mm. (17⅝ in.)
Total with mandible ..	470 mm. (18½ in.)	No Mandible.	No Mandible.	450 mm. (17 11/16 in.)	515 mm. (19⅞ in.)	No Mandible.	449 mm. (17⅝ in.)	441 mm. (17⅜ in.)	No Mandible.
Mandible alone ...	395 mm. (15½ in.)	No Mandible.	No Mandible.	382 mm. (15 in.)	427 mm. (16 13/16 in.)	No Mandible.	378 mm. (14⅞ in.)	370 mm. (14½ in)	No Mandible.
Greatest skull width at the zygomatic arch ...	188 mm. (7⅜ in.)	185 mm. (7¼ in)	190 mm. (7 7/16 in.)	189 mm. (7⅜ in.)	202 mm. (7 15/16 in.)	186 mm. (7 5/16 in.)	183 mm. (7 3/16 in)	193 mm. (7 9/16 in.)	192 mm. (7½ in.)
Notch to end of beak ...	290 mm. (11⅜ in.)	287 mm. * (11¼ in.)	285 mm. (11 3/16 in.)	274 mm. * (10¾ in.)	288 mm. * (11 5/16 in.)	286 mm. * (11 3/16 full.)	278 mm. (11⅞ full.)	274 mm. (10¾ in.)	No data.
Beak width at the notch	90 mm. (3½ in.)	95 mm. (3 11/16 in.)	104 mm. (4 1/16 in.)	90 mm. (3½ in.)	100 mm. (3⅞ full.)	90 mm. (3½ in.)	89 mm. (3 7/16 in.)	100 mm. (3⅞ full.)	98 mm. (3 13/16 in.)
Width in the middle of the beak	54 mm. (2⅛ in.)	56 mm. * (2 3/16 in.)	55 mm. (2 5/32 in.)	52 mm. (2 1/32 in.)	70 mm. (2¾ in.)	55 mm. (2 5/32 in.)	52 mm. (2 1/32 in)	57 mm. (2¼ in.)	56 mm. (2 3/16 in.)
Height at vertex with mandible, if available	152 mm. (5 31/32 in.)	148 mm. (5 13/16 in.)	150 mm. Mutilated. (5⅞ full.)	155 mm. (6 1/16 in.)	168 mm. (6 9/16 in.)	152 mm. (5 31/32 in.)	150 mm. (5⅞ full.)	152 mm. (5 31/32 in.)	149 mm.* (5⅞ in.)
Greatest width of prenarial basin	69 mm. (2 11/16 in.)	68 mm. (2⅝ full.)	69 mm. (2 11/16 in.)	70 mm. (2¾ in.)	74 mm. (2⅞ full.)	70 mm. (2¾ in.)	69 mm. (2 11/16 in.)	75 mm. (2 15/16 in.)	76 mm. (3 in.)
Locality and Donor ...		N.W. Coast of Tasmania (per Mr. M. T. Cheek).	Tamar Heads (Mr. Adye Douglas).		Scamander (per Mr. J. G. Walker).	King Island (per Mr. J. M Bowling).	River Derwent (per Mr. J. V. Cook).		Kelso—Tamar Heads (per Rev. W. White)
Footnotes.	Fair order. (Plate III.)	* Mutilated.	* Mutilated.	* Mutilated. (Plate IV.)	* Mutilated during life by a Killer.	* Mutilated.	Good order.	Good order. (Plate V.)	* Mutilated.

DESCRIPTIVE AND GENERAL.

No. 1.—This skull is practically adult, but shows no super ossification. The supra-occipital hood overhangs the frontals. The vomer is extremely thin (as it appears in the palate, for 60 mm.). Rostral cartilage not ossified. Left nasal sends down a short process. Sutures not ankylosed to extinction in temporal fossæ, at the vertex, or the otocrane. Interparietal coalesced with the frontal and the supra-occipital. General build of skull might suggest a sub-race, if external characters supported the idea. T. M. No. D 590. (Plate III.)

No. 2.—This is a beach-worn specimen, more adult than No. 1. Sutures opened by exposure to the weather, much mutilated at the end of the beak. Left nasal fused to the pre-frontal, supra occipital hood rubbed but apparently similar to No. 1. Beak of notch wider than No. 1 but less than the female skulls manifest.

No. 3.—Typically an adult male. This is also a beach-worn specimen. All characters conform to the type.

No. 4.—Adult, but showing no super ossification. Owing to method of cleaning no minute osteological details are available. Plate IV.)

No. 5.—Fully adult, with all the super ossification ever shown by the Dolphins of this genus. The mandibular excess (in length) is due to the upper jaw being mutilated during a fight in early life. The effect was that of upturning the tip of the beak, the bones being cross penetrated by a healed wound. This animal was eight feet one inch long.

No. 6.—Skull found at Surprise Bay, King Island. It to all intents and purposes duplicates specimen No. 1, and is therefore of the sub-race called "*Delphinus fosteri*."

No. 7.—A fine specimen of an immature male, all the characters of the normal type are present. The various stages of skeletal growth and development may be studied in this specimen. Total length of the animal, prior to dissection, six feet five inches.

No. 8. Fully adult female, a typical sex specimen. Prenarial basin shallow and wide. Intermaxillæ subside upon the maxillæ less steeply than in the male. Mandible shorter than that of the male. (Plate V.)

No. 9.—Typical female skull, sawn through for study of the falx. No mandible. All female characters splendidly shown as *vide supra*, in contrast with No. 8, a female, and No. 1, a male.

The Skeleton.

The axis and atlas vertebræ are always ankylosed in these whales, the rest of the cervicals being quite free. The vertebral formula is fairly constant, and may be given as follows:—

Cervicals = 7.

Dorsals = 14 (some cetologists say 15).

Lumbars = 22.

Caudals = 32 = 75—with a maximum of 76. Accidental mutilations of the vertebræ are common, even among young animals, owing to the custom of diving under ships in rapid motion. Such effects usually manifest themselves in the shape of exostosis, which may either simply cover the elements involved, or by partial absorption and subsequent accretion, materially alter the contour of the bones. We hold various instances, in our respective collections, of these naturally healed wounds. The true lumbar vertebræ are devoid of zygapophyses, but they appear in a functionally reduced state on the chevron-bearing portion of the caudal series, having doubtless reference to muscular attachment areas rather than anything else. The neural spines slope gradually backwards through half of the dorsal series, assume a recovery in the second half, and become vertical in the middle of the lumbar series—approximately the twenty-eighth vertebra from the skull. The chevron-bearing series (or as we might call them sacro-lumbars, although usually simply included in the caudal series) begin by being approximately vertical, as regards their neural spines, and end by having them pitched at a slope that closely simulates that which obtains in the middle dorsals. In the two animals dissected by me, the following express the sizes of the neural spines, and neurapophyses of the last dorsal that reaches the sternum, and the largest lumbar of the series: in other words—the twelfth and twenty-eighth vertebræ, from the skull.

Comparative Vertebræ.

Adult Male	Name of Vertebra	Measurement made	Size in mm.	Immature Male	Size in mm.	Remarks
"	No. 12 from the skull	Upper surface of centrum to tip of spine	70 mm.	"	65 mm.	Epiphyses of immatur animal all open
"	No. 28 from the skull	Upper surface of centrum to tip of spine	117 mm.	"	100 mm.	Epiphyses of immatur animal all open

Comparative Arm Bones.

Adult Male	Measurement made	Size in mm.	Immature Male	Size in mm.	Remarks
"	Humerus, alone	60 mm.	"	55 mm.	In the immature animal the epiphyses are all open
"	Total length of humerus, radius, wrist, and fingers	330 mm.	"	250 mm.	

Measurement applied comparatively to two animals in different stages of growth does not, always, convey to the mind the real differences existing between their skeletons —and in this connection weight is often a most useful aid. The outline of a bone may be very close to the size attained at maturity, and yet the amount of ossific matter deposited in that bone may be far below the quantity found in a similar bone taken from a fully matured animal. The humerus of the adult male dolphin, above cited, turns the scale at 55 grammes, while the same bone from the arm of the immature animal only weighs 28 grammes! This expresses more fully the real skeletal departure, than the minus of five mm. does, upon total (comparative) length. Comparative weights often reveal startling differences in skulls that upon measurement alone would be relegated to the common standard of "at, or about the same age." Naturally the general condition of the skull has to be carefully considered, and the weight standard is only absolutely a test when both specimens weighed have been treated exactly the same throughout, as in the present instance, with the humeri, where both were cleaned and dried under a common series of conditions.

Ear Bones.

The ear bones of immature dolphins of over two thirds the adult, minimum age of maturity, are practically as highly developed as those of their seniors—which means, that these atrophied sense capsules grow little, or not at all, after the period named. Ear bones of males, and females, manifest individual, and it may yet be shown sex variations, that would be called into determinative requisition if found fossil. An extensive range of specimens all correctly sexed, and aged, would yield some interesting data here. Ear bones of the genus *Delphinus*, can be separated from those of *Globicephalus*, by the less production of the tympanic, at its anterior articular end. Again, they can be separated from the Beaked whales, of

the genus *Mesoplodon*, as can those of *Tursiops*, and *Globicephalus*, by the less production of the posterior articular end of the perotic. In this connection *Tursiops* is intermediate, showing a more or less style-like extension that cuts it off from ear bones of either *Delphinus*, or *Globicephalus*. *Mesoplodon*, however, of all the whales named, is, at the point indicated, both extended and truncated. Minor variations of the foramina, etc., are not easily detailed in anything but an illustrated monograph, although interesting enough to the student.

DESCRIPTION OF PLATES.

Plate I.

This shows a photograph of Maingon Bay, Tasman's Peninsula, with Cape Raoul in the distance. In the foreground can be seen the dolphins springing out of the wave as it broke upon the shore. While this gives some idea of the scene, it does not convey any idea of the number of dolphins in the bay, or the number that could often be seen in the surf at one time. Owing to the very dull light, and the great rapidity with which the animals performed their aquatic evolutions, it was exceedingly difficult to obtain a photograph of the event. Of the many photographs, those taken by Mr. F. B. Cane give the best effect, and we have to thank him for allowing us to use them to illustrate these notes.

Plate II.

Two young dolphins captured in the River Derwent. The irregularity of outline is due to the mounting. (Tasmanian Museum, Reg. Nos. D591 and 592.)

Plate III.

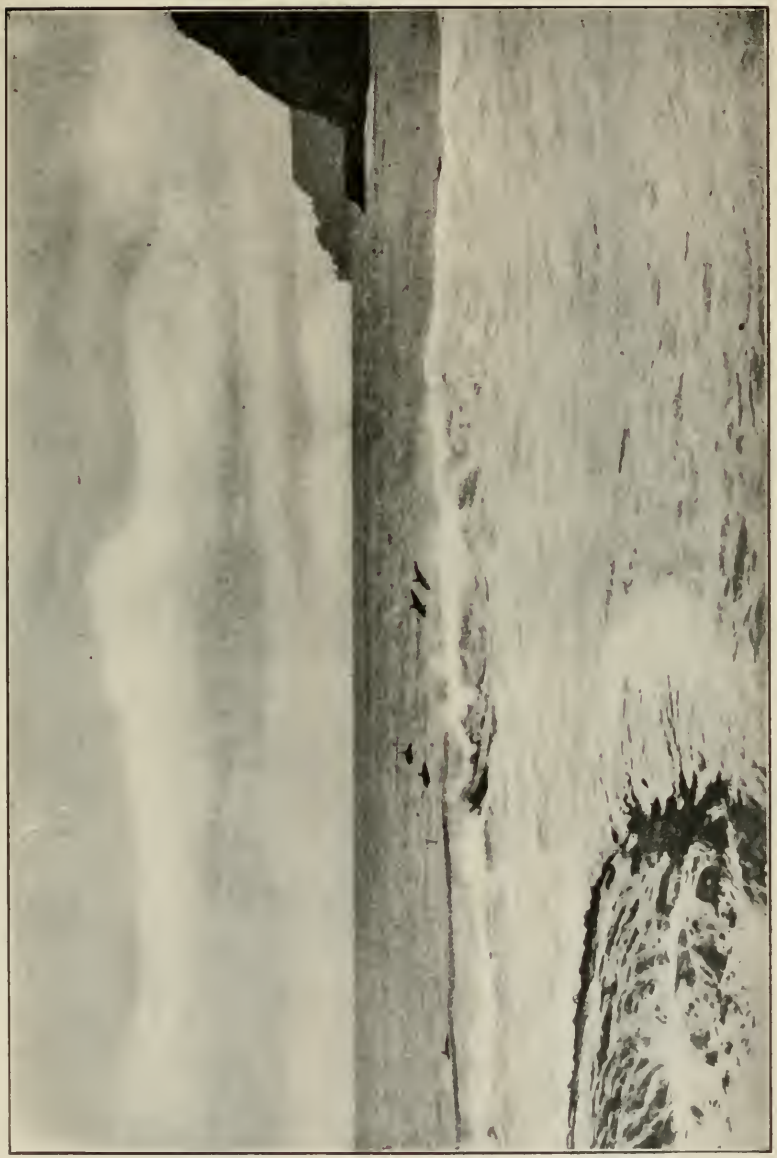
Articulated Skeleton of *Delphinus delphis* (*fosteri?*) (Tasmanian Museum, Reg. No. D590.).

Plate IV.

Skull of *Delphinus delphis*.
(Tasmanian Museum, Reg. No. 4680.).

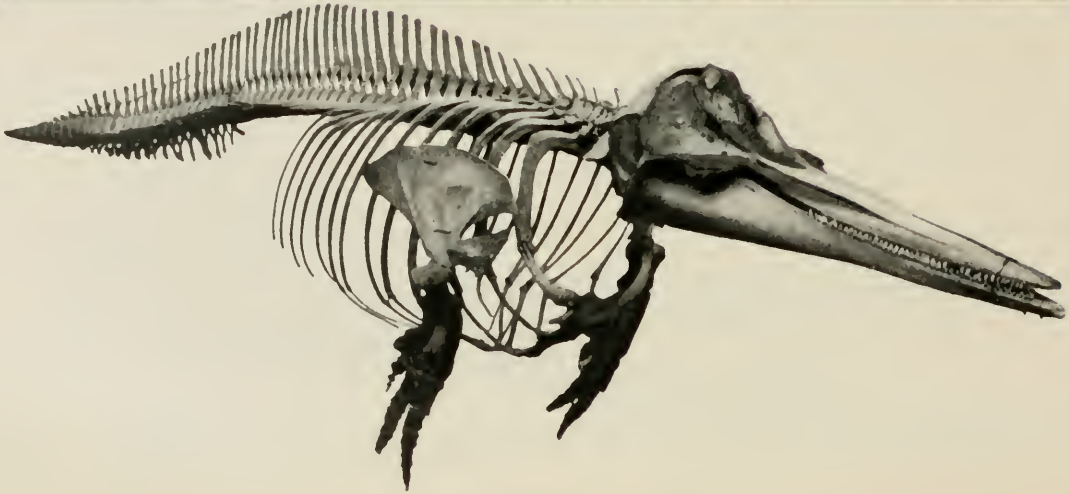
Plate V.

Skull of *Delphinus delphis*.
(Tasmanian Museum, Reg. No. 4425.).

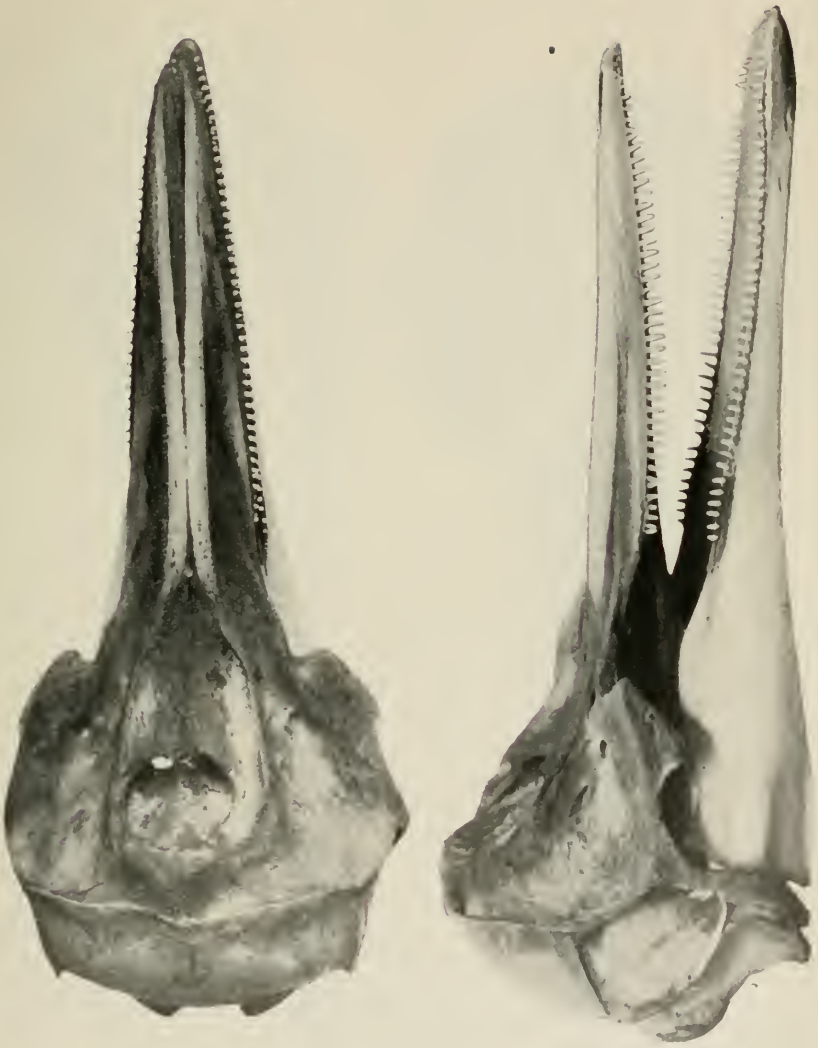


DOLPHINS IN SURF.

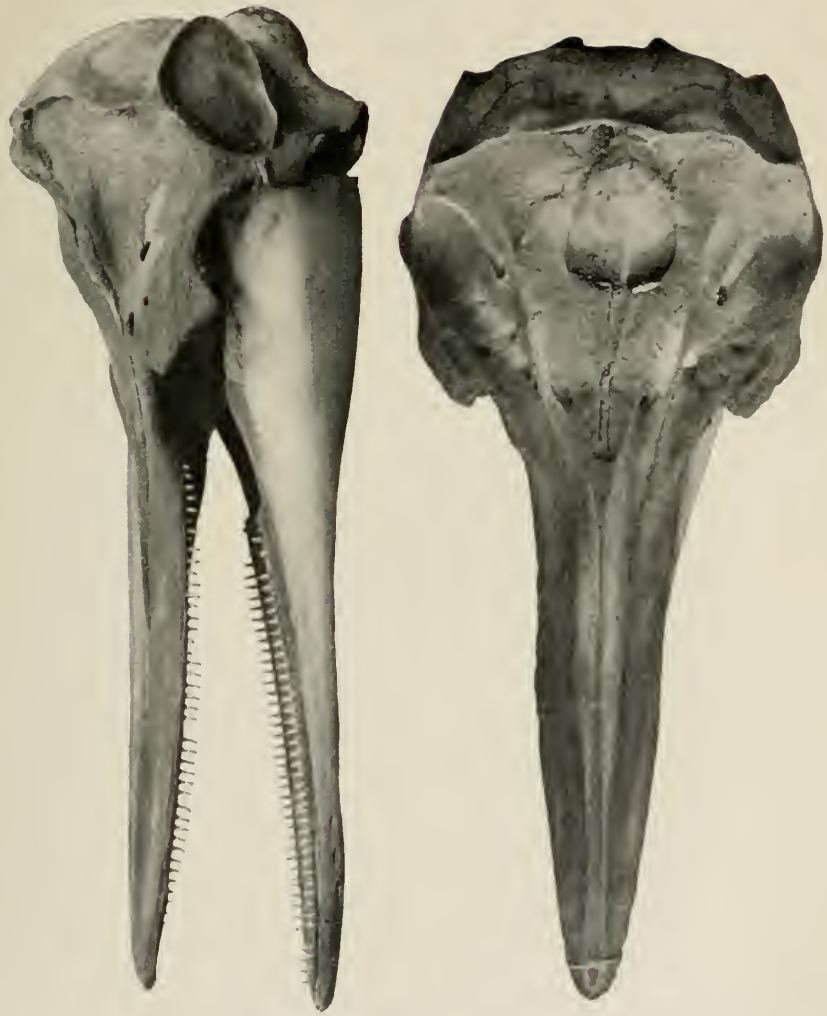

No. D. 592.
TASMANIAN MUSEUM, No. D 591.



TASMANIAN MUSEUM, No. D. 590.



TASMANIAN MUSEUM, No. 4680.



TASMANIAN MUSEUM, No 4425.

STUDIES IN TASMANIAN MAMMALS, LIVING AND EXTINCT.

Number I.

Nototherium mitchelli.

(A Marsupial Rhinoceros.)

Nototherium mitchelli, Owen, British Association for Advancement of Science, Report 1844, p. 232.

?Zygomaturus trilobus, De Vis, Proceedings Royal Society of Queensland, 1888, Vol. V., pt. 3, p. 111.

By H. H. Scott (Curator, Launceston Museum); and Clive E. Lord (Curator, Tasmanian Museum).

(Received 3rd May, 1920. Read 10th May, 1920.)

The discovery at Smithton, during the present year, of a nearly complete skeleton of *Nototherium mitchelli* forms the occasion for a revision of many of our ideas respecting these remarkable marsupial animals, since the fragmentary remains hitherto available for study have failed to yield the sequence of evidence we now possess. This is a note only—intended to place upon record the fact that *Nototherium mitchelli* was an extinct marsupial rhinoceros, and that the four genera, *Nototherium*, *Zygomaturus*, *Euowenia*, and *Sthenomerus*, with their several species, are accordingly under revision—and will later on be dealt with in detail. The enormous mass of material to be passed in review forbids anything like speculation at present, but it is within the mark to observe that two groups of these animals have been instinctively felt (by all workers) to have existed, quite irrespective of sex questions—one a platyrhine and the other a latifrons type, and that it now appears that they were also a horned, and a hornless group, and that *Nototherium mitchelli* belonged to the former, or cerathine group, and that some other species constituted the acerathine group, in which the

weapons were reduced to very small things, or actually missing. We are fully alive to the fact that the sex question comes strongly to the front here, and we hope to fully deal with the whole question later on. The true Rhinoceroses and Tapirs had generalized ancestors that brought these two families exceedingly close together, and so closely did they simulate each other that the teeth alone served to distinguish them. The *Nototheria* had tapir like teeth, and, as Professor Owen demonstrated, as far back as 1872, the nasal structure recalled the anatomy of the Tichorhine Rhinoceros, but with the imperfect material Owen had to work upon he was unable to say, as we can to-day, that *Nototherium mitchelli* was a marsupial Rhinoceros, and not a marsupial Tapir like animal, as hitherto assumed. The fortunate discovery of remains of the Tichorhine Rhinoceros, embedded in the ice, enabled palæontologists to speak with absolute certainty as to the nature of the animal's horn, but the absence of such an event in our case leaves grounds for conjecture as to structure and shape, to which set of circumstances we must add the fact that the marsupials, as a group, are well removed from the ancestral rhinoceros type, and accordingly the complex factors of "parallel evolution" have to be contended with. At present all that can be said is that we have an animal with a skull built for aggressive warfare with specially constructed cervical vertebræ—powerful and shock resisting—nasal regions akin to those of the Tichorhine Rhinoceros, plus a curious nasal cartilage point (practically unique), which is evidently a development, essential to the remoulding of the marsupial skull, to the special needs of the case. All these structures will, in due course, be dealt with, but at present can only be glanced at. Evidence of the titanic battles that this animal engaged in are to be found in the complete smashing and partial mending of the collar bone, the crushing in of the maxills-nasal region, and its subsequent repair. The whole series of structures that in *Nototherium tasmanicum* could have served no greater purpose than a moderate resistance of force, are here, in *Nototherium mitchelli*, built up to the strength essential to the conducting of the fiercest aggressive warfare; and the conclusion seems inevitable that the Marsupial Order, in ages past, evolved a fighting group of Rhinoceros like animals, of which the giant, *Nototherium mitchelli*, was one. The Palæontologist De Vis worked hard to show that *Zygomaturus* was a rare animal in its day, and made many departures from the typical *Nototheria*, thus feeling his way through fragmentary evidence to a segregation of the two groups cited above. Professor Owen never saw

the skull called *Zygomaturus*, but claimed a cast of it, as a replica of the skull that should have been associated with the type jaws of his genus *Nototherium*. We hold a very exact copy of Professor Owen's cast, and have checked it with his description and measurements, and found it to agree *in toto*, but the real skull, that has come to us, is more powerful in the essential parts, and accentuates the Rhinoceros habits in a most marked degree. In working over this cast, with Professor Owen's descriptive text as a guide, the master mind of the great comparative anatomist stands boldly out, and the pity is Owen is not here to deal with this splendid find from the Tasmanian pleistocene formations. This latest addition to our knowledge shows that the cerathine *Nototheria* were much larger animals than the genus were suspected of producing, and we quite expect to find Huxley's *Diprotodon minor* thus accounted for, not so much for its original description as for its later acceptance by others, who, finding Nototherian remains relating to the appendicular skeleton, naturally relegated them to *Diprotodon minor*, but this question we shall deal with very fully later.

STUDIES IN TASMANIAN MAMMALS, LIVING AND EXTINCT.

Number II.

Section 1.

The History of the Genus *Nototherium*.

Section 2.

The Osteology of the Cervical Vertebræ of *Nototherium mitchelli*.

By

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and

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Plates VI. and VII.

(Read 8th June, 1920.)

SECTION 1.

THE HISTORY OF THE GENUS *NOTOTHERIUM*.

In the middle of last century the first fossil remains of the extinct gigantic marsupial fauna of Australia were discovered. Although subsequent discoveries gave rise to the opinion that their distribution must have been a wide one, it was not until the year 1910 the first remains of these animals were discovered in Tasmania. This, and subsequent discoveries in the island, have all been of the one genus—*Nototherium*—but there appears to be no valid reason why the discovery of the remains of such marsupials as *Diprotodon* and *Thylacoleo* may not be anticipated. This view is strengthened by the fact that the species recently obtained at Smithton is *Nototherium mitchelli*, the typical mainland form, and not *N. tasmanicum*, which, up to the present, has only been discovered in this island. The discovery is also another link in the chain of evidence, showing that the subsidence of Bass Strait must have been of quite recent date—geologically considered.

In continuation of our previous note on the discovery of an almost complete skeleton of *Nototherium mitchelli* (1) we propose to review briefly the history of the genus. This is essential in order that our facts may be presented in a clear light. Incidentally, it will be necessary to deal with the various side issues which arose as *Nototherian* remains were slowly recovered from the Pleistocene formations of Australia, and eventually Tasmania also.

On 13th April, 1831, a paper (dated at Sydney, 14th October, 1830) was read before the Geological Society of London (2). It was entitled, "An account of the lime-"stone caves at Wellington Valley, and of the situation "near one of them, where fossil bones have been found," by Major Thomas L. Mitchell, F.G.S., J.C., Surveyor General of New South Wales.

In this description it is pointed out that the Wellington Valley is 170 miles west of Newcastle, on the eastern coast of Australia. The rock through which the valley has been excavated was limestone, resembling, in external characters, the carboniferous series of Europe. The rugged surface of the limestone tract abounded in cavities. One large cave descends at first with moderate inclination, and at about 125 feet from the mouth the floor is thickly covered with fine, dry, reddish dust, in which a few fragments of bones occur. About eighty feet from the mouth of the cave is another cavity. Here the surface itself consists of a breccia full of the fragments of bones. Near the lower part of the fissure (the whole extent of which was not explored), were three layers of stalagmitic concretion about two inches in thickness and three inches apart, the spaces being occupied with a red ochreous matter, with bones in abundance imbedded both in stalagmite, and between the layers of it. In describing the bones it was stated that the bones, with two exceptions, belong to animals at present known to exist in the country. "Along with the remains just mentioned "were found two bones, not agreeing with those of any of "the animals at present known to exist in New South "Wales. The first, and larger, is supposed to belong to the "elephant. The second bone is also obscure and imper-"fect, but seems to be a part of one of the superior "maxillary bones of an animal resembling the Dugong; "it contains portion of a straight tusk pointing directly "forward."

In 1838 Mitchell published his work on "Three Expeditions into the interior of Australia (3). The issue we have been able to refer to is a copy of the second edition, published in 1839. Commencing at page 359, in Vol. II.,

he gives an account of a detailed examination of the Wellington Valley Caves, together with geological maps and sketch sections. He states that the particulars concerning the animal remains referred to in his paper read before the Geological Society, had derived great additional importance from the discoveries made by Professor Owen.

Several plates were included, by Mitchell, in order to illustrate the bones, as well as a letter from Professor Owen. In the epistle, headed "The Royal College of "Surgeons, May 8th, 1838," the Professor stated, *inter alia*, "Genus Diprotodon. I apply this name to the genus "of Mammalia, represented by the anterior extremity of the "right ramus, lower jaw, with a single large procumbent "incisor. . . This is the specimen conjectured to belong "to the Dugong, but the incisor resembles the corres-"ponding tooth of the wombat in its enamelled struc-"ture and position. . . But it differs in the quadrilateral "figure of its transverse section, in which it corresponds "with the inferior incisors of the hippopotamus."

Strictly speaking, of course, this related to the genus Diprotodon, rather than to Nototherium, but as we hope to deal with the question of the *Nototheria* in relation to geological time at a later portion of this historical series, the remarks of Mr. (afterwards Sir) Thomas Mitchell are of interest. It also explains the inception of Mitchell's connection with Palæontology. He was of opinion that the caves had been probably twice immersed, and that in general the plains of the interior had been under the sea at one time. The accumulation of animal remains were very much broken. No entire skeleton was discovered, and very rarely were any two bones of the same animal found associated.

In the Report of the British Association for 1844 [4] appears the first reference to *Nototherium* * as distinct from *Diprotodon*; Professor Owen making two species from the material that was available to him at the time—the first of these being *Nototherium inerme*, and the second *N. mitchelli*. The collection available to the learned Professor was not large. It came from the Condamine River, and was collected by Sir Thomas Mitchell, C.B., who appears to have taken a keen interest in the collection of such fossils as these. From the study of the available data, the genus was founded in the belief that these animals, unlike the *Diprotodon*, had no tusks. The mistake was due to the lack of sufficient material, and also to the mutilated character of the specimens used as the types.

In 1845 Professor Owen received from Leichhardt and Boyd the mandibular ramus of a young *Nototherium*, showing the germ of an incisor (5) together with other specimens. The inclusion of the incisive tusks necessitated a revision of the genus. This was the first emendation of the type.

In 1856 the first skull was discovered that could be relegated to this genus; it came from the Darling Downs, and was minus the mandible. Mr. W. S. Macleay, of the Australian Museum, named this skull *Zygomaturus trilobus*, in a popular report of the discovery contributed to the local press during August, 1857.

Professor Owen protested against the new classification, and eventually a cast of the skull and photographs, giving details, reached him. The cast came later than the photographs, so that we can omit the report upon the former, and bring the matter down to 15th June, 1871, when Professor Owen's real work upon the cast was read before the Zoological Society, constituting Part V. of his series upon the Fossil Mammals of Australia. In this monograph he recapitulated all the published facts, claimed that the skull from which the cast was made was that of *Nototherium mitchelli*, and that, *ipso facto*, *Zygomaturus trilobus* was eliminated. As a consequence, the latter designation was allowed to lapse until Mr. C. W. De Vis, M.A., of Queensland, elevated it to the rank of a genus. De Vis' work in this connection will be considered later. In the year 1877, Owen published his paper on the Extinct Fossil Mammals of Australia in two quarto volumes, adding some notes to the genus Nototherium, and giving a woodcut of a humerus (Pl. CXXVII.), which he felt justified in relegating to this genus. The humerus really had nothing whatever to do with the genus *Nototherium*, but its resemblance to the same bone in *Phascolomys*, served to link it to the Phascolomyidæ in all classifications from that day until 1910, when the real humerus was discovered in Tasmania (6), together with the rest of a skeleton (*N. tasmanicum*), thus settling the matter at rest once and for all. One effect of this incorrect relegation was that any robust *Nototherian* humeri that were found were naturally relegated to *Diprotodon minor*, a species founded by Professor Huxley in 1862 (7). The late Dr. Stirling, F.R.S., of South Australia, was a strong supporter of Huxley's species, *D. minor*, but, with the coming to light of the true *Nototherian* humerus, felt the wisdom of going through the South Australian fossil humeri provisionally related to that species, but his attention being fully

claimed by Ethnological Studies, he never again published upon the question.

In 1882 Professor Owen described [8] a distal end of a femur which he thought might belong to the Genus *Nototherium*; this also—in 1910—was shown to be incorrect, and we may assume that some of the changes rung by taxonomists upon the *Nototherian* remains discovered from time to time, found support upon the departure of the real femur from that incorrectly relegated to it, the more so as the real femur is exceedingly similar in outline to that of *Diprotodon*.

This practically ends Professor Owen's connection with the genus.

In the year 1874, Professor Frederick McCoy, of the Melbourne University, figured [9] some *Nototherian* tusks (from Back Creek, Victoria), in a comprehensive study of *Diprotodon* and *Nototherian* dentition.

The next important developments of the generic history of this species were due to Mr. C. W. De Vis, M.A. who first relegated a humerus to *Nototherium* that departed so much from Owen's specimen that Lydekker, in his British Museum Catalogue [10], published in 1877, relegated it to *Diprotodon*, without question, but it is to-day, on the face of it, apparent that De Vis was correct in this matter.

Later on, in August, 1887, De Vis created a new genus for extinct *Nototherian* animals, calling it *Owenia*, which was later changed to *Euowenia*; this was communicated to the Royal Society of Queensland [11], the material being a skull and mandible, and the specimens were much crushed. Some of our own controversial material—yet to be presented—will revolve around this, and De Vis' subsequent taxonomic efforts at reconstruction.

In December of the same year (1877), he contributed a paper to the Linnean Society of New South Wales [12], making a new species of *Nototherium*, namely, that of *Dunense*.

By far the most important addition to the literature of this subject added by De Vis was a paper published in 1891 [13], in which, while confirming and re-naming the genus *Owenia*, he suggested a complete revision of the taxonomy of three extinct animals. This opens up several questions, and must be dealt with in some detail, as it recapitulated all published data, and questioned the correctness of even type specimens and their subsequent as-

sociations with more perfect specimens. De Vis' contentions may be summed up as follows:—

1. The skull claimed by Owen was not the correct cranium of *Nototherium* at all, and still stood generically distinct under the name of *Zygomaturus*, with characters duly detailed.

2. That Lydekker's creation of a family *Diprotodontidæ* was unwise, and that the only family that really existed was that of *Nototheriidæ*, of which *Diprotodon* was a genus.

3. That the family just named included the following genera:—

NOTOTHERIIDÆ

Dentition:

General characters: Posterior upper incisors small. Premolars, except in *Zygomaturus*, subtriangular, unicuspid; with a posterior talon. Molars transversely bilobed, the upper without longitudinal ridges, talons anterior-posteriorly narrow. Scapula long and narrow. Ilia greatly expanded. Limbs gressorial, approximately equal; their proximal bones elongate, simple. Foot broad, tail short, tapering.

Synopsis of Genera.

Nototherium.

Incisors: Upper premolars subtriangular, unicuspid; cranial habit and length of muzzle moderate. Crowns of first incisors contiguous, or slightly diverging, the lower incisors proclivous. Posterior upper incisors on the edge of the jaw; cusp of premolar with a shallow posterior cleft.

Diprotodon.

Posterior upper incisors near middle line of the jaw; cusp of the premolar with a deep lateral cleft.

Zygomaturus.

Upper premolar oval, tuberculated; cranial habit very massive, with short expanded muzzle.

Enowenia.

Incisors: Crowns of first incisors above and below widely diverging, with a similar strong double curvature.

Some parts of the above contention had been published by De Vis prior to the extenso notes given above, and the late Richard Lydekker [14] answered it, taking up the following ground: That the cast used by Professor Owen showed that the two premolars were not the same, one at least agreeing with the very class of tooth that De Vis had accredited to the genus *Nototherium*, and that apparently the other tooth did not belong to the original skull from which the cast was made. We hold a copy of this cast, and the two premolars agree with Lydekker's statement, but for the present we pass this item over. In 1894 De Vis described [15] a mandible of *Zygomaturus*, and with some warmth defended his position, again claiming that only a single family existed, namely, *Nototheriida*, and that *Zygomaturus* was a genus of that family.

The year 1911 brought out a description of the humerus, and parts of the skull of *Nototherium tasmanicum* in "The Tasmanian Naturalist," by Messrs. H. H. Scott and K. M. Harrisson [16]. In 1912 saw the description of *Nototherian* teeth [17], by L. Glauert, F.G.S., from specimens found in Western Australia, in which *Zygomaturus* was claimed as a synonym of *N. mitchelli*.

The same year some teeth from King Island gave evidence of Professor Owen's *Nototherium victoria*, being more than a mere individual variation of the type *N. mitchelli*, and later on a monograph on *Nototherium tasmanicum* was published by the Geological Survey of Tasmania [18]. In the latter, the author (H. H. Scott) claimed *Zygomaturus* as a sex mystery, and suggested that as a working hypothesis, all weak and flat-tusked animals be regarded as females, the stouter tusked animals be called the males.

The discovery, in 1920, of a very perfect skull, and most of the skeleton of a large *Nototherium* at Smithton, by Mr. E. C. Lovell—taken in conjunction with the former discovery of a skeleton in 1910—gives such an opportunity for a revision of the above that we propose to review the whole question in detail. This latter can only be effectively undertaken after the osteological data have been presented, so for the present we content ourselves with the statement that having proved that the mandible from the Boyd Collection (Brit. Mus. Coll.

32050) is identical with the jaws of *Zygomaturus*, Owen's determination of *Nototherium* as a genus stands good, and De Vis' dissensions rule out. At the same time, the evidence to date of writing tends to show that the real position is this:—

1. That the mandible from the Boyd's Collection, of which we hold an accurate cast, came from a male animal, and that the first *Zygomaturus* skull (and, therefore, Owen's cast, Brit. Mus. Coll. 33259) was a female.

2 Owen's so-called "female" jaws, we will deal with later, just recalling as we pass along that Owen made this determination with a strong reservation, and published his note with a query appended to it.

3. That De Vis afterwards obtained male skulls of his so-called "*Zygomaturus*" which depart—in sex variation—rather strongly from those of the female, and that in the circumstances the position he took up is readily understood. In going over this matter it is also evident that De Vis' contentions did good work, and are even now assisting to solve the problem of these ancient giant marsupials.

4. If the Boyd's collection mandible is placed side by side with the mandible of the latest discovery from Smithton, they will be found to agree *in toto*, while the skull itself agrees exactly with De Vis' determination of *Zygomaturus*, and departs from Owen's cast in exactly the way De Vis claimed.

5. Being practically certain (evidence yet to be given) that our animal was a male, the sex differences square all other outstanding points between Owen and De Vis—and *Zygomaturus*, as reconstructed by the latter, becomes a sex variation, and not a taxonomic one.

SECTION 2.

THE OSTEOLOGY OF *THE CERVICAL VERTEBRÆ.*

As we duly point out in our published [19] introductory note, the cervical vertebræ of *Nototherium mitchelli* are of special morphological interest, combining in fact

the maximum of strength with the minimum of bulk and weight. The especial features are these:—

1. The vertebræ are thin and wide, with enormous pre and post zygapophyses.

2. The centra are transversely oblong, thus giving an enormous neural canal—since the neurapophyses are so spaced as to embrace the whole area thus yielded.

3. The intervertebral pads were reduced to the smallest possible thickness, and accordingly the long zygapophyses functioned strongly.

4. The neural spine of the atlas (when the neck muscles were all in action) blocked against the spine of the axis, thus converting the whole series into a practically solid mass, and broke the shock of the act of ramming a foe. The remaining features will be detailed *in extenso*.

The lower border of the atlas is not completed by a bony bar below, the space being equal to 30 mm. The top of the neural canal, which in antero-posterior extent equals 30 mm., is still marked by the reticulations of the *dura mater*, indicating the perfect preservation of the bone. Both neurapophyses are perforated by a foramen, set in a deep channel (that girdles the rims of the anterior condylar cups) leading backwards and outwards to the incomplete inter-vertebral arterial foramen, thus obviously tracing the course of that artery.

Below the first-named foramina, and therefore between the occipito-axian articular cups, are two large scars some 15 mm. in diameter for the attachment of the great transverse ligament, essential to the setting of the odontoid process of the axis. Across that process runs a deep groove, also 15 mm. wide, marking the passage of the ligamentous band, and its synovial sac. The rest of the internal atlantean, neural, area is roughened by the attachment of capsular ligaments. The incompletion of the atlantean bony ring leaves room for conjecture as to muscular and ligamentous dispositions in this area, for the roughened apex of the odontoid process demands a strong central odontoid ligament. The spine of the atlas—whose unique function has already been cited—is divided into two areas, one that fits the axian spine, and an anterior muscular attachment surface apparently for powerful 'rectus capitis homologues. The crowding out from this area of any fascia

of the ligamentum nuchæ, as is usual among animals with heads carried horizontally, left this part of the spine free for the needs of the special adaptation that we find to obtain. Some kind of pad must have existed between these two spines, either muscular, cartilaginous, or ligamentous, but in the macerated bones the slightest compression of the cervical series, as a whole, jams the two spines firmly together. This special adaptation is, as far as we know, unique. In a monograph upon *Nototherium tasmanicum*, this action of the two anterior cervical spines in Nototheria was noted in the following terms:—"During "normal vertebral articulation, the aborted spine of the "atlas worked against this point in the axis, both being "flattened and roughened, as if for a loose kind of syndes-"mosal union." (20)

The posterior edges of the atlantean neurapophyses are groove-scarred for 35 mm. on either side, to receive interspinalis muscles, and ligaments that filled a fossa in the atlas 40 mm. wide × 40 mm. high; indeed, the whole under portion of that spine is thus excavated. This bold excavation of the neurapophyses continues throughout the cervical series, and when the seventh is reached, in spite of its apparent thinness, it yet yields a muscular and ligamentous attachment fossa, 70 mm. wide and 20 mm. deep.

This enormous padding of muscles and ligaments, added to the great strength of the zygapophyses, enabled what would otherwise be a weak neck to withstand enormous shocks, and was a special evolution of the marsupial skeleton. To give stress to this point it may just be added that the fourth cervical is only 34 mm. thick, measured through the centrum, but the processes for interlocking bring its total up to 65 mm.

The vertebra-artereal foramina are completed by bone in the third and subsequent vertebræ; are nearly completed in the axis, and indicated only in the atlas; the sizes of these are given in the table of measurements appended hereto. In the specimen under examination, the right diapophyses is complete, and the left nearly so, the former enabling us to say that the muscular attachments were all of a very extensive character. Skullwards the homologue of the rectus capitis lateralis, and the superior oblique claimed large areas, while the scar upon the back of the process evidently related to a moiety of the levator anguli scapulæ. The similarity of such muscles as the latter, with those of man, related in part at least to the complete revolution of the arm in mar-

supials incidental to the manipulation of the pouch. On the other hand, the likeness ends when we come to deal with the ligamentum nuchæ, which in such animals as are here under consideration, require an elastic ligament of great length and power, together with freedom of the two anterior vertebræ. Accordingly, the ligamentum nuchæ may arise far down upon the lumbar region, fan out upon the first dorsal spine into two fascia, one of which rains down upon the five posterior cervical spines, and the other ascends to the occipital regions for insertion. In this *Nototherium* skull, the supra-occipital bone is deeply excavated by two fossæ to receive this important ligament, a low median bony bar acting as a central septum, the total area thus occupied by the fossæ is 125 mm. wide, and apparently 100 mm. in vertical extent.

A common occipito-cervical ligament, modified in the anterior spinal regions, must have existed, and other myological notes could no doubt be collected, but the above data chiefly interest us in the present study.

COMPARATIVE CERVICAL VERTEBRÆ. *Nototherium mitchelli* (No. 1). *Nototherium tasmanicum* (No. 2).

Name.	Height.	Width.	Diameter anterior centrum.	Height of neural canal anterior.	Width of neural canal anterior.	Across rims of articular cups of atlas.	Greatest length of Transverse processes.	Length of zygapophyses (platforms).	Antero-posterior length of spine of axis.
Atlas									
No. 1	100 mm.	242 mm.	No	No. 1, 77 mm	No. 1 56 mm.	125 mm.	73 mm.	37 mm.	65 mm.
No. 2	95 mm.	230 mm.	centrum	No. 2, 58 mm.	No. 2, 56 mm.	113 mm.	70 mm.	35 mm.	45 mm.
Axis	Mutilated					Vertebra arterial foramen			
No. 1	134 mm.	144 mm.	100 x 50 mm.	30 mm.	46 mm.	No. 1, 21 x 15	No. 1, 47 mm.	No. 1, 39 mm.	—
No. 2	157 mm.	126 mm.	95 x 40 mm.	20 mm.	40 mm.	No. 2, 15 x 15	No. 2, 39 mm.	No. 2, 38 mm.	—
Cervical 3	Mutilated								
No. 1	135 mm.	154 mm.	No. 1 75x47mm	31 mm.	47 mm.	20 x 17 mm.	47 mm.	39 mm.	—
No. 2	150 mm.	140 mm.	No. 2 64x49mm	21 mm.	46 mm.	15 x 15 mm.	39 mm.	35 mm.	—
Cervical 4	Imperfect								
No. 1	144 mm.	171 mm.	73 x 46 mm.	34 mm.	54 mm.	17 x 12 mm.	50 mm.	40 mm.	—
	Imperfect								
No. 2	140 mm.	160 mm	70 x 50 mm.	22 mm.	47 mm.	15 x 14 mm.	50 mm.	30 mm.	—
Cervical 5	Spines very								
No. 1	imperfect in	No. 1, 178 mm.	77 x 51 mm.	33 mm.	56 mm.	15 x 15 mm.	56 mm.	42 mm.	—
No. 2	both cases	No. 2, 164 mm.	74 x 51 mm.	25 mm.	55 mm.	15 x 15 mm.	54 mm.	29 mm.	—
Cervical 6		Imperfect					Imperfect		
No. 1	142 mm.	178 mm.	77 mm.	37 mm.	62 mm.	15 x 15 mm.	57 mm.	41 mm.	—
	Imperfect		Imperfect						
No 2	134 mm.	160 mm.	73 mm.	31 mm.	58 mm.	13 x 15 mm.	50 mm.	25 mm.	—
Cervical 7	Imperfect								
No. 1	141 mm.	188 mm.	85 x 58 mm.	41 mm.	70 mm.	17 x 17 mm.	60 mm.	35 mm.	—
	Imperfect								
No. 2	140 mm.	170 mm.	72 x ? mm.*	35 mm.	60 mm.	9 x 7 mm.	45 mm.	24 mm.	—

REMARKS.—Owing to the mutilations to the spines of the Vertebræ of *Nototherium mitchelli*, no comparative measurements have been included in the table. Such data relating to *N. tasmanicum* appeared in the monograph on that specimen.

* Centrum imperfect in *N. tasmanicum*.

A study of the comparative table thus supplied will at once make manifest the superior bulk of the vertebræ of *Nototherium mitchelli*, and it only remains to contrast the *Nototherian* vertebræ with a normal marsupial type, to see the extent to which cervical specialisation has taken place.

In the wombat the neck vertebræ are upon the whole similar to those of the *Nototheria*, the neural spine of the axis being wide, with an angular superficial slope of 45 degrees. No special union exists between it and the atlantean spine, and the neurapophyses are not excavated for the implantation of powerful muscles and ligaments. What is true of the first two cervicals is equally true of the whole series, for the interlocking zygapophyses, with the usual supply of interspinalis muscles, and a normally sized ligamentum nuchæ, meet all the needs of the wombat's method of life, but it is otherwise with the *Nototheria*. In weakly horned animals (be they of stirpian or sexual segregation) the wombat cervical conditions are simply carried to a point sufficient to support the weight of the head with, but with small reserves for aggression; the spine (21) of the axis is of the same relative size as that of the wombat, and the neural spines are moderately excavated, thus exactly outlining to us the needs of the non-fighting animals. In *Nototherium mitchelli*, all such structures are carried a stage in advance, and power for power's sake is superadded. To show that this latter statement is not an ungrounded one, it must be remembered that the skull of such an animal as *Nototherium tasmanicum* is as large and weighty as that of *Nototherium mitchelli*, thus furnishing us with the ligamentous and muscular needs for its pose and support, and explaining why the other skull characters of fighting import exist in the skull of *Nototherium mitchelli* at all. When we come to deal with the comparative skulls, we shall have a lot to say upon this matter, it being only necessary to retain for the present the following salient facts in the foreground of our memories:—

1. The skulls of *N. mitchelli* and *N. tasmanicum*—at least—(with a possibility of that of other species) are equally large and weighty, yet their cervical vertebræ show marked differences. One being an exaggeration of the standard of the modern wombat *in about the same ratio of power* (*N. tasmanicum*), while the other shows an additional power with interspinalis muscles and paddings, suitable to the resisting of great shocks in the long axis of the head and vertebræ.

2. The above is an extension of our statement given in the former note to the effect that in an animal like *N. tasmanicum* the structures present could serve no greater purpose than the moderate resistance of force, but in *N. mitchelli* they are built up to a strength essential for conducting the fiercest aggressive warfare.

COULD A NOTOTHERIUM HAVE HORNED A FOE?

In order to establish the fact that a *Nototherium* could have horned its foe, it will be necessary to carry our study of the cervical vertebræ forward to the occiput itself, and pay some attention to the muscular and ligamentous conditions that obtained there. As we are also dealing here with a heavy headed animal whose weapon was planted on the nose, and therefore removed from the neck by a distance of seventeen inches (433 mm.), as against 2 inches (50 mm.) in the case of a modern bull, we must expect to find exceptional conditions provided. A glance at the picture of the neck bones will demonstrate their ability to resist the shock of the act of ramming a foe, and now the study of the occiput proves that the act of violently thrusting upwards the head and revolving it, together with most perfect checks, to avoid dislocation of the neck, were duly provided, as note:—

1. The foramen magnum is transversely oval, 55 mm. in width, and 40 mm. in height, the occipital condyles being very heavy, as might be expected.

   The lower edges of the condyles are excavated by two enormous fossæ for the implantation of the rectus capitis muscles, essential to the uplifting and rotating of the head. These fossæ are 30 mm. long x 12 mm. wide, and would also lodge the atlanto-axoidean ligaments to relieve the muscles from strain, and to enable them to exert their full power.

2. The crest of the magnum foramen carries an extensive transverse attachment tract some 20 mm. long, for the reception of the central odontoid ligament, one of the most important factors to a war-like animal—since any failure of this and the next two ligaments noted would mean death when ramming a foe.

3. The next two surfaces, germane to our subject, are those for the implantation of the lateral odontoid ligaments, since such ligaments are the checks that saved the dislocation of the neck when the animal horned and tossed its foe. In our specimen the surfaces thus provided for are so massive as to simulate a third condyle, and show that the bands of elastic ligament were over 15 mm. wide, and of considerable thickness. If these data are considered in the light of the evidence yielded by the study of the cervical vertebræ—always remembering the fact that the occiput was provided with a ligamentum nuchæ that covered a hundred millimetres of implantation surface—it will be obvious that everything of essential desiderata to a heavy animal wishing to horn its foe is thus provided for. Later on, we shall review the evidence in favour of a horn, figure the skull, and give description of all the cranial features relating to the method of life here assumed to have existed.

EXPLANATION OF PLATES.

Plate VI.

The vertical vertebræ of *Nototherium mitchelli*, showing the powerful zygapophyses and short stunted spine of the atlas, that can be compressed against the heavy spine of axis, during a forceful head thrust, thus converting the neck series into a solid mass of bone, muscle, and elastic ligament.

Plate VII.

To the left is the atlas vertebra. The central bone is the axis, tilted to display the excavation of the neural spine for the reception of interspinalis muscles, etc. To the right, the seventh cervical appears, showing wide neural canal, nature of processes, and excavated neurapophyses for the interspinalis muscles, and the elastic fascia of the ligamentum nuchæ.

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(21) Plate 16.

CERVICAL VERTEBRÆ, NOTOTHERIUM MITCHELLI.

ATLAS.

AXIS.

SEVENTH CERVICAL.

NOTOTHERIUM MITCHELLI.

AUSTRALIAN *STRATIOMYIIDÆ*.

By G. H. Hardy.

Plate VIII.

(Read 8th June, 1920.)

Fam. STRATIOMYIIDÆ.

The species belonging to this family are easily recognised by a combination of two venational characters—one is a short discal cell emitting veins, some of which do not as a rule reach the wing border, and the lower branch of the cubital fork running to or above the apex of the wing is the other. The antennæ are of diverse forms, the third joint of which may consist of as many as eight segments clearly defined, or all or many of these segments may be partly or completely fused. The abdomen consisting of from five to seven visible segments is often depressed.

Key to the Subfamilies of the Stratiomyiidæ.

1. The abdomen with seven visible segments. BERIDINÆ.
   The abdomen with five or six visible segments. 2.

2. The wings with three posterior veins. 3.
   The wings with four posterior veins. 4.

3. Antennæ with a short, usually bulbous, third joint which bears a hair-like arista. PACHYGASTERINÆ.
   The antennæ elongate, ten-segmented, the tenth segment as long as the other nine together, ribbon-like, and more or less parallel sided. LOPHATELLINÆ.

4. The wings with the fourth posterior cell rising from the discal cell, or at least touching it. 5.
   The wings with the fourth posterior cell rising from the second basal cell and not touching the discal cell. 6.

5. The scutellum without spines and the last antennal segment elongate. HERMETIINÆ.
   The scutellum with spines and the last antennal segment short or moderately long. CLITELLARINÆ.

6. The antennæ with a thread-like arista. SARGINÆ.
   The antennæ without an arista, at most with a short blunt style. STRATIOMYIINÆ.

Subfam. Beridinæ.

Synonymy.—In the "*Catalogus Dipterorum*" Kertesz places *Xenomorpha* as a synonym of the genus *Chiromyza* and suggests that *Inopus* is also a synonym of the same. The position of the Australian species placed under the genus *Xenomorpha* is still uncertain, but they are allied to the genus *Chiromyza*, and the genus *Inopus* agrees better with the genus *Metoponia*, and indeed may be synonymous with it.

White, in 1916, placed *Xenomorpha* as a synonym of the genus *Metoponia*, but misstated that the wings of the latter have four posterior veins. White's mistake caused him to create the genus *Cryptoberis* for species with three posterior veins, but the genotype is a male of Macquart's female type species of the genus *Metoponia*. On this account, in the present paper, *Cryptoberis* is placed as a synonym of the genus *Metoponia*, and the genus *Xenomorpha* is used for convenience for all species of *Beridinæ* without scutellar spines and with four posterior veins present. The material to hand is not sufficient to form a better arrangement.

Key to the Genera of the Beridinæ.

1. The scutellum without spines. 2.
   The scutellum with spines. 3.

2. The wings with three posterior veins. *Metoponia.*
   The wings with four posterior veins. *Xenomorpha.*

3. The eyes bare. 4.
   The eyes hairy. *Actina.*

4. The antennæ elongate, three times as long as the head; the wings without markings. *Xanthoberis.*
   The antennæ moderately long; the wings marked with fuscous. *Neoexaireta.*

Genus Metoponia, Macquart.

Metoponia, Macquart, Dipt. Exot., suppl. 2, 1847, p. 28. *Id.*, Walker, List Dipt. B.M., v. suppl. 1, 1854, p. 112. *Id.*, Osten-Sacken, Berl. Ent. Zeit., xxvii., 1883, p. 297. *Id.*, White, Proc. Roy. Soc. Tasm., 1914, p. 46; and 1916, p. 260.

Cryptoberis, White, P.L.S. N.S.W., xli., 1916, p. 73.

Type.—*Metoponia rubriceps*, Macquart.

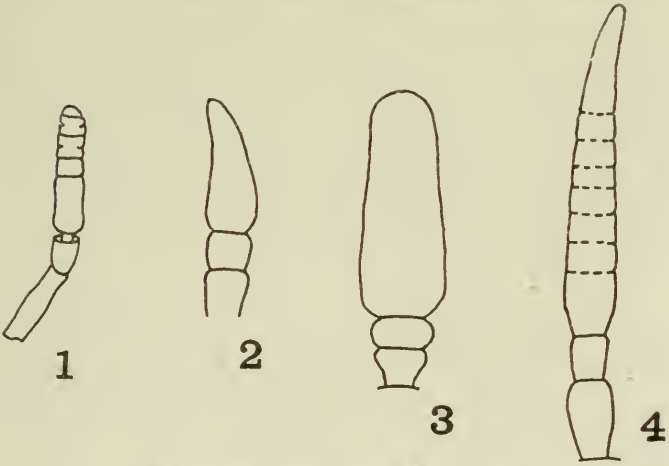
... ... New Holland.

Characters.—The species in this genus have a very receding face; the eyes contiguous in the male and widely separated in the female; the abdomen with seven visible

segments and rather elongated in the female; the scutellum without spines and the whole insect devoid of strong hairs or bristles. The wings have three posterior veins, a reduced discal cell and the anal cell closed before the wing margin.

Key to the Species of Metoponia.

1. The two basal joints of the antennæ equal; a yellow brown species. *prisca.*
   The first joint of the antennæ conspicuously longer than the second; a black, brown or reddish species and the female with a reddish head. *rubriceps.*



Metoponia rubriceps, Macquart.
Text fig. 1.

Metoponia rubriceps, Macquart, Dipt. Exot., suppl. 2, 1847, p. 28, pl. i. fig. 4; and suppl. 3, 1848, p. 15. *Id.*, Walker, List Dipt. B.M., v. suppl. 1, 1854, p. 113. *Id.*, Osten-Sacken, Berl. Ent. Zeit., xxvii., 1883, p. 297. *Id.*, White, Proc. Roy. Soc. Tasm., 1914, p. 46. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 75.

Chiromyza flavicaput, Walker, Ins. Saund. Dipt., i., 1852, p. 163.

Cryptoberis herbescens, White, P.L.S. N.S.W., xli., 1916, p. 74, Text fig. 1.

Synonymy.—Dr. E. W. Ferguson has a specimen named by White as *Cryptoberis herbescens*. It was taken about the same time of the year and in the same locality as the type, and it agrees in every respect with the male of *M.*

rubriceps, Macquart, described below, and does not agree with the antennal proportions given by White. A critical study of White's description compared with a number of undescribed *Beridinæ* has led the writer to conclude that the description given by White is misleading, and therefore the above specimen determined by White is considered to be correctly identified.

Inopus despectus, Walker (Ins. Saund. Dipt.), from unknown locality may also be intended for the male of *M. rubriceps*, Macquart, but the illustration with it does not quite conform to this insect.

Description.—Male. The head is black or blackish brown; the eyes are contiguous; the second joint of the antennæ is about one quarter the length of the first, and the third joint is as long as the first and is segmented. The thorax, scutellum, and abdomen are blackish brown, and a golden yellow pubescence, very conspicuous in fresh specimens, covers a large area of the thorax dorsally, and extends on to the scutellum and abdomen; ventrally the abdomen has yellow and much shorter pubescence; the male genitalia is exposed. The legs are yellowish brown and the wings are similarly coloured.

Length.—Males, 5-6 mm.; females, 6-10 mm.

Hab.—New South Wales: Sydney, March and April, 1919, 30 males and 13 females, and November, 1919, 24 males and three females. Victoria: Melbourne, November and December, 1 male and 2 females taken by Mr. C. E. Cole. Tasmania: This locality is recorded by Macquart, but specimens are not represented from there in recent collections.

Note.—Specimens have been taken in copula during the spring and the autumn, and this places its sex relationship beyond dispute.

Metoponia prisca, Walker.

Chiromyza prisca, Walker, Ins. Saund. Dipt. i., 1852, p. 162.

Status.—A blackish species with yellow pubescence is referred here with considerable doubt. Walker's description agrees with the species described below about as well as *Chiromyza flavicaput* of the same author agrees with the previous species. Until the type is examined it is advisable to append Walker's name to this, the only species from Tasmania, the type locality, that conforms to the description in any way.

Description.—Male. The eyes have scanty pubescence and are contiguous; the front consists of ocellar and

antennal triangles, the former is black and the latter is covered with yellowish tomentum and pubescence; the antennæ are short, consisting of two equal basal joints, and the third is as long as the two basal joints united; the face recedes and has yellow tomentum and lateral pubescence. The thorax and the base of the scutellum are black with the shoulder spots and apical margin of the scutellum yellowish, the latter markings extend on to the thorax; no other markings are perceptible; the pubescence is yellow and depressed. The abdomen is black-brown with yellow pubescence. The legs are yellowish, stained with black on the tibiæ and tarsi. The wings are light grey, a little darker along the anterior half.

Female. The head is black and the eyes are widely separated; the antennæ are similar to those of the male, but the third joint is a little longer than the basal joints united. The thorax is black, similar to the male, but with the markings more extended and showing tendencies to approach those of *Xenomorpha australis*, Macquart described below. The scutellum is yellow. The abdomen is black with the apex of most of the segments bordered conspicuously brown. The legs have the base of the segments yellowish, otherwise they are much stained with fuscous.

Length.—Male 5-6 mm.; female 10 mm.

Hab.—Tasmania: Cradle Mountain, 13 males and 10 females, January, 1917; Wynyard, 1 male, 2nd February, 1916; Mt. Wellington, 1 male, 9th January, 1919.

Note.—The resemblance of this species to *Xenomorpha australis*, Macquart, is remarkable; few points other than that of venation can be found to separate them.

Genus Xenomorpha, Macquart.

Xenomorpha, Macquart, Dipt. Exot. i. 1, 1838, p. 193; and i. 2, 1839, p. 190.

Metoponia, White (nec Macquart), P.L.S. N.S.W., xli., 1916, p. 74.

Type.—*Xenomorpha leptiformis*, Macquart; Brazil.

Synonymy.—White mistook the characters of the genus *Metoponia*, stating that it has four posterior veins, and thus he treated *Xenomorpha* as a synonym of it.

Characters.—Until the study of the species of the world is undertaken it seems advisable to keep *Xenomorpha* as a generic name for the Australian species of *Beridinæ* with four posterior veins and without scutellar spines.

Key to the Species of Xenomorpha.

1. A non-metallic species with the antennæ short, the third joint short. *australis.*
   A species with a metallic thorax and the antennæ with the two basal joints minute, the third joint long, in proportion, and swollen. *grandicornis, sp. nov.*

Xenomorpha australis, Macquart.

Text fig. 2.

Xenomorpha australis, Macquart, Dipt. Exot., suppl. 4, 1850, p. 54, pl. iii., fig. 7. *Id.*, Williston, Trans. Ent. Soc. Phil., xv., 1888, p. 244.

Metoponia australis, White, P.L.S. N.S.W., xli., 1916, p. 75.

? *Chiromyza vicina*, Bigot, Ann. Soc. Ent. France (5), ix., 1879, p. 200.

? *Metoponia vicina*, Kertesz, Cat. Dipt. iii., 1908, p. 145.

Synonymy.—Macquart's *X. australis*, described from the East Coast of Australia, and Bigot's *C. vicina*, queried from Australia, may belong to the same species. Until the types are examined it will be impossible to determine if this is the case, and indeed Bigot's species may belong to quite a different genus.

The species described below is probably correctly identified and is the only form obtained in numbers and in sufficiently good condition to warrant a description. There seem to be a number of specimens belonging to this genus, but most of them are represented by specimens which are inferior in condition, and may ultimately prove not to be distinct.

Description.—Male. Although black, a covering of yellowish depressed pubescence gives this insect the appearance of being greyish. The eyes have scanty yellowish pubescence; the front is linear and widens above the antennæ and at the ocelli into triangular areas; the pubescence on the ocellar triangle is black and on the antennal triangle yellow; the antennæ are yellow, stained more or less with black on the two basal joints, and the third joint is as long as the two basal joints together; the proboscis is yellow; the face is very receding and has sparse whitish pubescence at the sides, and is covered with light grey tomentum which extends on to the frontal triangle. The thorax above has two faint reddish brown stripes which widen anteriorly, merge into two large shoulder spots and converge towards the scutellum, near which they disappear, the pubescence of the dorsum is yellowish and that of the

venter whitish. The scutellum is black and has yellow pubescence. Other but indistinct markings are present on the thorax and scutellum, and they appear to be remains of lateral thoracic stripes which extend on to the scutellum. The abdomen has the first segment inconspicuously margined apically with reddish brown, and the genitalia is black but more or less tipped with reddish brown; the pubescence is more or less depressed, yellow, and with lighter and darker pubescence in places. The legs are brownish at the base and apex of the segments, and have yellowish pubescence. The wings are light grey and the halteres are yellow.

Female. Black with the pubescence mostly depressed and yellow. The eyes are widely separated and have scattered pubescence; the front has yellowish tomentum and mostly brownish pubescence; it has also a deep median furrow on each side of which, half-way between the ocelli and antennæ, there is a prominence with yellow pubescence. The antennæ are reddish and are only very slightly stained black on the basal segments which have black hair; the length of the third joint is equal to that of the two basal joints united. The proboscis is reddish and the receding face has yellow tomentum and hairs. The thorax has light shoulder spots from which run a pair of median stripes and a pair of lateral stripes; the median stripes become more or less fused towards the scutellum, but the darker interval separating them is still traceable; the lateral stripes meet the median and run on to the scutellum, which is otherwise brown with a black apical tip. The abdomen is similarly coloured to that of the male and most of the segments have an inconspicuous apical brown margin, and the apical segments are much attenuated. The legs have the basal half of the segments yellowish. The wings and halteres are as in the male.

Length.—Male, 10 mm.; female, 13-15 mm.

Hab.—Victoria: Gisborne, 5 males and 4 females, collected by G. Lyell.

Xenomorpha grandicornis, *sp. nov.*

Text fig. 3.

Description.—In general appearance this species is similar to *Actina incisuralis*, Macquart. The antennæ will distinguish it from any other *Beridina* known.

Male. The head is black and the eyes are widely separated and pubescent; the front is shining and has black pubescence and about half-way between the antennæ and the ocelli there is a transverse impression from which

run two parallel grooves to the ocelli and one median groove to the base of the antennæ. The antennæ have the first two joints short, small and equal, and the third joint is about four times as long as the two basal joints united, much swollen, cylindrical but slightly tapering apically, without segments, velvety black and bare of hairs. The face does not recede as in *N. australis*, and has black hairs. The thorax and scutellum are metallic blue and have black pubescence; on the shoulders and behind the wings there are yellowish markings. The abdomen is black with black pubescence, and the genitalia is reddish. The legs have the apex of the femora, and the base and apex of the tibiæ yellowish red; the first tarsal joints are more or less red. The wings are greyish.

Length.—Male 7 mm.

Hab.—Tasmania: Cradle Mountain (Pencil Pine Creek?), one male taken on the 17th January, 1917.

Genus Actina, Meigen.

Actina, Meigen, Klassif i., 1804, p. 116. *Id.*, White, Proc. Roy. Soc. Tasm., 1914, p. 49. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 77.

Type.—*Actina nitens*, Latrielle. ... ... Europe.

Characters.—The eyes are hairy and widely separated in both sexes; the scutellum has four spines; the abdomen consists of seven visible segments; the wings contain four posterior veins all issuing from the discal cell, and the anal cell is closed before the wing margin.

Key to the Species of Actina.

1. The two basal joints of the antennæ about equal. *victoriæ.*
   The first antennal joint about twice the length of the second. 2.
2. The scutellar spines always partly yellow at least; a species very variable in size. *incisuralis.*
   The scutellar spines always entirely metallic green; a very small species. *costata.*

The character used for *A. victoriæ*, Hill, in the above key is taken from the description of that species.

Actina incisuralis, Macquart.

Beris incisuralis, Macquart, Dipt. Exot., suppl. 2, 1847, p. 28; and suppl. 4, 1850, p. 42. *Id.*, Walker, List Dipt. B.M., v. suppl. 1, 1854, p. 12.

Beris filipalpis, Macquart, Dipt. Exot., suppl. 4, 1850, p. 41, Pl. iii., fig. 2, 1850.

Actina incisuralis, White, Proc. Roy. Soc. Tasm., 1914, p. 50. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 77.

?Beris fuscicentris, Macquart, Dipt. Exot., suppl. 4, 1850, p. 42. *Id.*, White, Proc. Roy. Soc. Tasm., 1914, p. 49. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 97.

?Beris nitidithorax, Macquart, Dipt. Exot., suppl. 4, 1850, p. 41, Pl. iii., fig. 3. *Id.*, White, Proc. Roy. Soc. Tasm., 1914, p. 49. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 97.

Synonymy.—It is possible that *Beris fuscicentris* and *B. nitidithorax*, both described by Macquart, may belong here; it will be noted that the reference to a figure given by Macquart under the former does not belong to that species but to *Stratiomyia nasuta*.

Hab.—Specimens have been examined from Queensland, New South Wales, South Australia, Western Australia, and Tasmania. The species has also been recorded from Victoria.

Actina costata, White.

Actina costata, White, Proc. Roy. Soc. Tasm., 1914, p. 51. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 77.

Hab.—This species is only known from Tasmania, and it can be taken in quantities on Mt. Wellington, about 2,000ft.

Actina victoria, Hill.

Actina victoria, Hill, P.L.S. N.S.W., xliv. (2), 1919, p. 450, figs. 1 a-c.

Status.—From the description this species appears more or less similar to *A. incisuralis*, White, but the basal joints of the antennæ are described as about equal in length.

Genus XANTHOBERIS, White.

Xanthoberis, White, P.L.S. N.S.W., xli., 1916, p. 75.

Type.—*Xanthoberis siliacea*, White.

... ... New South Wales.

Xanthoberis siliacea, White.

Xanthoberis siliacea, White, P.L.S. N.S.W., xli., 1916, p. 76, text fig. 2.

Genus Neoexaireta, Osten-Sacken.

Diphysa, Macquart, Dipt. Exot. i. 1, 1838, p. 172 (preoccupied). *Id.*, Walker, List Dipt. B.M., v. suppl. 1, p. 6.

Exaireta, Schiner, Verh. z.-b. Ges. Wien, xvii., 1867, p. 309 (preoccupied).

Neoexaireta, Osten-Sacken, Cat. Dipt. N. America, Edit. 2, 1878, p. 44. *Id.*, Enderlein, Zool. Anzeiger, xlii., 1913, p. 552, figs. 17-19. *Id.*, White, Proc. Roy. Soc. Tasm. 1914, p. 48. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 78.

Neoexaereta, Kertesz, Cat. Dipt., iii., 1908, p. 131.

Type.—*Xylophagus spiniger*, Wiedemann,
... ... Port Jackson.

Emendments.—Enderlein described this genus, after Macquart's figures, as having the radial vein (his r2-3) branching from the cubital (his r main stem) beyond the median cross vein, but Australian specimens have the radial vein branching interstatial with the median cross vein. Macquart's figures, and hence Enderlein's, show the scutellar spines to be conspicuously curved instead of straight or slightly curved and the antennæ differ considerably.

Characters.—The eyes are bare and separated in both sexes; the antennæ are moderately long, the third joint consisting of eight segments; the scutellum contains four spines; the abdomen consists of seven visible segments; the wings contain four posterior veins, the third of which does not reach the wing margin, and they all branch from the discoidal cell; also the wings are much marked with fuscous.

Neoexaireta spinigera, Wiedemann.

Text fig. 4.

Xylophagus spiniger, Wiedemann, Auss. Zweifl. ii., 1830, p. 618.

Diphysa spiniger, Macquart, Dipt. Exot. i. 1, 1830, p. 172. *Id.*, Walker, List. Dipt. B.M., iv., 1849, p. 1152.

Beris spinigera, Loew, Stett. Ent. Zeit., vii., 1846, p. 306.

Sargus spinigera, Kirby, Ann. Mag. Nat. Hist. (5) xiii., 1884, p. 457.

Neoexaireta spinigera, Froggatt, Australian Insects, 1907, p. 293. *Id.*, White, Proc. Roy. Soc. Tasm., 1914, p. 48. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 78. *Id.*, Hardy, Proc. Roy. Soc. Tasm., 1917, p. 63.

Beris albimaculata, Walker, List Dipt. B.M. i., 1848, p. 126.

Beris servillei, Macquart, Dipt. Exot. i. 1, 1838, p. 172, Pl. xxi., fig. 1; and suppl. 1, 1846, p. 47.

(For further references see Kertesz, Cat. Dipt. iii., 1908, p. 132.)

Hab.—A very common species which has been recorded from Queensland, New South Wales, Victoria, and Tasmania, and also from some of the Pacific Islands.

Subfam. Pachygasterinæ.

Characters.—The Australian species of this subfamily have short antennæ, the third joint of which is swollen, formed with a number of compact segments, and has a hair-like arista; the abdomen is formed with five visible segments, and the wings contain three posterior veins.

The four genera so far known to occur in Australia differ in the form of the scutellum which is normal and without spines in *Pachygaster*, is produced into a spine in *Lonchegaster*, has four spines in *Eraza*, and has many spines in *Wallacea*.

Genus Pachygaster, Meigen.

Pachygaster, Meigen, Ill. Mag. f. Ins., ii., 1803, p. 266.
Id., White, P.L.S. N.S.W., xli., 1916, p. 96.

(For synonymy see Kertesz, Cat. Dipt. iii., 1908, p. 9.)

Type.—*Nemotelus ater*, Panz. ... ... Europe.

Characters.—The antennæ are three jointed, and the third joint is bulbous and consists of several much compressed segments terminating in a long arista; the scutellum is without spines; the wings contain three posterior veins which issue from the discal cell.

Note.—White has a Tasmanian specimen of this genus in his collection, but he considered it to be a Lonchegaster with the spines broken or deformed; this specimen should now be in the British Museum, and probably belongs to the species described below. Later White recorded the genus from Victoria, but did not describe the species. Another species is represented by a specimen in the Macleay Museum from Mt. Kembla, New South Wales, but until further material is to hand it is not advisable to describe this or the many other new diptera in this old collection, most of which dates back fifty years and more.

The species described here is named after the late Arthur White.

Pachygaster whitei, sp. nov.

Pachygaster sp., Hardy, Proc. Roy. Soc. Tasm., 1917, p. 63.

? Pachygaster sp., White, P.L.S. N.S.W., xli., 1916, p. 97.

Description.—Female. Black; the antennæ are reddish; the femora and tibiæ are reddish, but are stained darker in parts; the tarsi are yellow.

The front is shining and a little punctate; two more or less parallel depressions contain the unevenly distributed punctures, and run from the ocellar tubercle towards the antennæ, ending at a deeper median depression situated a little before the antennæ. The eyes are bare. The thorax, scutellum, and abdomen are evenly and densely punctate dorsally, and the punctures are unevenly dense ventrally; all the punctures are small. The pubescence is silvery around the antennæ and mouth, elsewhere it is golden yellow; some very inconspicuous black pubescence can be seen on the front and elsewhere. The wings are hyaline and the veins are reddish and dusky yellowish. The halteres are yellow with black apices.

The male is similar to the female, but is more slender in build; the eyes are approximate, and the punctures on the body appear a little less uniformly and densely distributed; the legs are pale yellow, and the femora are stained with fuscous; the halteres are pale yellow.

Variation.—A female from Dunalley has the legs similar to those of the male.

Length.—Male, 4 mm.; female, $3\frac{1}{2}$-$4\frac{1}{2}$ mm.

Type.—The holotype ♀ was taken at Hobart on the 26th January, 1917, the allotype ♂ came from the same locality on the 29th December, 1917; both these specimens are in the Australian Museum. Two female paratypes are from Hobart on the 22nd January, 1916, and Dunalley 29th January, 1918, respectively. In all there are one male and three females taken in and around dwellings, three in the centre of Hobart and one in a farmhouse at Dunalley.

Hab.—Tasmania. The specimen recorded by White may belong to this species. The flight is similar to that of species belonging to the genus *Odontomyia*.

Genus Lonchegaster, White.

Lonchegaster, White, Proc. Roy. Soc. Tasm., 1914, p. 61.
Id., White, P.L.S. N.S.W., xli., 1916, p. 97.

Type.—*Lonchegaster armata*, White. ... ... Tasmania.

Characters.—The eyes are contiguous in the male and separate in the female; the scutellum is produced into a spine; and the wings contain three posterior veins. The genus differs from the *Platyniini* to which group it otherwise belongs according to Enderlein's keys (Zool. Anz., 1914), by the contiguous eyes of the male.

Lonchegaster armata, White.

Lonchegaster armata, White, Proc. Roy. Soc. Tasm., 1914, p. 62, fig. 7. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 97.

Note.—It appears that this insect has a superficial resemblance to *Parhygaster whitei*, from which it can be distinguished by the scutellum and the blue-black abdomen.

Hab.—Tasmania. A paratype is in the National Museum, Melbourne.

Genus Evaza, Walker.

Evaza, Walker, Proc. Lin. Soc. Lond., i., 1857, p. 109. *Id.*, Kertesz, Ann. Mus. Nat. Hung., iv., 1906, p. 277.

Type.—*Evaza bipars*, Walker. ... ... Borneo.

Evaza bipars, Walker.

Evaza bipars, Walker, Proc. Lin. Soc. Lond., i., 1857, p. 110, Pl. 6, fig. 2. *Id.*, Kertesz, Ann. Mus. Nat. Hung., iv., 1906, p. 284, Pl. 5, fig. 1.

Hab.—This species was described from Borneo, and reported since from New Guinea and New South Wales.

Genus Wallacea, Doleschal.

Wallacea, Doleschal, Nat. Tijdschr. Nederl. Ind. (4), iii. (xvii.), 1858, p. 82.

Type.—*Wallacea argentea*, Doleschal ... Ambonia.

Wallacea darwini, Hill,

Wallacea darwini, Hill, P.L.S. N.S.W., xliv., 1919, p. 460, figs. 7 a-c.

Subfam. Lophotellinæ.

Characters.—This subfamily contains species with three posterior veins issuing from the discal cell; the scutellum without spines; and the last segment of the antennæ ribbon-like.

Note.—A single Australian representative was described by Enderlein from a specimen with broken wings, and the assumption that there are only three posterior

veins present (i.e., the median is two branched in the terms used by Enderlein) requires confirmation.

The Australian Museum and the Macleay Museum have, between them, about thirty unidentified specimens, many of which are referable to this and the next subfamily, but unfortunately the specimens in the Australian Museum are not in a suitable condition to be studied with advantage, and those in the Macleay Museum do not seem to belong to the described forms. There is, however, sufficient material with diversity of characters to warrant a special warning against the assumption of venational characters made by Enderlein.

Genus Peratomastix, Enderlein.

Peratomastix, Enderlein, Zool. Anzeiger, xliii., 1914, p. 311, fig. 16.

Type.— *Peratomastix australis*, Enderlein.
... ... New South Wales.

Peratomastix australis, Enderlein.

Peratomastix australis, Enderlein, Zool. Anzeiger, xliii., 1914, p. 311.

Subfam. Hermetiinæ.

Characters.—This subfamily differs from the previous chiefly in the presence of a fourth posterior vein.

Note.—The material to hand is not in sufficient abundance or in sufficiently good condition to enable the species represented to be studied with advantage. Brauer's genus *Lagenosoma* is considered to be identical with Walker's genus *Massicyta*, and although this appears to be correct further information on the subject is desirable.

Genus Massicyta, Walker.

Massicyta, Walker, Proc. Lin Soc. Lond., i., 1857, p. 8, Pl. i., fig. 1. *Id.*, Enderlein, Zool. Anz., xliv., 1914, p. 8.

Lagenosoma, Brauer, Denkschr. Akad. Wien., xliv., 1882, p. 81.

Type of *Massicyta.*—*M. bicolor*, Walker ... Singapore.

Type of *Lagenosoma.*—*L. picta*, Brauer ... Cape York.

Massicyta picta, Brauer.

Lagenosoma picta, Brauer, Denkschr. Akad. Wien., xliv, 1882, p. 81.

Massicyta dispar, Brauer.

Lagenosoma dispar, Brauer, Denschr. Akad. Wien., xliv., 1882, p. 82.

Massicyta propinqua, Brauer.

Lagenosoma propinqua, Brauer, Denschr. Akad. Wien., xliv., 1882, p. 82.

Genus Hermetia, Latrielle.

Hermetia, Latrielle, Hist. Nat. d. Crust. et Ins., xiv., 1804, p. 338.

Type.—*Hermetia illucens*, Latrielle. ... ... America.

Hermetia pallidipes, Hill.

Hermetia pallidipes, Hill, P.L.S. N.S.W., xliv., 1919, p. 454, text figs. 3 a-b.

Emendments:—A letter received from Mr. Hill contains the following note.—"Re *Hermetia pallidipes*; I have re-examined the type with the following results.—The third joint of the antennæ has six annulations visible; what I have shown as an outstanding tuft of hairs may arise from a very short and very obscure annulation (the seventh), but this could only be ascertained by examination of a balsam preparation. The groove below the same joint covers segments 4, 5, and 6 in both sexes. The wing of the male is correctly drawn; in the female there is a space equal to about twice the width of the intermediate vein between it and its junction with the radial vein."

From this it becomes apparent that Mr. Hill's species is placed in its correct genus, and, therefore, must not be confused with several closely allied species in various collections which differ in the antennal groove and other particulars.

Four specimens in the Macleay Museum, from Cape York, also belong to the genus *Hermetia*, and may be identical with this species.

Subfam. Sargarinæ.

Note.—Enderlein renamed this subfamily *Geosargarina*, but the generic name was changed on an alleged preoccupation which was not sustained, and consequently the origial subfamily name must be restored.

Key to the Genera of the Sargarinæ.

1. Scutellum without spines, bright metallic species. *Sargus.*

Scutellum with spines, black species. *Acanthasargus.*

Genus Sargus, Fabricius.

Sargus, Fabricius, Suppl. Entomol. Syst., 1798, p. 549. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 94.

Type.—*Sargus cuprarius*, Fabricius ... ... Europe.

Sargus meridionalis, White.

Sargus meridionalis, White, P.L.S. N.S.W., xli.. 1916, p. 95.

Sargus gselli, Hill.

Sargus gselli, Hill, P.L.S. N.S.W., xliv., 1919, p. 459, fig. 6 a-c.

Genus Acanthasargus, White.

Acanthasargus, White, Proc. Roy. Soc. Tasm., 1914, p. 60. *Id.*, White, P.L.S. N.S.W., xli., p. 95.

Type.—*Acanthasargus pallustris*, White ... Tasmania.

Acanthasargus pallustris, White.

Acanthasargus pallustris, White, Proc. Roy Soc. Tasm., 1914, p. 60, fig. 6. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 96.

Acanthasargus gracilis, White.

Acanthasargus gracilis, White, P.L.S. N.S.W., xli., 1916, p. 98.

Subfam. Clitellarinæ.

Note.—Enderlein included the *Antissini* under this subfamily and created a new tribe *Abavini*.

Key to the Tribes of the Clitellarinæ.

1. The scutellum without spines. *Abavini.*
   The scutellum with spines. 2.
2. The scutellum with two spines. *Clitellariini.*
   The scutellum with four or more spines. *Antissini.*

Tribe Clitellariini.

Key to the Genera of the Clitellariini.

1. The thorax with a stout spine on each side; the antennæ with a long dense fringed style. *Negritomyia.*
   The thorax without such spines; the antennæ without a fringed style. 2.
2. The antennæ with an arista; the posterior legs with the first joint of the tarsi longer than the tibiæ. *Geranopus.*
   The antennæ without an arista. 3.

3. The antennæ very long and slender, about five times the length of the head. *Elissoma.*
The antennæ not slender, about twice the length of the head. *Ophiodesma.*

Genus Negritomyia, Bigot.

Nigritomyia, Bigot, Ann. Soc. Ent. France (5) vii., Bull. 1877, p. lxxiv.

Negritomyia, Bigot, Ann. Soc. Ent. France (5) ix., 1879, p. 190. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 82.

(For further references see Kertesz, Cat. Dipt. iii., 1908, p. 16.)

Type.—*Ephippium maculipennis*, Macquart. . Manilla.

Negritomyia albitarsis, Bigot.

Ephippium albitarsis, Bigot, Ann. Soc. Ent. France (5) ix., 1879, p. 207. *Id.*, Froggatt, P.L.S. N.S.W., xxi., 1896, p. 84, Pl. ix., figs. 12-13. *Id.*, Froggatt, Australian Insects, 1907, p. 293.

Negritomyia albitarsis, White, P.L.S. N.S.W., xli., 1916, p. 83. Text fig. 4. *Id.*, Hill, P.L.S. N.S.W., xliv., 1919, p. 452. Text fig. 2.

Hab.—This is a common species from the northern parts of Australia and from New Guinea. There are seven specimens in the Macleay Museum from Queensland.

Genus Geranopus, White.

Geranopus, White, P.L.S. N.S.W., xli., 1916, p. 84.

Type.—*G. purpuratus*, White. ... ... Victoria.

Geranopus purpuratus, White.

Geranopus purpuratus, White, P.L.S. N.S.W., xli., 1916, p. 85. Text figs. 5 and 6.

Genus Ellissoma, White.

Elissoma, White, P.L.S. N.S.W., xli., 1916, p. 86.

Type.—*Elissoma lauta*, White. ... ... Victoria.

Elissoma lauta, White.

Elissoma lauta, White, P.L.S. N.S.W., xli., 1916, p. 87.

Genus Ophiodesma, White.

Ophiodesma, White, P.L.S. N.S.W., xli., 1916, p. 88.

Type.—*Odontomyia flavipalpis*, Macquart.
... ... New Holland.

Ophiodesma flavipalpis, Macquart.

Pl. VIII., fig. 1.

Odontomyia flavipalpis, Macquart, Dipt. Exot., suppl. 4, 1850, p. 49.

Ophiodesma flavipalpis, White, P.L.S. N.S.W., xli., 1916, p. 89. Text fig. 7.

Hab.—Eleven specimens in the Macleay Museum are labelled from Queensland, New South Wales, and Western Australia; the species has already been recorded from Victoria, and therefore it is probable that it will be found throughout the whole of the mainland of Australia. Two specimens, one of each sex, were taken at Blackheath, New South Wales, during November, 1919.

Tribe Abavini.

Genus Anacanthella, Macquart.

Anacanthella, Macquart, Dipt. Exot., Suppl. 5, 1855, p. 38. *Id.*, Enderlein, Zool. Anzeiger, xliv., 1914, p. 23.

Id., White, P.L.S. N.S.W., xli., 1916, p. 80.

Type.—*Anacanthella splendens*, Macquart.... Adelaide.

Status.—This genus is placed in this position by Enderlein, who makes interesting though speculative remarks concerning it. No recent specimens of the species are known.

Anacanthella splendens, Macquart.

Anacanthella splendens, Macquart, Dipt. Exot., suppl. 5, 1855, p. 39, Pl. i., fig. 8. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 80.

Tribe Antissini.

Key to the Genera of the Antissini.

1. The scutellum with four or six normal spines; the male with the costa of the wings greatly inflated; the antennæ as long as the head. *Lecomyia.*
   The scutellum with six rudimentary spines; the costa of the wings normal. 2.
2. The antennæ much shorter than the head. *Antissa.*
   The antennæ twice as long as the head. *Antissella.*

Genus Lecomyia, White.

Lecogaster, White, Proc. Roy. Soc. Tasm., 1914, p. 53 (preoccupied). *Id.*, White, P.L.S. N.S.W., xli, 1916, p. 79.

Lecomyia, White, Proc. Roy. Soc. Tasm., 1916, p. 260.

Type.—*Lecogaster cærulea*, White ... ... Tasmania.

Note.—This genus is apparently well represented in Australia; there are four undescribed species as well as the two described represented in the Macleay Musum.

Key to the Species of the Genus Lecomyia.

1. The thorax blue; the scutellum normal, lying in the same plane as the thorax; the wings hyaline. *quinquecella.*

The thorax black, the scutellum upraised, not lying in the same plane as the thorax; the wings with a black spot at the middle of the costal margin. *cyanea.*

Lecomyia quinquecella, Macquart.

Beris quinquecella, Macquart, Dipt. Exot., suppl. 1, 1846, p. 47, Pl. v., fig. 2. *Id.*, Walker, List Dipt. B.M., v. suppl. 1, 1854, p. 12. *Id.*, White, Proc. Roy Soc. Tasm., 1914, p. 49. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 97.

Lecogaster cærulea, White, Proc. Roy. Soc. Tasm., 1914, p. 54. Text fig. 5. *Id.*, P.L.S. N.S.W., xli., 1916, p. 79.

Synonymy.—White placed *Beris quinquecella*, Macquart, amongst his doubtful species, but Macquart's illustration was undoubtedly intended to represent this species, as the inflation of the costa, although shown small in the drawing, leaves no doubt concerning the generic position, and the locality given is Tasmania.

Emendments:—In Macquart's description and illustrations, the scutellum is described with four spines, and correctly illustrated with eight, and the five posterior cells described are erroneously drawn as four. Allowing for these corrections, Macquart's description and drawing conform to this species.

Lecomyia cyanea, White.

Lecogaster cyanea, White, P.L.S. N.S.W., xli., 1916, p. 79. Text fig. 3.

Genus Axtissa, Walker.

Antissa, Walker, List Dipt. B.M., v. suppl. 1, 1854, p. 63. *Id.*, Brauer, Denkschr. Akad. Weiss. Wien., xliv., 1882, p. 71. *Id.*, Brauer, Offines schr., 1883, p. 7. *Id.*, Osten-Sacken, Berl. Ent. Zeit., xxvi., 1882, p. 373. *Id.*, Enderlein, Zool. Anzeiger, xliv., 1914, p. 11. *Id.*, White, P.L.S. N.S.W., 1916, p. 81.

Type.—*Antissa cuprea*, Walker ... Western Australia.

Antissa cuprea, Walker.

Clitellaria cuprea, Walker, List Dipt. B.M., iii., 1849, p. 524.

Antissa cuprea, Walker, List Dipt. B.M., v. suppl. 1, 1854, p. 63. *Id.*, Braur, Offines schr., 1883, p. 7. *Id.*, White, P.L.S. N.S.W., xli, 1916, p. 81.

Genus Antissella, Walker.

Antissella, White, Proc. Roy. Soc. Tasm., 1914, p 52. Text fig. 4. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 81.

Type.—*Beris parvidentata*, Macquart ... Tasmania.

Status.—White placed the genus *Antissella* near *Antissa*, but neither this nor *Anacanthella* has been recognised since they were described, and also the descriptions afford insufficient data to settle relationships. The three genera need further study.

Antissella parvidentata, Macquart.

Beris parvidentata, Macquart, Dipt. Exot., suppl. 4, 1894, p. 40, Pl. iii., fig. 1.

Antissella parvidentata, White, Proc., Roy. Soc. Tasm., 1914, p. 52. Text fig. 4. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 81.

Subfam. Stratiomyiinæ.

Notes.—The Australian species of this subfamily are placed in one genus, and from their descriptions are liable to be considerably confused. Before new material can be dealt with much further research is needed, especially with reference to the types. The present study is based upon numerous examples with the intention of finding the limits of species and specific variation, and thus laying the basis for further study on structural rather than colour characters.

Where no structural characters have been found to separate species undoubtedly distinct, colour characters have been taken into account rather for a guide than for final conclusions. No structural characters have been found to separate *O. carinifacies*, Macquart, *O. sydneyensis*, Schiner, and some forms of *O. decipiens*, Guerin, and yet they are apparently distinct species that are found not to merge into each other when long series are examined. *O. decipiens*, Guerin, will be found to comprise a large number of variations, and although many of these at first sight appear distinct, they cannot be separated when series of considerable length are examined.

The writer's convictions of the specific value of the various descriptions will be found embodied in the synonymy and the remarks made thereon. Until the types are examined, and the suggestions made in this work are confirmed or corrected, the identification of the majority of the species will be unsatisfactory.

Genus Odontomyia, Meigen.

Eulalia, Meigen, Nov. Class. 1800, p. 21 (name not permissible). *Id.*, Kertesz, Cat. Dipt., iii., 1908, p. 62 (which see for synonymy).

Odontomyia, Meigen. Ill. Mag. f. Ins., ii., 1803, p. 265. *Id.*, White, Proc. Roy. Soc. Tasm., 1914, p. 55. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 90. *Id.*, Hardy, Proc. Roy. Soc. Tasm., 1917, p. 61.

Type.—*Odontomyia ornata*, Meigen ... ... Europe.

Characters.—The species of this genus contain a much depressed five segmented abdomen and a scutellum with two spines (aberrant specimens in which these spines are absent or deformed are rare and do not exceed one in five hundred). The antennæ have the third joint longer than the two basal joints united, and it terminates in a short style. The wings contain four posterior veins rising from the discal cell.

Key to the Species of Odontomyia.

1. The scutellar spines below (not at the apical margin of) the scutellum and inconspicuous. The antennæ have the two basal joints united nearly as long as the third. *apertanea.*

   The scutellar spines conspicuous and situated at the apical margin of the scutellum. The antennæ with the two basal joints together much shorter than the third. 2.

2. The scutellar spines very strong and curved upwards so that they have their apices pointing almost perpendicular to the abdomen. *scutellata.*

   The scutellar spines normal, their axis lying in a plane about parallel to the abdomen. 3.

3. The scutellar spines long and straight and as wide apart as in Plate VIII., fig. 4. The abdominal sidespots are large, sometimes almost confluent, generally triangular. The face always black. *laterimaculata.*

   The scutellar spines short and closer together, never wider apart than as illustrated on Pl. VIII., fig. 6. If the abdomen has side-spots they are generally small, thin, and quadrangular elongate; if the side-spots are large they are generally confluent. 4.

4. The abdomen with side-spots. 5.
The abdomen with side margins yellow or green. *decipiens.*

5. The face black, generally narrowly margined yellow. *carinifacies.*
The face yellow. *sydneyensis.*

Note.—*O. hunteri*, Macleay, and *O stricta*, Erichson, are not included in the above key; they may be distinct species or varieties, or they may be identical with any of the other species, but no specimens are to hand that can in any way be associated with their respective descriptions. The two species described by Mr. Hill have their scutellar spines inadequately described, and therefore their position in relation to the above key cannot be ascertained at present.

Odontomyia scutellata, Macquart.

Pl. VIII., fig. 2 and 3.

Odontomyia scutellata, Macquart, Dipt. Exot., suppl. 1, 1846, p. 52, Pl. v., fig. 7. *Id.*, White, Proc. Roy. Soc. Tasm., 1914, p. 59. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 91.

Stratiomyia scutellata, Walker, List Dipt. B.M., v. suppl. 1, 1854, p. 55.

Status.—No doubt can exist about the correct identification of this species. White took it just prior to the time he left Tasmania, but one specimen, in bad preservation, was in the Tasmanian Museum collection; later several isolated specimens were taken, and more recently, when more was known about their habits, a long series was obtained.

Hab.—New South Wales, Victoria, and Tasmania.

Odontomyia laterimaculata, Macquart.

Pl. VIII., fig. 4.

Odontomyia laterimaculata, Macquart, Dipt. Exot., suppl. 4, 1850, p. 49. ? *Id.*, White, Proc. Roy. Soc. Tasm., 1914, p. 58 (male only). ? *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 94 (male only).

Status.—White's identification of this species requires confirmation. White identified it as the larger of two similar species, both of which occur in Tasmania as well as on the mainland of Australia. The two species, *O. carinifacies*, Macquart, from Tasmania, and *O. laterimaculata*, Macquart, from Australia, are not to be separated by Macquart's descriptions; both are described from the male,

and the typical male of *O. carinifacies*, Macquart, as identified by White, is not represented in any recent collection from the type locality, and this suggests that White transposed the name, if indeed Macquart's species are really distinct. The key to the solution lies in the fact that White's *O. laterimaculata*, male, has the scutellar spines wider apart and longer than in those identified by White as *O. carinifacies*. An examination of the structure of Macquart's types will easily determine if White transposed the names.

The specimen identified by White as *O. laterimaculata*, female, is not the female of his male, as the species has been taken in copula on several occasions in Tasmania. On this account White's female is referred to *O. sydneyensis*, Schiner, as the description conforms to that species, nevertheless the form has not been seen by me from that State.

Hab.—Tasmania, Victoria and New South Wales.

Type.—The male specimen upon which White identified the species is in the Australian Museum.

Odontomyia carinifacies, Macquart.

Pl. VIII., fig. 5.

Odontomyia carinifacies, Macquart, Dipt. Exot. Suppl. 4, 1850, p. 51. ? *Id.*, White, Proc. Roy. Soc. Tasm., 1914, p. 57. ? *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 94.

Status.—White identified this as the smaller of two similar species, but Macquart's description is not to be separated from *O. laterimaculata*, Macquart, under which species further remarks are supplied.

The typical male of the species identified by White is not known in recent collections, but a mountain form described below as a variety is much smaller and has the male with the colour pattern similar to that of the female.

The only male that can be associated with the typical form has a distinctive colour pattern, and is described, apparently for the first time, under the second variety name below.

Odontomyia carinifacies, var. minima, var. nov.

Pl. VIII., fig. 7.

Description.—A small mountain variety of *O. carinifacies* (as identified by White) occurs on Mt. Wellington, Hobart, Tasmania, at about the altitude of 2,000ft. The males are common and the females scarce, and on two occasions specimens have been taken in copula.

The abdomen is shorter and more compact than in the typical form, and is illustrated on Pl. VIII., fig. 7, which figure was drawn from the holotype var.

Length never exceeding 8 mm., and averaging 7½ mm.

Odontomyia carinifacies, var. grandimaculata, var. nov.

Pl. VIII., fig. 6.

Status.—A male of average size, but remarkably different in colour and spots on the abdomen, taken in abundance with the typical females, is here given a special form name. It is possible that this variety represents a distinct species, but without a female of the variety or a male of the typical form it is not advisable to separate them.

Description.—The abdomen and scutellum are illustrated on Pl. VIII., fig. 6; the abdomen is black with large reddish confluent or almost confluent side-spots which are generally confluent on the extreme lateral edges. In other respects the variety is similar to the typical form, but the legs may be black or reddish, or may contain both these colours.

Length.—8-10 mm.

Hab.—Tasmania: Bream Creek, February, 1918, 36 specimens; Garden Island Creek, December, 1916, 1 specimen; Lymington, December, 1916, 3 specimens.

South Australia: Two specimens in the Macleay Museum are labelled from this State and conform to the variety.

Note.—Four stray specimens were taken at Lymington and Garden Island Creek, and later specimens were met with in large quantities at Bream Creek, where large series of the male variety and of the female typical form were taken. A second visit was made to Bream Creek for the purpose of securing a pair in copula and thus definitely ascertaining the sex relationship, but unfortunately the weather turned cloudy and the object of the trip was not attained, but a second and longer series of the two forms was taken.

Odontomyia sydneyensis, Schiner.

Odontomyia sydneyensis, Schiner, Nov. Reise, Dipt., 1868, p. 60.

? Odontomyia laterimaculata, ♀ White, Proc. Roy. Soc. Tasm., 1914, p. 58. *? Id.*, White, P.L.S. N.S.W., xli., 1916, p. 94.

Synonymy.—*O. laterimaculata*, Macquart (as identified by White), has been taken in copula on several occasions

in Tasmania, and the female has invariably a black face and front, not fulvous, and is as large as the male. A smaller specimen with a yellow face and front is not represented in many collections, but conforms to the description of *O. sydneyensis*, Schiner, and White's female record of *O. laterimaculata* probably belongs here, but doubt must be placed upon its identity with *O. sydneyensis*, Schiner, as this species is not represented from Tasmania in any collection.

Status.—This species, described by Schiner, was entirely overlooked by White, and the remark under the description given by Schiner to the effect that it seems to be related to *O. laterimaculata*, Macquart, suggests that the *O. carinifacies* of White is the true *O. laterimaculata* of Macquart. Until the status of each of these various species is inquired into and established by examination of the type material the determination of the species of the *Odontomyia* in Australia will remain unsatisfactory.

Hab.—New South Wales, Sydney.

Odontomyia decipiens, Guerin.

Pl. VIII., fig. 8 and 9.

Oxycera decipiens, Guerin, Voy. Coq. zool. 2, ii., 1830, p. 291.

Hermione decipiens, Kertesz, Cat. Dipt. iii., 1908, p. 33.

Odontomyia regisgeorgii, Macquart, Dipt. Exot. i., 1, 1838, p. 186. *Id.*, White, P.L.S. N.S.W., xli., 1916, pp. 90 and 100.

Stratiomys regisgeorgii, Walker, List. Dipt. B.M., v. suppl. 1, 1854, p. 56.

Odontomyia carinata, Macquart, Dipt. Exot., suppl. 1, 1846, p. 52. *Id.*, White, Proc. Roy. Soc. Tasm., 1914, p. 59; and 1916, p. 260. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 90.

Stratiomys carinata, Walker, List. Dipt. B.M., v. suppl. 1, 1854, pp. 56 and 312.

Odontomyia stylata, Macquart, Dipt. Exot., suppl. 2, 1847, p. 39; and suppl. 4, 1850, p. 52. *Id.*, Froggatt, Australian Insects, 1907, p. 294. *Id.*, White, Proc. Roy. Soc. Tasm., 1914, p. 56. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 90.

Stratiomys stylata, Walker, List. Dipt. B.M., v. suppl. 1, 1854, p. 56.

Odontomyia ialemus, Walker, List Dipt. B.M., iii., 1849, p. 535. *Id.*, Bigot, Ann. Soc. Ent. France (5), ix., 1879, p. 186. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 90.

Stratiomys ialemus, Walker, List. Dipt. B.M., v. suppl. 1, 1854, pp. 54 and 312.

Odontomyia amyris, Walker, List. Dipt. B.M., iii., 1849, p. 535. *Id.*, White, Proc. Roy. Soc. Tasm., 1914, p. 56. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 91. *Id.*, Hardy, Proc. Roy. Soc. Tasm., 1917, p. 62.

Odontomyia subdentata, Macquart, Dipt. Exot., suppl. 4, 1850, p. 49. *Id.*, White, Proc. Roy. Soc. Tasm., 1916, p. 260. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 92. *Id.*, Hardy, Proc. Roy. Soc. Tasm., 1917, p. 62.

Odontomyia rufifacies, Macquart, Dipt. Exot., suppl. 4, 1850, p. 51. *Id.*, White, Proc. Roy. Soc. Tasm., 1914, pp. 55, 56, and 74. *Id.*, White, P.L.S. N.S.W., 1916, p. 90.

Odontomyia marginella, Macquart, Dipt. Exot., suppl. 4, 1850, p. 52. *Id.*, White, Proc. Roy. Soc. Tasm., 1914, p. 57; and 1916, p. 260. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 93.

Odontomyia annulipes, Macquart, Dipt. Exot., suppl. 4, 1850, p. 52. *Id.*, White, P.L.S. N.S.W., xli., 1916, pp. 90 and 92.

Odontomyia picea, Walker, Ins. Saund. Dipt. i., 1850, p. 78. *Id.*, White, P.L.S. N.S.W., xli., 1916, pp. 90 and 100.

Stratiomys picea, Walker, List. Dipt. B.M., v. suppl. 1, 1854, p. 55.

Odontomyia kirchneri, Jaennicke, Abh. Senck. Nat. Ges., vi., 1867, p. 323.

Odontomyia pectoralis, Thomson, Eug. Resa, Dipt., 1869, p. 455.

Synonymy.—The above synonymy includes all descriptions that come within the probable variation of the common and widely dispersed species of *Odontomyia* previously known as *O. amyris*, Walker. When the types are examined together with a long series of new specimens,

this long list may be found to contain more than one species.

The scutellar spines of this species are identical with those of *O. carinifacies*, Macquart, and *O. sydneyensis*, Schiner, in the larger specimens, but smaller and distinctive spines are to be found in small specimens, and these range in size to normal spines, making it impossible to form specific differences on this character.

Traces of a tibial ring, often met with in other species, appear rare in *O. decipiens*, Guerin, and no value can be placed on this or the face colouration for identification purposes.

Guerin's description of *O. decipiens* is typical of the male described by White as *O. amyris*, Walker. There can be little doubt that it is correctly identified.

O. regisgeorgii, Macquart, is described from a mutilated specimen, and probably belongs here.

O. subdentata, Macquart, probably belongs here, and White's record for Tasmania certainly belongs here, but a specimen with the black carina described by Macquart is not known in any recent collection.

O. rufifacies, Macquart, undoubtedly belongs here.

O. marginella, Macquart, reads like that of *O. opertanea*, White, and differs chiefly in the underside of the abdomen and the legs. The black face makes it somewhat doubtful if the species is correctly placed here, but the "Thorax with light green reflections and yellow pile" and the "Scutellum with little spines" prevent it being identified with any of the other species known.

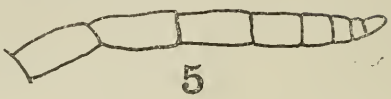
O. annulipes, Macquart, is distinctive in the two sexes, the male (like *O. marginella*, Macquart) reads similar to White's *O. opertanea*, and indeed may be identical with it, but the female is referable to the form described under the name *O. amyris*, Walker, by myself in 1917.

O. picea, Walker, apparently belongs here. White stated that the type in the British Museum is in too bad a condition for determination.

O. kerchneri, Jaennicke, and *O. pectoralis*, Thomson, were overlooked by White. Their descriptions conform to that of *O. decipiens*, Guerin.

Odontomyia opertanea, White.

Text figs. 5, 6, and 7.



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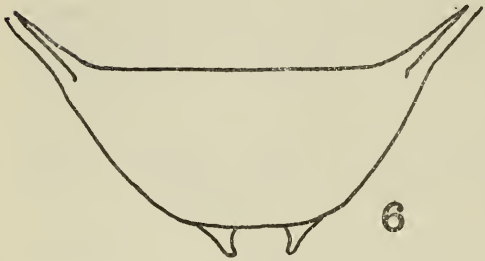

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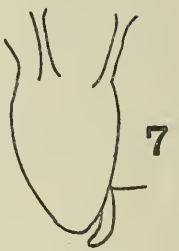

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Odontomyia opertanea, White, P.L.S. N.S.W., xli., 1916, p. 93. *Id.*, Hardy, Proc. Roy. Soc. Tasm., 1917, p. 62.

Status.—I am indebted to Mr. C. E. Cole for the loan of a specimen of this species from Ringwood, Victoria, and this is identical with the Tasmanian specimens recorded in 1917.

Description.—The following description is taken from the Tasmanian specimens, and is supplementary to White's description :—

Female. The antennæ are longer than in the other Australian species; the two basal joints are equal, and together are almost as long as the third. The scutellar spines are small, inconspicuous, and placed under the scutellum instead of on the apical border.

It is a black species with slight tracings of golden tomentum on the head and the thorax, a small yellowish area round the oral opening, the legs and wing veins yellowish, the abdomen green ventrally, and dorsally bordered very narrowly green, which colour shows signs of turning yellow in places, in addition to which there is a pair of very small lateral spots confluent with the border on the 2nd, 3rd and 4th segments, and the apex of the halteres green.

Length.—7-8.5 mm.

Hab.—Tasmania: Cradle Mountain, two females, 17th January, 1917. Victoria: Ringwood, one female. New South Wales: Blue Mountains, one female in the Macleay

Museum. Western Australia: King George Sound, two females in the Macleay Museum.

Odontomyia pallida, Hill.

Odontomyia pallida, Hill, P.L.S. N.S.W., xliv., 1919, p. 456. Text figs. 4 a-b.

Status.—It is impossible without a proper description of the scutellar spines to ascertain if the relationship of this species is near *O. decipiens*, Guerin, which seems probable, as there is nothing in the description to separate it from that variable species.

Odontomyia obscura, Hill.

Odontomyia obscura, Hill, P.L.S. N.S.W., xliv., 1919, p. 457. Text fig. 5 a-b.

Status.—The illustration of this species conforms to *O. laterimaculata*, Macquart, and indeed the description reads remarkably similar to a variation of the same, but differs in some colour markings.

It is possible that this may be the long missing *O. hunteri*, Macleay, which probably came from somewhere on the northern coast of Australia, and also appears to conform to *O. laterimaculata*, Macquart.

Odontomyia hunteri, Macleay.

Stratiomys hunteri, Macleay, in King's Narr. Surv. Austr. ii., 1827, p. 467.

Odontomyia hunteri, White, P.L.S. N.S.W., xli., 1916, p. 92.

Status.—The type of this species apparently cannot be traced. A specimen corresponding to the description is not to be found in the Australian Museum nor the Macleay Museum, and it is advisable to hold over the identification until more material is available.

It could be *O. laterimaculata*, Macquart (as identified by White), which sometimes has only two basal pairs of spots present. White included the reference under his *O. amyris*, Walker, now *O. decipiens*, Guerin, stating that a rare form has two pairs of spots, but as no special colour is given for the face in the original description this would probably be black and not yellow.

The description of *O. obscura*, Hill, also conforms to the *O. laterimaculata* variety referred to above, and as Macleay's species probably came from somewhere on the northern coast of Australia it is possible that *O. obscura*, Hill, belongs here.

Odontomyia stricta, Erichson.

Odontomyia stricta, Erichson, Arch. f. Naturf., viii., i., 1842, p. 272. *Id.*, White, P.L.S. N.S.W., xli., 1916, pp. 90 and 100.

Stratiomys stricta, Walker, List. Dipt. B.M., v. suppl. 1, 1854, p. 55.

Status.—This description appears confused, and no specimen is known to agree with it. Possibly the description was taken from more than one species, which would account for the apparent mixture of characters.

Stratiomyia badius, Walker.

Stratiomys badius, Walker, List. Dipt. B.M., iii., 1849, p. 529; and iv., 1849, p. 1157. *Id.*, White, P.L.S. N.S.W., xli., 1916, p. 90 and 100.

Hab.—Walker first gave New Holland as the locality, and then changed it to New Hudson. This species is cancelled from the Australian list.

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EXPLANATION OF PLATE.

Fig. 1. Scutellum of *Ophiodesma flavipalpis*, Macquart.

Fig. 2. Scutellum of *Odontomyia scutellata*, Macquart, dorsal view.

Fig. 3. Scutellum of *Odontomyia scutellata*, Macquart, lateral view.

Fig. 4. Scutellum of *Odontomyia laterimaculata*, Macquart.

Fig. 5. Scutellum of *Odontomyia carinifacies*, Macquart, ♀ typical form.

Fig. 6. Scutellum of *Odontomyia carinifacies* var. *grandimaculata*, *var. nov.*

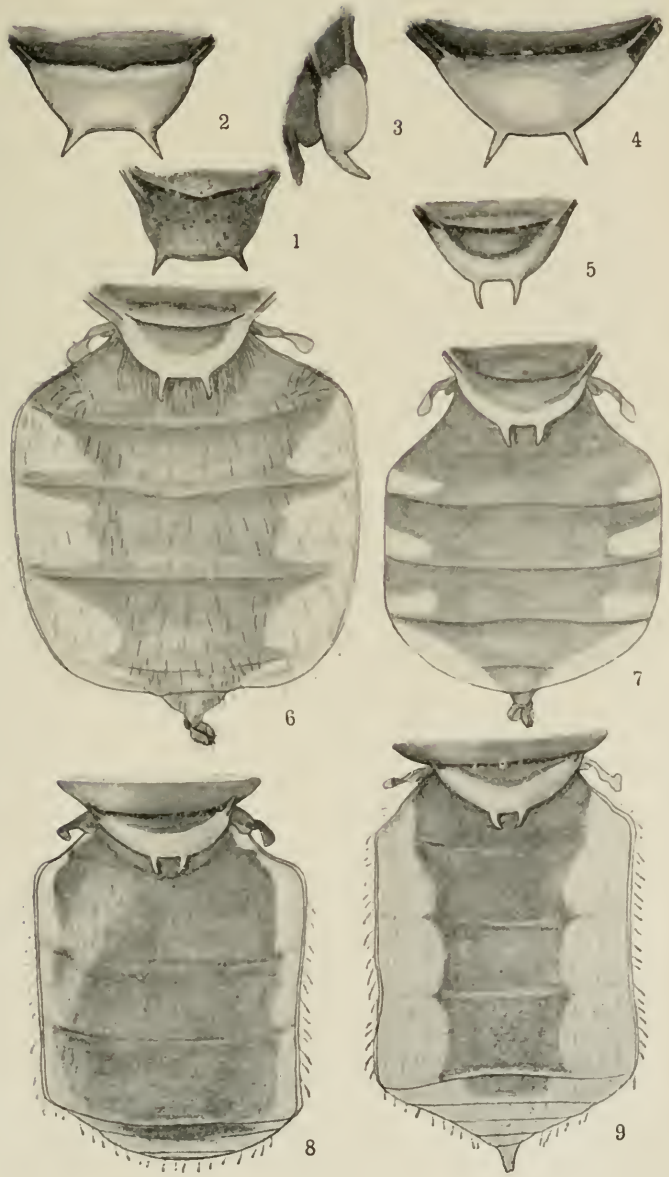
Fig. 6. Abdomen and scutellum of *Odontomyia carinifacies* var. *grandimaculata*, *var. nov.*

Fig. 7. Abdomen and scutellum of *Odontomyia carinifacies* var. *minima*, *var. nov.*

Fig. 8. Abdomen and scutellum of *Odontomyia decipiens*, Guerin, drawn from a small specimen.

Fig. 9. Abdomen and scutellum of *Odontomyia decipiens*, Guerin, drawn from a second small specimen.

Note.—All the above illustrations were drawn to the same scale.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A REVISED CENSUS OF THE TASMANIAN FLUVIATILE MOLLUSCA.

By W. L. May.

Plates IX.-XII.

(Read 12th July, 1920.)

On entering on a revision of the Tasmanian freshwater molluscs, the question naturally arises why should this be necessary, seeing the great amount of attention that has been given to this subject by a number of distinguished naturalists. The truth is that much overlapping has occurred in previous work, creating many synonyms, partly through ignorance, or uncertainty as to what previously described species really were, as they were usually not figured. Again, too much stress was laid on small variation in the erection of species, which variation proves to be individual, and not specific.

The earliest naturalists who touched this fauna appear to be Quoy and Gaimard, who in the Zoology of the Astrolabe, 1835, describe and figure *Paludina nigra* from D'Entrecasteaux Channel. Bourguegnat appears next by describing in Proc. Zool. Soc., 1854, our large freshwater limpet *Ancylastrum*. Reeve, in the Conch. Icon., 1857, described *Littorina paludinella*, subsequently described by Tenison-Woods as *Ampullaria tasmanica*, and now placed in the genus *Petterdiana*. Sowerby also in the Conch. Icon. described seven species of Physa, mostly sent him by Legrand; several of these species cannot be maintained. His *P. vandiemenensis* is almost certainly exotic, it is a large, conspicuous form, that has never been taken again, and was probably sent by Ronald Gunn, who is known to have made similar mistakes with a number of marine shells. The figure in Conch. Icon. looks very like some of the New Zealand forms. Von Martens in 1858 described *Hydrobia tasmanica*; this species was not identified by local workers, and consequently it was twice redescribed. Hedley P.L.S. N.S.W. for 1913 published a figure of *Amnicola diemense* Frauenfeld, which appears to be the same as Von Martens' figure of *H. tasmanica*. Frauenfeld also described, in 1863, *Hydrobia gunnii*, another species not recognised by local workers, and it has been several times redescribed. Hedley op. cit. gives a figure from the probable type in the

British Museum, from which it can be easily identified. Tenison-Woods was the first to work at these forms on the spot, and had a large amount of material placed in his hands by Legrand. Considering this naturalist's reputation, and opportunities, it is extraordinary how little value can be set on his work. Of 24 species of fluviatile shells described, only about six can be maintained as distinct species, but he must receive credit for partly admitting his errors, for when dealing with *Bythinella nigra* in these proceedings for 1879, pp. 71-72, he unites with it four of his supposed species. Of his four species of Lymnæa, *L. tasmanica* is admitted by himself, Proc. Roy. Soc. Tas., 1878, p. 72, to be founded on the introduced *L. peregra*, and the three others are probably variants of one native species (see Petterd, Journ. Conch. ii., p. 81). His six species of Physa all become sunk in synonymy. Fortunately a type series of these was mounted and placed in the Tasmanian Museum, Hobart. Many of these are broken, and some quite destroyed; of the four species and two varieties that remain I have prepared figures for this paper. Of *P. tasmanica*, one perfect specimen remains on the card, it seems conspecific with *P. pyramidata* Sowerby; var. a., the single specimen seems scarcely adult, it appears to equal *P. gibbosa* Gould; var. b., of five specimens mounted, one is the same as var. a.; probably the others are the same also, but in a more adult state. *P. ciliata*, four specimens, some rather broken; two are short spired, and practically identical with the last; two are long spired, resembling the next. *P. legrandi*, one large specimen, thin, and probably not quite adult, probably is a rather stout form of *P. pyramidata*. *P. huonensis*, four specimens have been mounted, but all are destroyed; Petterd, who probably saw the types, considered it equalled *tasmanica*. *P. huonicola*—no trace of this species seen, but the description would seem to bring it under *pyramidata*. *P. tasmanicola*, eight specimens have been originally mounted, of which one remains perfect. (Another specimen remaining is *Potamopyrgus tasmanica*). I consider this species undoubtedly a juvenile of *pyramidata*.

Our author was not more fortunate in dealing with the small Amnicola-like species in our streams. Three of his species are synonyms of *P. nigra*, and it is difficult to see with respect to two of them, viz., *B. legrandi* and *tasmanica*, how he could see any difference from *nigra*, or from one another. The same remarks apply to two other species, which become united to *P. gunnii*. Type series of these were also presented to the Museum, and

enough remained to enable a satisfactory identification and figure to be made. Two Pisidium and one Cyclas were also described, and *Valvata tasmanica*, now placed in Petterdiana. A very unsatisfactory feature of this description is that it is printed on a slip attached to page 82, P. and P. Royal Society, Tas., for 1875, immediately below *Cyclas tasmanica*; this is missing from the copy in the Royal Society Library, and may be from others. It may therefore be well to reprint the English portion of the original description, which is as follows:—

"Shell minute, globosely turbinate, deeply and widely umbilicate, pale horny, spotted with a blackish epidermis, rather solid, semi-pellucid; whorls 4, rounded, faintly undulately striate, subcanaliculate at the sutures; aperture semi-lunate, sub-reflexed, posteriorly angulate; inner lip straight and thin; umbilicus margined. Operculum horny, oval and subspiral. Long. 1, Lat. 1, millimeters."

W. F. Petterd, who is so well and favourably known for his work on the Tasmanian land shells, also gave considerable attention to the freshwater forms. He gives a very useful list of the species as then known in the Journ. Conch. ii., 1879, p. 80, with comments and some corrections. In his Contributions for a systematic catalogue of Aquatic shells in P. and P. Roy. Soc. Tas. for 1888, he dealt more thoroughly and completely with this group than any other worker; and at the same time described ten new species and several varieties, and published with the paper a large number of figures; many of these, however, especially of the smaller species, are very roughly executed, and are of little value for identification. Most of his types are now in the Launceston Museum, and I had an opportunity before they were placed there of examining them carefully, and figuring most. Of his two species of Lymnæa, *L. lutosa* is in my opinion only one of the common forms of *L. peregra* introduced from Europe. His *Potamopyrgus woodsi* equals *P. tasmanica* von Martens; his *Assiminia bicincta* is conspecific with *A. tasmanica*, Tenison-Woods, and his two minute species, *P. smithii*, and *P. dyeriana*, are somewhat doubtfully distinct from *P. gunnii*, of which they may be micromorphs.

Finally, R. M. Johnston, P. and P. Roy. Soc. Tas. for 1879, described *Gundlachia petterdi*, and *Ancylus woodsi*, the latter being the undeveloped form of the former, also an *Amnicola* and two *Planorbis*. Op. cit. for 1888, p. 84, appear critical observations on recent contributions to our knowledge of the Freshwater shells of Tasmania,

which are interesting, and accompanied by four plates of figures, tolerably well executed and numbered, but strangely he has omitted to provide an index to the numbers, so that identification is somewhat difficult. On page 95 of the same volume is a paper on the variability of our Tasmanian Unio, with a folding plate. Op. cit. for 1890 he published a list of the whole of the Tasmanian mollusca, and in dealing with *Physa* takes the drastic step of including all the species as synonyms of *P. nitida*, Sowerby, which is really a council of despair, although he was no doubt partly justified in so doing. He also lumps all the Planorbis together, which is unfortunate.

LIST OF SPECIES.

Family *Cycladidæ*.

Sphærium, Scopoli, Intra. ad. Hist. Nat. 1777, p. 397.

1. *macgillivrayi*, Smith, Pro. Linn. Soc., 1881, p. 305, pl. 7, f. 32. Hab.—Great Lake, Waratah, Flinders Island.
2. *tasmanicum*, Ten-Woods, Cyclas, P. and P. Roy. Soc. Tas., 1875, p. 82. Hab. East Coast, near Swansea, type; near Hobart, also Maria Island (Petterd); differs from the last, in being less round, and with more prominent umbos. Pl. IX., f. 1.

Pisidium, Pfeiffer, Land, Suggn. Moll. Deutsch, 1875, p. 82.

3. *dulvertonensis*, Ten.-Woods, P. and P. Roy. Soc., Tasm. 1875, p. 82. Type in Tasmanian Museum, Hobart. Hab. Lake Dulverton. Pl. IX., f. 2.
4. *tasmanicum*, Ten.-Woods, P. and P. Roy. Soc., Tasm. 1875, p. 82. Types in Tasmanian Museum, Hobart. Hab. Generally distributed. Pl. IX., f. 3.

Family *Unionidæ*.

Diplodon, Spix, Test. Fluv.

5. *australis*, Lamarck, Unio, Bras. 1827, p. 33; Var. legrandi Petterd, P. and P. Roy. Soc. Tasm., 1889, p. 81. Johnston, op. cit., p. 95, two plates; Stimpson, Pro. Nat. Mus., Smithsonian Inst., xxiii., 1900, p. 891.
6. *mortonicus*, Reeve, Unio, Conch. Icon. XVI., 1865, f. 118. Lea, Syn., 1870, p. 43. Stimpson, op. cit. Hab. It is remarkable that the genus in Tasmania is entirely confined to rivers flowing into Bass Strait.

Family *Limnæidæ*.

Amphipeplea, Nilsson Hist. Moll. Succ., 1822, p. 58.

7. *huonensis*, Ten.-Woods, Limnæa, P. and P. Roy. Soc. Tasm., 1875, p. 71 = *hobartonensis*, Ten.-Woods, op. cit. = *launcestonensis*, Ten.-Woods, op. cit., Petterd Journ. Conch. ii., 1879, p. 81; Proc. Roy. Soc., Tasm. for 1888, p. 65, pl. 2, f. 11. Tate, Proc. Roy. Soc. Tasm., 1884, p. 214; Petterd, op. cit. gives reasons for the above synonymy; Ten.-Woods P. and P. Roy. Soc. Tas., 1878, p. 72, says *hobartonensis* = *L. peregra*. Nelson, Journ. Conch. ii., 1879, says the same.

Limnæa, Lamarck, Mem. Soc. Nat. Hist., 1799, p. 75.

8. *gunnii*, Petterd, P. and P. Roy. Soc. Tas., 1888, p. 66, pl. 2, f. 10. Hab. South Esk River, near Launceston. The author remarks that the animal at once separates it from the last species.

9. *subaquatilis*, Tate, var. neglecta, Petterd op. cit. p. 66, Pl. 2 f. 13. Hab.—In Tea Tree swamp, near Launceston.

Bullinus, Oken, Lehrb., 1815, p. 303.

10. *apertus*, Sowerby, Physa, Conch. Icon. Pl. 11, f. 88, a.b. Hab. Creeks between Hamilton and New Norfolk, Tasmania, also the vicinity of Launceston and the Great Lake. Typically, very rounded in outline, but variants bring it sensibly near the shorter forms of *pyramidata*.

11. *gibbosus*, Gould, Physa, Proc. Boston Nat. Hist. ii., 1847, p. 214, Sowerby, Conch. Icon, f. 27. Smith, Journ. Linn. Soc. XVI., 1881, p. 278, pl. 6, f. 3-4 ? = *nitida*, Sowerby, op. cit. pl. 12, f. 89 = *tasmanica*, var. a. Ten.-Woods, P. and P. Roy. Soc., Tas, 1875, p. 75, Pl. IX., fig. 4 = *tasmanica var. b.* Ten.-Woods, op. cit. Pl. IX., f. 5. These varieties are probably *gibbosus* in a rather juvenile state = *ciliata*, Ten.-Woods, op. cit. p. 75, of the four specimens mounted on the type card, two seem to be of this species, and two, Pl. IX., f. 6, may possibly be juvenile of the next species. Hab. widely distributed, but overlooked or attributed to other species, near Waratah, Bruny Island, etc.

12. *mamillatus*, Sowerby, *Physa*, Conch. Icon. pl. 12, f. 90. ? = *ciliata*, Ten. Woods, pars. This species is separated from *P. attenuatus*, Sowerby, from the same locality, by its remarkable mucronate apex, but intermediaries may yet be found. Hab. Lake Dulverton, near Oatlands.

13. *pyramidatus*, Sowerby, Physa, Conch. Icon, f. 62. Smith, Journ. Linn. Soc. XVI., 1881, p. 282, pl. 6, f. 17.

=*eburnea*, Sowerby, op. cit. f. 89.

=*attenuata*, Sowerby, op. cit. f. 94.

=*bruniensis*, Sowerby, op. cit. f. 99, juvenile.

=*huonensis*, Ten. Woods, Pro. Roy. Soc. Tasm. for 1875, p. 74.

=*legrandi*, Ten. Woods, op. cit. Pl. IX., f. 7.

=*tasmanica*, Ten. Woods, op. cit. Pl. IX., f. 8.

=*tasmanicola*, Ten. Woods, op. cit. p. 75, juvenile, Pl. IX., f. 9.

=?*huonicola*, Ten. Woods, op. cit.

Johnston, P. and P. Roy. Soc. Tas., 1890, p. 145.

The common and variable form, universally distributed, differing greatly in colour, size, and length of spire. The type of *pyramidatus*, was from Flinders Island, and Smith's figure agrees fairly well with our ordinary specimens as *eburnea* and *tasmanica*; *bruniensis*, and *tasmanicola*, I consider undoubtedly juvenile, *attenuata* may possibly be a variant of *mamillatus*.

Family *Planorbidiæ*.

Planorbis, Geoffroy, Traite, Coq. 1767, p. 12.

14. *atkinsoni*, Johnston, P. and P. Roy. Soc. Tas., 1878, p. 26. Petterd, op. cit. for 1888, p. 68, pl. 2, f. 6-7. Whorls more rapidly increasing, and more strongly keeled, than the next, but closely allied. Hab. South Esk River, from Avoca to Launceston. Pl. X., f. 10.

15. *meridionalis*, Brazier, P.L.S. N.S.W., 1875. Petterd, P. and P. Roy. Soc. Tas., 1888, p. 67, Pl. 1, f. 4-6. Hab. Upper Ouse River, type; Great Lake. Pl. X., f. 11.

16. *scottiana*, Johnston, P. and P. Roy. Soc. Tas., 1878, p. 26. op. cit. for 1888, pl. 6, f. 2 a.b.c. Hab. South Esk River. Very distinct from our other species. Pl. X., f. 12.

17. *tasmanicus*, Ten. Woods, P. and P. Roy. Soc. Tas., 1875, p. 79. Petterd, op. cit. p. 68, pl. 2, f. 8-9. Hab. Swamps at Circular Head. Pl. X., f. 13, 14.

Segmentina, Flemming, Hist. Brit. Animals, 1838, p. 279.

18. *victoriæ*, Smith, Journ. Linn. Soc., XVI, 1881, p. 296, pl. 7, f. 11-13. May, P. and P. Roy. Soc. Tas. 1919, p. 69. Hab. Lake Tiberias.

Family *Ancylidæ*.

Ancylus, Geoffroy, Trait, Coq. 1767, p. 13.

19. *mariæ*, Petterd, P. and P. Roy. Soc. Tas., 1900, p. 1. Hab. Maria Island, possibly a variant of the next.

20. *tasmanicus*, Tenison Woods, P. and P. Roy. Soc. Tas., 1875, p. 70. Hab. Common in streams near Hobart. Pl. X., f. 15-16.

Ancylastrum, Bourguignat, Jour. de Conch. IV., 1853, p. 63 and 170.

21. *cumingianum*, Bourguignat, Proc. Zool. Soc., 1854, p. 91. Hedley, Pro. Malac. Soc. 1, 1894, p. 118. Ten. Woods, P. and P. Roy. Soc., Tas., 1875, p. 69. Hab. Streams above New Norfolk, also Great Lake. Var. *irvina* Petterd, P. and P. Roy. Soc. Tas., 1887, p. 40, pl. 41. Hab. Great Lake.

Gundlachia, Pfeiffer, Zeits. Malak, VII., 1849, p. 98.

22. *petterdi*, Johnston, P. and P. Roy. Soc. Tas., 1878, p. 23, 1884, p. 216, for 1888, figs. 2, a.b.c. Hab. In a pool near First Basin, Launceston = *Ancylus woodsi*, Johnston, op. cit., 1888, p. 25 = *G. beddomei*, Petterd, op. cit., 1887, p. 41, pl. 44, Journ. de Conch, IV., p. 180. Johnston, op cit. for 1888, pl. facing p. 86. Hedley, P.L.S. N.S.W., 1894, pp. 905-914, pl. 24, f. 1-15. Hab. Old quarry, Brown's River-road. *woodsi* is the immature form. I feel satisfied we have only one rather variable species.

Family *Hydrobiidæ*.

Potamopyrgus, Stimpson, Am., Journ. Conch 1, 1865, p. 53.

23. *brownii*, Petterd, P. and P. Roy. Soc. Tas., 1888, p. 72, pl. 3, f. 14. Hab. Rivers on the North-East Coast. Pl. X., f. 17.

24. *dyeriana*, Petterd, Bithynia, Journ. Conch, 1879, p. 86. Hab., Long Bay. Possibly a micromorph of the next. Pl. X., f. 18.

25. *gunnii*, Frauenfeld, Hydrobia, Verh. Zool. Bot. Gesill Vienna, xiii., 1863, p. 1025, and xv., 1865, p. 526, pl. 7, 2 figs. Hedley, P.L.S. N.S.W., 1913, p. 283, pl. 17, f. 51. = *A. simsoniana*, Brazier, P.L.S. N.S.W., 1875, p. 76. = *poutrillensis*, Ten.-Woods, P. and P. Roy. Soc. Tas., 1875, p. 76; pl. XI., f. 19 = *dunrobinensis*, Ten. Woods, op. cit. p. 77. Pl. XI., f. 20. Streams, lagoons, and ponds, particularly in the South-East. I think a study of the figures cited above will support the foregoing synonymy.

26. *elongatus*, Sp. Nov. Shell narrowly elongate, colour, dull brownish black on the spire, shining light brown on the body whorl, finely axially striate, whorls 6½, much rounded, suture well impressed. Aperture roundly ovate, lip entire, backed by a distinct umbilical chink. Long. 3, Lat. 1 mill. Hab. Apsley River, near Bicheno, collected by E. Mawle. It is with some diffidence that I add another member to this over-described genus, but I cannot match the species with any of the others. It comes nearest to *P. gunnii*, but it is much longer, and narrower, with very rounded whorls. The habitat is a small isolated river on the middle East Coast. Pl. XI., f. 21.

27. *marginata*, Petterd, P. and P. Roy. Soc. Tas., 1888, p. 73, pl. 1, f. 9. Hab. Stream near Heazlewood River. Very distinct from all our other species. Pl. XI., f. 22.

28. *nigra*. Quoy and Gaim. Zool. Astrolabe, iii., 1835, p. 174, pl. 38, f. 9-12. Hab. D'Entrecasteaux Channel.

    =*B. legrandiana* and *wisemanniana*, Brazier, Proc. Zool. Soc., 1871, p. 678. Pl. XI., f. 23.

    =*B. petterdiana*, Brazier, P.L.S. N.S.W., 1, 1875, p. 19.

    =*legrandi*, Ten. Woods, P. and P. Roy. Soc. Tas., 1875, p. 76. Pl. XI., f. 24.

    =*unicarinata*, Ten. Woods, op. cit. Pl. XI., f. 25.

    =*tasmanica*, Ten. Woods, op. cit. p. 77. Pl. XI., f. 26.

    =*exigua*, Ten. Woods, op. cit. for 1878, p. 71, op. cit. 1879, p. 71-72.

    Petterd, op. cit. for 1888, p. 69-71. Widely distributed in rivers and creeks, both North and South.

29. *smithii*, Petterd, Proc. Roy. Soc. Tasm. for 1888, p. 72, pl. 1, f. 10. Hab. Rivers of the North-West, Heazlewood, Arthur, Waratah, and Castray Rivers. Perhaps only a large form of P. *dyeriana*. Pl. XI., f. 27.

30. *tasmanica*, von Martens, Hydrobia, Weig. Arch. Nat. Sci., 1, 1858, p. 185, pl. 5, f. 12=*A. diemense*, Frauenfeld, Verhandl. Zool. Bot. Ges. Wien, XV., 1865, p. 529, pl. X., 2 figs. Hedley, P.L.S. N.S.W., xxxviii., 1913, p. 284, pl. 17, f. 52=*B. dulvertonensis*, Ten. Woods, P. and P. Roy. Soc. Tas., 1875, p. 77. Pl.

XII., f. 28=*woodsi*. Petterd, op. cit. for 1888, p. 71, pl. 1, f. 12=*P. victoriæ*, Ten. Woods. Pl. XII., f. 29. I possess a copy of Martens' fig 12, and it completely justifies the above synonymy. Hab. principally in the Northern Rivers.

31. *turbinata*, Petterd, Hydrobia, P. and P. Roy. Soc. Tas., 1888, p. 77, pl. 2, f. 3. Hab. R. Styx, and George's River, East Coast. Pl. XII., f. 30.

Petterdiana, Brazier, P. and P. Roy. Soc. Tasm. for 1895, p. 105.

32. *bellii*, Petterd, Beddomeia, P. and P. Roy. Soc. Tasm. for 1888, p. 75, pl. 1, f. 7. Hab. Heazlewood, Castray and Waratah Rivers. Pl. XII., f. 31.

33. *hullii*, Petterd, Beddomeia, op cit. p. 76, pl. 1. f. 8, Hab., with the last, doubtfully distinct from *loddereæ*. Pl. XII., f. 32.

34. *launcestonensis*, Johnston, Amnicola, P. and P. Roy. Soc., Tas., 1878, p. 24. Petterd, op. cit. p. 74, pl. 1, f. 2. Hab. South Esk River. Pl. XII., f. 33. Var. *A. tumida*, Petterd. op. cit. Hab., Great Lake, a large form.

35. *loddereæ*, Petterd, Beddomeia, op. cit., p. 75, pl. 3, f. 1. Hab., Castra and Duck Rivers, N. Coast. Pl. XII., f. 34.

36. *paludinella*, Reeve, Littorina, Conch. Icon., 1857, pl. 16, f. 84=*Ampullaria tasmanica*, Ten. Woods, Proc. Roy. Soc. Tasm. for 1876. p. 117, and 1878, p. 72. *Brazieria tasmanica*, Petterd, op. cit. p. 76, pl. 1, f. 1. Johnston, P. and P. Roy. Soc. Tas., 1879, p. 24. Hedley, P.L.S. N.S.W., xxxviii. 1913, p. 283. Hab. The Wye and other tributaries of the Waratah and the Arthur Rivers. Pl. XII., f. 35.

37. *tasmanica*, Ten. Woods, *valvata*, P. and P. Roy. Soc. Tas., 1875, p. 82 (attached). Petterd, op. cit., p. 75, pl. 1, f. 11. Hab. Small stream in Gould's Country. Pl. XII., f. 36.

EXPLANATION OF PLATES.

Plates IX-XII

Fig. 1. *Sphærium tasmanicum*, Ten. Woods (Cyclas), from Petterd's specimen.

Fig. 2. *Pisidium dulvertonensis*, Ten. Woods, from type.

Fig. 3. *Pisidium tasmanicum*, Ten. Woods, from one of the type series.

Fig. 4. *Physa tasmanica*, var A. Ten. Woods, from the type.

Fig. 5. *Physa tasmanica*, var. B. Ten. Woods, from one of the type series.

Fig. 6. *Physa ciliata*, Ten. Woods, from one of the type lot.

Fig. 7. *Physa legrandi*, Ten. Woods, from the type.

Fig. 8. *Physa tasmanica*, Ten. Woods, from the type.

Fig. 9. *Physa tasmanicola*, Ten. Woods, from the type.

Fig. 10. *Planorbis atkinsoni*, Johnston, from Petterd's specimen, compared with the type series.

Fig. 11. *Planorbis meridionalis*, Brazier, from Petterd's co-type.

Fig. 12. *Planorbis scottiana*, Johnston, from Petterd's specimen compared with the type series.

Fig. 13, 14. *Planorbis tasmanicus*, Ten. Woods, from specimens compared with the type series.

Fig. 15, 16. *Ancylus tasmanicus*, Ten. Woods, from one of the type series.

Fig. 17. *Potamopyrgus brownii*, Petterd, from one of the type series.

Fig. 18. *Potamopyrgus dyeriana*, Petterd, from one of the type series.

Fig. 19. *Potamopyrgus pontvillensis*, Ten. Woods (Bythinia), from one of the type series.

Fig. 20. *Potamopyrgus dunrobinensis*, Ten. Woods (Bythinia), from one of the type series.

Fig. 21. *Potamopyrgus elongatus*, May, from the type.

Fig. 22. *Potamopyrgus marginata*, Petterd, from one of the type series.

Fig. 23. *Bythinia legrandiana*, Brazier, from Petterd's specimen.

Fig. 24. *Bythinia legrandi*, Ten. Woods, from one of the type series.

Fig. 25. *Bythinia unicarinata*, Ten. Woods, from one of the type series.

Fig. 26. *Bythinia tasmanica*, Ten. Woods, from one of the type series.

Fig. 27. *Potamopyrgus smithii*, Petterd, from one of the type series.

Fig. 28. *Bythinia dulvertonensis*, Ten. Woods, from one of the type series.

Fig. 29. *Potamopyrgus woodsi*, Petterd, from one of the type series.


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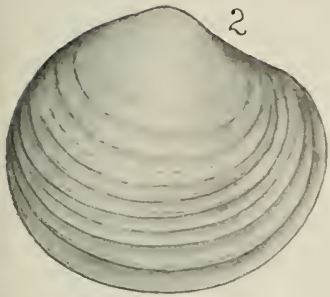
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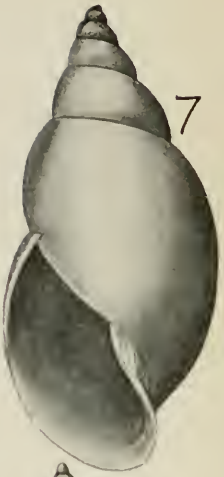
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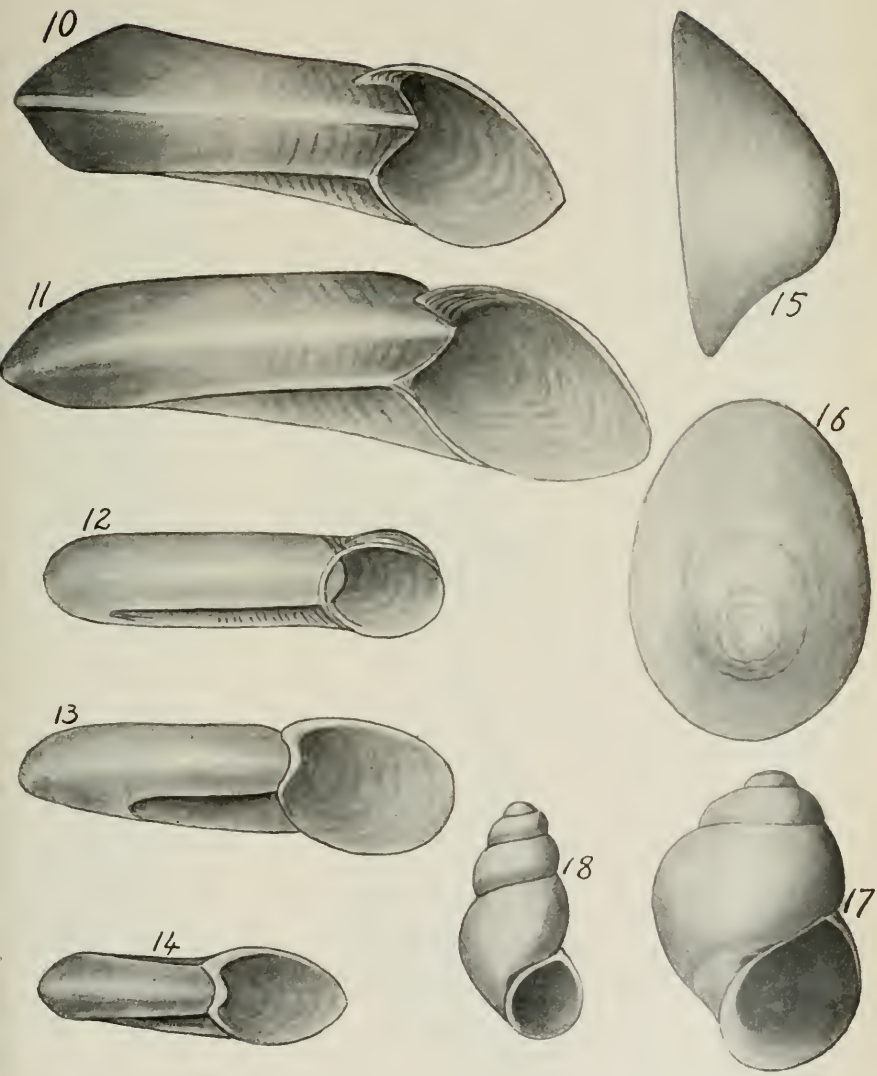
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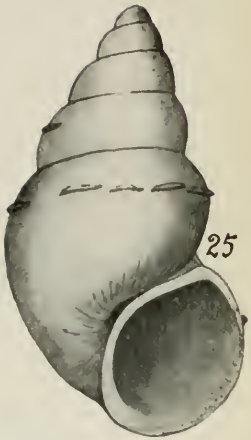
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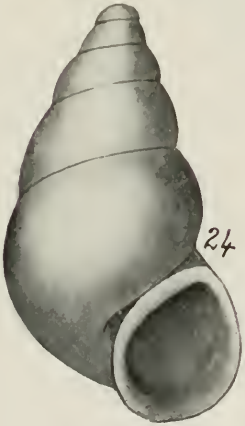
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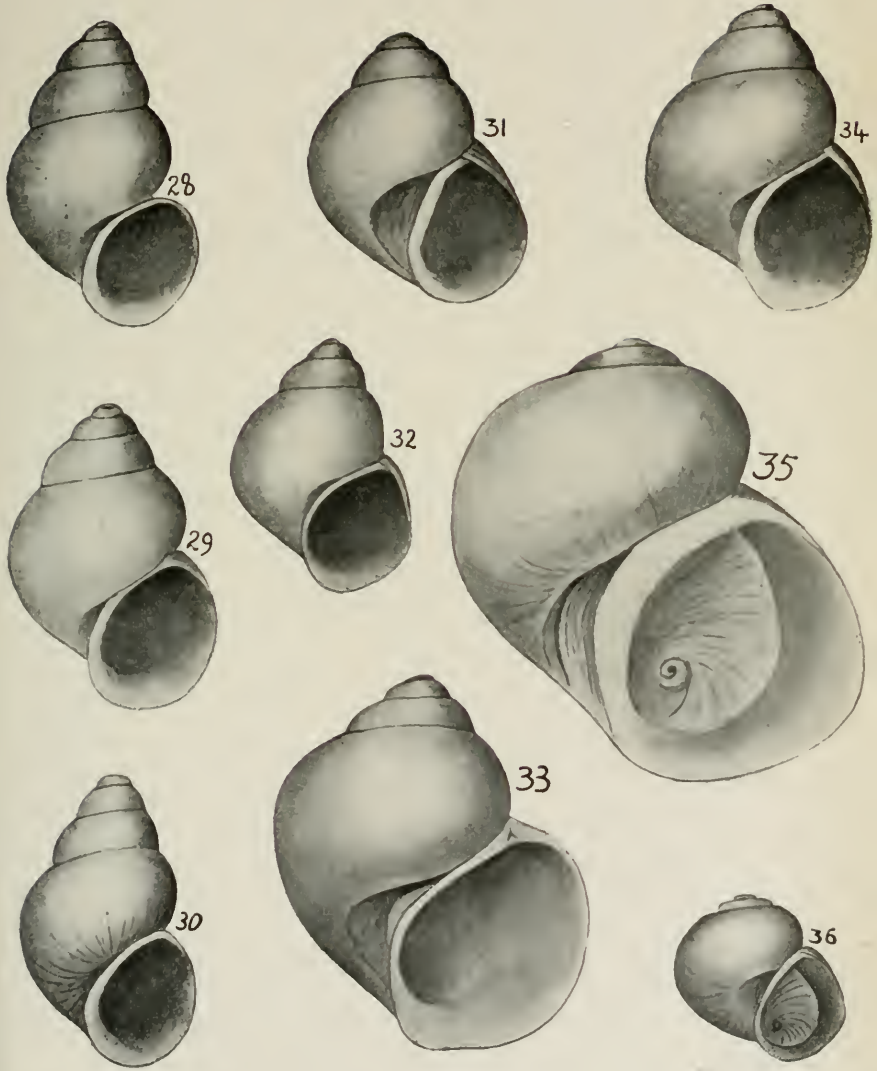
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Fig. 30. *Hydrobia turbinata*, Petterd, from one of the type series.

Fig. 31. *Beddomeia bellii*, Petterd, from specimen compared with the type.

Fig. 32. *Beddomeia hullii*, Petterd, from specimen compared with the type.

Fig. 33. *Amnicola launcestonensis*, Johnston, from Petterd's specimen.

Fig. 34. *Beddomeia loddera*, Petterd, from specimen compared with the type.

Fig. 35. *Ampullaria tasmanica*, Ten. Woods, from Petterd's specimen.

Fig. 36. *Valvata tasmanica*, Ten. Woods, specimen from type locality.

STUDIES IN TASMANIAN MAMMALS, LIVING AND EXTINCT.

Number III.

Nototherium mitchelli. *

Its evolutionary trend—the skull, and such structures as related to the nasal horn.

By
H. H. Scott (Curator of Launceston Museum)
and
Clive E. Lord (Curator of Tasmanian Museum, Hobart).

Plates XIII. - XXI.

(Read 9th August, 1920.)

INTRODUCTION.

In a previous contribution we have traced the history of the Genus *Nototherium*, and have also described the osteology of the cervical vertebræ. As a natural sequence we now desire to place on record certain data gathered from a detailed examination of the skull itself. Before proceeding further, however, it might be as well if we explained our aims as regards the work generally.

A wonderful and most interesting group of marsupial animals has died out in our immediate zoological province, and as the remains available to us are superior in point of preservation to anything obtained in other parts of Australia, we are tempted to pay more attention to phyletic than taxonomic data. If all the *Nototherian* remains in the world were collected to a single centre, many, if not most, of the accepted genera and species would be found unnecessary for their adequate display as a single scientific collection. Accordingly, we are less interested in the ultimate fate of any species than we are in the elucidation of such facts as relate the racial history, development, and extinction of the *Nototherian* stirp. The phyletic trend of the stirp we are investigating was apparently towards the production of an aggressive race, and even a super-

* The specimen described was found in the Mowbray Swamp, near Smithton, N.W. Tasmania, in 1920, by Mr. E. C. Lovell. Mr. K. M. Harrisson made an arrangement with Mr. Lovell whereby the specimen was presented to the Tasmanian Museum. Tasmanian scientific institutions have benefited considerably owing to Mr. Harrisson's interest in their welfare.

ficial study of the subject has revealed various osteological parallels, with the similar trend in ungulates, a table of which we hope to supply later on, by way of a recapitulation of the several facts that may be noted in passing. Owing to the imperfection of our knowledge respecting the larger pleistocene mammals of the Genera *Procoptodon*, *Palorchestes*, *Thylacoleo*, etc., it is at present quite impossible to say how fully this combative trend developed before racial extinction became an accomplished fact, but that such mighty creatures (all powerfully clawed), if not otherwise armed, escaped the tendency to aggression, is, to say the least of it, unlikely. A modern Forester Kangaroo (*M. giganteus*), when at bay, is a fearsome beast, and a *Palorchestes*, or a *Procoptodon*, with their extra weight of body and limb, must have been fighting units of no mean order. A little modern Wombat, when stirred up to a pitch of anger, has been seen to bite and lacerate the hand of a child in an exceedingly severe manner, causing one to wonder what a similar performance upon the part of an excited *Phascolonus* would have amounted to! The unenviable reputation of the *Cuscus* in the alleged circumstances of their predatory instincts, enlarged with a body bulk to that of *Thylacoleo*—although it might not produce the "public executioner" of former disputes, would certainly add its quota to the marsupial battlefield in an effective manner, especially when we remember that the whole construction of *Thylacoleo*, as far as we know it, indicates speed. Manifestly, until the whole history of the pleistocene giants has been worked out from associated bones, rather than—as at present—listed, and cross-listed, from isolated fragments, it will be quite impossible to do more than suggest possibilities; but, if the swamps of Tasmania continue to yield up such evidence as has come to light since the year 1910, the day of exact knowledge should not be a distant one. It has been argued that the *Diprotodon* was as harmless as a *Tapir*, but even Tapirs in a captive state have been noted to quite suddenly manifest "fits of irritation, plunging about, lunging "violently with their heads, and snapping with their "teeth"; while in a state of nature, it is said of the American Tapir—"when hard pressed it defends itself "vigorously with its teeth, inflicting terrible wounds." As the skull of the *Diprotodon*, according to the late Professor Stirling [1], is still a matter of speculation, in various parts of its osteology, it is obvious that some hitherto unsounded notes are yet to be heard before we can close the octave of that creature's story. Certainly

(1) Monograph of *Phascolonus*. Roy Soc. S. Aust., 1913, p. 177.

no man upon earth knew more of *Diprotodon* than Doctor Stirling did, so if the skull, *in toto*, was unknown to him, we can with confidence conclude that an uncrushed specimen would reveal new truths to us.

THE OSTEOLOGY OF THE NASAL PLATFORM.

That the wonderfully supported, and under-propped nasal platform of the *Nototherian* skull was indicative of a nasally implanted weapon, was first suggested by Professor D. M. S. Watson, M.Sc., of the University College, London (2). To the objection that the nasal and cervical regions of *Nototherium tasmanicum* were too weak to have sustained any serious shock, Professor Watson contended that the weapon might have taken the form of a pair of nasal bosses. With the discovery of the skull and parts of the skeleton of *Nototherium mitchelli*, all objections to the former existence of a nasal horn were immediately removed—since the more solidly built cervicals, wider and stronger nasal platform, and manifestly superior deposition of bony matter upon the nasal regions generally, spoke eloquently of the fact. The taxonomists of past days made features of the extent to which the nasal bones covered the nasal aperture, but as will now be shown, except in the most perfectly preserved crania, this character is not to be trusted, since the nasal cartilage was attached to the nasal bones in a manner wholly peculiar, and as we said in our original note, as an obvious adaptation to the special needs of the case. In *Nototherium mitchelli*, the ends of the nasal bones are 25 mm. thick, and upon either side of the middle line the thickness of this bone is first scooped out into a deep fossa, and then filled in with a bony stud, capable of movement within the fossa! A popular illustration of the result thus obtained would be found in the rotation of a bagatelle ball, in its cup-shaped socket upon the board. We can note grades of this adaptation in the following connection:—*Nototherium mitchelli* was a square mouthed animal, but, unlike the square mouthed rhinoceros of today, had front teeth and well-developed fangs. Such fangs, when in use, would need to be set free from the heavy overhanging lip (3), and as the distance between the end of the nose and the base of the horn was a short one, a fixed nasal cartilage would not have permitted of

(2) *Vide* Monograph of *Nototherium tasmanicum*, page 42, *et seq.*

(3) The extent of this lip may be gathered from the fact that the pre-alveolar extension of the tusks, from that process, to the gum line, amounts to 45 mm., practically a basal attachment for an incipient trunk.

such an action, hence the hinging of the cartilage itself. We do not imagine that any great extent of motion was thus obtainable in actual practice, but enough to give mobility to the upward pull of the ringentes muscles. In animals of the long faced type (to be defined fully later on), the nasals bent downwards, the horn was weak, and for practical purposes, but slightly developed, and so implanted as to leave the nasal cartilage freer from the stiffening effects of its contact with the nasal platform, and the origin of the lip, and accordingly the studs lost most of their motion, and may, in individual cases, have ankylosed up to the walls of their respective fossa, of which we are not without actual proof. The only other instance that we can recall in which the nasal cartilage was possibly attached to the bones by a bony stud is that of the South American *Mylodon*. In that extinct pleistocene giant, the terminal section of the united nasal bones develops a single, central, circular fossa, which, by analogy, suggests a condition similar to that found in *Nototherium*. If the stud existed in *Mylodon*—and apparently it has never been found, as is not to be wondered at if it was as loose as the studs are in the *Nototheria*—it was single and central, and not double and lateral. In Owen's Monograph upon the *Mylodon*, the fossa noted is beautifully shown [4], the appearance being exactly similar to that obtaining in *Nototherian* skulls, when the studs have dropped out. Now a fossil *Nototherian* skull, having once lost its nasal studs, would, with every mutilating movement, suffer attrition of the walls of the fossæ, until the real outline of the tips of the nasal bones would be effectively masked. Taxonomists should note this point! It is known that, irrespective of accidental rending of the horn from its platform, in modern rhinoceroses the horn itself is completely shed, and renewed every six years, and when so shed, animals frequently forget its loss and butt their tender nasal regions in attempting to horn a foe. If the horn was similarly deciduous in the *Nototheria*, they would still have their tusks available during the period of their renewal, and the extra mobility of the lips would serve a special purpose here. Our animal was just reaching the adult stage (as a mass of evidence can prove), and in the full power of its strength it had engaged in a desperate battle with some foe, lost its horn, broke the collar bone in half, shattered one mandibular tusk, and otherwise sustained minor wounds, that eventually led to its death, apparently some weeks later. The period that elapsed between the great fight and the time it actually

(4) Pl. 5, fig. 3a.

succumbed to its wounds is exactly that required to effect the amount of repair manifested by the broken clavicle, which, by estimation, is only a few weeks at the outside. A very careful examination of the skull and skeleton was made prior to removal from the matrix, especially the skull, and the conviction was formed that the horn had been lost prior to the animal's inclusion into the shallow mud of the old lake floor. Now the horn was an epidermal structure, and just what effect the chemical action of the marcasite and peaty marl would have had upon it is not easy to say, but as seemingly soft wood, in the form of roots of trees, manage to survive, and impress the matrix with their outlines, some little indication of it might have been expected had the weapon remained *in situ*. We most carefully removed all the mud with our hands from the nasal regions (without lifting the skull), and no indication of the fighting weapon rewarded our search, and accordingly we concluded that the horn had been torn from its platform prior to the animal's death. In the modern rhinoceros this also happens, in extreme cases, one instance being cited in which a rhinoceros drove its horn through the side of an elephant, tore the horn off, and both rhinoceros and elephant died.

THE NASAL HORN.

If a card of the shape shown in our illustration (fig. 1) is cut out and placed upon the nasal platform of the skull of *Nototherium mitchelli*, it will exactly cover the area that might be presumed to form the attachment surface for the base of the nasal horn. Its central portion would be cut equatorially by the naso-nasal fossa (C), and its right and left frontal aspects, by two nutrient foramina (A, B). Working backwards upon the skull, we discover that the ecto-carotid artery was immense, and prior to sending forward its maxillary branch, gave up some twigs to the vertex, as though to nourish a second, small horn, for which a frontal resting-place exists. After passing the ant-orbital canal, the internal maxillary artery ramified over the face, one portion going to supply the enormous nasal septum and cartilage generally, a second entered the nasal cavity, either in a distinct bony groove, or, in some skulls, more plexiform, over the bony roof of the nose, eventually passing upwards through the naso-nasal fossa to feed the base of the horn. While a third branch, seemingly the homologue of the *lateralis nasi*, went through the lateral groove in the nasal boss, to supply the horn with nourishment, and therefore means of repair.

It is an interesting fact that the horns of existing Rhinoceroses are strengthened and repaired along the front and fronto-lateral surfaces, to compensate for wear and tear, just as in the *Nototheria*, but apparently to a less degree, centrally, than obtained in the horned marsupials. If all the known Rhinoceros horns are passed in review, upon the question of size, ratio of base to height, as well as outline in girth, the card from the nasal platform of *Nototherium mitchelli* would nearest fit the base of an Indian Rhinoceros's horn; and if selection among such horns, upon a ratio of height to base-girth, were made, the height of the *Nototherian* horn would be nine to ten inches. As note—computed girth; deduced from available platform space, fourteen inches, average height of a horn of such girth, nine to ten inches. As some Rhinoceros horns have a distinct cingulum near the base, above which they contract in girth rapidly, this circumstance should be taken note of, also the fact that although practically adult, our *Nototherium* was still a young animal, and the nasal weapon would certainly be shorter than in an old male, who had many times shed and renewed it.

It will be convenient to give here the comparative thicknesses of the nasal bones of the two best-known *Nototherian* skulls, namely, *Nototherium mitchelli* and *Nototherium tasmanicum*, since nothing else short of a comparative examination of the actual skulls themselves will convey to the mind the extra massiveness of *Nototherium mitchelli*.

TABLE OF CALIPERED THICKNESSES OF *NOTOTHERIAN* NASAL PLATFORMS.

N. tasmanicum.		*N. mitchelli.*	
Thickness of right nasal boss	= 42 mm.	Thickness of right nasal boss	= 60 mm.
Thickness of left nasal boss	= 41 "	Thickness of left nasal boss	= 59 "
Central thickness of general nasal platform	= 21 "	Central thickness of general nasal platform	= 25 "
Thickness, at base, of nasal cartilage stud*	= 22 "	Thickness, at base, of nasal cartilage stud	= 22 "
Thickness of platform midway between the stud and the lateral nasal boss	= 7 "	Thickness of platform midway between the stud and the lateral nasal boss	= 16 "
Width of nasals *in toto*	= 138 "	Width of nasals *in toto*	= 175 "

* In this skull the right stud has fused to the nasal, and is drawn out to a thinness of 17 mm. at the tip.

The female of *N. mitchelli* (Owen's cast, and type skull of *Zygomaturus*), while exceeding all the measurements of *N. tasmanicum*, falls short of those of the assumed male in about the same proportions as usually exist between male and female skulls. Not having the actual skull to work upon, we omit various details, but the cast and a series of photographs, supplied by the Curator of the Australian Museum, are available to us, and a careful study of these leads us to formulate the above statement. As a single note, expressing the rate of reduction, we may cite the widths of the nasal platforms. In the male, the measurement is 175 mm., but in the female this suffers diminution to 150 mm. A glance at the outlines of the implantation surfaces available in the male and female skulls, as given in our figure, will also show that if a horn existed in the female (as apparently it did) it advanced more upon the nasal aperture than that of the male did. In other words, the tips of the nasals were carried nearly across the narial aperture, and the anterior surface of the horn touched the tips of the nasals. This gives an outline for the base of the horn that makes a distinct departure from that obtaining in the male. Such differences in modern Rhinoceroses might also be cited, and where the horn is long, slender, and pointed forward, the females use it to direct the young, the latter being always in advance of the mother when on the march. As long as the female skull of *Nototherium mitchelli* alone remained available for study, the existence of a horn would only have been suggested as a possibility, but the male skull from Smithton carries it forward to the cogency of a proof. Again, *Nototherium tasmanicum*, viewed as an isolated factor, that manifested an elaborately underpropped nasal platform, too weak to carry an effective fighting weapon, and no excess of cervical power, suggested nothing more than the "fighting bosses"—postulated by Professor Watson—and accordingly it was only with the acquisition of the male skull of *Nototherium mitchelli* that the stirpian homologies determined their full significance. Professor Watson's suggestion is, today, so obviously close to the truth, that it is practically a demonstration of actual fact, and we herewith record our thanks for the strong sidelight thus thrown upon an obscure palæontological point.

It will now be necessary, in order to deal with the question of sex among the *Nototheria*, to show that the type skull of *Zygomaturus* (and Owen's cast) is the female of *N. mitchelli*, and not the sex variant of *Nototherium tasmanicum*, nor is that latter the sex variant of the skull

we call the male of *N. mitchelli*—in a word, *Nototherium mitchelli*, male and female, are quite distinct from *Nototherium tasmanicum*, and as a full table of characters will be given, it is only needful here to investigate the question of the presence and absence of a parietal crest. De Vis made much of this, and it seems a good point to investigate, especially as we can appeal to Kangaroos, Wombats, and Native Bears, among existing marsupials, and to the *Diprotodons*, and the various *Nototheria*, among extinct forms. Exactly what the ancestor of the common group may have shown in the connection we cannot, of course, say, but for a working hypothesis, let us assume a more or less rounded parietal region, with an interparietal bone that formed a section of the calvarium, and divided the parietals upon the median—sagittal—suture.

How, it may be asked, does this fit in with the conditions obtaining in the animals already named?

1. In the Kangaroo, the cranium is rounded, the interparietal, in early life, appears upon the surface, separates the parietals, and throws a dart forward into the sagittal suture. Two muscular lines bound the suture, starting as closely together as 2 mm., and opening outwards to 8 mm. at the frontal suture. At maturity this becomes a bony strip-like platform, slightly elevated above the parietals and frontals.
2. The Wombat starts life with a rounded cranium, a very small interparietal, that early fuses with the supra-occipital, two muscular lines (26 mm. apart, at the occiput, and 35 mm., at the frontal suture) outline the future platform, that characterises the Wombat's skull at maturity.
3. In the Native Bear, the interparietal early fuses with the supra-occipital, but continues to carry forward its full complement of bony matter, dividing the parietals, by its shield-shaped interposition, to a distance of 8 mm., for the first 18 mm. of their journey forward, upon the roof of the skull. Thence forward to the frontals, the parietals develop a sagittal crest (at maturity) and ancestoral bounding lines in early life.

In all these, the platform, or the strongly marked crest, as the case may be, is elaborated in the method shown from the ordinary ancestoral cranial elements—and a platform never becomes a crest, or a crest a platform, as a sexual modification in the mature animal, whatever slight changes may obtain in early life. Accordingly, the

crested *Nototheria* are made a distinct group of, and not regarded by us as possible sexual skull variations.

To close this comparative study, we must now recall the stages outlined above, and see how they agree with the conditions found in the extinct *Nototheria* and *Diprotodons*.

1. The Kangaroo best agrees with *Diprotodon*.
2. The Wombat's cranial platform is most closely simulated by *Nototherium mitchelli*, in both sexes, to a slightly variant degree. There are, however, traces of the primitive state in which the interparietal interposed, as in the Kangaroo and Native Bear. This, however, is only visible under a lens.
3. The crest of the Native Bear is found in *Nototherium tasmanicum*, in which skull the whole of the shield-shaped interparietal area has become an open fossa for the implantation of a moiety of the ligamentum nuchæ, and accordingly, the crest arises at the occipito-parietal ridge, as the direct result of the suppression of the interparietal from its true ancestoral position, as a moiety of the vertex.

In our section devoted to the taxonomy of the groups, we shall deal fully with the relationships of the several known and recognised *Nototheria*—the present note, however, being osteological, was best interpolated here.

As Professor Owen's description of the *Nototherian* skull covers so much ground, we shall only add such items as his material did not permit of passing in review.

THE PALATE, ETC.

The whole palate is, in essence, that of the Hairy-nosed Wombat, and is not so closely allied to that of the Tasmanian Wombat—namely, the prepalatine fossa is the same, although less deeply impressed, and the second pair of molars are not carried inwards upon the palate, but remain practically in the same alveolar curve as their fellows.

The total length of the bony palate is 305 mm., and that of the tooth line—175 mm. The widths between successive teeth, measured between the centres of the teeth named, are as follows:—

Between	Premolars	(centres)	55	mm.
,,	Molars I.	,, ...	64	,,
,,	Molars II.	,, ...	74	,,
,,	Molars III.	,, ...	75	,,
,,	Molars IV.	,, ...	75	,,

The basi-occipital has coalesced with the basi-sphenoid, their sutures being obliterated, as are those of the palato-pterygoids. The maxillo-palatine suture crosses the palate at the interval between the third and fourth molars—touches the alveolar ridge at about the same point, zig-zags along the base of the last molar, turning outwards and downwards to be lost in the overlap of the maxillo-pterygoid plates. If a set of bristles are placed in the nine main foramina of the base of the skull, a similar set in the skulls of the two Wombats, that now exist in South Australia and Tasmania, it will be seen that with leanings now to one, and now to the other, the foramina of the Giant *Nototherium* are all depicted in the two crania named. The anterior condyloid is nearer to the Tasmanian skull; the fissura lacera is partly individual, owing to the enormous development in the *Nototheria* of the par-occipital, and the rest alternate in likeness from one to the other; but the general approximation to the Wombat is exceedingly close all through.

Owing to mutilations in the palate of *Nototherium tasmanicum*, it is not easy to conduct a comparison with the skull now under review, but it appears to have manifested as many differences as the two Wombats' skulls do in their departures from a common type.

The following table of measurements will give an accurate idea of the size of the skull:—

Total length between vertical rods	535 mm.
Greatest width	380 ,,
Height resting upon pre-massiter processes (without mandible) ...	260 ,,
Greatest width of forehead	175 ,,
,, ,, ,, nasals	175 ,,
From occiput—in a central line—to the tips of the nasals	380 ,,
Width of occiput	340 ,,

MANDIBLE.

Having stated that the mandible from the Boyd's Collection [5] is exactly similar to that of our male animal from Smithton, a general knowledge of these jaws will be widely available—since casts are always obtainable from the British Museum, and most Museums hold copies. These jaws are incomplete, anterior to the diastema, and the ascending coronoid processes are missing. Some of these imperfections are now made good by our photograph of the Tasmanian mandible, and these, together with the

(5) Brit. Mus. Cat. Foss. Mamm. f. 32,050.

appended measurements, will supply sufficient data to separate these jaws from those of any other *Nototheria*. From the *Leptocerathine* group, they can be distinguished by the twisted coronoid processes, a character sufficiently well marked to serve all taxonomic needs.

Greatest length between two vertical rods	422	mm.
Height to condyle	280	,,
Length of symphysis	165	,,
Greatest depth of the mandible ...	127	,,
Antero-posterior length of molar No. 4	45	,,
Width of ditto	35	,,
Length of diastema (to base of tusk)	55	,,

Any of the above measurements that can be compared with those furnished by the Boyd's Collection mandible, will demonstrate their specific and sex similarity of the two specimens.

TAXONOMIC.

As we have to deal in the fewest possible words with an extensive mass of notes that directly relate to our subject, we proceed at once to state that Professor Owen's original species, *Nototherium mitchelli*, of which we consider we have determined the sexes, stands apart from all other *Nototheria*. The species were horned, and platyrhine in cranial morphology, and were, moreover, sufficiently removed from the remainder of the stirp to found generic characters upon, if such were a desideratum. We rule out Owen's species, *Inerme*, for the present, but recognise his third species, *Victoriæ*, as being part of the second group that includes the following:—

Nototherium victoriæ, Owen	Date, 1872.
Euowenia grata, De Vis.	Date, 1887.
Euowenia robusta, De Vis.	Date, 1891.
Nototherium tasmanicum, Scott.	Date, 1911.

The several relationships within this group still present difficulties that an accession of future material may banish at any time. Some of these difficulties are directly due to a want of exact knowledge respecting the characters that determine sex, in relationship to growth stages. It looks upon the surface as though *Euowenia grata* was a female animal, and the so-called species, *robusta*, was the male. De Vis admits that *robusta* was so close to Owen's *victoriæ*, that he hesitated upon the

act of separation, but he makes *robusta* a flat tusked animal, which agrees better with a female than a male animal. Now *N. tasmanicum* agrees better with *Euowenia* than anything yet described, and we are convinced that De Vis' crushed skull, elevated to the type of the genus, was mutilated in the nasal regions, and the mutilation masked the real truth as to its normal structure. The skull of *N. tasmanicum* was recovered in thirty-six pieces, and, when first brought to light, was mutilated to the *Euowenia* outline! In other words, the whole nasal platform was carried away, and was not discovered until six weeks afterwards. If the figure of that skull (6) is examined side by side with De Vis' figure (7), it will be easy to see that a few lines with a pencil can convert the one into the other, and before the skull of *N. tasmanicum* was repaired, the likeness was most striking. De Vis' other great generic character was the slender zygomatic arch. This also is a mutilation (8). De Vis did not recognise it as such, because he was comparing the *zygoma* with the *mitchelli* type of animal, and the zygoma of that creature would not easily mutilate in quite the symmetric way that the zygoma of the second group can, and do—accordingly. De Vis mistook the mutilation for a generic character. In all this, of course, De Vis had never seen the unmutilated zygoma of the second group; hence we can understand and appreciate his position, although a mistaken one! For in the second group, the sub-orbital portion of the zygomatic arch is so rounded and thinned away, that a fracture would convert it readily enough into the slender zygoma of De Vis' figure and descriptive text. We have not included in this second group of *Nototheria* the species, *Dunense*, on the grounds that, in our opinion, it really relates to *Phascolomus*. With the clearing up of the *Sceparnodon* and *Phascolomus* puzzle, at the hands of the late Sir E. Stirling, the claims of the type jaws of *Dunense* to any genus other than that of *Phascolomus*, became remote, and in the circumstances we remove it to the *incertæ sedis* section, that includes *Inermis*, *Dunense*, and *Sthenomerus*. Of this latter we have only one word to say, and that is—As the real limb bones of the *Nototheria* were not correctly relegated to the genus *Nototherium* until 1910, and *Phascolonian* bones were previously usurping their places, we consider the bones relegated

(6) Monograph, *Nototherium tasmanicum*, Pl. I.

(7) Proc. Roy. Soc., Queensland, Vol. 4, 1887.

(8) The malar is stripped right out, leaving only the maxillary process in front, and the zygomatic process of the squamosal behind—apparently driven up on to the skull so as to expose its lower edge.

by De Vis to *Sthenomerus* most likely belong to *Nototherium*, and a re-examination of them in the light of later discoveries would, we fancy, establish some such fact. It appears to us that the interests of science will be better served by founding two well-marked groups, than by exhaustively contending the claims of the various species, and in this connection we present the following:—

CLASSIFICATION OF *NOTOTHERIA*.

GROUP ONE.

Megacerathine Group.

GROUP TWO.

Leptocerathine Group.

CONSPECTUS OF *MEGACERATHINE NOTOTHERIA*.

Animals of platyrhine cranial morphology, with flat foreheads and parietal platforms. Nasals not quite covering the nasal aperture; if anything, more so in the female than in the male. Zygomatic arches asymmetrical, the difference being well marked! Sub-orbital bar heavy, and slightly grooved at the malar suture. Tooth-line showing fairly even wear throughout. Teeth with well-marked cingula. Cervicals with strongly developed zygapophyses, and a powerful axian spine. Coronoid process of the mandible twisted from the tooth-line, as in the latifrons Wombat's jaws (9). Skull heavy, short nosed, and horned. A second very small horn may have rested on the frontal cavity. Nasal cartilage attached by bony studs, capable of motion, to resist shock when horning a foe, and also to give extra mobility to the lips. (Example: *Nototherium mitchelli*.)

CONSPECTUS OF *LEPTOCERATHINE NOTOTHERIA*.

Animals of leptorhine cranial morphology, with triangular foreheads and parietal crests. Nasals curved over nasal aperture. Zygomatic arches symmetrical, rounded, and deeply grooved. Tooth-line showing uneven wear, the excess always being anterior. Teeth without cingula, of a heavy type. Cervicals with a slender axian spine. Coronoid process not much, or not at all, twisted from the toothline (10). Skull heavy (less heavy than the other

(9) 35 degrees from the line of symphysis.

(10) 15 degrees from line of symphysis, in *Phascolonus tasmaniensis*.

group), long nosed, and armed only with small nasal bosses, or a very weak horn. Nasal cartilages attached by bony studs, capable of motion, but tending to fuse at maturity, owing to longer nose and weaker horn. (Best known example: *Nototherium tasmanicum*.)

The remaining members of this group are—*Nototherium victoriæ*, Owen; *Euowenia grata*, De Vis; *Euowenia robusta*, De Vis. It is apparent to us that the jaws Professor Owen thought might be those of a female come within this group, but their exact position is uncertain.

It is unfortunate that De Vis' name *Euowenia*, is later in time than *victoriæ*, as it would have made a nice setting to have called this group by that name. The word *victoria* is so suggestive of geographical bounds as to cause misconceptions to arise respecting it, and *tasmanicum* came too late in time to enter such a contest, even if it were suitable for such a group—which, of course, it is not! Accordingly, we leave the group to its *Leptocerathine* title, only using *Nototherium tasmanicum* as an example, because it is the most perfect skeleton yet recovered. We have a large mass of notes relating to the classification of such Museum specimens as have been fully described, but in our opinions—as already said—the creation of two well-marked groups covers all the immediate needs of taxonomy. In working over the lines ploughed out by those who have gone before us, we recognise nothing but honest attempts to arrive at the truth, and any mistakes that have crept in have been due to imperfect material rather than to any defect of judgment, or want of perspicuity, upon the part of those who rescued and described fragments of jaws and skulls from the pleistocene scrap heaps of Nature. A single illustration will make clear our meaning. De Vis always thought that the oval, tuberculated, premolar of the upper jaw would be opposed by a similar tooth in the mandible, and the narrow elongated tooth that really does oppose it be considered generically distinct! Such are the surprises that Nature springs upon us, that it was only with the finding of associated jaws in 1910 that any accurate data existed upon the subject. Our latest Smithton find—armed with a full set of unworn teeth—displays the wonderful manner in which the elongated, triangular premolar of the lower jaw exactly fits the inner two-thirds of the large, oval, upper premolar—the outer third of that tooth in unworn specimens forming only part of the gripping area. When the mandibular premolars are thus capped, and overhung by the upper premolars, the

anterior tooth-line is firmly locked against lateral motion. This is apparently correlated with the gripping of the tusks upon the lateral incisors, as though the anterior cheek teeth, tusks, and lateral incisors were closed down upon some object to be tightly held (11). In bringing the true molars into action (for cross grinding), the curve of the total tooth-line is such as to free the premolars, and they can cross and recross each other without actual contact, and accordingly, the outer third does not in any sense limit the rolling motion of the jaws under this latter operation. The curve of the tooth-line is aided in this matter by the fact that the mandibular premolars are set lower than the molars. The two factors combined produce the result named.

Here then is the answer to the seeming anomaly of an elongated and narrow lower premolar, being mutually associated with an upper, oval, tuberculated one (one-third greater in width), and which, in occlusion, fits tightly, and duly locks lateral motion when so required.

In the *Leptocerathine* group, the animals all unduly wear the anterior tooth-line, and the premolars, after a time, cut their crowns under the normal action of food grinding; the result is, such premolars are always denuded of their cusping. The cusps in the lower premolars are steeply bevelled, and, therefore, the outlines of excessively worn teeth always appear larger than those with unworn crowns. This also clears up a point!

As the condyle of the *Nototherian* jaw is exactly similar to that of the Wombat, the amount of cross grinding action is also similar, but, as just shown, a champing and gripping action is also provided for, it being only necessary to move the contracting pressure of the jaws either forward or backward, to call either into play.

This association of such dissimilar teeth in a single animal possibly throws a sidelight on the old *Protemnodon* and *Procoptodon* puzzle, but we have no specimens to refer to.

(11) As well as serving for fighting purposes the arrangement of the incisors would be of service to the animal when gathering branches, etc., for its food, the vegetable matter being treated much as a modern wombat does with the longer grasses, etc. We have observed wombats feeding amid such herbage, and their sharp incisors are first brought into play in order to sever the stem from its base, after which the stem is drawn into the mouth for treatment by the molars. Certain of the present day rhinoceroses feed on branches, etc., and most probably such formed a large percentage of the food of the *Nototheria*. The incisive tusks and the general arrangement of the teeth would admirably serve the double purpose of securing food and of being a fighting weapon of no mean order.

It might also be mentioned here that the teeth of certain species of rhinoceroses of the present day serve as an indication of species. In the black rhinoceros, which feeds upon branches, roots, etc., the teeth are worn into alternate ridges and hollows. In the so-called "white" rhinoceros, which feeds by grazing, the teeth are worn into a flat plane.

It will be remembered that in the type skull of *Zygomaturus*, the two premolars are of unequal size, and that De Vis and Lydekker debated this point with some heat [12], the latter always contending that the *Zygomaturus* skull manifested both kinds of premolars, claimed by De Vis as generic characters, and that both could not have been associates of the skull. With what we know of *Nototherian* skull asymmetry, we are not too sure of this, and even supposing that no mutilation of the smaller one was responsible for its reduced size, we could yet believe a normal, and very well marked difference might exist in the two premolars of a single skull.

All of which tends to prove how unwise it is to dogmatise over small dental variations, the more so when a very slight fracture would remove the outer third of a premolar, and so convert an oval and multituberculate one into an elongated angular crown of no special complexity.

THE OTHER SIDE OF THE TAXONOMIC QUESTION.

As we are making every honest endeavour to elucidate the truth, and not attempting to bolster up any special theory, we present the alternative to the double group system of classification here adopted—namely, that of a single species of *Nototherium*, with all variations, the results of age and sex.

We get at the outset the fact that the instinct of Professor Owen led him to determine two good species—*mitchelli* and *victoriæ*, and although Lydekker regarded the latter as a mere individual variation of the former, both Queensland and King Island have yielded similar specimens under conditions that certainly do not suggest any such assumption as that just cited. Nevertheless, if a single species is contended for, this evidence must be set aside, as also the following facts relating to this special connection :—

A. That De Vis found enough variation in the *victoriæ* remains that came to his hand, to found a genus upon, some of which was by admission unsound, but the rest was supported by similar variations observed in Tasmanian *Nototheria*.

(12) Ann. and Mag. Nat. Hist., 1889, p. 150.

B. That the astragalus of *N. victoriæ* (as obtained from King Island) presents enough variation from that of *N. mitchelli* to found a genus upon, and would, if treated as an isolated fragment, be certainly so classified by most palæontologists (*vide* Page 44 of Monograph of *Nototherium tasmanicum*).

Again. It will have to be shown that *Nototherium tasmanicum*, an animal as powerfully tusked as *N. mitchelli*, was a female, in the face of the fact that the original *Zygomaturus* skull presents all the characters that usually determine sex. That this latter is not to be confounded with *N. tasmanicum* is provided for in the circumstances of—

A. A parietal crest as against a sagittal platform.

B. A small forehead, as against a large flat one.

C. A leptorhine, as against a platyrhine cranial habit.

D. Untwisted coronoid processes, as against twisted ones.

E. A tall, slender atlantean spine, as against a wide, heavy; and more or less dwarfed one.

F. It will also have to be explained why the very characters that led us—although quite unbiased as to results—to found *Megacerathine* and *Leptocerathine* groups, are (with the exceptions of those directly relating to the nasal horn) exactly those that segregate the hairy-nosed Wombats from the mainland and Tasmanian forms.

G. That a number of *Nototheria* wore the anterior teeth to the exclusion of the posterior ones is an observed fact—and always appears in the very creatures that apparently fought by gripping with their tusks and lateral incisors, and were by cranial morphology unsuited for the possession of large nasal horns. That these animals were not females, is suggested by their large size and powerful tusks, and by the fact that the type of animal called *victoriæ* had the very kind of tusks one would naturally associate with their mates, and which are not without parallel in the larger animal, we believe to be the female of *Nototherium mitchelli*, thus suggesting, again, their sex determining value.

We do not imagine for one moment that we have cleared up all the mysteries that surround the *Nototheria*, but we hope we have so recapitulated the facts that the discoveries of the future may work more or less smoothly into line, and perfect our knowledge of the wonderful giants of pleistocene days.

When variations of the mandibular symphyses, bounding lines of horizontal rami—namely, contour lines, angles of coronoid processes, positions of dental foramina, etc., have all been relegated to the section headed—"Characters displayed during growth from immaturity to "maturity"—there still remains the material used by us for outlining our two groups of *Megacerathine* and *Leptocerathine* animals, and so for the present we leave the subject with that taxonomic setting.

THE HORN IN THE *LEPTOCERATHINE* GROUP.

Professor Watson's idea of the fighting bosses in *Nototherium tasmanicum* was that of bony eminences covered with skin. If we take an analogy from the Ungulates we get—

1. Rudimentary, skin covered bosses in Horses, as an abnormal condition.
2. Skin and hair covered bosses in Giraffes.

Among the gigantic ungulates of the American tertiary series, many instances of bony bosses obtain.

THE EVOLUTIONARY TREND.

To appreciate even the little we know of the evolutionary trend among the marsupials that culminated in the *Nototherian* stirp, it will be necessary to tabulate the various characters involved therein, with special reference to a geological succession.

PRE-EOCENE.

From Pre-Eocene times, the *Nototheria* retain—

A. Marsupial anatomy generally.

B. Well developed clavicles, relating to pouch manipulation by the hand and forearm.

C. Five fingers and five toes.

D. An entepicondyloid foramen to the humerus.

EOCENE.

From Eocene times; the *Nototheria* retain—

B. Bilophodont molars (still manifested among the modern Tapirs, to some extent) as found in many Eocene ungulates.

B. Flattened femora and humeri of generalised Eocene mammals.

The absence from the head of the femur in the *Nototheria* of a ligamentum teres brings the animals into line with the Eocene *Dinoceras*, as well as the following living and extinct forms:—Elephant, Sea Otter, Sea Elephant, Orang, both forms of *Monotremata*, and the gigantic pleistocene Ground Sloths of South America.

MIOCENE.

From Miocene times, the *Nototheria* retain but little that is essentially characteristic, unless the nasals of such forms as have advanced the least upon the fighting trend really do manifest bony cores, which is at present uncertain. The facts point to a higher stage in *N. tasmanicum*, making an approach to the pliocene dermal horn stage.

PLIOCENE.

From Pliocene times the *Nototheria* retain—

A. The central nasal horn, or horns.

B. *N. tasmanicum*, and its allies, show about the same amount of development in this connection that pliocene ungulates did.

C. *Nototherium mitchelli* appears to have advanced to early pleistocene in this matter, but still retains the pliocene characters of short and wide nasals, as in *Pachygnathus*.

D. A character here also reaches towards the *Tapir* stirp, as much as towards the *Rhinocerotidæ*, namely, in *N. mitchelli*, the nasal septum extends beyond the nasal bones, as in *Elasmognathus*, while in the other *Nototherian* group (*N. tasmanicum* and its allies), the nasals extend to the nasal septum, as in *T. indicus*, *T. americanus*, and *T. roulini*. Always, of course, with special, marsupial variations.

PLEISTOCENE AND RECENT UNGULATE CHARACTERS SHOWN BY *NOTOTHERIA*.

Rhinocerotidæ. The *Nototheria* approach these perissodactyle animals in the structure of the palate, the short neck, the horn, or horns, being developed in the mid-cranial line. The horns are also similarly nourished by anterior central and centro-lateral vascular supplies, but manifested a stirp character, in a central basal blood supply, not found in Rhinoceroses. They also approach these ungulates in the morphology of the occiput.

Tapiridæ. The *Nototheria* approach these Ungulates in the matter of bilophodont teeth. In having one premolar deciduous, but show a stirp trend in its being the fourth, instead of the first. They also show the Tapir character of not developing a third trocanter to the femur.

AS AN INDIVIDUAL STIRP.

The *Nototheria* show in the skeleton, marsupial bones, clavicles, an entepicondyloid foramen. Pentadactyl feet and hands. Longer lumbar regions than either Tapirs or Rhinoceroses possess. Premolars reduced to a single pair in either jaw. Incisors retained.

INTER-STIRP CHARACTERS.

Within the stirp the *Nototheria* display a blending of Kangaroo, Wombat, and Native Bear characters, in addition to their own osteology.

RECAPITULATION.

In the *Nototheria* we thus find a group of animals that in Tasmania became extinct late in pleistocene times, that were generalised, and yet, in part, specialised. They retained the racial characters that can be relegated to five geological periods—that is, from the pre-Eocene to the latest pleistocene. They show similar developments to those of the perissodactyle ungulates, and without leaving a single modern representative to carry on their race, in totality, they have left many characters scattered through their marsupial allies—the Kangaroos, Wombats, and Native Bears, who still grace our woodlands to-day.

EXPLANATION OF PLATES XIII.-XXI.

Nototherium mitchelli.

Plate XIII.

The side aspect of the skull giving structural details of the ear, zygomatic arch, tusks, and nasal septum.

Plate XIV.

Showing the face, toothline, nasal studs, pre-alveolar extension of the tusks and the asymmetrical processes.

Plate XV.

Skull resting upon tusks, and pre-massiter processes. Showing nasal platform, nasal studs *in situ*, also concave frontal platform, upon which a second small horn may have rested.

Plate XVI.

Skull, showing the toothline, palate, and basic view generally.

Plate XVII.

Showing nutrient foramina coming up to nasal platform, parietal platform and occiput, also convex contour of the parietals as they contribute walls to the temporal fossæ.

Plate XVIII.

Mandible orientated to show toothline and mutilation to tusk due to an accident in life.

Plate XIX.

Mandible in side view, showing cingula of teeth, dental foramen, etc.

Plate XX.

Mandible arranged to show both condyles, coronoids mutilated (*post mortem*). Contour of condyle similar to that of the platyrhine wombat.

Plate XXI.

Contour lines of the nasal platforms of *Nototherium mitchelli* male and female.

No. 1. Male.—Vertical axis = 110 mm; transverse axis = 108 mm.

No. 2. Female.—Vertical axis = 115 mm; transverse axis = 80 mm.

A & B indicate nutrient foramina in anterior regions. C is a third foramen for nourishing the base of the horn.

NOTOTHERIUM MITCHELLI.

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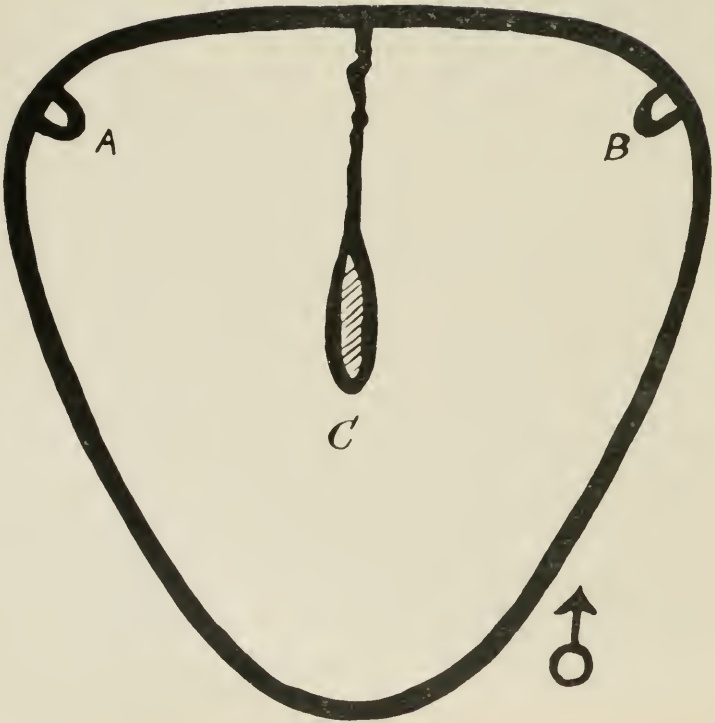

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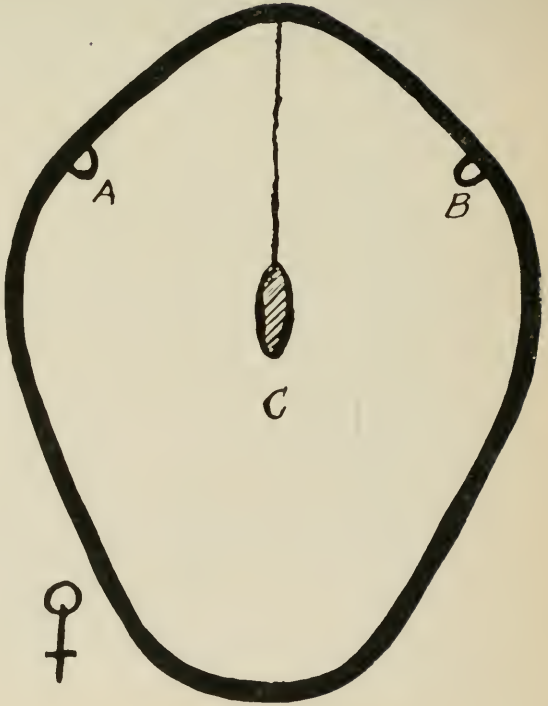

NO 2

STUDIES IN TASMANIAN MAMMALS, LIVING AND EXTINCT.

Number IV.

Nototherium mitchelli.

Appendicular Skeleton, including the manus and pes (hitherto unknown).

By
H. H. Scott (Curator of the Launceston Museum)
and
Clive E. Lord (Curator of The Tasmanian Museum, Hobart).

Plates XXII.-XXIII.

(Read 13th September, 1920.)

INTRODUCTORY NOTE.

The feet of the *Nototheria* have hitherto remained undescribed from associated specimens, although many bones in museum collections have been relegated to the genus. The calcaneum, and astragalus, of *Nototherium tasmanicum* were recovered with the rest of the skeleton in 1910, and the astragalus of *Nototherium victoriæ*, came to light with other associated remains from King Island in 1912. Of the foot of *Nototherium mitchelli*, we have now to record the following bones, all parts of a single pes, and the associates of the skeleton unearthed at Smithton, in 1920, namely:—

(1) Astragalus.
(2) Calcaneum.
(3) Navicular.
(4) Cuboid.
(5) Ento-cuneiform.
(6) Ecto-cuneiform.
(7) Two metatarsals.
(8) One ungual phalanx.

For all practical purposes this outlines the foot, and as the bones, in a general way, conform to the *Diprotodon* type, it will be easy to restore the missing parts, the more

so as the hand is complete in phalangeals, and claw bones, and therefore available for comparison. A glance at the outlines of the hand and foot quickly reveal the disproportion exhibited by the pes, in point of size. This, however, is compensated for in the wide expanse of the sacral regions of the skeleton, sheer weight and pelvic width making up for other reductions.

In the hands, one cannot but be struck by the great palmar expanse, as also the power of the claws. When fully spread such hands would have firmly gripped the soil, and thus presented a most solid and unyielding front to a charging foe. Such manal power must have been a useful factor also during the cranial twist incidental to the horning and tossing of a foe. In this connection it is manifestly obvious that the whole build of the scapular arch is in view of power, and the scapulæ, clavicles, and arm bones, are all called upon to contribute their quota to the total result.

OSTEOLOGY OF THE FOOT.

Plate XXII.

As the astragalus and calcaneum from the left pes of both *Nototherium mitchelli* and *N. tasmanicum* are present, a direct comparison can be instituted, and, with the astragali super-imposed upon their respective calcanei, the following notes were obtained. In spite of the fact that the femur of *N. mitchelli* exceeds that of *N. tasmanicum* in total length by 65 mm., and in width by 47 mm., the bones of the feet present hardly any differences in point of total size, although morphologically they manifest such well-marked differences as one would look for upon their taxonomic segregations. Unfortunately, the post-articular regions of both calcanei are mutilated, and accordingly no measurement of total length can be supplied, that of *N. tasmanicum* is the longer, being 152 mm., while that from the other species is only 127 mm. long. In the former, the whole post-articular muscular attachment area is present, and extends backwards for 50 mm., while in the latter only 25 mm. of this region is present.

The lateral tibial articular tract in *N. mitchelli* is horizontal, but in the other species it slopes forward and downward, is gently concave in the former, and convex in the latter, thus giving a more vertical tibial articulation to *N. mitchelli*, and markedly more angular one to *N. tasmanicum*. In *N. mitchelli*, the calcaneum presents a fibular articular facet 20 mm. long, and 8 mm. deep, the calcaneum projecting some 8 mm. beyond the astragalar

NOTOTHERIUM MITCHELLI.—PES.

facet. In *N. tasmanicum*, the astragalus overhangs the calcaneum, owing to the greater slope (noted *supra*), thus masking completely the primitive character of a fibular calcaneal articulation, strongly manifested by *N. mitchelli*. To followers of the evolutionary trend, this character will serve to recall the fact that the most primitive member of the sub-order *Perissodactyla*, namely, *Macrauchenia*, exhibited this character, as also did the several members of the sub-order *Taxodontia*. The suppression of such an osteological item should be of taxonomic importance. (1) In conformation with the abovenamed differences between the two astragali under consideration, every other articular surface, and facette, shows similar variations, the details of which it is unnecessary to give, since the articulation of the fibula with the calcaneum, by a well-marked surface, will serve to classify the moiety with the *Megacerathine Nototheria*, and the absence of such will relegate it to the *Leptocerathine* group.

The total height of the superimposed bones in *N. tasmanicum* is 120 mm., and that of *N. mitchelli* 122 mm., their astragalar widths (in articular position) being 82 mm. and 74 mm. respectively. For the classification of fragments of calcanei the best guide in the absence of the evidence yielded by the fibular facet, is that of the whole articular surface. In *N. mitchelli*, the sizes are 80 mm. in antero-posterior length, with a width of 70 mm., while in *N. tasmanicum*, the surface is 60 mm. × 60 mm. The antero-posterior slope in *N. mitchelli* is only 30 degrees, while in *N. tasmanicum* it is 50 degrees. When perfect, the two sets of bones must have been fairly similar in point of size and robustness. It is most unfortunate that the bones of the tarsus and toes are unknown in *N. tasmanicum*, as the digital reduction may have—indeed, we feel convinced must have—shown interesting grades when compared with those of *N. mitchelli*.

As far as we can judge (working only from photographs of the foot of *Diprotodon*), the articular cup for the astragalus is formed in the *Nototherium*, in about the same proportions as that which obtains in *Diprotodon*, namely—

(1) The largest share by the navicular.

(2) The next in importance being that contributed by the calcaneum.

(3) The minimum share being supplied by the cuboid.

(1.) In the kangaroo, the primitive character is retained, *in toto*, the fibula being elongated to reach the articular facet of the calcaneum—to the amount that the astragalus rises above that bone, in this region. Its almost suppression in *N. mitchelli*, and its total suppression in *N. tasmanicum*, are the facts to be kept in sight.

With Dr. Stirling's photo of the *Diprotodon's* pes (2) placed side by side with the foot of *N. mitchelli*, we note that in the latter—

1. The external horn of the navicular is much more expanded at the base.
2. The ecto-cuneiform is more elongated.
3. The ento-cuneiform is relatively more robust.

As far as it is fair to express an opinion, we would state that our material suggests less reduction of the toes than obtains in the *Diprotodon*. Allowing for missing bones, and, therefore, in part open to future emendation, the following set of measurements are submitted:—

Total length of foot	= 355 mm.
Greatest width	= 171 mm.
Width of toes	= 105 mm.

The *Nototherian* astragalus does not closely simulate that of the Wombat, but, if that bone from the foot of the Tasmanian Wombat is compared with the two astragali of the *Nototheria* just passed in review, it will be found to agree better with that of *N. tasmanicum* than the corresponding moiety from the pes of *N. mitchelli*. We have no bone to contrast, and compare with, from the platyrhine wombat, but we strongly suspect the astragalus from that animal would agree best with *N. mitchelli*, and so follow out the sequence so frequently noted during our studies.

THE MANUS.

Plate XXIII.

As with the pes, so with the manus, the parts present belong to the left side, and are not quite intact as to several moieties. We hold the following, however:—

(1) Pisiform.
(2) Cuneiform.
(3) Unciform.
(4) Scaphoid.
(5) Magnum.
(6) All five metacarpals.
(7) Four phalanges of the proximal series.
(8) All five ungual phalanges.

From the carpus there are missing the following bones, namely:—

(1) Trapezoid.
(2) Trapezium.
(3) Scaphoidal sessamoid.

Also six phalanges.

(2.) Foss. Lake Callabonna, vol. I., part 1, plate 10.

NOTOTHERIUM MITCHELLI — MANUS.

As the pisiform, and cuneiform, outline the ulnar cup, and the scaphoid can be articulated to the end of the radius, the loss of the items named will not seriously affect the articulation of the hand, the presence of the complete set of metacarpals is most fortunate, as is also the set of ungual phalangeals. Finger five is intact, and so a measurement taken from the end of the pisiform to the tip of the claw-bone supplies a size-determining factor. Taken thus, the hand measures 270 mm. in length, but this is less than actual totality by anything up to 25 mm., since the fifth is not the longest digit. In life, with claw sheaths *in situ*, this hand must have been quite 300 mm. long, by 145 to 150 mm. wide. In Tapirs, the hand always contains more digits than the foot, but in no known instance do they ever reach as high as five. In the Rhinoceroses, at least three digits enter into the composition of the pes, while the manus may retain four. The marsupials largely show a digital reduction of the pes, but, owing to the necessities for manipulating the pouch, the hand has remained intact. In the *Nototheria* the feet were obviously following the trend, but the stirp became extinct before the climax had been reached. In view of this latter fact, nothing very remarkable appears in the manal osteology; the pisiform and cuneiform supply the ulnar cup, the unciform gives articular facets to digits four and five, the magnum supports digit three, the trapezoid and trapezium carry the remaining digits. The scaphoid being mainly supported by the magnum, brings the *Nototheria* into line with the Tapirs and Perissodactyla generally.

As the ungual phalanges form a complete set, and have hitherto been undescribed, we supply a table of dimensions.

CLAW-BEARING PHALANGES OF *NOTOTHERIUM MITCHELLI*.

(Left Hand.)

Name.	Total Length	Width (Basal)	Girth	Remarks.
	mm.	mm.	mm.	
Digit No. 1 ...	55	31	87	Condition perfect
Digit No. 2 ...	56	25	77	Condition perfect
Digit No. 3 ...	62	26	80	Condition perfect
Digit No. 4 ...	71	27	84	Condition perfect
Digit No. 5 ...	71	23	83	Condition perfect

THE RADIUS AND ULNA.

As neither radius nor ulna was complete in *N. tasmanicum*, no measurements could be supplied when the monograph upon that animal was compiled. With *N. mitchelli*, we get both bones from the right side, and a perfect ulna from the left, the associated radius, however, being distally imperfect. The left ulna is 437 mm. long, the right being 436 mm. The right radius is 385 mm. long. As both bones have been figured proximally (*vide* plate 10, monograph *N. tas.*), it will be only necessary to say that distally the ulna ends in a perfectly round head, 36 mm. in diameter, while the radius expands to a transverse width of 80 mm., its proximal cup being only 50 mm. × 48 mm., which is exactly the same in *N. tasmanicum*.

THE STERNUM.

Four moieties of the sternum of *N. mitchelli* were recovered with the other parts of the skeleton. These consist of the manubrium, and three sternebræ of the Gladiolus. Possibly two segments, and the ziphoid element are missing. In articulating the skeleton of *N. tasmanicum*, ten pairs of ribs were carried to the sternum, seven of which were attached to the pre and meso-sternum. This must be very close, if not actually, the condition that really obtained in these animals, and, accordingly, two sternebræ are missing from the mesosternum of *N. mitchelli*, in addition to the metasternal element. The manubrium is 100 mm. long, and 108 mm. wide; it is heavily keeled, the carina ending in a tuberosity that projects outwards for 45 mm. If this tuberosity is pressed against the vertical plate of the measuring board the total thickness of the bone is 71 mm.

The sternebræ are furnished with nearly square bodies, and expanded ends; the two perfect ones measure 75 mm. and 74 mm. respectively, in total length, with a width of 40 mm. at the ends, sinking to a central width of 28 mm. in vertical measurement, the transverse rim measurement being 26 mm. Vertically, the surfaces are convex and concave—transversely concave—on either side.

FEMUR.

The femur closely simulates that of the *Leptocerathine* group (as duly figured in plate No. eleven of the monograph of *N. tas.*), but is larger, as the appended table will show. Being a younger animal, the muscular surfaces are less strongly marked; indeed, the femur, as a whole, is a smooth one, as indicates the age stated.

FEMORA OF *MEGACERATHINE NOTOTHERIA*, AND THOSE OF THE *LEPTOCERATHINE* GROUP.

(No. 1 = *N. mitchelli*. No. 2 = *N. tasmanicum*.)

No. 1.	mm.	No. 2.	mm.
Total length	= 540	Total length	= 475
Across condyles ...	= 157	Across condyles ...	= 153
Girth below head	= 275	Girth below head	= 251
Diameter of head	= 89	Diameter of head	= 83
Girth above condyles	= 385	Girth above condyles	= 381
Girth, including condyles	= 474	Girth, including condyles	= 451
Width between two vertical walls	= 251	Width between two vertical walls ...	= 204

HUMERUS.

The left humerus is here selected from the skeleton of *N. mitchelli*, so as to fall into line with that of the monograph of *N. tasmanicum*.

COMPARATIVE HUMERI.

(No. 1 = *N. mitchelli*. No. 2 = *N. tasmanicum*.)

No. 1.	mm.	No. 2.	mm.
Total length	= 496	Total length	= 467
Ecto-tuberosity to end of pectoral ridge	= 268	Ecto-tuberosity to end of pectoral ridge	= 238
Proximal width ...	= 120	Proximal width ...	= 125
Distal width	= 175	Distal width	= 175
Least width of shaft	= 71	Least width of shaft	= 62
Thickness of radial condyle	= 57	Thickness of radial condyle	= 58
Thickness of ulnar condyle	= 60	Thickness of ulnar condyle	= 60
Width of condylar articular surface	= 132	Width of condylar articular surface	= 124

A curious relationship between the width of the distal end of the humerus, and the length of the mandibular tooth line, has been noted by De Vis in the case of Wombats, and suspected by him to extend to the *Nototheria*. If the mandibular tooth line of *N. mitchelli* is measured it will be found to be 171 mm., while the distal end of the humerus is 175 mm., as noted *supra*.

TIBIA.

The tibia of *N. mitchelli* is generically similar to that of the second group, but shows various departures from that type. The shaft upon the whole (allowing for age characters) is similar, but the articular surfaces show the variations we might expect to find in animals whose gait was dissimilar.

COMPARATIVE SIZES OF TIBIÆ, IN THE TWO GROUPS.

(No. 1 = *N. mitchelli*. No. 2 = *N. tasmanicum*.)

No. 1.	mm.	No. 2.	mm.
Total length between two vertical walls	= 327	Total length between two vertical walls	= 284
Greatest proximal width	= 134	Greatest proximal width	= 125
Greatest distal width	= 92	Greatest distal width	= 88
Least distal width	= 66	Least distal width	= 63

THE FIBULA.

If anything, the fibula of *N. mitchelli* is more bent in the shaft than that of the second group, and the articular surfaces manifest their own special characters. These need not be noted *in extenso*, as the size of the bone will serve to separate it from one of the other race.

COMPARATIVE FIBULÆ.

(No. 1 = *N. mitchelli*. No. 2 = *N. tasmanicum*.)

No. 1.	mm.	No. 2.	mm.
Total length between two vertical plates	= 282	Total length between two vertical plates	= 248
Greatest proximal width	= 84	Greatest proximal width	= 73
Least proximal width	= 67	Least proximal width	= 64
Greatest distal width	= 59	Greatest distal width	= 52
Least distal width	= 49	Least distal width	= 43

THE CLAVICLES.

The clavicles of *N. mitchelli* agree in outline exactly with those attributed to *Diprotodon*, and depart in contour from those of the *Leptocœrathine Nototherian* group, in exactly the way noted in the monograph upon *Nototherium tasmanicum*. Owing to this variation in shape, it is not easy to give comparative contour measurements, but the following may prove useful.

COMPARATIVE CLAVICLES.

(No. 1 = *N. mitchelli*. No. 2 = *N. tasmanicum*.)

No. 1.	mm.	No. 2.	mm.
Greatest length ...	= 171	Greatest length ...	= 150
Height of arch ...	= 94	Height of arch ...	= 87
Greatest width ...	= 47	Greatest width ...	= 37
Least width	= 24	Least width	= 29

In every way the clavicles of both *Diprotodon* and *Nototherium mitchelli* are more shapely bones than those from the *Leptocœrathine Nototheria*. They are wider at the acromial end of the shaft, and more slender as the shafts approach the sternal facets. Apparently this extra thinning of the shaft did not introduce an element of weakness at this point, since the broken clavicle of *N. mitchelli* snapped well above the thinnest part of the shaft. In attempting to repair this fracture, the periosteal membrane poured out enough ossific matter to increase the width of the bone by 20 mm.; at the same time it contracted its length (by altering the curve of the outline) some 13 mm.

THE SCAPULÆ.

Both scapulæ are imperfect as to length, and otherwise mutilated. This is owing to the complete exposure of the right side of the animal to wind and weather for many years—the left side being buried in the mud saved the lower part of the left scapula, the apex, however, being above the water line came in for unfair treatment. The longer of the two measures 395 mm., the complete length being most likely 450 mm. That of *N. tasmanicum* is 430 mm. in an intact specimen, so we may assume the larger animal's shoulder blade was some 20 mm. longer. The width of the nearly perfect left scapula is 253 mm. Except in the matter of age, the scapulæ agree fairly well with those figured, and described in the monograph upon *Nototherium tasmanicum* (*vide* page 23, and plate 9.) The age factor, of course, omits the superossification due to matured muscular attachment. The great fossa

marked by an arrow in the picture is less strongly indicated in the younger animal—presumably, this fossa related to the infra spinalus, and teres muscles, and a second groove may relate to the scapular dorsal artery. The acromion process is 110 mm. wide, and is roughened for the enormous deltoid muscle, that ascended the spine for 245 mm., in addition to involving the whole of the distal end of the actual process.

THE PELVIS.

The pelvis of *Nototherium tasmanicum* has been duly illustrated and described (plate 15, pages 34 and 35 monograph), and this will serve the purpose of a generic description, but the comparative study we had hoped for was marred by the fragmentary character of the pelvis of *Nototherium mitchelli*. As far as the specimens serve we are safe in saying that the *Megacerathine* animal was similar to that of the *Leptocerathine* one in the pelvic regions, and if a complete set of measurements could be supplied the former would be presumably somewhat larger than the latter. To avoid the necessity of reference, we reproduce here the scale of sizes already published.

PELVIS OF *N. TASMANICUM*.

	mm.
(1)—Total width across the slightly imperfect ilia	= 702
(2)—Greatest width of least mutilated ilium	= 235
(3)—From tuberosity of ischium to upper rim of ilium	= 535
(4)—Width of pelvis across rims of the acetabula	= 422
(5)—Transverse measurement of inlet of pelvis ...	= 172

In the pelvis of *N. mitchelli* the whole of the sacral portion is torn away, and neither of the ilia is perfect. An attempt to compare measurement No. 3 of the above table gives 500 mm. for a slightly smaller portion than is present in the pelvis of *N. tasmanicum*, thus suggesting a rather larger pelvis as a whole. For articulation purposes the pelvis of *N. mitchelli* has been now restored, and as so outlined its greatest width across the ilia is (36in.) 915 mm. This may eventually prove to be too wide, but at least 100 mm. in excess of that of *N. tasmanicum* is certainly within the mark.

COMPARATIVE SKULLS OF *NOTOTHERIA*.

At an earlier stage of this work we promised to give a table of contrasting skull characters, and although in part this has been supplied in drawing up the conspectus

of either group, yet to a practical worker it will be exceedingly convenient to have a ready reference table such as that hereunder supplied.

	Megacerathine Nototheria.		*Leptocerathine Nototheria.*	
Characters.	Male.	Female.	Male.	Female.
Nasal bones	Wide and heavy, 175 mm. wide.	Not quite so heavy, 160 mm. wide.	Smaller than the female of *N. mitchelli*, total width 138 mm.	
Forehead and parietal regions.	Flat & wide with a parietal platform.	Similar to male, but smaller.	Small forehead, and a long parietal crest.	
Zygomatic arches.	Heavy processes not symmetrical.	As in the male.	Lighter in build, more grooved, and symmetrical.	Although at present the data is too slight to give with any degree of accuracy, the future will be certain to supply this information.
Nature of tusks.	Oval in outline, widely divergent, powerful.	Flatter in outline, less divergent, less powerful.	Oval in outline, widely divergent, and powerful, quite as powerful as males of the other group.	
Cranial walls	Convex to the temporal fossæ, strongly so.	As with the male.	Concave to the temporal fossæ, as strongly so as they are convex in the other group.	
Pre-massiter processes.	Bent back to molar No. 3, and blades twisted outwards.	Bent back to molar No. 3, blades twisted slightly outwards.	Bent back to molar No. 4, blades twisted inwards.	
Squamosal element of the zygomatic arch (contour line).	Leaves occiput concave, thus for a very small space, thence convex to the suture.	Leaves occiput concave, thus for a space, thence convex, and lastly nearly straight to the suture.	Leaves occiput with a big convex swelling, slopes concavo-convexo-concave, to suture.	

For other details see the text of the articles already published.

I

THE EXTERNAL EAR, AN OSTEOLOGICAL COMPARISON.

It is an interesting piece of parallel evolution to observe how closely the *Nototherian* ear simulates the conditions obtaining among true Rhinoceroses, and then to pass in review the skull elements out of which they have been developed. Although we have carried out this study widely enough to embrace various Rhinoceroses, space forbids the publication of more than a small portion of our data.

In the Tichorhine Rhinoceros, the meatus auditorius is formed by the post-glenoid—which is a powerful process—reaching backwards to meet a similar contribution from the mastoid, the line of junction being vertical and central. In a general way the Indian Rhinoceros repeats this set of conditions, although the true ear bones may be loose. If the photograph reproduced in plate xiii. is appealed to, it will be seen that in *Nototherium mitchelli* the loose tympanic tube of the Wombats is here strongly inset, between the backward curve of the post-glenoid and the forward sweep of the mastoid, the whole having coalesced into a single element.

Group departures from these conditions are found in the *Leptocerathine Nototheria*, not sufficiently important to detail here. (3) Now let us see how these structural moieties exist in the Wombats, and the Native Bear.

Tasmanian Wombat.

There is a post-glenoid process, which is removed mesiad from the contour line of the skull, and is shorter than the mastoid process. The tympanic is tube-like, and distinct, and the par-occipital is short.

Hairy-Nosed Wombat.

The post-glenoid is obsolete; the mastoid is thin and long; the tympanic is suspended mid-way between the glenoid articular wall, and the mastoid amid deeply excavated air cells.

Native Bear.

Strong post-glenoid process (deeply excavated by air cells), tympanic deeply set in a fossa between the post-glenoid and the squamoso-mastoid process, long par-occipital process.

(3.) Briefly it may be said that the ear is a stage nearer the primitive condition.

We may assume in this connection that the Wombats are nearer to the primitive marsupial than the Native Bear is, and that in the *Nototherium* the post-glenoid and mastoid enclosed the tube-like tympanic—that still remains distinct in the Wombat, but has developed a special stirpian trend in the Native Bear.

Here, then, we get a result structurally the same, in three animals widely removed as to habitat, one having ranged Europe in pleistocene time, a second living in Australia in the same age, and a third still living in the Indian zoological province. The Marsupial Rhinoceros (*Nototherium*) still shows exactly how the ear was evolved out of the elements common to more than one type of marsupial that still survives.

THE SIZE OF *NOTOTHERIUM MITCHELLI*.

It is an interesting study to try to recall the alteration in size of the animal here under consideration, that these new discoveries have forced upon our mental vision. Professor Owen allowed for a large animal, and as the female skull known to him—and so carefully studied in detail—falls little short of the male cranium in point of size, he was in this respect fairly well informed. In forehead, and nasal expansion, the male, however, exceeds the female by a full inch, and therefore his remark that in its facial parts *Nototherium* was the quaintest animal that ever lived receives additional support, since an extra inch in the dilation of an animal's nose completely changes the facial contour. The arms and legs, he assumed, were bulky, but relatively shorter than we know them to be, as note the size of the upper arm. The humerus Owen allowed for was 400 mm. long and 224 mm. wide. The real humerus is 496 mm. long and 175 mm. wide. Thus the upper arm bone was narrower by two inches, and longer by nearly four inches than was suspected of. If this ratio is carried out to all the bones of the appendicular skeleton, we are apparently dealing with an animal at least a foot taller than Professor Owen computed it to be. Even the *Leptocerathine* group of *Nototheria* were longer in their humeri by 67 mm. (2⅝ inches) than the humeri relegated to the *Nototheria* generally, and the elongation of their scapulæ to a measurement of 430 mm. (just on 17 inches) would certainly never have been guessed at.

The long narrow foot, not known to have been associated with the animal, and the excessively wide and heavily clawed hand are also new items, all of which, taken in totality, considerably alter the animal's make-up

as originally visualised. Upon the other hand, the great palæontologist had his share of success, correctly associating the skull and jaws (that by reason of their apparent anomalies acted as stumbling blocks to others for more than half a century). Again, in the matter of the imperfect mandible, from South Australia, he instinctively and with unerring accuracy separated it from the type species; and seeing as in a glass darkly the real significance of the evolutionary trend he listed the nasal septum of both *Diprotodon* and *Nototherium*, in the same category with such structures in the Tichorhine Rhinoceros. As some students of Professor Owen's works upon "Extinct Mammals of Australia" appear to have missed the association of *Nototherium* with *Diprotodon*—and therefore with the Tichorhine Rhinoceros—in this matter of the nasal septum, it may be opportune to recall his actual data relating to this subject. At page 524 (part 3, Foss. Mam. Aust.) he notes the development of the nasal septum of *Diprotodon*—out of the ordinary marsupial anatomy—to the condition that obtained in the Tichorhine Rhinoceros, and again at page 51 of part 5, he links *Nototherium* with *Diprotodon* in this respect, remarking, *inter alia*, that among the marsupials these two animals stand alone. *Ipso facto*, therefore, both approached the extinct Perissodactylan Ungulate, to a greater or lesser degree. We now know that in the *Leptocerathine* group, the nasal bones and nasal septum approached each other very closely—while in the other group, the nasals receded for some 40 mm. in the male animal, but less in the female.

RECAPITULATIVE NOTES.

If the aim of our studies has been realised, we shall have to some extent convinced zoologists, and palæontologists, of the fact that the Rhinoceros was not absent from the fauna of Australia in ages past. True to the structural type of the country, these animals retained the marsupial habit, simply grafting on to it the results of that evolutionary trend that has culminated in other lands in the Perissodactylan Ungulates. Just how many groups Australia could boast of we are at present unable to say, but apparently two, at least, were well segregated at the time extinction overtook the race. One of these, the *Megacerathine* group, manifested more development along the fighting trend than the second, or *Leptocerathine* group did. This is noticeable chiefly in the alterations to the nasal bones for the attachment of the horn; the extra strengthening of the neck; the general enlargement of the whole skeleton to maintain a suitable poise; the

dilation of the skull walls to provide extra air cells, to deaden shock and to combine lightness with strength. Starting (in the limbs) with pentadactyle hands and feet, and the primitive character of a fibula articulating directly with the calcaneum, they changed to a condition that was rapidly reducing the number of toes (as in the Rhinoceroses) and the fibula was slowly losing its articular grip of the calcaneum. In the *Leptocerathine* group it had absolutely done so, and in the *Megacerathine* group the articular facet was extremely reduced. The ear was being evolved to suit the new conditions of life, and in total result had reached a rhinoceros state of development, but the primitive material available to a marsupial animal being different from that which obtained in the Eocene Ungulates, the method of elaboration was quite distinctive, as duly noted above. As no *Diprotodons* have as yet been found in Tasmania we have not, by written word, attempted to speculate upon their relationship to the two groups we have had under review. Our personal views are therefore unexpressed, for the present. Students of Palæontology need not travel to the wastes of America to find remains of animals that closely simulated the Perissodactyle Ungulates, since they have in Australia, and Tasmania, the evidence of creatures that started with a primitive marsupial habit, and while unfolding that exceedingly interesting zoological form, some of them embraced, *pari passu*, the evolutionary trend that produced the Rhinoceros and Tapir stirps in other parts of the world. America is said to have elaborated seven groups of, more or less, Rhinoceros-like animals; it remains for the future to say what number actually existed in the Australian zoo-geographical province. Professor Owen first glimpsed the effect of the embracing evolutionary trend, in the year 1870. Professor Watson directly extended the idea when viewing the Tasmanian *Nototherian* remains in 1914. Early the next year, Mr. L. Glauert, of the Perth Museum, in Western Australia, expressed a tentative opinion upon the subject, after four months' work upon the fossil bones of the Mammoth Cave, but felt unable to state exactly how far the rhinoceros trend had advanced, his exact opinion (as reported at the time) being that the "*Nototherium* was a gigantic Tapir, or "Rhinoceros-like animal." In 1915, also, H. H. Scott reviewed the evidence yielded by a study of a *Leptocerathine Nototherium* (*N. tasmanicum*) in the light of its being purely a Tapir-like animal, but abandoned the view in March, 1917, in favour of that advanced by Professor Watson (*vide* Brochure No. 6, Launceston Museum Series).

The reasons for opposing the Rhinoceros habit, in *N. tasmanicum*, as also the evidence in favour of the same, in the light of information supplied by the study of the skeleton of *Nototherium mitchelli*, have been duly set out, in our Paper No. 3, and therefore need not be recalled here. As far as we know, we have fairly impartially weighed every fact of importance recorded by any and all workers, in this particular branch of Palæontology, and the final result has been the several views expressed in our short series of papers, of which the present constitutes No. 4.

For the scientific use of the skeleton of *Nototherium mitchelli*, we are indebted to Mr. K. M. Harrisson, of Smithton, who generously placed the specimens at our disposal for the purpose named. Mr. Harrisson has also presented the whole of the remains to the Tasmanian Museum, Hobart, with a view to their future exhibition at that institution. In conclusion, we may just add that the order in which the osteological evidence has been reviewed was largely determined by the condition of the material—some bones being unfit to handle for months, while others were stable at an earlier date.

ADDENDUM.

After our notes upon the nasal ossicles, found in the skulls of the *Nototheria*, were in print we discovered that similar structures had been recorded, by Prof. O. C. Marsh, as appearing in the gigantic *Dinocerata*, of Eocene, North America. Prof. Marsh published his note in 1884 (U.S. Geological Survey, monograph No. 10, page 14), and regarded the structures as being quite unique, but suggested that they had survived in a modified state in the modern artiodactyla as the pre-nasals of the genus *Sus*. Obviously, if this homology is correct, the ossicles must have been developed as a common ungulate possession prior to the divergence of the perissodactyla from the artiodactyla, as it is unlikely they were separately evolved. The parellel development of such structures in the *Nototheria* is an exceedingly interesting point, as also is the appearance of a single central ossicle in the South American Mylodon—as duly noted in our text.

The teeth of *Tinoceras stenops*, figured by Marsh at page 47 of his monograph, show a disproportion between the upper and lower premolars, that is almost similar to that obtaining in the *Nototheria*. The cusping, of course, is quite different.

EXPLANATION OF PLATES XXII.-XXIII.

The Pes and Manus of *Nototherium mitchelli*.

Plate XXII.—Left foot of *N. mitchelli*. Astragalus in position. All missing bones outlined in black. The facet for the articulation of the fibula, with the calaneum, being well shown.

Plate XXIII.—Left manus of *N. mitchelli*. This plate shows the great spread of the hand, the powerful claws, and the general conformation to the marsupial type. Some bones missing—outlines supplied in black.

THE EARLY HISTORY OF BRUNY ISLAND.

By

Clive E. Lord

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(Read 13th September, 1920.)

Many of the coastal features of our Island State are entwined with the romance of its early history. The nomenclature recalls visits of the hardy navigators, who, in years gone by, sailed amid the uncharted areas of the Southern Ocean in search of the Great South Land. Later, as the discovery of Australia became known, various expeditions added, little by little, to the knowledge of the coast line. The Southern part of Tasmania came in for a considerable amount of attention in the early days, mainly owing to the fact that the existence of Bass Straits was not known, and all vessels coming from the westward had to weather the South-West Cape in order to reach the East Coast of the Continent and the seas beyond. Some stayed for the purpose of examining the coast more closely whilst others merely sought the land in order to replenish their supplies of wood and water. Nearly all the navigators of whom we have record, however, left some trace of their visit by naming the prominent features of the locality wherein they stayed. In a previous paper [1] I traced the early history of Maria Island, and in the present instance it is desired to place on record a few facts that have been compiled in relation to Bruny Island and its early explorers. In doing so it must be remembered that the records will be merely those of whom we have knowledge. While they were undoubtedly the chief ones, it is well to recall that there were probably many ships that set forth to explore the Southern seas, but which never returned.

Whence, or how, Tasmania became to be inhabited by the dusky aborigines, who withered away so rapidly with the advent of the European settlement, we have no certain knowledge, although many theories have been advanced. They were here long before the seventeenth century, and doubtless gazed with wonder at the high pooped Dutch vessels which appeared off the South Coast in the spring of 1642. For it was on the 29th of Novem-

(1) The Early History of Maria Island. P. and P. Roy. Soc. Tas., 1919.

ber that Tasman's ships the *Heemskerck* and *Zeehan*, working round from the West Coast, passed several rocky islets, one of which Tasman compared to the shape of a lion. (2) Another was named Pedra Branca, owing to its likeness to a similar rock of that name off the coast of China, while a third was referred to as being like a high rugged tower. (3)

With the aid of a westerly breeze the Dutch ships continued their course along the shore, the islands at the south-east corner of Bruny Island were noticed, and to these the name Boreel Islands was given. (4) Towards evening the ships were making for a bay (5) intending to come to anchor when a north-westerly gale arose and blew the vessels to sea again, (6) and when they were able to again close with the land, several days later, they anchored on the East Coast. (7)

Had Tasman been able to come to anchor in Adventure Bay his stay in Tasmania might have been of a longer duration, and the discovery that Bruny was an island made then instead of a century and a half later. The Dutch explorations were made, however, with the chief object of extending the trade of the Dutch East India Company, and not for the mere spirit of adventure. The rugged coasts of this hitherto unknown South land, which Tasman named Van Diemen's Land, after the Governor of Batavia, did not offer any promise of filling the coffers of the company, and we hear of no further Dutch expeditions to this locality.

More than a hundred years later the Frenchman, Marion du Fresne, in command of the *Mascarin* and the *Marquis de Castries* sighted Tasmania. (8) Following on Tasman's charts he coasted along the shore and anchored on the East Coast, (9) a few miles to the north of where the Dutch navigator had furled his sails. Marion's charts merely represent the impressions of the coast obtained by the second European explorer to visit Tasmania, coasting along several miles off shore. As far as Bruny's

(2) Identified by Furneaux in 1773, and named the Mewstone

(3) Cook, in 1777, named this the Eddystone, owing to its resemblance to the English lighthouse of that name.

(4) Furneaux mistook Tasman's localities and renamed the Boreel Islands the Friars. The latter designation is now the one generally used. (See note on nomenclature of Tasman's Head, page 135.)

(5) Evidently the south end of Adventure Bay, where Furneaux anchored in 1773.

(6) Hence the name Storm Bay for the large bay at the estuary of the Derwent.

(7) Tasman, Abel Janszoon—Journal of a Voyage in 1642. Amsterdam, 1898.

(8) Marion sighted V.D L. on the 3rd of March, 1772.

(9) At Marion Bay.

history is concerned, Marion's visit scarcely needs to be considered. (10)

Captain Cook's second voyage to the South Seas commenced in April, 1772, his ships being the *Resolution* and the *Adventure*, Captain Tobias Furneaux being in command of the latter vessel. After leaving the Cape of Good Hope the vessels became separated during a thick fog on the 7th of February, 1773. Cook sailed direct to New Zealand, but Furneaux touched at Tasmania, or as it was then known, the South Coast of New Holland, before rejoining his chief. Furneaux sighted the land near the South West Cape on the 9th of March, 1773, and hauling in for the coast he passed and named the Mewstone Rock, off the entrance to the Channel. On the morning of the 10th, a boat was sent ashore, and on its return the crew reported that they had seen "several places where the Indians had been." The captain of the *Adventure* remarked upon the boldness of the shore, and referred to the fact that it seemed to afford several large bays or anchoring places. It remained for D'Entrecasteaux, however (as the result of an accident), to show that one of these bays was, in reality, a magnificent channel. Furneaux evidently noticed the entrance and took this, together with Cloudy Bay (off the South Coast of Bruny), to be the Storm Bay of Tasman. He records passing "several small islands "and black rocks" which he named "the Fryars." These were actually the Boreel Islands of Tasman, but Furneaux imagined himself to the East of Tasman's Islands—a fact which has led to much confusion. (See remarks on nomenclature of Tasman's Head, page 135.)

At seven in the evening of the 10th of March, being abreast of a fine bay, and having little wind, the vessel came to anchor in twenty-four fathoms, sandy bottom. Furneaux remarks—"We first took this bay to be that "which Tasman called Frederick Henry; but afterwards "found that his is laid down five leagues to the north-"ward of this." As a matter of fact Tasman's anchorage was about fifty miles to the North-East.

The whole of the next day was spent in selecting a watering place and moving the ship further into the bay. Furneaux mistook the present Tasman Peninsula for the Maria Island of Tasman, and records bearings to it. During the five days that the vessel was in the bay several expeditions were made on shore, and the explorers noticed that the trees were mostly burnt near the ground, this being done by the natives, who were in the habit of set-

(10) Crozet's Voyage to Tasmania, New Zealand, etc., 1771-72. Trans. by Ling Roth. London, 1891.

ting the undergrowth on fire. Of the birds observed the following are mentioned in the chief account [11] of the voyage—"A bird like a raven, [12] some of the crow kind, "black, with tips of the feathers of the tail and wings "white, their bill long and very sharp; [13] some paroquets. "The sea-fowl are ducks, teal and the sheldrake. A large "white bird which one of the gentlemen shot, about the "size of a kite of the eagle kind." [14] Of the animals the only record was an opossum. [15] In Forster's account [16] of the voyage, mention is made of a fresh water lake, covered with great flocks of wild ducks and other aquatic fowls.

Furneaux refers to the fact that traces of the natives were noticed and records finding in one of the rough shelters several of their crude implements. These were collected, and in their place were left "several medals, "gun flints, a few nails, and an old empty barrel." After having completed the task of taking in a supply of wood and water, Furneaux sailed from the bay (which had been named *Adventure* after his ship) on the 16th of March.

During Captain Cook's third voyage, the illustrious navigator personally examined portion of the Tasmanian Coast. His ships, the *Resolution* and *Discovery*, [17] arrived off the coast on the twenty-fourth of January, 1777, and in the evening were near the Eddystone Rock, which Cook named. The discovery of the Channel was forecasted, as in describing the coastline Cook states—"I am of opinion "that, were this coast examined, there would be found "some good harbours."

Owing to the wind coming from the South East, it was decided to put into Adventure Bay, and the ships were accordingly brought to anchor. Parties were sent ashore to gather wood and grass, and one such party was surprised by the appearance of several aborigines. Cook's description of the natives states that they were of common stature, but rather slender. "Their "skin was dark, and also their hair, which was as woolly "as that of any native of Guinea; but they were not dis- "tinguished by remarkably thick lips nor flat noses. On "the contrary, their features were far from being disagree- "able. They had pretty good eyes, and their teeth were "tolerably even, but very dirty. Most of them had their

(11) Cook's Voyages.

(12) *Corvus coronoides.*

(13) Probably *Strepera arguta.*

(14) Probably *Haliaëtus leucogaster.*

(15) *Pseudochirus cooki.*

(16) Forster—A Voyage round the World. Dublin, 1777.

(17) The *Discovery* was a vessel of 300 tons, and was commanded by Captain Clerk.

"hair and beards smeared with a red ointment, and some "had their faces painted with the same composition."

The morning of the twenty-ninth of January fell flat calm and prevented Cook from sailing as he had intended. Several parties, therefore, went ashore, and about twenty natives soon appeared. One of the aborigines is described as being "not more distinguishable by the hump upon "his back, than by the drollery of his gestures and the "seeming humour of his speeches."

Cook presented each with a string of beads and a medal. A second party of natives, including some women, also visited another party from the ship who were getting wood elsewhere.

Cook gives details of his bearings, and corrects a few minor errors of Furneaux, but fails to notice the great mistake concerning the position of Maria Island and Frederick Henry Bay which Furneaux had made.

The ships eventually sailed from Adventure Bay on the thirtieth of January, and reached New Zealand ten days later.

On January 7th, 1788, [18a] the First Fleet on the voyage to form the first settlement in New Holland sighted the Mewstone, a typical landmark for the early navigators. The westerly breeze failed them, and they were compelled to lay well off shore in order to weather the outlying rocks off the Coast of Bruny. From this time [18b] onward, particularly until the discovery of Bass Straits, there were vessels passing to and from the new settlement. Certain of these, and of the whaling ships which soon followed, probably anchored off the shores of Bruny.

In August, 1788, Captain Bligh anchored in Adventure Bay in the *Bounty*. He had previously visited the locality as Cook's sailing master on the *Resolution* in 1777, and it was only natural that he should continue to perpetuate the error of Furneaux as regards the position of Frederick Henry Bay. The voyage of the *Bounty*, culminating with the mutiny at Tahiti and Bligh's famous voyage in a small open boat, has become historic. We will therefore deal more fully with Bligh's observations when

(18a) The First Fleet consisted of the Transports *Alexander* 453 tons, *Scarborough* 418, *Charlotte* 346, *Lady Penrhyn* 338, *Prince of Wales* 334, *Friendship* 228. The storeships *Fishbourn* 378, *Borrowdale* 272, *Golden Grove* 331. H.M.S. *Sirius*, 20 guns, 520 tons, and H.M. Brig *Supply*.

(18b) At this time practically nothing was known of Australia beyond a few Coastal features. The following extract from Governor Phillip's Commission is of interest:—

"We . . . . appoint you to be Governor of our territory called New "South Wales, extending from the northern cape or extremity of the "coast called Cape York, in the latitude of 10° 37′ south, to the "southern extremity of the said territory of New South Wales or South "Cape, in the latitude of 43° 39′ south, and all the country inward "to the westward as far as the one hundred and thirty-fifth degree of "longitude." (See Historical Records of Australia, Series I., Vol. 1.)

discussing his later voyage in 1792, when he again called at Adventure Bay when on the way to make his second attempt to transplant the bread fruit trees to the West Indies.

The manuscript of log and narrative of Bligh's second voyage is in the Mitchell Library, Sydney, and I am indebted to Mr. H. Wright, the librarian, who kindly arranged for me to obtain copies of Bligh's writings. During my last visit to Sydney I was also enabled to examine the sketches, etc., relating to the visits to Adventure Bay. From Bligh's account we learn that he arrived off the South-West Coast at sunrise on the 8th of February, 1792, and twenty-four hours later anchored in Adventure Bay. As soon as the ships were moored a start was made in order to obtain fresh supplies of wood and water. Owing to adverse weather conditions, the efforts to obtain fish by means of the seine were unsuccessful, but many fine rock-cod were secured by line fishing, and good sport obtained catching the bream in the lake near the beach. Most of the time of the crew was occupied in getting the wood and water. Bligh was prevented from carrying out several excursions on account of the bad weather, and although it was February the fact is mentioned that snow lay on the "high Table-"land" (i.e., Mt. Wellington).

One of the proposed expeditions, if carried out, might have had far-reaching results, for Bligh, under the impression that the water of the Channel (which he could see from Adventure Bay) was the Frederick Henry Bay of Tasman, was anxious to examine the entrance to the Bay. He naturally considered this to be further to the north—beyond the Cape Frederick Henry (of Furneaux). Bligh proposed to take the smaller vessel of the two (The *Assistant*) and "go round into the Bay of Frederick Henry." Had not bad weather prevented this design being carried out, Bligh would undoubtedly have carried his explorations to the extent of circumnavigating Bruny Island, and therefore have been the discoverer of the Channel, which, owing in the first place to an accident, the French Admiral D'Entrecasteaux was to discover a few months later. By discovering is meant the discovery of the fact that it was a channel and not a bay already named. Bligh and other previous visitors to Adventure Bay had seen the central portion of the Channel before the French investigated it. Bligh's narrative states—"Lieut. Bond and others of our "gentlemen walked along the west shore as far as the "South part of Frederick Henry Bay. From the view he "had of it he gave me the following account.

"The Bay of Frederick Henry is separated on the South

"and East from Adventure Bay by a long narrow neck of "land, which in some parts is only 250 or 300 yards across. "To the N.E. it forms a high peninsula extending to the en- "trances of these two bays. To the North and West is the "main land. The greatest extent is about eight miles from "North to South, and about half the distance across. It "has a small island in the middle, and is perfectly land- "locked. From the shore of the Isthmus is a bank on "which are numerous oysters and muscles. The muscles "were larger, but not so good as those about Adventure "Bay." "The harbour is fine and capacious, perfectly "free from surf, while on the East side of the Isthmus the "sea broke with great fury."

Bligh also refers to the "wigwams" of the aborigines. He describes these as being in the form of a perfect section of a beehive, the open part to the N.E. The covering was large pieces of bark, but was neither wind nor watertight. Around these temporary shelters were scattered many mussel shells and the remains of crayfish, also handfuls of fine shavings, and a bundle of bark about two feet long intended for a flambeau. The wigwam was capable of covering about six people. Bligh himself was unable to personally interview any of the aborigines, but some of the crew met several bands of natives in the bush, and as a result of their observations they reported that the women wore a vestige of clothing in the shape of strips of animals' skins, but that the men were quite naked. The latter had thick bushy beards, but "no paint or dirt was observed about their skins, nor "was the women's hair cut in the manner described by "Capt. Cook." The natives were armed with short sticks ("waddies") and spears about ten feet long.

Bligh deals to a small extent with the natural history of the locality. One of his descriptions is of great interest, as it is probably the earliest record of the Tasmanian "Porcupine-Anteater" (*Tachyglossus* (*Echidna*) *aculeata* var. *setosa*). Bligh records that on February 18th, 1792, "Lieut. Guthrie in excursion to-day "killed an animal of very odd form. It was 17 ins. long "and the same size round the shoulders, to which rather "a small flat head is connected so close, that it can "scarcely be said to have a neck.—It has no mouth like "any other animal, but a kind of Duck Bill, 2 ins. long, "which opens at the extremity, where it will not admit "above the size of a small pistol ball.—The tongue is very "small. It has four legs which carry the belly about an "inch or two from the ground, and on each fore foot it has "three very strong claws an inch long and two about a "quarter of an inch. On the hind feet, it has the same "number, but they resemble more the thumb and fingers

"of a hand, except that the fore claw is longest and curved. "The eyes are remarkably small and just above the beak. "It has no tail, but a rump not unlike that of a pen- "guin, on which are some quills about an inch long, as "strong as and like those of a porcupine—these quills, "or rather prickles, are all over its back amidst a thick "coat of rusty brown hair; but the belly is of a light "greyish colour. The skin is remarkably white."

On the 19th sufficient wood and water had been secured, the ships were ready for sea, but were detained on account of the absence of one of the crew of the *Assistant*. Finally leaving the bay on the 22nd of February, Bligh states that being anxious to know something of "the entrance into "Frederick Henry Bay" he steered three leagues to the north, but was prevented from going further owing to the southerly breeze freshening. He accordingly hauled to the wind and proceeded on his voyage to Tahiti. (18c)

In 1791 the French nation became anxious concerning the fate of La Perouse, who had not been heard of for three years. It was eventually decided to send out an expedition to see if any trace could be found of the *Bouffole* and *Astrolabe*. As a result the ships *Recherche* and *Esperance*, under the command of Admiral Bruny D'Entrecasteaux, left Brest in September, 1791. (19) The complement of the former vessel was one hundred and thirteen, and of the *Esperance* (commanded by Capt. Huon Kermandec), one hundred and six (20)

After touching at several places, including the Cape of Good Hope, the vessels arrived off the Coast of Tasmania, (21) and on April the twenty-first, 1792, the Mewstone was sighted. It had been the Admiral's intention to anchor in Adventure Bay, but owing to an accident (22) he was confined to his cabin and was obliged to give orders respecting the navigation according to the observations reported to him. Upon nearing the land Pilot Willaumez was directed to take the necessary observations, and on being asked the bearings of the Eddystone Rock he gave it as S. 19 degrees W., though it was actually S. 19 degrees E. D'Entrecasteaux therefore gave orders to make for the bay on the left, thinking that this was Adventure Bay. In this manner the Channel which now bears D'Entrecasteaux's name was discovered.

(18c) Bligh's MSS.—The Mitchell Library, Sydney, N.S.W

(19) Labillardiere. Voyage in search of La Perouse. (Trans 1800.) Intro.

(20) Of the 219, as many as 99 had died before the vessels had reached the Isle of France on the return journey.

(21) Then V.D.L., or the southern extremity of New Holland.

(22) During a storm on the 14th of April he had been thrown "against "one of the corners of a barrel organ intended as a present for some "savage chief."

When the ships entered the opening in the coast, Labillardiere states [23]: "In vain we looked for Penguin's "Island, thinking ourselves in Adventure Bay, though it "really was Tempest Bay, named thus by Tasman, who in "having entered it in the month of November, 1642, was "in the most imminent danger of being driven ashore by "a S.E. wind when he endeavoured to get into the main "sea." [24] The French vessels eventually came to anchor in the entrance to the Channel, and the following day, after the boats had been sent out and discovered a sheltered harbour, [25] the ships were gradually towed towards it, but failed to reach the intended anchorage before dark. A boat which had been sent out fishing "took so "many at a single draught of the net that a distribution "was immediately made, and every one contented with his "portion."

Labillardiere states that a few wild dogs were seen in the neighbouring country. As the dingo did not reach Tasmania, it is a matter for conjecture as to what animal is referred to—probably *Thalacinus*.

Whilst the ships lay at anchor two boats were sent out to "reconnoitre the north-east side of Tempest Bay as "far as Cape Tasman." They returned at the end of four days, and it appeared from the result of their observations that "Tasman's Headland and the coast of Adventure "Bay make part of an island separated from Van Diemen's "Land by the sea. After they had gone up the Channel as "far as 43 degrees 17 min. S. lat. they were obliged to re-"turn for want of provisions."

For nearly a month the explorers stayed in the sheltered waters of the bay, and on the evening of the 17th of May, 1792, the *Recherche* and *Esperance* entered the Channel proper—"to which we gave the name of our "Commander, D'Entrecasteaux." Two days later Labillardiere records landing on an island [26] which bounds the Channel through its entire length. A boat from the *Esperance* had passed the night at the same place, and had taken a large haul of fish. The French Naturalist records the collection of a number of plants new to science, most of which "belonged to the genus of *Melaleuca*, *Aster*, "*Epacris*, etc."

A small island situated S. 42 degrees W. of the second anchorage was denominated Partridge Island by

(23) Labillardiere—Voyage in search of La Perouse. (Trans. Lond. 1800.)

(24) Labillardiere was perpetuating Furneaux's error, and presuming the mouth of the Channel to be Storm Bay. Labillardiere is also in error as regards the S.E. wind. Tasman was preparing to anchor in what is now known as Adventure Bay, but was blown to sea by a N.W. gale.

(25) Now known as Recherche Bay.

(26) Bruny Island.

some of the crew who discovered it, owing to the number of quail seen there. These were mistaken for partridges. Two of the ship's officers, who had landed further to the North on Bruny Island, saw several natives who fled at their approach. The aborigines left behind baskets made of rushes, some of which were filled with shell fish and others with pieces of "flint" and fragments of the bark of a tree, as well as several Kangaroo skins and drinking vessels made of the leaves of kelp.

On the 23rd of May, the pinnace, which had been sent out on an exploring expedition returned after having surveyed the whole length of the Channel. Following on this survey the larger vessels were navigated through the strait, and on the 28th of May they sailed from the Channel after having completed a geographical discovery of great importance. The historian of the voyage states that—"The season was advanced and the thermometer had "not yet been lower than 70 degrees above 0, although we "were near the 44th degree of S. latitude. Impetuous "winds reigned in the open sea, while in the strait [27] "we enjoyed the greatest tranquillity. We did not expect "to experience so much security near the Bay of Tempests." [28]

After circumnavigating Australia the *Recherche* and *Esperance* arrived off the South West Coast for the second time in January, 1793. Both ships needed repairs, and the water supply had run very short, so it was resolved to again steer for Van Diemen's Land. They sighted Tasmania on the 19th, and four days later came to anchor in the "Bay of Rocks" at the south end of Recherche Bay, where they remained until the 15th of February. While here various repairs were carried out, and it is recorded that the trials made the year before of the wood of the *Eucalyptus globulus* (Blue Gum) induced the carpenters to employ it in preference to the other species of the same genus.

Many excursions were made ashore and several boat expeditions sent out. On their passage up the Channel the ships were compelled to anchor on several occasions, and on the 15th of February a party from the ships landed on Bruny Island "on some low ground, whence it was easy to reach Adventure Bay in a short time. On the 18th a start was again made, but several natives being seen on the island a number of the ships' company set out to interview them. The aborigines gave the French to understand that they had seen ships before in Adventure Bay. The French vessels were detained by contrary winds, and it took them several days to work clear of

(27) D'Entrecasteaux Channel.
(28) Storm Bay.

the Channel. On the morning of the 24th, however, they were safely brought to anchor in Adventure Bay, where they remained until the first of the following month. Whilst in this locality a raft made of bark, as used by the natives, was found on the shore, and traces were found of Bligh's visit of the previous year. Several inscriptions engraved on the trunks of trees indicated that Bligh had anchored there in February, 1792. The botanists of Bligh's vessel had sown, at a little distance from the shore, cress, acorn, celery, etc. The French saw three young fig trees, two pomegranate trees, and a quince tree, which they had planted, as well as an apple tree, "the stem "of which was near six and a half feet high." Labillardiere dwells upon the fact that an inscription recorded that "Near this tree Captain William Bligh planted 7 fruit "trees, 1792. Messrs. S. & W., Botanists." The aspect which the Frenchman draws attention to is that although the name of the Commander is mentioned the botanists have only their initial inscribed. But it must be remembered that Labillardiere was himself a botanist, and that, to judge from his writings, he was often at variance with the ship's officers concerning the exact status of the scientific staff.

An interesting relic of D'Entrecasteaux's visit to Adventure Bay is drawn attention to by West (29) who states—"Letters buried in a bottle beneath a tree in Ad-"venture Bay were found by Captain Bunker of the *Venus* "in 1809, to which he was directed by the words 'dig "'underneath,' and supposed, from his imperfect know-"ledge of the language, that they were left by Perouse. In "this he was mistaken; they were deposited by D'Entrecas-"teaux at his second visit. *Bent's Almanac*, 1828, adopted "Bunker's mistake; it was copied by Widowson, who adds— "'these letters were dated one month after his departure "'from Port Jackson, and led to the opinion that the Ex-"'pedition must have perished on some reefs of V.D.L. In "'consequence of this idea the French Government in 1791, "'etc.' The first mistake can be allowed for; but not that "a discovery of letters in 1809 prompted by an expedition "in 1791." Even recent writers have stated that there is some evidence to show that La Perouse visited Tasmania, but they could not have been in possession of all the facts.

On the 25th of April, 1793, only a few weeks after the departure of the French vessels, Commodore Sir John Hayes arrived off the South Coast of Tasmania in command of the ships *Duke of Clarence* and *Duchess*. (30) His charts show that he passed outside the Mewstone and

(29) West—History of Tasmania. Launceston. 1852. Vol. I., p. 11.

(30) The *Duke of Clarence* was a ship of 250 tons, and the *Duchess* an armed snow of 100 tons (a snow was very similar to a brig).

Eddystone rocks and endeavoured to anchor in Adventure Bay, but that neither of the ships was able to beat into it owing to contrary winds. Hayes sailed on and eventually entered the Derwent. (31a) He was unaware that the French, under D'Entrecasteaux, had recently explored this locality, and he re-named a number of places to which the French had already afforded designations. One so treated was the Isle Willaumez, which Hayes named Betsey Island. (32) Hayes' ships ascended the Derwent as far as Mt. Direction, (31b) and his boats still further. Traces of his visit are retained by such names as Risdon (33) and Ralph's Bay. (34)

The English ships sailed down the Channel and returned to the Derwent. Many places on the western shore were named, and a chart of the Channel and Bruny Island drawn up. Hayes' charts (35) show that what we now know as Bruny Island he called "Rt. Honourable "William Pitt's Island." The most northern point (the correct Cape de la Sorti of the French) (36) was named Point Hodgson, the present Barnes Bay, Port McCluer, (37) while the S.W. point of the northern half of the island was named Point Capon. Green Island (the Ile Verte of the French) was designated Pelican Island, and Isthmus Bay, Henry Hall's Harbour. (38) Satellite Island was called Sutherland's Island. Hayes missed La Petite Anse of the French, but to La Grande Anse (now Great Taylor's Bay) he gave the name Ray Taylor's Bay, (39) and to Partridge Island (L'Ile aux Perdrix), Thistleton's Island. (40) The small islands or cluster of rocks off the South West Coast of Bruny Island he called Court's Islands, (41) and the point opposite Partridge Island, Point Collins. The Acteon Islands (the Iles Steriles of the French) became Fawcett Isles.

(31a and b) So called by Hayes.

(32) After the ship *Betsey* (Lee). Like many other place names, the designation of Betsey Island has been the subject of romantic tales. The island is often called Franklin Island at the present time, owing to the fact that Lady Franklin purchased it. The island is now the property of the Trustees of the Tasmanian Museum and Botanical Gardens.

(33) Risdon—so called by Hayes, after Wm. Bellamy Risdon, 2nd officer of the *Duke of Clarence*. (Lee.)

(34) Called Relph's Bay by Hayes, after Wm. Relph, Commander of the *Duchess*. The French had given the appropriate title of Double Bay to this locality.

(35) There are several copies, but in this instance we will deal with the copy of the MS. chart in the Admiralty collection. See copies in Mrs. Lee's work, "Commodore Sir John Hayes."

(36) On some charts the position of C. de la Sorti (C. Farewell) is shown too far to the south east.

(37) After John McClure, a Bombay marine officer.

(38) Henry Wallis on later copies.

(39) After Captain Taylor, Bombay marines.

(40) After his old chief, the captain of the *Drake*.

(41) Thomas Court was 1st officer of the *Duke of Clarence*.

To the Channel itself Hayes apparently gave the name of Seton Strait. Mrs. Lee, in describing (42) Hayes' charts states that "Esperance Bay, discovered by the boat "sent out from the *Esperance* and named in honour of the "French ship, is designated A. Adamson's Harbour. The "smaller indentation on its northern shore Hayes named "A. H. Bogle's Bay in memory of Dr. Alexander Bogle, a "former messmate who served on the *Drake* . . . . . "What is most extraordinary with regard to the western "shore is the complete omission from the charts of the "great opening which forms the mouth of the Huon "River. One can only suppose that when sailing down "the strait and returning up it, Hayes missed seeing any "part of the opening."

Anyone conversant with the locality would naturally wonder at such a prominent opening being missed, and a detailed examination of Hayes' charts shows that he not only noticed it, but sailed into the estuary of the river now known as the Huon. The harbour Hayes missed charting was Port Esperance, which might be easily missed from a distance owing to the surrounding hills, and the "A. Adamson's Harbour" of his charts is undoubtedly the mouth of the Huon. Hayes' ships sailed up the river, at any rate a little to the west of Huon Island, which Hayes charts as Jameson's Island. He also refers to Arch Island as Bridge Rock.

After exploring the Channel and the River Derwent Hayes left Tasmania on June 9th.

Flinders and Bass in the *Norfolk* (a sloop of 25 tons) during the voyage in which they conclusively proved that Tasmania was an island, arrived off the entrance to the Channel on the evening of December 13th, 1798. Flinders was mainly working on Hayes' chart of V.D.L., of which he had a copy, but it must also be remembered that Flinders had visited Bruny Island in 1792 when serving as a midshipman on the *Providence* under Bligh. (43)

Owing to the squally westerly weather the little vessel stood off and on during the night, and in the morning it was found that her position was far to leeward. Giving up the idea of entering the Channel the explorers bore up for the Boreel Islands (Friars of Furneaux). Of these islands Flinders states that three of them produced some vegetation, and that that of the largest had been recently burnt off. Flinders had observed also that the vegeta-

(42) Commodore Sir John Hayes. By Ida Lee. London, 1912.

(43) It is interesting to note that Bligh served under Cook, Flinders under Bligh, and later, when Flinders was in command of the *Investigator*, Franklin served under him as a midshipman. Sir John Franklin afterwards became Governor of Tasmania.

tion on the Maetsuycker [44] Islands had been treated in a similar manner, although these rocky outposts are situated several miles from the mainland. This is of interest as showing that the natives used to visit the islands lying off the coast in spite of the fact that they only possessed rough rafts of bark in which to make the journey. The aborigines must have crossed D'Entrecasteaux Channel regularly in their frail vessels in the same manner as they used to visit Betsey, Maria, and other islands off the coast.

Passing Fluted Cape, Flinders was unable to fetch into Adventure Bay, so stood on, intending to enter the Derwent, but as the Henshawe Bay of Hayes appeared to be a very large opening, and the wind was not favourable for entering the river, Flinders sailed on and finally anchored in a sheltered bay. [44a] Flinders did not enter the Derwent until December 23rd, and on Xmas afternoon, 1798, he sailed the sloop up as far as an inlet above Mt Direction. Flinders named this bay Herdsman Cove.[45]

Here the explorers stayed until the end of December and spent the last day of the old year, and the first of the new in beating down the river. On January 2nd, as the wind was strong S.E., they ran into the Channel and anchored in Pruen Cove [46] (of Hayes). On the 3rd they sailed from the Derwent estuary and passed Cape Pillar late in the afternoon. [47]

On the 13th of January, 1802, Admiral Baudin, in command of *Le Geographe* and *Le Naturaliste* arrived off the South Coast of Tasmania, and shortly after noon were near the entrance to the Channel, the weather being stormy with rain showers. Péron records that "boobies "and gulls, and cormorants, and sternæ from the neigh- "bouring rocks in countless legions flew around our ships, "and mingled their piercing screams with the roaring of "the angered waves; a long file of white mozzled dolphins, "with many others of the cetaceous tribe, performed their "evolutions around us." At 4.30 p.m. the ships anchored in 23 fathoms a mile to the west of Partridge Island, From this base several boat expeditions were sent out. One boat from *Le Geographe*, which visited Bruny Island,

(44) In the Tasmanian Museum there are aboriginal crania which were obtained from Maetsuycker and Tasman Islands.

(44a) Now generally known as Norfolk Bay—so called after Flinders' vessel.

(45) "From the pastoral appearance of the surrounding country."—Flinders.

(46) Now Oyster Cove.

(47) Cape Pillar has been stated to be one of the names bestowed by Flinders to prominent coastal features. Cape Pillar, however, was shown by Cox (who visited Tasmania in the *Mercury* in 1789) on his chart, which was published in London in 1791.

met with a number of natives. On the 17th the ships proceeded further into the Channel, but a calm caused them to anchor in 9 fathoms off Cape Ventenat. Péron records that "On the 19th at six in the morning we again made "sail for the North-West Port, in which we proposed an- "choring, and passed in succession Satellite Island, Rich "Point, (48) the Bay of the Isthmus, Cape Legrand, (49) "and Gicquet Point." (50)

The following day, owing to a fishing excursion in the vicinity of Bruny Island, the naturalist of the expedition records the capture of "more than twenty new species "of fish." "I likewise collected 12 or 15 species of new "and very curious conchæ, among which was *Trigonia "antarctica*, N., a species which hitherto was not supposed "to have existence and of which in our climates are many "very extensive banks in a petrified state."

From the anchorage in North-West Bay numerous boat expeditions were made to Bruny Island, the River Derwent, and other places of interest. The vexed question of the correct position of Tasman's Frederick Henry Bay was settled, and the French explorers drew up admirable charts showing the results of their investigations.

Several interviews were had with the natives on Bruny Island. On one occasion a party of native women were met with, who were returning from fishing. The shell fish were carried in bags made of rushes, the bags being fastened round the forehead by a band, and hung down the back. Some of the bags were of great weight.

The ships sailed from the Channel on the 17th of February. Baudin, however, returned to Adventure Bay for a few days in May of the same year. *Le Geographe* had become separated from her consort, and it was with great difficulty that Baudin managed to finally reach Port Jackson, where *Le Naturaliste* had been for some time. In view of the controversies that have taken place concerning the treatment given to French at Port Jackson, Flinders' detention for six years at Mauritius, and the general idea governing the French voyages of discovery generally, Péron's reports make interesting reading. As apart from the naturalist and, owing to the death of Baudin, the historian of the voyage, he frankly confesses himself as a spy. His report (51) on the settlement at Port Jackson, which he furnished to General De Caen, throws an entirely new light on his character.

(48) Named after Riche, the naturalist of the *Esperance*. Now known as Simpson Point.

(49) Named after Legrand, ensign of the *Esperance*. Now known as Kinghorne Point.

(50) Now known as Snug Point (the S.W. Point of N.W. Bay).

(51) For a translation of this report, see Professor Scott's work. "Life of Matthew Flinders," Appendix B., p. 437.

The year after the departure of the French, the *Lady Nelson* and the *Albion* arrived at Risdon, and laid the foundation of the English settlement of our Island State. With the advent of settlement and the stirring era of the whaling days, the island of Bruny was concerned to some extent. This period of its history, however, does not belong here and must remain to be told on some future occasion.

NOTES ON THE NOMENCLATURE OF BRUNY ISLAND.

Actæon Islands. So named from the fact that the ship *Actæon* was wrecked there in November, 1822. There have also been other wrecks in this locality, for instance, the ship *Wallace* in 1835.

These islands had been named the Sterile Isles by the French, and Fawcett Islands by Hayes. The present Admiralty charts show the larger island as Actæon Island, and the smaller as Sterile Island. D'Entrecasteaux named them the Sterile Isles in 1792.

Adventure Bay. So named by Furneaux after his vessel the *Adventure*, which anchored in the bay in 1773.

Arch Island. L'arche of D'Entrecasteaux and Bridge Rock of Hayes.

Apollo Bay. Probably named after the brig *Apollo* (built by Griffiths). The *Apollo* was lost off Maria Island in 1835.

Bad Bay. Commonly known as Cloudy Bay. La Baie Mauvaise of the French.

Barnes Bay. In Ross' Almanack for 1829, Barnes Bay is referred to, so the designation had been bestowed before that date.

Betsey Island. Originally called Willaumez Island by D'Entrecasteaux. Hayes, unaware of the French discoveries, anchored his ships near here in 1793 and re-named it Bestey Island after the ship *Betsey* (at one time commanded by Captain Megson, a friend of his). The island is sometimes referred to as Franklin Island. Lady Franklin purchased the island in 1840. She later vested it in Trustees for the use of the Acclimatisation Society, and after being used for such purposes for many years, it was vested by Act of Parliament (1903, No. 42, s. 15) in the Trustees of the Tasmanian Museum and Botanical Gardens. The island had been used in the twenties for acclima-

tisation purposes, for there are records (52) of silver haired rabbits, pheasants, and peacocks being on the island.

Blanche Rock (Channel). D'Entrecasteaux charted this as "R. Blanc" ("The White Rock"). An additional "he" has, at some period, been added to the French name, and the rock is usually charted as Blanche Rock.

Boreel Islands. Now known as The Friars. Called the Boreel Islands by Tasman in 1642 after a member of the Council of India. Furneaux mistook their location and re-named them The Fryars, which designation, with a slight alteration in the spelling, is now in general use.

Bruny Island. So named after Admiral Bruny D'Entrecasteaux. During the course of its history the locality has been referred to as Bruné and also Bruni, but the correct spelling of Bruny is now in general use. In the early days the island was also called Pitt Island, and some of the early land grants (i.e., Kelly's, 1818) refer to it as Pitt Island. (See notes on Hayes' visit to Tasmania.)

The "Lunawanna-allonah" of the Tasmanian aborigines.

Bull Bay (Shelah Cove). The correct name of this Bay is Shelah Cove, as this designation appears on charts of 1818, and the name Bull Bay was not given until later. Probably named after Captain Bull. This was a noted whaling station in the early days of last century. Ross, in 1830, writing of this locality, states—"Another is called Bull "Bay, being a great resort of boats in the whal-"ing season." The establishments belonged to several whalers in Hobart. (See Shelah Cove.)

Cape Connella. Furneaux referred to the Cape at the south end of Adventure Bay as Fluted Cape. D'Entrecasteaux accepted this designation, refers to it as Cap Cannelé ("Fluted"). Changes have appeared in maps from time to time, and the name Fluted Cape now appears on the charts as the point at the south end of Adventure Bay, while a point a mile or so further to the south has been designated "Cape Connella"—obviously an adaptation from the French Cap Cannelé, which was identical with Fluted Cape.

(52) Bent's Almanack, 1829.

Cape de la Sorti (Cape Farewell). So named by the French as their ships were leaving the Channel. Its original position has been moved, and is shown too far to the East on modern charts. The present Kelly Point is the correct Cape de la Sorti of D'Entrecasteaux.

Cape Frederick Henry. So named owing to Furneaux considering that the Frederick Henry Bay of Tasman was situated a few miles to the north of this point. D'Entrecasteaux refers to this cape as Cap Trobriand.

Cap le Grand (of D'Entrecasteaux). Now known as Kinghorne Point.

Cloudy Bay (Bad Bay). La Baie Mauvaise of D'Entrecasteaux.

Court's Islands. So called by Hayes in honour of Captain Thomas Court, First Officer of the *Duke of Clarence*.

D'Entrecasteaux Channel. Named after Admiral D'Entrecasteaux. Hayes first referred to it as Pruen Strait, but named it Seton Strait on his charts.

Eddystone Rock. So called by Captain Cook during his third voyage in January, 1777. He refers to it as follows—"About a league to the Eastward of "Swilly is another elevated rock that is not taken "notice of by Captain Furneaux. I called it the "Eddystone from its very great resemblance to "that lighthouse."

Fluted Cape. Has been ascribed to Hayes (1793), but Furneaux (1773) refers to it as a fluted pillar, and Anderson's account (1777), published in Cook's Voyages, refers to "Fluted Cape." Appears on D'Entrecasteaux's charts as Fluted Cape or Cap Cannelé. See note re Cape Connella.

Friars. See Boreel Islands.

George III. Rock. So called because the George III. was wrecked there in 1835. One hundred and thirty-four people were lost out of a total of two hundred and ninety-four. Upon Southport Head there is a stone monument which has the following inscription:—

"Near this place are interred the remains of many of the sufferers who perished by the wreck of the George III. convict ship, which vessel struck on a sunken rock near the Actæon Reef on the night of 12th April, 1835, upon which melancholy occasion 134 human beings were drowned. This tomb is erected by the desire of His Excellency

Colonel George Arthur, Lieutenant-Governor, to mark that sad event. and is placed on this spot by Major Thomas Ryan, 50th Regiment, one of the survivors upon this occasion."

Green Island. The Ile Verte of D'Entrecasteaux. This island is referred to by Bligh, who mistook the Channel for Frederick Henry Bay. In the MSS. account of his voyage in 1792 (Mitchell Library, Sydney), Bligh states in his description of the view from Penguin Island—"From the heights "of the island, Frederick Henry Bay can be seen "distinctly, and an island in it bore N. 30 W." See also Bond's description of "Frederick Henry "Bay" in Bligh's MSS.

Great Taylor's Bay—Little Taylor's Bay. A curious blending of the French and English nomenclature is apparent in this case. D'Entrecasteaux refers to the larger inlet as "La Grande Anse," and the smaller as "La Petite Anse." Hayes simply charted one bay. calling it Ray Taylor's Bay (after Captain Taylor, Bombay Marines).

Kelly Point. The correct Cap de la Sorti of the French. Called Kelly Point after Captain Kelly, the discoverer of Port Davey, who was the pilot for the Derwent, and had a farm at this point in the twenties. Ross (1829) refers to the beautiful farm of Mr. Kelly, and on the opposite coast to the farm and tobacco gardens of Mr. Joshua Ferguson at Tinder Box Bay. In 1830 there was a station situated about three miles to the south of Mr. Kelly's farm where rations were issued to the natives.

Kinghorne Point. The Cap le Grand of D'Entrecasteaux's chart. From the letterpress evidently originally intended as Cap Legrand, after Ensign Legrand of the *Esperance*. Like Kelly Point, the early French designation gave way to that of the first settler. Mr. Kinghorne had a farm in this locality in the twenties. I have not been able to trace if he was identical with the Mr. Kinghorne who was at one time master of the colonial schooner *Waterloo*.

Lunawanna. Lunawanna-allonah was the Tasmanian native name for Bruny Island. The names have now been given to two separate districts of South Bruny.

Mewstone. So named by Furneaux on 9th of March, 1773. "About four leagues along shore are three islands "about two miles long, and several rocks resem- "bling the Mewstone (particularly so one which we "so named)"—"Cook's Voyages."

Partridge Island. L'Ile aux Perdrix of the French. So called owing to the sailors mistaking the quail seen there for partridges. Called Thistleton's Island by Hayes. Ross (1836) referring to this locality states that the ship *Enchantress*, Captain Roxburgh, from London, was wrecked on a rock about seven miles from the island in July, 1835, and seventeen people drowned.

Pedra Branca A large rock off the entrance to D'Entrecasteaux Channel. So named by Tasman on 29th November, 1642, owing to its likeness to a similar rock off the coast of China. Furneaux re-named this and the adjacent rocks the Swilly Isles, but this designation has lapsed.

Penguin Island. Named by Furneaux owing to a curious penguin captured here. (53)

Pitt Island. Hayes named Bruny Island the Rt. Hon. William Pitt's Island, and in the very early days of the Colony the island was often referred to as Pitt Island.

Roberts Point. Bent, writing in 1825, refers to the soap and salt factory at Bruny Island, of which Mr. R. A. Roberts was the proprietor. Ross (1829) refers to Mr. Roberts' salt factory at Barnes Bay, and later (1834) refers to the fact that "Con- "siderable exertion has been made within the last "2 or 3 years by Mr. Roberts, the soap manufac- "turer, to open up a coal mine at a convenient "place for shipping, on the border of the Derwent, "about 30 miles below Hobart Town." The locality referred to would probably be the south end of Adventure Bay. If so, Adventure Bay would appear to have been the first part of South Bruny to receive permanent settlers, for Ross, writing in 1830, stated that South Bruny was then little known. No one resided upon it, and except for occasionally a few wandering natives from the northern part of the island, it was quite uninhabited.

(53) See Hull. Rec. Aust Mus., Vol. XII., No. 6. On the occurrence of the Crested Penguin (*Eudyptes chrysosome*) in Australia.

Satellite Island. D'Entrecasteaux charted this island as "I. du Satellite." It is often referred to at the present day as Woody Island, but this latter designation is incorrect. The true Woody Island is the one in Norfolk Bay, which was so named by Flinders.

Shelah Cove. Commonly known as Bull Bay. Upon a plan dated 1818, locating certain land to James Kelly, the Bay is designated Shelah Cove. (54) The plan is filed at the Lands and Survey Office, Hobart. Bruny Island was apparently then called Pitt Island. (See Bull Bay.)

Simpson Point. Point de Riche of D'Entrecasteaux. Riche was a naturalist on the *Esperance*.

Snake Island. I have been unable to trace the original date of this designation, but there is an interesting note regarding the early history of this small isle in a book of sketches relating to "The Voyage "of H.M.S. Britomart, from 1834 to 1843." This MS. volume is in the Library of the Royal Society of Tasmania, and there appears a sketch entitled, "Mr. Cole's House. Snake Island. D'Entrecasteaux Channel." In a note relating to the sketch appears the following:—"About ten "o'clock one dark night, about a fortnight previous "to our visit to the island, four convicts who had "escaped from Port Arthur in a whale boat landed "there. On arriving at the only house on the is- "land they found the owner of it, Mr. Cole, an "old man who had served in the army in his "younger days, sitting before the fire, and his "daughter, a fine strapping girl of 18, just going "to bed. Leaving two of the party, one of "whom was armed with a gun, to guard the father, "the other two obliged Miss Cole to show them "where the stores and provisions were kept. "While they were employed collecting what they "had wanted, Mr. Cole contrived to get posses- "sion of a knife that had been left on the floor "after supper unperceived by the two men who "were left to guard him. He then watched his "time, and striking up the muzzle of the musket, "rushed upon the man who held it, and wounded "him very severely. The second man came to "the rescue and received so severe a wound that "he died soon after. The other two men, alarmed "by the noise of the scuffle, now came in from

(54) I am indebted to Mr W. N. Hurst, Assistant Secretary for Lands, for this information.

"the store room, and succeeded in throwing Mr. "Cole down and would have strangled him had he "not received an unexpected relief from his son "and daughter. The former, a boy of 14, came in "armed with a heavy New Zealand club, with "which he dealt one of the assailants such a blow "as to stun him, and Miss Cole managed to drag "the other man, who had been wounded, away from "her father, who was too much exhausted to pre- "vent them getting away in their boat, but they "were taken next morning. One died from his "wounds, and the rest were hanged."

Storm Bay. So called by Tasman. On the evening of November 29th, 1642, he was making into the bay, evidently intending to come to anchor in Adventure Bay, when a nor'-west gale blew his ships to sea again.

Tasman's Head. Apparently owes its designation to Furneaux, as it first appears on Cook's chart. It is very difficult to reconcile the location noted by Furneaux. It must be remembered, however, that Furneaux was in all probability working on an indifferent copy of Tasman's charts, and also that the published accounts of the English captain's visit to Tasmania may have suffered when his notes were being revised for publication. The account also gives one the impression of having being written as the events happened, and various corrections made later. Furneaux states that upon sighting land they took the first point seen to be the South Cape. Now Tasman's South Cape (Zuyd Caep) is the present Cape Pillar. As he proceeds eastwards and passes the entrance to the Channel, Furneaux thought he was passing across Tasman's Storm Bay. The question naturally arises, how did he come to think that Storm Bay was east of South Cape? (55) If he really thought he was crossing Storm Bay, and was in possession of a copy of Tasman's chart (as he states he was), he would have noticed that Tasman had called the island at the eastern extremity "Tasman's Island." Furneaux, however named the islands (The Boreel Islands of Tasman) at the eastern extremity of what he

(55) This also explains the present nomenclature of South Cape, S.W. Cape, and S.E. Cape on the mainland. They owe their designation to Furneaux, but the original (1642) South Cape is the present Cape Pillar.

took to be Storm Bay, as The Friars. He eventually came to anchor in Adventure Bay, thinking he was in the Frederick Henry Bay of Tasman and that the Peninsula was Maria Island. He states, however, that they found that the true Frederick Henry Bay was some miles to the north. He did not recognise that it was also further to the east, and it was this mistake that led to the confused nomenclature in use at the present day. From his anchorage Furneaux records various bearings, and mentions the north point of the Bay as the one they consider is "Tasman's "Head." I have been unable to find any reference to Tasman's Head on any of Tasman's charts or in his writings. One can only conclude that Furneaux referred to Tasman's Island, as this is shown on the Dutch charts, and is, of course, some miles to the south of Frederick Henry Bay [56] (of Tasman.) Now on the published charts of Cook's voyages, the name Cape Frederick Henry appears as the designation for the northern point of Adventure Bay, and Tasman's Head for the bold south-east extremity of Bruny Island. Apparently both designations were originally due to Furneaux's error as regards his position, and the slight correction made between the written account and the charts did not tend to improve matters.

Taylor's Bay. See Great Taylor's Bay.

Trumpeter Bay. Ross' Almanack for 1830 in describing the inlets of Bruny states "One is called Trum-"peter Bay" from the quantities of that fish caught there.

Ventenat Point. Named after Louis Ventenat, chaplain and naturalist of the *Recherche*.

Zuidpool Rock (D'Entrecasteaux Channel). Named because the ship *Zuidpool*, 536 tons, from Amsterdam, struck this rock, which was not then charted, in December, 1845. The vessel remained on the rock for six hours, but floated off with the rising tide and was not damaged. [57] The rock is often referred to as "The Dutchman."

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(56) The present Blackman's Bay, East Bay Neck.

(57) I am indebted to Mr. J. Adams, Secretary of the Hobart Marine Board, for this information.

A DESCRIPTIVE CATALOGUE OF THE OSTEOLOGICAL SPECIMENS RELATING TO THE TASMANIAN ABORIGINES CONTAINED IN THE TASMANIAN MUSEUM.

By
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and
Clive E. Lord (Curator of the Tasmanian Museum).

(Read 13th September, 1920.)

INTRODUCTORY.

During the course of the preparation of a paper dealing with certain recent valuable additions to the Tasmanian Museum it became necessary for us to revise the complete collection of the osteological specimens relating to the Tasmanian Aborigines.

This list forms a record of the largest single collection of osteological remains of the extinct Tasmanian aboriginal race. It embraces also specimens concerning which data are being gathered for publication. Again, in the course of the work additional particulars have been added to specimens already described in part. As will be seen, with the exception of the researches of Harper and Clarke and later of Berry and Robertson on certain of the crania included in this list, none of the specimens have been described. Even the complete skeleton of Trucanini (the last of her race) remains to be measured and the indices to be tabulated.

Yet again, four more crania, the property of various gentlemen and hitherto undescribed, have been located. It is the intention of the authors to proceed steadily with the work of describing in detail the more important of the specimens included in this list, together with the additional crania mentioned above.

HOMO TASMANENSIS.

LIST OF OSTEOLOGICAL SPECIMENS IN THE TASMANIAN MUSEUM.

Tasmanian Museum No. 1572. Portion of Cranium. ♀

Reference:—Berry and Robertson, Trans. Roy. Soc. Vic., No. 22, Vol. V. (1910).

T.M. No. 3362. (1) Cranium. ♀

(1.) T.M. No. 3362 now includes T.M. 3362-3369. The whole of the bones relating to the skeleton Waubadeba have been given the one index number—3362.

Berry and Robertson No. 9. (2) Harper and Clarke (3) No. 10 (P. and P. Roy. Soc. Tas., 1897).

This is the cranium of "Waubadeba," a fact not noted by either of the above authorities. There are also in the Museum collection additional bones relating to this specimen.

T.M. 3362 now includes the following:—

Cranium. Four fragments R. and L. superior maxillæ. Mandible (not figured by B. and R.). Scapulæ, R. and L. (incomplete). Sternum (incomplete). Ulna, R. (incomplete). Radius, L. (incomplete). Ribs, fragments, R. and L. (15). Femur, R. and L. (incomplete). Tibia, R. and L. (incomplete). Fibula, R. and L. (incomplete). Os calcis (incomplete). Astragalus (incomplete). Metatarsal, fragments (unidentified) 2.

T.M. No. 4287. Complete skeleton. ♀ "Trucanini" (the last of the race).

Berry and Robertson No. 6. Harper and Clarke No. 7.

The above describe the cranium and mandible only. As far as we are aware the remainder of the skeleton has not yet been described.

T.M. No. 4288. Cranium (complete). ♂ "Augustus."
B. and R. No. 1. H. and C. No. 1.

T.M. No. 4289. Cranium (complete). ♀ "Caroline."
B. and R. No. 8. H. and C. No. 9.

T.M. No. 4290. Cranium. ♀
B. and R. No. 14. H. and C. No. 3a.

T.M. No. 4291. Cranium. ♂
B. and R. No. 2. H. and C. No. 2.

T.M. No. 4292. Cranium. ♀
B. and R. No. 11. H. and C. No. 12.

T.M. No. 4293. Cranium. ♀
B. and R. No. 7. H. and C. No. 8.

T.M. No. 4294. Cranium. ♀
B. and R. No. 10. H. and C. No. 11.

T.M. No. 4295. Cranium. ♀
B. and R. No. 15.

T.M. No. 4296. Cranium. ♂
B. and R. No. 16.

T.M. No. 4297. Cranium. ♂
B. and R. No. 13. H. and C. 2a.

(2.) Berry and Robertson. Trans. Roy. Soc. Vic., Vol. V. (1910).
(3.) Harper and Clarke. Papers and Proceedings Royal Society of Tas., 1897.

T.M. No. 4298. Cranium. ♂
B. and R. No. 5. H. and C. No. 6.

T.M. No. 4299.—Missing.

See B and R. No. 2. T.M. 4299 is evidently H. and C.'s No. 3. Future investigations may lead to this skull being returned to the Museum collection.

T M. No. 4300. Cranium. ♂
B. and R. No. 3. H. and Co. No. 4.

T.M. No. 4301. Cranium. ♂
B. and R. No. 4. H. and C. No. 5.

T.M. No. 4302. Cranium. ♂
B. and R. No. 11. H. and C. No. 1a.

T.M. No. 4303. Cranium. ♀
B. and R. No. 17.

T.M. No. 11509. Skull found on beach at Eaglehawk Neck and presented to the Museum by Mr. Parker, January 4, 1910. This skull is probably portion of the large collection (A (E.H.) 555-886) obtained later. Adult skull, less mandible. Very much weathered. Greater portion of R. parietal and frontal, with part of temporal bones being lost through exposure. Skull presents a particularly carinate appearance. Parietal eminences not marked.

T.M. No. 11554. Skull from N. W. Tasmania, presented by Police Department. Skull of young adult. Very much damaged by exposure and weather. Outer table of greater portion of frontal and of portions of both parietal bones has disintegrated. Superciliary ridges wanting, as is glabella, but general configuration of skull, with its parietal eminences and superior portion of occipital bone, is typically Tasmanian.

T.M. No. A. 887. Cranium. Portion of parietal and occipital bones.

This specimen has been in the Museum for very many years. It was found at Triabunna, and presented to the Museum by Captain Vicary. Apparently not previously catalogued.

T.M. No. A. 298. Cranium (incomplete) and mandible.

The left side of this skull is fairly complete, a part of the left parietal bone being absent. The right lateral surface has probably been exposed for a considerable period, and to a large extent is completely gone. The superior and inferior maxillæ present features of unusual interest, and will be described fully in a subsequent paper. This skull was obtained from Tasman Island, being presented to the Museum by the Marine Board of Hobart in 1913.

T.M. No. A. 499. Cranium, less mandible.

Obtained from Maetsuycker Island. (4). Presented by G. H. Oates, 1916.

T.M. No. A. 500. Humerus, R. From Maetsuycker Island.

T.M. No. A. 501. Radius, R. Carpal and Meta-carpal bones, R.

These bones are ankylosed and show signs of chronic inflammation.

T.M. No. A. 506. Portion of Calvarium.
B. and R. No. 22.

T.M. No. A. 507. Frontal and other portions of skull (see B. and R. No. 23.)

To the specimen as figured have been added the right parietal bone, the right temporal bone, and other minor portions, which add considerably to the value of the specimen.

T.M. No. A. 550.

Portion of a skeleton, obtained at Risdon in 1918 and purchased for the Museum, consisting of Cranium. Mandible. Sternum (incomplete) in two fragments. Ribs, ten (incomplete). Scapula, L. acronium process. Scapula, R. coracoid process. Scapula, L. coracoid process. Vertebræ, fourteen (incomplete). Humerus, R., head and proximal end of shaft only. Humerus, L., ditto. Radius, L. (complete). Radius, R., distal portion. Ulna, R. (incomplete). Sacrum (six sacral vertebræ). Innominate, R. and L. (incomplete). Femur, R. and L. (incomplete). Fibula, R., distal extremity. Os calcis, R. and L. Astragalus, R. and L. Tarsal and Metatarsal bones.

T.M. No. A. 551. Cranium. Purchased 1919. (5).

T.M. No. A. 552. Cranium. Purchased 1919. (5).

T.M. No. A. (E.H.) 555. (6). Cranium (incomplete).

Obtained from Eaglehawk Neck. (7).

(4.) Maetsuycker Island is situated on the S.W. Coast. It was discovered by Tasman in 1642 and named after Joan Maetsuycker, a member of the Council of India.

That the natives used to visit the islands off the coast is well known. As regards the aborigines visiting Maetsuycker Island, see Flinders, "Voyage Terra Australis," Intro., p. clxxx.

(5.) Nos. A551 and A552 were purchased from Miss Betts. These skulls were for many years in the possession of the late J. R. Betts and were given to him by Mr. Howells, an old settler in the Bothwell district

(6.) The whole of the Eaglehawk Neck Collection (Nos. A. (E.H.) 555-886) is marked (E.H.)

(7.) Mr. T. I. Brister was responsible for the Museum obtaining this collection. For particulars concerning the discovery of these aboriginal remains see Lord, Pap. and Proc. Roy. Soc. Tas., 1918, p 118.

T.M. No. A. (E.H.) 556. Cranium (incomplete).
Obtained from Eaglehawk Neck.

T.M. No. A. (E.H.) 557. Cranium (incomplete).
Obtained from Eaglehawk Neck.

T.M. No. A. (E.H.) 558. Cranium (incomplete).
Obtained from Eaglehawk Neck.

T.M. No. A. (E.H.) 559. Cranium (incomplete).
Obtained from Eaglehawk Neck.

T.M. No. A. (E.H.) 560. Incomplete frontal, parietal and occipital bones of immature cranium.
Obtained from Eaglehawk Neck.

T.M. No. A. (E.H.) 561. Incomplete frontal, R. and L. parietal and L. temporal bones of cranium.
Obtained from Eaglehawk Neck.

T.M. No. A. (E.H.) 562. Incomplete frontal, portions of R. and L. parietal and occipital bones of cranium.
Obtained from Eaglehawk Neck.

T.M. No. A. (E.H.) 563. Portions of R. and L. parietal and occipital bones of cranium.
Obtained from Eaglehawk Neck.

T.M. No. A. (E.H.) 564. Portion of frontal, R. temporal, occipital and parietal bones of a child.
Obtained from Eaglehawk Neck.

T.M. No. A. (E.H.) 565. Portions of occipital and parietal bones, R. and L. temporal (incomplete) of immature cranium.
Obtained from Eaglehawk Neck.

T.M. No. A. (E.H.) 566a. Portions of occipital and parietal bones of immature cranium.
Obtained from Eaglehawk Neck.

T.M. No. A. (E.H.) 566b. Portion of frontal bone of a child.
Obtained from Eaglehawk Neck.

T.M. No. A. (E.H.) 567. Temporal, R. Adult (incomplete).

T.M. No. A. (E.H.) 568. Temporal, R. Immature (incomplete).

T.M. No. A. (E.H.) 569. Temporal, R. Adult (incomplete).

T.M. No. A. (E.H.) 570. Temporal, L. Immature (incomplete).

T.M. No. A. (E.H.) 571. Temporal, R. Adult (incomplete).

T.M. No. A. (E.H.) 572. Temporal, L. Adult (incomplete).

T.M. No. A. (E.H.) 573. Temporal, L. Adult (incomplete).

T.M. No. A. (E.H.) 574. Temporal, R. Immature (incomplete).

T.M. No. A. (E.H.) 575. Temporal, R. Adult (incomplete).

T.M. No. A. (E.H.) 576. Temporal (incomplete).

T.M. No. A. (E.H.) 577. Mandible (complete).

T.M. No. A. (E.H.) 578. Superior maxillæ. Immature.

T.M. No. A. (E.H.) 579. Mandible. Immature (incomplete).

T.M. No. A. (E.H.) 580. Mandible, R. Ramus and body.

T.M. No. A. (E.H.) 581. Mandible of child (incomplete).

T.M. Nos. A. (E.H.) 582-589. Eight fragments of mandible.

T.M. No. A. (E.H.) 590. Superior maxillæ, R. and L. Adult.

T.M. No. A. (E.H.) 591. Fragment of superior maxilla. Adult.

T.M. No. A. (E.H.) 592. Fragment of superior maxilla. Immature.

T.M. No. A. (E.H.) 593. Fragment of superior maxilla. Adult.

T.M. No. A. (E.H.) 600. Clavicle, R. Portion of acromial extremity wanting.

T.M. No. A. (E.H.) 601. Clavicle, R. Portion of acromial extremity wanting.

T.M. No. A. (E.H.) 602. Clavicle, R. Adult (complete).

T.M. No. A. (E.H.) 603. Clavicle, L. Part of both extremities wanting.

T.M. No. A. (E.H.) 604. Clavicle, R. Portion of acromial end.

T.M. No. A. (E.H.) 605. Clavicle, L. Acromial extremity only.

T.M. No. A. (E.H.) 606. Clavicle, L. Sternal extremity only.

T.M. No. A. (E.H.) 607. Clavicle, L. Sternal extremity only.

T.M. No. A. (E.H.) 608. Clavicle, L. Portion of shaft, less extremities.

T.M. No. A. (E.H.) 609. Clavicle, L. Acromial extremity.
T.M. No. A. (E.H.) 610. Clavicle, R. Immature.
T.M. No. A. (E.H.) 611. Clavicle, L. Immature. Less acromial extremity.
T.M. No. A. (E.H.) 612. Clavicle, R. Immature. Less portion of shaft.
T.M. No. A. (E.H.) 613. Clavicle. Immature. Part of shaft.
T.M. No. A. (E.H.) 614. Scapula, L. (incomplete).
T.M. No. A. (E.H.) 615. Scapula, L. (incomplete).
T.M. No. A. (E.H.) 616. Scapula, L. (incomplete).
T.M. No. A. (E.H.) 617. Scapula, L. Immature (incomplete).
T.M. No. A. (E.H.) 618. Scapula, L. Immature (incomplete).
T.M. No. A. (E.H.) 619. Scapula, R. (incomplete).
T.M. No. A. (E.H.) 620. Scapula, R. (incomplete).
T.M. No. A. (E.H.) 621. Scapula, R. Glenoid cavity and coracoid process.
T.M. No. A. (E.H.) 622. Scapula, L. Immature (incomplete).
T.M. No. A. (E.H.) 623. Scapula, L. (incomplete).
T.M. No. A. (E.H.) 624. Scapula, R. (incomplete).
T.M. No. A. (E.H.) 625. Scapula, R. Immature (incomplete).
T.M. No. A. (E.H.) 625. Scapula, R. Immature (incomplete).
T.M. No. A. (E.H.) 626. Scapula, L. Immature (incomplete).
T.M. No. A. (E.H.) 627. Scapula, L. (incomplete).
T.M. No. A. (E.H.) 628. Scapula, L. (incomplete).
T.M. No. A. (E.H.) 629. Scapula, L. Acromial process.
T.M. No. A. (E.H.) 630. Humerus, R. Shaft and distal extremity.
T.M. No. A. (E.H.) 631. Humerus, L. Shaft.
T.M. No. A. (E.H.) 632. Humerus, R. Shaft and distal extremity.
T.M. No. A. (E.H.) 633. Humerus, L. Less both extremities.
T.M. No. A. (E.H.) 634. Humerus, R. Shaft, less both extremities.

T.M. No. A. (E.H.) 635. Humerus, L. Shaft (child).
T.M. No. A. (E.H.) 636. Humerus, L. Distal extremity (child).
T.M. No. A. (E.H.) 637. Humerus, L. Distal extremity.
T.M. No. A. (E.H.) 638. Humerus, R. Part of shaft and distal extremity.
T.M. No. A. (E.H.) 640. Humerus, R. Distal extremity.
T.M. No. A. (E.H.) 641. Humerus, L. Distal extremity (child).
T.M. No. A. (E.H.) 642. Humerus, R. Distal extremity.
T.M. No. A. (E.H.) 643. Humerus, L. Part of shaft and distal extremity.
T.M. No. A. (E.H.) 644. Humerus, R. Part of shaft (child).
T.M. No. A. (E.H.) 645. Humerus, R. Part of shaft (child).
T.M. No. A. (E.H.) 646. Humerus, L. Part of shaft and distal extremity.
T.M. No. A. (E.H.) 647. Humerus, R. Comparatively complete (young child).
T.M. No. A. (E.H.) 648. Humerus, L. Complete in three parts (adult).
T.M. No. A. (E.H.) 649. Humerus, L. Distal extremity.
T.M. No. A. (E.H.) 650. Humerus, L. (Child.)
T.M. No. A. (E.H.) 651. Humerus, L. Distal extremity.
T.M No. A. (E.H.) 652. Humerus, R. Proximal extremity.
T.M. No. A. (E.H.) 653. Humerus, R. Proximal extremity.
T.M. No. A. (E.H.) 654. Humerus, L. Proximal extremity.
T.M. No. A. (E.H.) 655. Humerus, L. Shaft.
T.M. No. A. (E.H.) 656. Humerus, R. Distal extremity.
T.M. No. A. (E.H.) 657. Humerus. Portion of shaft.
T.M. No. A. (E.H.) 658a. Humerus, L. Portion of shaft (immature).
T.M. No. A. (E.H.) 658b. Humerus, L. Portion of head.

T.M. No. A. (E.H.) 659a. Humerus. Portion of head.

T.M. No. A. (E.H.) 659b. Humerus. Part of shaft.

T.M. No. A. (E.H.) 660. Ulna, R. Proximal extremity and portion of shaft.

T.M. No. A. (E.H.) 661. Ulna, L. Proximal extremity and portion of shaft.

T.M. No. A. (E.H.) 662. Ulna, R. Proximal extremity and portion of shaft.

T.M. No. A. (E.H.) 663. Ulna, L. Shaft, less head.

T.M. No. A. (E.H.) 664. Ulna, R. Proximal extremity and shaft.

T.M. No. A. (E.H.) 665. Ulna, L. Less head and styloid process.

T.M. No. A. (E.H.) 666. Ulna, L. Proximal extremity.

T.M. No. A. (E.H.) 667. Ulna, R. Proximal extremity.

T.M. No. A. (E.H.) 668. Ulna, L. Proximal extremity and part of shaft.

T.M. No. A. (E.H.) 669. Ulna, R. Proximal extremity and portion of shaft.

T.M. No. A. (E.H.) 670. Ulna, R. Proximal extremity and part of shaft.

T.M. No. A. (E.H.) 671. Ulna, L. Proximal extremity and part of shaft

T.M. No. A. (E.H.) 672. Ulna, L. Proximal extremity and part of shaft.

T.M. No. A. (E.H.) 673. Ulna, L. Proximal extremity and part of shaft.

T.M. No. A. (E.H.) 674. Ulna, L. Head and part of shaft.

T.M. No. A. (E.H.) 675. Ulna, L. Head and part of shaft.

T.M. No. A. (E.H.) 676. Ulna, L. Portion of head and shaft.

T.M. No. A. (E.H.) 677a. Ulna, L. Portion of head and shaft.

T.M. No. A. (E.H.) 677b. Ulna, L. Head.

T.M. No. A. (E.H.) 677c. Ulna, R. Head.

T.M. No. A. (E.H.) 678. Radius, R.

T.M. No. A. (E.H.) 679. Radius, R. Less distal extremity.

T.M. No. A. (E.H.) 680. Radius, R. Distal extremity.
T.M. No. A. (E.H.) 681. Radius, L. Distal extremity.
T.M. No. A. (E.H.) 682. Radius, R. Distal extremity.
T.M. No. A. (E.H.) 683. Radius, L. Distal extremity.
T.M. No. A. (E.H.) 684. Radius, R. Complete in two parts.
T.M. No. A. (E.H.) 685. Radius, R. Shaft, less both extremities.
T.M. No. A. (E.H.) 686. Radius, L. Shaft, less both extremities.
T.M. No. A. (E.H.) 687. Radius, L. Distal extremity.
T.M. No. A. (E.H.) 688. Radius, L. Head and part of shaft.
T.M. No. A. (E.H.) 689. Radius, R. Head and part of shaft.
T.M. No. A. (E.H.) 690. Radius, R. Head and part of shaft (immature).
T.M. No. A. (E.H.) 691a. Ulna, R. Shaft.
T.M. No. A. (E.H.) 691b. Ulna. Portion of shaft.
T.M. No. A. (E.H.) 692. Sternum. Presternum and mesosternum less ensiform process.
T.M. No. A. (E.H.) 693. Sternum. Portion of mesosternum.
T.M. No. A. (E.H.) 694. Sacrum. Less part fifth sacral vertebræ. Laterally distorted.
T.M. No. A. (E.H.) 695. Sacrum. First and second sacral vertebræ.
T.M. No. A. (E.H.) 696. Sacrum. Adult. Practically complete.
T.M. No. A. (E.H.) 697. First sacral vertebra (immature).
T.M. No. A. (E.H.) 698. First sacral vertebra (immature).
T.M. No. A. (E.H.) 699. Sacral vertebræ (immature).
T.M. No. A. (E.H.) 700. Sacral vertebræ (immature).
T.M. No. A. (E.H.) 701. Os innominatum, L. Ilium. Adult (incomplete).
T.M. No. A. (E.H.) 702. Os innominatum, L. Ilium. Adult (incomplete).

T.M. No. A. (E.H.) 703. Adult (incomplete).	Os innominatum, L.	Ilium.
T.M. No. A. (E.H.) 704. Adult (incomplete).	Os innominatum, R.	Ilium.
T.M. No. A. (E.H.) 705. Adult (incomplete).	Os innominatum, L.	Ilium.
T.M. No. A. (E.H.) 706. Adult (incomplete).	Os innominatum, R.	Ilium.
T.M. No. A. (E.H.) 707. Adult (incomplete).	Os innominatum, R.	Ischium.
T.M. No. A. (E.H.) 708. Adult (incomplete).	Os innominatum, R.	Ilium.
T.M. No. A. (E.H.) 709. Adult (incomplete).	Os innominatum, L.	Ilium.
T.M. No. A. (E.H.) 710. Adult (incomplete).	Os innominatum, L.	Ischium.
T.M. No. A. (E.H.) 711. Adult (incomplete).	Os innominatum, R.	Ischium.
T.M. No. A. (E.H.) 712. Adult (incomplete).	Os innominatum, L.	Ischium.
T.M. No. A. (E.H.) 713. Adult (incomplete).	Os innominatum, R.	Ischium.
T.M. No. A. (E.H.) 714. Adult (incomplete).	Os innominatum, L.	Ischium.
T.M. No. A. (E.H.) 715. Adult (incomplete).	Os innominatum, L.	Ischium.
T.M. No. A. (E.H.) 716. Adult (incomplete)	Os innominatum, L.	Pubis.
T.M. No. A. (E.H.) 717. Adult (incomplete).	Os innominatum, L.	Ilium.
T.M. No. A. (E.H.) 718. Immature.	Os innominatum, R.	Ilium.
T.M. No. A. (E.H.) 719. Immature.	Os innominatum, L.	Ilium.
T.M. No. A. (E.H.) 720. Immature.	Os innominatum, L.	Ilium.
T.M. No. A. (E.H.) 721. Immature.	Os innominatum, L.	Ilium.
T.M. No. A. (E.H.) 722. Immature.	Os innominatum, L.	Ilium.
T.M. No. A. (E.H.) 723. Immature.	Os innominatum, R.	Ilium.
T.M. No. A. (E.H.) 724. Immature.	Os innominatum, R.	Ilium.

T.M. No. A. (E.H.) 725. Os innominatum, L. Ilium. Immature.

T.M. No. A. (E.H.) 726. Os innominatum, R. Ilium. Immature.

T.M. No. A. (E.H.) 727. Os innominatum, R. Ilium. Immature.

T.M. No. A. (E.H.) 728. Os innominatum, R. Ilium Immature.

T.M. No. A. (E.H.) 729. Os innominatum, L. Ilium.

T.M. No. A. (E.H.) 730. Os innominatum, L. Ischium. Immature.

T.M. No. A. (E.H.) 731. Os innominatum, R. Pubis. Adult.

T.M. No. A. (E.H.) 732. Os innominatum, R. Ischium. Immature.

T.M. No. A. (E.H.) 733. Os innominatum, R. Ischium. Immature.

T.M. No. A. (E.H.) 734 Os innominatum, L. Pubis. Adult.

T.M. No. A. (E.H.) 735. Os innominatum, L. Ischium. Immature.

T.M. No. A. (E.H.) 736. Os innominatum, R. Ischium. Immature.

T.M. No. A. (E.H.) 737. Os innominatum, L. Ischium. Mature.

T.M. No. A. (E.H.) 738. Os innominatum, L. Pubis. Adult.

T.M. No. A. (E.H.) 739. Os innominatum, L. Pubis. Adult.

T.M. No. A. (E.H.) 740. Os innominatum, L. Pubis. Immature.

T.M. No. A. (E.H.) 741. Os innominatum, L. Ischium. Immature.

T.M. No. A. (E.H.) 742. Os innominatum, L. Pubis. Immature.

T.M. No. A. (E.H.) 743. Os innominatum, R. Ilium. Immature.

T.M. No. A. (E.H.) 744. Os innominatum, R. Ischium. Immature.

T.M. No. A. (E.H.) 745. Os innominatum, R. Ischium and Pubis. Immature.

T.M. No. A. (E.H.) 746. Os innominatum, R. Ischium and Pubis. Immature.

T.M. No. A. (E.H.) 747. Os innominatum, R. Ischium and Pubis. Immature.

T.M. No. A. (E.H.) 748. Os innominatum. Ischium and Pubis. Immature.

T.M. No. A. (E.H.) 749. Os innominatum. Ischium and Pubis. Immature.

T.M. No. A. (E.H.) 750. Os innominatum, L. Ischium and Pubis. Immature.

T.M. No. A. (E.H.) 751. Os innominatum. R. Ischium and Pubis. Immature.

T.M. No. A. (E.H.) 752. Os innominatum, R. Ischium. Immature.

T.M. No. A. (E.H.) 753. Os innominatum, R. Ischium. Immature.

T.M. No. A. (E.H.) 754. Os innominatum, L. Ischium. Immature.

T.M. No. A. (E.H.) 755. Os innominatum, R. Ischium. Immature.

T.M. No. A. (E.H.) 756. Femur, R. Adult.

T.M. No. A. (E.H.) 757. Femur, R. Adult.

T.M. No. A. (E.H.) 758. Femur, R. Adult.

T.M. No. A. (E.H.) 759. Femur, R. Adult.

T.M. No. A. (E.H.) 760. Femur, R. Immature.

T.M. No. A. (E.H.) 761. Femur, L. Adult.

T.M. No. A. (E.H.) 762. Femur, L. Adult.

T.M. No. A. (E.H.) 763. Femur, L. Adult.

T.M. No. A. (E.H.) 764. Femur, L. Adult.

T.M. No. A. (E.H.) 765. Femur, L. Distal extremity.

T.M. No. A. (E.H.) 766. Femur, L. Adult (in two portions).

T.M. No. A. (E.H.) 767. Femur, L. Shaft less epiphyses.

T.M. No. A. (E.H.) 768. Femur, L. Shaft.

T.M. No. A. (E.H.) 769. Femur, L. Shaft.

T.M. No. A. (E.H.) 770. Femur, R. Portion of shaft.

T.M. No. A. (E.H.) 771. Femur, L. Portion of shaft. Immature.

T.M. No. A. (E.H.) 772. Femur, R. Portion of shaft. Immature.

T.M. No. A. (E.H.) 773. Femur, R. Portion of shaft. Immature.

T.M. No. A. (E.H.) 774. Femur, R. Portion of shaft. Immature.
T.M. No. A. (E.H.) 775. Femur, L. Shaft.
T.M. No. A. (E.H.) 776. Femur, L. Distal extremity, less epiphyses.
T.M. No. A. (E.H.) 777. Femur, L. Distal extremity, less epiphyses.
T.M. No. A. (E.H.) 778. Femur, L. Distal extremity, less epiphyses.
T.M. No. A. (E.H.) 779. Femur, L. Distal extremity, less epiphyses.
T.M. No. A. (E.H.) 780. Femur, L. Distal extremity, less epiphyses.
T.M. No. A. (E.H.) 781. Femur. Distal epiphysis.
T.M. No. A. (E.H.) 782. Femur. Distal epiphysis.
T.M. No. A. (E.H.) 783. Femur. Distal epiphysis.
T.M. No. A. (E.H.) 784. Femur. Distal epiphysis.
T.M. No. A. (E.H.) 785. Femur. Distal epiphysis.
T.M. No. A. (E.H.) 786. Femur. Distal epiphysis.
T.M. No. A. (E.H.) 787. Femur. Distal epiphysis.
T.M. No. A. (E.H.) 788. Femur. Distal epiphysis.
T.M. No. A. (E.H.) 789. Femur. Distal epiphysis.
T.M. No. A. (E.H.) 790. Femur. Distal epiphysis.
T.M. No. A. (E.H.) 791. Patella. Adult.
T.M. No. A. (E.H.) 792. Patella. Adult.
T.M. No. A. (E.H.) 793. Tibia, L. Adult.
T.M. No. A. (E.H.) 794. Tibia, R. Adult.
T.M. No. A. (E.H.) 795. Tibia, R. Adult.
T.M. No. A. (E.H.) 796. Tibia, R. Adult.
T.M. No. A. (E.H.) 797. Tibia, L. Adult.
T.M. No. A. (E.H.) 798. Tibia, L. Adult.
T.M. No. A. (E.H.) 799. Tibia, R. Distal extremity. Adult.
T.M. No. A. (E.H.) 800. Tibia. Head. Adult.
T.M. No. A. (E.H.) 801. Tibia. Portion of shaft.
T.M. No. A. (E.H.) 802. Tibia. Proximal extremity and shaft.
T.M. No. A. (E.H.) 803. Tibia, L. Less epiphyses.
T.M. No. A. (E.H.) 804. Tibia, L. Less epiphyses.
T.M. No. A. (E.H.) 805. Tibia. Shaft.

T.M. No. A. (E.H.) 806. Tibia, R. Shaft.
T.M. No. A. (E.H.) 807. Tibia, L. Shaft.
T.M. No. A. (E.H.) 808. Tibia, L. Shaft.
T.M. No. A. (E.H.) 809. Tibia, R. Shaft and proximal extremity, less superior epiphysis.
T.M. No. A. (E.H.) 810. Tibia, R. Proximal extremity (immature).
T.M. No. A. (E.H.) 811. Tibia, R. Proximal extremity (immature).
T.M. No. A. (E.H.) 812. Tibia. Part of shaft and distal extremity, less epiphysis.
T.M. No. A. (E.H.) 813. Tibia, R. Shaft, less superior epiphysis.
T.M. No. A. (E.H.) 814. Tibia. Superior epiphysis.
T.M. No. A. (E.H.) 815. Tibia. Superior epiphysis.
T.M. No. A. (E.H.) 816. Tibia. Superior epiphysis.
T.M. No. A. (E.H.) 817. Tibia. Superior epiphysis.
T.M. No. A. (E.H.) 818. Tibia. Superior epiphysis.
T.M. No. A. (E.H.) 819. Tibia. Superior epiphysis.
T.M. No. A. (E.H.) 820. Tibia. Superior epiphysis.
T.M. No. A. (E.H.) 821. Fibula, R. Head and shaft.
T.M. No. A. (E.H.) 822. Fibula, L. Head.
T.M. No. A. (E.H.) 823. Fibula, R. Head.
T.M. No. A. (E.H.) 824. Fibula, R. Distal extremity.
T.M. No. A. (E.H.) 825. Fibula, R. Distal extremity.
T.M. No. A. (E.H.) 826. Fibula, R. Distal extremity.
T.M. No. A. (E.H.) 827. Fibula. Distal extremity.
T.M. No. A. (E.H.) 828. Fibula. Distal extremity.
T.M. No. A. (E.H.) 829. Fibula. Distal extremity.
T.M. No. A. (E.H.) 830. Fibula, L. Head and proximal portion of shaft.
T.M. No. A. (E.H.) 831. Fibula. Portion of shaft.
T.M. No. A. (E.H.) 832. Fibula. Portion of shaft.
T.M. No. A. (E.H.) 833. Fibula. Portion of shaft.
T.M. No. A. (E.H.) 833. Fibula. Portion of shaft.
T.M. No. A. (E.H.) 834. Fibula. Portion of shaft.
T.M. No. A. (E.H.) 835. Fibula, L. Distal extremity.
T.M. No. A. (E.H.) 836. Fibula, L. Distal extremity.
T.M. No. A. (E.H.) 837. Fibula. Portion of shaft.

T.M. No. A. (E.H.) 838. Fibula. Portion of shaft.
T.M. No. A. (E.H.) 839. Femur. Superior epiphysis.
T.M. No. A. (E.H.) 840. Femur. Superior epiphysis.
T.M. No. A. (E.H.) 841. Femur. Superior epiphysis.
T.M. No. A. (E.H.) 842. Femur. Superior epiphysis.
T.M. No. A. (E.H.) 843. Femur. Superior epiphysis.
T.M. No. A. (E.H.) 844. Femur. Superior epiphysis.
T.M. No. A. (E.H.) 845. Rib, L. First cervical.
T.M. No. A. (E.H.) 846. Rib, R. First cervical.
T.M. No. A. (E.H.) 847. Rib, R. First cervical (child).
T.M. No. A. (E.H.) 848. Rib, R. Portion of body.
T.M. No. A. (E.H.) 849. Rib, L. Portion of body.
T.M. No. A. (E.H.) 850. Rib. Fragment of body.
T.M. Nos. A. (E.H.) 851-871. Ribs. Fragments.
T.M. No. A. (E.H.) 872. Ribs. Fragments, 100 pieces.
T.M. No. A. (E.H.) 873. Metacarpal, metatarsal and phalangeal bones (87 bones).
T.M. No. A. (E.H.) 874. Carpal and tarsal bones.
T.M. No. A. (E.H.) 875. Atlas.
T.M. No. A. (E.H.) 876. Axis.
T.M. No. A. (E.H.) 877. Axis.
T.M. No. A. (E.H.) 878. Axis.
T.M. No. A. (E.H.) 879. Axis.
T.M. No. A. (E.H.) 880. Axis.
T.M. No. A. (E.H.) 881. Axis.
T.M. No. A. (E.H.) 882. Axis.
T.M. No. A. (E.H.) 883. Vertebræ. Cervical, dorsal, and lumbar. (Fifty vertebræ, fairly complete.)
T.M. No. A. (E.H.) 884. Vertebræ. Portions.
T.M. No. A. (E.H.) 885. Numerous small portions of bones.
T.M. No. A. (E.H.) 886. Malar bones (3), R., R. and L.

ADDITIONS TO THE FUNGUS FLORA OF TASMANIA.

Part 3.

By L. Rodway, C.M.G.,

Government Botanist.

(Read 11th October, 1920.)

The previous notes and additions to our cryptogamic flora may be found in the Papers and Proceedings for the years 1917 and 1919.

Of those plants here recorded for Tasmania, but not as new species, fuller descriptions may be found in Cooke's Australian Fungi or in Massee's British Fungus Flora.

Cordyceps hawkesii. This, though close to *C. gunnii*, appears to be fairly distinct. The club is paler in colour; the perithecia less sunk and the fertile portion ceases abruptly and not imperceptibly shading away.

It appears to be confined to the north-east of Tasmania.

Ascomyces aureus, Mag. This is the Golden Blister of Black and Lombardy Poplar, common in many places in Tasmania.

Introduced with the host plant.

Ascocorticium effusum, n.s. A thin crimson sheet growing over dead wood and adjoining earth for many centimetres; immarginate and undifferentiated into body and hymenium, asci arising direct from web-like hyphæ. Asci clavate, 8 spored. Spores elliptic, obtuse, smooth, hyaline, 12-15 x 6 μ. Paraphyses filiform, septate, slightly thickened at apex.

On dead wood and clay. McRobie's Gully. Something like *Trentopolia* but more crimson, very different in structure. Evanescent.

Ascobolus nitidus, n.s. Discoid, 0.3 mm. diameter on a slender stem of the same length, pale dull greenish-ochre, waxy, smooth externally. Asci protruding, pyriform, 8 spored; spores in an irregular group, oblong, sooty-black, smooth, uniseptate, 10 x 6 μ.

On rotting *Poria*. Cascades, Hobart.

Peziza badia, Pers. Sessile, concave, then flat, mostly 2-4cm. diameter, disk dark brown, external surface paler, often tinged with purple, minutely granular. Asci cylindric, 8 spored. Spores elliptic, hyaline, smooth, or minutely verrucose, 16 x 9 μ. Paraphyses slender.

Very like *Curreyella trachycarpa*, but with very different spores.

Mt. Nelson.

Sepultaria austro-geaster, n.s. Oblong, at first subterranean and closed, about 1cm. diameter, at maturity bursting above just on surface of soil into few lobes as in outer peridium of *Geaster*. Fleshy, dull brown, rather darker internally; externally clothed with numerous hyphæ permeating sandy soil. Asci linear, 8 spored. Spores broadly elliptic, very obtuse, hyaline, smooth, 24 x 10 μ. Paraphyses clavate with a thickened end not coloured, septate, the cells in many instances swollen and moniliform.

On Sandy hill, Bellerive, Aug.-Sept.

Sepultaria aurantia, n.s The habit of the last only rather smaller. Margin fimbriate, disk bright orange-yellow to ochre. Spores elliptic, rather acute at both ends, hyaline, smooth, 22 x 8 μ. Paraphyses filiform, septate, hyaline.

On Sandy hill, Bellerive, Aug.-Sept.

Geopyxis pallidus, n.s. Cupshaped, 5-8mm. diameter, on a slender stem 10mm., all parts white, thin, fleshy, externally smooth or slightly mealy, margin brownish with short irregular fimbriations. Hymenium smooth, asci linear, spores uniseriate, oblong, 22-24 x 10 μ., hyaline, minutely verruculose. Paraphyses filiform.

On ground, Mt. Nelosn.

Cyathicula multicuspidata, n.s. Cupshaped, sessile, white, delicate, about 1mm. broad, smooth, but the margin armed with compound lobes. Asci cylindric, 8 spored, uniseriate. Spores hyaline, smooth, continuous, narrow oblong, 15-20 x 4 μ., but immature.

On decaying rhachis of *Dicksonia*.

Peziza brunneo-atra, Desm. Dark chestnut-brown, about 1cm., sessile, broadly attached, discoid at maturity. Asci cylindric. Spores uniseriate, elliptic, hyaline, granular rough, 27 x 12 μ. Paraphyses filiform with brown clavulate tips. *Humaria macrospora, Fekl.*

On ground, Bellerive.

Helotium claro-flavum, Berk. Small, seldom exceeding 1mm. diameter, lemon-yellow throughout, concave to convex, very shortly stalked. Asci clavate, spores elliptic, hyaline, obtuse, 7-10 x 3 μ.

On dead wood, not at all common.

Helotium striatum, n.s. Attached by a very short slender stalk or sessile; disk fleshy, soft, concave, pale cinereous when fresh, ochre when dry, 1-2mm. diameter, externally sooty brown, smooth, striate; asci clavate, paraphyses filiform; spores oblong, obtuse, hyaline 6 x 3μ.

On dead wood.

Helotium microsporium, n.s Discoid, shortly stipitate, 1-2mm. diameter, livid, nearly white, soft fleshy, externally smooth; asci cylindric, spores hyaline, smooth oblong, obtuse, 4.5 x 2 μ.

Very close to *Mollisia.*

Much paler than *H. prasinum.*

On dead wood.

Helotium carnosum, n.s. Sessile or very shortly stalked, pale ochre yellow when fresh, soft fleshy becoming darker to dull red when old, 1mm. diameter, rim thick involute, convex, externally delicately pruinose; asci cylindric; spores hyaline, smooth, narrow oblong, 6 x 1.5 μ.

On dead wood.

Helotium tasmanicum, n.s. Sessile, concave to convex, 2-4mm., bright orange yellow all over but externally a little paler, slightly furfuraceous, asci cylindric, spores narrow oblong, 14-18 x 3-4.5 μ., hyaline, smooth, not with a darker disk as in *H. citrinum,* to which it is closely related.

On dead wood.

Mollisia undulata, n.s. Soft waxy, sessile, usually broadly affixed, concavo-discoid, undulate, 5-8mm., livid gray, turning black when dry, externally black; asci narrow cylindric, spores narrow oblong, smooth hyaline, 6 x 1.5 μ., paraphyses filiform.

Differs from *M. cinerea* in large size, broad attachment, undulate disk, black exterior, and absence of even white margin, completely collapsing when dry.

On rotting wood.

Dasyscypha ovina, n.s. Superficial to partially erumpent, sessile, cupshaped, exciple exceeding the disk, externally coarsely woolly with a dense vestiture of globose cells, dull ochre brown, 1-2mm. diameter; asci cylindric, spores 8, uniseriate, broadly elliptic, obtuse, smooth, brown at maturity, 14 x 8 μ., paraphyses slender with clavate olive tips.

On dead bark.

Humaria omphalodes, Mass. Minute disks 1mm. diameter, orange to reddish, arising from a spreading subiculum on burnt ground; spores elliptic, 11-13 x 6 μ.

On Domain.

Cenangella tasmanica, n.s. Erumpent, cartilaginous, sessile, concavo-convex, smooth, black; asci cylindric, 8 spores in one series; spores elliptic, subacute, uniseptate, smooth, wall thick, light purple when mature 10-12 x 5 μ., paraphyses filiform, mostly branched above.

On dead wood.

Patellaria massea, n.s. Gregarious, sessile, concave then plane, dark green becoming black when dry, 1-2 mm. broad. Asci clavate, base little constricted, 8 spored, staining blue with iodine, 150 x 10 μ. Spores in two series, oblongo-elliptic, 3-6, often 5, septate, hyaline, 18-22 x 5 μ. Paraphyses filiform, ramose, apex thickened.

Allied to *P. tasmanica, Berk.*, but distinguished by the larger size of the ascophore, also by the larger septate spores. The hypothecium and excipulum consist of slender interwoven hyphæ.

On dead branches of *Acacia verniciflua.*

The above is the description of the plant by the late Mr. Massee in Kew Bulletin No. 138, under the name of *Patellaria maura, n.s.* Unfortunately this name was already applied by Phillips to a European plant.

Tremella mesenterica, Retz. Toughly gelatinous, lobes short and contorted, surface pruinose with white spores.

Very common, but not recorded for Tasmania. Much tougher and darker than in *T. lutescens.*

Auricularia mesenterica, Fries. Waxy when fresh, resupinate on under surface of fallen wood, nearly black to greyish-brown, margin reflexed, velvety.

Fairly common.

Coniophora ochracea, Mass. Very broadly effused, submembranaceous, usually indeterminate; hymenium pulverulent, whitish then ochraceous; spores yellowish, subglobose, 8 x 6 μ.

Common on dead wood.

Solenia anomala, Fries. Minute, cup-shaped, on a slender stalk usually under 1 mm. high, externally hairy dingy brown to ochraceous, hymenium smooth, spores oblong, 7 x 4 μ.

On dead wood. Resembling a brown *Dasyscypha*, but the hymenium is basidiosporous.

Typhula tasmanica, n.s. Very slender, filiform, arising from a peltate strigose base, white or pale ochre below; stipes 2 cm., fertile portion 1 cm., and very little enlarged. Spores white, smooth, broadly oblong, slightly unequal sided, 6 x 3-4 μ.

On dead Eucalypt leaf.

Hydnangium glabrum, n.s. Irregularly globose, red-brown, 1cm., no sterile base. Peridium very thin not differentiated, gleba pale red-brown to ochre, canals very numerous and tortuous. Spores spherical glabrous or with few very minute asperities, white, 7-10 μ.

Close to *Hymenogaster levisporus*.

Slopes of Mt. Wellington.

Gymnomyces solidus, n.s. Irregularly globose, white, 1cm. Peridium none, the tramal plates defining the sporiferous cavities protruding externally. Gleba dense white, canals .3 mm. diameter closely packed, full of spores. Spores white globose, coarsely echinulate, 12 μ.

Slopes of Mt. Wellington.

Hymenogaster barnardi, n.s. Irregularly globose, white, 1-1.5 cm. Peridium very thin. Gleba rather tough white, cells numerous much convoluted, no sterile base. Spores oblong, acute at both ends, hyaline, smooth, white, 16-18 x 7 μ.

McRobie's Gully.

Hymenogaster maideni, n.s. Globose, 2 cm. Peridium very thin, white or slightly ochraceous when exposed. Sterile base obsolete. Gleba white, canals numerous, small, contorted. Spores ovate to oblong, yellow brown, smooth, 10-12 x 6 μ.

McRobie's Gully.

Dasyscypha pteridophylla, n.s. Cupulate on a short slender stem, lemon-yellow throughout, about 0.3 mm. diameter, clothed externally with short slender hairs, asci cylindric, eight spores biseriate. Spores fusiform, acute, hyaline, 16 x 1.5 μ. Paraphyses filiform.

On stipe of Dicksonia, National Park.

Rhizina atra, n.s. Discoid, black, plane, undulate, bound down except on the margin by mycelial strands, externally pruinose, mostly 1 cm. diameter, rather tough. Asci cylindric, eight spored in one series. Spores broadly oblong, dark brown, coarsely verrucose, 22 x 12 μ. Paraphyses filiform, clavate at the apex, brown.

On ground, in woods, McRobie's Gully.

Humaria tenacella, Phil. Cupulate, to discoid, sessile, dark umber brown, externally paler and furfuraceous, asci cylindric, spores elliptic, smooth, hyaline, 15 x 7 μ.; paraphyses filiform with clavate dark umber tips.

On ground, Ridgeway.

Humaria rutilans, Fr. Cupulate, 0.5-1 cm. diameter, pale crimson to orange, externally slightly pubescent, paler. Asci cylindric; spores elliptic, obtuse, hyaline, granular when mature 25 x 14 μ.

On burnt ground, McRobie's Gully.

Humaria mollispora, n.s. Hemispheric, sessile, fleshy, pinkish-hyaline, 1 mm. diameter, exciple smooth, parenchymatous, disk plane; asci cylindric, eight spored. Spores elliptico-fusiform, smooth, hyaline, rather irregular in form due to the spore wall being very thin, 18 x 5 μ. Paraphyses filiform with slightly clavate tips.

Near *H. omphalodes, Mass.*

Cascades, Hobart.

Barlaea verrucosa, n.s. Hemispheric to plane, sessile, crimson, fleshy, 1 mm. diameter, the exciple parenchymatous. Asci cylindric, eight spores in one series. Spores globose 20 μ. diameter covered with large hemispheric warts even when young, hyaline. Paraphyses slender, claverulate, crimson.

On ground, Cascades, Hobart.

Morchella tasmanica, J. Ramsbottom. This is a Morel often found in Tasmania, and hitherto referred to *M. esculenta, Linn.* It differs chiefly in the capitulum being more cylindric, and the spores larger. The species is described in the Journal of Ecology, Vol. VIII., No. 1, March, 1920, from material gathered in Tasmania by Miss Gibbs.

Trametes serpens, *Fr.* At first tubercular and crumpent on dead wood, then resupinate and spreading on the surface, margin determinate, pubescent, pores rounded or angular, unequal, obtuse, 1.3 mm. diameter; spores ovoid, hyaline, 14 x 6 μ. (Cooke).

Very like *Poria vaporaria*, but distinguished at once by the much larger pores.

Lindisfarne.

Radulum orbiculare, *Fr.* Orbicular pale or white, often many centimetres wide and confluent, glabrous, but covered with prominent cylindric-obtuse to hemispheric tubercles 2-3 mm. long, margin hyssoid. Spores cylindric-oblong slightly curved, 10 x 5 μ

On dead wood, Cascades, Hobart.

FIRST DISCOVERY OF PORT DAVEY AND MACQUARIE HARBOUR, BY JAMES KELLY.

[Note.—The MS. containing the following account is in the Society's Library at Hobart, and owing to its great historical interest the Council decided to publish same. The Manuscript is in Kelly's handwriting, and apparently was originally contained in two note books which have since been bound together as one. There is, in the Mitchell Library, Sydney, another account of this voyage. It is not in Kelly's handwriting, but is signed by him. The peculiar fact is that this second account commences the voyage on 16th December, 1815, and concludes with the completion of the journey on January 24th.

The following account was evidently written some time after the completion of the voyage. As far as a printed copy will permit it is reproduced here exactly as Captain Kelly wrote it.

James Kelly was born at Parramatta, N.S.W., on 24th December, 1791. His parents do not appear to have been in affluent circumstances. Although self-educated, James Kelly's natural ability soon showed itself, as he rose from cabin boy to commander. He later became the owner of several ships trading out of Hobart.

Captain Kelly was appointed Harbour Master for the River Derwent on 18th April, 1819, and for many years lived at North Bruny. He died on 20th April, 1859.—Ed.]

FIRST DISCOVERY OF PORT DAVEY AND MACQUARIE HARBOUR, BY JAMES KELLY.

on the 12th of December 1815 James Kelly Sailed from Hobart Town in a Small Sized open five oared Whale Boat to Examine the then Unknown West Coast of Van. D. Land accompanied by the following Named four Men as the Crew

John Griffiths a Native of the Colony
George Briggs Do.
William Jones Englishman
Thomas Toombs Do.

on the 13th we attempted to haul the Boat up on the South Side of Recherche" Bay but was prevented by a Large Body of Natives giving us a Tremenduous Volley of Stones and Spears" we Were obliged to Retreat to the North Side of the Bay and Haul up for the Night

on the Morning of the 14th Launched and proceeded Round the South Coast of Van D. Land, With a fresh Breze at South East at Sun Set the Same Evening Hauled up in a Small Sandy Bay to the Northward of the Largest of the De,, Witts Isles Here we had a Freindly Reception from a Large Number of Natives—we made them a few presents of Some Sugar and Biscuit But the Disgusting" Sight of them Puling Virmin" by Handfulls from thair Heads and Beards and Eating them Which they Seemed to Enjoy" more than the Sugar and Biscuit, in fact it Seemed Like a Rejoicing at them Seeing thair New Visitors, but they did not Seem the Least Hostile as they Brought Down thair Women and Children to see us, Which Denotes friendship in these Savages. at Dusk they took thair Leave of us and pointed to a Small Rising Hill about a Mile Distant Signifying that they intended to Sleep there we thought it was only a Decoy" to put us off our Guard but we Kept a Good Watch During the Night in Case of an attact but we Saw no more of them."

at Day Light of the 15th We Launched and proceeded to the Westward towards the South West Cape about Noon we put into a Bay about Eight or Nine Miles to the Eastward of S W Cape which was Named New Harbour but on Sounding found it Verry Shoal and only fit for small Vessels although Looking well to the Eye after Geting inside we Remained in this Place only two or three Hours and then proceeded on to the Westward—at Sun Set Hauled up on a Small Low Island about four Miles Eatward of S W Cape Where we Remained the Night" this is a Good Boat Harbour being only seperated by a Boat Passage from the Main Land, with a Good Stream of fresh Water and Plenty of Wood

on the Morning of the 16th Launched and Steered to the Westward—at Noon Rounded the S W Cape Distant about a quarter of a Mile with a fair Wind at South East and Steered along the Shore to the North West in the Evening Hauled up on a Small Grassy Island for the Night about Seven Miles to the N W of the Cape this Island Nearly Joins the Main, seperated only by a Small Boat Passage, and not a good Boat Harbour

at Daylight of the 17th Launched and Steered along Shore to the North West at Noon Entered a Large inlet

Which was Named Port Davey" in Honor of the then (1) Lieutenant governor (2) of Van D. Land in the Evening we Hauled up on a Low Sandy point three Miles up the North Side of the Harbour Where we Remaind the Night, inside of a thick Scrub we Cleared away about two Rods" of Rich Ground and Sowed" a quantity of Garden Seeds" this was Named Garden Point in Consequence", We Remaind in the Harbour three Days the 18th. 19th & 20th Sounding and Making a Sketch of its Extent the Eastern arm was Named Bathurst" Harbour in Honor of Lord. Bathurst" Secretary for the Colonies" the Inner West Point of Port Davey was Named Point Lucy" in Honor of Miss Davey" Daughter of the Lieutenant Governor. During our Stay in this place we Caught a Great quantity of Wild fowl" Black Swans Ducks teel and plenty of Ells and fish

on the 21st of December we took our Departure with a Light breze at East from Port Davy" and Steered along the Coast to the Northward in the Evening we Landed on a Low Grassy Island about five Miles to the Southward of Low Rocky point and Close to the Main Land, here we fell in with two Natives aboriginees, they Seemed Verry Much alarmed at Seeing us they Were above Six feet high thair Stomachs Verry Large Legs and arms Verry thin and Seemed as if they Were Nearly Starved we gave them two Black Swans of Which we had a good Stock in the Boat they Seemed Delighted with the present on Landing on the Island we intended to Remain the Night but fearing there Were More of them on the Island it was thought best to Leave it Which we Did and hauled up for the Night in a Small Creek half a Mile to the Southard of Low Rocky Point this was named Craw fish Creek in Consequence of the Immence Number of Craw fish that Lay at the Waters Edge they appeared to have been Gathered the day previous Which must have been Done by the Natives there Was above three tons in one Heap

on the Morning of the 22d Launched and Steered along the Land to the Northward at Sun Set Hauled up in a Snug Cove Near High Rocky point on the 23d and 24th a heavy Swell Roleing in from the Westward Which prevented us from proceeding along the Coast, 25th December Christmas Day"—Strong Gales" from the West-

(1.) [Note the wording, "of the *then* Lieutenant Governor." This is one of the indications that this account was written some time after the voyage. Colonel Davey was Lieutenant Governor of V.D.L. from 4th February, 1813, until April, 1817.—Ed.]

(2.) [Lieutenant Governor. V.D.L. was then a dependency of N.S.W. It was not proclaimed a separate colony until 3rd December, 1825.—Ed.]

ward and a Heavy Sea Heaving into the Cove, this Day we Had a Glorious" Feed for Dinner Two Black Swans" One Roasted (stuck up) the other a Sea Pie a three Decker in the Large Iron Pot a first Rate Christmas" Dinner on the West Coast of, Van Diemans Land—after Dinner" We Named the Cove Christmas Cove" by throwing" a Glass of Brandy into the Salt Water and Three Hearty Cheers for the ocasione—on the 26th the Gale abated—on the 27th in the Morning we Launched with a Light Breze" from the Southard and proceeded along Shore to the Northward In the fore Noon the Wind freshened and Blew Strong at S.S.Et. we Run Close along Shore untill the Evening Where we Hauled up on a Small Sandy Beach, inside of Some High Rocks that Lies a Little Distance from the Shore and about Six Miles to the Southard of Macquarie" Harbour—at Noon this day Passed Point Hibbs" Close too and Examined it—on the Morning of the 28th Launched Weather Calm Pulled along Shore to the Northward—at Noon Rounded a projecting point Which opened to an Inlet" to the South East, we found a Strong Current" Running out Which Made us Believe there must be a Large River in the South East Direction—"

The Whole face of the Coast Was, on fire and Lucky it Was for us it Was on fire, for the Smoke was so thick We Could not See a Hundred yards a Head of the Boat, on puling into the "Narrows" at the Small Entrance Island We Heard a Large Number of Natives Shouting and Making a Great Noise as if they Were Hunting Kangaroos,"

It was Lucky the Smoke was So thick for Had the Natives Seen the Boat passing through the Narrow Entrance it is possible they would have Killed Every person on Board by Volleys" of Stones and Spears" in thair usual Way

in the afternoon the Smoke Cleared off a little we found ourselves in a Large Sheet of Water Near a Small Island Where we Landed and found plenty of Black Swans on thair Nests, and plenty of thair Eggs we Remaind on the Island, the Night Which Kept us Safe from the Natives—on the 29th the Morning was Clear we Could see Nearly all over the Harbour this Island Was Named Elizabeth Island in honor of Mrs. Gordon" Wife of James Gordon" Eq. of Pit Water" in Van D. Land, the Harbour was Named Macquariie" Harbour in Honor of the then Governor of New South Wales"—we Launched and pulled to a point on the South Shore Nearly oposite the Island Where we Caught about a Dozen fat Black Swans" to Eat we Had four of our Stock Left that we

Brought from Port Davey" after Catching a fresh Supply we gave those four thair Liberty in Macquarie" Harbour and Named the Point—Liberty Point in Consequence—at Sun Set We Hauled up on an Island about twenty five Miles up the Harbour which was Named Sarah' Island in Honor of Mrs. Birch" Wife of Thos. William Birch Eq. of Hobart Town

on the Morning" of the 30th Launched and proceeded further up the Harbour untill we Came to the Mouth of a fresh Water River Made a Sketch of it and Named it Gordon" River in Honor of James Gordon Esq. of Pit Water, he Having Kindly Lent his Boat for this particular trip of Discovery" Round Van D. Land

This Day we proceeded up an Inlet to the Southard of Gordon" River Which was Named Birches Inlet in Honor of Mr. Birch—on the 31st we Went Round Macquarie" Harbour Made a Sketch of it and found it to be a Bar Harbour only for Vessels of a Light Draft of Water we also found Plenty of Huon" pine Growing on the Banks of the Harbour

on the Morning of 1st January 1816 We Left Macquarie Harbour With a fresh Breze at South East This day we Run a Long Distance to the North West Having a Strong fair Wind at 8 P M attemped to get into a River Which was Named Retreat" River being Nearly Lost on the Bar in a Heavy Surf During the Night of the 1t January it Blew a Strong Gale from the Southard We were obliged to Heave the Boat Too by a Raft made of the oars with about forty five fathoms of Rope Where she Lay Verry Snug During the Night, the Men taking it in turns to attend to the Steer oar" to Keep the Boat End on to the Sea and Having a Good Tarpaulin" that Covered the Boat all over She Lay Verry Dry—at Day Light of the Morning of the 2d of January Hauled the Raft in, Set the Reefed Lug" and Steered in for the West point of Van D. Land with a Heavy Sea Runing," as we Neared the Shore we had to pass" through Heavy tide Rips the tide Runing to the Southard against the Wind made it more Dangerous"

We got Within 500 yards of the Shore, the Boat was pooped by a Heavy Sea that filled her to the thoughts—and had it Not Been for the Precaution" taken Before we Left Hobarton" that was of Having three good Buckets Slung with Lanyards and fastened to the thoughts for the purpose of Bailing the Boat on Such an Emergency" we must all Have Been Lost" However by the quick use of the Buckets the Boat was Soon Bailed out—we got under the Lee of the point and Landed on a Small Sandy Beach

Hauled the Boat up and Began to Examine" our Clothes Blankets Provisions and arms' all of Which" was Wet" and Nearly useless" fortunately the Amunition" was in a Small Box in the Stern of the Boat that was Water tight Which Preserved" it otherwise" we Should have been Badly off

We now thought we were Safe so far and had just got a Large fire" made to Dry ourselves" When to our great Astonishment" we were acosted by Six Huge Men, Black Natives" Each of them above Six feet high and Verry Stout Made thair faces Greased and Blacked they had a Spear in Each of thair Right Hands and two in thair Left" they Were quite Naked and appeard quite Ready for War" or Mischief—our Men got Greatly alarmed and Called out What Was to be Done—it was thought Best to make gestures" to them to Come Closeer to us" they Were Standing Behind a Low thick Scrub and did not seem inclined to Come any Nearer, our arms" all Wet and no Means of Defending ourselves we Were in a Verry Dangerous" Situation —

it hapened that Luck was Still at our side we Had 9 or 10 Black Swans" and a Large Wombat in the Boat that we Brought from Macquarie" Harbour for fresh Provisions" on Showing them one of the Swans" they Seemed Delighted and Came Nearer to the Boat after they Came out of the Scrub" we saw more of thair War Impliments" as Each of them Had a Spear betwen the Great toe of Each of thair feet Draging them along the Ground we Supposed they Had never Seen a White Man Before, it was thought best to try to Barter with them for thair Spears" that if we got Posssion" of them they Could not Hurt us —we Luckily Succeeded—and gave them four Swans" and the Wombat" for all thair Spear's they Seemed much pleased with thair Bargain" they Went away Holding up one Hand as a Sign of frienship we Were Equally pleased When they Were gone we saw no more of them, During the Evening a Great Number of Smoaks ware made along the Coast Which we thought to be Signals" Betwen the Natives

We Remained on the Beach that Night and got our arms" dried and put in fireing order Keeping a Good Watch, in Case the Natives Should pay us another Visit— On Examining our Bread flour Tea Sugar etc we found it nearly all Spoiled Which Caused us to go on Short allowance" —

on the Morning of the 3d of January at Day Light we Launched and proceeded to the Northward towards Cape Grim" it was Nearly Calm" during the day with a

Heavy Swell from the Westward we had to pull" Nearly the Whole of the Day in the Evening Hauld up in a Small Nook about 9 Miles to the Southard of Cape Grim"—

on the Morning of the 4th Launched and Stood to the Northward with a Light Breze at South East—about Noon Rounded Cape Grim" we passed Between two Pinnical Rocks that Lies Near the Cape we Were Nearly filled in a tide Rip Going through but Luckily Escaped We pulled along Shore to the Eastward untill we Came to the South End of the Largest Hunters Island we Landed on a point oposite on the Main Land on a Large flat of Pebble Stones to Boil our Kittle" and take a Rest there was a Great many fires along the Shore we Kept the Boat afloat and the arms" Ready in Case of an attack by the Natives Tooms" and Jones" were Left to take Care of the Boat and Have the arms" in Readiness" we had Just got a fire Lighted When we Saw a Large Body of Natives at Least fifty in Number Standing at the Edge of the Bush about fifty yards from us they Were all armed with Spears" and Waddies We Immediately Brought the arms" from the Boat and put ourselves" in a State of Defence" Near the fire they Began to advance Slowly towards us We held up our Pieces" and made Signs to them not to Come any Closeer" they Held up thair Spears" in Return with Loud-Laughing and Jeering" at us as if they thought we Were afraid of them at Seeing them so formidable" We thought it best to Retreat to the Boat, When all of a Sudden they Laid Down thair Spears and Waddies in the Edge of the Bush and holding up Both thair Hands as if they did not mean any Mischief, at the Same time Making Signs to us to Lay Down our arms" Which we did To Satisfy them for if we had Retreated to the Boat quickly they Must Have Killed Every one, Before we Could Have got out of the Reach of thair Spears x—they then Began to Come to us one by one Holding up Both thair Hands to Show they had no Weapon" But we Kept a good Lookout that they had no Spears betwen thair toes as they had on a former occasion" but they had none"—there was 20) Twenty two Came to the fire (we Made Signs to them that no more Should Come") upon that being Understood two More Came from the Bush together one of them Seemed to be a Chief a Stout good Looking Man about Six feet High 30 years of age, the other an old Man about Six feet Seven Inches High with Scarcely" a Bit of flesh" on his Bones. When the Chief Came he ordered them all to sit Down on the Ground Which they did and formed a Sort of Circle" Round the fire, the Chief ordered the old Man to Dance and Sing, as if to amuse us Which he did, Making

ugly" faces and puting himself into Most Singular attitudes. While the old Man Was Engaged in his Dancing and Singing we found out it was only to take our attention off What the Chief and his Men Were Doing, he ordered them to gather pebble Stones about the Size of Hens Eggs and put them Betwen thair Legs Where they Sat for the purpose as we Supposed to make an atack on us with the Stones at this our Men Began to get alarmed and Expecting some Mischief Would be Done We planed it to give them a few Swans" and get off as Well as we Could—Briggs—Brought two Swans" from the Boat one under Each arm When the Chief Saw them he Rushed at Briggs to take the Swans" from him but did not Succeed he then ordered his men to give us a Volley" of Stones Which they did by him giving them the time in most Beautiful order by him Calling With the Swing of the arm three times Yah". yah". yah", and a Severe Volley it Was, I Had a pair of Large Dueling Pistols in my Coat pocket Loaded with two Balls Each and seeing there Was no, alternative" I fired one amongst them, Which Dispersed them the other I fired after them as they Ran away two of them Draged Briggs along the Ground a little Distance to get the Swans" from him but did not Succeed—the Chief and his men Run into the Bush and Was quickly" out of Sight—on Looking Round after they had all Ran" away we found the 6 feet 7 inch Dancing Gentleman Laying on his Back on the Ground We thought of Course he was Dead" but on turning him over to Examine his Wounds" found he had not a Blemish on him, his Pulse" was going at 130" it must have been the Report of the Pistols" that frightened him, We then set him on his feet to See if he Could Walk he opened his Eyes" and trembled Verry Much We Led him a few Steps towards the Bush he stood up Straight Looked around him and took one Jump towards the Bush the Next Leap" he was out of Sight as Soon as he was out of Sight the Hills around Echoed" with Shouts of Joy" from the Voices of Men Women" and Children that the Daning" Gentleman had escaped—We measured the first Jump the old Man took, it was Exactly Eleven" yards but the Second one must have been More this was More Like the Jump of a Kangaroo" than a Man—

We found Several Marks of Blood on the Stones in the Direction that the Natives Run away When the Pistols was fired, Some of them must have been Wounded, we got into our Boat, Just as we Were pulling away we Received a Volley" of Stones and Spears from the Natives one Spear Went through the Side of the Boat But Luck-

ily" no one was Hurt We Landed on a Small Rock Covered with Birds they Were Laying we got Six Buckets full of fresh Eggs" a good Supply"

this Seemed to ofend the Natives as a Number of Women Came down on a point of Rocks and abused" us Verry Much for taking thair Eggs" We pulled to a Small Island 3 Miles to the North East" one of the Hunters Islands Where we Hauled up for the Night

On the 5th at Daylight we Launched with a Light Breze at N.W. and Went into Robins" Passage"—Examined it, in the Evening Hauled up for the Night in the East End of the Passage—

on the 6th in the Morning" We Launched with a Light Breze" at South West and pulled along Shore towards Circular Head at Sun Set Hauled up for the Night on the Beach" at the South East side of the Head—on the 7th at Day Light Launched with a Strong Breze" from the Westward and Run along Shore all the Day to the Eastward at Sun Set Hauled up on a Pebbley" Beach about Forty Miles" from Circular Head—The 8th Strong Brezes from the Westward at Day Light Launched and Run along Shore to the Eastward, this Day" Run a Long Distance" at Sun Set arrived at What was Called the first Western" River—We hauld up for the Night this River has Since been Called Port Sorell"—(3)

9th at Daylight Launched Wind North West and Steered towards Port Dalrymple" at Noon arrivd at George" town, on Landing at the Wharf we Were Hailed by a Man Like a Soldier"—Who, are you What Boat is that Before we had time to answer" Eight Men Rushed from Bihind an old Building with Muskets' and fixed Bayonets" in thair Hands Sayaing if you Move we Will Kill Every Man of you, one of them Seemed to be an officer" he had a Double Barrel in his hand Himself and the Rest Were all Dressed in Kangaroo Skin and a Ruffian" Like Mob" they Were, the officer Said have you any arms" in the Boat, the answer Was yes" plenty, he then said Sargeant Handcuff them all and hand the arms" out of the Boat —we were Handcuffed two and two as we Came out of the Boat But the Captain of the Boat had the Honor of being Handcuffed by himself When we were out of the Boat Standing on the Wharf the officer Said now my Ladds" What Have you to Say for yourselves" I have been a Long time Looking for you and have got you at Last"—

(3.) [Note the wording:—This has *since* been called Port Sorell. Colonel William Sorell held office as Lieutenant Governor from 8th April, 1817, until 1824. The designation was probably changed during his term of office.—Ed.]

you are the Collegues" of Michael" Howe the Bushranger and if you do not give me all the Information—Where we Can find Howe and his party I will send you all to Hobart Town in Double Irons" I told him we Knew nothing of Howe" and that we Were on a Voyage of Discovery Round the West Coast of Van Diemans" Land he Laughed at this and Said that Story went do for me I then Recognised" him to be Major Stuart 46th Reigment Commdant at Launceston—I put my hand into my Waistcoat Pocket to find the Key" of the Amunition" Box" Where our Port Clearance" Was Kept, he in a flurry" Said Sergeant" Mind he is puting his hand in his Pocket I Supposed the Gallant Major" thought I was going to take out a Pistol to shoot him the Serjeant Seized my hand and Said what are you going to do—I said there is the Key of the Box" that will give you all the Information you Require.

the Sargeant unlocked the Box and took out the amunition" the Journal" and Port Clearance" Which he handed to the Major it Was a printed form in the Usual" Way filled up and to the following" Effect—

Commandants Office

Military Barracks Hobart Town

Those are to Certify to all Whome it May Concern" that the Boat Elizabeth" Commanded by Mr. James Kelly" was Cleared out for the West Coast of Van Diemans Land on a Voyage of Discovery after Having paid the Acustomed Dues

Given under my hand
this 11th Day of December, 1815
in the absence" of the Lieutenant
Governor
Wm. Nairn,
Captain 46th Reigment
Commandant.

the Names of the following Persons" who Comprised the Crew of the Boat was Writen in the Margin" of the Clearance"

John . Griffiths
George . Briggs"
William Jones—
Thomas Tooms"

When the Major Received the Clearance" from the Sergeant he turned Round and Walked a few paces Seem-

ing to Examine" it Verry Minutely, in a few Minutues" he Returned—and Said—

How Long" have you been from Hobart Town—the Answer was from the Date of that Clearance" Have you Seen any Military parties in Search of Bushrangers", not any, Have you seen any Boats or Vessels on the Coast, Not any, When you Left Hobart Town Were you aware that Bushranger's Was out, Yes", Where was the Lieutenant Governor, it was Said he was gone to the Lakes", he asked Several other questions, he then Said Sergeant toake the Handcuffs" off those Men, the order was obeyed, he said Which of you is the person in Charge of this Boat Mr. Kelly answered, I am, Are you the Person Who was Master of the Brig Sophia" Some time ago at Hobart Town, I am, Have you Ever Seen me Before Mr. Kelly, O" yes, Repeatedly, Where, at Hobart Town I have Dined With you often at Mr. Birches" in the Castle" Still Holding the Clearance in his hand Reading it and Could Scarcely" Believe it he Said is it Usual" at Hobart Town to give Clearances" Such as this to open" Boats going Round the Coast, Mr. Kelly answered it Was" and Was always the Case Since Martial Law Commenced" in this Island he then Called the Mens Names over one by one from the Clearance" and asked them a Great many questions Still Looking Verry Suspisiously" at them

the Major said now Mr. Kelly" are you quite Sure you Know who I am, the answer" was O" yes I Cannot Mistake you, you are Major Stuart" of the 46th Reigment Commondant at Launceston—the Major then Said Mr. Kelly I am quite Satisfied Who you are give me your Hand and I am Verry Sorry for What has hapened that was puting yourself and your men in Irons" But had it not been for the Port Clearance" I Certainly Could not have Believed But you Were an associate" of Michael Howe the Bushranger", However you must Come up to the Government Cotage and accept of a Knife and fork and a bed at my quarters While you Remain at George Town—Sergeant you will haul Mr. Kellys Boat up Close to the Barracks—Let the oars etc. with the arrms" be secured in the Guard house and Let his Men Live With the Soldiers, give them plenty to Eat and Grog" but Dont Let them get Drunk,

Here was a Chang in the State of affairs" Mr. Kelly a Prisoner" in Handcuffs" and in a few Hours Released and Seated at the Majors" table Dining and partaking of a Bottle of his Best Wine," after Dinner the Major"

Related to Mr. Kelly that he had only Returned to to George Town, the Day previous that he had been out with a Strong party of Military" for the Last Six Weeks" Round the North East Coast in search of Howe" and his party but heard nothing of them

that he had Received Information that Howe" Intended to Lay Wait at the Entrance of the Tamer" to Capture a Boat or a Vessel" that he Might make his Escape over to the Coast of New Holland—Mr. Kelly Spent the Night in the Majors quarters and Having a good Nights Sleep on a good Bed Having been Sleeping in the open air by a fire Side for twenty five Nights Previous he awoke in the Morning and found himself Verry Much Refreshed his men was also well housed and good Beding in the Soldiers Barracks

10th January We Remained this Day at George Town under the Majors Hospitable Roof During the Day he ordered the Seargeant to open the Public" Store and Issue to us as Much Provisions, Such as flour Tea Sugar Beef Pork Spirits etc. as we thought proper to ask for he also Remarked that the Mens Beding and Cloathing were not Sufficient for Such a Voyage as we were on he ordered the Seargeant who was the Store Keeper to Issue to Each Man one Pair of Blankets and one Suit of Slops, this Being all Public Property Mr. K. offered to give a Draft on Hobart Town for the Whole amount of the Supplies We had Received but the Generous" Major said No you shall not pay any thing for What you have Receved I will account to the Government for all, you are on a Voyage of Discovery What you are Doing is for the Public Good and for the Good of this Colony—in the Evening Every thing was Ready to Start the Next Morning and took another Night of the Majors Hospitality—the Major prepared a Despatch adressed to the Lieutenant Governor at Hobart Town" informing him of What he had Done with Mr. Kelly" and that Mr. Kelly had offered his Services in the Event of him falling in with Howe" and his party to Return to George Town or proceed on to Hobart Town Which Ever might be most Convenient to inform the Government of Howes" Position—Mr. Kelly was also Requested that in the Event of him Coming in Contact with the Bushrangers to Destroy the Despatch for fear of them falling into Howes" Hands

it was not often that Communication Could be Had by the Government" betwen Hobart Town and George Town, in Consequence of Howes" Formidable Position in the Bush" and Repeatedly Sending threatining Letters to

the Lieutenant Governor telling him that he Should open all his Despatches—and the Armed—Messengers" who Conveyed them if they Were Soldiers he would hang them up by the Heels to a tree Let thair Intrils out and Leave them Hanging Just as he would do a Kangaroo" and that he would Serve the Governor or any of his officers in the Same way but more Particularly" Mr. Humphrey the Police Magistrate" Who he termed his Bitter Enemy"—

11th January 1816—all this day it Blew a Strong Gale from the Northward Which prevented us from Launching but got our Boat and Geer in good order to Start the first fair Wind—12th January after Partaking of a Good Early Breakfast With the Major we Launched with a fine Breze from the Westward and was soon Clear of Port Dalrymple Having taken Leave of Major Stuart" and all his party thanking him and them for thair Kindness We Steered along the Coast to the Eastward and in the Evening hauled up on Waterhouse Island Where we Remaind the Night, before We Landed a Smoke was Seen opisite the Island on the Main Land Which we though might have been Howe and his party but on Looking with the Glass" we Saw it was a Large Mob of Natives Walking along the Beach

13th January at Daylight Launched with a fine Breze from the Westward and Clear Weather and Run along the Shore" to the Eastward at Noon Landed on Ringarooma" Point Here we Suddenly fell in with a Large Mob" of Natives Who at the first apearance Seemed Hostile but on Seeing Briggs, they all Knew him Well particularly the Chief Whose Name was Lamanbunganah" he seemed Delighted at Seeing Briggs and told him that he was at War with his own Brother Tolobunganah" Who was then on the Coast Near Eddistone" point, a most Powerful Chief Who Briggs also Knew Verry Well, Briggs at this time had on the Island two Wives and five Children that he had Left During his absence to Hobart Town, and had taken this trip in the Boat Round the West Coast thinking he might fall in with Some of his—Black Relations," Near Cape Portland, one of his Wives was a Daughter of the Chief Lamanbunganah" we just fell in with, Briggs Generally" Called his father in Law Laman" for Shortness the Chief Made Enquiry after his Daughter and was told that She and her Children Was Safe over on Cape Barren" Laman Said he Knew that for he Saw her Smokes almost Every Day"—after Some further Discourse Laman asked Briggs if he had any fire arms in the Boat he told them we Were

Well armed Laman Said he was Glad of that—as he had heard that five or Six White Men Well armed was with his Brother—Tolobunganah" at Edistone Point and that they Intended to Come and attack" him and Kill them all he Intreated Briggs to Join him and go and Meet them and Fight it out Briggs of Course Declined telling him that he had no Controle" over the Boat and that Mr. Kelly Could not agree to any Such proposeal," at this. Laman Seemed Verry much Dissatisfied and told Briggs in a Verry Hostile Tone that he had often Before gone with him to fight other Tribes" when he Wanted Women"—Laman then gave a Loud Cooe" and in two Minutes we Were Surrounded by above fifty Natives Laman" Said to Briggs now we Will force you to go with us and fight Tolo" he meant the Chief his Brother the White Men Spoken of We of Course thought must be Howe and his party—Briggs asked if they had a Boat Laman" Said no

We now got Much alarmed at the Dangerous Situation" we Were in, and as an Excuse to get away—Briggs told Laman" that we would go over to Cape Barren and fetch his Wife Lamans" Daughter also that we would get five or Six of the Sealers to Join us with plenty of fire arms We would Come over and fight them Laman" Seemed much pleased and asked when we would go. Briggs Said we would Start Directly—Sleep to Night on Swan" Island and Tomorrow Morning go over To- to Cape Barren and Return in three Days Laman" and all his Mob was much pleased at this arrangement," the Boat was Launched We pulled to Swan Island and Hauled up for the Night, Much pleased with the Escape we made from Lamanbunganah" and his Mob—Had we Refused or Resisted his proposeal to fight he would have taken the Boat and Killed Every man of us as it was Impossible we Could have Stood against Such a Number of Natives

Briggs had been Employed as a Sealer" on the Islands in Bass' Straits for many years' Previously and had acquired the Native Language" of the North East Coast of Van Diemans" Land fluently in Consequence of often having gone over from the Isands To Cape Portland to Barter with the Natives for Kangaroo Skins also to purchase the Young Grown" up Native females to Keep them as their Wives and for Hunting Kangaroos" and Catching Seals, Both for thair Skins they Were Wonderfully Dexterous"

The Custom of the Sealers" in the Straits was that Every man Should have from two to five of those Native

Women for their own use and Benefit to select any of them they thought proper to Cohabit with as their Wives —In fact a Large Number of Children had been produced betwen these people the White man and the Black Woman and a fine active Race of People they Were Both for Hunting Kangaroo" and Catching Seals the men good Boat men the Women Good assistants to them, they were of a Light Copper Colour and Generally Verry good Looking—14th January, Launched from, Swan" Island with a Moderate Breze at North West and Steered along Shore to the South East. Soon after Leaving the Island we saw Smokes on the Shore and Some Natives walking on the Beach Which we Supposed to be our friend Laman and his tribe they Called and made Signals to us to Come on Shore but we took no Notice of them Having had so Narrow an Escape" the Day before Just Before Sun Set we hauled up on King George" Island or Rocks on a Small Sandy Beach" Not Wishing to give a Chance to Mr. Tolobunganah" to Serve us as Mr. Lamanbunganah" had Done the Day before for While we were on the Island we were Safe from thair atacks—Here we found a Large Number of Seals Laying on the Rocks Basking in the Sun, but having no Salt with us to Cure the Skins we thought it useless to Kill them, on the following Day the—15th January the Wind Set in at South East and fine Weather

We thought it Needless to Lay Idle" with a foul Wind and being Provided with Knives Steels and Clubs" and Being all old Hands at Sealing into the Bargain, we Commenced Killing and flinching" the Skin from the Body and Streching it out on the Grass with Wooden pegs it was Dried in the Sun and in one day Became Perfectly Cured this day by the above Process we Killed flinched and Peged out thirty Skins the following Day — 16th January we Killed flinched and Peged out twenty five Seal Skins—Wind Southerly and fine Weather—Several Smokes on the Shore oposite the Island and a Large Number of Natives on the Beach this day Caught ten young Cape Barren Geese" Which afforded us fresh Grub and with a little of the Majors fine pork we lived Sumptuously.

17th January this Day Wind South East and fine Weather found the Seals geting Shy of Coming up on the Rocks we gave them a Rest as it would not do to Storm them only at Low Water—at Noon—Launched the Boat and Went over to see the Natives and took with us four Seals Carcases that had been Skined and four young Pups alive about three Weeks old, we did not go Closeer to the

Beach than Musket Shot for fear" of Being Surprised by a Shot from Howe and his Party" Briggs Stood up in the Boat and Called out to the Natives in thair Language to Come to the Water Side. they seemed Shy untill he told them who he was When an old Man Rushed up to his Middle in the Water Briggs Called to him to Swim to the Boat Which he did we hauled him in turned out to be the old Chief Tolobunganah" he was over Joyed at Seeing Briggs and asked if he had Seen his Brother Laman" he Said No" Tolo" asked where we Came from Briggs said from Cape" Barren" by Way of Swan Island Tolo" said I Know that I Saw you Come from there. We then pulled a Little Distance along the Beach" to a Small Rock that lay off about fifty yards from the Shore. Tolo"-

Continud from first Book—

17th January 1816 from first Book Continud, Tolobunganah" Stood up in the Boat and Called to the x Natives" about twenty of them Came down to the Water Side they all Knew Briggs and Seemed Glad to See him, we made Tolo" a present of the four Dead Seals' and the four Live pups" at Which he seemed much pleased—Immediately after they got the Seals' Six Women Came Down to the Water Side Each with a Dead Kangaroo" on their Shoulders Tolo" ordered them to be Brought to the Boat—and Said that we Must Receive in Exchange for the Seals" we had Given them, that they had no more Kangaroo but tomorrow they would catch plenty, Tolo" Seemed anxious that we should Come on Shore We Declined

17th January 1816 Continued

by telling the Natives that we We did not wish to Come in Contact with the Six white men they had Seen" Tolo" asked if we Were Frightened of them, Briggs said no—but they were bad men and we Wanted to Know Whereabouts" they was—

all these Excuses" we was obliged to make to get all the friendly" Information we Could from the Natives Relative to Howe and his Party as we were still of opinion that they was Near at Hand but the Natives assured us that they was Gone a Long Distance to the Southard towards Saint Patricks" head we took Leave of Tolo" and his Mob in the Evening" and told them that we Shoufd Come over Next day and Bring them More Seals at Which they Seemed Delighted and Said that if we Brought them plenty of Seals, they would give us plenty of Kangaroo" and thair Skins in Return—the Wind being fair we Run over to the Island Hauled the Boat up" and Had a good Kangaroo Steamer for Supper the first we had this Voyage.

18th January 1816 at day Light it being Low Water there was a good Number of Seals' up on the Rocks" we Stormed them, and Killed, twenty Which we Skined and peged" out to Dry the Weather was Verry fine Wind from the South East, this, day found the fresh Water on the Island geting Short and Verry Brackish, Launched the Boat and put our three Water Kegs into her to get the Natives" to fill them with fresh Water we also put into the Boat twenty of the Seals" Carcases' to Barter With the Natives for Kangaroo Skins, we also took Six young Seal pups alive as presents, Eearly in the morning Signal Smokes' was made on the Beach for us to Come over according to Promise"

on arriveing at the Beach We did not See a Native" Which Made us think there was something the Matter we waited about half an hour When we saw Tolobunganah" Make his appearance on the Beach" We Called to him to Come to the Rock Where he had been the day previous' he Came we asked him why he did not Come to the Boat when we first arrived he said that all the Natives' was in the Bush" Hunting Kangaroo" and geting Skins but they would be Here Shortly, we had still a Suspision that Howe" was with the Natives but Tolo" assured us he was not we told him we wanted our three Kegs' filled with fresh Water and that we Would Buy all the Kangaroo Skins he had; in about twenty Minutes" the Whole tribe Came down on the Beach there were about Two. Hundred Men Women" and Children' and at Least fifty Dogs" on seeing them aproach we pulled the Boat out from the Shore a Little Distance Leaving Tolo" on the Rock and got our Arms" and Examined them, to see that they were in fireing order We held up 3 or 4 Seals Carcases" and told them we Wanted to Barter for Kangaroo Skins Tolo" ordered Ten Women" to go into the Water Each Loaded With Kangaroo" and Skins we then gave the Women the Seals Carcases" we Brought over they Carried them to the Mob and Returned Immediately to the Boat With another Load of Skins as Payment for the Seals" we then Requested Tolo" to fill our Kegs with fresh Water Which he Did but we would not Let them take away more than one Keg at a time for fear they should not Bring them all Back at Which Tolo" Seemed Displeased—

The Natives asked if we Would Bring over more Seals Tomorrow Briggs told them they were geting Scarce and Shy of Being Caught Tolo" told Briggs We had Better take Some Women over to the Island to assist in Catching Seals" at Which they Were Verry Dexterous" This Being agreed on Tolo" ordered Six Stout Women to

go into the Boat" which they Did and seemed Delighted the Wind being fair We run over to the Island Hauled the Boat up, and Peged the Kangaroo" Skins out to Dry, the Women on Seeing the Seals on some of the outer Rocks Were Verry ,anxious" to Commence" Catching them, Briggs having Been a Long time on the Islands in Bass' Straits with the Native Women as a Sealer was Well Acquainted with the Mode of them Catching Seals" and a Most Singular Mode it is, It is here Described

We gave the Women Each a Club that We had used to Kill Seals" with they went to the Waters Edge and Wet themselves" all over thair head and Body as they Said to Prevent the Seals from Smeling them as they Walked along the Rocks they Were Verry Cautious not to go to Windward of them as they Said a Seal Would sooner Belive his Nose than his Eyes" When a Man or Woman Came Near him, the Six Women Walked into The Water two and two and Swam to three Rocks about 50 yards from the Shore Each Rock, had about 9 or 10 Seals on it they were all Laying aparently asleep, Two Women went to Each Rock with thair Clubs in hand Each of them Crept Slowly Close up to their Seal and Lay Down with thair Club alongside them Some of the Seals aRose thair heads up to Look at thair New Visitors and Smell them Scratchd themselves and Lay Down again—this Was Done by thair fin or flipper

the Women Went Nearly through the Same Motion as the Seal Did by holding up the Left Elbow a little and Scratching themselves With thair Left hands Keeping the Club firm in the Right hand Ready for the attack—the Seals Seemed Verry Cautious" Now and then Lifting up thair heads Looking around Scratching themselves with thair flippers and Laying their heads Down again, the Women went through the Same Motions as Near as possible—after they had been Laying on the Rocks for Nearly an hour the Sea ocationly washing over them and they quite Naked We—Could not tell thair meaning for Remaining So Long all of a Sudden the Women aRose" up on thair Seats thair Clubs up at arms Length—Each Struck a Seal on the Nose Which Killed him, and in an Instant they all Jumped up as if by Magic and Killed one More Each, after giving the the Seals Several Blows on the head and Securing them, they Commenced Loud Laughing and Dancing as if they had gained a great Victory" over the Seals, Each of them Draged a Seal into the Water and Swam with it to the Rock Where we was Standing and then Swam Back to the Rock and Brought one more Each Which made twelve Seals the Skins of Which being worth

one pound each in Hobart Town Was not a Bad Beginning by the Black Ladies, the Six Women then went to the top of a Small Hill and Made Smoaks as Signals to the Natives on the Main that they had been Killing Seals Which was soon answered by Smoaks" on the Beach We Skined the Seals and peged them out to Dry the Women then Commenced—Cooking their Supper Each Cut a Shoulder off a young Seal Weighing three or four pounds and threw them on the fire When they were about Half Done they Commenced Devouring them and Rubing the oil on thair Skin Saying they had a Glorious Meal.

19th January 1816

at Daylight being Low Water the Women Began Killing Seals they would not Let us Come Near untill they had Killed all that Could be got on the Beach they Killed twenty six before Brakfast, the Weather being fine Wind South East, the Remainder of the Day was Spent Catching and Killing Seals Principally by the Women

20th January 1816

at Sun Rise Smoaks were made on the Main, the Women Said they were Signals for us to Come over we were Employed untill Noon Killing and Skining Seals Mostly by the Women Swiming to the outer Rocks the Seals geting Verry Shy we only Succeeded in geting Sixteen Skins in the Evening Launched the Boat and Went over to the Main Took two of the Women and Loaded the Boat with Carcases of the Seals we had Skined, on arrival at the Beach Tolobunganah" was there the two Women told him What we had Done he was Delighted to See the Boat Loaded with Seals he told us he had plenty of Kangaroo and Skins for us in payment for the Seals We threw the Seals into the Water the two Women Draged them to the Beach Tolo ordered the Mob, to take them all into the Bush in a few Minutes they Returned with ten Dead Kangaroo and about Ninety Skins Tolo Enquired how Long we Should want the Women we told him about two or three days as the Seals were geting Scarce we should not Stay Longer he ordered the two Women to go over with us and Stop as Long as we Required them the Wind being from the Westward we Run over to the Island and hauled the Boat up the four Women we left on the Island informed us that During our absence they had Caught Six Seals.

21t January 1816

During this Day fresh Brezes at South West and fine Weather Employed Drying and packing Skins in Bundles

Ready for a Start, Killed and Skined Eleven Seals the Women Employed Roasting a Large Number of Seals—Flippers and Shoulders Ready to take over with them they informed us that if We gave them Some Seals for the trouble they had been at in Catching them the Chief Tolo' would not Let them Keep them but if the Shoulders and flippers Were Roasted they Might Keep them and do as they pleased with them so the Ladies were Determined to have a good Stock of fresh Meat to take home with them

22d January 1816

During this Day the Wind blew—Strong from the Eastward and thick Weather. Killed and Skined Eleven Seals the Women Employed Roasting Seals Shoulders and flippers

23d January 1816

first part of this Day fresh Brezes from the Southard and fine Weather the Women Killed five Seals on the outer Rocks at Noon Loaded the Boat with Seals Carcases the Women and thair Roasted Meat and took them over to the Main on our arrival at the Beach Tolo" and all his Mob Came Down they had a few Dead Kangaroo and about fifty Skins they Were Verry Much pleased to See the Boat Loaded with Dead Seals, we threw them out of the Boat Tolo" ordered them to be put in a Heap on the Beach, he also ordered the Six Women to take thair Roasted flippers and Shoulders into the Bush, Briggs then told Tolo" that we Should Start Tomorrow from the Island and that we should now take our Leave of them at Which the Women all Began to Cry" in Fact the Whole Mob Seemed full of Sorrow that we Were about to Leave them Tolo" then told Briggs not to go away untill they Had a Dance, the Whole Mob about three Hundred in Number formed a Line in three Divisions the Men in one the Women in one and the Children in one Tolobunganah then gave the Signal to Commence the Dance and a most Singular Dance it was, the Women Began in the Center with a Song Joining thair hands forming a Circle and Dancing Round the Heap of Dead Seals then throwing themselves Down on the Sand and puting themselves into Most Singular attitudes Beating the Lower part of thair Bodies with thair hands and Kicking the Sand over Each other With thair feet the Men and Children Laughing Verry Much Seeming to Enjoy the Sport the Women then all Sat Down. the Children had a Similar Dance to the Woman and Sat Down the Men then Commenced a Sort of Sham fight with Spears and Waddies then Dancing Round the heap of Dead Seals' and Sticking

thair Spears into them as if they Were Killing them all this Lasted about an hour Tolo then told us the Dance was over he asked Briggs Where we Where going when we Left the Isand Brigges told him we Where going to Cape Barren and if he Saw the White Men Meaning Howe and his party to tell them So this was to Deceive them in Case they Should try to Waylay us on our way to Hobart Town the Wind being fair we Run over to the Isand hauld the Boat up and Began to pack our Skins Ready for a Start Next Morning if the Wind and Weather should Permit

24th January 1816

at Sun Rise the Wind North West and fine Weather Launched the Boat got all the Skins Provisions &c. into her after Breakfast Started with a fine Breze at North and Steered along Shore to the Southard the Natives made three Smoaks to Say good Bye We found after Leaving King George' Island and Rocks we had been there Nine Days and had procurd one Hundred and Seventy two Seal skins and two Hundred and forty six Kangaroo Skins from the Natives, the Whole Value of Which is £180 at Hobart Town we Run to the Southard untill Sun Set When we hauled up for the Night on a Small Sandy Beach at the South Side of the Bay of fires —

25th January 1816

Throughout this day strong Brezes from the Westward at Sun Rise Launched and Stood along Shore to the Southard under the Reefed Lug in the Evening Squally with Rain Hauled up on a Small Beach under Saint Patricks Head for the Night

26th January 1816

all this Day Strong Brezes from W S W, at Sun Rise Launched and pulled along Shore to the Southard a Heavy Swell Seting from the Southard in the afternoon Hauled up in Waubs" (4) Boat Harbour a Heavy Surf on the Beach Half filled the Boat Landing Which Wet all the skins

27th January 1816

all this day fresh Gales at South West Employed Drying the Skins and Cleaning the arms in the Evening a Small party of Natives Came along the Beach Close to

(4.) [The reference to Waub's Harbour is of interest. This designation was apparently given to the locality in honour of Waubedebar, an aboriginal woman who was probably of some importance in the district, as on her death she was buried there, and a stone erected to her memory. The inscription on the stone is as follows:—"Here lies "Waubedebar a female aborigine of Van Diemans Land died June "1832, aged 40 years. This stone was erected by a few of her white "friends."—Ed.]

us but Seeing our Number they Returned and went into the Bush

28th January 1816

all this Day Light Brezes at North West and fine Weather at Daylight Launched and Stood along Shore to the Southard at Noon Passed Wine Glass Bay Winds Light pulling along Shore to the Southard at Sun Set Hauled up on the North Side of Schouten Island in the Boat Harbour for the Night Saw a Large Number of Natives on the Island Which Caused us to Keep Watch During the Night for fear of an attack by them

29th January 1816

at Daylight a fine Breze from the Northward. Launched and Stood Round the West End of the Island at 8 a m Landed on the White Rock in oyster bay and Killed Six Seals" put thair Skins into the Boat and Made sail to the Southard Saw Several Natives on Maria" Island Runing along the Beach Calling to us to Come on Shore Which we Declined in the Evening Hauled up in the Inlet Near East Bay Neck and Began to Carry our things over the Neck Ready to Haul the Boat over Next morning — —

30th January 1816

at Daylight Hauled the Boat over East Bay Neck got all the things into her and Made Sail for Hobart Town With a fine Breze from the Northward at Noon passed Iron Pot Island and Entered the Derwent at 4 P M arrived at Hobart Town Discharged the Boat and Hauled her up — this Day finishes our Voyage of Discovery Round Van Diemans Land Having Been Forty Nine Days absent Without Meeting with any accident or Danger further than what is Contained in this Journal" Which is a true Narative of What Tranpired"

James Kelly.

ABSTRACT OF PROCEEDINGS
1920

Annual Meeting.

The Annual General Meeting was held at the Museum on 8th March, 1920, His Honor the Chief Justice (Sir Herbert Nicholls) presiding.

The Annual Report and Statement of Accounts were read and adopted.

The following were elected as Members of the Council for 1920:—Rt. Rev. R. S. Hay, D.D., Dr. A. H. Clarke, M.R.C.S., Dr. W. L. Crowther, D.S.O., M.B., Messrs. W. H. Clemes, B.A., B.Sc., L. Dechaineux, T. W. Fowler, J. A. Johnson, M.A., L. Rodway, C.M.G., and C. C. Thorold, M.A. Mr. R. A. Black was appointed Auditor for 1920.

Illustrated Lecture.

Mr. Clive Lord delivered an illustrated lecture on "The National Park of Tasmania."

Conversazione.

After the business of the meeting was concluded an adjournment was made to the Art Gallery, where a conversazione was held.

12TH APRIL, 1920.

The Monthly Meeting was held at the Museum on 12th April, Mr. L. Rodway, C.M.G., presiding.

The following Members were elected:—A. W. Swindells, H. Nowotny, T. P. Arnold, R. S. Burdon, R. W. Canning, B. Whitington.

Paper.

Studies of Tasmanian Cetacea, No. 4 (*Delphinus delphis*). By H. H. Scott and Clive Lord.

Lecture.

Mr. D. B. Copland delivered an instructive lecture upon "Currency Inflation and Price Movement in Australia during the War."

10TH MAY, 1920.

The Monthly Meeting was held at the Museum on 10th May, His Excellency, Sir William Allardyce, presiding.

Mr. L. Rodway, C.M.G., Vice-President, extended a hearty welcome to His Excellency upon taking his seat as President of the Society.

Major L. F. Giblin, D.S.O., was elected a member of the Council, in place of Mr. T. W. Fowler (resigned).

Paper.

"Preliminary Note upon the Discovery at Smithton of a Skeleton of *Nototherium mitchelli*." By H. H. Scott and Clive Lord.

Illustrated Lecture

Mr. L. G. Irby, Conservator of Forests, delivered an illustrated lecture on "Forestry."

8TH JUNE, 1920.

The Monthly Meeting was held at the Museum on 8th June, Mr. L. Rodway, C.M.G., presiding.

The following members were elected:—Dr. W. I. Clark, Messrs. J. H. Gillies and F. B. Cane.

Papers.

"Studies of Tasmanian Mammals, Living and Extinct." Part II. By H. H. Scott and Clive Lord.

"Australian Stratiomyiidæ." By G. H. Hardy.

Illustrated Lecture.

Mr. L. Rodway delivered an illustrated lecture on the "Proposed Road to the West Coast."

12TH JULY, 1920.

The Monthly Meeting was held at the Museum on 12th July, His Excellency the Governor (Sir William Allardyce) presiding.

The following members were elected:—Messrs. T. Hytten and T. W. Blaikie.

Paper.

"A Revised Census of the Tasmanian Fluviatile Mollusca." By W. L. May.

Illustrated Lecture.

Mr. Frank Ellis, M.A., B.E., delivered an illustrated lecture, entitled "Notes on Vocational Training."

9TH AUGUST, 1920.

The Monthly Meeting was held at the Museum on 9th August, His Excellency the Governor (Sir William Allardyce) presiding.

Paper.

"Studies in Tasmanian Mammals, Living and Extinct." Part III. By H. H. Scott and Clive Lord.

Lecture.

Mr. H. T. Parker delivered a lecture, entitled "Mental Efficiency: An Experimental Study, based on the Binet-Simon Intelligence Tests."

13TH SEPTEMBER, 1920.

The Monthly Meeting was held at the Museum on 13th September, 1920, Mr. L. Rodway, C.M.G., presiding.

Papers.

"Studies in Tasmanian Mammals, Living and Extinct." Part IV. By H. H. Scott and Clive Lord.

"A Catalogue of the Osteological Specimens relating to the Tasmanian Aborigines, contained in the Tasmanian Museum." By Dr. W. L. Crowther and C. E. Lord.

"The Early History of Bruny Island." By C. E. Lord.

Lecture.

Dr. W. L. Crowther delivered a lecture on "The Aborigines of Tasmania."

11TH OCTOBER, 1920.

The Monthly Meeting was held at the Museum on 11th October, Dr. A. H. Clarke, M.R.C.S., presiding.

The following members were elected:—Mrs. Cranstoun, Dr. Orr, and Mr. A. D. Bernacchi.

Paper.

"Additions to the Fungus Flora of Tasmania." By L. Rodway, C.M.G.

Lectures.

Short Lecturettes, dealing with "Education for Community Life," were delivered by Messrs. J. A. Johnson, D. B. Copland, C. E. Fletcher, L. Dechaineux, and S. R. Dickenson.

8TH NOVEMBER, 1920.

The Monthly Meeting was held at the Museum on 8th November, 1920, Mr. L. Rodway, C.M.G., presiding.

The following member was elected:—Hon. W. M. Williams, M.L.C., O.B.E.

Lecture.

Mr. W. H. Clemes, B.A., B.Sc., delivered an illustrated lecture on "The Geology of the Hobart Reservoir Sites."

ANNUAL REPORT

The Royal Society of Tasmania

1920

Patron:
HIS MAJESTY THE KING.

President:
HIS EXCELLENCY SIR W. L. ALLARDYCE, K.C.M.G.
GOVERNOR OF TASMANIA.

Vice-Presidents:
E. L. PIESSE, B.Sc., LL.B
L. RODWAY, C.M.G.

Council:
(Elected March, 1920).

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.
L. DECHAINEUX
T. W. FOWLER (resigned May, 1920)
L. F. GIBLIN, D.S.O. (elected June, 1920)
RT. REV. R. S. HAY, D.D.
J. A. JOHNSON, M.A.
L. RODWAY, C.M.G.
C. C. THOROLD, M.A.

Standing Committee:
A. H. CLARKE, L. RODWAY, AND C. C. THOROLD

Hon. Treasurer:
L. RODWAY.

Editor:
C. E. LORD.

Auditor:
R. A. BLACK.

Secretary and Librarian:
CLIVE E. LORD

LIST OF MEMBERS.

Honorary Members:

David, Sir T. W. Edgeworth, K.B.E., 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., D.Sc., Litt.D., 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.
1920		Arnold, T. P. Ferndene Avenue.
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.
1920		Bernacchi, A. G. D. Maria Island.
1918		Bisdee, E. O. Lovely Banks, Melton Mowbray.
1912		*Black, R. A. Chief Clerk, Department of Agriculture.
1909		*Blackman, A. E. Franklin.
1920		Blaikie, T. W. Practising School, Elizabeth Street.
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.
1920		Burdon, R. S., B.Sc. The University of Tasmania.
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.
1920		Cane, F. B. 90 High Street, Sandy Bay.
1920		Canning, R. W. The University, 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, Hobart.
1920		Clark, W. I., M.B. Macquarie 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.
1920		Cranstoun, Mrs. L. A. 158 Macquarie Street, Hobart.

Year of Election.		
1917		Cullen, Rev. John. Macquarie Street, Hobart.
1918		*Cummins, W. H., A.I.A.C. Lindisfarne.
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.
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.
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, Lieut.-Colonel H. Merton Vale, Campbell Town.
1905	L	Foster, J. D. "Fairfield," Epping.
1913		†Fowler, T. W., M.Inst. C.E. Uhls Building, Brisbane, Queensland.
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.
1920		Gillies, J. H. Macquarie Street.
1913		†*Glasson, J. L., M.A., D.Sc. C/o Agent-General for Tasmania, London.
1918		Gould, J. W. Tramway Department, Hobart.
1907		Gould, Robert. Longford.

Year of Election.		
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.
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. "Reminé," 174 Argyle Street, Hobart.
1919		Hay, Rt. Rev. R. S., D.D., Bishop of Tasmania. Bishopscourt, Hobart.
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.
1920		Hytten, T. "Eltham," Bathurst Street.
1913		Ife, G. W. R., LL.B. Summerhill Road, Hobart.
1919		Irby, L. 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.
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.

Year of Election.		
1887		†Lewis, Sir Neil Elliott, K.C.M.G., M.A., B.C.L., LL.B., M.H.A. "Werndee," Augusta Road, New Town.
1919		Lewis, A. N. "Werndee," Augusta Road.
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.
1913		Mather, J. F. 1 Mount Stuart Road, 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., Senator. Roxburgh, Newstead.
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.
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.
1920		Nowotny, H. Hutchins School, Hobart.
1917		Oldham, N., J.P. New Town.
1919		Oldmeadow, H. E. R. "Lowes Park," Woodbury.
1920		Orr, Dr. Hubert, Campbell Town.
1908		Parsons, Miss S. R. 190 Davey Street, Hobart.
1888	C	Pearson, W. H., M.Sc., A.L.S. 18 Palatine Road, Withington, Manchester, England.
1902		†*Piesse, E. L., B.Sc., LL.B. 39 Broadway, Camberwell, Victoria.
1910		Pillinger, James. 4 Fitzroy Cresecent, 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.
1919		Riggall, Captain A. Horton, 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.
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. "Cootha," 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., B.Sc., B.M.E. Town Hall, Hobart.
1919		Smith, G. O., Mrs., B.Sc. 75 Burnett Street.

Year of Election.		
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.
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.
1920		Swindells, A. W. 141 Campbell Street.
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.
1198		†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, L. F. Lands Department, Hobart.
1919		Williams, T. H. Electrolytic Zinc Company, Risdon.
1920		Williams, Hon. W. M., M.L.C., O.B.E., Hobart.
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 1920.

The Council and Officers.

The Annual Meeting was held on the 8th March, 1920, and the following members were elected as the Council for 1920:—Rt. Rev. R. S. Hay, Dr. A. H. Clarke, Dr. W. L. Crowther, Messrs. W. H. Clemes, L. Dechaineux, T. W. Fowler, J. A. Johnson, L. Rodway, and C. C. Thorold.

Ten Council meetings were held during the year, the attendance being as follows:—Dr. Clarke, 10; Dr. Crowther, 9; Mr. Rodway, 9; Mr. Clemes, 8; Mr. Johnson, 8; Mr. Thorold, 6; Mr. Dechaineux, 5; Major Giblin (elected June), 3; Rt. Rev. R. S. Hay (on leave of absence in England from April), 2; Mr. Fowler (resigned May), 1.

The Council, at its first meeting, elected the following officers:—Chairman, Dr. Clarke. Standing Committee, Dr. Clarke, Messrs. Rodway and Thorold. Editor of Papers and Proceedings, C. E. Lord. Hon. Treasurer, L. Rodway. Secretary and Librarian, C. E. Lord.

The Council elected Drs. Clarke and Crowther, Messrs. Clemes, Dechaineux, Johnson, and Rodway to be Trustees of the Tasmanian Museum and Botanical Gardens.

During the year Mr. Fowler resigned, and Major L. F. Giblin was elected in his place.

Meetings.

During the year nine ordinary meetings of the Society were held. In addition to the papers read there were several instructive illustrated lectures delivered at the meetings. The attendances showed a considerable improvement upon those of the past few years.

Membership.

The membership of the Society continues to increase, and the roll at the end of the year showed that there were four Honorary Members, twelve Corresponding Members, eight Life Members, and one hundred and fifty Ordinary Members.

Midlands Branch.

During the year the activities of the Society were extended by the formation of a Branch of the Society in the Midlands. The inaugural meeting was held at Campbell Town on September 30th. Mr. R. C. Kermode, who has shown considerable interest in this matter, was elected Chairman of the Branch.

Psychology and Education Section.

Seven meetings were held during the year, and were well attended.

Officers.—J. A. Johnson, Chairman; W. H. Clemes, Hon. Secretary.

The following Papers were read and discussed:—"Reconstruction in Education," J. A. Johnson; "Ideals of Community Life," D. B. Copland; "The Curriculum as an Instrument of Training for Community Life," C. E. Fletcher; "General Education and Vocational Training in the Community," L. Dechaineux; "Culture and Community Life," S. R. Dickinson; "Authority and Freedom," L. F. Giblin.

Obituary.

It is with regret that the Society has to record the death of the following Members during the past year:—W. A. Harvey, M.B., of Hobart (elected a member in 1893); George Kerr, of Hobart (elected a member in 1905).

ROYAL SOCIETY OF TASMANIA

RECEIPTS AND EXPENDITURE, 1920. GENERAL ACCOUNT.

RECEIPTS.			£	s.	d.
Government Grant in aid of Printing			100	0	0
Subscriptions :—					
Current, 123 at £1/1/- ...	£129	3 0			
Arrears, 8 at £1/1/-	8	8 0			
Advance, 12 at £1/1/- ...	12	12 0			
			150	3	0
Payments for use of Society's Room			14	0	0
Sale of Publications			28	7	6
Miscellaneous			24	4	7
			£316	15	1
Dr. Balance, 1920			50	6	6
			£367	1	7

PAYMENTS.			£	s.	d.
Balance brought forward			50	18	5
Salaries			33	15	0
Papers and Proceedings :—					
1919 (Part)	£65	10 6			
1920 (Part)	128	10 2			
			194	0	8
Expenses of Meetings			21	3	3
Library			9	12	11
Light and Fuel			2	7	9
Lantern and Operator			8	16	6
Postages and Petty Cash			9	9	8
Miscellaneous...			35	14	8
Bank Charges, etc.			1	2	9
			£367	1	7

MORTON ALLPORT MEMORIAL FUND ACCOUNT,* 1920.

RECEIPTS.	£	s.	d.	PAYMENTS.	£	s.	d.
Balance brought forward 1st Jan., 1920	49	14	3	Mathew's Birds of Australia (Part)	42	2	7
Interest received from Perpetual Trustee Co.—				International Catalogue of Scientific Literature			
5 per cent. on £200 War Loan £10 0 0				(additional volumes)...	27	1	6
Less Trustee Co. Commission ... 0 5 0							
	9	15	0				
	£59	9	3				
Dr. Balance, 1920	9	14	10				
	£69	4	1		£69	4	1

* £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.

I have compared the Receipts Book, Vouchers, and Bank Book with Items particularised in the Cash Book, and found them to be correct.

11th January, 1921. R. A. BLACK, Hon. Auditor.

L. RODWAY, Hon. Treasurer.
CLIVE LORD, Secretary.

7th January, 1921.

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