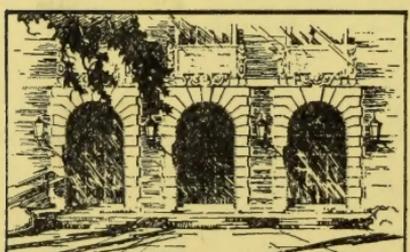


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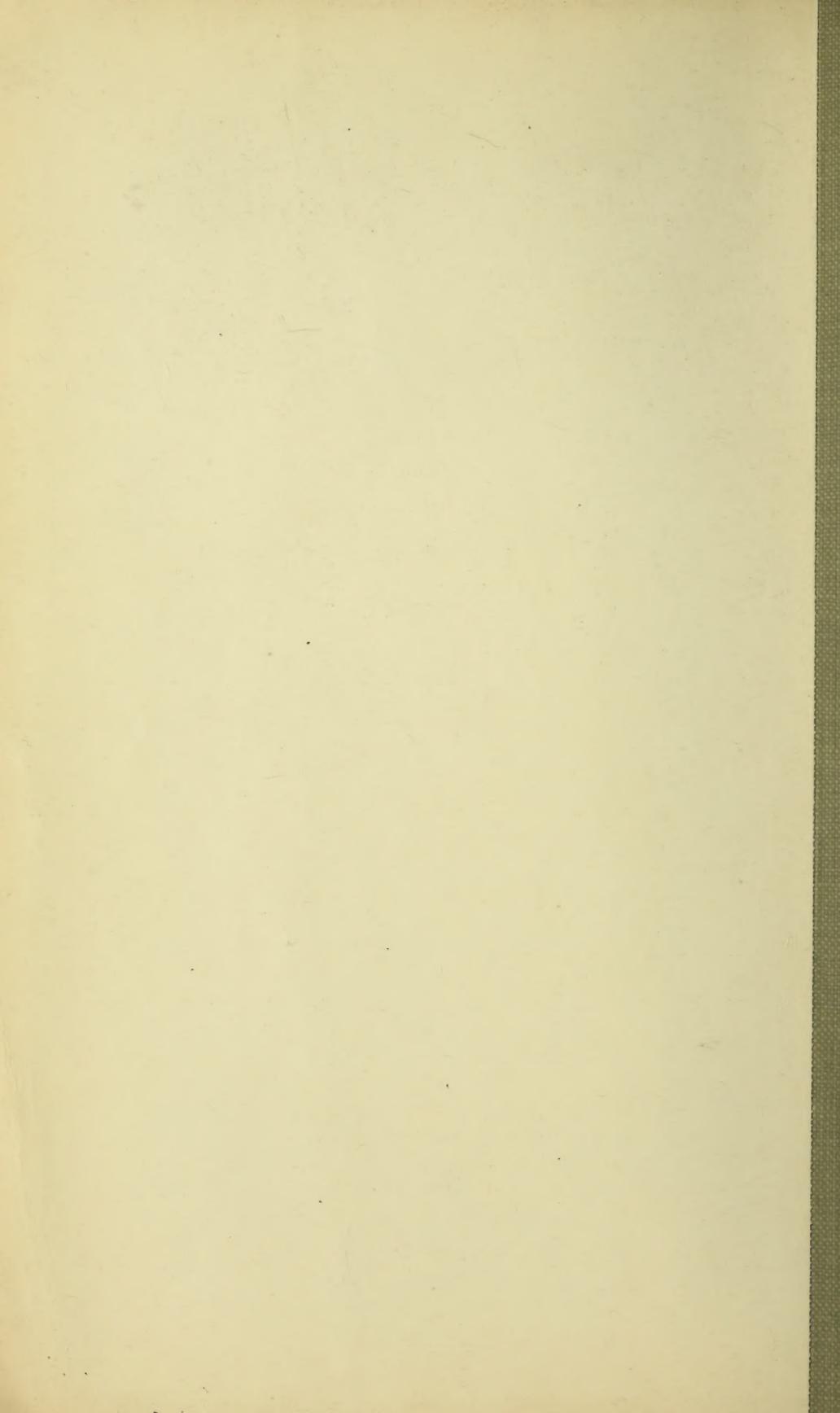


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TRANSACTIONS AND PROCEEDINGS

AND

REPORT

OF THE

ROYAL SOCIETY of SOUTH AUSTRALIA

(INCORPORATED).

VOL. XXXV.

[WITH TWENTY-SEVEN PLATES AND ONE FIGURE IN THE TEXT.]

EDITED BY WALTER HOWCHIN, F.G.S



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NEW SPECIES OF BORONIA.

By J. H. MAIDEN, F.L.S., and J. M. BLACK.

[Read August 2, 1910.]

PLATE I. (upper half).

Boronia palustris, sp. nov.

Suffrutex humilis glaber 10-25 cm. altus, circum paludes crescens, ramis erectis dichotomis, foliis lanceolatis integris 1-nerviis planis 8-15 mm. longis, floribus solitariis vel geminatis terminalibus et axillaribus, pedunculis brevibus obconicis, bracteis lanceolatis pedunculo longioribus, sepalis ovato-lanceolatis 3-nerviis rubescentibus intus puberulis reduplicato-valvatis 5 mm. longis, petalis obovatis albis imbricatis calyce brevioribus, staminibus 4, filamentis ciliatis apice glandulosis, ovulis collateralibus.

Found in flower by H. H. D. Griffith on the edge of swamps near Cape Borda and Starvation Creek, Kangaroo Island, October, 1908.

This is a very distinct species, standing nearly midway between *Boronia* and *Zieria*. It has the thick, entire disk of the former genus, but only the 4 stamens of the latter. It has been decided to place it in *Boronia*, on account of the undivided disk, the collateral ovules, and the filaments ciliate for three-fourths of their length, and glandular at the apex. The two firstnamed characters are never found in *Zieria*, and ciliate filaments are rare in that genus. In habit the new species closely resembles *B. parviflora*, Sm., but is distinguished from that and all other *Boronias* by the 4 stamens, and from most of them by the sepals being longer than the petals.

EXPLANATION OF PLATE I. (upper half).

Boronia palustris, sp. nov. Plant with flowers and carpel.

ADDITIONS TO THE FLORA OF SOUTH AUSTRALIA.

By J. M. BLACK.

[Read August 2, 1910.]

— PLATE I. (lower half).

The following list contains the names of plants recently found growing spontaneously in South Australia, with notes on two species already recorded for this State. The aliens (distinguished by an asterisk) are additions to those described in the "Naturalized Flora of South Australia," and the Australian species are supplementary to those given in Tate's "Flora of Extra-tropical South Australia," or subsequently recorded in the Proceedings of the Royal Society:—

FUMARIACEÆ.—**Fumaria densiflora*, DC. (considered by some botanists as a variety of *F. officinalis*, L.). Adelaide plains.—A native of Europe.

POLYGALACEÆ.—**Muraltia Heisteria*, DC. Roadside between Morialta Gully and Norton's Summit.—South Africa.

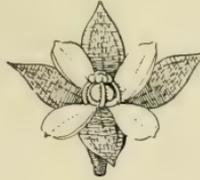
CARYOPHYLLACEÆ.—**Alsine tenuifolia*, Crantz. Port Lincoln (H. H. D. Griffith).—Europe.

LINACEÆ.—**Linum gallicum*, L. Roadsides, Balhannah.—Mediterranean region.

LEGUMINOSÆ.—*Pultencea adunca*, Turcz. Warrunda, Port Lincoln railway (H. H. D. Griffith).—Western Australia. Determination confirmed by Professor Ewart on comparison with specimens in the National Herbarium, Melbourne. The leaves of all our specimens are scabrous and hairy, without any hooked point. **Vicia sativa*, var. *angustifolia*, Ser. (*V. angustifolia*, Roth). Roadsides near Crafers.—Europe.

COMPOSITÆ.—**Erigeron canadensis*, L. Roadsides, Renmark (E. C. Black).—North America.

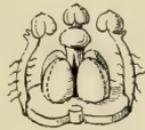
Note on *Olearia picridifolia*, Benth. (Plate i.).—This handsome shrub, reported in *Fl. Aust.*, iii., 487, from the neighbourhood of Lake Torrens, and not mentioned in Tate's work, has been found in the remaining scrub at Halbury and Strathalbyn. The heads of the Halbury plants are larger than those from Strathalbyn and contain more rays—about 30 as against 15. Professor Ewart found that the specimens agreed with the types from Lake Torrens. This species differs from *O. rudis*, F. v. M., in the narrow, entire leaves, slender branches, and short outer row of pappus-hairs.



carpel opened



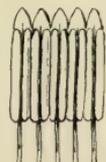
stamen



Boronia palustris, sp. nov.



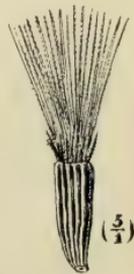
style



stamens



central flr



akene

Olearia picridifolia, Benth.

CONVOLVULACEÆ.—**Convolvulus arvensis*, L. Becoming very common near Adelaide and along the railways northwards into the agricultural areas.—Cosmopolitan.

BORAGINACEÆ.—**Echium italicum*, L. Near Mannum (H. H. D. Griffith).—Mediterranean region.

SOLANACEÆ.—**Datura Stramonium*, L., var. *Tatula*, DC. (*D. Tatula*, L.). Fulham.—Most warm countries.

Note on *Solanum coactiliferum*, Black. Kew remarks that this species "is very closely allied to the South American *S. elæagnifolium*, Cav., which differs in having pentamerous flowers."

SCROPHULARIACEÆ.—**Bartsia Trixago*, L. Greenhill Road.—Mediterranean region. *Glossostigma spathulatum*, Arn. Port Lincoln and Kangaroo Island (H. H. D. Griffith).—New South Wales and Queensland.

CHENOPODIACEÆ.—**Beta vulgaris*, L. Reedbeds.—Europe and Western Asia.

EUPHORBIACEÆ.—**Euphorbia helioscopia*, L. Port Lincoln (H. H. D. Griffith).—Europe.

LILIACEÆ.—**Allium triquetrum*, L. Roadsides, Blackwood.—Mediterranean region.

RESTIACEÆ.—**Loxocarya fasciculata*, Benth. Warrunda, near Port Lincoln (H. H. D. Griffith).—Western Australia.

GRAMINEÆ.—**Cenchrus tribuloides*, L. Swamps near River Murray (H. H. D. Griffith).—United States and Canada. *Isachne australis*, R. Br. Myponga (H. H. D. Griffith).—Eastern Australia. **Cynosurus echinatus*, L. Mount Lofty and Stirling (H. H. D. Griffith).—Mediterranean region. **Poa pratensis*, L. Rare near Adelaide and in hills.—Temperate countries. **Poa bulbosa*, L. Rare along River Torrens, near Adelaide, and numerous along the Henley Beach Road, where it usually assumes the viviparous form.—Europe.

EXPLANATION OF PLATE I. (lower half).

Olearia picridifolia, Benth. Plant with flowers and akene.

PRELIMINARY REPORT ON THE DISCOVERY OF NATIVE
REMAINS AT SWANPORT, RIVER MURRAY; WITH AN
INQUIRY INTO THE ALLEGED OCCURRENCE OF A
PANDEMIC AMONG THE AUSTRALIAN ABORIGINALS.

By E. C. STIRLING, M.D., Sc.D., F.R.S., Hon. Fellow
of the Royal Anthropological Institute.

[Read July 13, 1911.]

PLATES II. TO IX.

A recent discovery (April, 1911) of an aboriginal burial-ground at Swanport, on the River Murray—a small settlement about $3\frac{1}{2}$ miles below Murray Bridge—is of more than usual interest, not only on account of the large number of interments that have taken place within a very limited area, but also, and more particularly, from the fact that they all occurred before the arrival of the first colonists in South Australia. Thus there can be no question that these remains represent the pure strain of aboriginals, whose methods of interment, moreover, have been uninfluenced by the practices of civilization. Whether the cause of what, at first sight, appears to be an unusual mortality is attributable in any way to such influence, direct or remote, will be part of the object of the present inquiry.

The Crown Lands Department of South Australia, having of recent years initiated a policy of reclaiming, for agricultural purposes, various swamp lands bordering on, and at times overflowed by, the River Murray, began a work of this kind in April, 1911, on a submerged area lying immediately to the north of Swanport, on the right bank of the river. As an essential part of this project it became necessary to remove soil from the adjacent dry ground to provide material for an embankment designed to exclude the river waters from the swamp.

This soil was, in part, taken from a small Government reserve abutting both on the river and on the southern end of the swamp itself (plate ix.).

Opposite to the water frontage of the reserve, at a distance of 60 or 70 yards from the bank of the river, which here takes a trend in an east-south-east direction, an isolated granite mass shows above the surface of the water at ordinary levels. This for many years was a bare, exposed rock, but a willow truncheon planted some years ago in a crevice has

now grown into a tree which effectually conceals it from view. The navigation channel lies in the wider portion of the stream between this rock and the left bank. Within the area of the reserve, close to the water's edge and right opposite to the rock in the river, a group of several other large masses of the same material emerges from the ground and, I understand, that a ridge of granite connects the latter with the former, rendering the intervening channel too shallow for navigation except for small boats. Along the adjacent river margin, and for some distance lower down, willows have been planted at the water's edge and have grown luxuriantly. About 200 yards below the reserve is a small island between which and the right bank is a narrow channel. This island, like the adjacent bank, is thickly overgrown with closely-planted willows.

Both the isolated rock in the river and the neighbouring group on the bank are portions of a long line of granite outcrop running, approximately, from west-north-west to east-south-east. Other portions of the same outcrop can be seen on the farther side of the river and in the opposite direction on the solid ground beyond the swamp that is being reclaimed. The line of outcrop extends much farther in either direction.

Within a few feet of the river the natural surface of the ground rises, with a gentle incline of about 1 in 10, away from, and in a direction at right angles to, the river bank, and, as one stands with the back to the latter looking up this incline, the ground surface shows a similar gentle slope to the right and left. Thus the section parallel to the river and across the incline, which was that actually made in the removal of the soil, shows a gentle and even convexity (plates ii., iii., and iv.).

In former days a group of the indigenous Cypress Pine (*Callitris* Sp.) grew upon the slope, but they have now all disappeared from that immediate locality, though a few trees still remain in the neighbourhood.

Recourse was had to this bank to provide material for the embankment, and the removal began at its lowest part within a few feet of the stream, and, of course, as the cutting advanced away from the river the deeper became the face of the exposed section.

The geological characters of this section will be described directly.

Early in April, 1911, and soon after this work had begun, there appeared in the daily Press notices that skeletons, presumably those of aboriginals, were being exposed in the course of the removal of the earth, and, on the 5th of the month, intimation was received at the Museum from Mr. A.

White, Assistant Superintendent of the Works, to the effect that bones were then being met with in considerable numbers. He advised also that as some of them were being thoughtlessly or wilfully damaged it would be desirable that steps should be taken to secure them. Accordingly Mr. F. R. Zietz was instructed to go to the locality on the following morning to act on behalf of the Museum.

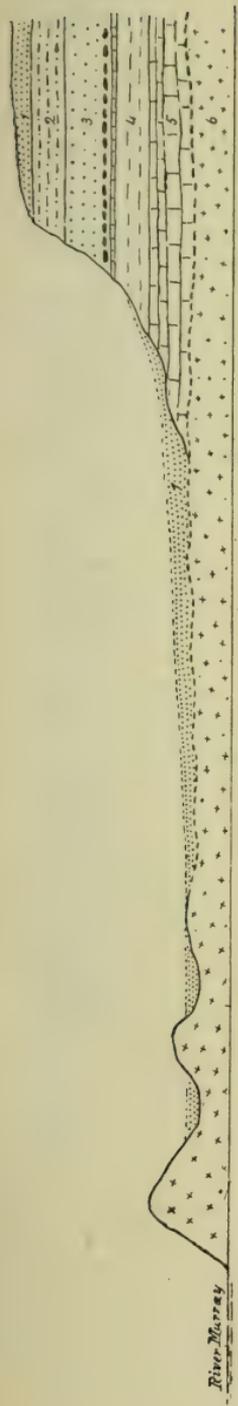
On reaching Swanport he found that a large number of bones had already been exposed, most of them having been promiscuously thrown into a hole, while others had been shovelled with the soil into the trucks and tipped on to the embankment. Mr. Zietz, who was present on the spot during a part of April 6 and during the whole of April 7 and 8, with the assistance of Mr. White and of Messrs. Bott, sen. and jun., rescued as many as possible of these bones, but owing to the indiscriminate way in which they had been treated the individual identity of all the skeletons so handled was unfortunately lost. During Mr. Zietz's stay, however, other skeletons were exposed as the cutting advanced, but never in such numbers as before his arrival; but these, however, he was able to secure more or less completely.

I visited the locality myself for the first time on April 14, when the cutting had advanced about 25 yards from its beginning. The length of the exposed section was then about 50 yards and its height, at the centre where it was highest, about 6 ft., and, from what has been said of the contour of ground, it will be understood that the height of the section gradually diminished to vanishing point towards either end.

The face of the section showed the following features:—The top layer was the undisturbed, rather sandy, surface soil, about 8 in. to 1 ft. thick where it was intact, though most of this had been previously scraped off by the scoop. Below this was a dark, in parts almost black, layer about 18 in. thick. Its basis was sand, with which were intermixed immense quantities of mussel (*Unio*) shells, broken into small fragments, with some unbroken valves, ashes, and fragments of limestone blackened by fire. A few hammerstones were also found in this layer (plate v.).

This extensive, dark layer covering the whole section evidently formed a great accumulation of kitchen-midden material, indicating long usage as a camping-ground.

Underlying the above was a layer of reddish sand from 2 to 3 ft. thick (plate v.), descending into which were occasionally seen extensions of the material of the kitchen-midden layer. At the bottom of such leads bones were usually found, thus showing that such had been buried after the accumulation of some, at least, of the kitchen-midden



SECTION OF BEDS AT SWANPORT WHERE THE REMAINS OF ABORIGINES WERE FOUND.

1. Surface soil (sandy). 2. Dark sand with remains of kitchen-midden material; thickness, 1 ft. 6 in. 3. Reddish sand containing small pockets and thin lines of broken Unio shells. The skeletons, represented by the horizontal line of elongated black marks, were found near the base of this bed; thickness, 2 ft. 6 in. 4. Travertine limestone above, with calcareous rubble below; thickness, about 2 ft. 5. Calcareous sandstone (Murray Bridge freestone) of Lower Cainozoic age; thickness, 2-3 ft. 6. Bed-rock consisting of massive granite.

material, or, in other words, that the site was used as a camping-ground subsequent to these burials. In fact, those who were engaged in the work told me that the presence of such a lead might always be taken as evidence that bones would be found beneath. In other parts, generally speaking, the line of separation between the kitchen-midden layer and the subjacent red sand was fairly distinct.

Below the red sand was a horizontal band of travertine limestone (plate iv.) varying in thickness from 6 in. to 1 ft., which was of moderately hard consistency towards the northern end of the section, but much softer towards the opposite extremity. Underlying the travertine was a layer of sand and rubbly limestone, the full depth of which was not exposed by the section.

On the occasion of my second visit to the locality on May 4, during which I had the advantage of the company of Mr. Howchin, the cutting had advanced a few yards farther into the rising ground, and its vertical face had consequently increased in height, the increase being due to the exposure of a greater thickness of the layer of sand and limestone rubble beneath the travertine. The subjacent layers were unaltered in their depth or relations. Bones were still being met

with but sparsely, and most of them were in friable condition.

GEOLOGY (Figure, p. 7).

For the following description of the site from the geological point of view and for the sketch of the section, here given, I am indebted to Mr. Howchin, F.G.S.

The ground in which the remains were found forms a river terrace on the right bank, having an average height of 10 ft. above high-water mark.

The bed-rock of the locality consists of the well-known Swanport granite, which is quarried near by for building purposes. There are large irregular outcrops of this granite fronting the river, at the base of the bank which has yielded the aboriginal skeletons.

Resting on the granite is a layer of calciferous sandstone of Eocene Age (Murray Bridge freestone), having a thickness of 2 or 3 ft.

This calcareous bed has given rise to a layer of imperfectly consolidated travertine limestone about 2 ft. in thickness, which at one time formed the surface of the ground. The upper portion of the bed forms an irregular crust, and the lower portion a marly and sandy rubble.

At a later stage, and before the site was utilized as an aboriginal burying-ground, the limestone became covered with blown sand, forming a capping about 4 ft. in thickness on the limestone. This deposit of sand is divided into two very distinct portions—the lower 2 ft. 6 in. consists of clean red sand with small pockets and thin layers of broken *Unio* shells, while the upper 1 ft. 6 in. is a dark-coloured sand mixed with black pellets of travertine limestone and a large quantity of *Unio* shells broken into by small fragments.

The red colour, present in the lower portions of the sand-bed, is a characteristic feature of deposits of this nature, in all arid climates, when left for a long time undisturbed. The colour is caused by the presence of iron oxide carried down by the rain-water from the surface, as a mineral residue from the decomposition of vegetable organisms. When exposed to the weather and blown by the wind the sand loses this colour by friction and bleaching.

The upper part of the sand-bed has taken its dark colour from the fires made by the aboriginals on the spot. The charcoal and ashes from the fires, as well as a certain amount of animal refuse, became mixed with the superficial sand, imparting a dark colour to it. The considerable thickness of this deposit, besides the large quantities of broken *Unio* shells in the kitchen-midden, gives evidence of a prolonged occupation of the site.

The presence of man is indicated contemporaneously with the building up of the lower portions of the sandhill by the pockets and thin layers of *Unio* shells referred to above, but only as an occasional visitor. It seems probable that the utilization of this ground as a burying-place was long anterior to its becoming a regular camping-ground, as it is not likely that the aboriginals would bury their dead where they lighted their camp fires. There seems to be three successive periods indicated by the section:—(a) An early evidence of man's presence before the period of many burials, when he occasionally visited the spot and ate his meals; (b) a period of crowded burials in which the sandhill became disturbed by digging graves; (c) a comparatively late period, when probably the remembrance of the burials had passed from the mind of the local tribe, as shown by the selection of this site for a camp, which must have been frequently visited.

POSITION AND ATTITUDE OF THE SKELETONS.

Unfortunately that part of the ground in which the skeletons occurred most numerous and in closest juxtaposition had been disturbed by the workmen before the arrival of Mr. Zietz on the field. Bones and earth had been picked down together in a confused mass, and in consequence, so far as these skeletons were concerned, both the identity of individuals and the opportunity of noting their positions and attitude were lost. As already stated, Mr. Zietz rescued as many as possible of the bones that had been previously removed under such unfavourable circumstances, and he was able, also, to take care that those subsequently exposed were removed with proper precaution. The skeletons, however, never again occurred in such remarkable profusion as before his arrival.

Fortunately Mr. J. T. S. Bott, a resident in the locality for many years, was present from the time of the first exposure of the bones, and for what I have to say under the present heading I am chiefly indebted either to his information or to the observations of Mr. Zietz, who, though coming later on the scene, made the best use of his opportunities. The great bulk of the bones were found at the level of the bottom of red sand, lying just above the travertine band, and the majority were concentrated within an area of about 50 x 30 ft., situated a little to the south of the centre of the rise. In the case, however, of one skeleton that was removed during my first visit—and there were a few others of which the same may be said—the hole made for their reception had penetrated the travertine, and the bones lay at this level or even partly below the latter. At this place the travertine

was very soft and presented little obstacle to penetration, while a little farther to the north it was of harder consistence. Such a position, however, was quite exceptional, and the great bulk of the bones lay, as stated, just above, or on, the band of travertine, which was about 4 ft. below the surface of the ground. Mr. Zietz further noted that the bones found at the lower part of the slope were in a much better state of preservation than those found farther away from the river, which might indicate a later date of interment in the former position, but he also remarked that bones found resting on the travertine were liable to be decomposed, owing probably to the continued action of water, to the drainage of which this more impervious stratum presented an obstacle.

As regards attitude, the majority of the skeletons were found in the trussed position in which many Australian tribes bury their dead—that is to say, the body was in a sitting position with the knees drawn up to the chest, the elbows bent so that the hands are brought up to the face, and the head bent forwards over the flexed knees. Sometimes in this trussed position the body lay on one side. In some instances, as was the case with the skeleton exposed during my first visit, the body had apparently been thrown into the grave anyhow; none were seen lying stretched out straight in the supine position. In only a few instances two, but not more than two, skeletons lay in one hole, and in some of these cases they were those of an adult and child. Even where the bodies lay in closest juxtaposition they had still apparently been buried separately.

Not infrequently the skull and other bones were found covered with a tenaciously adherent black encrustation, as if from prolonged exposure to smoke, and in some cases the surface of the bones had been charred, or, even, the whole thickness destroyed. In several instances, as indeed in the skeleton I saw removed, the cranium—usually so conspicuous an object in an exhumation—could not be found after the most careful search, though in this particular case a lower jaw of remarkable size was present. Once, the cranium being absent, two lower jaws were found accompanying the rest of the skeleton. Very frequently the small bones of the foot and hand were absent, and the remaining bones did not occupy their proper relative positions, and occasionally the long bones of the extremities were found broken.

Many of the conditions and deficiencies just recorded can be accounted for by the burial custom of the Narrinyeri tribe, to which the natives of this locality belonged. It was their practice, among other elaborate procedures, to place the bodies of their dead upon a platform and subject them

to a prolonged process of smoking over a slow fire. This will explain the blackening and occasional charring of the bones.

Mr. Taplin, in his account of the Narrinyeri in "Native Tribes of South Australia" (1, 20),⁽¹⁾ describes this smoking process, but says nothing as to subsequent burial. In his "Folklore," etc. (2, 37), he mentions that at the conclusion of the long smoking and drying process the body "was put on a stage in a tree and after a time buried." How long it was left on this tree platform before burial Mr. Taplin does not say, but I know that it was sometimes left in this position for years—so long, in fact, that it would seem as if no further disposal of it had been intended. This, however, may have been because of the discontinuance of their proper native customs due to the influence of the whites.

In the course of this long exposure, as I have repeatedly seen, the small and easily detached bones, such as those of the feet and hands and, even, the lower jaw, were apt to fall to the ground or be removed by carrion-eating birds, and, if afterwards the bones were buried, it can be easily understood how some of them should be missing and others relatively displaced.

The not infrequent absence of the cranium, which, from its size, is not likely to have disappeared in this fashion, may not unreasonably be accounted for by the practice among the Narrinyeri, as indeed among some other Australian tribes, of utilizing skulls as vessels for carrying water.⁽²⁾

Of the bones found broken it is possible that the more fragile ones might have been fractured by rough usage such as dropping them, or the body, into a deep hole; but this would scarcely account for the fracture of such strong bones as those of the thigh, which, also, were not unfrequently found broken into two or more pieces. Some of these frac-

(1) The figures, within brackets, occurring in the text refer to the bibliography at the end. The first figure in heavy type corresponds to the number of the work referred to and that in lighter type to the page. Where it is necessary to indicate a particular volume its number will be expressed by a Roman numeral interpolated between the former two.

(2) Unfortunately this interesting form of utensil is represented in the National Museum only by a cast, for which it is indebted to the Australian Museum, Sydney; the original, in the possession of that institution, having been obtained on the Coorong, South Australia. This is an example, of which many others might be given, of how interesting and sometimes unique relics have, from want of proper foresight, been allowed to leave the country of their origin.

tures may have occurred during life and have formed the injury, or a part of the injuries, causing death, for it is evident, as shown by a considerable number of the bones, that broken limbs were not uncommon. Some of these fractures had become united so satisfactorily that the resulting union would have done credit to a skilled surgeon. In other cases the union, though very strong, had taken place in bad position. There was nothing in the character of the fractures of the exhumed bones to suggest that they had been broken for the purpose of obtaining the marrow.

Associated with the human remains that were collected, after the promiscuous removal of those first met with, were bones of the dingo, including a perfect skull, and odd bones of the kangaroo, opossum, bustard, pelican, turtle, and fish,⁽⁵⁾ and a closer examination of the remains may possibly reveal the presence of bones of other animals. Whether these had been actually buried with the human remains or, belonging properly to the kitchen-midden layer, had accidentally become mixed with the latter cannot be stated with certainty. A few articles of human manufacture were also found in like association with the skeletons, viz., some hammer and anvil stones, one small quartzite implement which may have been used as an engraving or boring tool, two awls made from kangaroos' fibulæ, a few stone chips and a few blackened stones that had been used for cooking. No emu remains have been so far identified, and not a single fragment of iron, glass, pottery, or other white man's material was seen.

Resting immediately over a few—but only a very few—of the skeletons were large oval slabs of a composite material of the consistency of soft and friable mortar, and composed of sand, white earth, small fragments of limestone, burnt clay, broken *Unio* valves, and, occasionally, pieces of charcoal. The largest of these slabs was 1 ft. 9 in. x 1 ft. 3 in., and 5 in. thick at the thickest part: another was 1 ft. 3 in. x 12 in. x 3 in. Fragments of others were also found. From their composition they are evidently of artificial origin, but as to their significance in relation to the interments I am unable to speak. They may, however, come into the same category as the "widows' caps," actual or conventional, that were placed in the graves by the natives higher up the river, or the "Kopai" stones similarly used in the Darling River district.

(5) It is curious that so few remains of fish were found when we remember that it is a favourite food of the natives and that the adjacent river abounds with them.

THE NARRINYERI TRIBE.⁽⁴⁾

As this tribe has been mentioned in connection with the remains found at Swanport and will be further noticed it may be convenient to give some particulars as to its geographical distribution.

According to Mr. Taplin (**1**; 1 and **2**, 34) this tribe inhabited a large, triangular tract of country bounded on two sides by lines drawn from a point 20 miles above Wellington to Cape Jervis and Kingston respectively, and on the third side by the sea. Having thus an immense frontage to the fresh waters of the river and lakes and to the salt waters of the ocean and Coorong, they were exceptionally well favoured in the matter of food supplies. As Swanport is, in a direct line, about 15 miles above Wellington it stands nearly at the northern apex of the Narrinyeri territory. The tribe was divided into eighteen local divisions or clans, each having its own geographical distribution, and, collectively, they formed a powerful body whose numbers, in 1840, Mr. Taplin reckoned at 3,000 individuals, though he gives no grounds on which his estimate is based. The many camping- and burial-grounds that are found all along the shores of the lakes and river are, however, quite indicative of a numerous population.

On the north, east, and south their neighbours were the Moorundie, Adelaide, and Tatiara tribes respectively.

The Narrinyeri have some historical interest, as it was members of this tribe who were concerned with the death of Captain Barker at the Murray Mouth in 1831, and with the murder of the shipwrecked passengers and crew of the "Maria" at Lacepede Bay in 1840. It is the remnants of this once numerous tribe, now chiefly half-castes, that form the population of the Point Macleay Mission Station, or that lead a nomadic existence along the lake and river shores. A few have a more or less permanent camp at Brinkley below Wellington, on the left bank of the Murray just before it enters the lake.

(4) Though the word Narrinyeri is, according to general custom used here as a tribal designation it really has not this significance, as Mr. Taplin has explained (**1**, 1). According to this writer the term properly signifies "belonging to men," meaning that this people considered themselves *par excellence* as men in contradistinction to other natives whom the Narrinyeri considered as inferior beings.

An old blackwoman, to whom further reference will be made, implied that the term signified the native race generally, and she spoke of the subdivisions of the Narrinyeri as separate tribes, but she could hardly be considered as an authority on ethnological terminology.

PREVIOUS HISTORY OF SWANPORT.

Mr. Bot^t, whose name has been mentioned in connection with these remains, has been a resident at Swanport for the last thirty years. His predecessor lived there one year, and before him, again, was a resident of twenty years' standing. This takes us back for a period of fifty-one years or to 1860. During the whole of that time the fact that the place had been used as a native burial-ground was completely unknown to any of the residents, and, certainly, no interment had taken place during those years, though, since the memory of the white man, it has been constantly used as a favourite camping-ground.⁽⁵⁾

If, therefore, some of the interments took place after the great accumulation of the kitchen-midden material—and that this happened in some cases at least is shown by the leads of this layer into the subjacent sand—it betokens a very ancient occupancy of the site.

MONTEITH.

Before passing on to the consideration of the question whether the presence of so many skeletons in one limited area is due to any special cause, I may mention that, on the occasion of my second visit to Swanport, I was able to examine a spot about $1\frac{1}{2}$ miles lower down the river, on the left bank, where I was informed that many skeletons had been exposed by the drifting of sand some years ago.

The site was at the top of a high sandy bluff which, pushing itself right up to the river bank, separates the reclaimed flat, formerly known as Monteith's Swamp, from an unnamed and unreclaimed swamp to the north of it. From the facts of its exposed situation, the sandy nature of the ground, and the thriftless way in which it has been denuded of vegetation 5 or 6 ft. of the superficial soil has been blown away to accumulate elsewhere as drifts over a considerable area, leaving exposed the underlying surface of indurated sand. On this floor, and over a considerable area, occur very numerous and, sometimes, very large heaps of broken *Unio* shells and many blackened cooking-stones, indicating long occupancy by the natives. The age of these cooking-stones was indicated by the fact that their surface had become

(5) For some years a ferry-boat service was maintained at Swanport (formerly known as Thompson's Crossing), and in the course of the removal of the bank it was found that the lower end of a buried portion of one of the wooden slabs used in the construction of the ferryman's house had come into close contact with a skeleton. The house was, in fact, built right upon the burial site, and some of its chimney-stones still remain upon the spot (see plate iv.). The native name of the locality was *Kongong* (31, 123).

almost polished by the long action of driven sand. No human bones, however, were visible, though a hammer- and an anvil-stone and a few quartzite flakes and chips were found.

Mr. Bott told me that when, some years ago, he saw the recently exposed skeletons they were lying in a row side by side.

THE ALLEGED PANDEMIC.

From what has been said the actual manner of disposal of the bodies at Swanport affords no conclusive evidence of the incidence of some sudden and great mortality among the natives, of such a catastrophic character as would cause them to substitute a more hurried method of burial for their ordinary mode of interment, and although the facts that two bodies were sometimes found buried together, and that others seemed to have been thrown in without care, may be taken to show that sometimes all may not have been quite in order, there was, at least, no sign of such promiscuous and collective burial as occurred in the "plague pits" of the mediæval epidemics of Europe. The number of bodies represented by the remains, apart from the fact that it does not constitute a record (3, 1., 217), is not of itself conclusive, for the accumulation in this one place may be explained equally well on the assumption that it may have been, and probably was, used as a burying-ground for a very long period of years: and, moreover, if some sudden and great mortality did actually occur in the district there is no evidence to show that Swanport, more than any other of the numerous burying-grounds along the river, was a special place of sepulture for the victims of the supposed malady. In any case Swanport was, no doubt, only one of many which would have been put to a similar use in a great emergency.

Nevertheless there is such an accumulation of evidence that not only the Narrinyeri, but many other of the native tribes were at some time, and possibly on more than one occasion, smitten with an epidemic disease of great virulence and destructiveness that it may be of some interest to present the available information bearing on the subject. In the inquiry it will be necessary to investigate the origin and nature of the disease and the course taken by it in its spread throughout, as we shall see, a large part of Australia.

Unfortunately for such an inquiry, the living persons who are old enough to have spoken with natives who were themselves alive at the time of the occurrence of the supposed epidemic are few in number. Most of the old pioneers are dead, and so are most of the aboriginals who, though they might not be old enough to have lived at the time of its supposed occurrence, might yet have heard of it from eye-witnesses.

Still, as I shall show, some evidence of this kind is fortunately yet available. Mr. Bott, whose long residence of thirty years at Swanport has been mentioned, informs me that in his early days three old blacks were living in the district, viz., Billy Poole, Jimmy Giles, and Jimmy Duck. Their names are still well remembered by old colonists. Billy Poole was the eldest of the three and was, at the time of which Mr. Bott speaks—that is, about 1880 or 1881—probably seventy years of age. Assuming this estimate of age to be correct Billy Poole's personal recollections might have gone back to about the year 1815. These old blacks, Mr. Bott told me, often spoke to him about a great sickness which, when they were quite young, fell upon the natives along the river, causing their deaths in such numbers and with such rapidity that the living were at their wits' end to know how to dispose of the dead quickly enough; and they also described how in the sickness they came out all over spots and quickly died, the rapid onset of decomposition after death, and their unavailing efforts to find an effective remedy among the plants of the scrub.⁽⁶⁾

This evidence does not enable us to fix the time of the occurrence, except to the extent that it was certainly before the coming of the white man as a permanent settler.

There is still alive and in full possession of all her faculties an unusually intelligent old woman of the Narrinyeri tribe, well known to all the inhabitants of the Lake Districts, who has often told me an unvarying story of her first sight of the white people. It occurred to me that she might have some recollection of the great sickness, and accordingly I sought an interview with her at Wellington West on May 21. She had been camping on Poltalloch Station, on the south side of Lake Alexandrina, but she readily came to the place mentioned when told that I wished to see her.

This old black's married name, under which she is generally known, is Mrs. Karpeny,⁽⁷⁾ or Louisa Karpeny (plates vi., vii., viii.), but her own proper name is Kōntinyeri (the exact vowel sound of the first syllable being represented by the German modified o). She has, or has had, two sons and six daughters and twenty-eight grandchildren. She spends her life wandering from place to place along the shores

(6) Or, as Billy expressed it, "Long time ago big one sick; big one tumble down all about 'long river; die very quick; can't bury quick enough; big one very quick stink, blackfellow big one frightened; all run away."

(7) In the pronunciation of this name the accent is upon the first syllable and the second is short.

of the Lower Murray and lakes from Wood's Point to Point Macleay, sometimes camping for varying periods on the stations and sometimes staying at a native camp at Brinkley. In her younger days she was often employed on the stations at shearing-time, and she told us how much better than the white men she and other natives did their work in the wool-sheds.

Mrs. Karpeny related her reminiscences with much dramatic vividness, and as they are interesting in themselves I will make no apology for giving them at some length, even when they refer to other matters than the immediate object of my inquiry.

On the occasion of our interview she told how, when she was quite a little girl and encamped with others of the tribe on what is now Poltalloch Station, she and her young brothers and sisters were much alarmed at the sight of two soldiers in red coats, and another man, on horseback, one of the soldiers having a "feather sticking out of his hat." In their fear the children went into the water and stood, hidden, among the reeds until the soldiers had passed out of sight. This could not have been before December, 1836 (the date of the proclamation of the colony), but it was probably not long afterwards, for, according to her story, this episode occurred some time—she thought two or three years—before the wreck of a ship (the "Maria") which occurred in 1840. Though living at Poltalloch at the time, which place, however, is not a great distance from the Coorong, when the episode took place, she seemed to know all about the affair, the natives concerned in it, and the punishment inflicted upon some of the supposed participators in the murder of the crew and passengers, for she related, with much circumstantial detail, that two of the natives were hanged and two shot, a statement which agrees with that given by Mr. Taplin (1, 5). At that time she said, indicating her height, she was "quite a big girl," about ten or twelve years of age, as she thought.

Then, on being questioned, she spoke of the coming of the great sickness which she called small-pox. She said it occurred some time before the episode of the white soldiers, and that she was a very little child at the time.

Now, assuming that Mrs. Karpeny was of the age she stated at the time of the "Maria" incident, she would have been about seven when she saw the white soldiers—which, as we have said, could not have been before 1837: and if she were actually alive at the time (a point on which she insisted) it would fix the date of the epidemic at not earlier than 1830—a date which it is important to remember—and

her own age at not less than eighty, which I think is not at all improbable.

If this be approximately the date of the epidemic of which Mrs. Karpeny was a witness as a child it was, as we shall see, some years later than that which we must assign to the one of which Mr. Taplin speaks in his account of the Narrinyeri, to which I shall refer directly. But Mrs. Karpeny was quite certain that the sickness of which she spoke was the only one that occurred during her lifetime, nor before that occurrence had she ever seen any blacks marked with the disease, though afterwards there were many such.

This old black spoke of the coming of a strong *west* wind which made the reeds all tremble, and this, she said, was taken as a sure sign that the sickness was coming—which it did very quickly. In making this statement, which she repeated two or three times with great earnestness, she held out her two hands and made them quiver. With much gesture she described how the faces of those affected with the disease came out all over spots, and how that many died of it, including many children. She herself escaped, but her aunt, who is still living,⁽⁸⁾ and who, she says, is considerably older than herself, caught the disease and has her face marked. She told of the remedies they sought, one being young reed shoots pounded and administered from a mussel (*Uro*) shell used as a spoon; another was the boiled leaves of mallee eucalypts gathered in the scrub. She also mentioned the use of other plants which I could not identify, but which she said she could point out. Nothing, however, did any good. Several of these statements were repeated two or three times, and always with adherence to the same version.

When asked whether they buried those who had died of the sickness she said, "No; we smoked 'em," and that led me to ask her about the ante-burial rites of the Narrinyeri. Her replies conformed to the account given by Mr. Taplin, but she gave more explicit information about the subsequent and final interment, stating that the bones were put into the ground two or three years after they had been finally placed on the platforms.

She had never been as far up the river as Swanport, and knew nothing of the burials there.

Bearing in mind the frequent absence at that locality of the cranium from the other parts of the skeleton, I asked Mrs. Karpeny whether, in her young days, it was a common custom to convert the skulls into drinking vessels. She said it was, and that she herself had often carried two of them.

⁽⁸⁾ Since these lines were written this old woman has died. She will be again referred to.

She described, without any hesitation, how they took the skull from a platform ("knocked off the head" were her actual words) and put it to soak in the water until freed from the soft parts; and when cleaned they carried it about by means of a handle made of string. "Lots of 'em," she said, were used in this way. This statement affords a satisfactory explanation of the missing crania at Swanport.

Mrs. Karpeny knew the three old blacks mentioned by Mr. Bott, and reminded me of a forgotten episode in which one of them had taken charge of my brother and me as boys. She also named several other natives who were well known round the lakes in the early days.

From Mr. Paul Martin, now of Appila-Yarrowie, I have also some information on the same subject. He writes me, under date May 17, 1911, to the effect that he went to live in Strathalbyn about 1845, being then about eight or nine years of age. He remained there until 1852, when he went to the Victorian gold diggings. Returning afterwards to South Australia he went to live on the lower Finnis. There he saw many pock-marked blacks, and one of these—an intelligent man of about thirty or thirty-five—told him that when he was a little boy "big one wind" came from the east (cf. Mrs. Karpeny's account *ante*); then, pointing to his marked face, "this one come." He also said that many blacks in the district were affected and that many died. It is striking that in the accounts given by both Mrs. Karpeny and Mr. Martin's informant the coming of the sickness is associated with a strong wind, though the direction given in the two statements is diametrically opposite. In this respect Mrs. Karpeny's statement is an exception, for most of the statements speak of the disease as coming from the east.

Turning now from the oral to the written evidence bearing on the subject, and, first, as it relates to the Narrinyeri, the Rev. George Taplin, writing in 1874 (which is the date of the first edition of his account of this tribe), says (1, 44):—"They have a tradition that some sixty years ago a terrible disease came down the River Murray, and carried off the natives by hundreds. This must have been small-pox, as many of the old people now have their faces pitted who suffered from the disease in childhood. The destruction of life was so great as to seriously diminish the tribes. The natives always represent that before this scourge arrived they were much more numerous. They say that so many died that they could not perform the usual funeral rites for the dead, but were compelled to bury them at once out of the way. I think there must have been more than one visitation of this kind, judging from the age of those who are pock-marked."

In this writer's "Aboriginal Folklore" (2, 45) he makes the same reference, with the omission of the period at which the disease is supposed to have occurred. Assuming, however, the epidemic of which he speaks to have occurred at about the time referred to in the first-mentioned account the approximate date of its occurrence would be 1814 or thereabouts, or more than twenty years before the foundation of the colony.

Mr. Howitt, also (4, 195), speaks of certain propitiatory rites as having been proposed by certain riverine tribes to avert the consequences of a great sickness that they heard was coming down the Murray, and there are other statements to the same effect to which reference will be made later. What has already been said, however, is sufficient to establish, as a starting-point for my inquiry, the fact that at some time prior to the arrival of the white man the natives of the Lower Murray were afflicted with a pestilence of great fatality, and that the Murray riverine system formed a principal channel for its transmission. What the pestilence was and how it originated we shall have also to inquire.

ORIGIN OF THE DISEASE.

Had there existed any evidence of the existence of disease, a widely-spread disease such as small-pox, among the Australian aborigines before the first colonization settlement in New South Wales in 1788 its presence, or its past effects, would probably not have escaped the notice of the earliest voyagers such as Dampier and Cook. The former came intimately in contact with a particular tribe on the north-west coast of what is now Western Australia and gave many details of them, for the most part of an uncomplimentary nature (24, I., 464); while Captain Cook, at different times, saw a good many natives and wrote concerning them, but neither of these travellers make any mention of any characteristic affection such as that of which we are speaking; indeed, the latter traveller expressly states that he saw no marks of disease or sores upon their bodies (25, III., 634). There is also no evidence to show that any disease was communicated to the natives by the white sailors of either expedition.

The circumstances and possible influence of two subsequent expeditions to Australia will require a closer scrutiny. The first of these was that of the English fleet which brought the first convicts to the then newly-founded settlement of New South Wales. This was under the command of Captain Arthur Phillip (who subsequently became the first Governor of the colony), with Captain John Hunter as second in com-

mand. The expedition arrived in Botany Bay in January, 1788, and shortly afterwards moved to Port Jackson. Of the circumstances attending the start of this expedition it will be necessary to speak further.

Five days after these English ships had reached Botany Bay two French frigates, the "Boussole" and the "Astrolabe," under the command of La Pérouse, arrived at the same harbourage, and in the March following sailed away, to be lost with all hands, as was subsequently discovered, on one of the islands of the Santa Cruz group.

There are good grounds for excluding from suspicion the crews of the French ships as the source of any communicated disease. A perusal of the account of the voyage (5, I.) will show that the expedition was fitted out with great care and foresight, and that in the instructions to the commander a whole chapter is especially devoted to the precautions which are to be taken in order to preserve the health of the crews (5, I., 55). That these were effectually carried out may be gathered from the statement, several times repeated, that there was no sickness on board, and in a letter written by La Pérouse on February 4, 1788 (5, IV., 201), after his arrival at Botany Bay, he says:—"Nous sommes arrivés à la nouvelle Hollande sans qu'il y ait eu un seul malade dans les deux bâtiments." These facts will sufficiently establish the freedom from disease of the sailors of the great French navigator, and we may dismiss them from suspicion as propagators of disease of any kind.

In April, 1789, *fifteen months after the departure of the English ships and thirteen after that of the French*, no other ships having visited the locality meanwhile, a virulent and fatal epidemic was found to be raging among the natives living round the shores of Port Jackson. The event is thus described by Colonel David Collins, Judge-Advocate and Secretary of the colony (6, 65):—

"April.—Early in the month (1789), and throughout its continuance, the people whose business called them down the harbour daily reported, that they found, either in excavations of the rock, or lying upon the beaches and points of the different coves which they had been in, the bodies of many of the wretched natives of this country. The cause of the mortality remained unknown until a family was brought up, and the disorder pronounced to have been the small-pox. It was not a desirable circumstance to introduce a disorder into the colony which was raging with such fatal violence among the natives of the country; but the saving the lives of any of these people was an object of no small importance, as the knowledge of our humanity, and the benefits which we

might render them, would, it was hoped, do away the evil impressions they had received of us. Two elderly men, a boy, and a girl were brought up, and placed in a separate hut at the hospital. The men were too far overcome by the disease to get the better of it; but the children did well from the moment of their coming among us.

“From the native who resided with us we understood that many families had been swept off by this scourge, and that others, to avoid it, had fled into the interior parts of the country. Whether it had ever appeared among them before could not be discovered, either from him or the children; but it was certain that they gave it a name (*gal-gal-la*); a circumstance which seemed to indicate a previous acquaintance with it.

“May.—Of the native boy and girl who had been brought up in the last month, on their recovery from the small-pox the latter was taken to live with a clergyman’s wife, and the boy with Mr. White, the surgeon, to whom, for his attention during the cure, he seemed to be much attached.

“While the eruptions of this disorder continued upon the children, a seaman belonging to the ‘Supply,’ a native of North America, having been to see them, was seized with it, and soon died; but its baneful effects were not experienced by any white person of the settlement, although there were several very young children in it at the time.

“From the first hour of the introduction of the boy and girl into the settlement it was feared that the native who had been so instrumental in bringing them in, and whose attention to them during their illness excited the admiration of everyone that witnessed it, would be attacked by the same disorder; as on his person were found none of these traces of its ravages which are frequently left behind. It happened as the fears of everyone predicted; he fell a victim to the disease in eight days after he was seized with it, to the great regret of everyone who had witnessed how little of the savage was found in his manner, and how quickly he was substituting in its place a docile, affable, and truly amiable deportment.”

The same writer again refers, with a few additional but not essential details, to the outbreak in a chapter dealing with the disease of the natives (p. 596).

In the foregoing account the following points are of importance and will be further noticed:—

1. The long period—fifteen months—elapsing between the departure of the English ships and the outbreak of the disease, or, in the case of the French, thirteen months.

2. The pronouncement presumably either made or acquiesced in by the chief medical officer to the settlement (Surgeon-General White) that the disease was small-pox.

3. That neither the whites, generally, nor the white children were affected, and that while the two native adults died of the disease the two affected children recovered.

Captain Hunter (7, 132) also gives an account of the outbreak which is assumed to be small-pox, and it is again alluded to by Barrington (8, 31) "as a disorder in appearance like the small-pox," and similarly by Tench (9, 18 and 27).

These are the earliest references to this outbreak, made by those who were living in the settlement at the time of its occurrence, and they leave no doubt of the main fact, viz., that in 1789 the natives of the locality became smitten with a virulent malady that was either small-pox or so like it as to be readily taken for it.

At this stage, and before tracing the further progress of the disease, we must return more particularly to the question of its mode of origin. We have seen that there are no grounds for attributing its source to the French sailors, whose ships show an exceptionally clean bill of health right up to the shores of Australia. There remains, then, for further consideration the English ships, and it becomes necessary to examine their health record more minutely from the commencement of their voyage.

The facts in this connection are recorded by John White, Surgeon-General to Captain Phillip's expedition and, afterwards, of the settlement (10, 2 *et seq.*), and as their correct interpretation is of such importance I must at some length quote the author's words (the italics are his):—

While the main part of the fleet destined for the new settlement was lying at Spithead previous to sailing it was joined by two additional transports, on one of which was the Surgeon-General, and immediately afterwards "I visited all the other transports, and was really surprised to find the convicts on board them so very healthy. When I got on board the 'Alexander,' I found there a medical gentleman from Portsmouth, among whose acquaintance I had not the honour to be numbered. He scarcely gave me time to get upon the quarter-deck, before he thus addressed me—"I am very glad you are arrived, Sir; for your people have got a *malignant* disease among them of a most dangerous kind; and it will be necessary, for their preservation, to get them immediately released." Surprised at such a salutation, and alarmed at the purport of it, I requested of my assistant, Mr. Balmain, an intelligent young man, whom I had appointed to the ship for the voyage, to let me see the people

who were ill. 'Sir,' returned Mr. Balmain, taking me aside, 'you will not find things by any means so bad as this gentleman represents them to be: they are made much worse by him than they really are. Unlike a person wishing to administer comfort to those who are afflicted, either in body or in mind, he has publicly declared before the poor creatures who are ill, that they must inevitably fall a sacrifice to the malignant disorder with which they are afflicted; the malignity of which appears to me to exist only in his own imagination. I did not, however,' continued Mr. Balmain, 'think proper to contradict the gentleman; supposing from the consequence he assumed, and the ease with which he had given his opinion, or more properly *his directions*, that he was some person appointed by the Secretary of State to officiate for you till your arrival. When you go among the people you will be better able to judge of the propriety of what I have said.' Mr. Balmain had no sooner concluded than I went between decks, and found everything just as he had represented it to be. There were several in bed with slight inflammatory complaints: some there were who kept their bed to avoid the inconvenience of the cold, which was at this time very piercing, and whose wretched clothing was but a poor defence against the rigour of it: others were confined to their bed through the effects of long imprisonment, a weakened habit, and lowness of spirits; which was not a little added to by the declaration of the medical gentleman above mentioned, whom they concluded to be the principal surgeon to the expedition. However, on my undeceiving them in that point, and at the same time confirming what Mr. Balmain had from the first told them, *viz.*, *that their complaints were neither malignant nor dangerous*, their fears abated."

The Surgeon-General then goes on to say that he informed the patients that he would give orders for the supply of clothing to those who were in want of it, and that as they had been nearly four months on board on a diet of salt provisions he would endeavour to get some fresh for them while in port. "This short conversation had so sudden an effect on those I addressed, and was of so opposite a tendency to that of the gentleman alluded to, that before we got from between decks, I had the pleasure to see several of them put on such clothes as they had, and look a little cheerful. . . .

"On returning to the quarter-deck, I found my new medical acquaintance still there; and before I could give some directions to Mr. Balmain, as I was about to do, he thus once more addressed me—'I suppose you are now convinced of the dangerous disease that prevails among these people, and of the necessity of having them landed, in order

to get rid of it.' Not a little hurt at the absurd part the gentleman had acted, and at his repeated importunity, I replied, with some warmth, that I was very sorry to differ so essentially in opinion from him, as to be obliged to tell him that there was not the *least appearance* of malignity in the disease under which the convicts laboured, but that it wholly proceeded from the cold; and was nearly similar to a complaint then prevalent, even among the better sort of people, in and about Portsmouth. Notwithstanding this, he still persisted so much in the propriety of their being landed, and the necessity there was for an application to the Secretary of State upon the occasion, that I could no longer keep my temper: and I freely told him, that the idea of landing them was as improper as it was absurd. And, in order to make him perfectly easy on that head, I assured him, that when any disease rendered it necessary to call in medical aid, he might rest satisfied I would not trouble *him*; but would apply to Dr. Lind, Physician to the Royal Hospital at Hasler, a gentleman as eminently distinguished for his professional abilities as his other amiable qualities; or else to some of the surgeons of His Majesty's ships at Portsmouth Harbour, or at Spithead, most of whom I had the pleasure of knowing, and on whose medical knowledge I was certain I could depend."

The Surgeon-General subsequently adds that notwithstanding the salutary effect on the patients of a change of diet to fresh beef and vegetables, with the addition of some wine and other necessaries, "the report of a most malignant disease still prevailed; and so industriously was the report promulgated and kept alive by some evil-minded people, who either wished to throw an odium on the humane promoters of the plan, or to give uneasiness to the friends and relations of those engaged in the expedition, that letters from all quarters were pouring in upon us, commiserating our state. The newspapers were daily filled with alarming accounts of the fatality that prevailed among us: and the rumour became general, notwithstanding every step was taken to remove these fears, by assurances (which were strictly true) that the whole fleet was in as good a state of health, and as few in it would be found to be ill, at that cold season of the year, as even in the most healthy situation on shore. The clearest testimony that there was more malignity in the report than in the disease, may be deduced from the very inconsiderable number that have died since we left England; which I may safely venture to say is much less than ever was known in so long a voyage (the numbers being proportionate), even though not labouring under the disadvantages we were subject to, and the crowded state we were in."

It is to be noticed that, in addition to overcrowding, the conditions under which the convicts made their voyage were evidently very insanitary, for we are told that the Surgeon-General proposed white-washing, with quicklime, those parts of the ships where the convicts were confined, as a means for correcting and preventing the "unwholesome dampness which usually appeared on the beams and sides of the ships, and was occasioned by the breath of the people." Here are, at all events, favourable conditions for the development and spread of disease.

Whatever may have been the exact nature of the "malignant disease" of the unnamed Portsmouth doctor there is other evidence to show that all was not quite right at the start from a health point of view, for Tench (11, 1), in speaking of the long stay of the ships at the Motherbank, says:—"In this period, except a slight appearance of contagion in one of the transports, the ships were universally healthy and the prisoners in good spirits." Note here, again, the dominant idea of contagion. Now, while a certain amount of difference of opinion between doctors is unfortunately not unusual, at the present time of improved medical knowledge, one is scarcely prepared to find, even in those days, so great a divergence as appears to have existed in this case. Between a disease, thought to be characterized by malignity, and the effects of cold, aggravated by malnutrition, close confinement, and insanitary conditions generally is a wide gulf, and it is impossible to avoid suspicion that the Portsmouth doctor, whose reiterated opinion the official medical officer treated with so much contumely, may have been right after all. Such a suspicion is strengthened by a significant remark made by Tench (9, 18), who sailed with the expedition as captain of marines. He is endeavouring to discover the origin of the Sydney outbreak, which he assumes to be small-pox, and, in a footnote, he mentions that "no person among us had been afflicted with the disorder since we had quitted the Cape of Good Hope, seventeen months before." Surely this may be read as equivalent to an admission that the disease had existed in the previous part of the voyage.⁽⁹⁾ If this was so it is curious that the principal medical officer (Surgeon-General White) makes no mention of such an occurrence in his account of the voyage, though he alludes to an outbreak of mumps soon after sailing and, later, of dysentery, from which one man died.

It must thus be admitted that strong suspicion attaches to the English expedition as a potential source of some disorder

(9) The fleet arrived at Table Bay on October 13, 1787, and left on November 13. It arrived at Botany Bay on January 20, 1788.

of a contagious kind, but if that be so the question must be asked why did not the outbreak in Sydney take place until the lapse of so long a period after the arrival of the ships which, under this view, must have contained the germs of the disorder? For, as mentioned, it did not appear until fifteen months after the ships had actually left Sydney or seventeen months after they had left the Cape, since which time there had been, according to Tench's statement, no disease on board.

Mr. Curr (3, 1., 226) attempts to account for these facts by supposing that the disease emanated from clothes that had become infected on board and had been distributed to the natives. It is well known that disease may be, and is, distributed in this way, even after a long interval has elapsed since the articles were exposed to contagion, and that may possibly be the explanation in this case. Still, under the particular circumstances of the case, one would like to know what was done with the infected clothes during all this long period, which included the time occupied by the voyage from the Cape when the clothes must have been on board and possibly worn. To make the circumstances fit the case one must suppose that these clothes had been put aside, and kept away from human contact, for nearly a year and a half before they were distributed. Otherwise why did not they communicate infection to the white folk who handled, or wore, them in the interval? Or if they were given to the natives soon after the arrival of the ships why did the disease not break out earlier among them?

These are questions that cannot be answered and it would seem impossible to pursue the inquiry further in this direction. We may conclude, therefore, that the Sydney outbreak may have originated from the English ships, but that it is not absolutely proved.

A little later we shall consider another possible origin, also of an extrinsic nature, but before doing so it will be desirable to trace, as far as may be possible, the march of events subsequent to the Sydney outbreak in relation to this or to some similar disease affecting the natives in other parts of Australia.

SUBSEQUENT EPIDEMICS.

In this part of my inquiry I am much indebted to an interesting chapter of Curr's "Australian Race" (vol. i., chap. viii.), on the diseases and decline of the aboriginal race, in which the author summarizes all the information he could gain either from published books or from correspondents in various parts of the country. Some details on this subject are also given by Brough Smyth (28, 1., 253).

The Sydney epidemic occurred, it will be remembered, in 1789; that outbreak appears to have run its course and died out, for, so far as the records are concerned, we hear no more of any similar occurrence until 1830 or 1831, or more than forty years later. About that date an outbreak is reported to have occurred at Bathurst, New South Wales, and at King's Plains, 27 miles west of this place. Under the native word *Nguya* (pustule) Teichelmann and Schürmann (12, 34) add a note to the effect that, about the same date, 1830, a disease (small-pox) was universal among the natives of the Adelaide tribe and diminished their numbers considerably. It is also, there, stated that it came from the east or the Murray tribes. The disease is again reported from Scone, New South Wales, 200 miles north of Sydney, about 1833-5, and from various other places in Victoria or New South Wales between the years 1840 and 1845. Besides these reports, referring to definite outbreaks, the dates of which are approximately fixed, there will be found in the chapter of Curr's work referred to many other statements from people who, writing some years after the actual outbreaks, had seen the blacks bearing pock-marks.

One such reference may be particularly noticed here. It appears that at a date which, according to the context of the letter reporting it (3, I., 218), may be put about 1807 smallpox has committed "awful ravages" at Swan Hill, on the Murray.

Farther north Mitchell (22, I., 26) records in 1831 an outbreak of which he himself was a witness at Curringai, in the Liverpool Range; and later, in 1835 (22, I., 218), he speaks of having seen pock-marked blacks at Fort Bourke and at several other places lower down the Darling, and he alludes to the native population of this river as having been reduced by small-pox. Sturt also (21, I., 105) in speaking of the natives of this river, says "that their tribe did not bear any proportion to the number of their habitations. It was evident that their population had been thinned."

It will thus be seen that all the outbreaks, so far mentioned, occurred in eastern and south-eastern Australia: that nearly all of them were among the blacks of the Murray riverine system; and that while most of those of which the dates are definitely stated occurred between 1830 and 1845, one outbreak (Swan Hill) may have occurred as early as 1807. After 1845 the disease seems, if not to have once more disappeared from these regions, to have, at least, subsided in extent and virulence.

In Western Australia Curr records outbreaks of, apparently, the same disease occurring at various localities on

the north-west coast, of which most took place between 1865 and 1870, and he states that as early as 1829 pock-marked blacks were seen in the neighbourhood of Perth (3. 219).

According to Foelsche (13. 7) small-pox broke out among the natives around Ports Darwin and Essington about 1862, and he makes mention of a plant the juice of which is used as a remedy.

Wilson also in his account of a voyage made in 1828 (14, 319) gives in his vocabulary of the Raffles Bay tribe a word, Oie or Boie, for small-pox which shows that they had had, even then, experience of it.

Other references to the existence of small-pox in the Northern Territory about 1865 will be found in Curr's chapter.

That small-pox had existed as far into the interior as Lake Eyre appears from Gason's account of the Dieyerie tribe (1, 283), and Foelsche, who knew the natives well, states (13, 8) that "no doubt it spread a long distance inland, as pock-marked natives are found among all the inland tribes."

There is evidence also of its presence still farther north, for Mr. Gillen, whose work in conjunction with Professor Spencer on the Central and Northern Australian tribes is so well known, writes me (May 24, 1911) that thirty years ago when he lived at Alice Springs it was a common thing to see old natives pitted with small-pox all along the telegraph line from Charlotte Waters to Barrow Creek: but he saw no young natives similarly marked. Old blacks of the Arunta tribe, which occupies a large part of the tract of country just mentioned—that is the heart of Australia—had a tradition that a terrible disease traversed their country and destroyed great numbers of their people. When Mr. Gillen went to live at Moonta ten or twelve years ago he found that a similar tradition obtained among the Yorke Peninsula (Narrunga or Narrang-ga) tribe, and an old man told him of a place—an old camping-ground—where many of the victims had been buried, but he was never able to find it.

The disease is also recorded from Central Australia by Tietkins (13, 112), who mentions that out of fifteen or twenty blacks who visited his camp at the Rawlinson Ranges (24° 30' southern latitude, 127° 42' E. longitude) in 1873 eight were unmistakably marked with small-pox.

According to Curr it never made its appearance in Gippsland, nor, according to the same writer, is there any record of it among the natives of the Australian Bight, though he appears to have overlooked a reference to its former presence

at Streaky and Fowler Bays (13, 112), where it was believed to have come from the north.

As regards Queensland, the only mention of the occurrence of the disease in this State by an early writer that I have so far discovered is made by Lang (23, 340), who speaks of it as a "variolous disease, somewhat similar to the small-pox," and as affecting a tribe of natives on the Upper Brisbane River. He further mentioned that vaccination was a specific.

Later, in 1904, Miss Petrie states (26, 65) that when her father first came to North Pine (16 miles from Brisbane) pock-marks "were strong on some of the old men" (this was not long after 1837), who told him that the sickness had come among them long before the advent of the white people, killing off numbers of their comrades. "Pock-marks they called nuram-nuram—the same name as that given to any wart. From this Neurum-Neurum Creek gets its name."

References to outbreaks in other localities might be given, but enough has been said to show that a disease, which is always described either as small-pox or as one very closely resembling it, has been spread so widely, and perhaps more than once, among the Australian natives as to to deserve the term pandemic.

THE QUESTION OF A POSSIBLE CONNECTION BETWEEN THE SYDNEY EPIDEMIC OF 1789 AND THE SUBSEQUENT OUTBREAKS.

We must now return to the inquiry whether any connection can be traced between the Sydney epidemic in 1789 and that, or those, occurring subsequently in many places.

Dealing first with the manifestations in eastern and south-eastern Australia—where such a connection might most reasonably be expected to be traceable—if such a connection had existed it is remarkable that for more than forty years we find no sign of a recrudescence of any epidemic similar to that in Sydney.

Where was the infection during all these years? Did the next observed outbreaks, of which several seem to have occurred in 1830 or a few years afterwards, originate independently, or did the embers of the Sydney disease remain smouldering, somehow and somewhere, during this long period, to burst into flame again forty years afterwards? These are not easy questions to answer, and either supposition involves difficulties.

If the later outbreaks of 1830-5 were the aftermath of the epidemic of 1789 then we are quite unable to trace the connection between the two. For, apart from the length of the interval, it is difficult to see how, in the case of

natives who wear no clothes and have few personal and permanent belongings, the seeds of the disease could be kept alive for so long, and if it were actually kept alive why did they not germinate in human bodies?

If, on the other hand, the 1830 epidemics arose *de novo* and without any connection with the outbreak that had preceded it forty years earlier, then, for their cause, we are without even the uncertain facts that we possess concerning the possible origin of the Sydney epidemic from the English ships. If, however, we could explain the origin of the outbreaks of 1830 it would not be difficult to trace to them those others which, in New South Wales and Victoria, seem to have occurred, between that date and 1845 or thereabouts, at intervals of, at most, a few years, and at places between which the geographical features would have afforded a ready means of transmission.

There is, of course, a third alternative, viz., that these later epidemics of which we are speaking may have been transmitted from the north—a question which will be discussed directly—for it has been mentioned that Wilson⁽¹⁰⁾ found evidence indicative of its presence among the Raffles Bay tribe prior to 1826, and, in face of the difficulties attending other explanations, this is perhaps the most reasonable, as it is the simplest, view to take concerning the manifestations in New South Wales in 1830 and the years following.

As regards the later outbreaks in Western Australia—that is to say, those occurring for the most part between 1865 and 1870—most of them seem to have taken place at points along the north-western coast, and a continuation of this to the north and east brings us, after no very great distance, to that of the Northern Territory, where we have seen that the disease made its appearance about the same period.

It is generally supposed, and indeed it is more than probable, that to the latter coasts the disease was brought by the Malay trepang fishers who have paid annual visits to these localities for many years.

Flinders, whose voyage to the northern coasts of Australia was made in 1803, was at some pains to ascertain the facts concerning the visits of the Malays to these shores. According to the information given him by the captains of a detachment of one of these fishing fleets⁽¹¹⁾ that he encountered at the English Company's Islands, and subsequently

⁽¹⁰⁾ *Loc. cit.*

⁽¹¹⁾ Flinders' statement (27, II., 230) that the whole of this fleet comprised sixty prahus and 1,000 men will indicate how numerous were these visitors.

by Dutch officers at Koepang, in Timor, these annual visits had begun only about twenty years previously, *i. e.*, about 1783 (27, II., 231 and 257). This date is suggestive, for it permits of the possibility that the disease might have existed in Australia even before the 1789 outbreak in Sydney, and it is therefore also quite possible that the latter might have originated in this way, and not from the English ships. We have already alluded to the difficulty, under the latter hypothesis, raised by the long delay of fifteen months before the disease manifested itself. Moreover, the very long interval of forty years which elapsed between the first outbreak and those occurring on the east and south-east in 1830 and subsequently, without any apparent connection, also suggests a fresh introduction, and for this the only source we know of is the northern coast.

And, if contact with the Malays was, as Mr. Foelsche and others believe, the origin of the epidemics occurring in the Northern Territory about 1862-5, it would have been a natural process for the disease to have spread down the Western Australian coast—indeed, as we have said, most of the outbreaks in that State occurred between 1865-70.

To account for its presence in Perth before 1829 (the date of its first settlement) we should have to look to an earlier invasion, which might, however, have had, as we have suggested, a similar northern origin and have been transmitted along a similar route. In this instance, however, we have not, as in the case of the later epidemics of north-western Australia, the history of a whole series of outbreaks the occurrence of which at about the same time, and in localities more or less adjacent both to one another and to the districts visited by the Malays, is strongly suggestive not only of the place of origin of the disease, but of a progressive onward march. Still, even in the absence of similar evidence of continuous progress in the former case, it is easier to suppose that in this, also, it had the same origin and travelled by the same route than to believe that the disease, having originated in the east, passed to the west throughout the whole length of the continent, which hypothesis would, moreover, have involved its transit through very sparsely-populated and desert regions.

It is therefore to be regarded as more probable that the various epidemics of Western Australia resulted from the transmission, down the coast, of the disease originating from the Malays than that it, or they, should have spread from the east across the whole width of Australia.

To account for its presence in Central Australia we must suppose that it reached this region from the east or

from the north, or even from the south, where we have evidence of its presence at an early date. As Mitchell reports it to have been prevalent all along the Darling it might well have reached the centre from this direction, though a northern derivation is, perhaps, equally probable, as there is a succession of contiguous tribes all the way from Port Darwin to the MacDonnell Ranges, and no physical obstacles stand in the way of its transmission.⁽¹²⁾

THE NATURE OF THE DISEASE.

So far we have, without argument, assumed that the disease the origin and spread of which we have endeavoured to trace was small-pox, and though the inquiry into its true nature is essentially a medical question, it is necessary to give it some consideration here.

It will have been noticed in what has preceded that the disease was considered to be small-pox by all those witnesses of the first outbreak in Sydney who have mentioned it, though I can find no direct medical pronouncements to that effect, save such as have been stated.

In nearly all of the later epidemics occurring in New South Wales, Victoria, or South Australia it was either definitely called small-pox or spoken of as a disease exactly like it: and the various eruptive and other symptoms that were described, sometimes by medical men, when associated with its severity, contagiousness, and mortality certainly correspond with those of small-pox and to no other known disease.

The outbreak at Bathurst and in its neighbourhood which has been mentioned as occurring in 1830-1 excited so much attention that Dr. Mair, Assistant Surgeon of the 39th Regiment, was sent from Sydney to investigate it. Unfortunately he arrived too late to be an actual witness of the disease in progress, but he made inquiries on the spot and embodied his results in a report to his Government. I have not been able to refer directly to the full text of this report, as no copy of it exists either in the Public or Parliamentary Libraries of this State: but Bennett, when discussing this part of the subject at some length (15, l., 148) gives Dr. Mair's own synopsis, which may be advantageously quoted here as summarizing his conclusions:—

(12) Spencer and Gillen have pointed out (29, 20) that the line of transmission, as represented by the handing on of corroborrees from tribe to tribe and of certain other changes in tribal practices, has always been from north to south and never *vice versa*.

1. The eruptive febrile disease, which lately prevailed among the aborigines, was contagious, or communicable from one person to another, and capable of being propagated by inoculation.

2. It approached more nearly in its symptoms to the character of small-pox than any other disease with which we are acquainted, particularly to that species of small-pox described by Staff-Surgeon Marshall as occurring in the Kandyan Provinces in 1819 (quoted in Good's "Study of Medicine," vol. iii., p. 82).

3. The mortality attending the disease varied from one in three to one in five or six, but might have been less if the persons labouring under it had been sheltered from the weather, and attended by physicians.

4. Vaccination⁽¹³⁾ seemed to possess a controlling power over it, as three blacks who had been successfully vaccinated, although equally exposed to the disease, escaped infection.

5. It was not confined to the aborigines, but in one instance attacked a European in the form of secondary small-pox, and proved fatal to a child with symptoms resembling confluent small-pox.

6. In several cases it occasioned blindness, and left many of the poor blacks in a very debilitated and helpless condition, with marks which could not be distinguished from the pits of small-pox on different parts of their bodies.

7. It was never observed to attack any of the aborigines a second time, and it spread alarm and consternation among them.

Bennett (15, I., 148), himself a qualified medical man, besides quoting the foregoing summary, comments at some length on Dr. Mair's report, and the perusal of the chapter with the other available evidence will, I think, leave little doubt in the mind of any doctor familiar with the subject that the disease could have been no other than true small-pox. Yet there are circumstances frequently mentioned in connection with the various outbreaks which are not quite consistent with the known behaviour of this disease when epidemic among unvaccinated white people.

1. If Mair's estimate of its mortality during the Bathurst outbreak is correct—for it is not stated how it was arrived at, nor to what number of cases it referred, and, in any case, it could scarcely have been very accurately

(13) The discovery of the protective effect of vaccination was announced by Jenner in 1798.

estimated—it falls below that of English epidemics,⁽¹⁴⁾ whereas one would have expected that the mortality rate of a people affected for the first time by a severe zymotic disease, and in whom there could have been no acquired immunity, would be very high.⁽¹⁵⁾

2. In Collins' account of the Sydney epidemic it was stated that "its baneful effects were not experienced by any white person of the settlement, though there were several very young children in it at the time." And again in the same work (chap. viii., p. 597) he says "notwithstanding the town of Sydney was at this time filled with children, many of whom visited the natives that were ill of this disorder, not one of them caught it." Curr (3) and Bennett (15), in their notices of various outbreaks, also frequently allude to the fact that children either did not take the disease or were affected by it less severely than adults. Now, among the European races, young children are more liable to small-pox than older persons, and, moreover, the mortality from small-pox is greatest in the first years of life (see footnote (14)). In fact, in prevaccination days small-pox was regarded as a "disease of childhood, just as whooping-cough and measles were and are."⁽¹⁶⁾

3. White adults seem to have enjoyed a similar immunity, as will appear from special mention of this circumstance by those writers quoted in the case of the exemption of children, and this notwithstanding the fact that no special precautions seem to have been taken to avoid communi- cation with the affected blacks.

In spite, however, of these abnormalities in the incidence and effects of the disease we shall, I think, still come

(14) Mair's rates of mortality, reduced to percentages, lie between 33 and 17 per cent. inclusive. In "The System of Medicine," by Allbutt and Rolleston [vol. II., pt. 1 (1906), p. 783], a table of mortality of unvaccinated persons of all ages is given as ranging from 66 per cent. in children up to two years old, down to 23 per cent. for the ages ten to fifteen, and rising again to rates varying from 40 to 50 per cent. for intervening ages.

(15) Catlin (16, II., 24), in speaking of the ravages of small-pox among the North American Indians in 1832—about the same date as the Bathurst outbreak, it will be noticed—states that the Pawnees lost 50 per cent., or more, of their number and that many other tribes were also greatly reduced. In the great epidemic of measles, a much less fatal disease among whites than small-pox, in Fiji in 1875 it is estimated that one-third of the native population of the islands perished (17, I., 56).

(16) Although the exact proportion cannot yet be given it is evident that the Swanport remains contain a considerable number of young children.

to the same conclusion as that so often expressed by those who were actual witnesses of its symptoms and behaviour, viz., that it was true small-pox. If it was not small-pox, then medical science has no name for it.

ADVANCE OF THE DISEASE TO THE LOWER MURRAY.

Having so far attempted to discover the origin of the introduction of this epidemic disease, to trace its course throughout the land, and to discuss, very briefly, its nature, it is time to consider the evidence on which it may be considered to have reached Swanport and other localities on the Lower Murray.

Speaking from the standpoint of South Australia there seems to have been a very general belief, which finds frequent expression both in the statements of the blacks and in written accounts, that the disease came from the east and eventually travelled down the Murray.

Published notices directly making, or implying, this statement are to be found in Teichelmann and Schürmann (12, 34), Curr (3, 1, 2, 16), Eyre (18, 11, 379), and Howitt (4, 195), and the separate facts, some of which have been mentioned, confirm the tradition. Many of the places and tribes which are specifically mentioned by Bennett, Curr, Mrs. Langloh Parker (19, 39), and other writers as having been subject to outbreaks are situated on, or close to, tributary streams of the River Murray system—some on their upper waters, some lower down.

Thus from Curr we hear of it from an eye-witness of a case near Echuca in 1841 or 1842; at Towanniney (Towanninie), which is near the Murray; and at Swan Hill, on the Murray, at a date estimated to have been about 1807. Its presence at Swan Hill is also alluded to by Mr. Joseph Hawdon in his "MS. Journal" (20, 40),⁽¹⁷⁾ a copy of which is in the possession of the Public Library of South Australia.

There is thus ample evidence of the existence of the disease at many places situated on, or near, the banks of the two great tributary rivers that, by their junction at Wentworth, form the main stream of the Murray, and this soon afterwards enters South Australian territory.

From the Darling River and Victorian Murray districts, southwards, I have not been able to trace its successive stages

(17) As this Journal has never been published, and therefore not generally accessible, I will quote the writer's words:—"In the evening some of the blacks came to Swan Hill, where we were encamped. After holding a little conversation with us across the river they swam over to us. They were fine, well-made men, about 5 ft. 11 in. in height; their faces were nearly all marked with small-pox, but otherwise their features were pleasing."

in specified localities until we come to Moorundie.⁽¹⁸⁾ At this place, which is 3 miles below Blanchetown, Eyre was stationed as Resident Magistrate from 1841-4, and he alludes to the existence at some previous period of a disease very similar to small-pox, and leaving similar marks upon the face (18, II., 379), though he himself had never seen a case. He states further that it is reported to have come from the eastward.

The Moorundie natives are, as have been mentioned, the northern neighbours of the Narrinyeri, and we can see, therefore, the facilities that would have been afforded for the transmission of the disease along the broad highway of the river, whose banks were frequented by a numerous native population. We know, indeed, that they navigated the river in their mungos, or bark canoes, the last remaining example of which is now in the National Museum.

That it did, however, reach and decimate not only the Narrinyeri, but the adjacent Adelaide tribe, there can be no doubt; to this the written testimony of early writers such as Mr. Taplin, Messrs. Teichelmann and Schürmann, and others, as well as the traditions of the natives and oral statements,⁽¹⁹⁾ bear witness; and although, as we have seen, the actual circumstances of the interments at Swanport do not afford any conclusive evidence that this place, more than any other, had any special association with the incidence of the disease, we shall, I think, in our minds regard its numerous remains as a silent testimony of the event.

When, however, we endeavour to fix a date for this calamity, possibly the one great event of their lives, we are on more uncertain ground. Still, there is a certain amount of evidence bearing on the question which we will examine.

We have some reason to believe (3, I., 218) that an outbreak occurred at Swan Hill, on the Murray, about 1807. though it must be admitted that this date, based as it is upon

(18) G. F. Angas states (30, I., 123; and II., 226) that he had himself "seen two aged men from high up the Murray, beyond the great North-West Bend, who were deeply marked with the effects of smallpox." He also states that the natives of South Australia spoke of the disease as having come down the Murray from the country far to the eastward, and almost depopulated the banks of that river for more than 1,000 miles. For these references I am indebted to Mr. T. Gill, I.S.O.

(19) Since the above was written I have a letter (May 17, 1911) from Mr. Paul Martin, now of Appila-Yarrowie, in which he informs me that when, as a boy, he lived at Strathalbyn from 1845-52 and subsequently on the Lower Finnis, he saw numbers of pock-marked blacks, and one of them, an intelligent man then about 30-35 years of age, told him that it came from the east (cf. the statements of Eyre and Angas *ante*).

a mere estimate of an elapsed period of seventy years, rests on a very uncertain foundation. Hawdon⁽²⁰⁾ reports it from the same place at some period antecedent to 1838, the year in which he visited the locality.

As Swan Hill is the nearest place to the South Australian boundary at which a date can be approximately fixed for the alleged occurrence of an epidemic the event is of some importance to the present part of our inquiry.

If Mr. Taplin's similar estimate of a long period of past years, the actual duration of which, cannot either in his own case or in that of Swan Hill quoted by Mr. Curr, be accurately determined, is to be regarded as approximately correct the date of the Narrinyeri outbreak would be fixed at about 1814 (1, 44).

If, then, we might assume that there is no great error in the estimates on which these two dates, 1807 and 1814, are fixed they might be considered as coming near enough together for us to consider that the Swan Hill outbreak was the forerunner of that occurring among the Narrinyeri.

Moreover, the view that there may have been an epidemic among the natives of the lakes about this time, or, at least, at a period anterior to 1830, receives some support from information recently received from Mr. G. G. Hacket, J.P., of Narrung, Lake Albert, a resident of this district of very long standing. He writes, under dates May 17 and June 1, to the effect that in 1864, when a young lad, he saw pock-marked blacks in these districts. To the best of his recollections these natives were at the time between fifty and sixty years of age, and it would seem, as Mr. Hacket observes, that they must have had the disease in infancy, for they had no recollection of their own particular illness and referred it to a legendary sense.⁽²¹⁾ Now, a native fifty years old in 1864 would have been an infant in 1814, which is the date arrived at on Mr. Taplin's estimate, while one sixty years of age would have been only four years of age, or little more than an infant, in 1807, which is the estimated date of the Swan Hill outbreak.

(20) *Loc. cit.*

(21) In the story the blacks told Mr. Hacket the idea that the disease came down the Murray is again prominent, and they also believed that it was brought by an evil spirit. The natives further said that it affected old and young, that the dead were buried where they died, and that in many cases the sick were abandoned and left in their wurleys. Speaking of the skulls used as water vessels Mr. Hacket mentions that he saw them, and that their use was more general about Wellington than round the lakes.

But, according to Messrs. Teichelmann and Schürmann, the date of the disease among the Adelaide tribe was, by a similarly uncertain method of computation, about 1830; or, as these writers put it, "about a decennium" before they wrote, which was in 1840. Now, obviously, a retrospective estimate of ten years based only on the memory of the blacks is less likely to err than one of sixty or seventy years similarly computed, and, if this was the date at which the Adelaide tribe was affected, it is almost certain that this would have been the time at which its neighbours—the Narrinyeri—also suffered. Further, this date of 1830, or thereabouts, is particularly suggestive, for it falls into line with a period at which, as we have seen, several outbreaks are accurately known to have occurred in New South Wales and Victoria.

Moreover, if the statement of the old black, Mrs. Karpeny (on whose very positive and unvarying tale I am disposed to rely), that she was alive at the time when the catastrophe occurred among her people is correct, its date, on that basis, might be fixed some time between 1830 and 1835—that is to say, at the period which would correspond to that of the active manifestation of the disease at Bathurst, New South Wales, and at other places in eastern and south-eastern Australia.

This date would also, to some extent, harmonize with the information given by Mr. Bott's three old black men, for, if they were men of sixty when they told their story in 1881, the personal memory of the oldest of them might well have gone back to 1830, but not to 1807 or even to 1814. If, however, the eldest was seventy he might, as a child of four—which would have been his age in 1807—have retained the memory of a disaster of such magnitude occurring at that date.

On the whole, therefore, and using the admittedly rather uncertain evidence that is available, the most probable view is that the date of the outbreak among the Narrinyeri and Adelaide tribes was during the quinquennium 1830-5. And if Mrs. Karpeny is correct in her assertion that she never saw pock-marked blacks until they had become thus affected, as the result of the epidemic she claims to have witnessed as a young child, then, so far as the Narrinyeri are concerned, there has been only one such epidemic since the beginning of last century, and the earlier date of 1814 computed by Mr. Taplin must have been based on an overestimate of years that had elapsed. Whether a similar explanation applies to the supposed outbreak at Swan Hill in 1807, or whether there really was an earlier manifestation of the disease in that locality, it seems impossible to say. There is, however, some

evidence in favour of the view that there was more than one period at which outbreaks occurred in South Australia.

The conclusions stated in the foregoing paragraph have been based upon facts and statements, often of a very indefinite nature, that have been related in the preceding pages; but since they were reached they have, so far at least as they relate to the date at which the epidemic occurred among the Narrinyeri and their neighbours, received additional support of a more precise kind than has generally been found available in this inquiry. In a paragraph in the *South Australian Register* of July 5, 1911, the death is reported, at Pottaloch, of the old black woman who was stated by Mrs. Karpeny to have been her aunt; whether this was the actual relationship according to our nomenclature I cannot say. The old woman, who was known to the whites as Jenny Pongie (native name Clul-lul-owrie), spoke English well and retained her faculties almost to the last. She was, according to her own statements, a grown woman when the epidemic descended on her people, and, according to her account, it came shortly after Captain Sturt's voyage down the Murray. As this explorer reached the lakes on February 9, 1830, old Jenny's evidence fixes the date with considerable definiteness as occurring during the quinquennium mentioned, and probably, it would seem, in the earlier part of this period.

She, too, spoke of a peculiar noise, as of wind, just before the arrival of the disease, which she said came from the east.⁽²²⁾ The writer of the paragraph referred to, Mr. A. Rodman, superintendent of the Point Macleay Mission Station—as, indeed, does another correspondent, Mr. G. G. Hackett—suggests that the noise might have been referable to an earthquake, which is not improbable, for, writes the latter, in the last event of that nature the earth tremors

(22) If, then, we may consider Jenny's age as "a grown woman" to have been sixteen at the date of the occurrence, which, it might be claimed, represents female maturity in her race, this old black would have been ninety-seven years old at the time of her death; and if sixteen is considered to be an unnecessarily early estimate of full growth it would only be required that she should have been three years older for her to have died a centenarian. And, indeed, she was considered by the old residents to have passed the century by three or four years. In any case she affords a remarkable example of longevity in a race that has been assumed without justification, if the evil influences of civilization are excluded, not to be long-lived. Though at the time of my interview with Mrs. Karpeny, recorded on a previous page, I did not attach importance to the accuracy of her estimate of long periods of years I must, with this confirmation and in justification of her statement, now say that on that occasion she told me her aunt must be more than 100 years old.

were accompanied by a rushing wind such as the natives described, and he has heard the natives themselves refer to a similar occurrence.

SUMMARY.

Epitomizing the principal points of the foregoing investigation—

1. There is clear evidence of the occurrence in 1789 of a virulent disease among the aborigines of Port Jackson which was at time considered to be small-pox; and

2. Doubtful evidence that this originated from the English ships that brought the first convicts to Sydney more than a year previously, though there is a possibility that it may have done so.

3. This outbreak having apparently subsided, nothing more is definitely recorded of a similar disease until about 1830 and the years following, when it reappeared at Bathurst, New South Wales, and similar outbreaks seem to have continued at other places in New South Wales and Victoria up to about 1845. There is also some uncertain evidence that the disease may have reappeared still earlier, viz., at Swan Hill about 1807.

4. There is no evidence to show how this later series of epidemics arose, but

5. There is good reason to believe that an outbreak took place in the coastal regions of the Northern Territory between 1862 and 1865, which was presumably brought by the Malay trepang fishers.

6. As the Malays seem to have visited the north coasts of Australia as early as 1783 and to have continued their visits, annually, until the present time they may have been the source both of the Sydney epidemic of 1789 and of those of 1830 and following years in eastern and south-eastern Australia; almost certainly of those occurring in north-western Australia between 1860-70, and possibly of those which, there is some evidence to show, took place still earlier in the nineteenth century both in the eastern and western parts of the continent.

7. However originating, there is abundant testimony to the fact that the disease at some time spread throughout almost the whole of Australia, reaching even the heart of the country.

8. In its symptoms, progress, and behaviour the disease corresponded to genuine small-pox, though in its incidence and effects it differed in some respects from this disease as it occurs among unvaccinated white people.

9. As regard South Australia, there is considerable testimony to support the belief that the disease came from

the east, probably by river routes, and was transmitted down the Murray, making its effects severely felt among the Narrinyeri and Adelaide tribes, probably between 1830 and 1835—at any rate before the advent of the white settlers in 1836. If, however, Mr. Taplin and some others are correct in their estimates of the length of a long period of elapsed years, without any facts to guide them as to its real duration, there may have been outbreaks both in Victoria and South Australia earlier in the century.

10. To Central Australia the disease may have come from either the north or the east or even from the south—none of these routes would have presented difficulties in transmission; but the invariable migration of certain practices from north to south is suggestive of the first-named direction.

11. In the actual circumstances of the Swanport burials there is no very distinct evidence of the incidence of the disease in such a catastrophic form as to have caused the natives to abandon their ordinary methods of interment for a promiscuous sepulture, though, according to their tradition, the onset was sudden and the mortality great.

CONCLUSION.

I had hoped in this account to have been able to give some brief survey of the general characters of the Swanport remains. This, however, I am not yet in a position to do, for, apart from the fact that the inquiry pursued in the preceding pages has proved a longer task than I had anticipated, the number of the remains is so considerable, and the bones so mixed, and, in many cases, so broken that the task of sorting and mending is still far from complete, though the whole of our available staff has been engaged in the work ever since the arrival of the remains at the Museum. Besides, their number is still being increased by further additions from the same locality. All I can say now is that the total number of individuals represented by the remains actually received at the Museum, though in many cases only by odd bones or fragments of bones, will probably be found to be about 160. Probably the number actually met with was still greater, for some of the remains have, no doubt, found other destinations. In age they vary from extreme senility, as shown by the edentulous condition of the jaws, to that of children under six months. In some of the remains pathological conditions are present.

At a future date I hope to report further on these remains from a craniological, osteological, and pathological point of view, but as this work will necessitate many hundreds of measurements and calculations of indices it will require some time. It will also be necessary to make pro-

vision for the requisite and now extensive literature bearing on the subject, and for an adequate osteometric outfit.

Finally, I desire to express my thanks to the Commissioner of Crown Lands of South Australia, the Honourable Crawford Vaughan, M.P., who, by his sympathy and prompt action, has made it possible for the National Museum to acquire these interesting relics of a vanishing race. So, also, I must acknowledge the assistance of Mr. T. Duffield, Secretary to the Commissioner; of the Surveyor-General, Mr. E. M. Smith, for allowing his department to supply me with the accompanying map, and for other facilities in the prosecution of this investigation; of the Government photolithographic department for the reproductions which illustrate this paper; and of Mr. Walter Howchin, F.G.S., Chairman of the Museum Committee, who drew for me the sketch of section and has otherwise given his valuable assistance in regard to geological details. Mr. Kellett, Superintendent of the Murray River reclamation works; Mr. A. White, who, as has been stated, first brought the discovery under the notice of the Museum; Mr. E. Baxter, ganger in charge at Swanport; and Messrs. Bott, sen. and jun., have also all given much assistance and, often, personal service in the work of recovery. To Mr. Bott, sen., Mr. G. G. Hacket, and Mr. Paul Martin I am indebted for valuable information that has been recorded in the preceding pages, and to Messrs. J. W. Bakewell and A. C. Minchin for the photographs from which the illustrations have been reproduced. I desire also to acknowledge the zeal and energy with which Mr. Robt. Zietz performed his task as the representative of the Museum. The assistance of all these gentlemen has greatly aided me in my task.

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EXPLANATION OF PLATES.

PLATE II.

View of Swanport, looking south, from the southern end of the swamp, which is seen in the foreground. The cutting from which the bones were obtained is shown in the distance between two eucalyptus trees, and just to the right of Mr. Bott's house. The surface of the sandbank is seen rising to the right. The tramway in the foreground was used for the transportation of the soil to form the embankment.

From a photograph by Mr. J. W. Bakewell.

PLATE III.

The cutting in its condition on April 14, 1911, taken from a point nearer to it than in plate ii.;

From a photograph by Mr. J. W. Bakewell.

PLATE IV.

The exposed face of the cutting from a near point. The band of travertine mentioned in the description is plainly shown crossing the pick-handle standing against it a little below its top end. Patches of broken mussel shells are visible in the kitchen-midden layer. The stones on the top of the bank formed part of the ferryman's house which formerly stood here.

From a photograph by Mr. J. W. Bakewell.

PLATE V.

Another view of the face of the section which shows, towards the right, and just above the pick-handle, the line of demarcation, here distinct, between the kitchen-midden deposit and the subjacent layer of red sand. A skeleton, without the cranium, was removed from the circumscribed excavation of which the travertine forms the floor. The figure is Mr. Bott, sen.

From a photograph by Mr. J. W. Bakewell.

PLATE VI.

Mrs. Karpeny.

From a photograph taken in 1907 by Mr. J. W. Bakewell.

PLATE VII.

Mrs. Karpeny.

It will be noticed by her grey beard that Mrs. Karpeny is a good example of the condition known as hypertrichosis, or excessive hairiness, which is not uncommon among the Australian aborigines; but in her case it is confined to the face. Her beard

would be still longer did she not habitually trim it. Her head is unusually massive, her colour lighter than is usual among her tribe, and her height 5 ft. 2 in.

From a photograph by Mr. A. C. Minchin, 1911.

PLATE VIII.

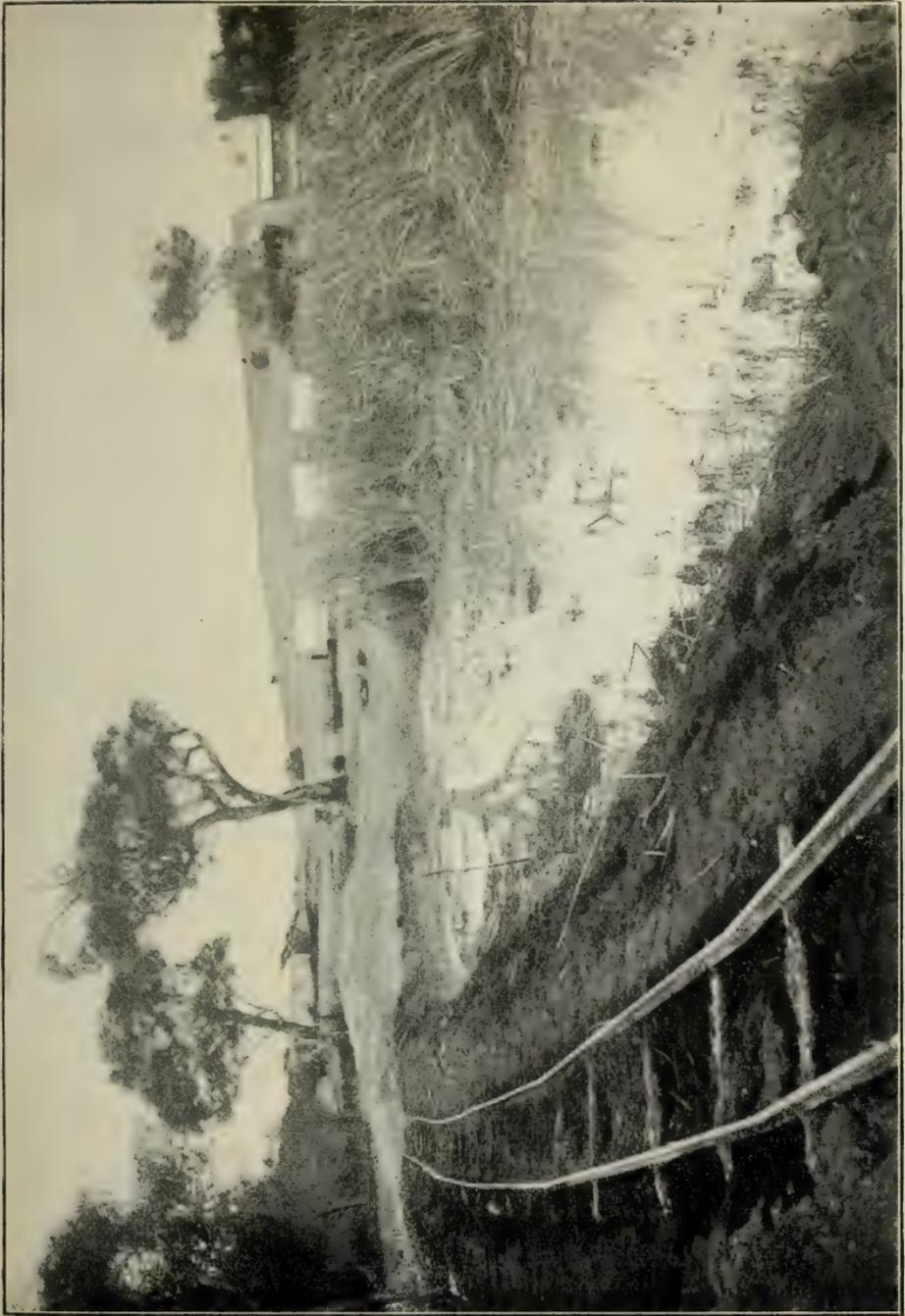
Mrs. Karpeny.

From a photograph by Mr. A. C. Minchin, 1911.

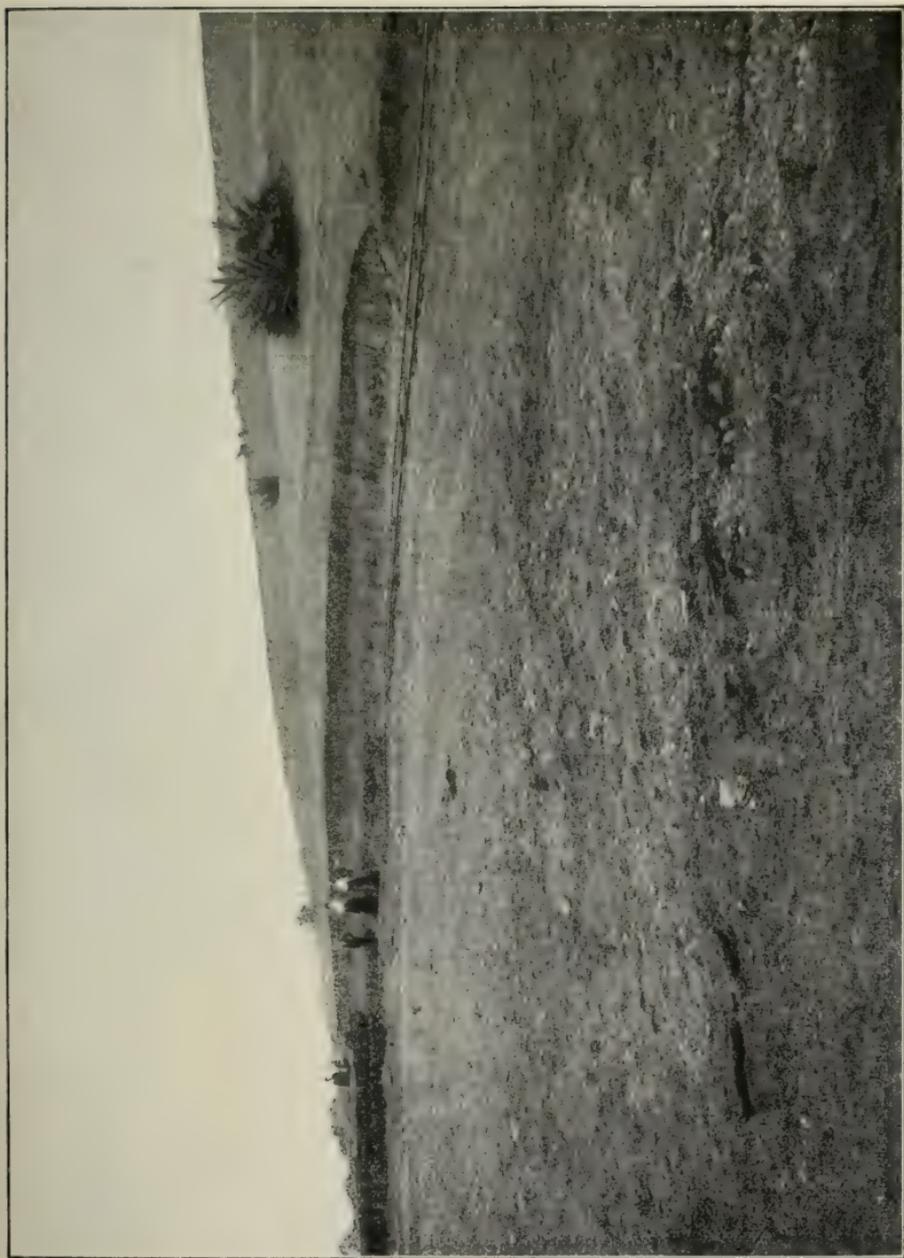
PLATE IX.

Map of the Murray, from Murray Bridge to Swanport. The bones were taken from the small Government reserve abutting on the river marked RES.

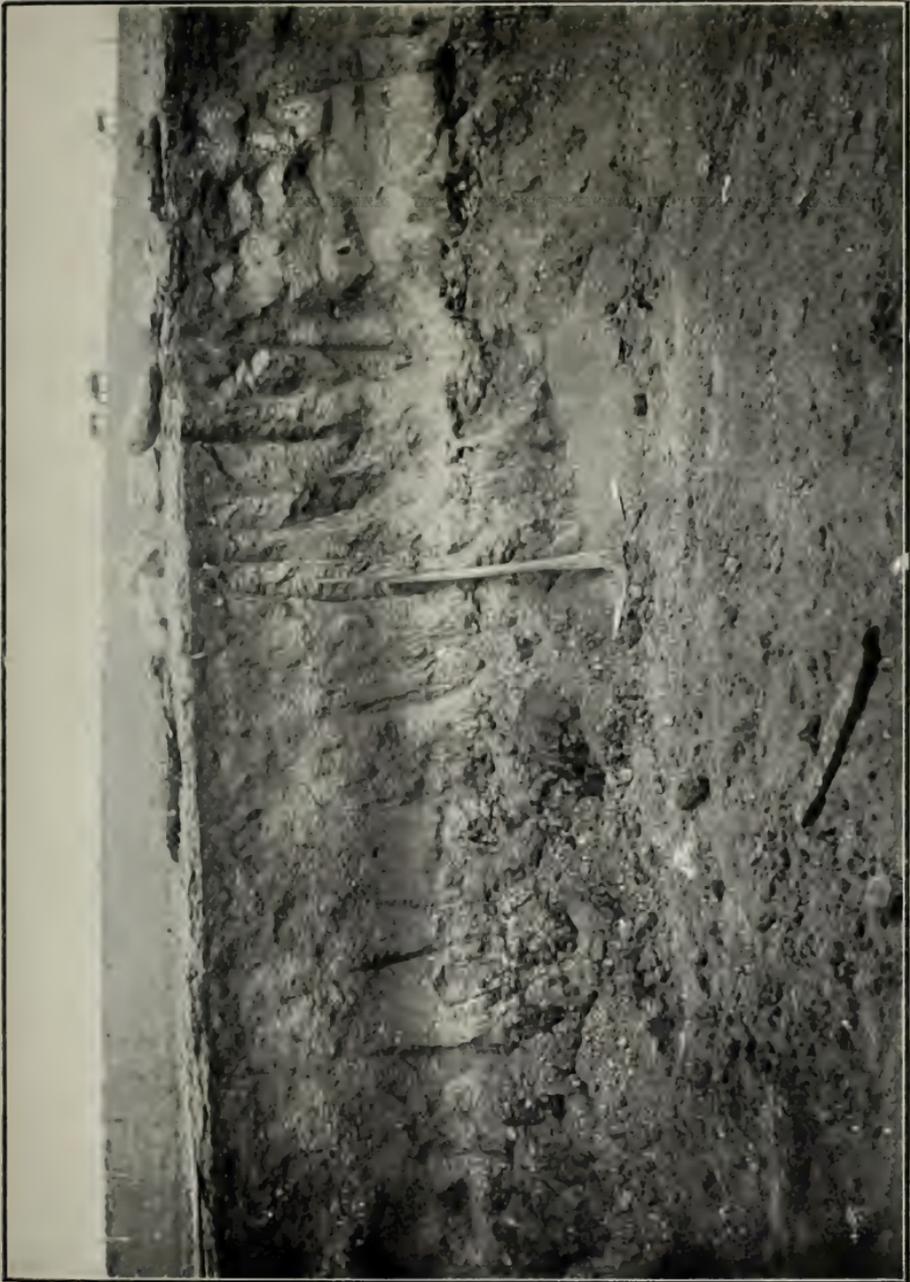
From a plan supplied by the Surveyor-General.



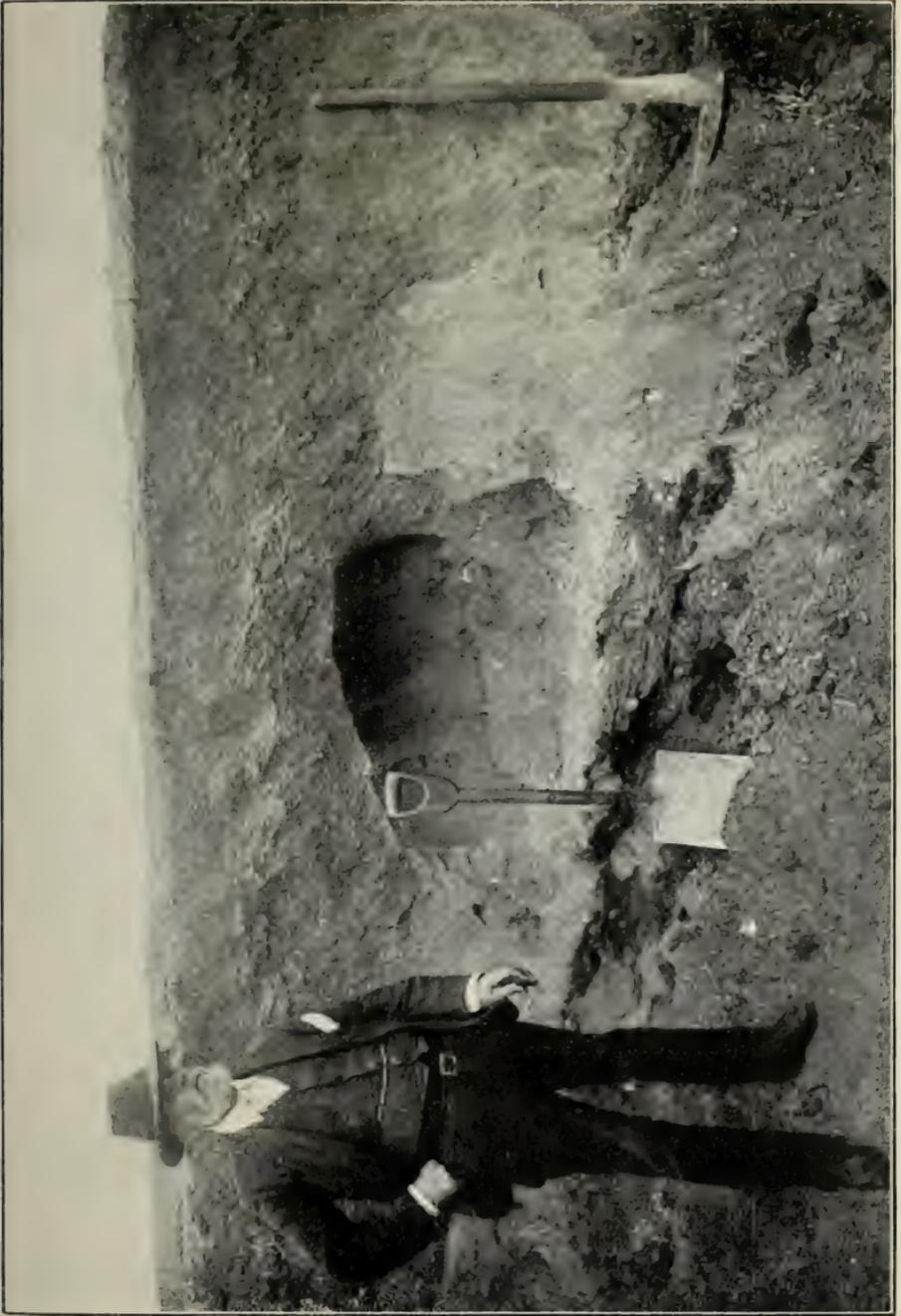
View of Swanport, looking South from the southern end of the Swamp, which is seen in the foreground.



The Cutting in its condition on April 14, 1911, taken from a point nearer to it than in Plate ii.



Exposed face of the Cutting from a near point.



Another view of face of Section, showing line of demarcation between kitchen-midden deposit and subjacent layer of red sand.



MRS. KARPENY.



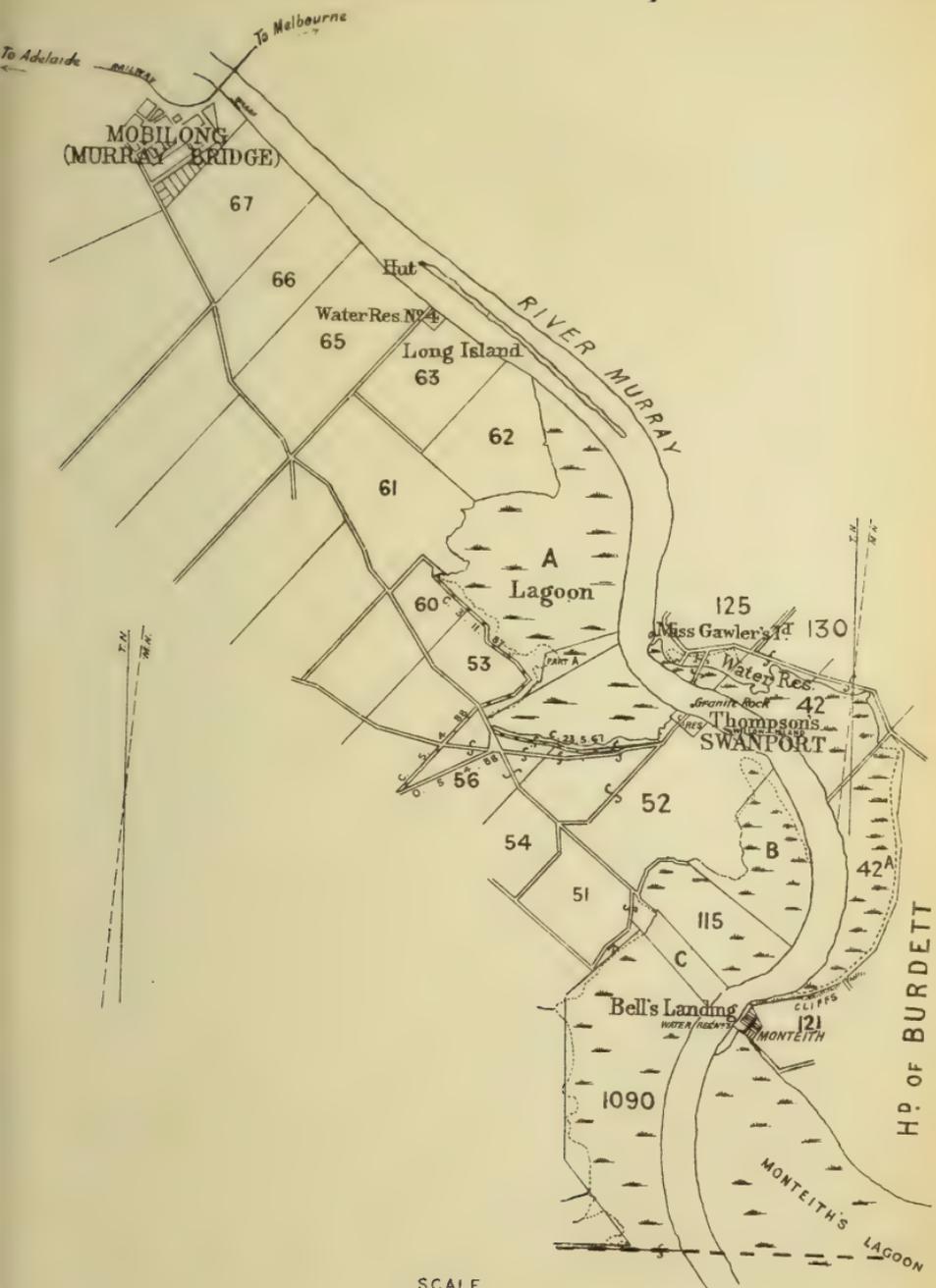
MRS. KARPENY.



MRS. KARPENY.

HP OF MOBILONG

Vol. XXXV. Plate 9.



SCALE

0 10 20 30 40 50 60 70 80 160 240 Chains

A. VAUGHAN, GOVERNMENT PHOTOLITHOGRAPHER, ADELAIDE.

**DESCRIPTION OF A DISTURBED AREA OF CAINOZOIC ROCKS
IN SOUTH AUSTRALIA, WITH REMARKS ON ITS GEO-
LOGICAL SIGNIFICANCE.**

By WALTER HOWCHIN, F.G.S., Lecturer in Geology and
Palaeontology in the University of Adelaide.

[Read April 4, 1911.]

PLATES X. TO XIX.

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Introduction	47
Description of Cainozoic Beds in Disturbed Area ...	49
Tectonic Considerations	53
Geological Age of the Earth Movements	56

INTRODUCTION.

Marine limestones of Lower Cainozoic age occupy nearly the whole of the maritime districts of this State, extending on the westward into Western Australia, and on the eastward into Victoria. The submerged regions at the time when these limestones were laid down included the sites of the three southern capitals of Australia, *viz.*, Perth, Adelaide, and Melbourne. The two important gulfs of South Australia, at that time, were troughs in the open ocean; and Kangaroo Island, Yorke Peninsula, and much of Eyre Peninsula, were sunken reefs in the sea; a wide gulf occupied the Murray Plains, and extended northward into western New South Wales.

Since this period of maximum depression of the southern coastline, there has been an elevation of the land and the sea has retired from its former bed to an extent that has left, at least, 200 ft., in vertical height, dry land. This elevated sea floor has been subjected to various vicissitudes. Active volcanoes have broken through its deposits and spread out sheets of lava and other volcanic material, thousands of square miles in the South-East of this State were again submerged, and the older Cainozoic rocks became covered by newer marine deposits. Exposed to atmospheric waste through long ages these beds have been deeply eroded, lithologically transformed, and, in many instances, reduced to small and isolated fragments.

The age of the beds in question, according to the late Professor Ralph Tate and Mr. J. Dennant, based on the percentage of living species which they contain, is Lower Cainozoic, or the equivalents of the Eocene beds of the

Northern Hemisphere, and these are overlain by a newer marine series, which the gentlemen mentioned referred to the Miocene.⁽¹⁾

Notwithstanding the considerable age of these deposits and the oscillations of level to which they have been subjected, they have, for the most part, preserved an almost horizontal position. The inclination is usually inappreciable, or where it occurs amounts to an angle of less than 5° , giving evidence of a remarkable stability in the earth's crust throughout wide areas in Australia, dating from remote times. There is, however, in this State, one very interesting exception to this rule, which is made the subject of the present paper.

In 1899, Mr. E. V. Clark, B.Sc., a graduate of the Adelaide University, in some "Notes on the Cliffs separating Aldinga and Myponga Bays," published in the Transactions of the Royal Society of South Australia (vol. xxiv., p. 1), drew attention to the disturbed area now under description. He says, "Three hundred yards further on Eocene again appears overlying the Cambrian. It is here, however, much inclined, dipping to the north-north-west at an angle of 50° at first, increasing to 65° , and finally diminishing to 45° . It extends seawards for a short distance as a reef, but owing to the high dip it is of no great breadth. Due, however, also to the great inclination, it is extremely regular, and for 150 yards or so where the cliffs take a bend and run approximately parallel to the direction of the strike (west-south-west) it consists of a series of ridges, parallel to each other and to the shore. One ridge in particular, though only 2 ft. wide, is so uniform that it was keeping the sea inside at a height of 15 in. to 18 in. higher than outside. In this the reef is very different from that at the small patch of Eocene rocks to the north, and to the reefs south of the Port Willunga Jetty and at Blanche Point. In these cases, where the dip of the rocks is low, the reef either presents a fairly level surface or, if the rock is not quite uniform, a labyrinthine outcrop, the projecting lines of greatest resistance to wear turning and twisting about extremely irregularly, as is so well seen in the Miocene reef at Schnapper Point, south of Port Willunga Jetty."

⁽¹⁾ More recent investigations, in which the fauna living in Australian waters have become better known by means of sea-dredging, have reduced the number of supposed extinct species, and it is possible that the question of the age of the Australian marine Cainozoic beds may have to be reconsidered, but for convenience the terms adopted by the late Professor Tate and Mr. Dennant have been used in this paper.

This interesting locality can be most conveniently reached by diverging from the main road at Sellick's Hill township, which is situated one and a half miles from the beach. On two former occasions, one of which was as far back as 1897, I had visited the spot and noted the great throw in the Eocene limestones, but on both occasions circumstances prevented my making a detailed examination of the beds. With the latter object in view I revisited the locality during the late vacation, and took photographs of some of the more interesting features.

At Port Willunga, about 7 miles north of the disturbed area, there are excellent sections of the Cainozoic beds in the sea cliffs, showing a dip of about 5° to the south, by which they are lost to sight at about two miles south of the Port Willunga Jetty. Low banks of alluvium and sand-dunes take their place, and, at about four miles south from the jetty, the old mouth of the Onkaparinga River is indicated by a wide valley with a low shore only feebly protected from the sea.

Immediately south of this point, the sea cliffs, consisting of alluvium, once more make their appearance and increase in height till, at the distance of a mile, they attain a height of 200 ft., with the Cainozoic limestones outcropping at their base. Whether this absence of the limestones from the intervening space of three miles arises from a synclinal fold in the rocks or from erosion effected by the old river drainage, is not quite clear.

DESCRIPTION OF THE CAINOZOIC BEDS IN THE DISTURBED AREA.

(See Map, plate x.)

These beds come to the surface about midway between the outlet of the Sellick's Hill Creek, which has cut a deep canyon in the alluvial beds, and the so-called Mount Terrible Creek,⁽²⁾ about a mile further south. The beds consist of white and yellowish limestones, of varying hardness, made up mainly of triturated fragments of polyzoa, echinodermata, and shelly material. The outcrop is in two sections, divided

(2) This creek, for the distance of about a mile, forms the boundary between the Hundreds of Willunga and Myponga. It is locally known as the Mount Terrible Creek (or Gorge) under a misunderstanding as to the correct position of Mount Terrible. The latter, as marked on the official maps, is situated one and a half miles to the east of Sellick's Hill township and about three miles from the Creek to which the name of the Mount has become locally attached. A more appropriate name would be Boundary Creek, as it makes the dividing line between the two hundreds mentioned.

by a short space of Cambrian slates which take the place of the Cainozoic limestones in the cliffs and on the beach.

The northern section forms low cliffs up to 15 ft. in height, or, where small washouts have cut back into the alluvial beds that overlie the limestone, the latter is exposed up to 20 ft. in height. The rock is easily operated upon by the waves, and as the cliffs come within the range of high tides, the limestone, throughout its entire length, exhibits a series of caves by the undermining of the sea. The beds are not quite horizontal but roll in long, low curves, with an extreme inclination not exceeding 15° , on the one side pitching to the south-east, and on the other, to the north-west.

In addition to its occurrence in the cliffs, the Eocene limestone occurs on the beach, between tides, and, apparently, below low water, in the form of an extended floor or tabular reef. The limestone cliffs disappear shortly before reaching the outlet of Boundary Creek, but the flat reef of the littoral zone continues to the southward until nearly opposite the Waterfall Creek (No. 1), situated at the north side of Section 278 (Hundred of Myponga), and about one-third of a mile south of the Boundary Creek. The position of this creek has been carefully defined for the reason, that, within its channel, not far from its outlet, there occurs a limited outcrop of the Eocene limestone which is of some interest. It is here that the first evidence of an unusual dip in the Cainozoic rocks is markedly evident, as the limestone has a dip north 20° west at 48° . The outcrop is in the form of a bar, which crosses the creek, but is obscured on either side by a cover of alluvial wash of great thickness. Its position, with respect to the Cambrian slates, is peculiar, as it lies almost at the base of a great scarp of these rocks which show a vertical height of 150 ft. facing the sea. The waterfall (No. 1) occupies an acute niche in this scarp-face, and then there is a sheer drop of 20 ft., as the water falls over the edge. The Eocene limestone in this peculiar position is probably a truncated fragment from what was once a considerable sheet of these rocks, resting at a high angle on the down-throw face of the Cambrian beds, as is still the case with the limestones a little further south, but the encroachments of the sea have cut away the upper portions of the fold, leaving a floor of the limestone at sea-level in the fragment referred to.

Immediately to the south of the creek, just described, the Eocene limestones have been completely removed by marine erosion for a distance of about a quarter of a mile, and in this interval the cliffs consist entirely of Cambrian slates, of buff and purple colours. Within this section of the cliffs there occurs another small waterfall (No. 2), fed by

springs, with good water, and maintains a permanent flow. The water is precipitated from a hanging valley, 80 ft. in height, no doubt occasioned by the cutting back of the cliffs by the sea; the first 20 ft. of the fall is vertical and the lower 60 ft. is encumbered by large masses of rock that have accumulated at a sharp angle of its descent.

A little to the south of Waterfall Creek (No. 2), the Eocene limestones reappear, both on the beach and in the cliffs, the coastline at this spot having a more westerly extension, which probably accounts for the reappearance of the beds. These exhibit a high angle of dip, ranging from 40° to 90° , and in one instance, at least, to a distinct overfold. In the sea cliffs, the Eocene beds, to a height of 100 ft., form a thick veneer, resting on the Cambrian rocks, and dip at an angle of 80° . The dip, however, is not in the form of a straight line, but a curve, in which the upper part dips at a lower angle than those portions of the fold that are at sea-level. This gives the beds the appearance of a monoclinical fold, of which only the western limb or septum has been preserved, for the Eocenes run out, easterly, where the ground rises at the back of the cliffs.

The beach at this spot is composed of a number of parallel ridges caused by the truncation of the beds at sea-level. Some of these ridges are very strong and look like masonry. Where the stone has been of superior hardness, sea-stacks, of about 8 ft. in height, have resisted the action of the waves and give evidence as to the dip of the beds a short distance in advance of the cliffs. Some instructive sections are thereby obtained. Several of the stacks show the Eocene limestones in a vertical position, and, in one case, the beds are reversed (plate xviii.). In another stack there are several sharp folds, which, in a zone of about a foot in thickness, exhibit herring-bone structure (plate xvii.). As a rule the beds are not greatly disturbed, other than by the main movement of downthrow, but in a few places, especially near the base of the beds, there are evidences of shatter and some mixing up of the beds.

In one case, seen in the sea cliffs towards the southern end of the section, a very distinct shear plane with overthrust has been developed. The shear plane forms a distinct zone, about 6 in. in thickness, having a dip north 10° west at an angle of 35° . The upper beds in the section have slid over the lower ones, while the differential movement of the mass has led to a discordant dip in the beds above as compared with those below the shear plane, giving an appearance of stratigraphical unconformity (plate xix.). The zone of

thrust consists of ground-up calcareous material in which it is difficult to recognize distinct organic forms.

The junction between the Eocene limestones and Cambrian slates is well shown at both the north and south ends of the cliff section. At the north end (plate xii.) the base of the Eocene beds is marked by an irregular deposit, about 9 ft. in thickness, of earthy, calcareous, and carbonaceous material, which may represent an ancient soil, or weathered capping, antedating the marine deposits; or, possibly, the crushed-up material produced by a slide of the newer beds over the old Cambrian floor on which they rest. The disturbed area continues for a distance of about three-quarters of a mile, and near its southern extremity a small creek has exposed another cross-section of the unconformity between the Cambrian and Eocene beds. Here the Cainozoic limestones rest directly on the Cambrian slates. The latter are of a bright-pink colour and exhibit parallel jointing to the plane of unconformability which gives the misleading appearance of an identity of dip between the Cambrian and Cainozoic series. This effect is heightened by the bleaching that has taken place along the joints of the Cambrian and thereby brought these divisional planes into prominence. The dips of the respective series, are, however, very distinct and discordant, the Cambrian beds dipping north 20° west at 85°, and the overlying Cainozoic limestones north-west at from 30° to 45°. On the south side of this section the newer series forms a capping on the Cambrian slates and rises from sea-level to the top of the cliffs parallel with the coast, where they run out and are not again met with in a southerly direction until Kangaroo Island is reached.

The Cainozoic beds within the disturbed area have suffered a greater or less degree of induration and make a fairly hard and compact stone, but no other evidence of alteration could be detected when examined either macroscopically or microscopically. The general direction of dip varies from west to north-west.

Palaeontological Notes.—Reference has already been made to the polyzoanal composition of the limestones. In this respect, as well as in the relative scarcity of molluscan remains and the presence of echinoderms, the beds bear a close resemblance to the upper beds of the same age in the Aldinga cliffs. The large branching polyzoan, *Cellepora*, which is common at Aldinga, is also abundant at Sellick's Hill. The *Turritella aldingæ* beds which are at sea-level at Blanche Point, Aldinga, are not seen in the Sellick's Hill cliffs, although a few isolated examples of this form were noticed in the polyzoanal rock. There can be no doubt that

the beds at Sellick's Hill are on the same horizon as those at Aldinga, the slight palæontological contrasts between the two localities is not exceptional, as the nature of the Cainozoic sediments along the borders of Gulf St. Vincent frequently vary within short distances to a very extraordinary degree. The triturated condition and uniform grade of the material which make up these limestones are suggestive of a littoral deposit and the sorting action of the waves. On the southern side of the Sellick's Hill section the limestones become less fragmental and whole forms may be seen, particularly the fronds of *Retepora*, which at some horizons is so abundant that the stone might be classed as a *Retepora* limestone.

Mr. Clark in his paper (*loc. cit.*) has supplied the following list of fossils from these beds, which, he informs me, were identified by the late Professor Ralph Tate:—

CRINOIDEA—*Antedon pertusa*, Tate, M.S.

ECHINOIDEA — *Cidaris*, sp.

Echinus woodsii, Laube.

Lovnic forbesi, Ten.-Woods.

Echinolampas posterocrassus, Gregory.

Scutellina patella, Tate.

Fibularia gregata, Tate.

BRACHIOPODA—*Waldheimia*, sp. (indet.).

LAMELLIBRANCHIATA—*Pecten consobrinus*, Tate.

To the above list I may add:—

POLYZOA—*Cellepora*, sp.

Retepora, sp.

LAMELLIBRANCHIATA—*Ostrea hyotidoidea*, Tate.

GASTEROPODA—*Conus*, sp. (Cast.).

Turritella aldingæ, Tate.

TECTONIC CONSIDERATIONS.

The juxtaposition of two series of beds, of distinct ages and stratigraphically uncomformable (as occurs in the district under discussion), is a fortunate circumstance, as it supplies data on which certain great tectonic movements in the building up of South Australia may be recognized.

Many questions are suggested by this unique example of diastrophism in the Cainozoic rocks of our State, as, for example, What was the nature of the earth movements that produced this great distortion of the crust? When did it take place? Was it an isolated movement or an incident connected with a much wider field of disturbance? Has the disturbed area reached the stage of a stable equilibrium, or, are further crustal adjustments likely to occur in the future?

It is certain that the folding of the Cainozoic rocks was caused by earth movements on a large scale in which the Willunga Ranges, as a whole, participated. These ranges form the scarp-face (plate xi.) of an extensive upland plateau that takes in most of the country to the southward. The geological strike runs parallel with this scarp, in a north-east and south-west direction, until it nears the coast, where it turns more to the south and follows the general trend of the coastline. This change in the strike can be seen even at a distance, where the serrated outcrops of Cambrian limestone pass over a round hill, known as Sugarloaf Hill, on the north side of Boundary Creek. At a later stage in our enquiries we shall find that this change of strike is an important consideration in interpreting the geological facts—the strike of the country instead of maintaining a straight course is along two distinct lines, which, in their intersection form an obtuse angle.

Another point, which proves that the Willunga Range movement formed a distinct tectonic unit, can be gathered from the sudden change that takes place in the dip of the Eocene beds as they come into line with these ranges. At Port Willunga, and for some miles to the south, the Eocene limestones have a normal dip, and, even just in front of the great Willunga scarp, they only roll to an extreme inclination of 15° , but immediately they form a junction with the Cambrian of the Willunga Ranges they are thrown into a very high angle of dip, which is suggestive that this high dip has been occasioned by the elevation of the ranges, in which movement the Cainozoic beds participated.

In a study of the Cambrian beds which abut upon the coast we find a confirmation of this view. In the cliffs facing the sea, and for some distance back, the Cambrian slates are greatly disturbed. They are intimately fractured in all directions, rendering it most difficult to determine the true dip. In the Boundary Creek, at about half a mile from its outlet, the beds dip westerly at 48° . A ridge of hard purple slates, between tides, situated near Waterfall Gully (No. 2), shows a dip north-west at 70° . At the point of junction between the Cambrian and Cainozoic beds, each of these appear to have a dip of 80° westerly. This is probably a false dip, so far as the Cambrian beds are concerned, for there was certainly an initial unconformity of strata between the latter and the newer series, and the apparent dip undoubtedly arises from master-joints, slides, and shear-cleavage that have been induced by the earth-strains. These slides are parallel to the coast, they conform to the high dip of the Eocenes, and, as planes of weakness, give rise to frequent

land-slips, exposing smooth faces of rock from which the material has slid. The evidences submitted seem to point to only one conclusion, that in the locality under review there was a common movement of the earth's crust in which both the Cambrian and Cainozoic rocks were equally involved.

We must now attempt to decipher the nature of these earth movements.

It can be safely assumed that a great fault-fissure follows the base of the Willunga scarp, running in a north-easterly direction, and is marked by the valley in which the townships of Bellevue, McLaren Vale, and Kangarilla are situated. Although the exact line of fault is obscured by thick deposits of alluvium, its presence is clearly indicated by the discordance of the strike in contiguous areas and other features. In the Mount Lofty Ranges the general strike is approximately north and south, while the strike in the Willunga Ranges is east 40° north. The existence of such a fault has long been inferred and has now received confirmation by the collateral evidences obtained on the seacoast near Sellick's Hill. The Sellick's Hill coast section does not demonstrate the existence of a north-easterly fault in a direct way, but gives it a high probability, indirectly, in showing that there is a corresponding earth movement facing the sea with which it can be correlated. It is an example of block-faulting on a large scale. A segment of the earth's crust has been fractured and tilted. The throw of the rocks has exposed two sides of the fractured block in prominent scarps, which, as already explained, intersect to form an obtuse angle—the Willunga Ranges, forming one limb of the block, and the sea cliffs and Myponga Ranges, the other. The Willunga scarp gives an average height above sea-level of 1,200 ft.

We can take a step further in our investigations, and conclude that the earth movement, so far as the Willunga segment is concerned, was in the direction of an uplift amounting at least to 1,200 ft., bordered on its northern and western sides by downthrows. Looking from Sellick's Hill northwards a great land-slope is seen, rising northerly, until it finds its culmination in the Mount Lofty ridge. On this slope, the highest bed, geologically, occupies the lowest position at the base of the Willunga Ranges; while the lowest bed, geologically, occupies approximately the highest position along the ridge of Mount Lofty. Here we have the rough outline of another great faulted block showing a downthrow to the Willunga scarp.

Another item of evidence in proof of the uplift of the Willunga segment is gathered from the distribution of the Eocene beds within the area. The most distant, as well as the

most elevated, outlier of the Eocene beds in South Australia occurs as a small patch on the Hindmarsh Tiers, near the middle of this elevated plateau (see inset map, plate x.). It is exposed in the head waters of the Hindmarsh River, near Mr. Maslin's, and ten miles distant, in a straight line, south-east from the outcrop on the coast. The beds are under alluvial cover and only seen in creek sections, so that their lateral extent is uncertain. The stone is highly fossiliferous, of a pinkish colour, and consists of a very pure limestone with secondary deposition of calcium carbonate in the interspaces. The old furnace, used for smelting the iron ore from Mount Cone, is in close proximity to the outcrop and the Eocene limestone was used as a flux in the process. The height which these beds occupy above sea-level is probably between 900 ft. and 1,000 ft. The height of Mount Cone, not quite three miles distant, is given, officially, as 1,380 ft. The Eocene beds, in other places, rarely exceed the 200-ft. limit of altitude, so that this outlier on the Hindmarsh plateau is several hundreds of feet higher than any other outcrop of these rocks known in South Australia, and it therefore supplies an indirect proof that the Willunga segment has undergone an uplift relatively to the surrounding areas. This interesting outlier also clearly indicates a former extension of the lower Cainozoic marine series over the area of what, at present, forms the Hindmarsh Tiers plateau, and was, probably, originally conterminous with beds of the same age on the Murray Plains, as well as those on the west in the neighbourhood of the gulfs. Of this great upland sheet of marine limestones this little outlier has alone survived to tell the tale.

GEOLOGICAL AGE OF THE EARTH MOVEMENTS.

The geological age of these earth movements can be defined within certain limits. They were certainly post Eocene, as the beds of this age have been profoundly affected by the tectonic movements. The relationship they bear to the Miocene is not so clear. The Miocene beds usually rest directly on the Eocene—sometimes with a slight stratigraphical unconformity. This is the case at Port Willunga. At Sellick's Hill, however, only the basal beds of the Eocene occur in the cliffs, while the higher strata, at a high dip, pass seawards and disappear below sea-level. If the Miocene beds occupied the same position in relation to the Eocene at Sellick's Hill that they do on the coast further north, they have been placed beyond the range of observation. This is unfortunate, as it leaves the question of the relationship which these great crust movements bore to Miocene times, undefined. It is possible that the movements

took place in the interval between the deposition of the Eocene and that of the Miocene, and if so the Miocene laid down at Sellick's Hill must have shown a much stronger unconformity with the older Cainozoics as compared with the Port Willunga section.

The next newer system represented in the Sellick's Hill section is a thick accumulation of Pliocene (or Pleistocene) clays and gravels, which rest unconformably on the Eocene beds. These alluvial cliffs rise precipitously to a height of 200 ft., and are deeply scored by rain and surface drainage. They are, geologically, undisturbed, and, in places, occupy lines of erosion in the Eocene limestones. We can thus narrow down the limits of the period of tectonic activity as post-Eocene and pre-Pleistocene. This brings it somewhere within the Neogene period, but whether as an inauguration of the Miocene, or as characteristic of some inter-Miocene period, or, as marking its close, or even as Pliocene, we have not at present the data to decide.

The process of disruption probably began in the form of a dome-shaped regional uplift that included most of the southern portion of South Australia. In this upward movement a degree of strain was reached when the rising dome became intersected with fractures, and was split up into vast blocks of country, which, being unequally supported settled along some lines and left others strongly in relief. This process of block-faulting would result in major and minor effects. The great slopes of Mount Lofty to McLaren Vale, and the Willunga scarp and plateau, represent some of the major lines of disruption, and these, again, are split up into secondary blocks, scarps, and trenches which make the minor features of our landscapes. It is very unlikely that these diastrophic effects were produced by a sudden or cataclysmic occurrence, but resulted, no doubt, from a number of small movements, spread over a long period of time, and may even still be in progress.

The downthrow to the gulf, seen in the Sellick's Hill section, supports the view of the existence of a great trough-fault, or graben, in the line of Gulf St. Vincent—a view which has already been assumed by the writer as necessary for the explanation of other local geological phenomena. It is very probable that the earth tremors which occur in the southern portions of the State are connected with these great lines of crust fracture. In the important earthquake of September 19, 1902, the foci of maximum intensity was in Gulf St. Vincent, opposite to the disturbed area described in this paper, and the tremors were particularly severe in a line facing the coast, and also in the valley along the base

of the Willunga scarp, as, for example, at Willunga and Clarendon. It is therefore highly probable that the great 1902 earthquake was caused by a settlement along the north and south trough-fault accompanied by sympathetic movements along the tangential fissures.

With the time data roughly diagnosed, it is instructive to note the amount of denudation that has taken place in the interval. The present coastline along the gulf is exceedingly modern. Since the great earth movements above described the sea has retreated from the gulfs and left them dry and returned again—probably, more than once. At the present time the coast, near Sellick's Hill, is in rapid retreat before the advancing waves. There is a broad plain of marine denudation on the shore which tells of recent loss of land. All the exposed rocks in the cliffs—Cambrian slates, Eocene limestones, and Pliocene clays—are easily operated upon by the waves and as easily removed by the undertow. The encroachments on the land would be still more rapid were it not for the wide floor of truncated limestones, standing up on the beach in successive ridges, which break much of the force of the waves before they reach the base of the cliffs, but it cannot be long before this interesting section will be entirely wiped out.

A better gauge of the time that has elapsed, since the uplift, may be found in a study of the amount of waste that has occurred along the line of scarp. The Willunga Ranges are deeply scored by running water, and, in their varied sculpture, present a picturesque view from the opposite sides of the valley; but all the streams that drain the northern face of the ranges are in a very juvenile stage of development; they are all consequent streams, none are sufficiently advanced to pirate their neighbours, and in no instance has a stream intersected its watershed. The same immature condition of stream development occurs on the plateau and in the glacial districts of Mount Compass and Nangkita, as noted in a paper that I have recently had the honour of reading before this Society.⁽³⁾

The measure of denudation accomplished on the Willunga uplift, within a recognized period, may be used as a standard of comparison with other uplifts, in other parts of the State, by which we may infer their synchronism or relative age with respect to the Willunga movements. It is not likely that these movements were strictly local, but rather one phase of a complex and regional disturbance, in which,

(3) Description of a New and Extensive Area of Permo-Carboniferous Glacial Deposits in South Australia. *Trans. Roy. Soc., S.A.*, vol. xxxiv., 1910, p. 234.

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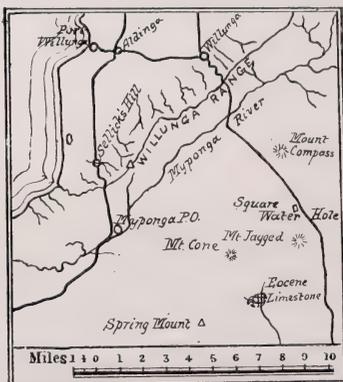
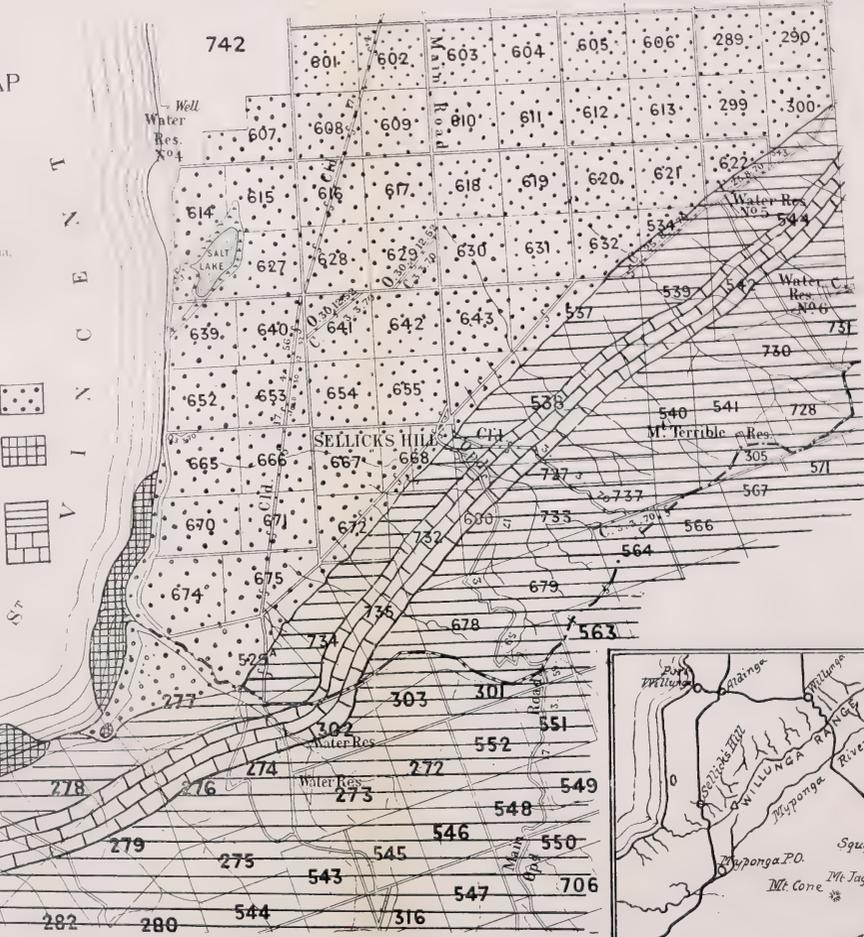
GEOLOGICAL SKETCH MAP

TO ILLUSTRATE A DISTURBED AREA OF
CAINOZOIC ROCKS IN THE NEIGHBOURHOOD
OF SELLICK'S HILL, SOUTH AUSTRALIA.

BY WALTER HOWCHIN, F.G.S.
(Transactions Royal Society, South Australia,
April 4, 1911.)

REFERENCES

- CAINOZOIC.**
 Pleistocene and Recent—Clays, Sands,
and Gravels 
 Eocene—Fossiliferous Marine Limestones 
- PALAEZOIC.**
 Upper Cambrian—Purple Slates and
Quartzites 
 Upper Cambrian—Archaeocyathinae
Limestones 



SKETCH MAP TO SHOW THE POSITION OF THE
OUTLIER OF EOCENE LIMESTONE ON THE
HINDMARSH TIERS PLATEAU.

SURVEYOR GENERAL'S OFFICE ADELAIDE, *Albion, Photo-Engraver.*
JANUARY 1911



Photo. by W. H. Howarth.

The Willunga Valley, with great Fault-Scarp of the Willunga Ranges in the distance.

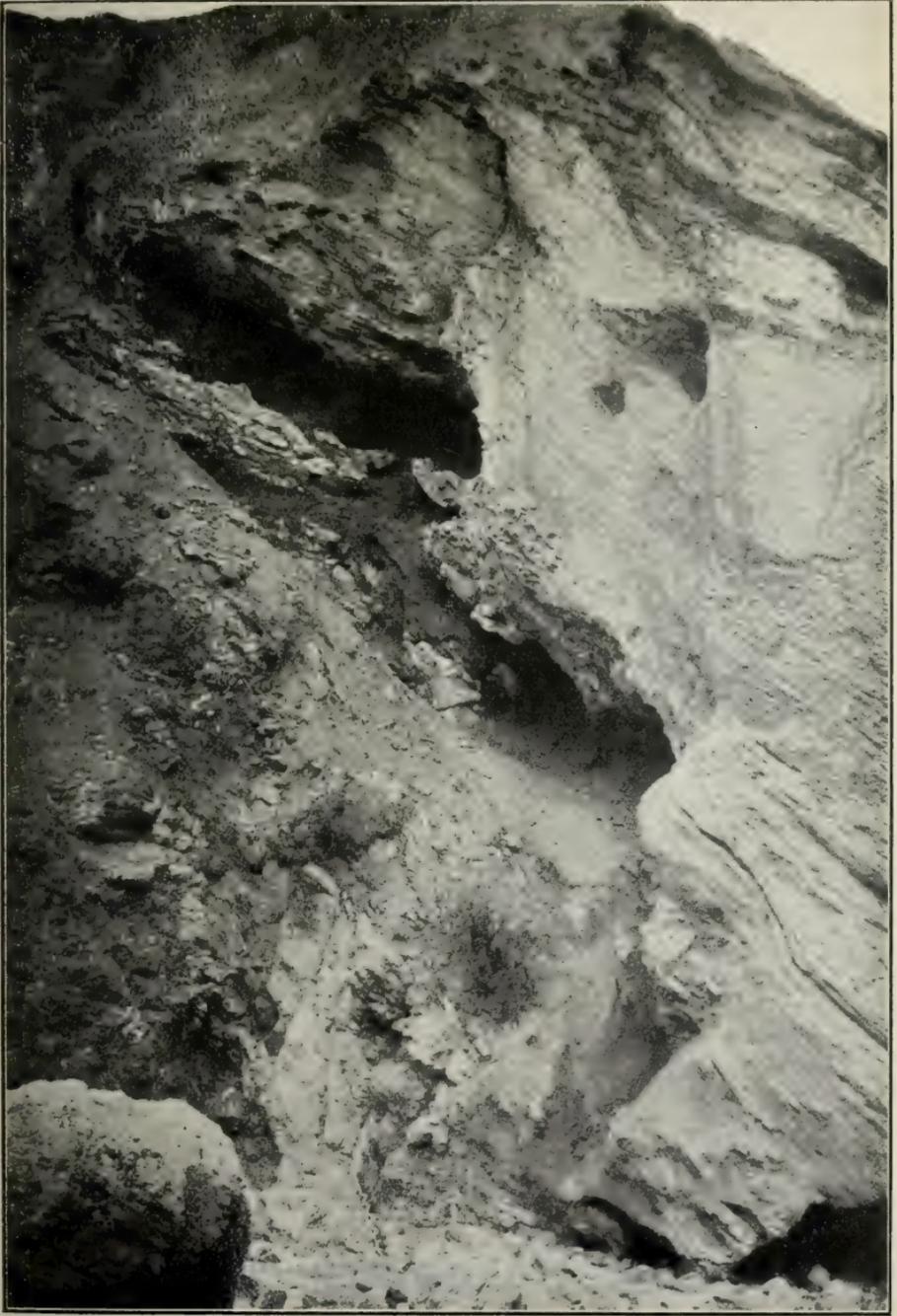


Photo. by W. Howchin.

Tilted Lower Cainozoic Rocks resting unconformably on Cambrian Slates.

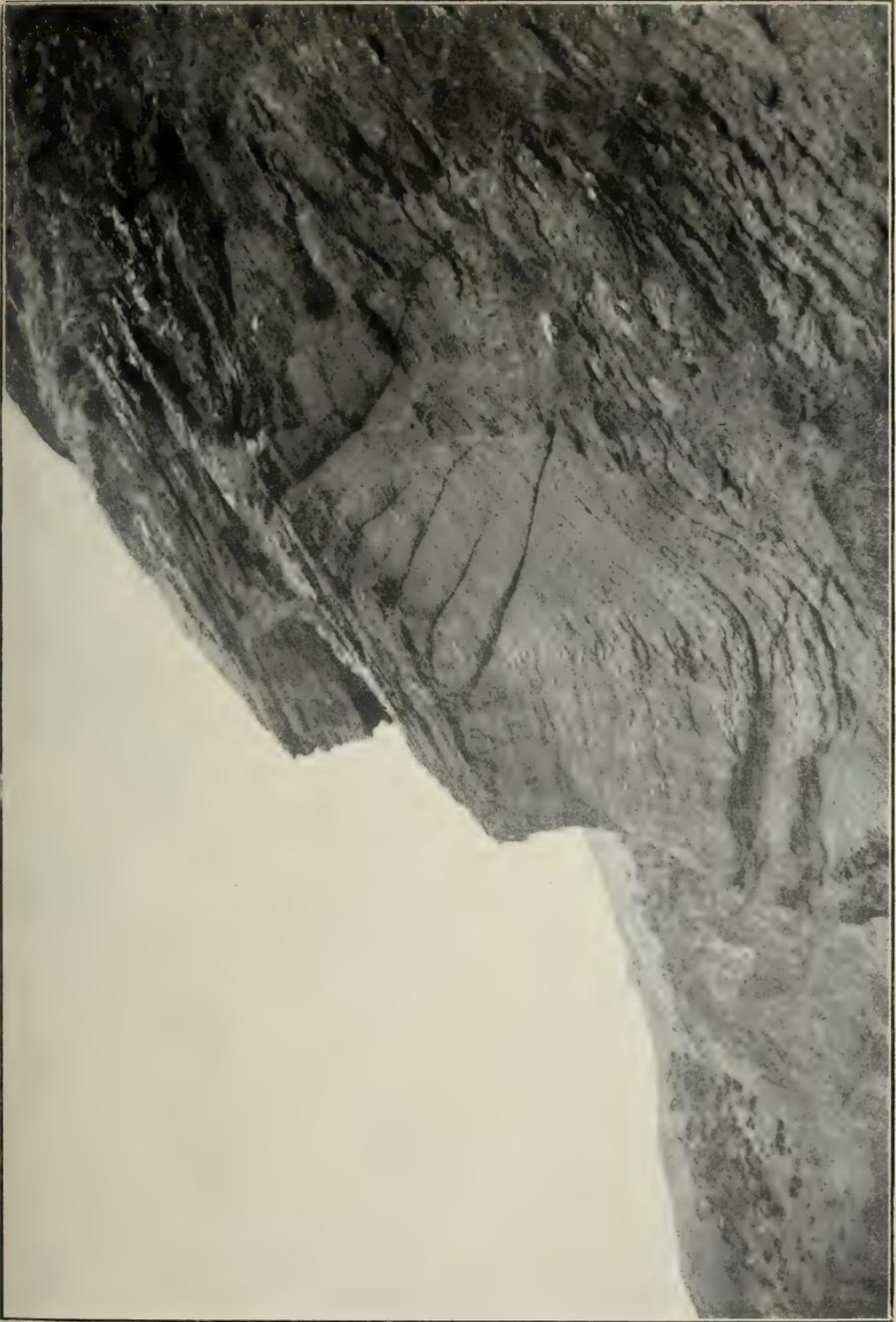


Photo. by W. Haecklin.
Folded Lower Cainozoic Rocks in Sea Cliffs, looking north.

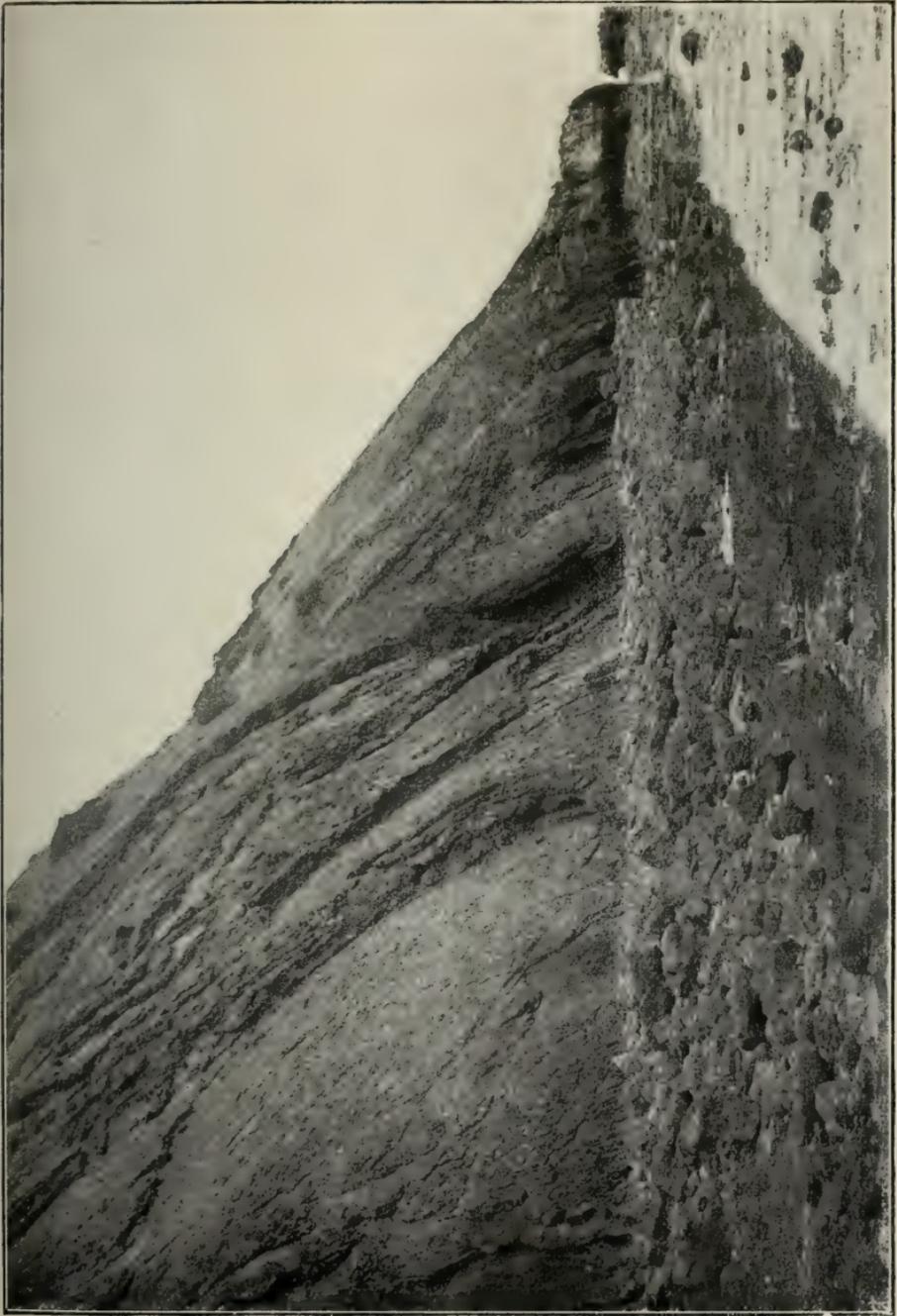


Photo. by W. Hinchin
General view of Lower Cainozoic Rocks forming Sea Cliff with a High Angle of Dip, looking south.



Near view of Cliffs shown in Plate XIV.

Photo. by W. Howchin.

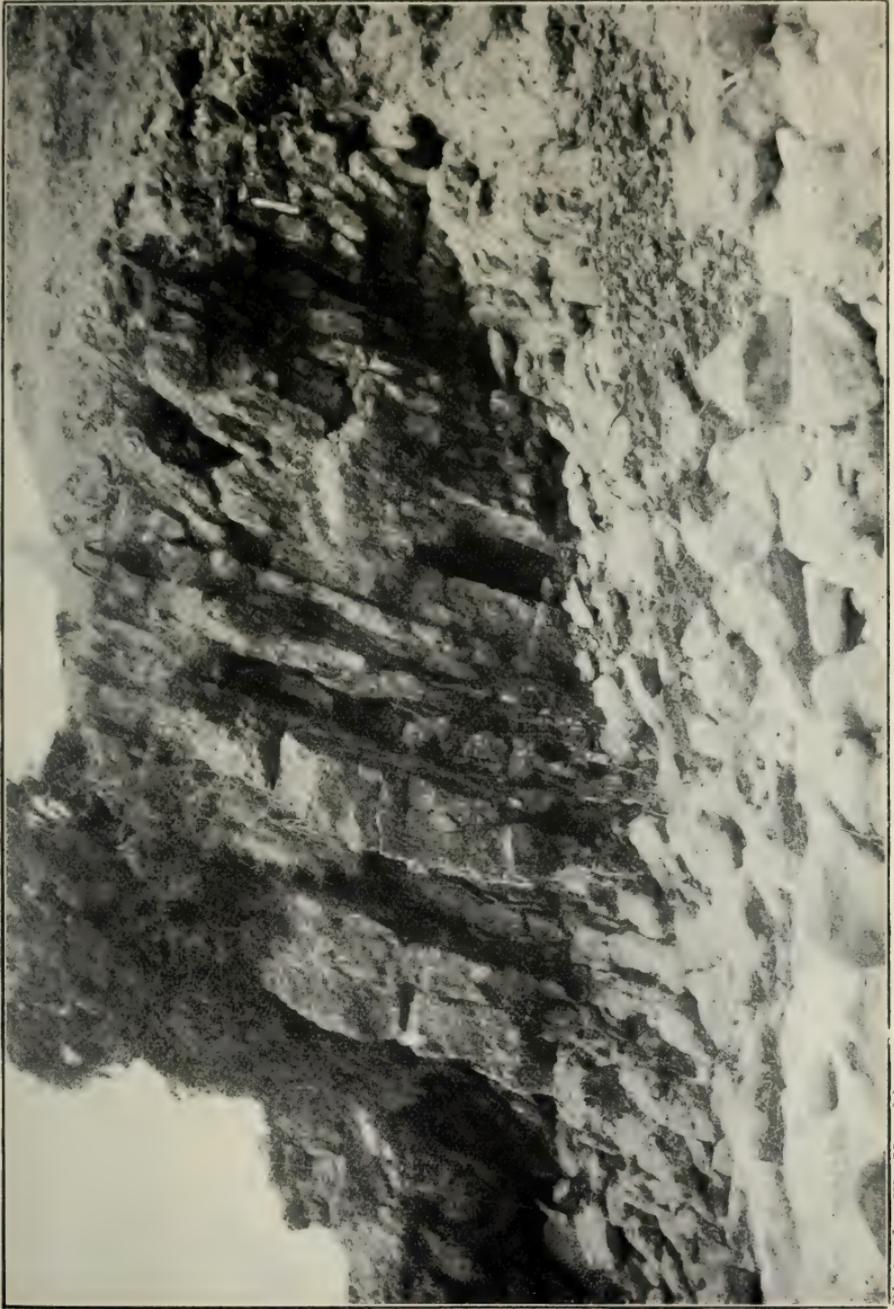


Photo. by W. Howchin.

Lower Cainozoic Rocks, strongly tilted, occupying Spur of Cliffs, looking north.

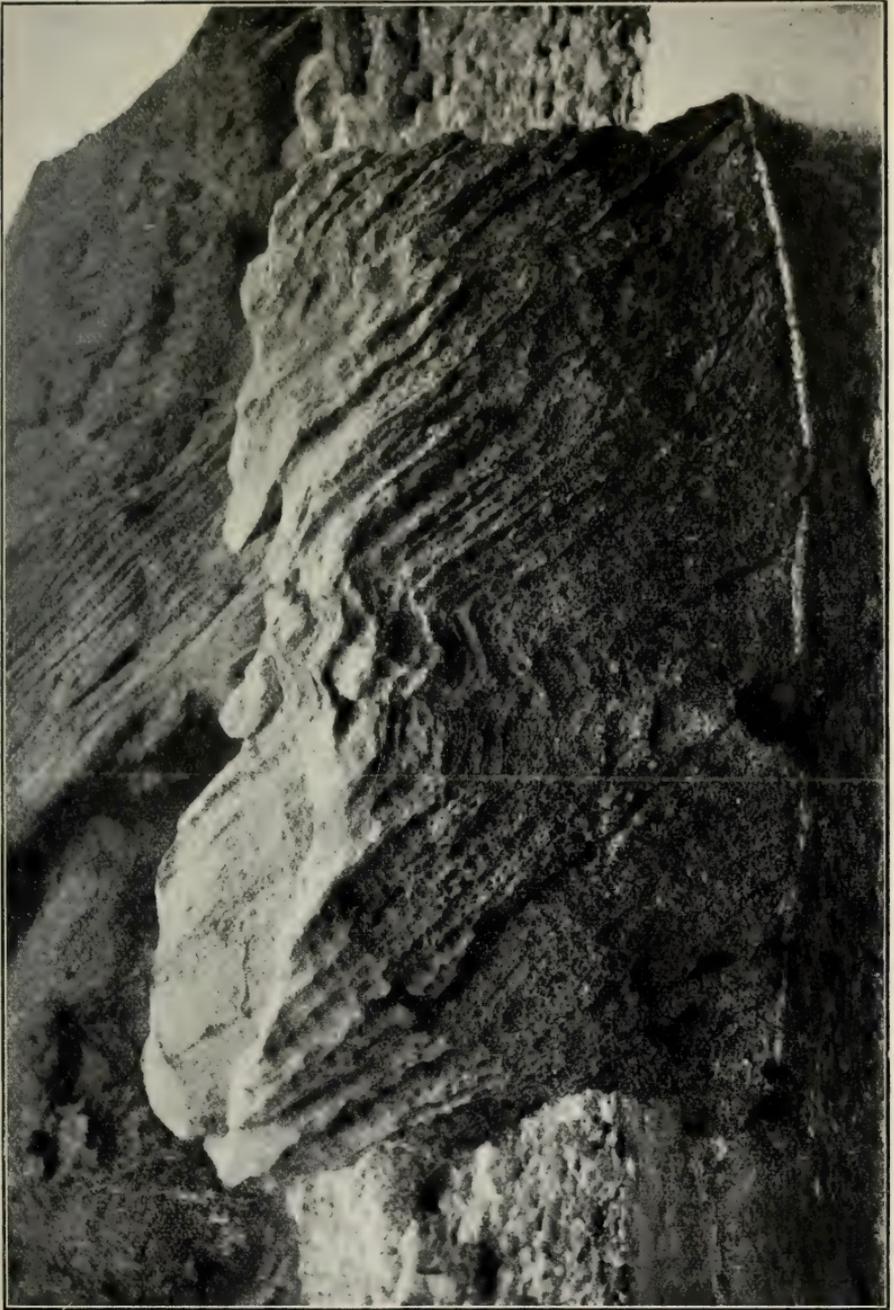
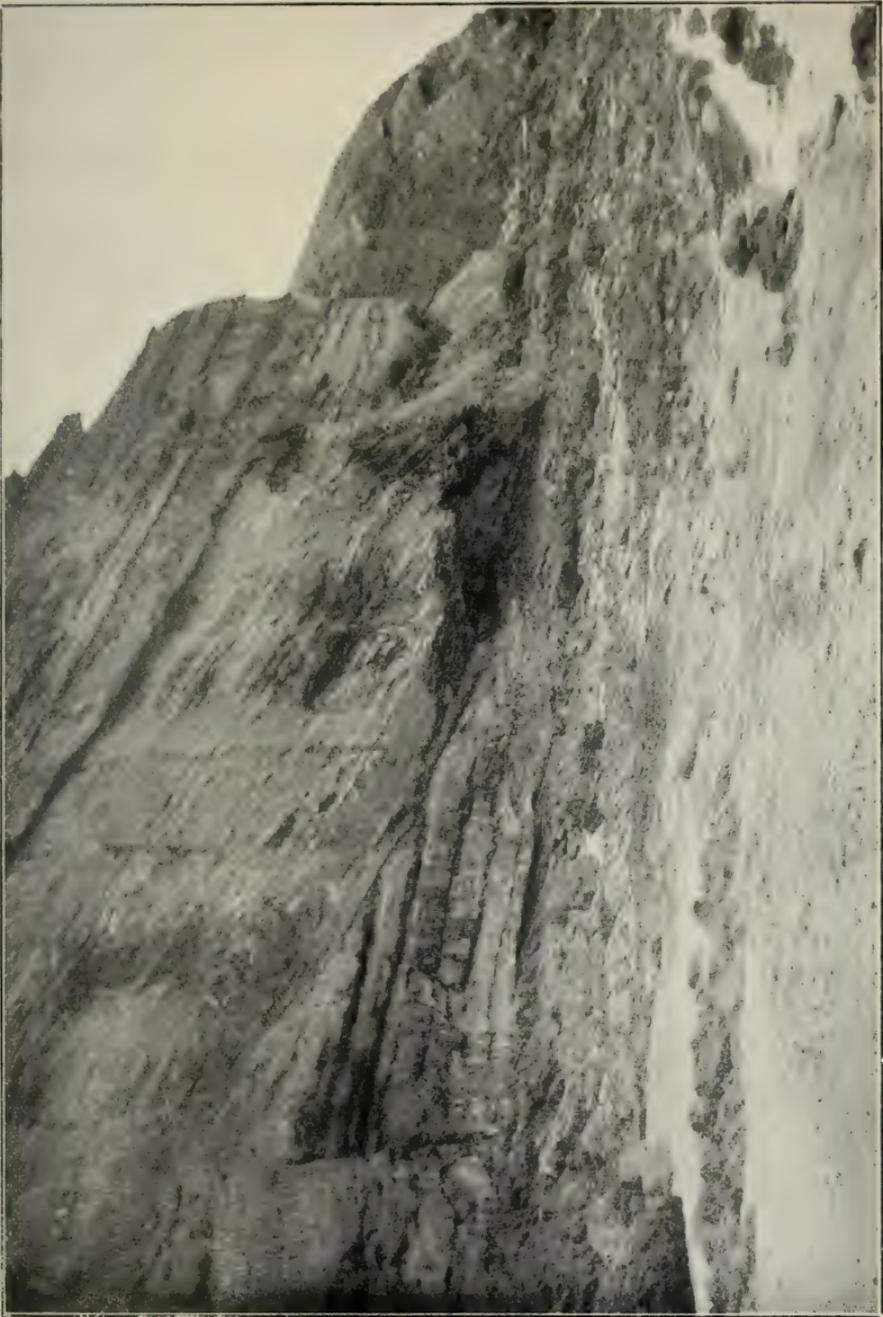


Photo. by W. Horchin.
Contorted Lower Cainozoic Rocks forming isolated Pedestal on Beach.



Photo. by W. Howchin.
Vertical and Reversed Folds of Lower Cainozoic Rocks on Beach.



Thrust-Plane in Lower Cainozoic Rocks, looking south.

Photo. by W. Houchin.

possibly, modern South Australia took its main features of relief. It is in this view of the subject that the importance of the Sellick's Hill section must be judged. It forms the geological key for a much wider interpretation, the evidences it supplies is accumulative and consistent, and the conclusions to which it brings us is that within comparatively recent geological times the mountain systems of South Australia have been profoundly affected and have passed through reconstructive stages.

EXPLANATION OF PLATES.

PLATE X.

Map of locality described. Shows the areas occupied by the Cainozoic rocks (which have undergone distortion by earth movements), and also a geological plan of the Cambrian beds that form the Willunga Ranges. Note the juvenile drainage seen on the northern scarp-face of these ranges. The inset-map shows the position of a small high-level outlier of Cainozoic limestones which occurs on the Hindmarsh Tiers.

PLATE XI.

View of Willunga and Sellick's Hill Valley, with the Willunga Ranges and Sellick's Hill in the distance, as seen from Aldinga. The ranges form the north-west fault-scarp of the dislocated block.

PLATE XII.

The basal beds of Cainozoic limestones, tilted, and resting unconformably on Cambrian slates in the sea cliffs.

PLATE XIII.

Folded lower Cainozoic rocks, in sea cliffs, looking north.

PLATE XIV.

General view of Lower Cainozoic rocks, thrown down at high-angle, forming sea cliffs, looking south.

PLATE XV.

Nearer view of cliffs shown in plate xiv.

PLATE XVI.

Lower Cainozoic rocks, at high angle, forming spur of cliffs, looking north.

PLATE XVII.

Contorted Lower Cainozoic rocks, forming an isolated pedestal on beach.

PLATE XVIII.

Vertical and reversed folds of Lower Cainozoic rocks on beach.

PLATE XIX.

Thrust-plane developed in Lower Cainozoic rocks, caused by a slide, consequent on trough-faulting. Looking south.

ADDITIONS TO THE ALIEN FLORA OF SOUTH AUSTRALIA.

By J. M. BLACK.

[Read July 13, 1911.]

The following is a list of plants which have been found growing wild, and more or less firmly established in South Australia during the past year, together with notes on a few other species. Those marked with an asterisk are completely extra-Australian in their origin:—

PAPAVERACEÆ.—**Glaucium corniculatum*, Curt. Parnaroo.—A native of the Mediterranean region.

CRUCIFERÆ.—**Sinapis incana*, L. (*Brassica adpressa*, Boiss.) Numerous on roadsides and in fields near Port Lincoln.—Mediterranean region, extending northwards to the Channel Islands. **Alyssum maritimum*, Lamarck. A garden escape (Sweet Alyssum) at Robe.—Mediterranean region.

CARYOPHYLLACEÆ.—**Silene conica*, L. (Conical Catch-fly.) Common at Robe.—Europe and Western Asia. **Spergularia diandra*, Boiss. Oodla Wirra.—Mediterranean region.

LEGUMINOSÆ.—**Trifolium suffocatum*, L. (Suffocated Clover.) Keith.—Europe. **Trifolium scabrum*, L. (Rough Clover.) Adelaide Plains and South-East.—Europe. *Kennedyia nigricans*, Lindl. Scrub below Mount Lofty (F. S. Salisbury).—Western Australia.

COMPOSITÆ.—**Senecio elegans*, L. (Purple Ragwort.) A garden escape growing near the sea at Robe (C. D. Black).—South Africa. **Gazania rigens*, R.Br. A garden escape along the Summit Road, Mount Lofty (F. S. Salisbury).—South Africa.

BORAGINACEÆ.—**Lithospermum apulum*, Vahl. Marino (H. H. D. Griffith).—Mediterranean region.

Note.—The shrub described as *Lycium chinense*, Mill., in the "Naturalized Flora of South Australia," is really *L. campanulatum*, E. Meyer, a native of South Africa. The true *L. chinense*, which is a more slender and less spiny plant, is also found wild near Adelaide, but is not nearly so common as the other.

LABIATÆ.—**Salvia Ethiopis*, L. Ulooloo (North-East); Hundred of Butler (Eyre's Peninsula).—Mediterranean region.

CHENOPODIACEÆ.—**Chenopodium multifidum*, L. Near Largs (F. S. Salisbury).—South America.

AMARANTACEÆ.—**Amarantus patulus*, Bert. A weed in cultivated land, Blackwood; Mount Gambier. Mediterranean region.

POLYGONACEÆ.—**Rumex obtusifolius*, L. (Broad-leaved Dock.) East Parklands, Adelaide.—Europe. *Polygonum lanigerum*, R.Br. Reedbeds (H. H. D. Griffith).—Eastern Australia; tropical Asia.

CONIFERÆ.—Note on localities for some species of *Callitris*.—*C. propinqua*, R.Br. Gawler; Franklin Harbour; Mount Brown Forest Reserve (Maiden, *For. Fl., N.S.W.*, xii., 54); Hog Bay, K.I.: Murray Bridge; Port Lincoln (Maiden, *Trans. Roy. Soc.*, xxxii., 255-71); ranges near Adelaide; East Wellington; ranges near Cleve, Eyre's Peninsula (J. W. Mellor); Pinnaroo (J. Sincock). *C. robusta*, R.Br. Mount Brown Forest Reserve and Far North (Maiden, *For. Fl., N.S.W.*, xii., 46); Pinnaroo (J. Sincock); Strathalbyn. I cannot help feeling some doubt as to whether it will be possible to keep *C. robusta* and *C. propinqua* permanently separated as distinct species, at least in this State. *C. cupressiformis*, Vent. Adelaide District; Kangaroo Island (Tate); Hog Bay, K.I. (Maiden, *Trans. Roy. Soc.*, xxxii., 255); Arno Bay (J. W. Mellor), "small tree or almost shrub." *C. cupressiformis*, Vent., var. *mucronata*, Benth. Cape Borda, K.I. (J. W. Mellor); Slape's Gully, Mount Lofty Ranges (H. H. D. Griffith).

GRAMINEÆ.—**Polygonum maritimum*, Willd. Robe.—Mediterranean region. **Bromus rigidus*, Roth. Coast near Adelaide.—Europe.

Note.—Recent investigations, instituted at first by Mr. J. H. Maiden, Government Botanist of New South Wales, go to prove that the introduced Brome, so common throughout temperate Australia, is not *Bromus sterilis*, L., as has been supposed ever since Bentham's identification of it in the *Flora Australiensis*. It now appears that this determination was erroneous and that the grass is really *B. maximus*, L. South Australian specimens of supposed *B. sterilis* were sent to Kew Botanic Gardens and to the Muséum d'histoire naturelle, Paris, with the result that they, like the New South Wales specimens sent by Mr. Maiden to Kew, were pronounced to be *B. maximus*.

DESCRIPTIONS OF AUSTRALIAN CURCULIONIDÆ, WITH
NOTES ON PREVIOUSLY DESCRIBED SPECIES.

PART IX.

By ARTHUR M. LEA.

[Read October 3, 1911.]

I have to thank Mr. Gilbert J. Arrow, of the British Museum, for the opportunity to examine some specimens of *Curculionida* belonging to that institution; some of these were marked as co-types, and others as compared with types. Comments on a number of these specimens will be found herein, but Dr. E. W. Ferguson is to comment on most of the *Amycterides* sent.

SUBFAMILY BRACHYDERIDES.

PROSAYLEUS SUBLINEATUS, n. sp.

Black, antennæ and tarsi (and sometimes the rest of the legs) more or less obscurely diluted with red. Densely clothed with white or greyish scales, interspersed with numerous erect setæ.

Head with small concealed punctures; with a narrow deep partially-concealed median line. Rostrum about as long as the width across eyes, obliquely impressed on each side at base, with a strong partially-concealed median carina. First joint of funicle stouter and slightly longer than second. *Prothorax* in male about as long as wide, in female slightly transverse; sides moderately rounded, base no wider than apex; with numerous partly-concealed granules. *Elytra* elongate-subcordate, at base no wider than prothorax, nowhere parallel-sided, considerably wider in female than in male; with series of rather large but normally almost-concealed punctures; interstices regular, gently convex, very little wider than punctures, but before abrasion apparently much wider. Length, 3-4 $\frac{3}{4}$ mm.

Hab.—New South Wales: Illawarra (Geo. Compere), Monaro (Macleay Museum), Queanbeyan, Forest Reefs (A. M. Lea).

A small species that occurs on the flowers of a dandelion-like plant, and that may be taken in abundance by means of the sweep-net. The setæ are longer and more erect than in *Hopei*, but considerably shorter than in *comosus*; in build (except that it is narrower) it more resembles the latter than any other species known to me; but, in addition to the setæ, the scales are different and the size is much smaller.

Both prothorax and elytra, of fresh specimens, usually have a feebly-striped appearance owing to some scales being darker than others. Thus there usually appears to be a feeble dark median stripe, and a feeble one on each side from apex of prothorax to apex of elytra. But on old or dirty specimens the striped appearance is lost. On the under-surface the scales frequently have a greenish or golden-green gloss. The setæ are longer on the elytra than elsewhere, and when viewed from in front or behind are seen to form a regular row on each interstice. To the naked eye the apex of the prothorax actually appears to be a trifle wider than the base. The male is smaller than the female, with longer prothorax and legs, and narrower elytra, on which the punctures are larger.

PRYPNUS QUINQUENODOSUS, Gyll.

(*P. subtuberculatus*, Gyll.)

In this species the third interstice on each elytron is slightly elevated near the base, and gradually raised posteriorly, with the elevated portion suddenly terminated so as to present a tuberculated appearance. In other species of the genus the third interstice, although more or less elevated, has not this appearance. The suture at the summit of the posterior declivity is marked by conjoined tubercles, but sometimes these are rather feebly defined. The scales in fresh specimens are often more or less golden, but on old and dirty specimens they are usually of a muddy-grey.

The female was described on page 493 of Schönherr's work (vol. i.) under the name of *quinquenodosus*, the male at page 494 as *subtuberculatus*. As the former name appears to be the best for the species I think it should be retained.

PRYPNUS SCUTELLARIS, Fab. (*Prostomus*, Schön.).

In this species the deciduous mandibular processes are unusually stout and firmly attached, and I have never seen a specimen in which they were lost. Near the apex of each there is a slightly oblique outwardly directed ridge in the male. The processes and the somewhat aberrant front tibiæ may have caused Schönherr to regard it as belonging to a different genus to *Prypnus*: but it appears to me to be only a slightly aberrant form of that genus.

Although described from New Holland, it appears to be confined to Tasmania.

Var. MURINUS, n. var.

The typical form of the species is black and highly polished, but there are six specimens before me that differ in

being smaller (15-17 mm. excluding the rostrum), and more or less densely clothed all over with muddy-brown or mouse-coloured scales. In the male the prothorax is more, and in the female less, rugose than in the typical form.

Hab.—Tasmania: Mole Creek (Aug. Simson), New Norfolk, Hobart (A. M. Lea).

SUBFAMILY OTIORHYNCHIDES.

MYLLOCERUS MULTIMACULATUS, n. sp.

Black, parts of legs diluted with red. Densely clothed with greyish scales; with three sooty stripes on the prothorax, and numerous sooty spots on the elytra. Under-surface, scutellum, and legs with white clothing. Upper-surface with short and usually black, or blackish, recurved setæ.

Head with a rather large but normally-concealed interocular fovea; sides, conjointly with sides of rostrum, regularly decreasing in width. Rostrum shorter than width of base; each scrobe semicircularly encroaching on upper-surface. Antennæ long; scape stout, strongly curved, shallowly grooved on lower surface; first joint of funicle as long as second and third combined. *Prothorax* feebly transverse, apex almost truncate, base feebly bisinuate, and the width of apex, sides lightly rounded; with numerous small, normally-concealed punctures, and with some larger setiferous ones. *Elytra* oblong-ovate, sides regularly increasing in width to beyond the middle; striate-punctate, punctures rather large, but almost concealed; interstices regularly convex, with numerous small normally-concealed punctures. *Femora* minutely but acutely dentate. Length, $4\frac{1}{2}$ -5 mm.

Hab.—Queensland: Cunnamulla (H. Harcastle).

In size, sculpture, clothing, and general appearance very close to *trilineatus*, but sides of prothorax a trifle more rounded, and elytra with dark setæ not so depressed, the scutellum also is distinctly transverse, instead of slightly longer than wide.

The male differs from the female in being smaller and thinner, with the scape stouter and the legs somewhat longer. The elytral spots are frequently conjoined, and have the appearance of forming feeble zigzag fasciæ.

MYLLOCERUS FOVEIFRONS, n. sp.

Reddish-brown, appendages somewhat paler. Densely clothed with white scales, not quite so snowy on elytra as elsewhere. Setæ of upper-surface depressed, sparse, and indistinct.

Head flattened between eyes; these moderately convex. Rostrum about as long as wide, and distinctly narrower than head, sublateral carinae fairly distinct before abrasion; scrobes near apex suddenly and strongly encroaching on upper-surface. Antennae long; scape fairly stout and regularly curved, feebly grooved on lower surface; first joint of funicle feebly curved, slightly longer than second and third combined. *Prothorax* distinctly transverse, apex truncate, base strongly bisinuate and much wider than apex, sides regularly rounded; with sparse, normally-concealed punctures. *Elytra* parallel-sided to beyond the middle; with fairly large, but normally almost concealed, punctures, in regular striae; interstices gently convex and with small normally-concealed punctures. *Femora* very feebly dentate. Length, 5-6 mm.

Hab.—Queensland: Cunnamulla (H. Hardcastle).

In build approaching *abundans*, but smaller and narrower, prothorax truncate at apex and less transverse; elytra with sparser setae and rostrum and eyes somewhat different. The clothing is much as in *niveus*, but the wide base of prothorax readily distinguishes it from that species. The curvature of the basal joint of the funicle is a rather unusual feature. From above the scrobes cause the apex of rostrum to appear strongly bifoveate.

On abrasion the prothorax is seen to have sparse and sharply-defined, but rather small, punctures (in which the setae are set), but under a Coddington lens no smaller ones (for the reception of the scales) are visible.

MYLLOCERUS HARDCASTLEI, n. sp.

Black, appendages in places more or less obscurely diluted with red. Densely clothed with green scales, varying in places to golden or grey, but nowhere with distinct markings. Upper-surface with distinct, and more or less erect, reddish-brown setae, longer on elytra than elsewhere; under-surface and legs with shorter, paler, and depressed setae.

Head flat between eyes; these but little prominent. Rostrum slightly longer than the width of base, sides regularly decreasing in width to apex; middle regularly depressed, with parallel costae marking margins of depression; scrobes foveiform. Antennae long and thin; scape lightly curved, apex thickened and on lower surface shallowly grooved; first joint of funicle about as long as second and third combined, second about as long as third and fourth combined. *Prothorax* strongly transverse, apex distinctly incurved to middle, base strongly bisinuate and much wider than apex, sides feebly rounded; setiferous punctures normally concealed. *Elytra* not much wider than base of pro-

thorax, parallel-sided to beyond the middle, with regular rows of rather large, but partially-concealed punctures, in feeble striæ; interstices scarcely separately convex, with minute concealed punctures. *Femora* scarcely visibly dentate. Length, $4\frac{1}{2}$ -5 mm.

Hab.—Queensland: Cunnamulla (H. Hardcastle).

The rostrum is strongly at variance with that of others of the genus. The scrobes are very short and subterminal, but immediately behind the insertion of each antenna is a feeble groove bounded inwardly by a carina; the two of these are rather closer throughout their length than usual, and the space between them is gently concave. The eyes are also less prominent than usual. The elytral setæ are decidedly longer than in any other described species in which the base of the prothorax is much wider than the apex, except *mirabilis*; but in that species the rostrum is of very different shape; the eyes very prominent, etc.; *castor*, in which the elytral setæ are fairly long, for the section, has also very prominent eyes, and rostrum of different shape.

The teeth of the femora are normally concealed in fresh specimens. The seven specimens under examination appear to present no distinct sexual features.

TIMARETA PILIPES, Pasc., ♂ (*Dysostines*).

(*D. pustulosus*, Pasc., ♀.)

Two female specimens (one marked as a co-type) were sent to me for examination by the British Museum as *D. pustulosus*. and they agree well with the description. The fine clothing on the prothorax is remarkable, each scale appears to be closely pressed to the derm, and to be in the form of a minute O or U; similar scales clothe the rest of the body and legs, but are mixed to a certain extent with ordinary ones. The pale and dark scales are alike, but the white ones are more conspicuous.

The Museum also sent four male specimens without name labels; they agree with the description of *D. pilipes*, and the remarkable hind tibiæ are as figured by Pascoe for that species, but one specimen is smaller (2 lines, including the rostrum), whilst the others are larger ($3-3\frac{1}{4}$ lines) than the type ($2\frac{1}{2}$ lines). These specimens I believe to be *pilipes*, and that the form described as *pustulosus* is the female. The finer clothing is exactly as in the co-type of *pustulosus*, and is different from that of any other weevil known to me.

All the Museum specimens are from Albany (King George Sound).

The male differs from the female in being narrower, hind tibiæ very different at apex, front tibiæ inflated towards (but

not to) base; basal segment of abdomen depressed in middle, and second flat, instead of both rather strongly convex.

The species belongs to *Timareta*, as the ocular lobes are entirely absent.

SUBFAMILY LEPTOSIDES.

MANDALOTUS DENTIPES, n. sp.

♂. Black, antennæ and parts of legs more or less reddish. Densely clothed with muddy scales, interspersed with numerous stout whitish or greyish setæ; metasternum with rather long blackish setæ; tibiæ, especially front pair, fimbriated internally.

Rostrum with a narrow more or less concealed carina. *Prothorax* moderately transverse, sides strongly rounded; with transverse granules or interrupted carinæ, traceable through clothing. *Elytra* rather short, closely applied to prothorax, shoulders somewhat projecting, sub-tuberculate behind shoulders; with rows of large but almost-concealed punctures; alternate interstices feebly raised. *Metasternum* and basal segment of abdomen with a wide and rather shallow conjoint excavation. Front *coxæ* obliquely flattened internally, and widely separated, middle each with a strong obtuse tooth on its hind edge; front tibiæ strongly curved towards apex, and distinctly notched at outer apex, hind hair rather strongly curved. Length, $5\frac{1}{2}$ mm.

♀. Differs in being shorter and wider, metasternum and abdomen flat, middle *coxæ* unarmed, tibiæ shorter and much straighter, and front pair not notched at outer apex.

Hab.—New South Wales: Sydney (E. W. Ferguson).

In my table of the genus⁽¹⁾ would be placed in F; from the four species placed there it may be readily distinguished by the dentition of the middle *coxæ* and the shape of the front tibiæ.

MANDALOTUS TAYLORI, n. sp.

♂. Black, antennæ and parts of legs reddish. Densely clothed with muddy scales, thickly interspersed with stout pale setæ, becoming regular on elytra; tibiæ fimbriated internally.

Rostrum with a narrow distinct carina. *Prothorax* feebly transverse, sides strongly and evenly rounded, median line distinct, with numerous small granules, each with one setiferous puncture. *Elytra* moderately long, conjointly arcuate at base, sides regular, with rows of large, partially-concealed punctures, interstices almost even. Basal segment of *abdomen* with a fairly large excavation at apex, on each

(1) Trans. Roy. Soc., S.A., 1907, p. 131.

side of which is a fairly large obtusely conical tubercle, rather closer to the side than to each other. Front *coxæ* moderately, the middle almost twice as widely, separated; front tibiæ obtusely denticulated on lower surface; hind pair strongly curved, each with an obtuse inner tooth about the middle. Length, 6-7 mm.

♀. Differs in being shorter and wider; abdomen flat and without tubercles; tibiæ less curved and hind pair unarmed.

Hab.—New South Wales: Oberon (Taylor Bros.).

The two abdominal tubercles associate this species with *geminatus* and *amplicollis*. The latter has the tubercles on the second segment, the hind tibiæ very differently clothed and without the small tooth. The former is a much smaller species, with the abdominal tubercles smaller, not at the sides of an excavation, and the front *coxæ* touching.

The only female I have seen has been returned to Messrs. Taylor Bros.

MANDALOTUS CARINATIPES, n. sp.

♂. Black, antennæ and parts of legs reddish. Densely clothed with muddy scales, thickly but somewhat irregularly interspersed with stout somewhat stramineous setæ; greater portion of under-surface with rather sparse fine setæ or pubescence; tibiæ rather feebly ciliated internally.

Rostrum with carina concealed except near apex. *Prothorax* feebly transverse, almost flat, sides strongly rounded and wider than elytra; with a strong median line and with numerous irregular impressions marking the sides of very 't' tuse granules or flattened spaces. *Elytra* rather short, conjointly arcuate at base, sides diminishing in width almost from base; with rows of fairly large, partially-concealed punctures, becoming somewhat sinuous on sides; derm somewhat uneven, and with very obtuse tubercles about summit of posterior declivity. *Mesosternum* with a strong, wide, intercoxal projection, truncate at apex and with oblique sides; metasternum and basal segment of abdomen conjointly shallowly concave; apical segment with coarse and dense punctures. Front *coxæ* widely separated; femora stout; front tibiæ obliquely flattened and shining internally on apical two-thirds; hind pair of curious form. Length, 6½ mm.

♀. Differs in being shorter and wider, prothoracic sculpture more regular, intercoxal process of mesosternum flat and slightly curved, metasternum and abdomen flat, and tibiæ simple.

Hab.—New South Wales: Blue Mountains (H. J. Carter).

In my table of the genus would be placed in A, from all the species of which it may be distinguished by the hind tibiæ of the male. The structure of these represents still another remarkable aberration in this highly interesting genus. Each is somewhat thickened and flattened on the basal half (but not at the extreme base) with the thickened portion shining, and marked by a number of fine transverse carinæ; then on the apical half, on a narrower space, but not on the same plane, there are other short ridges, dividing the side, as it were, into small cells. The front tibiæ are also remarkable. The general outline and the intercoxal process of mesosternum are somewhat similar to those of the male of *niger*, but the sculpture is different.

The prothorax of the male could scarcely be called granulate, but there are numerous shallow impressions that mark some of the boundaries of somewhat granuliform spaces. In the female, however, the granules are more conspicuous, and there are some very distinct punctures.

MANDALOTUS INTEROCULARIS, n. sp.

♂. Black, antennæ and tarsi reddish, tibiæ, coxæ, and under-surface partly or entirely diluted with red. Densely clothed with greyish, more or less variegated scales; and in addition with stout more or less erect setæ, varying from white to black. Under-surface with rather dense but fine setæ or pubescence. Tibiæ with long clothing, especially on the under-surface.

Head with a narrow inter-ocular fovea. Rostrum convex and feebly carinated along middle; scape long and thin, rather lightly dilated at apex; first joint of funicle distinctly longer than second, second almost as long as third and fourth combined. *Prothorax* moderately transverse, sides strongly rounded; with close evenly-rounded granules, of rather large size, and readily traceable through clothing; with a narrow median line, continuous to base and almost to apex. *Elytra* at widest no wider than prothorax across middle, shoulders evenly rounded, sides strongly incurved near apex; with regular rows of fairly large punctures; alternate interstices moderately elevated. *Under-surface* with dense fine punctures, with a few of larger size scattered about. *Metasternum* depressed in middle. *Abdomen* with basal segment depressed between coxæ, the depression bounded posteriorly by a narrow curved impression, immediately outside of which is a very narrow carina, that is fairly close to the apex, which is strongly incurved to middle. *Legs* rather long; front coxæ widely separated; front tibiæ strongly bisinuate, the apex acutely produced. Length (excluding rostrum), $5\frac{1}{2}$ - $6\frac{1}{2}$ mm.

♀. Differs in having a shining and conspicuous inter-ocular tubercle; prothorax somewhat smaller; elytra larger, wider, and more ovate; basal segment of abdomen convex and non-carinate; legs somewhat shorter, front tibiæ less curved, more sparsely clothed and the apex less acute: the clothing of the under-surface is also decidedly shorter.

Hab.—Tasmania: Stanley, under stones and abundant in grass-tussocks on summit of the "Nut" (A. M. Lea); Victoria: Forrest (H. W. Davey).

Of the species belonging to the group with carinated abdomen it is distinguished from all, of which the female is known, by the conspicuous inter-ocular tubercle of the female. Of those of which the female is unknown, it is distinguished from *imitator* by the basal segment of abdomen of male less incurved to middle, the carina much less curved, and front tibiæ less hairy and less curved. *Longicollis* has prothorax longer, elytra rougher and differently clothed, front coxæ more widely separated, and basal segment of abdomen less incurved to middle. *Excavatus* and *Severini* have the abdomen very different. It is very close to *arciferus*, and I was at first inclined to regard it as a variety of that species, but the clothing is not so dense, so that the prothoracic granules are more distinct before abrasion, the elytra are not subtuberculate posteriorly, have the alternate interstices elevated, with the punctures, although still of large size, considerably smaller (both before and after abrasion), the rostrum somewhat stouter, and the scape is slightly thicker, except at apex, where it is thinner. The under-surface and legs, usually so distinctive of the species of this genus, are practically identical. There is now no female of *arciferus* before me, but the inter-ocular tubercle of the present species is so distinct, that had it been present on the type female of that species it could hardly have been overlooked.

The clothing is very variable, and is seldom exactly alike on any two specimens. It is usually of a dark ashen-grey, mottled with small darker and paler spots (usually each shoulder has a small pale spot). The suture, especially about summit of posterior declivity, is more or less ochreous. On an occasional specimen there are a few small shining granules on the suture towards the base.

MANDALOTUS IRRASUS, n. sp.

♂. Black, antennæ and tarsi reddish, under-surface red or in parts diluted with red. Densely clothed with muddy-brown scales, interspersed with suberect setæ.

Rostrum with a very narrow continuous median carina. *Scape* somewhat inflated at apex, first joint of funicle about

as long as second and third combined, second as long as third and fourth combined. *Prothorax* lightly transverse, sides evenly rounded, depressed along middle; with rather large but not uniform granules. *Elytra* at widest slightly wider than prothorax across middle, base rather strongly trisinate; with rows of large punctures, interrupted in places by tubercular elevations. *Metasternum* and abdomen flattened, and with fairly numerous small granules. *Legs* moderately long; front coxæ widely separated; front tibiæ bisinuate, the apex acutely produced. Length, $4\frac{1}{2}$ - $4\frac{3}{4}$ mm.

Hab.—New South Wales (Macleay Museum).

In my table would be associated with *Coatesi*, from which it differs in being longer and thinner, prothorax and elytra rougher, and front tibiæ sparsely ciliated.

The specimens before me are all more or less dirty, and the scales do not show the least sign of variegation. On the under-surface the setæ are much thinner than on the upper-surface, where the clothing is so dense that the granules and punctures are all more or less concealed. The front tibiæ have a few longish hairs, but they are not conspicuously ciliated as in so many species of the genus. The granules on the under-surface are small, but on abrasion are very conspicuous.

A female, in the Macleay Museum, probably belongs to this species, it differs in being larger ($5\frac{1}{2}$ mm.), elytra wider, abdomen moderately convex, and front tibiæ less curved.

MANDALOTUS ACUTANGULUS, n. sp.

♂. Black, tarsi red; antennæ feebly or not at all diluted with red. Densely clothed with muddy-brown scales, becoming somewhat variegated on under-surface and legs. With stout recurved setæ.

Rostrum convex but apparently not carinated along middle. Scape not very thin, regularly dilating from near base to apex, first and second joints of funicle narrow at base and wide at apex, first as long as second and third combined, second almost as long as third and fourth combined, third to seventh transverse. *Prothorax* moderately transverse, sides strongly rounded; median line indistinct or absent; with numerous flattened granules, usually wider than long, and arranged transversely. *Elytra* rather strongly emarginate at base, with the shoulders acute and clasping sides of prothorax; with rows of large punctures, regular except on posterior declivity; alternate interstices lightly elevated. Basal segment of *abdomen* lightly concave, its apex rather feebly incurved to middle. *Legs* moderately long; front coxæ moderately separated (slightly less than middle pair); front tibiæ

rather strongly curved and acutely produced at apex. Length, $4-4\frac{1}{2}$ mm.

♀. Differs in having the elytra wider, basal segment of abdomen flat and front tibiæ slightly shorter, less curved and less produced at apex.

Hab.—New South Wales: Blackheath (E. W. Ferguson).

Allied to *setosus* and *dentipes*, from the former distinguished by its smaller size, front tibiæ shorter and different at apex, median coxæ closer together, prothorax with transverse arrangement of granules rather less conspicuous, and scape considerably stouter (although not stout enough to associate it with the *crassicornis* group). From *dentipes* it is readily distinguished by the unarmed middle coxæ and much stouter scape.

Dr. Ferguson sent four specimens (two of which were obtained *in cop*); on one of them the scales on the upper surface are of an almost sooty black; on another they are feebly variegated on the prothorax.

MANDALOTUS ANGUSTIPICTUS, n. sp.

♂. Reddish-brown or black, some parts reddish. Densely clothed with more or less variegated scales, and with numerous recurved setæ, usually of the same colours as the scales amongst which they are placed. Under-surface with almost silken clothing, especially on the metasternum and two basal segments of abdomen. Front tibiæ with moderately long, but not very dense, ciliation.

Rostrum with a narrow but more or less concealed carina along middle. Scape rather thin, except towards apex; first joint of funicle almost as long as second and third combined, and second as third and fourth combined. *Prothorax* about as long as wide, sides strongly rounded; median line narrow and often indistinct; with closely-packed, small, flattened granules. *Elytra* rather narrow, base feebly trisinate; with regular rows of rather large but partially-concealed punctures; alternate interstices feebly elevated. *Metasternum* and two basal segments of abdomen conjointly moderately concave. Front *coxæ* moderately separated; front tibiæ bisinate on lower surface, the apex acutely produced. Length, $4\frac{1}{2}-5\frac{1}{2}$ mm.

♀. Differs in the elytra being wider; basal segments of abdomen gently convex and with much shorter clothing; legs slightly shorter and front tibiæ less curved and less produced at apex.

Hab.—Tasmania: Stanley, under and at sides of stones, and on summit of "Nut" in tussocks of grass (A. M. Lea).

In some respects close to *piliventris*, but both sexes narrower, male with front tibiæ much less densely ciliated and otherwise different at apex, front coxæ closer together and scape considerably stouter, etc.; *humeralis* is a smaller and rougher species, with base of elytra different; *avenaceus* has very different front tibiæ; and *albonotatus* is wider, with the prothorax larger, and male with very different clothing on both surfaces.

Some specimens have the derm of the entire body black, with the tarsi of a rather bright red, and the funicle and club and base of scape more or less distinctly diluted with red. Others have the derm more or less reddish, sometimes of a rather pale reddish-brown, with all the appendages paler. The clothing is frequently prettily variegated, especially on the males. It is commonly more or less ochreous, with black or sooty or brown markings, on the elytra both colours may consist of more or less numerous spots, or either may prevail in large irregular blotches, but there are usually four pale distinct spots at the base. On old or dirty specimens the clothing becomes more or less of a muddy-grey or brown. The prothoracic granules on many specimens, and especially at the sides, are more or less transversely arranged, but on many others this arrangement is scarcely evident, and it is never very conspicuous.

MANDALOTUS PONDERICORNIS, n. sp.

Black, funicle club and tarsi reddish. Densely clothed with muddy-brown or grey scales; interspersed with numerous stout more or less curved setæ, varying from white to black.

Rostrum convex and with a strong but partially-concealed carina along middle. Scape very stout, except the basal third, which is moderately thin. First joint of funicle slightly longer than second, second about as long as third and fourth combined. *Prothorax* moderately transverse, sides strongly rounded; with numerous small granules, most of which are scarcely traceable through clothing. *Elytra* rather short and subcordate, shoulders strongly rounded, with regular rows of fairly large (but for the genus small) partially-concealed punctures; alternate interstices very feebly elevated. *Metasternum* and abdomen feebly convex. *Legs* rather stout. Length, $3\frac{1}{2}$ mm.

Hab.—Tasmania: Stanley, summit of "Nut" (A. M. Lea).

In my table and the additions thereto this species would come in with *crassicornis*, *herbivorus*, and *ammophilus*, from all of which it differs in being shorter and comparatively wider, with the scape even stouter. It is the first species

with very stout scape to be recorded from Tasmania; the specimen is probably a female, but as the females of the group are but little different to the males I have not hesitated to describe it.

On the under-surface the setæ are all pale and depressed, and they show up more conspicuously than most of those on the upper-surface, although the latter are longer. The first joint of the funicle is rather stout, and from some directions appears to be shorter than the second.

MANDALOTUS SQUAMIBUNDUS, n. sp.

Black or blackish-brown, appendages, and sometimes the under-surface, more or less reddish. Densely clothed with muddy-brown or grey scales. With numerous stout recurved setæ, regularly distributed, and on the elytra forming uniform lines on the interstices.

Rostrum apparently not carinated along middle. Scape moderately long and thin; first joint of funicle slightly longer than second, second distinctly longer than third. *Prothorax* moderately transverse, sides widest slightly in advance of the middle; with dense, concealed punctures. *Elytra* elongate-cordate, base distinctly wider than prothorax, and widest slightly before middle; with regular rows of large, quite-concealed punctures; interstices regular. *Abdomen* gently convex. *Legs* rather short; front coxæ almost touching; front tibiæ acutely produced at apex. Length, $2\frac{1}{2}$ -3 mm.

Hab.—Queensland: Port Denison (Macleay Museum).

In my table would come in with *maculatus* and *inusualis*, but with little resemblance to either, or in fact to any other species known to me. The clothing is somewhat as in *ammophilus*, but that species is considerably larger, with the scape very stout.

The clothing is so dense as to entirely conceal the derm; on abrasion the prothorax is seen to be without granules, but with very dense punctures, and the elytra to have regular rows of large punctures, with uniform and gently convex interstices. The ocular lobes are rather more prominent and lower than usual. There are five specimens before me, three of which have the abdomen slightly flatter than the others, and the elytra somewhat narrower, but the differences are not very pronounced, so that, quite possibly, they are all of one sex.

MANDALOTUS VALGUS, Pasc. (*Dysostines*).

A male co-type of this species (sent by the British Museum for examination) is before me; also another male from the Illawarra district.

The elytra has several feeble inequalities, and in my table (in Trans. Roy. Soc., S.A., 1907, p. 133) the species would be associated with *mirabilis*. It is in fact close to that species, but the middle coxæ are not concave internally, and each has a ridge extending from the middle, where it is subtuberculate, to the hind end; the clothing of the abdomen is also shorter and sparser.

MANDALOTUS FULIGINEUS, Pasc. (*Dysostines*).

(*M. carinativentris*, Lea.)

Three specimens of this species were sent by the British Museum for examination, one bearing a name label, and one marked as a co-type. All three are males, and have the abdomen carinated, a character not mentioned by Pascoe, but of primary importance in the genus. The specimens certainly belong to *M. carinativentris*.

Mr. Blackburn thought that *fuliginus* was probably a synonym of *sterilis*, and there is nothing in Pascoe's description to warrant exception being taken to that supposition, but if, as I presume, the two named specimens are correctly identified, then *fuliginus* is certainly not a synonym of *sterilis*, which has the abdomen simple in both sexes.

MANDALOTUS BLACKBURNI, Lea.

A British Museum male of this species is labelled as from Rockhampton (Queensland), but almost certainly in error; a female is labelled as from Tasmania, the type locality.

MANDALOTUS NIGER, Lea.

A British Museum male, labelled as from Queensland, probably belongs to this species, but its mesosternal process is quite rounded, instead of slightly produced. I should have been inclined to treat it as belonging to a distinct species, but as in all other respects it agrees perfectly with seven males of *niger*, it is best perhaps to regard it as an accidental variety.

SUBFAMILY AMYCTERIDES.

TALaurINUS DAMELI, Macl. (1865).

(*T. cariosus*, Pasc., 1873.)

The British Museum sent for examination four specimens of *Dameli*, one labelled as a co-type of *cariosus*. In the females of this species the shoulders are somewhat projecting (although not as in *Euomus*). Pascoe described the elytra as "without a trace of setæ." On all the specimens I have

seen, however, black depressed setæ are fairly numerous, but possibly the type was abraded. One of the Museum specimens is labelled "*Westwoodi*, Hope Coll.," but it certainly is not the *Westwoodi* of the Macleay Museum, nor does it agree with Macleay's quoted description of that species.

AMYCTERUS LEICHARDTI, Macl.

A British Museum male, labelled as from South-West Australia, has the elytral tubercles reddish, and this is probably their normal colour, as most of the males that I have seen have similar tubercles.

SUBFAMILY CYLINDRORHINIDES.

PERPERUS LANGUIDUS, Er.

The type of this species is before me. It has the first joint of the funicle longer than the second; a character which will distinguish it from most species of the genus, but in which it agrees with *costirostris* and *malevolens*. From both of these, however, it differs in the antennæ being much thinner, and the median carina of the rostrum obsolete instead of acute and sharply defined. It agrees perfectly, however, with a specimen identified by the Rev. T. Blackburn as *innocuus*, Boh.⁽²⁾ In general appearance it is very close to *Conloni*.

PERPERUS CERVINUS, Boh. (*Pantopæus*).

Three specimens before me from Sydney and Maitland (New South Wales)⁽³⁾ agree with both the generic and specific diagnoses of this species. Three others (from Bulli) have the derm entirely reddish and the pale latero-basal markings of the prothorax less conspicuous.

The second joint of the funicle is about one-fourth longer than the first. The prothorax has a narrowly-impressed median line, which, however, is not always traceable.

The species is quite an ordinary *Perperus*.

PERPERUS DELENS, Blackb. (*Centyres*).

Mr. Blackburn describes the two basal joints of the funicle as being subequal; this is the case, but the second is slightly longer than the first.

(2) Neither Erichson nor Boheman described the comparative lengths of the two basal joints of the funicle; a most important feature in *Perperus*.

(3) The only locality given by Boheman was New Holland.

PERPERUS LITORALIS, n. sp.

Black; antennæ, tibiæ, tarsi, and base of femora more or less red. Densely clothed with dark-brown scales more or less feebly variegated on upper-surface; with numerous setæ scattered about. Lower-surface with whitish scales, more or less setose in character.

Head with dense, normally-concealed punctures. *Ros-trum* stout, shorter than front tibiæ; median carina acute and quite distinct through normal clothing. *Antennæ* rather short and stout; first joint of funicle distinctly longer than second, and second than third, the others feebly transverse. *Prothorax* moderately transverse, sides evenly rounded, apex lightly but distinctly incurved to middle; with very dense and rather small partially-concealed punctures; without granules. *Scutellum* small but distinct. *Elytra* subovate, greatest width about once and one-half that of prothorax; with rows of comparatively small punctures in feeble striæ; interstices feebly convex, not alternately raised. Second segment of *abdomen* slightly shorter than first, but distinctly longer than third and fourth combined. Front tibiæ not denticulate below, but with a few stout setæ or short spines. Length, 5-6½ mm.

Hab.—Tasmania: Ulverstone, Hobart (A. M. Lea).

The female differs from the male in being larger, with elytra wider and punctures smaller and shorter legs.

In general appearance remarkably close to *malevolens*, but front tibiæ with several stout spines, instead of short teeth; the rostrum also is decidedly shorter and stouter. The Hobart specimens were obtained whilst searching for blind beetles at the roots of plants close to a sandy beach. The Ulverstone specimens were probably also taken close to a sea-beach.

The apical segment of abdomen and the apical portion of the elytral margins are sometimes diluted with red. On most specimens before me the clothing of the upper-surface is of a dark chocolate-brown, but on two others it is more or less grey. There is generally a feeble whitish spot close to each eye and another in the middle of the base of each elytron. The sides of the elytra are sometimes feebly spotted and there is generally a whitish stripe on each side of the prothorax, with sometimes a small spot in juxtaposition to the one on each elytron. The elytral setæ are more or less erect and many of them are white, but most of them are similar in colour to the scales. Each femur has generally a whitish ring, with sometimes a rather less distinct additional one.

PERPERUS VERMICULATUS, n. sp.

Black, antennæ almost black. Moderately densely clothed with more or less slaty-grey, feebly-variegated scales. With rather numerous setæ (varying from white to dark-brown) scattered about. Under-surface with whitish scales, thickly interspersed with fine whitish setæ.

Head with dense partially-concealed punctures. Rostrum comparatively thin; median carina traceable through clothing but not very distinct. Antennæ long and thin; second joint of funicle fully once and one-half the length of first, and slightly longer than third and fourth combined. *Prothorax* feebly (especially in male) transverse, sides strongly and evenly rounded, apex scarcely visibly incurved to middle; surface vermiculate; with a moderately distinct median line. *Scutellum* absent. *Elytra* subovate; at base (which is almost truncate) very little wider than base of prothorax; in male not much wider than prothorax at its widest, in female considerably wider; with series of large punctures in feeble striæ; interstices not alternately raised, and not (or scarcely) sinuous about the middle. Second segment of *abdomen* much shorter than first or fifth, and about once and one-half the length of third or fourth. Front *tibiæ* lightly denticulate below. Length, $7\frac{1}{2}$ - $9\frac{1}{2}$ mm.

Hab.—New South Wales: National Park (A. M. Lea), Burrawang (T. G. Sloane).

The female differs from the male in being larger, the prothorax less globular, elytra wider, with smaller punctures, the legs shorter and thinner and the antennæ slightly thinner.

The second joint of the funicle much longer than the first will readily distinguish the species from *melancholicus*, which in some respects it resembles. Of those having the second joint longest, it agrees in sculpture most with *cervinus*, but it is considerably larger and the prothorax without the conspicuous latero-basal markings of that species, although there appears to be feeble remnants of such markings.

The hind femora have each a distinct ring of whitish scales, usually with a golden or golden-green gloss, but on the other legs the rings are feeble or absent. Some of the scales on the under-surface (especially of the head) have also a metallic gloss. The prothorax is closely covered with small flattened interlacing ridges, each of which on abrasion is seen to have a row of small but distinct punctures.

Var. Two female specimens (also from the National Park) differ in being more densely clothed, with a large proportion of the scales, even on the upper-surface and rostrum, golden or golden with a rosy gloss. Their derm

also is more or less reddish. In all structural details, however, they agree with normal females.

SUBFAMILY GONIPTERIDES.

OXYOPS MINUSCULA, n. sp.

Castaneous. With dense clothing, varying from white to black, and from stout setæ to scales.

Head with normally quite-concealed punctures; interocular fovea rather large and partially concealed. Rostrum (excluding muzzle) scarcely longer than greatest width; apical portion wide, with small punctures becoming larger posteriorly; basal portion with sculpture entirely concealed, but apparently without a carina. Two basal joints of funicle subequal in length. *Prothorax* evenly convex, with evenly-rounded sides; with dense but more or less concealed punctures; median carina very feeble. *Elytra* elongate-cordate, sides parallel from shoulders to beyond the middle; with rows of large but partially-concealed punctures. Intercoxal process of *mesosternum* strongly produced but obtuse. *Tibiæ* rather short, and strongly, but not clearly, denticulate. Length, $4\frac{3}{4}$ -5 mm.

Hab.—North-West Australia: Murchison (C. French); Victoria: Birchip (J. C. Goudie).

Of very small size, but the mesosternum and eyes are quite as in normal species of *Oxyops*. The three specimens before me vary from rather bright to dark castaneous. The clothing is distinctly variegated, but consists mostly of stout setæ of a pale stramineous. On the prothorax three feeble pale lines can be traced; the scutellar clothing is snowy. On the elytra there is a feeble oblique stripe before the middle, the stripe composed mostly of snowy scales, and remnants of another stripe can be traced beyond the middle; the clothing between being brown or black; but small patches of dark clothing can be seen elsewhere on the elytra. Judging by one of the specimens fresh ones are covered with a brownish meal.

In size, and to a certain extent in appearance, like *simplex*, but the white fascia much less distinct, and of different shape, the eyes less convex but of normal appearance for *Oxyops*, and the mesosternum also normal. It is apparently allied to *arctatus*, but has the elytral clothing variegated.

SUBFAMILY CLEONIDES.

LIXUS IMPONDEROSUS, n. sp.

Black, claws red, funicle obscurely diluted with red. Upper-surface sparsely clothed with short white pubescence

except that in places it is condensed to form spots; under-surface with denser, longer, and more uniform pubescence.

Rostrum almost straight, about as long as front tibiae, with a faint longitudinal impression between insertion of antennae; in male with punctures concealed almost to apex, in female only towards base. First joint of funicle slightly longer than second. *Prothorax* lightly transverse, sides evenly rounded, apex about two-thirds the width of base; with dense and fairly large round punctures, the interspaces with numerous small punctures. *Elytra* parallel-sided to beyond the middle, scutellar region flattened; with rows of fairly large, suboblong, deep punctures, becoming smaller posteriorly; interstices with minute and not very dense punctures, becoming rather stronger towards base, third feebly raised at base, and in common with all the base with small granules. *Tibiae* very feebly denticulate on lower surface. Length, $6\frac{1}{3}$ - $6\frac{2}{3}$ mm.

Hab.—New South Wales: Windsor (A. M. Lea).

At first sight the five specimens before me appear to be small ones of *Mastersi*; but the rostrum measured from the lower edge of the eye to its tip is scarcely if at all shorter than the front tibiae; whilst in *Mastersi* it is very decidedly shorter. Comparing the species together the difference is at once apparent. *Copiosus* has a still stouter rostrum. *Tasmanicus* (a much larger species) has the rostrum longer and the joints of the funicle different. *Albilineatus* is larger, with narrower eyes and very different clothing; whilst *immundus* (or, at any rate, the species I have so named) has the sides of the prothorax impunctate. *Terminalis* is much more narrowed at both ends.

The prothorax is very sparsely clothed, except at the sides, where the pubescence is much as on the under-surface. On the elytra there are numerous feebly-defined spots, giving them a somewhat mottled appearance.

SUBFAMILY HYLOBIIDES.

PÆPALOSOMUS DEALBATUS, Boi.

This species was recorded by Pascoe from many parts of the Malay Archipelago.⁽⁴⁾ It was originally described as a species of *Alcides*,⁽⁵⁾ and it certainly *looks* like a member of that genus. When living the specimens of it are more or less densely covered with a substance resembling powdered chalk, irregularly distributed over the surface and entirely concealing the derm in places. I have received from the Genoa

(4) Jour. Linn. Soc., xi., 1873, p. 168.

(5) Boi. Voy. Ast., ii., p. 425.

Museum one of the specimens of the species taken by Beccari at Aru, and it agrees exactly with several specimens from North Queensland⁽⁶⁾ in my collection.

Both genus⁽⁷⁾ and species are now first recorded as Australian.

SUBFAMILY ERIRHINIDES.

MISOPHRICE.

This genus hitherto has been unrecorded from Queensland, a gap I am now happy to fill by the record of three species taken at Dalby on Casuarinas by Mrs. F. H. Hobler. Of these one is represented by two abraded specimens, that appear to belong to *setulosa*, whilst the others are new, and together with two others that have been recently obtained, are described hereunder.

MISOPHRICE HOBLERI, n. sp.

Black, scape and basal joint of funicle reddish. Densely clothed with black and green, or golden green, or silvery green scales. Elytra with long suberect blackish hairs, prothorax and head with much shorter hairs or setæ.

Rostrum thin, moderately curved, about as long as prothorax and finely carinated towards base. Scape thin but apex somewhat inflated; first joint of funicle about as long as three following combined. *Prothorax* moderately transverse, sides strongly and evenly rounded; with rather coarse, partially-concealed punctures. *Elytra* at base distinctly wider than prothorax, shoulders square, sides parallel to rear apex; with regular rows of large, suboblong, partially-concealed punctures. *Legs* rather long; front coxæ almost touching. Length, $2-2\frac{1}{6}$ mm.

Hab.—Queensland: Dalby (Mrs. F. H. Hobler).

A beautiful species with outlines as in many species of *Cydmæa*. The long fine hairs on the elytra are very different to the stout conspicuous setæ of *hispidæ*.

On the under-surface the scales are rather longer, paler, and more uniform than on the upper, where the paler ones vary from silvery- to golden-green, and occasionally (as also on the legs) are of a fiery-golden colour; they cover a greater space than the black ones; these on the prothorax are almost confined to a fairly wide median space; on each elytron they are in two large blotches (scarcely fasciæ), one at about basal third, the other about apical third, the subapical one being occasionally continued almost to apex, and feebly connected

(6) Mulgrave River, Cairns and Kuranda.

(7) Schoenherr, *Mantissa Secunda*, 1847, p. 69.

with the sub-basal one along (but not actually on) the suture. The rostrum, except at its extreme base, is glabrous.

MISOPHRICE CRISTATIFRONS, n. sp.

Dull-red, club and most of funicle infusate. Densely clothed with greyish or dingy-whitish scales, and with two small fascicles or longitudinal crests between eyes. With short recurved setæ.

Rostrum moderately thin, lightly curved, about as long as prothorax, basal half rather strongly carinated. Scape thin and comparatively short, first joint of funicle about as long as three following combined. *Prothorax* moderately transverse, sides feebly rounded and gently diminishing from near base to apex; with dense, almost entirely-concealed punctures. *Elytra* very little wider than prothorax, parallel-sided to near apex; with regular rows of large, partially-concealed punctures. *Legs* stout; front coxæ lightly but distinctly separated. Length, $2\frac{1}{4}$ - $2\frac{1}{2}$ mm.

Hab.—Queensland: Dalby (Mrs. F. H. Hobler).

Closer to *squamibunda* than to any other species known to me, but larger, front coxæ more noticeably separated, and head conspicuously crested between eyes.

On the upper-surface, both of the body and legs, the scales are entirely without gloss, whilst on the lower surface of the legs they sometimes have a silvery lustre, and on the abdomen they have a beautiful purplish, or golden, or green gloss. The fascicles on the head are probably supported on tubercular swellings. The elytra appear to be conspicuously striated, but this is due more to the partial absence of scales along the lines of punctures than to regular striæ.

MISOPHRICE ORTHORRHINA, n. sp.

Dull-red, parts of under-surface almost black. Densely clothed with somewhat ochreous scales, variegated with brown, and becoming somewhat golden on under-surface and legs.

Head comparatively large. *Rostrum* straight, rather stout, slightly shorter than prothorax; apical half with small punctures. *Antennæ* rather stouter than usual; first joint of funicle about as long as three following combined. *Prothorax* rather lightly transverse, sides moderately rounded, base distinctly wider than apex; punctures normally concealed. *Elytra* distinctly wider than prothorax, shoulders rounded, sides parallel to about apical fourth; with regular rows of large, partially-concealed punctures. *Legs* moderately stout; front coxæ lightly separated. Length, 3 mm.

Hab.—New South Wales: Gosford (H. J. Carter).

With the very dense clothing of *squamiventris*, although on a different pattern, but the rostrum straight, and shorter and thicker (unusually so for the genus). *Squamosa*, described as having the rostrum *nearly* straight (it is *quite* straight in the present species), is larger, with clothing very different, colour different, rostrum 5-carinate (this character is probably confined to the male, however), and elytra narrowed from base to apex.

The clothing on the upper-surface is mostly without gloss, but towards the sides is faintly glossed, whilst on the under-surface, head, and basal third of rostrum, it is shining and almost golden. The dark mottlings on the type, and only specimen examined, consist of an irregular median blotch on the prothorax, and several very irregular patches on the elytra, of which the most conspicuous one extends from the basal fifth obliquely to the suture at its middle, but they are probably very variable. Erect or suberect setæ are entirely absent from the upper-surface.

MISOPHRICE CARTERI, n. sp.

Black or blackish-brown, elytra (base, suture, and an elongated spot on fifth interstice posteriorly excepted), legs (tarsi excepted), scape, and basal joint of funicle of a dingy-reddish flavous. Rather sparsely clothed with thin, pale, greenish scales, or setæ.

Rostrum long, thin, and strongly curved, distinctly longer than prothorax, with rows of coarse punctures towards base, but elsewhere almost or quite impunctate. Antennæ thin, first joint of funicle as long as three following combined. *Prothorax* moderately transverse, sides strongly rounded, base distinctly wider than apex; with fairly dense punctures of moderate size. *Elytra* at base slightly wider than widest part of prothorax, sides feebly dilated to beyond the middle, and then evenly rounded with regular rows of fairly large punctures in feeble striæ; interstices with small punctures. *Legs* moderately stout; front coxæ almost touching. Length, 2 mm.

Hab.—New South Wales: Gosford (H. J. Carter).

The black shining rostrum with blackish prothorax will distinguish from *vitiata*; *variabilis* is considerably larger, with shorter and paler rostrum; *apionoides*, *spilota*, *inflata*, *vicina*, and *amphicollis* have paler rostrum and prothorax, and are besides not of the same shape. The outlines of the elytra are as in *spilota*, but the prothorax is much less attenuated in front.

The clothing on the types may possibly be somewhat abraded, but the species belongs to a group on which the

scales are seldom very dense. The abdomen is obscurely diluted with red towards the base.

A specimen from Sydney appears to represent a variety. It has the apex of the prothorax somewhat diluted with red, the elytra with the basal markings continued as to the shoulders, the postmedian longer and feebly connected with the suture; and the clothing rather dense, although still sparse.

THECHIA ALTERNATA, n. sp.

Brownish-red, parts of under-surface darker, antennæ and tarsi paler. Very densely clothed, even on the rostrum almost to its tip, with dingy-greyish, more or less feebly variegated, scales; becoming whitish on under-surface. With fairly numerous, strongly recurved setæ on the upper-surface and legs.

Rostrum moderately stout, lightly curved, about as long as prothorax; with dense punctures entirely covered by scales except at tip. Antennæ rather long and thin, first joint of funicle about as long as second and third combined. *Prothorax* about as long as wide, sides moderately and evenly rounded, base not much wider than apex; with dense, coarse punctures, partially traceable through but entirely covered by clothing. *Elytra* distinctly wider than prothorax, parallel-sided to near apex; with regular rows of large, deep, partially-concealed punctures; alternate interstices moderately raised. *Under-surface* with dense and coarse, but more or less concealed punctures. *Legs* rather stout. Length, 3 mm.

Hab.—Darnley Island (H. Elgner).

The clawless tarsi and seven-jointed funicle are indicative of *Thechia*, from the only previously known species of which (*pygmæa*) it differs in being much larger, elytra densely clothed and with alternate interstices raised; with numerous curious setæ amongst the scales, etc.

The clothing is so dense that the punctures are quite covered, although usually traceable. The setæ are of a most unusual type, being so strongly recurved that the tips are usually concealed amongst the scales, and in consequence they appear decidedly Ω -shaped.

Each elytron at base appears at first to be separately rounded, but at about its middle there is a slight incurvature, so that the space between the shoulders might fairly be regarded as trisinate.

THECHIA CINERASCENS, n. sp.

Of a dingy-brownish red. Densely clothed with mouse-coloured or muddy-grey scales, becoming somewhat paler

towards sides, and on under-surface and legs; rostrum clothed almost to tip; scutellum, shoulders, and a median prothoracic line, with whitish scales. With a few short, recurved setæ scattered about.

Rostrum moderately stout, rather lightly curved, about as long as prothorax; with dense punctures, more or less concealed except towards apex. *Antennæ* not very thin, first joint of funicle about as long as second and third combined. *Prothorax* rather lightly transverse, sides strongly and evenly rounded, base not much wider than apex; with dense normally-concealed punctures. *Elytra* distinctly wider than prothorax, shoulders gently rounded, sides parallel to just beyond the middle, and thence coarctate to apex, which is distinctly notched; with regular rows of fairly large, but normally almost concealed punctures. *Under-surface* with dense, but normally-concealed punctures. *Legs* rather stout. Length, 3 mm.

Hab.—Tasmania: New Norfolk, in a grass tussock (A. M. Lea).

Distinguished from *pygmæa* by its larger size, somewhat different shape, and much denser clothing; from the preceding species in being narrower and more fusiform, elytra distinctly notched at apex and with the interstices not alternately raised, the setæ much sparser and less conspicuous, and the antennæ darker.

SUBFAMILY TYCHIIDES.⁽⁸⁾

The *Tychiides* are numerous represented in Australia, although hitherto but few species have been referred to the subfamily. Only four genera and an equal number of species being noted in Masters' Catalogue, and of these two, *Ochrophæbe*⁽⁹⁾ and *Orichora*⁽¹⁰⁾ are wrongly placed there.

The species have a strong general resemblance to the *Erirehinides*, practically the only character separating them

⁽⁸⁾ The notes on this subfamily were prepared for inclusion with the species described in these Transactions for 1908, pp. 239-251, but were overlooked at the time.

⁽⁹⁾ *Ochrophæbe* was compared by Pascoe with *Sibinia* and *Derelomus*, but without being assigned to a definite position; but as its claws were described as simple, it evidently does not belong to the *Tychiides*.

⁽¹⁰⁾ *Orichora* was expressly referred to the *Erirehinides*, and its claws were described as simple. The mistake as to its location in Masters' Catalogue probably arose from the typical species being said to resemble a *Tychius*.

therefrom being the appendiculate claws.⁽¹¹⁾ The supplementary piece to each claw varies considerably, in some being blunt and basal, in others acute and basal, whilst in others it is so much like the claw itself that each tarsus appears to be terminated by four almost equal claws, and there are numerous intermediate stages. It is often difficult or impossible to see it under a hand lens, and so much manipulation is needed to see it clearly under the microscope, that it is a character that in the present early stage of our knowledge of the subfamily should not be too much relied upon.

The genera known to me from Australia may be tabulated as follows:—

Femora dentate (the dentation, however, sometimes very feeble)	... ..	<i>Elleschodes</i>
Femora edentate.		
Eyes finely faceted	... ..	<i>Hibberticola</i>
Eyes coarsely faceted.		
Tibiæ distorted in male	... ..	<i>Sellechus</i>
Tibiæ not distorted in male	... ..	<i>Elleschus</i>

SUBFAMILY BELIDES.

PACHYURA PYRIATRA, n. sp.

Black; sides of elytra and appendages (two apical joints of tarsi excepted) reddish. Upper-surface rather sparsely and irregularly clothed with whitish pubescence. Under-surface with dense whitish pubescence, denser on sides of sterna than elsewhere, but each abdominal segment with a nude spot on each side.

Head shorter than prothorax; with dense, and in places partially-concealed, punctures. Rostrum stout, wide, the length of head; basal two-fifths with rather coarse, partially-concealed punctures, and a feeble median carina; elsewhere polished and lightly punctate; rather suddenly narrowed beyond antennæ, and then inflated towards apex. Antennæ long and thin, two basal joints moderately stout, first slightly shorter than third. *Prothorax* about as long as wide, disc regularly convex, base strongly bisinuate; punctate-granulate throughout. *Scutellum* strongly transverse. *Elytra* considerably wider than prothorax, shoulders strongly rounded, sides very feebly dilated posteriorly, conjointly rounded at apex, each separately strongly rounded at base; punctate-granulate throughout. *Legs* rather long; femora edentate, posterior passing apex of second abdominal segment; front tibiæ

(11) As the supplementary pieces are often so hard to detect it seems a reasonable supposition that some of our genera have been referred in error to the *Eriirrhinides*.

feebly, the others very feebly, denticulate below; claw joint of normal length. Length, $6\frac{1}{2}$ mm.

Hab.—New South Wales; Sydney.

The reddish part of the elytra commences on each shoulder, is rather wide to the basal third, then strongly narrowed so as to become purely marginal, but is again dilated and is continuous across apex; the black portion in consequence is somewhat pear-shaped. On the two specimens before me (in each of which the terminal joint of the antennæ is missing) the clothing on the head close to each eye and on each side of the base is fairly dense, on the prothorax it forms a rather feeble median line, and on the elytra it is distributed in feeble spots. The scutellum is densely clothed.

The rostrum, although somewhat like that of *fasciata*, is longer, less polished towards the apex, and not narrowly convex at its middle, the claw joint is longer, and it differs in other details of sculpture and clothing. From *minima* it differs in being longer, but no wider, with longer antennæ and very different clothing on the upper-surface.

PACHYURA VESTITA, Pasc.

Specimens of this species are considerably altered in general appearance by alcohol and abrasion, but the species may be readily identified by the large and granulated tubercles near the base of the elytra; it is the only described Australian species of the subfamily in which such tubercles are present.

SUBFAMILY COSSONIDES.

XENOCNEMA.⁽¹²⁾

This genus is readily distinguished from all others known to me by the structure of the elytra.⁽¹³⁾ Hitherto it has been known only from the typical species, *X. spinipes*⁽¹⁴⁾ of New Zealand. Recently, however, Mr. C. French, jun., has sent me several specimens of a species of the genus, taken in Melbourne in cedar and kauri logs from Queensland. As I was acquainted with the female only of *spinipes*, I sent sexes of the Queensland species to Major Broun, asking for his opinion; this he kindly gave me, together with a male of

(12) Wollaston, Trans. Ent. Soc., Lond., 1873, p. 499 and p. 587.

(13) These have each interstice between the striæ in two fine parallel costæ. The rostrum of the male is also of enormous width, and is tipped with very strong mandibles.

(14) Wollaston, *loc. cit.*, p. 648; a photo-micrograph given by Major Broun (Trans. N.Z. Inst., vol. xli., plate xvi., fig. 15) will enable the species to be readily identified.

spinipes. He pointed out several slight differences between the two forms, and these, with a few others that are here noted, may be regarded as denoting the Queensland species as worthy of varietal rank.

XENOCNEMA SPINIPES, Woll., var. AUSTRALIÆ, n. var.

♂. Differs from male of *spinipes* in having the rostrum more convex, shinier, with distinctly smaller punctures, and the apical fovea more distinct. The prothoracic punctures are also rather smaller. Length, $3\frac{1}{2}$ -5 mm.

♀. Punctures of head, rostrum, and prothorax somewhat smaller.

Hab.—Queensland (C. French, jun.); Kuranda (H. Hacker).

NOTES ON SOME SPECIES OF THE ISOPOD FAMILY
SPHÆROMIDÆ FROM SOUTHERN AUSTRALIAN SEAS.
PART III.

By W. H. BAKER, F.L.S.

[Read October 12, 1911.]

PLATES XXII. AND XXIII.

The present paper deals with only two species, but these are of more than ordinary interest. The first, though here given as a distinct species, may, however, as a variety be useful in elucidating the very attractive genus *Amphoroidea*. The other, besides belonging to the division *Platybranchiata*, presents some unique features of its own.

Family SPHÆROMIDÆ.

Subfamily SPHÆROMINÆ.

Group EUBRANCHIATÆ.

Genus *Amphoroidea*.

Amphoroidea elegans, n. sp. Pl. xxii.

The body is broadly ovate with the epimera spread out laterally. The dorsal surface is very obscurely tuberculate medianly, glabrous, and covered with minute dots. The colour in nature is green, being found among green seaweed.

The head is only a little broader than long, trilobed anteriorly. The eyes are lateral, situated in little angles just anterior to the postero-lateral angles of the head.

The antero-lateral angles of the first thoracic segment reach to the level of the eyes, leaving the anterior portion of the head free. The remaining thoracic segments do not differ much from each other in length.

The anterior portion of the abdomen has a well-marked first segment not showing lateral expansions; the following segment is marked by two sutural lines on each side and has large epimeral expansions a little produced backwards. The posterior portion of the abdomen is domelike, with slightly incurved sides and a shallow lunate posterior notch.

The lamellar expansions of the first antennular joints are rather short and slightly excavate above. There is a very narrow lenticular hiatus between each contiguous margin. The flagellum has 13 joints.

The antennal flagellum has 20 joints, gradually increasing in length, the whole reaching to near the posterior angle of the third thoracic segment.

The epistome is large, with a small median anterior projection.

The mandibles are rather slender with large palps, incisory processes strongly dentate, spine row and secondary plate of left mandible obscure, molar process small, but projecting as far as the incisory process.

Maxillipeds narrow, with lobes of palps small and the fringes of these scanty.

First gnathopods the smallest of the legs, joints very sparingly spined; dactyli small.

Second gnathopods the longest of the legs and not differing much in robustness from those which follow, the second, third, fourth, and fifth joints not differing much in length and covered on their sides, presented inwards with dense, very fine hair; there is also a little tuft of similar hairs near the distal end of the first joint; dactyli small, each with two very small claws; spines are absent.

The third pair of legs are longer than those which follow and little less robust, also strongly ciliated. In the four following pairs the joints are flattened on their surfaces, presented inwards, and are densely furred; the dactyli are short with large curved terminal claws, each showing a somewhat subchelate arrangement with the subterminal claw.

Sternal filaments short, stout, and partially cylindrical.

The uropods are broadly lamellar extending considerably beyond the end of the abdomen, especially the outer rami, the shape of which is irregularly acuminate; the inner rami are truncate.

One male specimen from Victor Harbour.

I have specimens of an *Amphoroidea* from Tasmania which agree well with M. Edwards' figure of *A. typa*, except that the posterior notch is lunate as in the present species. They, however, differ from it in having a narrower body, in having the basal antennular joints larger and more projecting, their combined anterior margins being more arcuate, with the inner margins nearly parallel, in the legs being destitute of fur, in there being a greater distinction in size between the first three pairs of legs and the following ones, and in the uropods being somewhat slenderer. There are four females, none of which show signs of brood.

Group PLATYBRANCHIATÆ.

Genus *Paracassidina*, n. gen.

Paracassidina pectinata, n. sp. Pl. xxiii.

The body is ovate, smooth, moderately convex, with epimera spread outwards, bearing a margin fringe which is short, dense, and with a few longer hairs projecting.

The epistome projects anteriorly as an ovate plate strengthened above by a keel, whose base is in close contact with a short truncate rostral projection, bearing a small swelling on each side.

The head is short, extended laterally to obtuse points; the eyes are prominent and large.

The first thoracic segment is medianly short with its epimeral regions reaching a little anterior to the eyes. The rest of the segments are short and differ little from one another.

The anterior portion of the abdomen shows two segments with an anterior one almost completely covered by the last segment of thorax. The posterior portion is domeshaped, the end being rounded without notch or channel.

The basal antennular joint is trilobed, the anterior lobe is laminate, a little curved outwards, and reaches much beyond the epistomial projection, it has a superior thickening; the median lobe is not laminate, but shorter and narrow, also thickened above, and has near its end on the inner side an opaque swelling like a gland; the lobe is apparently hollow; the posterior lobe is small and laminate. The second joint is slightly expanded, with its antero-distal angle a little produced, the third joint is narrow, the flagellum short with 5 or 6 joints.

The antennal peduncle is of ordinary kind; its flagellum carries 12 joints, which reach as far as the fourth thoracic segment.

The mandibles are small and short with incisory plate, secondary plate, spine row, and molar not much projecting; the palp is long and slender.

The first and second pairs of maxillæ are short and of the usual type.

In the maxillipeds the plate of the second joint is rather short with a distal crowd of short setæ. The palp is large; the third joint is as long as the second, its lobe is proximal, so that a wide gap exists between it and that of the penultimate joint: this joint is short with a long lobe, which is longer and larger than the terminal joint and is situated close to it, so that the setæ of both intermingle.

The first gnathopod is a peculiar prehensile apparatus. The basis, which is nearly as long as the succeeding joints taken together, is slender and a little curved outwards, the merus has its "heel" prolonged, reaching as far as the end of the propodus, where it carries about 10 long, curved, stiff setæ; the propodus also reaches beyond the insertion of the dactylus, this part being thickened and carrying about 6 similar setæ; the dactylus is long and slender.

The second gnathopod is of the usual kind; a rather short curved basis is stout compared with the succeeding joints; the ischium is long and the following joints short and subequal; the dactylus is short and stout with single claw.

The remaining legs are similar, with long ischium joints rendering the succeeding ones very short; the basal joints are robust and little pads are found at their distal ends, as also at the ends of the three following joints; the legs are sparingly hairy with few spines.

In the first pleopods, which are the smallest, the endopod is oblong and about twice as long as broad; the fringes of both rami are very long.

The second pleopods are larger than the first, the fringes are long, and the *appendix* is broad and exceeds the length of the inner ramus.

The third pleopods are fringed, the exopod has a division not very near the end, and there is a slight insinuation on the inner margin.

The fourth pleopod is composed of two ovate thin plates without fringes.

In the fifth pleopods the exopod is nearly twice as long as broad, with three lobes one above the other on the inner margin, as in *Chitonopsis*; there is a faint indication of a division near the end.

The uropods are lamellar, rather narrow, the inner ramus reaches to the end of the abdomen, the outer ramus is a small plate filling a cleft in the side of the uropod.

The female is similar to the male, except that the middle lobe of the first antennular joint is absent and the anterior lobe is smaller; the flagellum has 3 joints; the antenna also is slenderer; the prolongation of the epistome is shorter.

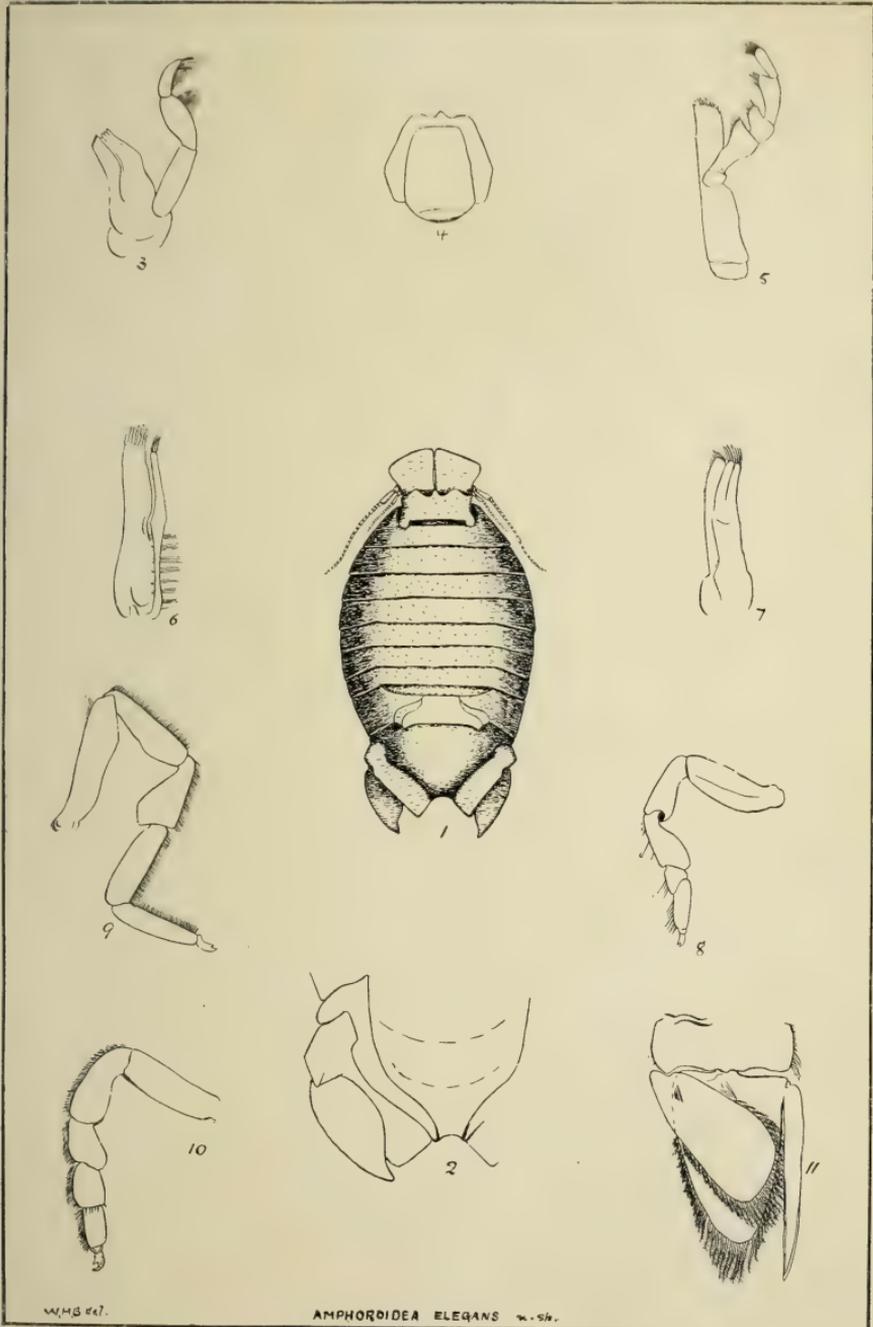
One male and one female without visible brood.

Dredged by Drs. Verco and Torr, Geographe Bay, Western Australia, in 16 to 20 fathoms.

DESCRIPTION OF PLATES.

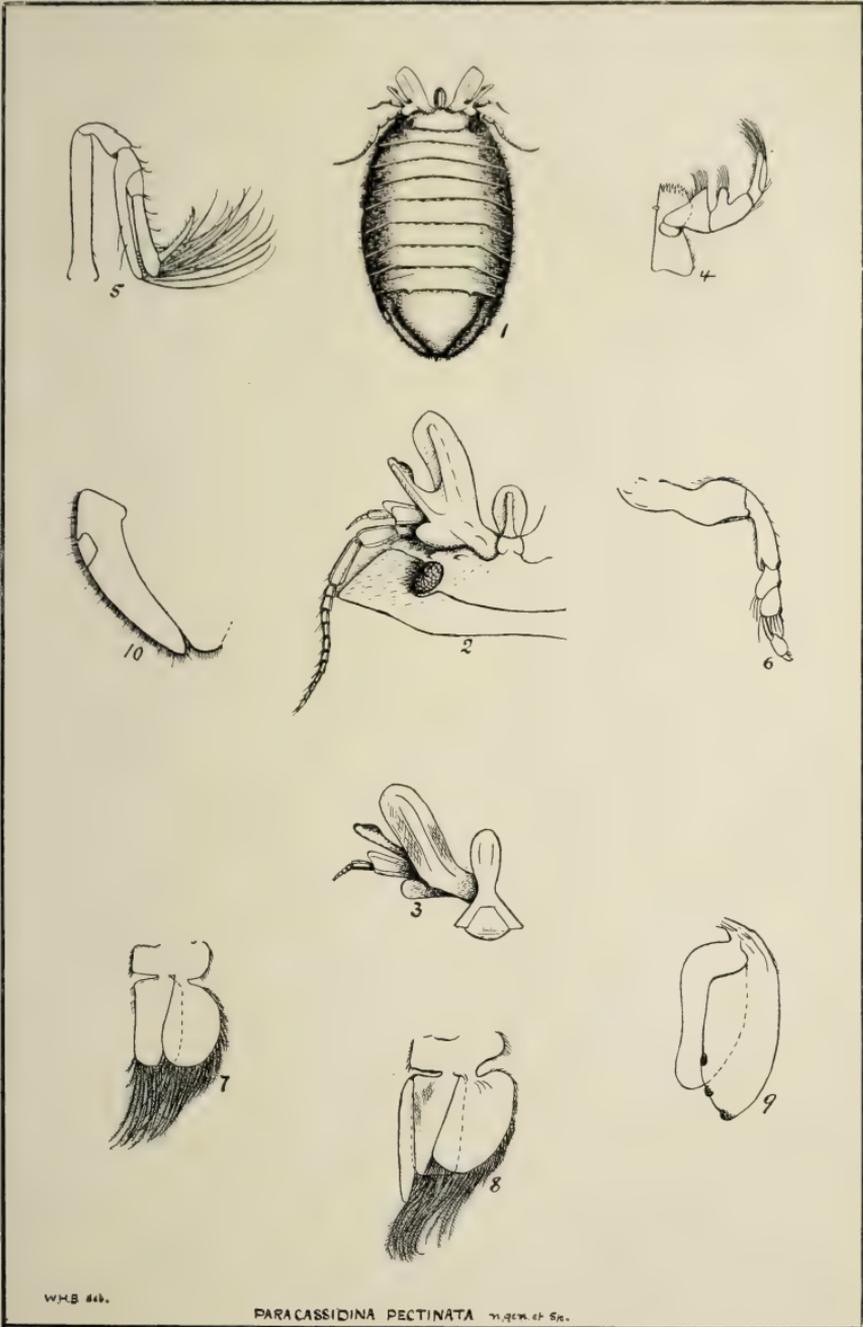
PLATE XXII.

- Fig. 1. *Amphoroidea elegans*, n. sp., magnified $2\frac{1}{2}$ diameters.
 ,, 2. ,, ,, posterior portion of abdomen from
 the underside.
 ,, 3. ,, ,, mandible.
 ,, 4. ,, ,, epistome.
 ,, 5. ,, ,, maxilliped.



W.M.B. del.

AMPHORIDEA ELEGANS n. sp.



W.M.B. del.

PARACASSIDINA PECTINATA n. gen. et sp.

- Fig. 6. *Amphoroidea elegans*, first maxilla.
 " 7. " " second maxilla.
 " 8. " " first gnathopod.
 " 9. " " second gnathopod.
 " 10. " " seventh leg.
 " 11. " " second pleopod of male.

PLATE XXIII.

- Fig. 1. *Paracassidina pectinata*, n. gen. et sp., magnified 6 diameters.
 " 2. " " anterior region from above.
 " 3. " " antennule and epistome from below.
 " 4. " " maxilliped.
 " 5. " " first gnathopod.
 " 6. " " second gnathopod.
 " 7. " " first pleopod.
 " 8. " " second pleopod, male.
 " 9. " " fifth pleopod.
 " 10. " " uropod.
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WESTERN AUSTRALIAN POLYPLACOPHORA.

By W. G. TORR, M.A., B.C.L. (Oxon.), LL.D.
(Dublin and Adelaide).

[Read October 12, 1911.]

PLATES XXIV. AND XXV.

In the September, 1910, number of the Proceedings of the Malacological Society of London, vol. ix., part 3, p. 153, Mr. Tom Iredale has some "Notes on Polyplacophora, chiefly Australian." On p. 159, Mr. Iredale says: "I conclude that the chiton fauna of Western Australia will be of a most interesting nature."

Through the courtesy of Dr. J. C. Verco, the President of the Royal Society of South Australia, I was able during the Christmas vacation of 1910-11 to make a fairly thorough exploration of the south coast of Western Australia from Esperance to Albany, and the west coast as far north as Fremantle.

The places visited were Esperance, Hopetoun, Albany, Ellenbrook and Yallingup (south of Cape Naturaliste), Geographe Bay, Rottnest Island, and Fremantle Harbour. With the assistance of Mr. Hedley, conchologist (of the Australian Museum, Sydney), and Mr. Basset Hull, of Sydney, I have been able to identify twenty-three species of Western Australian polyplacophora similar to South Australian species and nine others, seven of which I take to be new.

As Mr. Iredale suggests in the paper mentioned, the list contains representatives of the Adelaidean region. At least fifteen of the identified species are found in his Adelaidean list, one is classified as Solanderian, two are in the Peronian, and three are in the "Doubtful Position" list. The seven new species will probably represent the Autochthonian element to which Mr. Iredale refers.

The small rise and fall of the tides (not more than 2 or 3 ft.) on the visited parts of the Western Australian coast make chiton hunting much more precarious than in South Australian waters. While a large number of South Australian chitons are found in Western Australia, yet there are some striking differences.

I have traced *Plaxiphora albida*, Blain, locally known as *P. petholata*, Sby., all round the South Australian coast from MacDonnell Bay to Murat Bay, a distance of nearly a

thousand miles of coastline, but going out from Murat Bay to St. Francis Island (Nuyts Archipelago), a distance of 40 miles, *Plaxiphora costata*, Blain, formerly known as *P. glauca*, Q. et G., takes the place of *P. albida*, and specimens of *P. costata* were found in Western Australian waters. *P. albida*, Blain., is generally found on or above high-water mark in South Australia, but on the Western Australian coast its place is taken by *Liolophura georgiana*, Q. et G. These could be frequently seen on exposed rocks. The order of exposure in South Australian waters, *mutatis mutandis*, is *P. albida*, on exposed rocks at or near high-water mark; *I. crispus*, in abundance everywhere, in sheltered pools, a foot or two below, with *Acanthochites* on sandy moss-covered rocks. In deeper pools, *I. contractus*, *I. cariosus*, *I. ustulatus*, *I. smaragdinus*, and other *Ischnochitonida*, and deeper still in 2 or 3 ft. of water at low tide, the true chitons, *jugosus*, *tricostalis*, *exoptandus*, and *calliozona*. On the west side of St. Vincent's Gulf I have found the true chitons on exposed rocks in shallow pools.

The order in which Western Australian chitons are found is *Liolophura georgiana*, near or above high-water mark (*P. albida* and *I. crispus* are missing), and on account of the small fall of the tides *Chitons*, *Callochitons*, and *Ischnochitons* may be found together. The *Ischnochitonida* favour shallow pools, while the true chitons prefer the ocean surf.

Chiton torrianus was found in Western Australia on the under-side of wholly exposed rocks. This chiton, formerly misnamed *coxi*, was separated by Hedley and Hull as *C. torri*, afterwards altered to *torrianus*. It was rarely found in South Australian waters till Mr. Walter Klem, of Corney Point, Yorke Peninsula, discovered a number. In Western Australia it was found in almost every place visited.

It is hoped that this first paper on Western Australian Polyplacophora may do something to stimulate and help future beginners at chiton-hunting in Western Australia.

My acknowledgments are due to Mr. W. T. Bednall, whose excellent paper on South Australian Polyplacophora, Proc. Mal. Soc., London, vol. ii., part iv., April, 1897, has been the foundation of much of my work, and to whose paper I have had frequently to refer; also to Mr. M. M. Maughan, B.A., for his kindly revision of my paper and his assistance in examining my new species and verifying some of my descriptions.

1. CALLOCHITON PLATESSA, Gould, 1846.

Chiton platessa, Gould, Proc. Bost. Soc., N.H. II., 1846, p. 143; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 49.

Three specimens collected. It is common in New South Wales, rare in the Adelaidean and Western Australian regions. Specimens obtained at Rabbit Island (Albany), Ellenbrook, and Rottnest Island. Colour markings resemble New South Wales species. Dark-red with splashes of orange and olive-green. About 20 valves of a bright-pink colour, picked up at Ellenbrook, were evidently bleached specimens of *platessa*.

2. ISCHNOCHITON (STENOCHITON) JULOIDES, Ad. and Ang., 1864.

Stenochiton juloides, Ad. and Ang., Proc. Zool. Soc., 1864, p. 193; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 55.

Two anterior valves and one median valve of this very slippery chiton were collected in shell-sand at Albany.

3. ISCHNOCHITON CARIOSUS, Carpenter, 1873.

Heterozona cariosa, Carpenter, MS.; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 65.

Numbers of these were found at Rottnest Island, Albany, Hopetoun, Yallingup, and Ellenbrook (south of Cape Naturaliste). The Western Australian specimens are much less coated with serpularia, etc., than the South Australian species.

4. ISCHNOCHITON USTULATUS, Reeve, 1847.

Chiton ustulatus, Reeve, Conch. Icon., sp. 102; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 96.

Several specimens were taken on the west coast at Rottnest Island and Yallingup. None were found on the south coast. This chiton travels easily. One collector reports finding them in abundance at one spot in South Australia, but they had all vanished a few days later.

5. ISCHNOCHITON CRISPUS, Reeve, 1847.

Chiton crispus, Reeve, Conch. Icon., sp. 120; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 89.

Ischnochiton Haddoni, Pilsbry, Man. Conch., ser. i., vol. xiv., p. 88.

The specimens classified as *I. crispus* are either so small or in such bad condition that I have hesitated in allowing *crispus* to appear at all. They were found only in the places examined nearest to the South Australian border, Esperance and Hopetoun. It is interesting to find that a chiton so common in South Australia and Victoria should be so rare in Western Australia. The specimens found closely resemble our South Australian *I. variegatus*, which is probably only a variety of *I. crispus*.

6. ISCHNOCHITON CONTRACTUS, Reeve.

Chiton contractus, Reeve, Conch. Icon., sp. 78; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 93.

Chiton pallidus, Reeve, Conch. Icon., sp. 92; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 89.

Fairly common in sheltered pools on the south coast. I have specimens from Hopetoun and Albany.

7. ISCHNOCHITON DECUSSATUS, Reeve, 1847.

Chiton decussatus, Reeve, Conch. Icon., sp. 107; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 93.

Chiton castus, Reeve, Conch. Icon., sp. 145.

Lepidopleurus speciosus, H. Adams and Angas, Proc. Zool. Soc., 1864, p. 192.

Two specimens were taken from buoys between Fremantle and Rottnest Island. Through the courtesy of the harbour-master we were permitted to be present at the lifting and cleaning of the buoys. *I. decussatus* is frequently found attached to such shells as *Pinna inermis*, Tate.

8. ISCHNOCHITON PTYCHIUS, Pilsbry.

Ischnochiton ptychius, Pilsbry, Nautilus, vol. viii., p. 53.

Ischnochiton ptychius, Bednall, Proc. Mal. Soc., vol. ii., part 4, April, 1897.

One specimen of this rare chiton was taken from the anchor of a buoy between Fremantle and Rottnest Island.

9. ISCHNOCHITON VIRGATUS, Reeve.

Chiton virgatus, Reeve, Conch. Icon., sp. 192; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 78.

Several specimens were found at the Quarantine Station, Albany. Some of my specimens are of a creamy-white, which may possibly need to be placed under a new species.

10. ISCHNOCHITON THOMASI, Bednall, 1896.

Ischnochiton Thomasi, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897.

One diminutive specimen was dredged from 20 fathoms in Geographe Bay.

11. ISCHNOCHITON RESPLENDENS, Bednall and Matthews, 1906.

Ischnochiton resplendens, Bednall and Matthews, Proc. Mal. Soc., London, vol. vii., part 2, June, 1906.

Several specimens of this beautiful chiton were taken at Yallingup, and an anterior valve at Ellenbrook, both south of Cape Naturaliste, and also at Albany. No specimen of its close ally *I. smaragdinus* was seen.

12. CALLISTOCHITON ANTIQUUS, Reeve.

Chiton antiquus, Reeve, Conch. Icon., sp. 169; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 274.

Specimens were obtained at Albany, Ellenbrook, and Yallingup.

13. CHITON TRICOSTALIS, Pilsbry, 1894.

Chiton (canaliculatus, var. ?) tricostalis, Pilsbry, Nautilus, vol. viii. (1894), p. 54.

Two specimens from Ellenbrook, south of Cape Naturaliste, one dark olive-green mottled with creamy-white, terra-cotta, and light-green, the other terra-cotta with splashes of red and white.

14. CHITON TORRIANUS, Hedley and Hull, 1909.

Chiton torri, Hedley and Hull, Records of the Australian Museum, Sydney, vol. vii., No. 4, 1909, p. 162.

Chiton Hullianus, Iredale, Proc. Mal. Soc., London, vol. ix., part 2, June, 1910, p. 103.

Chiton torrianus, Mal. Soc. Journal, March, 1911, vol. ix., pt. iv.

Numerous specimens of this handsome chiton were taken at Esperance, Albany, Yallingup, Ellenbrook, and Rottnest Island. Valves were plentiful on the beaches. I have them up to 50 mm. in length. It is evidently one of the common chitons of Western Australia.

15. CHITON BEDNALLI, Pilsbry, 1895.

Chiton Bednalli, Pilsbry, Nautilus, vol. ix., p. 90, December, 1895.

One median valve of this, the most beautiful of all our chitons, was dredged from 20 fathoms in Geographe Bay. Most of the specimens taken in South Australia have been dredged.

16. CHITON EXOPTANDUS, Bednall, 1897.

Chiton exoptandus, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897.

One anterior valve and one median valve were taken from 20 fathoms in Geographe Bay.

17. LORICA VOLVOX, Reeve, 1847.

Chiton volvox, Reeve, Conch. Icon., sp. 31; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 237.

Chiton cimolius, Reeve, Conch. Icon., sp. 141.

Valves of this very large species were picked up at Rottnest Island and Ellenbrook, south of Cape Naturaliste.

18. PLAXIPHORA COSTATA, Blain.

Chiton costatus, Blain, Dict. Sc. Nat., xxxvi., p. 548; Pilsbry, Man. Conch., vol. xv., p. 105.

Plaxiphora glauca, Quoy and Gaim.; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897.

Chiton glaucus, Quoy and Gaim., Voy. Astrolabe, Zool. iii., p. 376.

Plaxiphora glauca, Pilsbry, Man. Conch., ser. i., vol. xiv., p. 325.

Plaxiphora costata, Iredale, Proc. Mal. Soc., London, vol. ix., part 2, June, 1910, p. 97.

Mr. Iredale says: "Blainville's *costatus* is easily recognizable as the species I have noted as *glauca*, Q. et G." He agrees with Dr. Thiele in his "Revision des Systems der Chitonen" in placing *P. petholata*, Sow., as *albida* of Blainville and *P. glauca*, Q. et G., as *costatus*, Blain.

Good specimens of *P. costata* were found at Rottneest Island, Albany, and Bunbury, and valves were plentiful at Ellenbrook and Yallingup.

I notice that Blainville took *P. costata*, or, as he named it, *Chiton costatus*, from the "Port of King George." Western Australia, therefore, is the first locality where the shell was found. Quoy and Gaimard found it in d'Entrecasteaux Channel, Tasmania.

19. ACANTHOCHITES ASBESTOIDES, Smith, 1884.

Chiton (Acanthochiton) asbestoides (Carpenter, MS.), Smith, Zool. Coll., H.M.S. "Alert," p. 833; Pilsbry, Man. Conch., ser. i., vol. xv., p. 17.

Acanthochites asbestoides, Carpenter; Pilsbry, Proc. Acad. Nat. Sec., Philad., 1894.

Two specimens taken at Albany.

20. ACANTHOCHITES SPECIOSUS, H. Adams, 1861.

Cryptoptax (noloptax) speciosus, H. Adams, Proc. Zool. Soc., 1861, p. 385.

Acanthochites speciosus, H. Adams, Pilsbry, Man. Conch., ser. i., vol. xv., p. 32.

One specimen of this rare shell was found at Rabbit Island, near Albany.

21. ACANTHOCHITES VERCONIS, Torr and Ashby, 1898.

Acanthochites Verconis, Torr and Ashby, Trans. Roy. Soc., S.A., 1898, p. 217.

One specimen dredged from 20 fathoms at Geographe Bay. Mr. Hedley, conchologist, of Sydney, is unable to separate *A. Verconis* from *A. Wilsoni*, of Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896.

22. *CRYPTOPLAX STRIATUS*, Lamarck, 1819.

Chitonellus striatus, Lam., An. S., Vert. vi., p. 317, 1819.

Cryptoplax striatus, Pilsbry, Man. Conch., ser. i., vol. xv., p. 53.

This chiton was taken at Hopetoun, on the south coast, and at Yallingup, on the west coast. Valves were obtained at Hopetoun, Ellenbrook, and dredged from 20 fathoms in Geographe Bay. I concur with Messrs. Gatliffe and Bastow, of Melbourne, in placing the hairy, seal-like specimens with *striatus* and the hairless one with *var. Gunnii*, of Reeve.

23. *CRYPTOPLAX STRIATUS*, *var. GUNNII*, Reeve.

Chitonellus gunnii, Reeve, Conch. Icon., sp. 5.

Cryptoplex striatus, *var. Gunnii*. Pilsbry, Man. Conch., ser. i., vol. xv., p. 54.

Two specimens of this hairless species were found at Yallingup. They are both destitute of the "minute calcareous spinelets" of *striatus*. The valves are narrower, and in both specimens of a deep-pink colour. When examined with *striatus* they seem worthy of being placed in a distinct species.

NOTE.—The foregoing 23 species are all found in South Australian waters.

24. *LILOPHURA GEORGIANUS*, Quoy and Gaimard, 1835.

Chiton Georgianus, Quoy and Gaim., Voy. "Astrolabe," Zool., 1835, iii., p. 379, t. 75, f. 25-30.

Liolophura Georgiana, Quoy and Gaim.; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 241.

Chiton Georgianus, Iredale, Proc. Mal. Soc., London, vol. ix., part 3, September, 1910.

The type specimen was found by Quoy and Gaimard at King George Sound, South-west Australia (Port du Roi-Georges). Mr. Iredale says that the type appears to have been lost. It is the commonest chiton in Western Australian waters. The specimens I have dissected correspond to Quoy and Gaimard's description. It certainly is not a true chiton, and I have not been able to discover the presence of eyes necessary to place it among *Liolophura*; but this may be accounted for by the fact that it is exceedingly difficult to get a clean specimen. They are either very much eroded or covered with calcareous matter and other foreign growths.

I have been assisted in my nomenclature by Messrs. Hedley and Hull, of Sydney.

L. georgiana was seen in every place visited, Esperance, Albany, Ellenbrook, Yallingup, and Rottnest Island. Some years ago one specimen with the girdle removed was sent to

me from Eyre Patch, Western Australia, not far from the South Australian boundary. It is often found high and dry in crevices of rocks at and above high-water mark. It is remarkable that no specimens have been discovered in South Australian waters when it is so common in Western Australia. It occupies a similar position in Western Australia to that taken by *Plaxiphora albida* in South Australia.

The figure in Pilsbry, vol. xiv., plate 53, figs. 36-40, shows the concentric marking and the beaks of the valves very distinctly. My specimens are nearly all much worn, and only a few valves retain the beak; the more perfect specimens show both the beak and rows of concentric polished pustules on the anterior valve, radiating from the apex.

25. ONITHOCHITON QUERCINUS, Gould, 1846.

Chiton quercinus, Gould, Proc. Bost. Soc. Nat. Hist., 1846, vol. ii., p. 142; U.S. Expl. Exped. Moll., p. 312, figs. 437, 437a; *Otia*, Conch., p. 3.

C. (Onithochiton) quercinus, Gould, *Otia*, Conch., p. 242.

C. Incii, Reeve, Conch. Icon., 1847, No. 94.

Onithochiton rugulosus, Angas, P.Z.S., 1867, pp. 115, 223.

O. Incii, Angas, P.Z.S., 1867, p. 223.

O. Lyelli (*non* Sow.), Pilsbry, Man. Conch., vol. xiv., p. 247.

O. quercinus, Gould; Pilsbry, Man. Conch., vol. xiv., p. 248.

O. rugulosus, Angas; Pilsbry, Man. Conch., vol. xiv., p. 249; Proc. Acad. Nat. Soc., Phil., 1894, p. 88.

O. Incii, Reeve; Thiele, Zoologica Chim., Heft. lvi., p. 99.

O. quercinus, Gould; Iredale, Proc. Mal. Soc., London. vol. ix., part 2, June, 1910.

Specimens of this very beautiful chiton were taken at Esperance, Albany, Ellenbrook, and Rottnest Island. On the outlying reefs at Rottnest they could be seen crawling over the reefs very energetically. Gould's type specimen was a small one—length, 22 mm.; breadth, 15 mm. I have a dried specimen, slightly curled, taken at Port Esperance—length, 52 mm.; breadth, 23 mm. It is beautifully coloured. Those found on exposed rocks were covered with foreign matter. I have to thank Messrs. Hedley and Hull for the identification of this species.

Unfortunately I have not had access to a description of *Onithochiton Scholvieni*, Thiele, Zool. Chun. 1909. Heft. lvi., p. 99. Mr. Iredale says in the paper quoted that the specimens in the British Museum are labelled "West Australia." He thinks that is correct. My specimens of *O. quercinus* vary considerably. It is possible that I may be able to place some of them with *Scholvieni*.

26. ISCHNOCHITON VERCONIS, *sp. nov.*

Plate xxiv., figs. 1a,b,c,d,e,f.

Mr. Hedley says: "This is certainly a new species and a magnificent one. One would need to disarticulate a valve to be sure of the classification. Probably it is an *Ischnochiton*, and perhaps of the section *Ischnoradsia*." As only one specimen was found I am not disarticulating, but hope to supplement my description later.

General Appearance. Shell elliptical, flattened, side slopes curved. Colour, uniformly slatish-grey, tending to heliotrope. Girdle and valves of the same colour.

Anterior Valve. No very distinct markings. Surface rough with irregular concentric growth lines and minute longitudinal striæ. Eight teeth.

Posterior Valve. Mucro-median, prominent; divided into two distinct areas by a slightly-raised riblet running up to the mucro. The anterior half has longitudinal colour markings with microscopic nodulose lines. To the unaided eye it seems smooth. The posterior half has concentric irregular nodulose lines similar to the anterior valve.

Median Valve. The pleural and dorsal areas run together, while the lateral area is very distinct. The dorsal area is smooth, horny, with brown-pencilled longitudinal lines and microscopic zigzag striations. The pleural area has very delicate longitudinal markings. The lateral area is distinctly raised and has a lighter shade of colour than the pleural. The very slight longitudinal and lateral markings give it a textile appearance.

Girdle. Clothed with imbricating scales, curved, apices suberect; under the microscope the scales are beautifully frosted over and show about ten transverse parallel grooves. The girdle is one-third of the depth of the lateral area, about 3 mm. across.

Interior. Bluish-grey colour with broad sinus and dark splashes near the sinus of each valve. The anterior valve has delicate brown pencillings from the sinus to half its depth with eight riblets.

Measurement. Dried specimen. Length, 44 mm.; breadth, 28 mm.

Habitat. Rockpool, inside reef, Ellenbrook, south of Cape Naturaliste, Western Australia.

Remarks. It is different in shape from any Australian *Ischnochitons*, and the only specimens in my collection of similar shape are *Mopolia lynosa*, Gould, from California, and *Chiton Magnificus*, Deshayes, from the Philippines. This species has been named after Dr. Verco, to whose generosity

I have been indebted for the opportunity of exploring Western Australian *Polyplacophora*.

27. *PLAXIPHORA HEDLEYI*, *sp. nov.*

Plate xxiv., figs. 2a,b,c,d,e,f.

General Appearance. Shell ovate, narrowing toward the anterior, side slopes curved. Colour pale-green with five black and white zebra stripes in the pleural area. The articulation is a milky-white with dark splashes at the sutures.

Anterior Valve. Radially ribbed with eight rounded costæ dying off toward the apex. These correspond with the eight slit rays in the interior of this valve.

Posterior Valve. Insertion plate smooth, unslit, like all plaxiphora. Sinus broad and rounded. Insertion plates large. Colour, milky-white, splashed with brown and black stripes.

Median Valve. Dorsal area beaked, forming an equilateral triangle, with a central ridge almost smooth and splashed longitudinally on its posterior margin, with black-and-white stripes varying in different valves. In one valve microscopic striæ run out diagonally from the central area. To the unaided eye the dorsal area is pale-green, smooth, and horny. The division between the dorsal and pleural areas is distinctly marked by five white and five black zebra bands, small toward the apex and lengthening toward the girdle. The pleural and lateral areas seem to run into one another, a slightly raised radial rib marking the division. The pleural and lateral areas have a mottled appearance, with splashes of brown and white or black and white. The internal part is a milky-white with a distinctly-raised rib, broad at the apex and narrowing off to one tiny slit. The sinus is broad and the sutural plates neatly curved.

Girdle. Leathery with microscopic granulations. Narrow with sutural horny protuberances, some spikes remaining. Colour alternately black and white, black at the valves and white at the sutures, 11 or 12 stripes of each colour on each side.

Measurement. Dried specimen. Length, 16 mm.; breadth, 11 mm.

Habitat. Rabbit Island, Albany. Two live specimens and one median valve.

Remarks. This specimen has been named after Mr. Hedley, conchologist, whose wide conchological information has helped many a beginner. The zebra-like stripes will cause this specimen to be easily distinguished.

28. ACANTHOCHITES SUBVIRIDIS, *sp. nov.*

Plate xxv., figs. 3a,b,c,d,e,f.

General Appearance. Shell elongated, narrow, carinated, side slopes curved. Colour creamy-white with a pale-green tint on some of the valves, a brighter green on the dorsal area with a pink-tipped beak in some specimens; girdle dark-buff.

Anterior Valve. Strongly marked with fine granulose, radiating costæ corresponding to the five slit rays. The sutural plates are much larger than the tegmentum. Internally milky-white with a curved sutural band.

Posterior Valve. Distinctly marked with dorsal and latero-pleural areas. The dorsal area is a smooth ridge, irregularly transversely striated, terminating in fine radial riblets, which are continued in the sutural plates as slit rays. The latero-pleural area is covered with squamose granules. Sutural plates large, sinus wide.

Median Valve. Dorsal and latero-pleural areas same as posterior valve with the exception of two postmedian granulose radial riblets, one on the anterior margin. In some specimens these riblets are strongly pustulose, small at the apex, and increasing in size toward the margin. Internally one slit ray, sutural plates large, sinus medium. The dorsal area is a pale-green colour, with in some cases a pink tip. In others it is a dark-buff.

Girdle. Leathery, very broad, 7 sutural tufts on each side, and 4 round the anterior valve. Elementary spicules may be seen in one or two. Colour dark-buff, resembling the girdle of *Cryptoplax Gunnii*.

Measurement. Length, 22 mm.; breadth, 12 mm.

Habitat. Four specimens from Rabbit Island, Albany.

Remarks. I was very much inclined to place this specimen under *A. costatus*, Ad. and Ang., Pilsbry, Man. Conch., ser. i., vol. xiv., p. 40, but the *distinctly pustulose riblets* and coloured dorsal areas with other minor differences have led me to place it under a new species. Adams and Angas' drawing of *A. costatus* gives a very diminutive riblet. The minute fringe of white spicules, described by E. A. Smith, Zool. Coll. "Alert," p. 83, t. 6, f. F., as *Chiton (Macandrellus) costatus*, is absent in all the specimens. The greenish tint so common has given its name, *subviridis*.

29. TONICIA HULLIANUS, *sp. nov.*

Plate xxv., figs. 4a,b,c,d,e,f.

General Appearance. Shell elliptical, broad, smooth, back rounded, side slopes curved, valves distinctly beaked.

Colour reddish-buff, mottled on dorsal areas, turning to deep red on some of the lateral areas, a few minute irregular black and white spots. Second valve larger than any of the following five. The forward part of the lateral areas and the posterior and anterior valves bear radiating rows of eye-dots.

Anterior Valve. About 15 or more fine striæ radiating from the apex with a slightly raised rib between each pair. These rays are really the eye-dot lines. I counted 15 eyes in one ray. There seems to be on either side a sort of flesh-coloured lateral area. The rest of this valve is a pale-pink, mottled with cream. Dentition: Eight slits are distinctly visible, but as I have only one specimen I have not dissected it. The insertion teeth are pectinated.

Posterior Valve. Large, mucro median *rectangularly elevated*. The dorsal area is smooth, beaked with irregular lateral striæ. The eye-dots radiate from the mucro to the insertion plate. Colour dorsal and posterior area pink, mottled with cream, and on each side corresponding to the lateral area which is of a rich red colour. The insertion plates are pectinated with probably a dozen slits.

Median Valves. Dorsal area is V-shaped, curved, and beaked, colour pinky-buff, mottled with cream. Pleural area small, flesh- or buff-coloured, depressed with concentric growth lines running from lateral into pleural and dorsal areas. Lateral areas, some flesh-coloured, others mottled as in the dorsal areas, five or six irregular flattened ribs. Eye-dots irregular on the anterior half of each valve. Insertion plates, one slit, pectinated. The sutural plates are diminutive, sinus shallow and pectinated, and the interior is porcelain-white.

Girdle. Leathery, nude. Breadth in dry state, 2 mm. Colour light-brown.

Measurement. Dried specimen. Length, 30 mm.; breadth, 20 mm. Divergence, 125°.

Habitat. Rockpool, Ellenbrook, south of Cape Naturaliste. One live specimen and one median valve.

Remarks. The Genus *Tonicia* is somewhat rare in Australian waters. I have named this very handsome species after Mr. A. F. Basset Hull, whom Mr. Iredale describes as "the most enthusiastic chiton student in Australasia."

30. LEPIDOPLEURUS NIGER, *sp. nov.*

Plate xxv., figs. 5a,b,c,d,e,f.

General Appearance. Shell small, broad in proportion to length. Valves rounded and raised. Regular granulose striations are microscopically conspicuous. Colour dark

slatish-grey on anterior and 5 median valves, posterior valve almost black.

Anterior Valve. Longitudinally parallel rows of pustules.

Posterior Valve. Almost black; umbo postmedian, with concentric pustulose striæ.

Median Valves. Regularly longitudinally granulosely striated. No difference in the dorsal, lateral, and pleural areas.

Girdle. Diminutive, dark, scaly, and with spicules.

Habitat. Under stones in shallow pools at Hopetoun, Western Australia. Only one specimen was found.

Measurement. Dried specimen. Length, 4 mm.; breadth, $2\frac{1}{2}$ mm.

Remarks. I had classified this as *L. Matthewsianus*, Bednall, which is so common in South Australian waters, but on comparing them I found it much broader in proportion to its length, and the body of the animal which is uniformly red in *L. Matthewsianus* is almost black in *L. Niger*. I then placed it with *L. Badius*, Hedley and Hull, and found it very similar, with the exception that the grain rows were distinctly regular. Its dark appearance has given it its name.

31. PLAXIPHORA ZEBRA, *sp. nov.*

Plate xxv., fig. 6.

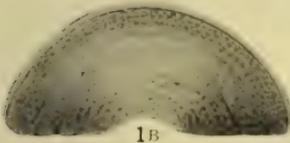
A beautiful median valve was collected at Port Esperance and is worthy of a name. The valve is rounded. The dorsal area is indistinct with 10 irregular creamy tear-drop pustules in the centre forming a V with diagonal striations terminating in the anterior part of the valve. The lateral part of the dorsal area has three or four transverse striæ continued into the pleural area. The colour is a delicate pink, mottled with white and brown splashes. The pleural area has a number of zigzag pustulose riblets running into the striations coming from the dorsal area and narrowing toward the apex. Colour: Five alternate splashes of bright-red and creamy-white give the shell its name. The lateral area is distinctly raised with two rows of 9 or 10 large pustules on its anterior and posterior margins with a sulcus between, irregularly pustulose and striated. The pustules have the tear-drop appearance of those in the dorsal area. Interior is porcelainous, sinus curved, broad, shallow, and pectinated. The sutural plates are small, one slit. The anterior part of the valve is folded over and an irregular sulcus is formed, terminating in the slit. The specimen may have been bleached, so that the pink splashes in the pleural area may have been brown or black.



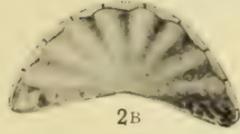
1A



2A



1B



2B



1C



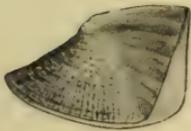
2C



1D



2D



1E



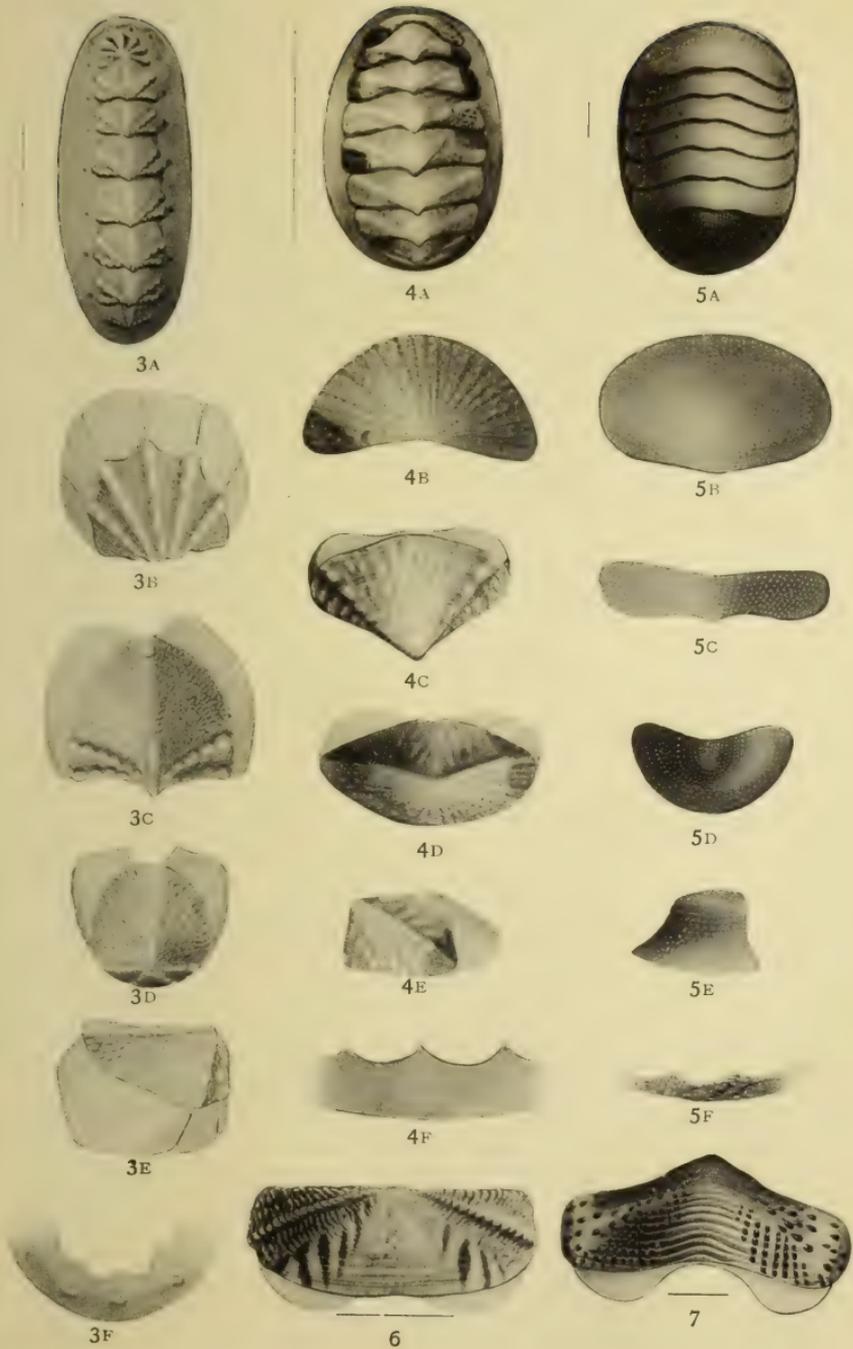
2E



1F



2F



The markings are very like *P. Hedleyi*, but the lateral area makes a distinct species.

Habitat. Port Esperance. One median valve.

32. *PLAXIPHORA PUSTULOSA*, *sp. nov.*

Plate xxv., fig, 7.

One median valve was taken at Albany and is in perfect condition. The valve is slightly arched and beaked. The posterior part of the dorsal area has 12 bright-brown transverse riblets divided by pale-green striæ, rather crowded toward the posterior. These riblets are continued into the pleural area in rows of bright shiny pustules, longitudinally parallel, and diminishing in number from seven near the dorsal area to one at the insertion plate. The lateral area is slightly raised, but very distinct. It has three or four radiating rays of the tear-drop pustules.

Interior. The sinus is gracefully curved, colour rich dark-brown, slightly pectinated. The sutural plates are small. The rear part is folded over, making a white limy sulcus, ending in one slit at the insertion plate.

Habitat. Albany, Western Australia. One median valve.

Brighton,
South Australia.

EXPLANATION OF PLATES.

PLATE XXIV.

1a,b,c,d,e,f—*Ischnochiton verconis*, *sp. nov.*
2a,b,c,d,e,f—*Plaxiphora hedleyi* *sp. nov.*

PLATE XXV.

3a,b,c,d,e,f—*Acanthochites subviridis*, *n. sp.*
4a,b,c,d,e,f—*Tonicia hullianus*, *sp. nov.*
5a,b,c,d,e,f—*Lepidopleurus niger*, *sp. nov.*
6—*Plaxiphora zebra* (median valve), *sp. nov.*
7—*Plaxiphora pustulosa* (median valve), *sp. nov.*

a—Dorsal view of entire shell.
b—Anterior valve.
c—Median valve.
d—Posterior valve.
e—Lateral view of posterior valve.
f—Portion of girde magnified.

Sizes of type specimens are marked in each case

**NOTE DESCRIPTIVE OF A STEREOGRAM OF THE
MOUNT LOFTY RANGES, SOUTH AUSTRALIA.**

By W. N. BENSON, B.Sc.

[Read August 10, 1911.]

PLATES XX. AND XXI.

In a previous paper a short outline was given of the physiography of the Mount Lofty Ranges as it appeared to the writer from observations made during 1908.⁽¹⁾

Recently a stereogram has been constructed for the Sydney University to illustrate the features on which his conclusions were based. A brief description of this model may not be out of place here. The information on which it was modelled was obtained from the official map of south-eastern South Australia and the topographic map of the vicinity of Adelaide. Trigonometrically-determined heights are sadly few in number. The general relief of the area between Noarlunga, Angaston, and Murray Bridge, and in the Inman Valley is based on the writer's own sketches and aneroid readings. A topographic map of Mount Barker district published in the daily Press during the military manœuvres of 1908 was also of service. The modelling of the area about Mount Compass is based on Mr. Howchin's map and descriptions⁽²⁾ and additional information kindly supplied by him.

Owing to the writer's non-acquaintance with areas outside these limits the model may be subject to some modification in those parts, and indeed owing to the smallness of scale no more than a very rough accuracy has been attempted throughout.

The small inset model illustrates the main tectonic features. As these are being investigated in detail by Mr. Howchin a very brief description will here suffice.

The main portion of the Mount Lofty Ranges, stretching from beyond Angaston to Cape Jervis and extending into Kangaroo Island, is a peneplain. The main drainage, before uplift, was in mature valleys running in an approximately meridional direction.⁽³⁾ On the peneplain surface were residuals of a higher level, monadnocks, such as Mounts

(1) Trans. Roy. Soc., S.A., 1909, p. 107.

(2) Trans. Roy. Soc., S.A., 1910, pp. 231-47 and pls. xxxi. to

(3) W. Howchin, Geography of South Australia, p. 124.

Lofty and Barker, composed of a resistant rock, usually quartzite. In comparatively recent, probably at the close of Pliocene, times this peneplain was elevated, by upthrust chiefly, rather than by folding.⁽⁴⁾

Stratigraphical proof of this uplift is afforded by the presence of raised marine Eocene fossils⁽⁵⁾ on the hills behind Encounter Bay, at the head of the Hindmarsh River,⁽⁶⁾ where they occur at an altitude of 1,000 ft.

Mr. Howchin has also noted the presence of steeply dipping and overfolded Tertiary beds near Sellick's Hill.⁽⁷⁾ By this movement the drainage was much altered. Erosion readily removed the soft glacial clays and sandstones from the Inman, Hindmarsh, and Upper Finnis Valleys, and in the first named exposed in places the hard glaciated Permo-Carboniferous land-surface.⁽⁸⁾

The uplift was not *en bloc*, but the area was broken up into larger and small blocks which were differentially elevated, tilted to some extent, and possibly slightly flexed. This makes fault scarps a frequent feature.⁽⁹⁾ The small inset model shows the series of fault-blocks that form the western flanks of the range. They are roughly triangular in shape and are tilted sloping to the south. They may be due to differential elevation in the first instance or may have dropped off the main peneplain, collapsing after their original uplift.

A somewhat similar series of steps, though less well marked, appears on the eastern flanks of the Range, as at Palmer and the Bremer Range. It is possible that Mount Lofty and perhaps the Forest Range are on a block raised above the general level, of which German Town Hill would be the eastern scarp. This feature is not shown on the model, however, chiefly because it has not been sufficiently studied by the writer.

Backstairs Passage, the narrow strait that separates Kangaroo Island from the mainland, may have originated in one of two ways. There can be little doubt that the high flat surface of the island is a continuation of the peneplain of the

(4) Compare R. Tate, *Trans. Roy. Soc., S.A.*, 1884-5, pp. 56-7; also E. C. Andrews, *Geographical Unity of Eastern Australia*, *Proc. Roy. Soc., N.S.W.*, 1910, especially p. 440.

(5) R. Tate, *Proc. Roy. Soc., N.S.W.*, 1888, p. 242.

(6) W. Howchin, *Trans. Roy. Soc., S.A.*, 1898, p. 15-6; also present volume *ante* pp. 55-6 and pl. x. (inset).

(7) See present volume, *ante*, pp. 47-59.

(8) W. Howchin, Report of the Australasian Association for the Advancement of Science, 1907, p. 267; also *Trans. Roy. Soc., S.A.*, 1910, p. 1 and p. 231.

(9) W. Howchin, present volume, p. 53.

mainland. That its extension is in a westerly direction rather than southerly, parallel to the Mount Lofty Ranges, cannot be due primarily to the original Palæozoic folding, the axis of which also bends in a similar fashion; but it may be due to it, secondarily, in that the bounding fault-scarps have developed parallel to the folding planes of the rocks, as in the case of the Mount Lofty Range itself. The most obvious explanation of the passage is that it is a *senkungsfeld*, *i.e.*, an area dropped down between two fault-planes, respectively the southern scarp of the main range and the northern of the island. The Pages might be considered as the tops of a sunken residual. But in the case of the Inman, Hindmarsh, and Upper Finnis Valleys it is clear that their great maturity is due to the fact that they were carved by the Permo-Carboniferous glaciers and filled with their soft till. This has been quickly removed when first exposed to the attack of streams, rejuvenated by the uplift. Might it not also be suggested that the Backstairs Passage was a wide glacial valley filled with till, which has been subsequently almost entirely removed by stream and marine erosion? Several facts are in support of this. The base of the valley must, of course, have been below sea-level; but so is that of the Inman glacier at Victor Harbour. The researches of Mr. Howchin⁽¹⁰⁾ have shown the strongly glaciated nature of portion of the southern scarp of the mainland, and he has proved the presence of glacial boulders near Cape Jervis.⁽¹¹⁾ He has also described Permo-Carboniferous glacial till on northern Kangaroo Island.⁽¹²⁾

The depression is thus bounded on both sides by glacial material and, in places, striated surfaces—facts strongly in support of the second hypothesis. It is, of course, possible that block-faulting may have assisted in the formation of the passage, but the author's inclination is to give it a minor rôle. On the glacial hypothesis The Pages should be *roches moutonnées*. The Admiralty soundings are of little help in deciding the question, as they show only that a flat bottom exists in the passage at a depth of less than 20 fathoms.

The drainage alterations during the various periods of earth movement require much further study. Rivers were captured, as the heads of the Onkaparinga by the Torrens,⁽¹³⁾

(10) Trans. Roy. Soc., S.A., vol. xxxiv., 1910, p. 1, pls. i. to xvii.

(11) Rep. Aus. Asso. Adv. Science, vol. vii., 1898, p. 124.

(12) Trans. Roy. Soc., S.A., vol. xxiii., 1899, p. 198, pls. iv. and v.

(13) This conclusion, though reached independently by the writer, has been, he finds, Mr. Howchin's view for some time.



or revived with the formation of valley in valley structure, as in Foreston Creek, near Gumeracha; or they were reversed altogether. Sixth Creek, flowing north from Uraidla into the Torrens, seems to be a reversal of Cox's Creek flowing south into the Onkaparinga. Further, the uplift and consequent entrenchment and headward extension of the east and west valleys (entrenched meanders of the Torrens River) brought about the capture and reversal of portions of the meridional streams. An excellent example of this was noted in Millendella Creek, near Palmer, by Mr. Howchin and the writer. The former has a full description of it in preparation. Other examples are shown by Rocky Gully,⁽¹⁴⁾ near Murray Bridge, Mount Barker Creek, Bull's Creek, etc. The recurrence of earth movements at several periods probably accounts for many puzzling features in the present drainage, particularly the course of the Lower Onkaparinga. The occurrence of its present valley cutting across the middle of the southward sloping, Clarendon-Aldinga block, is very remarkable. Mr. Howchin has shown that an older mouth lies considerably south of its present opening.⁽¹⁵⁾

Many further problems await solution in this area, which is one of the most interesting geologically and physiographically in Australia.

The writer's thanks are due to Mr. Howchin for his ever-ready assistance and information freely given.

Geological Department,
Sydney University,
March, 1911.

DESCRIPTION OF PLATES.

PLATE XX.

Stereogram of the Mount Lofty Ranges.

PLATE XXI.

Map of the Mount Lofty Ranges to show the drainage system. Notice how the original meridional drainage, the streams of which are in matured valleys, has been broken into numerous watersheds by capturing east and westerly gorges, developed consequent upon the uplift of the range. Mark particularly the Wakefield, Light, Rhine, and Onkaparinga systems and their relation to the lines of faulting. These faults have an easterly downthrow on the eastern side and a westerly on the western. The ends of the fault-lines shown are points beyond which they have not been traced, or appear to pass into monoclinical folds, or to die out. The doubt as to the scarp nature of the southern coast is explained in the text.

(14) W. G. Woolnough, *Trans. Roy. Soc., S.A.*, 1908, p. 124.

(15) *Geography of South Australia*, p. 124.

REVISION OF THE AUSTRALIAN HESPERIADÆ.

By OSWALD B. LOWER, F.Z.S., F.E.S., Etc.

[Read August 10, 1911.]

INTRODUCTION.

Since Mr. Meyrick and myself gave our Revision of this group (Trans. Roy. Soc., S.A., vol. xxvi., p. 38, *et seq.*) many new forms have been discovered and the synonymy of others further corrected, consequently no excuse is necessary for a further revision of this difficult yet fascinating group. In dealing with the present monograph I have not deviated perceptibly from the arrangement laid down in the former paper. The neural characters and antennal structure, together with the peculiarities of palpi, have been made use of where expedient. In recent years Scudder and Elwes have advanced their theory of classification by utilizing the genitalia as a means of discrimination—in fact, Elwes has considered this system of paramount importance in characterizing the different species. I am not averse to the utilization of these characters when of value or in doubtful species, but prefer keeping to our original arrangement.

When we become better acquainted with the earlier stages of the various species I hazard the opinion that the present arrangement will require considerable alteration, but as yet we are acquainted with so few that nothing satisfactory can be promulgated in this direction. What knowledge I possess in the matter indicates interesting results. The various pupæ known to me present generic peculiarities which promise to be of particular value in generic distinctions. Whether they can be used to advantage in future remains to be seen. At present I have an open mind on the question, which is better than formulating an hypothesis which would fashion matters to assimilate with preconceived ideas, as frequently the latter method promotes useless disputes over minor details and narrows the mind to indulge in acrimonious personalities which are devoid of value, excepting perhaps to make confusion confounded. For instance, one could form several new genera for the reception of species under *Hesperilla*, but the problem is too complex to be finally disposed of with the knowledge we at present possess of the various known species. I have erected new genera where I have considered it necessary and have submerged others when indicated.

Whether we have several small genera or one large section is purely a matter of individual opinion, and unless there is a distinctive generic peculiarity I prefer the larger genera, as fully three-fifths of the species enumerated in this paper are endemic. The most troublesome and least understood group are *Telicota* and the allied genera, and progress must necessarily be slow, as no satisfactory arrangement can be maintained until an exhaustive examination is accomplished by the accumulation and dissection of a large quantity of material from the Indo-Malayan region. The geographical range which I consider Australian is the continent proper and Tasmania. In the near future I intend to prepare a paper which will embrace structural characters, etc., coloured figures of larvæ, pupæ, and imagines, and will endeavour to place my New Guinea and material from the adjoining islands in the proposed work, in which I hope to receive the same generous assistance from my co-workers.

I have unsuccessfully endeavoured to locate many of the types. This applies more especially to those of Plötz, and have been reluctantly compelled to abandon the search. Many of Plötz's species are in the collection of the late Herr Erhardt at Munich.

Before concluding I would take this opportunity of heartily thanking Colonel Chas. Swinhoe, Messrs. J. A. South, H. J. Elwes, Bethune Baker, H. Druce, A. Bang-Haas, Herr Krepelin, G. A. Lyell, and many others for assistance, not forgetting Mr. G. A. Waterhouse, whose valued help has been of yeoman service to me in the elucidation of many knotty points.

1. *CASYAPA*, Kirby.

Casyapa, Kirby, Syn., Cat., Diur., Lep., p. 576, 1871. *Chætocneme*, Feld., Sitz., A. K. Wiss, Math. Cl., vol. xl., p. 460, 1860 (*nom præocc.*). *Casyapa*, Watson, P.Z.S., p. 29, 1893; M. and L., T.R.S., S.A., vol. xxvi. p. 40.

Club of antennæ moderate, gradually thickened, tapering to a fine point, bent, not hooked. Forewings in male with costal fold; vein 5 equidistant from 4 and 6; 3 from well before end of cell; 2 three times as far from base of wing as from end of cell. Hindwings with termen evenly rounded; 5 obsolete; 3 from just before end of cell. Hind tibiæ densely fringed and with only terminal part of spurs.

Type *corvus*, Feld.

This genus differs from *phænicops*, Watson, by the presence of costal fold of ♂. The genus extends to the Indo-Malayan Archipelago.

1. C. CARISTUS, Hew.

Chætrocne me caristus, Hew., Desc. Hesp., p. 21; *Casyapa critomedia*, M. and L. (*nec* Guer), T.R.S., p. 40.

The description given as above refers to this species and not to *Critomedia*, Quer. This latter species does not, so far as I am aware, occur in Australia. The two specimens of *caristus* in the Miskin collection (said to have been taken by the late Mr. Diggles at Kangaroo Point), the two ♂ specimens in my own collection from Cape York, and two in Mr. Bethune-Baker's collection (taken in New Guinea) are identical.

Type in Coll. Hewitson (British Museum).

2. PHÆNICOPS, Watson.

P.Z.S., p. 30, 1893; M. and L., T.R.S., p. 41.

Club of antennæ moderate, elongate, gradually thickened, pointed, bent, not abruptly angled. Palpi ascending, terminal joint very short, obtuse. Posterior tibiæ without middle spurs. Forewings in male without characters, 5 parallel to 4 and 6, slightly nearer to 6 at base. Hindwings with 5 obsolete.

Type *beata*, Hew.

An endemic genus, comprising the three largest and most beautiful species in the Australian group.

2. P. BEATA, Hew.

Netrocoryne beata, Hew., Desc. Hesp., p. 22, 1867. Ex. Butl., v. Hesp., figs. 2, 3, 1874; M. and L., T.R.S., p. 41.

Type in Coll. Hewitson (British Museum).

I have received several specimens from Mr. F. P. Dodd taken and bred at Kuranda, Queensland, in May, September, October, and November. It also occurs from Brisbane to Cooktown, and at Richmond River (Waterhouse) and at Mount Kembla (A. G. Hamilton).

P. DENITZA, Hew.

Netrocoryne denitza, Hew., Desc. Hesp., p. 22, 1867; ex. Butl., v. Hesp., fig. 4, 1874; Stand., ex. Schmett, pl. c., 1888; *Phænicops denitza*, M. and L., T.R.S., p. 42.

Type in Coll. Hewitson (British Museum).

Brisbane to Cooktown, Queensland, and Port Darwin; December to March.

3. P. PORPHYROPIS, M. and L.

T.R.S., p. 43.

Types in Coll. Lower.

I have received several fine specimens of both sexes of this species from Mr. F. P. Dodd taken at Kuranda, Queens-

land, in October and February. The ♀ does not differ from the ♂ in markings; the ♂ appears to have an indistinct costal fold. In some specimens it may appear more perfectly developed. Should such prove to be the case, the species will be required to be placed in *casyapa*. The present species is very similar to the New Guinea species, *Kallima*, Swinh. (A.M.N.H. (7), xx., p. 430, 1907, and T.E.S., p. 3, pl. i., fig. 1, 1908), but differs by the presence of the yellow patch on termen of hindwings. The type of *porphyropis* came from Johnstone River, North Queensland.

3. NETRO CORYNE, Feld.

Reis., Nov., Lep. iii., p. 507, 1867; M. and L., T.R.S., p. 43.

Type *repanda*, Feld.

Club of antennæ elongate, pointed, bent. Palpi porrected, terminal joint rather short, obtuse. Posterior tibiæ with all spurs. Forewings in ♂ without stigma or costal fold; 5 parallel to 4 and 6. Slightly nearer 6 at base. Hindwings with 5 obsolete. Confined to the Australian region.

4. N. REPANDA, Feld.

Reis., Nov., Lep. iii., p. 507, pl. lxx., fig. 10, 1867; Math. T.E.S., 1888, p. 181, pl. vi., fig. 5; M. and L., T.R.S., p. 43. *Goniloba vulpecula*, Prittw., S.E.Z., p. 187, pl. iii., figs. 2ab, 1868.

Type in Coll. Felder.

Sydney to Cooktown. Mr. Dodd has sent several specimens bred at Kuranda, North Queensland; between November and March.

The larvæ feed on *Callicoma serratifolia*, *Elæocarpus cyanea*, and *E. reticulatus*.

4. TAGIADES, Hüb.

Verz., Z., p. 108, 1816; M. and L., T.R.S., p. 45. *Pterygospidea*, Wallgr., Rhop., Caffr., p. 53, 1857.

Club of antennæ slender, gradual, elongate, bent, apiculus rather long, pointed. Palpi porrected, terminal joint short, obtuse. Posterior tibiæ with all spurs. Forewings in male without characters; 5 parallel to 4 and 6, slightly nearer to 6 at base. Hindwings with 5 rudimentary, very faint.

Type *japetus*, Cr. (*Tagiades*); type *flesus*, Fabr. (*Pterygospidea*).

Chiefly confined to the Indo-Malayan and Asiatic regions.

Note.—Since writing the above I submitted authentic specimens of *Tagiades gamelia*, Misk., to Colonel Swinhoe, who returned them as *louisa*, Swinh. The same specimen was

afterwards submitted to Mr. Herbert Druce, who compared it with specimens of *Janetta*, Butl., in the Godman collection (British Museum), and he states that they are undoubtedly one and the same species. The synonymy will therefore be:—

T. JANETTA, Butl.

T.E.S. Lond., p. 519, 1870; *T. gamelia*, Misk., P.R.S. Qld., 1889, p. 146; *T. australensis*, Mab., C.R. Ent., Belg., xxxv., p. 72; *T. louisa*, Swinh., Ann. Mag. Nat. His. (7), xx., p. 432, 1907.

108. *Padrasna suborbicularis*, Mab.

109. *Ocybadistes suffusus*, Mab.

These two new species were recently described in Wystmarnis Gen. Insect. I am not acquainted with either. The locality given is Australia.

The *Tagiades* are sombre-coloured insects showing slight geographical variations; the Australian forms and those of the adjoining islands are closely allied and probably derived from *japetus*, Cr. They are, however, separated from that group by the snow-white hindwings, of which I consider *atticus*, Fabr., the earliest form. As it is highly probable that *janetta*, Butl., will be taken on the mainland and may ultimately prove to be identical with *gamelia*, Misk., I append both of the original descriptions.

5. T. JANETTA, Butl.

T.E.S., Lond., p. 519, 1870; M. and L., T.R.S., p. 45.

Front wings dark-brown; a streak at end of cell and another on the disc, grey scales, four central spots, two within the cell and two between the median branches, and five points near the apex in a recurved series, white hyaline; hindwings, the basal area, and apex dark-brown, two large black spots placed obliquely within the apical band; body brown. Frontwings below nearly as above, the grey discal streak broader and well defined, becoming white near anal angle; hindwings white, costa and apex dark-brown; subapical spots as above; a black triangular spot at end of median branch and a short black line at the end of second; white; body, greyish in front, white behind.

Expanse of wings, 2 in.

Hab.—Aru Islands.

Coll. Druce. Belongs to *Japetus* group (Butler, T.E.S., Lond., p. 519, 1870).

T. gamelia, Misk., P.R.S., Qld., 1889, p. 146.

♂ ♀. $1\frac{8}{12}$ – $1\frac{10}{12}$ in. Upper side pale-brown with 9 pale-colourless transparent spots, 2 within and at end of cell, 2:

others below and slightly beyond these, and a series of 5 very small ones forming a bent row a short distance from and parallel with apex. Hindwings with the basal and apical area pale-brown, rest of wing pure white, with two quadrate black patches near apex, upper one being the least. Under-side of forewings as above with a whitish patch near hinder angle. Hindwings all white with apical angle broadly towards base dark-brown; 2 brown patches near apex, of which the upper is the largest; a short line of brown close to outer margin, not reaching anal angle or extending to termination of median, base of wing with a bluish tinge. Thorax and abdomen above pale-brown, beneath light-grey.

Cape York, Queensland. Allied to *Japetus*, Cr., which it resembles somewhat on under-side. The sexes do not differ.

Butler does not give the colour of hindwings above, nor does he state the sex (it is probably a female). In some specimens the two cellular marks are separate above, but joined on under-side by a fleck of whitish; this peculiarity occurs irrespective of sex. Mr. Waterhouse has sent me specimens of *gamelia* in which the ♂ measures but 45 mm. These were taken on Prince of Wales Island during June; the mainland specimens are slightly larger, ranging up to 50 mm.

Cape York, Queensland; also from Prince of Wales Island.

6. T. LOUISA, Swinh.

Ann. Mag., N.H. (7), xx., p. 432, 1907; T.E.S., Lond., p. 6, fig. 5, pl. i. (1908).

Types in British Museum.

♀. 2 in. Exp. Blackish-brown, palpi white beneath, frons with a white spot on each side; forewings with two large hyaline spots at end of cell, one outside its lower angle and another close beneath it, all more or less triangular, a subapical row of six small spots in the usual recurved line; hindwings with about one-half the lower portion white, the white running up the abdominal margin to the base; two very large black spots in the middle of the disc, touching the inner-side of the outer curve of the brown portion of the wing; no marginal marks or spots; under-side with two additional hyaline spots on the forewing near the hinder angle; hindwings with a somewhat narrow black costal border; the two discal spots much smaller and one minute black mark on the outer border below the middle. Legs and body white. (Swinhoe, A.M.N.H. (7), xx., p. 432, 1907.)

Rossel Island; also from Cape York.

As will be seen by the above, *louisa* only differs from *gamelia* by having 6 instead of 5 subapical spots. I very much

doubt if the species can stand as distinct, as I possess a specimen of *gamelia* with an additional subapical spot, and although the insect is smaller, it could be considered either species. Probably a longer series will connect the forms as being one and the same.

7. T. GAMELIA, Misk.

P.R.S., Qld., 1889, p. 146. *T. Australensis*, Mab., C.R., Ent. Belg., xxxv., p. 72. *T. janetta*, M. and L. (*nec* Butl.), T.R.S., p. 45.

Type *gamelia*, in Queensland Museum; type *Australensis*, in (?) Coll. Staudinger.

We formerly called this species *janetta*, Butl., and although the descriptions are similar it appears that *janetta* differs from *gamelia* by the hindwings. Mabilles' description of *Australensis* certainly indicates *gamelia*.

Cape York, Queensland, and Prince of Wales Island, in June.

5. MESODINA, Meyr.

Ent. Mon., Mag., xxxvii., p. 168, 1901; M. and L., T.R.S., p. 46.

Club of antennæ elongate, pointed, bent, sub-porrect, apiculus very short. Posterior tibiæ without middle spurs. Forewings in male without stigma; 5 parallel to 4 and 6, slightly nearer 6 at base. Hindwings, 5 obsolete.

Type *æluropis*, Meyr.

This genus differs from *Hesperilla* only by the absence of stigma of forewing and absence of middle spurs of posterior tibiæ, which latter character also separates it from *Trapezites*, Hüb.

8. M. ÆLUROPIS, Meyr.

Ent. Mon., Mag., xxxviii., p. 168, 1901; M. and L., T.R.S., p. 46.

In the former Revision the reference was inadvertently given as an M.S.S. name, but was described as above.

Mr. Waterhouse informs me that this is a mountain species, and so far has been bred only in October to December, and again early in January.

Type in Coll. Meyrick.

9. M. HALYZIA, Hew.

Hesperilla halyzia, Hew., Desc. Hesp., p. 38, 1868; ex. Butt., v., figs. 4-6, 1874; Vict., Butt., ii., p. 125, 1894; M. and L. T.R.S., p. 47

Mr. Jarvis, the Entomologist to the Government Museum at Brisbane, informs me that he took this species on

Moreton Island, Queensland, in October. This is a new locality, and extends the range of this species considerably. Mr. Miskin, in his catalogue, gives Mackay and Bowen as localities, but as pointed out previously the insect referred to was *tyrrhus*, Mab. (*Bathrophora*, M. and L.).

Sydney, New South Wales, October to April.

Type in Coll. Hewitson (British Museum).

10. *M. HALYZIA*, Hew., *var. CYANOPHRACTA*, *nov. var.*

♂ ♀, 28-36 mm. Head, thorax, palpi, and abdomen dark-fuscous, mixed with golden-ochreous hairs on thorax and abdomen: thorax and abdomen beneath mixed with bluish-white. Legs bluish-white. Antennæ fuscous, annulated with white, apiculus reddish. Forewings elongate, triangular; costa somewhat sinuate in middle, termen oblique, in ♀ more strongly bowed; dark ochreous-fuscous; markings ochreous-whitish; a large, somewhat quadrate spot in end of cell, excised internally, outer edge straight; a cartridge-shaped spot beneath and beyond, beneath which is another similar spot, separated by vein from former spot; an oblique transverse row of 3 subapical spots *present in both sexes*; cilia fuscous, basal half darker, somewhat barred. Hindwings with termen rounded, somewhat prominent in ♂ above middle; colour and cilia as in forewings. Forewings below blackish-fuscous, markings of upper side reproduced, upper half of termen and apical area bluish-white, some orange scales in basal half of cell. Hindwings bluish-grey; a faintly produced curved series of postmedian fuscous rings, absent in some specimens; cilia of all wings bluish-grey, that of forewings being more or less barred with fuscous.

Whether this insect can be raised to the rank of a species or simply remain as a variety of *halyzia* remains to be seen. I have 2 ♂ and 3 ♀ specimens, and have seen others, and the 3 subapical spots on forewings and peculiar bluish-whitish colouring of under-side appears on the whole of the specimens.

In true *halyzia* the subapical spots of ♂ are very rarely *present*, although I have a single ♂ specimen, probably taken at Sydney, in which the 3 spots are feebly developed. I have not seen Victorian specimens of *halyzia*, but Mr. Waterhouse gives that locality.

When the life history of *cyanophracta* is elucidated it will probably be found necessary to further consider the question. The five specimens under review were all taken at Perth, Western Australia, in November.

Types in Coll. Lower.

6. MOTASINGHA, Watson.

P.Z.S., p. 73, 1893.

Club of antennæ robust, bent, apiculus blunt. Palpi obliquely ascending, subporrect terminal joint short, subconical. Posterior tibiæ with all spurs. Forewings in male with stigma; 5 parallel to 4 and 6, slightly nearer 6 at base. Hindwings, 5 obsolete.

Type *dirphia*, Hew.

This genus differs from *Hesperilla* by the shape of club of antennæ and from *Mesodina* by the presence of discal stigma of ♂ and presence of all spurs on posterior tibiæ.

11. M. DIRPHIA, Hew.

Desc. Hesp., p. 38, 1868; ex. Butt., v., figs. 1-3, 1874; M. and L., T.R.S., p. 60. *H. trimaculata*, Tepp., l.c., 1881, p. 32, pl. ii., fig. 1. *H. quadrimaculata*, ib., l.c., pl. ii., fig. 2. *Motasingha dirphia*, Watson, P.Z.S., 1893, p. 73.

Western Australia, South Australia, Victoria, and New South Wales. Thirty-three specimens; November to March. I think the former locality quoted, i.e., Cape York, is erroneous; at all events, it requires verification. The antennæ of this species has the apiculus very obtuse.

Type *dirphia*, in Coll. Hewitson (British Museum); types *trimaculata* and *quadrimaculata*, in Coll. Adelaide Museum.

7. HESPERILLA, Hew.

Desc. Hesp., p. 37, 1868. *Telesto* (nom præocc), Bdv., Voy., "Astrolabe," Lep., p. 164, 1832; Plötz, Stett, Ent., Zeit, 1884, p. 376; M. and L., T.R.S., p. 48. *Oxytoxia*, Mab., Wyt. Gen. Ins.

Club of antennæ elongate, more or less bent, apiculus acute, moderate. Palpi obliquely ascending or subporrect, terminal joint short, rarely moderately long, subconical. Posterior tibiæ with all spurs. Forewings in male with stigma; 5 parallel to 4 and 6, slightly nearer 6 at base. Hindwings, with 5 obsolete.

Type *ornata*, Leach; *Hesperilla*, Hew.; type *perroni*, Latr.; *Telesto*, Bdv.; type *Doubledayi*, Feld.; *Oxytoxia*, Mab.

We formerly placed all the following species in *Telesto*, Bdv., but as this name has been used in *Tubularina*, in 1812, and again in *Crustacea*, in 1814, I am adopting Hewitson's name in preference to Boisduval's. With the exception of *perornata*, Kirby, and *munionga*, Oll., the genus is immediately separated from *Mesodina* and *Trapezites* by the absence of stigma in male. I have merged *Oxytoxia*, Mab., into *Hesperilla*, as to all intents and purposes it is structurally identical with that genus. A somewhat discordant character in

the genus *Hesperilla* is the slight structural differences in the antennæ and palpi, but at present I see no reason for dividing the genus any further than I have done. When we become better acquainted with the earlier stages of the different species, it may be advisable to erect new genera where expedient, but as they form a tolerably compact group, and are (with one or two exceptions) peculiar to the Australian region, I prefer to retain them under the one genus.

Watson distinguishes *Hesperilla* from *Telesto* by the latter having "club arcuate without terminal crook," whereas in the latter genus he considers the club "usually bent to less than a right angle." *Perornata* and *munionga* will probably require a new genus to receive them, as in characters they appear to be intermediate between *Hesperilla* and *Trapezites*, having the facies of the former and characters (in a degree) of the latter. In this and the following genus I have adopted a somewhat different arrangement from that in our previous paper, as it appears to be more in keeping with the proper sequence of the various species.

Mabille's genus *Oxytoxia* was erected on the strength of the stigma of male being oblique instead of erect, a rather feeble effort and quite unnecessary. The suggestion to form a new genus for *Doubledayi*, *flammeata*, and a few others came from Watson (P.Z.S., 1893, p. 74). By some mischance Mabille has made *flammeata* a synonym of *Doubledayi*, but the stigma of *flammeata* is certainly widely different from the others in places in his genus, *i.e.*, *Doubledayi*, *parvulus*, *compacta*, *argento ornatus*, and (?) *croites*. The last-named two are referable to *Anisynta*.

12. H. CYCLOSPILA, M. and L.

Telesto cyclopila, M. and L., T.R.S., p. 63.

Port Lincoln, South Australia; Melbourne, Victoria; in November.

Types in Coll. Lower.

13. H. CHRYSOTRICHA, M. and L.

Telesto chrysotricha, M. and L., T.R.S., p. 59.

Since the former Revision appeared I have received the ♀ taken at Rottneest Island, Western Australia. I append description of same.

♀, 42 mm. Head, palpi, antennæ, thorax, legs, and abdomen ochreous-fuscous; head, thorax, and abdomen clothed with yellowish hairs. Forewings elongate, triangular, termen slightly bowed, oblique; dark fuscous, silvery-whitish markings; a large, somewhat quadrate spot in end of cell, broadest above, slightly yellowish tinged, in end of cell; a

cartridge-shaped spot at base of veins 3 and 4, and a moderately large quadrate one immediately below; an oblique row of 3 subapical spots; a semi-ovoid spot lying on vein 1, at $\frac{2}{3}$ from base; cilia dark-fuscous. Hindwings with termen rounded, colour and cilia as in forewings; a rather large median patch of orange scales, divided into 3 unequal portions by veins, basal hairs orange; under-side of forewings reddish ochreous; markings of upper-side reproduced; basal $\frac{2}{3}$ of cell clothed with short orange hairs; dorsal edge pale-yellow, more broadly at anal angle. Hindwings reddish; marking dull silvery-white, edged with fuscous; a roundish spot in posterior end of cell; a similar spot at $\frac{2}{3}$ from base, between veins 6 and 7, and 2 similar, between veins 2 and 4; indications of similar spots adjoining.

Types in Coll. Lower.

Albany and Rottnest Island, Western Australia; in November. Mr. Meyrick has it from Northampton, Western Australia, and I possess what is probably a worn ♀ of this species from Goolwa, South Australia, taken in March.

14. H. DONNYSA, Hew.

Desc. Hesp., p. 39, 1868; ex. Butl., v., fig. 7, 1874; Victorian Butterflies, ii., p. 122, 1894. *Telesto donnyssa*, M. and L., T.R.S., p. 64. *Hesperilla Rietmanni*, Semp., Mus. God., xiv., p. 187, 1878.

Watson and Swinhoe suggest forming a new genus to receive this species. I have placed *Rietmanni*, Semp., as a synonym of this species, but am not perfectly satisfied as to its being identical. Semper's description applies fairly well to *donnyssa*, excepting the size and the yellow longitudinal streak (which may probably be intended for the scales along the dorsum). Judging by the figure I have of *croites*, Hew., that species is very similar to the ♀ *chaostola*, Meyr., but the ♂ of *chaostola* can hardly be considered to approach ♂ *picta*, Leach, with which *Rietmanni* is compared by Semper. *Donnyssa* is the only *Hesperilla* that I am acquainted with which shows the 6 white spots on border, and I know of no other Sydney species which approaches Semper's description better than *donnyssa*, consequently I treat it as a synonym of that species. I have made diligent inquiries, but have been unable to trace Semper's types. I append Semper's original description:—

“*HESPERILLA RIETMANNI*, Semper, *nov. spec.* Erhalten von Sydney, im Februar, gefangen Flugellänge: ♂, 12 mm.; ♀, 13 mm. Das ♂ ähnelt oberseits auf den Vorderflügeln der vorigen Art, nur hat der noch senkrechter auf den Innenrand des Flügels stehende Wulst einen gelben Längs-

strich. Die Hinterflügel sind einfarbig dunkelbraun mit einem gelblichen Schimmer auf dem Discus. Auf der Unterseite ist die Wurzelhälfte der Vorderflügel gelbbraun, der Innenrand grau und der grössere Theil des Aussenrandes dunkelbraun mit violet angeflogener Flugelspitze. Die Hinterflügel sind violettbraun mit hellerer undeutlicher Mittelbinde.

“Das ♀ sieht oberseits wie *Cycl. croites*, Hew. (ex. Butl., v. *Cycl. and Hesp.*, fig. 14) aus, nur fehlt der helle Wurzelfleck auf den Vorderflügeln; und der gelbe Mittelfleck auf den Hinterflügeln ist kleiner. Auf der Unterseite ist die Zeichnung wie beim ♂, nur etwas heller und im Ganzen scharfer ausgeprägt; so besonders die hellere Mittelbinde auf den Hinterflügeln, welche wurzelwärts mit einem und saumwärts mit einer Reihe von sechs kleinen weissen Punkten begrenzt ist.” The “preceding species” which Semper compares *Rietmanni* with is *picta*, Leach.

I have recently seen specimens of *downysa* taken at Mount Wellington, Tasmania, in which the markings of upper-side of wings are considerably enlarged and the colouring much brighter: the median patch of hindwing above deep-orange, and the spots of under-side are larger and distinctly white-centred. It may be advisable to give this a varietal name, but until more material is available I will consider it a well-marked form.

Victoria, Tasmania, South Australia (Blackwood and Yatala). Sydney, etc., New South Wales: from November to January.

15. H. IDOTHEA, Misk.

♀, *Trapezites idothea*, Misk., P.R.S., Qld., 1889, p. 152; Vict., Butt. ii., p. 116, 1894; *Telestos idothea*, M. and L.; T.R.S., p. 68. ♂, *Telestos dispar.*, Kirby, Ann. Mag., N.H., 1893, p. 436; Vict., Butt. ii., p. 117, 1894.

The sexes of this species are very dissimilar, but admit of no doubt of their being one and the same. My brother (Mr. Harold Lower) took several *male* specimens at Mount Lofty, South Australia, at about 7 a.m., without observing the ♀.

Tasmania, Victoria, Blue Mountains, New South Wales; Mount Lofty, South Australia; in November and December.

Type ♀ in Coll. Miskin (Brisbane Museum): type ♂ in Coll. British Museum.

16. H. FLAMMEATA, Butl.

♂, *Telestos flammeata*, Butl., Ann. Mag., N.H., 1882, p. 85; Vict., Butt. ii., p. 124, 1894; M. and L., T.R.S., p. 69. ♀, *Telestos eclipsis*, Butl., Ann. Mag., N.H., 1882, p. 86; *Hesperilla atromacula*, Misk., P.R.S., Qld., 1889, p. 148.

Healesville, Gisborne, etc., Victoria; Sydney, New South Wales; in January and February.

Types *flammeata* and *eclipsis*, in British Museum; type *atromacuta*, in Brisbane Museum.

17. H. TYMBOPHORA, M. and L.

♂, *Telesto tymbophora*, M. and L., T.R.S., p. 70. ♀, *l.c.*, 1908, p. 312.

Type ♀ in Coll. Waterhouse; type ♂ in Coll. Lower.

Mr. Waterhouse considered the ♀ to be *arsenia*, Plötz, but that species is identical with ♀ *Perroni*, Latr.

Mount Kembla, New South Wales; in December.

18. H. COMPACTA, Butl.

Ann. Mag., N.H., 1882, p. 87. *Telesto compacta*, M. and L. T.R.S., p. 77. *Hesperilla scepticalis*, Rosen., Ann. Mag., N.H., 1885, p. 379, pl. ii., fig. 2. ♂, *Hesperilla melissa*, Mab., Comp., Rend., Ent. Belg., vol. xxxv., p. 81, 1891. ♀, *Hesperilla atrax*, Mab., *l.c.*, 1891.

I sent ♂ and ♀ of this species to Mabille. He identified the ♂ as *Hesperilla melissa*, Mab., and the ♀ as *Telesto compacta*, Butl., consequently the question arises what species does his ♀ *melissa* represent? Of his *melissa* he says:—

“Noir; à reflet roux; ailes portant un trait presque en croissant dans la cellule, trois points à l’apex et une petite dans le 4^e intervalle, tous blancs et vitrés. Inférieures avec une rangée de 4 taches allongées, vitrées sur le milieu, la supérieure plus petite, et un point roux clair (deux chez la ♀) à la base de la cellule. Franges roux clair, dessous des ailes avec les taches du dessus, mais le fond est brun rougeâtre clair, excepté le milieu des supérieures qui est noirâtre, et l’intervalle I., qui est blanc roussâtre. Aux inférieures la bande du milieu à deux points roux cercles de noir qui lui font suite sur les intervalles 3 et 2; et un autre semblable sur l’intervalle 7. En outre il y a sur la base de l’aile une rangée de trois points blanc roussâtre, et un autre à la base de l’intervalle 8.

“Le Corps est de la couleur des ailes; en dessous les palpes et la poitrine sont blanc; 21 mm., ♂ et ♀, Sydney.”

The description of the male admits of no doubt, although no mention is made of the stigma, unless “un trait presque,” etc., refers to it; but I take that to refer to the elongate subcrescentric mark in cell of forewing. I have a coloured drawing of the *type specimen* of *atrax*, and it is without doubt the ♀ of *compacta*, Butl.

Sydney, etc., New South Wales; Macedon, Gisborne, etc., Victoria; from February to April.

Types *compacta*, in British Museum: types *melissa* and *atraw*, in Coll. Berlin Museum (Staudinger's).

19. H. ANDERSONI, Kirby.

Telesto Andersoni, Kirby, A.M.N.H., p. 434, 1893; Vict., Butt., ii., p. 118, 1893; M. and L., T.R.S., p. 66.

Type in British Museum.

Dandenong Ranges and Poowong, Victoria; Mount Kembla, New South Wales; in November and January.

20. H. DOUBLEDAYI, Feld.

Telesto Doubledayi, Feld., Verh., Zool., Bot., Ges. xii., p. 491, 1862; Vict., Butt. ii., p. 126, 1894; M. and L., T.R.S., p. 72. *Hesperilla dirphia*, Herr.-Sch. (*nec* Hew.), S.E.Z., 1869, p. 79, pl. iii., fig. 10. *Telesto Leachi*, Feld., Verh., Zool., Bot., Ges. xii., p. 491, 1862. *Telesto extranea*, Plötz, S.E.Z., p. 383, 1884.

As will be seen an additional synonym is *extranea*, Plötz.

Brisbane to Cairns, Queensland; Como (Sydney), New South Wales; Healesville and Wandon, Victoria; from November to March.

21. H. LEUCOSTIGMA, M. and L.

Telesto leucostigma, M. and L., T.R.S., p. 73.

Types in Coll. Lower.

Sydney, New South Wales, to Cairns, Queensland.

22. H. LEUCOSTIGMA, M. and L., *var.* PARASEMA, Low.

T.R.S., S.A., p. 312, 1908.

Differs chiefly from typical *leucostigma*, M. and L., by the absence in both sexes of the sickle-shaped cellular spot, which is never more than faintly indicated. The 3 subapical spots are absent in both sexes, and the lower post-stigmal dot is sometimes absent.

Types in Coll. Lower.

Kuranda, Queensland. Several specimens sent me by Mr. Dodd; taken in November and December.

23. H. PARVULUS, Plötz.

Telesto parvulus, Plötz, S.E.Z., 1884, p. 379. *Hesperilla humilis*, Misk., P.R.S., Qld., 1889, p. 150. *Telesto ismene*, Newm., M.S.S., Vict., Butt., ii., p. 128, 1894; M. and L., T.R.S., p. 73.

We formerly called this *ismene*, Newm., but Colonel Swinhoe informs me that the name was never published. Mr. Kirby and Mr. Heron (of the British Museum) can find no record of it, and Mr. Meyrick can throw no light on the matter. Felder described an insect (Reis. Nov.

iii., p. 512, No. 894, figs. 4 and 5, t. 73, 1867) under the name of *Hesperia ismene* from Celebes, but I am not acquainted with it.

Sydney, etc., New South Wales; Brisbane to Mackay, Queensland; Healesville, Lake Tyers, Victoria; in November.

24. H. SEXGUTTATA, Herr.-Sch.

Telesto sexguttata, Herr.-Sch., S.E.Z., 1869, p. 80, pl. iii., fig. 16. ♀, M. and L., T.R.S., p. 74, Brisbane (?), Bowen, Rockhampton, Herberton, Queensland.

Brisbane (?), Bowen, Kuranda, Rockhampton, Herberton, Queensland.

25. H. MELANIA, Waterh.

Telesto melania, Waterh., Vict., Nat. 1903, p. 54.

♂ ♀, 30-36 mm. Head, palpi, antennæ, thorax, abdomen, and legs dark-fuscous; palpi, thorax, and abdomen beneath whitish; apiculus of antennæ dull-reddish internally. Forewings elongate, triangular, costa straight, termen oblique, hardly rounded; dark-reddish fuscous, without markings; stigma oblique, very narrow, entire, dull-whitish, edged internally with its own width of black, from just above dorsum to base of vein 4, where there appears sometimes a small white dot, generally absent, which in ♀ is slightly larger and with an additional smaller dot below, which is also sometimes absent; cilia whitish. Spotted with fuscous. Hindwings with termen rounded, without markings; colour and cilia as in forewings. Under-side of forewings dark-fuscous, dorsum much lighter, becoming whitish at and above anal angle; spots of upper-side when present reproduced. Hindwing light-brown, suffused with grey; generally a curved series of 7 whitish interneural spots at $\frac{5}{8}$ from base, sometimes absent; cilia of both sexes brownish-fuscous. Nearest *tyrrhus*, Mab., but immediately separable from that species by the form of the stigma, which in that species is very broad. In general appearance not unlike *Erynnis fuliginosa*, Misk., but apart from the different cilia, which in that species is a striking characteristic, it is at once recognized by theuration of forewings.

Types in Coll. Waterhouse.

Kuranda (Cairns), Queensland. Several specimens; January to April.

26. H. TYRRHUS, Mab.

Toxidia tyrrhus, Mab., Comp. Rend. Soc., Ent. Belg., vol. xxxv., p. 80, 1891. *Telesto sarula*, Swinh. (nec Mab.), Ann. Mag., N.H. 7, vol. xvi., p. 614, 1905. *Telesto bathrophora*, M. and L., T.R.S., p. 82.

This insect has been subject to some unnecessary confusion. Mabille, who described a ♀ and considered it to be the ♂, formed the genus *Toxidia* to receive it, which is not warranted. Of the species he says:—

“♂, 25 mm. Ailes noires, côté des antérieures un peu rousse. Celles-ci offrent en outre trois petits points apicaux en ligne droite dont l'intermédiaire plus petit, en outre on en voit encore un dans le 4^e intervalle. Frange large, concolore et luisante. Inférieures d'un noir foncé. Dessous semblable; intervalle 1, aux premières et une partie du 2^e, blanchâtres. Disque des inférieures à reflet violâtre. Palpes et poitrine gris cendré, abdomen égalant les ailes inférieures.”

In 1905 Colonel Swinhoe identified it as *Hesperilla saxula*, Mab., and described the ♂ under the name of *saxula*, but which in reality refers to the ♂ *tyrrhus*, excepting that he mentions only 2 subapical spots (there are 3 in typical *tyrrhus*), and added as a footnote:—“Mabille's ♀ type came from Cooktown, and his description fits my examples very well, considering the usual sexual differences.” This identification is rather confusing, as the description of *saxula* on under-side of hindwings is nothing like *tyrrhus*, which is practically without markings, and cannot possibly be confused with it. Mabille says of under-side of hindwings of *saxula*:—

“Les inférieures sont noirâtres avec une bande basilaire de deux taches jaunâtre cerchés de brun foncé, et une médiane de taches semblables séparée en deux groupes, l'un de deux taches près de l'angle antérieur, et l'autre commençant au dessus de la cellule et s'arrêtant à l'espace abdominal.”

In 1904 Mabille, in his Monograph of the Hesperiadæ in Wytman's Genera Insectorum, fascd., p. 132, put his species *saxula* under Godman and Salvins' genus *Halotis*, with Costa Rica, Central America, as its habitat. *This is probably correct.* Colonel Swinhoe says (Ann. Mag., N.H. 7, xvi., p. 615, 1905):—“In the Biologia Insecta, Lep. Rhop., ii., p. 505, pl. xcv., figs. 42, 43, 44, ♂ (1900), a Hesperid from Costa Rica is described and figured as the type of the genus *Halotis*; but neither the description nor the figures represent the Queensland insect. One of the Biologia examples, it is said, is labelled as having been compared by Salvin with the type of *Hesperia saxula*, Mab., a description of which *could not be found*; this must refer to some Hesperid from Costa Rica, so named by Mabille, which never was described and published. It can have no reference to the Cooktown insect.”

As mentioned above, the insect has been described, and I have received a fine coloured drawing by R. Flanderky, per favour Trustees of Berlin Museum, which decides the question beyond any doubt, as the drawing delineates a species *totally* dissimilar to *tyrrhus*, and not near anything found in Australia so far as known to me. As the former description embraced two forms I will redescribe the species.

♂, 28 mm. Head, palpi, thorax, and abdomen blackish-fuscous, mixed with greenish-golden hairs, palpi and thorax beneath whitish. Antennæ fuscous, spotted beneath with whitish, apiculus whitish. Forewings elongate, triangular, costantly arched, termen gently bowed, oblique; dark-fuscous, with a greenish-golden sheen; without markings or very rarely with 3 subapical dots; stigma entire, rather broad, whitish, sometimes appearing white, oblique, edged narrowly on either side with blackish from above vein 1 to posterior extremity of cell, anterior edge with a moderate projection in middle, posterior edge moderately straight; cilia fuscous-whitish. Hindwings with termen rounded; colour and cilia as in forewings; without markings: a few golden-ochreous hairs toward base. Under-side of both wings ochreous-fuscous, dorsum broadly dull-whitish; finely dusted with whitish, especially hindwings; markings of upper-side, except stigma, reproduced; hindwings with dull-purplish reflections and a curved postmedian series of dull-whitish spots from beneath costæ to vein 1 in middle, lying on somewhat darker ground colour; cilia as above.

♀, 30 mm. Head, etc., as in ♂. Forewings as in ♂, but termen more bowed; a white, somewhat quadrate spot between veins 4 and 5 at base, sometimes absent; a transverse row of 3 white subapical spots; cilia as in forewings. Hindwings as in ♂. Under-side of wings as in ♂, markings of upper-side of ♂ reproduced.

Type ♀, in Berlin Museum (Coll. Staudinger); type ♂, in Coll. Lower; types *Bathrophora*, in Coll. Lower.

This species is subject to slight variation, but not of sufficient importance to separate the forms. The *presence* of the subapical spots in the ♂ is comparatively rare, and the *absence* of same in ♀ is very rare; the interneural quadrate spot of ♀ is subject to variation in size, becoming almost obsolete in some specimens, but is generally indicated. I have now twenty-nine specimens taken at Mackay, Kuranda, and Cairns from December to March.

27. H. CRYPSIGRAMMA, M. and L.

Telesto crypsigramma, M. and L., T.R.S., p. 81.

Herberton, Queensland.

Type in Coll. Lower.

28. H. PERRONI, Latr.

Enc. Meth., ix., p. 763, 1823. *Telesto Perronii*, M. and L., T.R.S., p. 75. *Telesto Kochii*, Feld., Verh., Zool., Bot., Geis xii., p. 491, 1862. *Hesperilla doctea*, Hew. Desc., Hesp., p. 39, 1868. ♀, *Telesto arsenia*, Plötz, S.E.Z., xlv., 384, 1884.

As the now accepted rule is that proper names should be in the genitive and terminate in "i" and not "ii," I have adopted *Perroni* in preference to *Perronii*. *Telesto arsenia* is identical with this species; Plötz's coloured drawing, which is before me, depicting both the upper and under side, indicates the ♀ with certainty.

Types ——?

Brisbane to Herberton, Queensland. Forty-nine specimens; between November and February.

29. H. MALINDEVA, n. sp.

♂, 32-35 mm. Head, palpi, thorax, and abdomen dark-fuscous; palpi, thorax, and abdomen beneath ochreous-white; thorax above clothed with short dull-golden hairs. Antennæ dark-fuscous, annulated with white. Legs ochreous-whitish, posterior pair mixed with reddish-ochreous. Forewings elongate, triangular; costa nearly straight, termen gently rounded, oblique; rather dark smoky-brown; markings pale-yellowish; a rather broad transverse spot in end of cell, sometimes much constricted on upper half, a moderate elongate quadrate spot lying on vein 3 at base, a shadowy outline of a larger quadrate spot below; and oblique transverse row of 3 small subapical spots between veins 6 and 9; stigma entire, rather narrow, thickest in middle, from base of vein 4 to vein 1 at about $\frac{2}{3}$ from base; cilia dark-fuscous, terminal half paler. Hindwings with termen rounded; colour and cilia as in forewings, without markings; basal $\frac{2}{3}$ of wing clothed with dull-orange hairs. Under-side of wings dull-ochreous, faintly reddish-tinged, more pronounced on hindwings; markings of upper side of forewings, except stigma, reproduced; lower half of forewings darker than rest of wing; quadrate spot below vein 3 tolerably well developed; dorsum whitish-ochreous throughout; a suffused quadrate patch, below the quadrate spot; hindwings with 2 small roundish fuscous spots between veins 2 and 4 at $\frac{2}{3}$ from base; cilia as above, becoming grey-whitish on tornus of hindwings.

♀, 42 mm. Head, etc., as in ♂. Wings as in ♂, but termen of forewings more rounded; spots larger, an additional moderately large quadrate spot lying between veins 2 and 3 at $\frac{2}{3}$ from base, immediately below postcellular spot; a roundish whitish spot lying on vein 1 at $\frac{2}{3}$ from base. Under-side as in ♂.

Allied to *Perroni*, Latr., but abundantly distinct by shape of stigma, cellular spot, and under-side of hindwings.

I have dedicated this species to my wife (Eva Linda May), whose keen interest in the *Hesperiadae* is of valued assistance to me.

Type ♂, Coll. Lower; type ♀, in Coll. Waterhouse.

Herberton, Queensland. Two ♂ specimens and one ♀, the latter in Coll. G. A. Waterhouse; taken by Mr. Dodd in January.

30. *H. XIPHIPHORA*, n. sp.

♂, 28 mm. Head, palpi, antennæ, and thorax dark-fuscous; palpi and thorax beneath pale-yellow; antennæ beneath spotted with yellowish, apiculus red. Legs and abdomen yellowish-fuscous, abdominal segments yellow. Forewings rather short, costa straight, termen oblique, nearly straight; fuscous ochreous; basal half of wing clothed with short dense orange hairs; markings dull-whitish; a somewhat sickle-shaped elongate spot in posterior end of cell; a small quadrate spot at base of veins 3 and 4, another slightly larger immediately below; a transverse series of 3 subapical spots, median smallest; stigma black, very broad, erect, entire, from just below vein 1 at $\frac{2}{3}$ from base to base of veins 3 and 4; cilia fuscous, base darker, mixed with whitish or terminal half. Hindwings with termen rounded; colour and cilia as in forewings, base and dorsum clothed with rather long orange hairs; two moderate, well-marked, yellow-whitish ovoid spots, separated by intervening veins just beyond middle of wing at $\frac{2}{3}$ from base.

♀, 30 mm. Head, palpi, antennæ, thorax, abdomen, and legs as in ♂. Forewings with colour and markings as in ♂, but cellular spot irregularly 8-shaped and other spots similar but much enlarged, spot at base of veins 2 and 3 quadrate; a whitish quadrate spot lying on vein 1 in middle. Hindwings as in ♂, but lower spot much smaller and often obscure; cilia of both wings as in ♂.

Under-side of all wings of both sexes thickly clothed throughout with orange scales, excepting dorsum of forewings and a patch above anal angle; markings of upper-side, except stigma, reproduced, and more or less edged with fuscous; cilia more yellowish than above.

Types in Coll. Lower.

This insect is very closely allied to *croceus*, Misk., being intermediate between that species and the following. It differs from *croceus* primarily by the very broad stigma (of which I have not met with intermediate forms), the shorter and more abrupt wings and general contour. The female *croceus* has the spot which lies at the base of veins 2 and 3

cartridge-shaped, with its apex directed inwards, and its *outer* edge does not reach more than beyond the middle of the spot above; whereas in the present species it is quadrate and reaches to the extreme edge. These characters are constant enough to warrant the assumption that it is a good species and not a variety of *croceus* or *xanthomera*.

Port Darwin. Fourteen specimens; in February, March, and April. Cairns, Queensland. One specimen; in December (F. P. Dodd).

31. H. CROCEUS, Misk.

♂, *Hesperilla croceus*, Misk., P.R.S., Qld., 1889, p. 150.
♀, *l.c.* (*nec croceus*). ♀, *Hesperilla satulla*, Mab., Comp. Rend., Ent. Belg., vol. xxxv., p. 82, 1891. *Telesto croceus*, M. and L., T.R.S., p. 79.

I sent a ♀ specimen to Mabilie, who returned it as *H. satulla*, Mab. (?), at the same time stating that the type was now in Coll. Dr. Staudinger (since purchased by the Berlin Museum). Herr Flanderky has sent me an excellent coloured figure of the type *satulla*, which agrees exactly with ♀ *croceus*, Misk. *Croceus* is subject to some variation, especially in the hindwings of ♀, the upper-side of which sometimes has the two conspicuous median spots, and sometimes one only, and in rarer cases practically absent, yet, strange to say, the *two* are always present on the *under-side*, though sometimes obscurely delineated.

Type ♂ *croceus*, Misk., in Brisbane Museum; type ♀, in Coll. Lower; type *satulla*, Mab., in Coll. Staudinger (Berlin Museum).

Port Darwin; Brisbane, Cooktown to Cairns, Queensland; February, March, and April.

32. H. SENTA, Misk.

♀, *Hesperilla senta*, Misk., Ann. Qld. Mus. Supp., 1891. *Telesto senta*, M. and L., T.R.S., p. 78.

Having received better specimens from Mr. Dodd, taken at Kuranda, I find that the ♂ insect requires redescribing.

♂, 28 mm. Head, palpi, antennæ, and thorax dark-fuscous; palpi and thorax yellowish beneath; antennæ spotted beneath with whitish, apiculus reddish; abdomen dark-fuscous, beneath yellow; segmental margins yellowish. Legs fuscous, yellowish tinged. Forewings elongate, triangular; costa faintly sinuate in middle, termen hardly rounded, oblique; dark-golden fuscous, thickly clothed on basal half with short orange hairs; markings semi-transparent, pale-yellowish; an irregular quadrate spot in posterior end of cell, strongly indented anteriorly, lower edge somewhat elongate; an ovoid spot, sometimes obscure, imme-

diately below; stigma narrow, entire, slightly oblique, from immediately above dorsum to base of veins 4 and 5; a somewhat cartridge-shaped spot touching its apex; a small spot immediately below; an oblique transverse row of 3 subapical spots, median smallest; cilia pale-whitish yellow, distinctly barred with dark-fuscous. Hindwings with termen rounded; colour and cilia as in forewings; a moderate deep-yellow ovate spot at $\frac{2}{3}$ from base, between veins 6 and 7; a similar spot at $\frac{2}{3}$ from base between veins 3 and 4. Under side of forewings dark-fuscous; costal area and upper half of termen broadly yellow; markings of upper side, except stigma, reproduced in golden-ochreous. Hindwings wholly yellow except a broad cuneiform blackish patch along dorsum; markings pale-yellowish, edged with fuscous; an obscure spot at base of veins 7 and 8; a second larger, in end of cell; a third between veins 7 and 8 at $\frac{2}{3}$ from base; a fourth, largest, ovate just below; 2 very small dots just below, and 3 moderately large spots between last 2 and vein 1, the last 7 forming a curved series parallel to termen.

Type ♀, in Coll. Queensland Museum; type ♂, in Coll. Lower.

Cooktown, Kuranda, and Herberton, Queensland; November to February.

33. H. XANTHOMERA, M. and L.

Telesto xanthomera, M. and L., T.R.S., p. 80.

Types in Coll. Lower.

Brisbane and Cairns, Queensland.

The localities, Victoria and New South Wales, previously given are probably erroneous.

34. H. CHAOSTOLA, Meyr.

Telesto chaostola, Meyr., P.L.S., N.S.W., 1887, p. 830; M. and L., T.R.S., p. 65.

Type ♂, Coll. Meyrick; type ♀, in Coll. Lower.

Blackheath, New South Wales; Huonville, Tasmania, in November and December.

The upper-side of the ♀ of this species bears a rather striking appearance to *Trapezites croites*, Hew., but the under-side is quite different. This and the following species appear to be allied, and have the terminal joint of palpi very long compared with other species of the genus.

35. H. ATRALBA, Tepp.

T.R.S., S.A., iv., 1881, p. 33, pl. ii., fig. 5. *Telesto atralba*, M. and L., T.R.S., p. 71. *T. dactyliota*, Meyr., P.L.S., N.S.W., 1887, p. 831.

Type *atralba*, in Adelaide Museum; type *dactyliota*, in Coll. Meyrick.

Port Lincoln and Moonta, South Australia; Geraldton, Western Australia; in October and November.

36. H. DRACHMOPHORA, Meyr.

Teleso drachmophora, Meyr., Ent. Mon. Mag., p. 82, 1885; M. and L., T.R.S., p. 61.

Type in Coll. Meyrick.

This and the two following species have terminal joint of palpi long and somewhat slender.

Deloraine, Tasmania; Moonbar, New South Wales; in March.

37. H. DOMINULA, Plötz.

Teleso dominula, Plötz, S.E.Z., xlv., p. 379, 1884; M. and L., T.R.S., p. 61.

Type ----?

I much doubt if this species can remain as distinct from *drachmophora*, Meyr. I have a specimen from Newcastle, New South Wales, which agrees very well with Plötz's description and figure. It chiefly differs by the markings of under-side of hindwings being dull-whitish instead of being silvery-white, as in *drachmophora*, but as both species are scarce and material scanty I prefer to keep them separate for the present.

Tasmania; Newcastle, New South Wales.

38. H. MONTICOLÆ, Oll.

P.L.S., N.S.W., 1889, p. 624; M. and L., T.R.S., p. 62; Waterh., Vict., Nat., 1903, p. 52.

Having received more perfect specimens from Mr. Edmund Jarvis, I redescribe this species, the former description being faulty. ♂, 22-25 mm. Head, thorax, palpi, and abdomen dark-fuscous, beneath yellowish terminal joint palpi long. Antennæ fuscous, annulated with whitish-yellow. Legs yellowish. Forewings elongate, moderate, triangular, terminally rounded oblique; dark-fuscous, basal half clothed with short orange hairs; a small somewhat quadrate orange spot in end of cell; a somewhat cuneiform orange spot at base of veins 3 and 4, its apex directed inwards; a small ovoid orange spot immediately below, sometimes absent; a transverse row of 3 pale-yellow subapical spots; stigma dull-black, more or less broken into spots, oblique, from vein 1 to base of orange cuneiform spot; cilia, dull-reddish orange, barred with blackish at extremities of veins. Hindwings with termen somewhat strongly bowed; colour and cilia as in forewings; basal area clothed with fine long orange hairs; an indistinct

orange spot at end of cell, sometimes very suffused, beyond which an orange suffusion; two small, well-marked elongate orange spots beyond extremity of cell, separated by vein; under-side of forewings with markings, except stigma, of upper-side reproduced, the 3 subapical spots pale-lemon, cellular spot edged on either side with black; costal and cellular area of wing deep-orange from base to subapical spots; an irregular lemon-coloured apical patch extending to middle of termen; rest of wing blackish; dorsum dusted with ochreous. Hindwings beneath ochreous-fuscous, with lemon-coloured markings; an irregular cuneiform spot lying at base of wing; an irregular fascia from beneath costa at $\frac{1}{3}$ to middle of dorsum, where it becomes confluent with a large spot on anal angle and a smaller one near base; the two spots of upper side connect the fascia beyond middle; between basal cuneiform spot and upper edge of fascia is a small dot; an irregular quadrate spot on termen in middle, nearly touching lower edge of fascia; two small dots above termen, between veins 2 and 4; cilia of both wings with a broad lemon-coloured basal line.

♀. 25 mm. Head, palpi, antennæ, and thorax as in ♂. Upper side of forewings somewhat lighter than ♂, and spots larger and the discal series consisting of four spots; first and second elongate, third smaller, lowest larger cuneiform; cilia yellowish, spotted with fuscous. Hindwings with colour and cilia as in forewing; a large cartridge-shaped yellow spot just beyond end of cell, below which are two smaller but similar spots, divided by intersecting vein. Under-side of both wings as in ♂, markings of upper-side darker, except subapical series of spots.

Type ♂, in Australian Museum; type ♀, in Coll. Lyell, Moonbar, near Mount Kosciusko, New South Wales, in March; near Walhalla, Victoria (E. Jarvis), in February.

39. H. CRYPSARGYRA, Meyr.

Telesto crypsargyra, Meyr., P.L.S., N.S.W., p. 829, 1887; M. and L., T.R.S., p. 58.

Type in Coll. Meyrick.

Blackheath and Katoomba, New South Wales; November to February.

40. H. PICTA, Leach.

Zool., Misc., i., p. 126, pl. lv., figs. 4-5, 1815; Math., T.E.S., 1888, p. 185, pl. vi., figs. 9-9a; Vict., Butt., ii., 1894, p. 121; M. and L., T.R.S., p. 57.

Types — ?

In the former Revision the references to the figures of *picta* and *ornata* were inadvertently given as the same.

Sydney and Bathurst, New South Wales; Victoria: from October to January.

Mr. R. Illidge has specimens taken at Brisbane.

41. *H. MASTERSI*, Waterh.

P.L.S., N.S.W., 1900, pl. i., figs. 5-8, p. 54; M. and L., T.R.S., p. 55.

Types in Coll. Waterhouse.

Blue Mountains, Illawarra, New South Wales; in January.

42. *H. ORNATA*, Leach.

Zool., Misc., i., p. 126, pl. lv., figs. 1-3, 1815; Math., T.E.S., 1888, p. 187; Aust., Butt., 1889, p. 41; *Telesto ornata*, M. and L., T.R.S., p. 53.

Type —— ?

Wandin, Victoria; Sydney, New South Wales, to Cooktown, Queensland; from October to January.

43. *H. ORNATA*, Leach, *var. MONOTHERMA*, Low.

T.R.S., S.A., 1907, p. 169.

In the original description this name was misprinted *monotherm*. Some years ago, in looking through the *Hesperiadæ* in the Queensland Museum, I saw a ♀ variety of *ornata* in poor condition with all spots of upper-side of forewing (excepting the 3 subapical and a minute one below) absent. The under-side was as usual, but without the curious dark spot in the white patch of hindwings. This specimen is an intermediate link between *monotherma* and *ornata*. In the former all markings of upper side of forewings are obsolete.

Type in Coll. Lower.

Cooktown and Herberton, Queensland.

44. *H. PERORNATA*, Kirby.

Ann. Mag., N.H., 1893, p. 437. ♀, *Telesto perornata*, M. and L., T.R.S., p. 2.

This species and *munionga*, Oll., will probably require a new genus to receive them. The stages of the larvæ and pupæ are quite different from *ornata* and its allies. This species shows considerable resemblance to *ornata*, but is immediately separable by the absence of stigma of ♂. The club of antennæ is slightly different from *ornata*, being somewhat more robust and more evenly curved. Superficially it shows such similarity as to be almost confused with that species, especially the ♀, hence my reason for retaining it in *Hesperilla*. The absence of stigma of ♂ in this and the following I at present regard as specific only. This I consider the better plan than erecting

a new genus, which may ultimately prove to be superfluous.

The ♂ does not differ from the ♀ excepting in size (26-28 mm.).

Type ♀, in British Museum.

Victoria; Blue Mountains, New South Wales; in October and November.

45. H. MUNIONGA, Oll.

P.L.S., N.S.W., 1889, p. 623; *Telesto munionga*; M. and L., T.R.S., p. 56.

This species presents the same peculiarities as *perornata*. They are both mountain species.

The sexes do not differ.

Types in Coll. Australian Museum, Sydney.

Mount Kosciusko, New South Wales.

8. TRAPEZITES, Hb.

Verz. Bek. Schmett, p. 112, 1816; *Patlasingha*, Watson, P.Z.S., p. 74, 1893.

Club of antennæ elongate, more or less bent, apiculus pointed, long or moderately long. Palpi obliquely ascending or subporrect, terminal joint short, subconical. Posterior tibiæ with all spurs. Forewings in ♂ without stigma; vein 5 parallel to 4 and 6, slightly nearer 6 at base. Hindwings with vein 5 obsolete.

Type *symmomus*, Hb., *Trapezites*.

Type *phigalia*, Hew., *Patlasingha*.

Watson separated his genus *Patlasingha* from *Trapezites* on the length of the terminal joint of palpi and length of apiculus of antennæ. I have altered the generic characters of *Trapezites* so as to embrace both genera, as they are too intimately associated to warrant division.

46. T. HETEROMACULA, M. and L.

T.R.S., p. 84.

The ♀ of this species does not differ from male except that the two small spots on under-side of hindwing, near termen, are somewhat larger and less rounded.

Note.—In the original tabulation the name is misprinted *heliomacula*.

Type ♂, in Coll. Macleay Museum.

Cairns, Herberton, and Endeavour River, Queensland; in May.

47. T. PETALIA, Hew.

Hesperia petalia, Hew., Desc. Hesp., p. 32, n. 25, 1868; Herr.-Sch., S.E.Z., 1869, p. 80, pl. iii., fig. 11; M. and L., T.R.S., p. 85; *Telesto megalopis*, Meyr., P.L.S., N.S.W., 1887, p. 832.

Type *petalia*, in Coll. Hewitson (British Museum); type *megalopsis*, in Coll. Meyrick.

Sydney to Mackay; from March to November.

48. T. LUTEA, Tepp.

Hesperilla lutea, Tepp., T.R.S., S.A., iv., p. 33, t. 2, fig. 6, 1887; *Trapezites petalia*, Misk. (*nec* Hew.), Ann. Qld. Mus., p. 79, 1891 (in part); *T. lutea*, M. and L., T.R.S., p. 90.

Type in Adelaide Museum.

This species has the apiculus of antennæ shorter than the other species of the genus.

Stonyfell and Port Lincoln, South Australia; Hobart, Tasmania; and New South Wales; in November.

49. T. IACCHUS, Fabr.

Papilio iacchus, Fabr., Ent. Syst., p. 533, 1775; Donovan, Ins. New Holl., pl. xxxi., fig. 1, 1805.

The description formerly given by us, *T. iacchus*, Fabr., refers to *eliena*, Hew. The whole trouble arose thus: Herrich-Schäffer recognized that Hewitson's *eliena* was allied to *iacchus*, but not knowing true *iacchus* says (S.E.Z., p. 80, n. 66, 1869):—"Ich bestimmte dies Thier vor Herrn Hewitson's Erklärung als *H. iacchus*, Don., Austral; es sind in diesem Bilde die Flecke der V fl nur gar zu licht und jene der U.S. der H fl zu gross weiss gekernt," indicating that he disagreed with Donovan's as representing *iacchus*. Plötz no doubt considered Herrich-Schäffer's figure of *eliena* and Donovan's were not the same, and imagined that Herrich-Schäffer's incorrectly determined Hewitson's *eliena*, and so considered the figure to represent *donnysa*, Hew., and placed *eliena*, Hew., as a synonym of *iacchus*. The original Fabrician description reads:—"Papilio iacchus; alsi ecaudatis, flavo maculatis postis punctis sex niveis" (wings without tails, spotted with yellow and six snowy-white dots). The number of spots should be five, not six, although Donovan's figure shows seven, caused by the veins dividing two of the spots. Mr. R. E. Turner states that the type *iacchus* which is in the Banksian Collection has the spots somewhat more elongate than usual, and although neither *iacchus* nor *eliena* can be said to possess white spots on forewings, those on *iacchus* are yellowish-white and those of *eliena* golden-yellow. I am quite satisfied that the northern form, ranging from Brisbane to Cape York, is *iacchus*; and the southern form, ranging through New South Wales, Victoria, South Australia, and Tasmania, is *eliena*, Hew. Professor Mabille, to whom specimens were submitted, returned them as *phigalia*, Hew.; certainly an error in identification.

♂ ♀, 34-40 mm. Head, palpi, antennæ, thorax, and abdomen dark-fuscous, palpi and thorax beneath whitish, antennæ spotted beneath with ochreous-whitish, apiculus reddish. Legs reddish-fuscous. Forewings elongate, triangular, moderate; costa nearly straight, termen gently rounded, oblique; rather light-golden fuscous, with yellowish-white markings; basal third of wing clothed with yellow hairs; a rather large quadrate spot in posterior end of cell, slightly indented anteriorly and posteriorly; a moderately large cartridge-shaped spot at base of veins 3 and 4, and a larger one, more quadrate, immediately below; a suffused roundish spot lying on vein 1 about middle; a transverse row of three cartridge-shaped subapical spots; a streak of yellow along dorsum to middle, and a similar streak along vein 1 to middle, meeting spot; cilia fuscous, yellowish-white round anal angle. Hindwings with termen rounded; colour as in forewings; base and dorsum clothed with long yellowish hairs; an orange median band divided into three parts by intersecting veins; upper part elongate-ovate, with a short projection toward termen; median very small; cuneiform; lower somewhat similar to last, but larger; lower edge mixed with orange hairs; cilia yellow, becoming fuscous at base. Under-side of forewings dull-reddish ochreous; markings of upper-side reproduced; basal half of costa and upper half of cell yellow; basal half of wing and lower half of termen dark-fuscous, inclining to black; cilia paler than above. Hindwings rather bright-reddish ochreous; markings distinct, snow-white, narrowly edged with fuscous; a spot in cell toward base; a second at $\frac{2}{3}$ from base between veins 6 and 7, and three others at $\frac{2}{3}$ from base in a curved series between veins 1 and 4; cilia pale-ochreous fuscous.

Brisbane to Cape York. Eleven specimens; from February to May.

50. *T. ELIENA*, Hew.

Desc. Hesp., p. 32, n. 24, 1868; Herr.-Sch., S.E.Z., n. 66, pl. iii., fig. 13, 1869; *iacchus*, Semp. (*nec* Fabr.), Mus. God. Lep., xiv., p. 49, 1878; *Telesto cæcilius*, Plötz, S.E.Z., p. 380, xlv., 1884; *eliena*, Misk. (in part), Ann. Qld. Mus., p. 78, 1891; *iacchus*, M. and L. (*nec* Fabr.), T.R.S., p. 87.

Note.—Miskin's *iacchus* is partly *symmomus*, Hb., and *maheta*, ♂, Hew. The true *iacchus* was apparently unknown to him.

♂ ♀, 34-38 mm. Head, palpi, thorax, and abdomen dark-fuscous, clothed with pale-greenish-yellow hairs, beneath pale-yellowish; antennæ fuscous, annulated with ochreous, posterior half beneath ochreous, terminal half of apiculus beneath reddish. Legs dull-orange. Forewings elongate, triangular, costa gently arched, termen bowed, oblique;

varying from golden-fuscous to dark-fuscous; costal and basal areas clothed with orange scales; markings golden-orange, placed as in *iacchus*; spot on vein 1 bright orange, and more or less anteriorly suffusedly mixed with golden hair scales and continued to base; a bright orange streak on dorsum from base to middle; cilia orange, basal half dark-fuscous. Hindwings dark-fuscous; basal and dorsal hairs long, orange; median band orange, shaped as in *iacchus*, but broader; cilia orange, with blackish bars at neural extremities. Under-side of both wings bright orange-fulvous, lower $\frac{2}{3}$ of forewings dark-fuscous, markings of upper-side reproduced, but paler; cilia as above. Hindwings with 5 spots placed as in *iacchus*, that in the cell being the largest, white, ringed with black; the 4 remaining spots are much smaller, and are sometimes wholly blackish without the white centres, all spots larger in ♀.

Type in Coll. Hewitson, British Museum.

Plötz places *eliena*, Herr.-Sch., as a synonym of *donnysa*, Hew. (S.E.Z., t. 3, f. 13, 1869), and *eliena*, Hew., as a synonym of *iacchus*, Fabr.

Macedon, Gisborne, etc., Victoria; Como, Sydney, etc., New South Wales; Brisbane to Mackay, Queensland; Deloraine, Tasmania; Mount Gambier, South Australia. Twenty-two specimens; October to January.

Plötz's locality for *cæcilius*, *i.e.*, India, is an error.

51. T. ELIENA, Hew., *var. MONOCYCLA, nov. var.*

T. *iacchus*, A. and S. (*nec* Fabr.), Vict., Butt., p. 115.

♂ ♀, 34-44 mm. Head, thorax, etc., as in *eliena*. Forewings somewhat more elongate than in *eliena*, markings placed as in *eliena*, but deeper coloured. Hindwings as in *eliena*, but median band deeper orange and hardly separated by veins. Under-side of both wings as in *eliena*, but all markings of hindwings absent except the large cellular spot. This is such a well-marked variety that it can be conveniently separated. It is at once recognized by the single cellular spot on hindwings beneath.

Mount Gambier, South Australia (November); Gisborne and Berwick, Victoria (December). Four specimens.

52. T. SYMMOMUS, Hb.

Zutr., ex. Schmett, figs. 225, 226, 1823; Math., T.E.S., 1888, p. 183; Staud., ex. Schmett, pl. c., 1888; Vict., Butt., pt. ii., p. 114, 1894; M. and L., T.R.S., p. 86; *Telesto praxedes*, M. and L. (*nec* Plötz), T.R.S., p. 86.

Type — ?

We formerly quoted *Telesto praxedes*, Plötz, as a synonym of this species, but are now satisfied that *praxedes* is identical

with ♂ *T. maheta*, an opinion also shared by Colonel Swinhoe.

Victoria, New South Wales, and Brisbane to Herberton, Queensland; from November to March.

53. *T. MAHETA*, Hew.

Hesperia maheta, Hew., Ann. Mag., N.H., 1877, p. 80. *Trapezites maheta*, M. and L., T.R.S., p. 89, Waterh., Vict., Nat., 1903, p. 54. *Telesto praxedes*, Plötz, S.E.Z., p. 378. ♂, *Trapezites iacchus*, Misk. (nec Hew.), Ann. Qld. Mus., p. 78, 1891.

Mr. Waterhouse makes *phlæa*, Plötz, a synonym of the ♀ of this species, but this conclusion is undoubtedly an error, that species being identical with *phigalia*, Hew. In our former description we mentioned that the under-side of hindwings has 7 silvery-white spots; this is the rarer form, the usual number being 4, the remaining number being, as a rule, inconspicuous.

Type in Coll. Hewitson, British Museum.

Como, etc., New South Wales; Brisbane to Cairns, Queensland. Nineteen specimens; December to April.

54. *T. MAHETA*, Hew., var. *PHIGALIOIDES*, Waterh.

Vict., Nat., 1903, p. 56.

This is a very curious and remarkable variety, agreeing essentially on upper side with typical *maheta*, with the exception of the third subapical spot of forewing being irregularly placed and the broader and deeper coloured fascia of hindwings. The under-side is greyish, the spots of upper-side reproduced, slightly larger, and the spots of hindwings as small brown rings *never centred with silver*.

Types in Coll. Lyell.

Gisborne, Toora, etc., Victoria.

55. *T. MAHETA*, Hew., var. *IACCHOIDES*, Waterh.

Vict., Nat., 1903, p. 56.

This chiefly differs from typical *maheta* by the salmon-coloured under side and silver spots of hindwing (using six in number) being of moderate size, that of the apex being of equal size to that of anal angle.

Type in Coll. Waterhouse.

Como and Blue Mountains, New South Wales.

56. *T. PHIGALIA*, Hew.

Hesperia phigalia, Hew., Desc. Hesp., p. 32, n. 23, 1868; Herr.-Sch., S.E.Z., t. 3, fig. 15, 1869. *Telesto phlæa*, Plötz, S.E.Z., xlv., p. 378, 1884. *Trapezites phillyra*, Misk., P.R.S., Qld., p. 153, 1889. *T. phigalia*, M. and L., T.R.S., p. 94.

Mr. Waterhouse (Vict. Nat., 1903, p. 55), when writing, considered that *phlaa* (Plötz) was not identical with the above species. Plötz's drawing admits of no doubt, an opinion in which Mr. Waterhouse acquiesces.

Type *phigalia*, in Coll. Hewitson (British Museum); type *phillyra*, in Coll. Queensland Museum.

South Australia, Victoria, and New South Wales; from September to March.

9. ANISYNTA, n.g.

Club of antennæ moderately robust, apiculus blunt. Palpi subporrect, hairy or densely hairy beneath; terminal joint, short or moderate, subconical, posterior tibiæ with all spurs. Forewings with costa moderately straight, slightly concave in *Tasmanicus* and *argenteo-ornatus*; ♂ without stigma; 5 parallel to 4 and 6, slightly nearer 6 at base. Hindwings with vein 5 obsolete.

I have formed this genus to receive those species with the blunt apiculus of antennæ; it bears the same relation to *Trapezites* as *Motasingha* does to *Hesperilla*.

Type *cynone*, Hew.

57. A. CROITES, Hew.

Cyclopides croites, Hew., ex. Butt., v., fig. 14, 1874. *Astictopterus croites*, Hew., Misk., Ann. Qld. Mus., p. 78, 1891. *Trapezites croites*, M. and L., T.R.S., p. 88.

Type in Coll. Hewitson (British Museum).

So far to my knowledge the type is unique. As previously mentioned, the drawing which I possess, taken from the type, bears a striking resemblance on the *upper-side* to the ♀ *Hesperilla chaostola*, Meyr.

Western Australia.

58. A. ARGENTEO-ORNATUS, Hew.

Cyclopides argenteo-ornatus, Hew., Desc. Hesp., p. 41, 1868; ex. Butt., v., figs. 18-19, 1874. *Trapezites argenteo-ornatus*, M. and L., T.R.S., p. 91.

Type in Coll. Hewitson (British Museum).

South-West Australia (Perth); in October and November.

59. A. TASMANICUS, Misk.

Hesperilla Tasmanicus, Misk., P.R.S., Qld., 1889, p. 149. *Telesto comma*, Kirby, Ann. Mag., N.H., 1893, p. 436. *Trapezites Tasmanicus*, M. and L., T.R.S., p. 96.

Type *Tasmanicus*, in Queensland Museum; type *comma*, in British Museum.

The costa of this species is faintly sinuate beyond middle. Tasmania and Victoria; November to January.

60. A. POLYSEMA, Low.

Hesperilla polysema, Low., T.R.S., p. 311, 1908.

The ♂ of this species is without a stigma, consequently I refer it to *Anisynta*. This sex differs very little from the ♀, excepting that it is slightly smaller (34 mm.), and the small additional fleck above vein 1 on under-side is also conspicuous on upper-side; there are very faint indications of two or three whitish flecks on upper side of hindwing (in one specimen tolerably distinct). The row of spots on under side of hindwings are somewhat smaller, and the fifth one, counting from the bottom, has a tendency to be geminate. In all probability these characteristics will be *en evidence* in better and fresher specimens of the ♀. The type from which the original was taken was somewhat imperfect. The species under review does not approach any other known to me, but appears nearest *Tasmanicus*, Misk.

Type ♀, in Coll. Lyell; type ♂, in Coll. Lower.

Port Darwin; and Chillagoe, North Queensland. Two specimens; in February (F. P. Dodd).

61. A. (?) ARGINA, Plötz.

The reference given to this species is S.E.Z., xlv., p. 227, n. 903 (1883). *Hesperia argeus*, Plötz (Weymer M.S.S.) is on that page, and the number is 704, and as the insects are so widely divergent the reference is probably wrong. I have no copy of S.E.Z. of that date, so am unable to state definitely. Mr. Waterhouse gives "Mittheilungen Verein für neu Vompommern und Rugen in Greifswald (Berlin), p. 22, 1884," as the reference. The description of *argina* is as follows:—"Fichlerkolbe (? Fühlerkolbe) am Ende stumpf abgerundet. Oberseite schwarzbraun. V fl nur mit den typischen weissen Flecken; der in der Mittel 3 ist gespalten, der in Z. 1 ist getheilt und grau; in Z. 5 ein Querstrich. H. fl mit 5 grauen Puncten im Bogen hinter der Mitte. Unterseite grau mit braunen Rippen. Vdfl mit den weissen Flecken wie oben, auf der Hinterhälfte braun. H. fl. mit 8 weissen Puncten in $\frac{3}{4}$ Kreis und einem in der Mitte."

Herr.-Sch., I.L. 13 mm., Brisbane.

It is referred to the genus *Syrichthus*, Bdv. The description, so far as it goes, agrees somewhat with *polysema*, Low., but the absence of the curved series of 5 grey dots on upper-side of hindwing is a deterrent character. One of my male specimens of *polysema* has a faint curved series of 5 dull whitish dots beyond middle on upper-side of hindwing.

The drawing of *argina* before me shows the 5 grey dots, also the divided grey dot in cell 1. And the under-side

of both wings has the spots situated similar to those in *polysema*, but the costal, apical, and terminal areas of forewings and nearly the whole of hindwings are suffused with *pale-lilac blue*, whereas in *polysema* the ground-colour is yellowish-fuscous, so that probably *argina* represents a species allied to *polysema*, but separable by the above-mentioned differences. The locality given is Brisbane, and the expanse (one wing only) is 15 mm. *Polysema* has so far been recorded only from Chillagoe district and Port Darwin.

62. A. CYNONE, Hew.

Cyclopides cynone, Hew., ex. Butt., v., fig. 17, 1874. *Pamphila gracilis*, Tepp., T.R.S., S.A., 1881, p. 34, pl. ii., fig. 7, *Trapezites gracilis*, M. and L., T.R.S., S.A., p. 93.

Type *cynone*, in Coll. Hewitson, British Museum; type *gracilis*, in Adelaide Museum.

Semaphore and Henley Beach, South Australia; Gunbower, Victoria; in June and December.

63. A. SPHENOSEMA, M. and L.

T.R.S., p. 92; *T. paraphaës*, *ib.*, *l.c.*, p. 93.

Types in Coll. Lower.

Further investigation convinces me that *paraphaës* is only a variety of *sphenosema*.

Perth, Western Australia; in November.

10. EXOMETÆCA, Meyr.

P.L.S., N.S.W., p. 833, 1887; M. and L., T.R.S., p. 97.

Type *nycteris*, Meyr.

Club of antennæ elongate, pointed, bent. Palpi subporrect, terminal joint moderately long, pointed. Posterior tibiae with all spurs. Forewings in ♂ without stigma; 5 parallel to 4 and 6, slightly nearer 6 at base. Hindwings with 5 present, somewhat nearer to 6 at base.

Contains only the single species.

64. E. NYCTERIS, Meyr.

P.L.S., N.S.W., ser. ii., p. 833, 1887; M. and L., T.R.S., p. 97.

Type in Coll. Meyrick.

Albany, Western Australia; in December.

11. TARACTROCERA, Butl.

Cat. Lep., Fabr., p. 279, 1869; Watson, P.Z.S., p. 93, 1893, pl. iii., fig. 20.

Type *mævius*, Fabr.

Antennæ short, club forming a flattened disk, conspicuously hollowed, tip abruptly pointed; palpi ascending, ter-

minal joint moderately long, slender, erect, pointed; posterior tibiæ with all spurs. Forewings with vein 12 reaching costa well before end of cell; vein 5 close to bottom of cell; vein 3 well before end of cell, about twice as far from 2 as from 4; vein 2 slightly nearer to end of cell than base of wing. Hindwings with vein 7 very close to end of cell; 5 absent; 3 immediately before end of cell; vein 2 twice as far from base of wing as from end of cell. Forewing without stigma.

This genus ranges from India, through the Indo-Malayan Archipelago to Australia, and it is probable that other species will be discovered in the tropical parts of Australia. The antennal club is characteristic of this and the following genus.

65. T. DOLON, Plötz.

Apaustus dolon, Plötz, Stett, Ent. Zeit, xliv., p. 165.

♂ ♀, 20-22 mm. Head, palpi, antennæ, thorax, and abdomen fuscous; palpi, thorax, and abdomen beneath whitish. Antennæ annulated with white. Club somewhat flattened, distinctly hollowed, apiculus extremely short. Legs fuscous, posterior pair whitish. Forewings elongate, moderate, costa straight, termen somewhat bowed, oblique, some obscure raised scales on veins 1, 2, and 3 representing stigma, fuscous with yellowish-orange markings. An elongate spot, filling up whole of cell from base to posterior end of cell, with a slight fuscous suffusion toward base, more pronounced in ♂; extreme costal edge fuscous; an oblique transverse fascia, moderately narrow, composed of 8 more or less connected spots, from just beneath costa, at $\frac{4}{5}$ to vein 1 above anal angle; the two spots between veins 4 and 6 are *completely* separated from the remainder, and are very close to the termen; the three subcostal spots (representing the usual sub-apical series) *are not* placed obliquely, but directly transverse; a narrow streak between vein 1 and dorsum; cilia dark-fuscous, becoming whitish on terminal half and paler at anal angle. Hindwings with termen rounded; colour as in forewings; an orange-yellow spot in posterior extremity of cell; an orange-yellow rather narrow postmedian band of four spots separated only by intervening nervules, extending from vein 1 to 6; the two middle spots much smaller than others, somewhat cartridge-shaped; other two irregularly quadrate; generally an additional spot on vein 7; basal and dorsal hairs orange-yellow; cilia whitish, basal half fuscous, becoming yellowish round anal angle. Under-side of forewings dark-fuscous, markings of upper-side reproduced, basal half of cell fuscous, wing between vein 4, costa, and apex dusted with

yellowish, orange in ♀; cilia whitish-yellow, with a fuscous median line. Hindwings pale-yellowish, in ♀ orange or orange-yellow; markings of upper-side reproduced; an obscure fuscous streak above dorsum, becoming blackish and more clearly developed on termen, where it becomes patch-like; cilia as in forewings.

This species is very distinct from all others by the absence of any defined stigma; the raised scales on veins 1, 2, and 3 require close scrutiny to reveal them, and are apparently absent in some males, probably through denudation. Plötz's figure is a good one, and represents the species clearly. The species later on described as *hypomeloma* is somewhat like the wing pattern, especially beneath, but the blackish streak along the dorsum of *hypomeloma* is absent in *dolon*. Plötz's drawing does not show the peculiar antennæ of the genus, but I attach no importance to this omission, as the drawing otherwise agrees in detail. The additional spot on vein 7 of hindwings is rarely absent.

Type ——?

Mackay, Kuranda, and Cooktown, Queensland; also Port Darwin; in March and April. Fourteen specimens (R. E. Turner and F. P. Dodd).

12. BIBLA, Mab.

Wyst., Gen. Inst., xvii., 1904.

Type *Papyria*, Bdv.

This genus differs from *Taractrocera* only by the presence of stigma in ♂.

66. B. PAPHYRIA, Bdv.

Hesperia papyria, Bdv., Voy., "Astrolabe," Lep., p. 166, 1832. *Taractrocera celo*, Cox, Ent., 1872, p. 402. *Hesperilla fumosa*, Guest, T.R.S., S.A., v., p. 37, 1882. *Apaustus alix*, Plötz, S.E.Z., 1884, p. 165. *Ap. minimus*, Misk., P.R.S., Qld., 1889, p. 153. *A papyria*, M. and L., T.R.S., p. 98.

Type *papyria*, Paris Museum; type *fumosa*, Adelaide Museum; type *minimus*, Queensland Museum.

We formerly placed this and the following species in Hübner's genus *Apaustus*, but as that genus, as now accepted, is confined to South America I adopt Mabilles' genus as being in keeping with the characters of *Bibla*. The stigma of ♂ is well defined.

Larvæ feed on *Imperata arundinacea* and the imagoes frequent the blossoms of lucerne (*Medicago sativa*).

Herberton, Queensland; January and February. Tasmania, South Australia, New South Wales, and Victoria; from November to March.

67. B. FLAVOVITTATA, Latr.

Hesperia flavovittata, Latr., Enc. Meth., ix., p. 768, 1823.
Ancylorhyncha agraulia, Hew., Desc. Hesp., p. 45, 1868. *Hesperilla bifasciata*, Misk. (nec Tepp.), Ann. Qld. Mus., 1891, p. 81.
Apaustus flavovittata, M. and L., T.R.S., p. 100.

Type *agraulia*, in Coll. Hewitson (British Museum).

We formerly gave *agraulia*, Hew., as a synonym of *Padraona sunias*, Feld., but a recent comparison of Hewitson's type of *agraulia* with *flavovittata* prove them to be identical. Hewitson says of *agraulia*:—"Alis fuscis; anticis macula magna costali, margine interiori, fascia transversa, maculaque subapiculi vix tripartita aurantiacis, posticis pilis basalibus, macula parva costali, fasciaque transversa aurantiacis." Under-side as above, except that the apex of the anterior wing and the *whole* of the posterior wing are rufous and the bands less distinct. The club and apiculus of this species are very similar to *papyria*; as before mentioned, it is probably a well-marked geographical form of that species.

Perth, Western Australia; in November.

68. B. ANISOMORPHA, n. sp.

♂ ♀, 25-28 mm. Head, palpi, thorax, and abdomen orange-yellow; palpi, thorax, and abdomen beneath whitish; palpi tinted with yellow; terminal joint short. Antennæ fuscous, annulated with white, basal half of club white, hollowed, apiculus short. Legs yellowish, posterior pair fuscous-tinged. Forewings elongate, triangular, costa straight, termen oblique, hardly rounded, dark-fuscous with orange markings; costal area between base and posterior end of cell and whole of cell orange; slightly oblique transverse row of 8 more or less connected spots from just below costa at $\frac{4}{5}$ to vein 1 at anal angle; the two spots between 4 and 6 are quadrate and *completely* separated from the remainder, and very close to termen; the three subcostal ones are not placed obliquely, but directly transverse; the upper of the lower three of band is narrowly cartridge-shaped; the one below nearly quadrate, and that on vein 1 irregular shaped, excised internally. In the ♂ the 3 subcostal spots are connected with orange costal streak by continuation of same; a somewhat flattened patch of narrow blackish scales (representing stigma) parallel to, and edging inner edge of three lower spots of transverse band, not in ♀; basal half of wing below cell and an elongate dorsal streak orange; cilia fuscous, terminal half yellowish, round anal angle orange. Hindwings with termen rounded; dark-fuscous, basal and dorsal hairs long, orange; an oval orange spot in posterior extremity of cell; a moderately broad submedian orange band, outer edge moderately even, inner edge

with double projection in middle, from vein 1 to vein 6; *not* separated by veins; cilia as in forewings, but more orange round tornus. Under-side of forewings blackish; basal third of cell blackish, apical and terminal area of wings from vein 3 to apex greenish-yellow; markings of upper-side, except stigma, reproduced and very narrowly edged with fuscous; cilia as above, but paler. Hindwings greenish-yellow; a fuscous supra dorsal streak, broadest at termination; cellular spot as above, pale-yellow; submedian band reproduced, but upper portion formed into 3 pale-yellow oval spots, faintly edged with fuscous; an obscure yellow spot on vein 1 (indicating lower spot of band); cilia pale-yellow, mixed with fuscous.

Types in Coll. Lower.

This species is in appearance somewhat like *Taractrocera dolon* (Plötz), but is immediately separated by the presence of stigma in ♂ and broad submedian band of hindwing in both sexes. The transformation of the band of upper-side of hindwings into oval spots on under-side is a peculiar and noteworthy characteristic. The late Dr. Staudinger considered this species *Telicota dara* (Koll.), but the antennæ never agreed (in my estimation) with the characters of *Telicota*, and having recently received the ♂ all doubt is at an end, as *dara* has *no stigma*, and although the ♀ of the present species is *very similar* to that species, yet the oval spot of orange on vein 8 of hindwings in *dara*, and which appears to be a constant character, is absent in the present species.

Port Darwin, Northern Territory. Two females and one male; in September and May (*Dodd*).

13. OCYBADISTES, Heron.

Ann. Mag., N.H. (6), xiv., 1894, p. 105.

Type *Walkeri*, Heron.

Antennæ about $\frac{2}{3}$ length of costa of forewings; club moderate, elongate; apiculus bent, rather longer than thickness of club; palpi densely scaled, *terminal joint slender*, erect, about half length of second. Forewings with vein 12 reaching costa well before end of cell; vein 8 to apex; 5 nearer to 4 than to 6; veins 2, 3, and 4 equidistant; vein 2 slightly nearer end of cell than base of wing. Hindwings with termen very slightly excised between 2 and 1*b*; vein 7 well before end of cell; 5 absent; 3 close to end of cell, twice as far from 2 as from 4; vein 2 nearer to end of cell than base of wing. Posterior tibiæ with all spurs present; costa of hindwings above clothed with stiff hairs. *Male with stigma*. This genus has a similar geographical range to *Taractrocera*. It has been suggested that all those species

I have included in this genus should be merged into *Padraona*, Watsn., but the presence of the stigma precludes this, as *mases*, Mre., which is the type of *Padraona*, has no stigma. *Padraona* differs from *Ocybadistes* by the absence of the stigma, so that the only two Australian species retained in *Padraona* will be *lascivia*, Rosen., and *heterobathra*, Low.

69. O. MARNAS, Feld.

Pamphila marnas, Feld., Sitz., Akad., Wiss., Wien., Math., Nat., Cl., p. 462, 1860. *Apaustus dschilus*, Plötz, Berl., Ent. Zeit., xxix., p. 229, pl. mcccxciv. (1885). *Telicota marnas*, Elwes and Edwards, P.Z.S., xiv. (4), p. 256, 1897; M. and L., T.R.S., p. 103. *Ocybadistes marnas*, Swinh., T.E.S., pl. ii., fig. 13, p. 21, 1908.

Brisbane to Cooktown, Queensland; from December to June; also from New Guinea and Amboina (type locality).

In Miskin's collection in the Queensland Museum there are 5 specimens of *marnas* and 1 ♀ *augias*, Linn. (var. i.), standing under the name of *olivescens*, Herr.-Sch. I place *marnas* in *Ocybadistes*, chiefly on account of its slender palpi, but it would appear to be more at home in *Telicota* on account of its general resemblance to that genus, but the form of the palpi precludes this.

Type in Coll. Felder.

70. O. WALKERI, Heron.

Ann. Mag., N.H. (6), xiv., 1894, p. 106. *Ancyloxypha agraulia*, Oll., Ann. Mag., N.H., 1888, p. 360, pl. xx., figs. 3a, 3b. *Apaustus sunias*, M. and L. (nec Feld.), T.R.S., p. 101.

Type in Coll. British Museum. Taken at Port Darwin, also at Dammur Island.

This species, which is subject to considerable variation, ranges from Adelaide to Port Darwin, being also found in New South Wales, Tasmania, and Brisbane to Cairns. Probably when its geographical range is definitely known it will be found to occur wherever the couch-grass (*Cynodon dactylis*) flourishes, that being one of its chief food plants. The former description (T.R.S., p. 101) being in part defective, and not representing typical forms, I shall redescribe the species, also the southern variety, which is deserving of a distinctive appellation, and which may ultimately be raised to the rank of species. We formerly placed this species in *Apaustus*, but that genus as now restricted is confined to South America. The differences in *Ocybadistes* and *Padraona* (Moore), structurally considered, are to my mind very slender.

♂ ♀, 18-24 mm. Head, palpi, thorax, and abdomen blackish, densely clothed with orange hairs; palpi and thorax beneath whitish, upper half second joint of palpi orange.

Abdomen beneath orange, mixed with white. Legs pale-yellow, posterior pair orange. Forewings elongate, triangular, costa straight, termen oblique, gently bowed in ♂; dark-fuscous, with orange markings; whole of cell and costal area for whole length of cell orange, leaving extreme costal edge dark-fuscous; a moderately broad transverse fascia, from vein 1 to vein 6, very much narrowed between veins 4 and 6 to about half the width of rest of fascia, directed toward termen, but not nearly reaching it; a nearly quadrate subcostal spot (representing the usual subapical spots) lying midway between apex of fascia and end of cell; suffused orange streaks along vein 1 and dorsum; stigma narrow, nearly straight, from vein 1 to 4 running along anterior edge of fascia; cilia dark-fuscous, terminal half orange. Hindwings with termen rounded; basal and dorsal hairs orange; an ovate spot in cell; a moderately broad orange submedian band of orange from vein 1 to vein 6, lower edge irregularly crenulate, upper edge with a slight projection in middle and a small orange spot resting on inner edge of apex of band, often absent; cilia orange-yellow, fuscous at base. Under-side of forewings blackish, base of cell dark-fuscous; apical area and upper half of termen greenish-orange; markings of upper-side, except stigma, reproduced, but paler, and more or less narrowly edged with fuscous; cilia fuscous, orange at anal angle. Hindwings orange, with a greenish tinge; supra-dorsal streak fuscous, more pronounced on termen; markings of upper-side reproduced, but paler, and finely edged with fuscous; cilia orange, mixed with light fuscous.

Tasmania; Sydney, etc., New South Wales; Brisbane to Port Darwin. Forty-seven specimens: from October to May.

71. *O. WALKERI*, Heron, *var. HYPOCHLORA*, *nov. var.*

The description of this insect is given under the name of *sunias*, Feld., by M. and L. (T.R.S., p. 101), and need not, therefore, be repeated. It differs consistently by the larger size (17-25 mm.), the *much* broader markings, especially in ♂, and especially the clear greenish-yellow under-side of hindwings, which are often without any markings whatever. The stigma is flat and very broad, usually filling up the interspace between the cellular marking and anterior edge of transverse fascia, which, though approached nearest by the Port Darwin specimens, scarcely assumes the same aspect. I have not seen specimens from Victoria, and the specimens I have seen from Sydney, etc., are not satisfactorily connected with the form under review, consequently I prefer to give it a varietal name.

Types in Coll. Lower.

Adelaide, etc., South Australia. Eighteen specimens; from November to February. The imagoes frequent the blossoms of Globe amaranth (*Gomphrena*).

72. O. RECTIVITTA, Mab.

Pamphila rectivitta, Mab., Pet. Nouv., Ent. ii., p. 237, 1878.

♂ ♀, 22-24 mm. Head, antennæ, thorax, and abdomen blackish; antennæ beneath spotted with yellow; club rather narrow, yellow beneath, apiculus fuscous. Thorax and abdomen beneath yellow. Legs yellowish. Forewings elongate, triangular, costa nearly straight, termen oblique, hardly bowed, blackish-fuscous, with orange markings; whole of cell and costal area, from base to end of cell, orange; a small, short, elongate streak lying on lower edge of cell; a direct transverse fascia from vein 1 to vein 6, more or less dentate on either side, but more so posteriorly; an irregular triangular spot, its apex directed toward costa (representing subapical series of spots) lying midway between extreme apical spot of fascia and posterior extremity of orange cellular patch; a streak along vein 1 and another, more distinct, along dorsum; stigma moderate, running along anterior edge of fascia, from vein 1 to near vein 5, more or less broken into spots; cilia dark-fuscous, becoming orange on terminal half round anal angle. Hindwings with termen rounded, slightly more prominent in middle; an oval spot of orange in posterior extremity of cell; an orange submedian band, about twice as broad as fascia of forewings, from vein 1, where it is continued as a streak to base of wing, to vein 6; both edges irregular, lower somewhat scalloped in ♂; a small spot resting on middle of vein 7 and touching apex of band, generally separated in ♀; both fascia of forewings and band of hindwings much abbreviated in ♀; cilia yellowish-orange, with fuscous spots at extremities of nervules. Under-side of forewings black, basal portion of cell dark-fuscous, apical area and upper-half of termen mixed with dull-greenish yellow; an interrupted orange streak along termen narrow from vein 2 to apex; markings of upper side, except stigma, reproduced in yellow and finely edged with fuscous. Cilia as above. Hindwings bright greenish-yellow; markings of upper side reproduced, but paler, and outlined finely with dark-fuscous; dorsal broadly yellow; cilia orange, with a black basal line ending at vein 1.

Types probably in Coll. Staudinger, Berlin Museum. Specimens of this species were submitted to Professor Mabile, who returned them as above.

Mackay, Townsville, Kuranda, and Cooktown. Nine specimens; from March to May; also from Celebes, whence the type came.

73. *O. SUNIAS*, Feld.

Pamphila sunias, Feld., Sitz., Akad., Wiss., Wien., Math., Cl., p. 462, 1860; M. and L., T.R.S., p. 101. *Apaustus Walkeri*, M. and L. (*nec* Heron); *l.c.*, *Hesperia ahrendti*, Plötz, S.E.Z., xlv., p. 230 (1883), pl. dxcv. *Padraona sunias*, Swinh., T.E.S., 1908, pl. i., fig. 22, p. 18.

♂ ♀, 22-25 mm. Head, palpi, antennæ, thorax, and abdomen dark-fuscous; palpi beneath pale-yellowish, antennæ spotted with orange, club orange, terminal half and apiculus black, thorax and abdomen beneath yellowish. Legs orange-yellow; coxæ paler. Forewings shaped as in *rectivitta*, blackish, with orange markings; markings in ♂ as in *rectivitta*, but all much broader than in that species, band nearly twice as wide, and the apical spot (representing subapical series) generally enlarged so as to touch apical spot of band and cellular spot; stigma and cilia as in *rectivitta*. Hindwings blackish; basal hairs, cellular spot, and postmedian band as in *rectivitta*, but the band, especially in ♀, twice or more than twice as wide, and the spot on apex of band is rarely separated in either sex (it generally is in *rectivitta*); cilia as in *rectivitta*. Under-side of both wings, colour markings, etc., reproduced as in *rectivitta*, excepting that markings are enlarged as above. I think this and the former species are distinct enough at present, the ♀ in each species especially so. It is highly probable that as our knowledge of this difficult group is advanced intermediate forms may be discovered which will necessitate placing them under one species.

Rectivitta differs chiefly from *sunias* by the narrower markings and position of apical spots of both fore and hind wings; the ♀'s of the former are distinctly and easily separable from those of the latter; but the ♂'s are more, yet not difficult of separation, although some specimens of *rectivitta* approach them closely. Colonel Swinhoe lent me specimens of authentic *sunias* from the Solomon Islands which are exactly similar to specimens in Mr. Waterhouse's collection from Murray Island taken in September. The Australian specimens (also those from New Guinea) have the markings above slightly narrower than the Island forms. Swinhoe's figure is not good, and the sex is not mentioned. It appears to represent a different insect from the one under review, but the species I have called *sunias* is typical of those standing in the British Museum under that name.

Type (? in Coll. Tring, Museum).

Kuranda, Cooktown, Queensland; Port Darwin; from January to May. Eighteen specimens. I have seen specimens from Celebes and New Guinea. Felder's type came from Amboina.

74. *O. HYPOMELOMA*, n. sp.

♂ ♀, 24-28 mm. Head, palpi, antennæ, thorax, and abdomen dark-fuscous; palpi whitish beneath, antennæ annulated with whitish, thorax and abdomen clothed above with yellowish hairs, beneath whitish. Legs yellow, mixed with fuscous; ♂ with stigma. Forewings elongate, triangular, costa straight, termen gently bowed; dark-fuscous, with orange markings; a streak along costa, from base to vein 9, leaving a narrow costal streak of ground-colour on extreme edge; in ♀ the yellow streak is interrupted in middle by ground-colour; cell filled in with orange, in ♀ interrupted by intrusion of ground-colour; 3 moderate, cartridge-shaped, subcostal spots at about $\frac{2}{3}$ from base, upper one about $\frac{1}{3}$ the size of other 2, lower one in ♂ tending to touch costal streak; an oblique transverse band of 5 irregularly cartridge-shaped spots, posterior edges excavate, anterior edges obtuse, lying between veins 1 and 6, upper 2 half the size of remaining 3; stigma narrow, obscure, lying between veins 1 and 4, and closely appressed to anterior edge of 3 lower spots of oblique band; a narrow dorsal streak, from base to near anal angle; cilia dark-fuscous, becoming yellowish round anal angle. Hindwings with termen rounded, slightly prominent on vein; dark-fuscous; markings orange; basal hairs orange; a roundish spot in cell; an oblique band of 5 spots as in forewing, lowest spot continued along vein 1 to base and termen, more obscure in ♀; a small somewhat ovoid spot lying on vein 6, well separated from oblique band; cilia yellowish, mixed with fuscous at base. Under-side of forewings dark-fuscous, apical and terminal area irrorated with yellow scales; markings of upper-side, except stigma, reproduced; cilia ochreous-fuscous, with a fine black line along termen. Hindwings yellowish-orange; markings pale-yellow; an ovoid spot in posterior end of cell; a cuneiform spot lying on vein 6, representing spot of upper side; 3 very oblique, cartridge-shaped spots at $\frac{2}{3}$ from base, lying between veins 2 and 6, upper one inclining to be double and reaching close to termen; indications of a suffused spot on vein 1 at $\frac{2}{3}$ from base; a well-marked elongate cuneiform black streak from base to termen; extreme dorsal edge yellow-whitish; cilia as in forewings, but becoming pale-yellow round anal angle.

This species, which appears scarce, is an excellent mimic of *Taractrocera dolon*, Plötz, but the antennæ afford an

immediate distinguishing test. In the fifteen specimens of *dolon* before me some have a small yellow fleck on vein 6 on upper side of forewing, but not of sufficient importance as to confuse it with the present species. From its general appearance it is probable that it has been overlooked by being confused with *Walkeri*.

Herberton and Kuranda, Queensland; in March.

One ♀ specimen (*Dodd*), Roseville, near Sydney; two ♂ specimens; in April (*Waterhouse*).

Types in Coll. Lower.

14. PADRAONA, Mre.

Lep., Ceylon, vol. i., p. 170, 1881.

Type *mæsa*, Mre.

I have examined a specimen of ♂ *dara*, Koll., and the generic characters differ from *Ocybadistes* only by the absence of stigma of ♂, vein 2 practically equidistant from end of cell and base of wing, twice as far from 3 as from 4. In the hindwings of ♀ vein 2 is sometimes exactly midway between 3 and base. Elwes and Edwards place this genus as a synonym of *Telicota*, Mre., but I prefer to keep them separate, as it is desirable to prevent the group becoming unwieldy and more difficult.

75. P. LASCIVIA, Rosen.

Pamphila lascivia, Rosen., Ann. Mag., N.H., 1885, p. 378, pl. ii., fig. 1. *Apaustus lascivia*, Waterh., P.L.S., N.S.W., 1897, p. 244; Vict., Butt., 1894, p. 113; M. and L., T.R.S., p. 100. *Pamphila neocles*, Mab., Cont. Rend. Soc., Ent. Belg., vol. xxxv., p. 177, 1891.

I sent specimens of this species to Professor Mabilie, who returned it as *Padraona neocles*, Mab.

Colonel Swinhoe suggested forming a new genus to receive this species, but I am unable to discern any different characters by which a new genus could be safely erected, excepting perhaps that this species has somewhat broader wings than some of its congeners. The specimens from the Cairns and Herberton districts in North Queensland have the ground-colour of wings nearly black, and the markings both above and beneath much more sharply defined than those from the southern districts, but they do not warrant a distinctive name.

Type in ——? British Museum.

Victoria, Tasmania, New South Wales, and Queensland. Thirty-nine specimens; from November to March.

76. P. HETEROBATHRA, Low.

Apaustus heterobathra, Low., T.R.S., S.A., p. 316, 1908.

Types in Coll. Lower.

I have specimens from Ké, consequently I hazard the opinion that in all probability it has been previously described. On comparing the figure of *Taractrocera* (*Hesperia*) *aliena*, Plötz (from Java), T.E.S., 1908, pl. i., fig. 20, it appears to approach that species closely. Colonel Swinhoe, to whom I submitted specimens, returned it as unknown to him.

Mackay, Cairns to Port Darwin. Ten specimens; from January to March.

Note.—It may be desirable to mention that *Ocybadistes* (*Hesperia*) *flavoguttata*, Plötz, S.E.Z., xlv., pl. 696, p. 231, 1883, which is said to be from Australia, is represented in the British Museum by specimens of *O. Walkeri* from Sydney. I am satisfied that the identification is erroneous. I do not mean to insist that *flavoguttata* is not to be found in Australia, but that Plötz's figure does not represent *Walkeri*. Plötz's type came from Manila, and Colonel Swinhoe figures it in T.E.S. (pl. ii., fig. 14, p. 21, 1908). The late Dr. Staudinger sent me 5 specimens labelled "Australia (?)" *flavoguttata*, but they are specimens of *Taractrocera ziclea*, Plötz, and I think there is a mistake in the locality. I may say, *en passant*, that the same five specimens have been identified for me as *Telicota dara*, Koll., but this is purely an haphazard guess, as the antennal club is characteristic of *Ziclea*.

15. TELICOTA, Mre.

Lep., Ceylon, i., p. 169, 1881; M. and L., T.R.S., p., 102.

Type *augias*, Linn.

Antennæ more than half as long as costa, club stout, moderately long, apiculus pointed, bent, as long as, or longer than greatest width of club. Palpi erect or suberect, *terminal joint stout, short*, bluntly pointed. *Forewings in ♂ with stigma*; 2, 3, and 4 practically equidistant in ♂; in the ♀ 3 and 4 are closely approximated at base, and 2 is widely remote from 3, being midway between 3 and base of wing; in both sexes 5 is approximated to 4 toward base. Hindwings with 5 absent; 2, 3, and 4 somewhat approximated toward base; 3 is nearly twice as far from 2 as from 4; posterior tibiæ with all spurs.

As restricted by me *Telicota* will embrace those species with the above characters; the genus as thus constituted principally differs from *Padraona*, Mre., by the presence of the discal stigma, position of vein 2 of forewing, and stouter

palpi; and from *Ocybadistes*, Heron, by the stouter terminal joint of palpi, different form of stigma, and relatively large size. In a group so difficult as this it is necessary to utilize any character of value which will facilitate accuracy in determining the various species, and I trust that the characters as herein delineated may prove as useful as I intend them to be, as the varieties mentioned are easily recognizable.

77. T. AUGIUS, Linn.

Papilio augias, Linn., Syst., Nat., p. 794, 1767. *Pamphila Kreffti*, Macl., Proc. Ent. Soc., N.S.W., p. 54, n. 20, 1866. *Pamphila ancilla*, Herr.-Sch., S.E.Z., p. 79, n. 59, 1869. *P. olivescens*, *ib.*, *l.c.*, n. 60, fig. 14, t. 3, 1869; *ib.*, ex Schmett., ii., p. 116. *Hesperia argeus*, Plötz, S.E.Z., xlv., p. 229, n. 704, 1883. *H. augustula*, Plötz (*nec* Herr.-Sch.), *l.c.*, n. 705. *Telicota augias*, Dist. Rhop., Malay, p. 382, pl. xxxiv., fig. 23, 1886; M. and L., T.R.S., p. 105.

As neither Elwes nor Swinhoe gives *sagara*, Mre., as a synonym I will refrain from doing so.

This species is subject to considerable local variation; that is, *if* all the species ranged as above are one and the same variable species. I cannot bring myself to consider it of such a variable nature as to embody insects ranging in size from 25 to 44 mm. and in markings varying in size, intensity, and position. In the past it seems to have been considered satisfactory enough to consider any deviation of the type pattern in this group (*Telicota*) to be a variety of *augias* without considering the matter thoroughly; it certainly is a very simple manner of disposing of any difficult deliberations, but is not satisfactory. It seems singular that this one unfortunate species should be singled out for such notoriety. I admit that it does vary; but not to the extent attributed, and until a thorough and exhaustive study of the various species of this (*Telicota*) group is made from considerable material from Australia and the adjoining islands confusion must reign. To give an instance, I had typical ♂ specimens of *bambusæ*, Mre., identified by a leading authority as "*augias*, without doubt," and the ♀ was identified as a variety of *augias*. I sent the *identical* insects to another eminent writer, and the ♂ was given as probably *bambusæ*, and the ♀ as *olivescens*, Herr.-Sch. Leaving out the Indo-Malayan species, I find that the Australian specimens, which range from Sydney to Port Darwin, resolve themselves into the following well-marked forms. I cannot consider them local races, because in some districts one or more varieties occur in the same locality. Perhaps some of them will ultimately be raised to the rank of species.

77A. Var. I. T. AUGIAS, Linn.

(including *krefftii*, Macl., and *argeus*, Plötz).

Wings above fuscous, *markings yellow*; markings of subterminal band continued as fine lines along *both edges* of veins to termen. Under side of hindwings yellow. Markings of upper side reproduced in dull-orange; median band margined with fuscous lunules; stigma broad, entire, edged with blackish. This I consider typical *augias*, and I have specimens from Sydney, New South Wales; Townsville, Queensland; and Port Darwin. *Argeus* and *krefftii* differ from typical *augias* only by the paucity of markings of under-side of hindwings. It would be interesting to learn what Plötz considered *augias*, as, curiously enough, when showing the relationship of these several species he mentions *augias*, and gives *sagara*, Mre., *krefftii*, Macl., and *ancilla*, Herr.-Sch., as synonyms.

Argeus and *krefftii* are practically confined to the Cape York district, so far as I am aware.

78. Var. II. T. ANCILLA, Herr.-Sch.

♂, *Pamphila ancilla*, Herr.-Sch., S.E.Z., p. 79, n. 59, 1869. ♀, *P. olivescens*, *ib.*, *il.*, n. 60, 1869; *ib.*, ex. Schmett, *ii.*, p. 116. *Telicota bambusæ*, M. and L. (*nec* Moore), T.R.S., p. 107.

Wings above dark-fuscous, *markings deep-orange*; markings of subterminal band continued as fine lines to termen along *lower edge* of veins only. Under-side of hindwings varying from greenish to dull-olive greenish; markings of upper side reproduced as in var. i. rarely absent. Stigma from moderately broad to broad, edged with blackish. This is the commonest Australian form, and extends from Sydney to Port Darwin. The green under side is very beautiful in freshly-bred specimens, but it rapidly fades. Curiously enough, the females show the greenish tinge more strongly than the opposite sex. As will be noticed, Herrich-Schäffer gave the sexes different names, and although they show slight variations there is no doubt that the two sexes represent but one species. *Olivescens* is well figured in S.E.Z., and is quite recognizable. Of this species Schäffer says:—"Unten das Spitzendrittel der V. fl und de H fl von Z, lb am bleich olivegrün, M Fleck und Band der letzteren kaum angedeutet; gelblicher, *ohne schwarze Mondchen*." It is true that many ♀ specimens are without the black lunules of under side of hindwing, but it is not a reliable character, as every intermediate form occurs. The band of upper side is reproduced in varying degrees of intensity, but is always delineated. We formerly called this *bambusæ*, Mre.

79. Var. III. T. AUGUSTULA, Plötz.

This is very similar to *ancilla*, but the markings are more broadly defined, deeper orange, and the under side of hindwings is bright orange with scarcely any markings. Stigma as in *ancilla*, but narrower. This is not the *augustula* of Herr.-Sch., and that species is referable to *Corone*. Plötz identified the species wrongly. This variety is scarce. My four specimens are from Mackay and Cape York, and were taken in November and December.

80. Var. IV. T. MESOPTIS, *nov. var.*

Wings above blackish, markings orange; subterminal band in both wings narrow, half the width of that in *ancilla*. Lower edge shortly produced, not nearly reaching termen. Under side of hindwings dull-olive greenish. Band of upper side reproduced in dull-orange and edged with black lunules. Stigma very narrow.

This variety is nearest *brachydesma*, Low., and appears to fluctuate between that species and *eurotas*, Feld., differing from both by the under-side of hindwings.

My specimens are all from the Kuranda district, taken in March, April, and May.

Before closing my remarks on this species I may state that although but four well-marked varieties are mentioned there are several slight minor varieties. These need not disturb the general scheme, as they can be easily assigned to the different varieties. The whole of the species mentioned vary little as regards size, the ♂'s being from 24 to 26 mm. and the ♀'s from 25 to 32 mm.

81. T. ANISODESMA, n. sp.

Type in Coll. Lower.

♂, 40-42 mm. Head, palpi, antennæ, thorax, and abdomen fuscous, palpi beneath orange, antennæ beneath banded with blackish. Club beneath yellow, thorax and abdomen clothed with orange hairs above and beneath. Legs orange. Forewings elongate triangular, termen gently bowed, dark fuscous, with orange markings; stigma oblique, moderately broad; a broad costal streak from base to extremity of vein 12; cell filled in with orange; interspaces between veins 12 and 9 filled in with orange, quite or nearly reaching costa; an elongate spot at base of veins 7 and 8 continued as fine lines along both edges of veins to termen; 3 moderately large irregularly subquadrate spots lying on veins 1, 2, and 3 respectively, posteriorly excised and lower edge more or less continued as a fine line along vein to near termen; 2 small simi-

lar spots lying on veins 4 and 5; the whole 5 forming an oblique series, but last 2 nearer termen; a moderate dorsal streak from base to near anal angle. Hindwings with termen rounded, somewhat prominent on vein 1; dark fuscous with orange markings; basal hairs orange; an ovate spot in cell; a transverse row of four moderately broad, somewhat cartridge-shaped spots, separated by veins; anterior apices obtuse, posterior excised, that on vein 1 continued along vein to termen; cilia of forewings fuscous, becoming orange round anal angle; cilia of hindwings orange, becoming fuscous round apical third. Under-side of both wings orange-yellow, markings of upper-side, except stigma, reproduced; dorsal and basal area of forewings dark-fuscous; transverse markings of forewings edged anteriorly and posteriorly with blackish lunules; cilia more yellowish; band of hindwings clearer orange and edged anteriorly and posteriorly with black lunules; cilia orange, with a black terminal line at base not extending beyond vein 2.

I do not know the ♀ of this species. The ♂ is very like ♂ *bambusæ*, Mre., from India, and is probably the Australian representative of that species. It appears to differ by the somewhat narrower transverse markings of both wings, the continuation of the lower edge of markings of forewings to termen, and especially by the unevenness of the anterior edges of the 5 transverse spots of forewings, which in *bambusæ* are usually even and limited by the stigma, while on the under-side the blackish lunules are much enlarged in comparison with *anisodesma*. Moore's figures of *bambusæ* (P.Z.S., 1878, p. 45), Nos. 11-12, are fair. They do not figure the under-side, but the upper-side of both sexes show the transverse band of forewings with the internal edge quite straight. Moore's original description (*l.c.*) reads:—"*Pamphila bambusæ*, allied to *augias*, Linn., from typical Java specimens of which it differs in its somewhat broader and less pointed wings. Markings above similar, but more defined; the borders of the wings blacker, the basal yellow streak on hindwing confined to a terminal spot at end of cell, and the abdominal border black. On the under-side the markings are also more clearly defined and the interspaces blacker."

I have seen seven male specimens of *anisodesma*, and they do not vary from the description given. The nearest approach to the Indian and Sarawak specimens of *bambusæ* is the specimen from Mackay. The other specimens are from Richmond River (*Waterhouse*), Townsville (*Dodd*), and Brisbane (*Illidge*), and were taken in March and April.

82. T. EURYCHLORA, Low.

T.R.S., S.A., p. 314, 1908.

Types in Coll. Waterhouse.

Ballina, Richmond River; in February.

83. T. BRACHYDESMA, Low.

T.R.S., S.A., p. 312, 1908.

Types in Coll. Lower and Waterhouse.

Kuranda and Cooktown, Queensland; March and April.

84. T. OHARA, Plötz.

Hesperia ohara, Plötz., S.E.Z., 1883, p. 226; M. and L., T.R.S., p. 104.

Having received both sexes and fresher specimens I re-describe the species.

♂, 38 mm.; ♀, 40-48 mm. Head, palpi, antennæ, thorax, and abdomen dark-fuscous; palpi beneath yellow; antennæ spotted with yellow beneath; club beneath yellow, reddish on apical half; thorax and abdomen more or less clothed with golden-ochreous hairs. Legs orange-fuscous. Forewings elongate, triangular, costa nearly straight, termen oblique, hardly rounded in ♂, slightly rounded in ♀; dark-fuscous, inclining to blackish, markings deep-orange; an elongate streak along costa from base to very near middle, absent in ♀; whole of cell filled in with orange; in ♀ only represented by either two spots, sometimes joined, at posterior end of cell, or one spot and an elongate streak along lower edge of cell; an oblique row of three quadrate spots, outer edges excised, from vein 1 to vein 4, edged on inner edge by stigma, which is entire, moderate, with outer edge straight and inner edge somewhat dentate; a row of 3 elongate, somewhat cartridge-shaped spots near apex, between veins 6 and 9, absent in ♀; between veins 4 and 6 are two small irregularly-shaped spots, making a more or less complete band from vein 1 to 9, absent in ♀; a moderate streak along dorsum; cilia fuscous, becoming orange round anal angle. Hindwings with termen rounded, slightly indented between veins 1 and 2; dark-fuscous, inclining to blackish; markings deep-orange; basal hairs orange; a roundish spot at end of cell; a submedian band of 4 spots, much narrower in ♀; two middle ones elongate, cartridge-shaped; spot between veins 1 and 2 irregularly edged and continued along vein 1 to base and termen; upper spot irregularly quadrate; cilia orange. Under-side of forewings dull-fuscous, more or less tinged with dull-olive greenish, especially on margins; markings of upper-side, except stigma, reproduced. Hindwings as forewings; markings of upper-

side reproduced; band faintly edged with fuscous; cilia orange-yellow, more pronounced at anal angle.

This species is easily recognized, especially the ♀, which is curious in having no spots between vein 4 and the apex. The ♂ is not unlike a large *bambusæ*. The under-side of both sexes has the ground-colour similar; that is, dull-olive greenish, tinged with fuscous.

Kuranda, Queensland. Five specimens; January to April; also from Mackay.

85. T. ARUANA, Plötz.

Hesperia aruana, Plötz, S.E.Z., p. 103, 1886, pl. mcccclx. *Pamphila autoleon*, Misk., P.R.S., Qld., 1889, p. 147, *Erynnis Macleayi*, M. and L. (*nec* Plötz). *Telicota aruana*, Swinh., T.E.S., pl. ii., fig. 9, 1908.

Type *aruana*, in Coll. Erhardt (Munich); type *autoleon*, Misk., in Queensland Museum.

Since seeing Plötz's drawing of *Macleayi* I am of opinion that it does not represent *aruana*, but an allied species. I am strongly of opinion that *Dobboe*, Plötz., and *Oharina*, Stgr. (M.S.S.), represent very slight geographical variations of *aruana*, the former representing the ♀, the latter the ♂. I have both from New Guinea and the Aru Islands, and the only difference is the more prominent cellular streak on upper-side of forewings. I place *aruana* in *Telicota*, as it possesses the ♂ stigma; otherwise it would be better placed in *Corone*, as veins 2, 3, and 4 of forewings are not equidistant. I look upon this species as forming a connecting link between *Telicota* and *Corone*, yet not necessitating forming a new genus.

Mackay to Cairns, Queensland; November to May; also from Aru Islands.

16. CORONE, Mab.

Pet., Nouv., Ent., p. 205, 1878.

Type *ismenoides*, Mab.

This genus differs from *Telicota* by the absence of stigma on either forewing or hindwing, and the position of the veins 2, 3, and 4 of forewing. In both sexes 3 and 4 are closely approximated at base, 3 from immediately before angle, 2 midway between 3 and base of wing.

Edwards and Elwes (Rev. of Hesp.) place *augiades*, which is closely allied to *sperthias*, in *Telicota*.

86. C. SPERTHIAS, Feld.

Hesperia sperthias, Feld., Verh. Zool., Bot. Geis., xii., p. 492, 1862. ♀, *Pamphila ulama*, Butl., T.E.S., p. 504, 1870. ♀, *Corone ismenoides*, Mab., Pet., Nouv., Ent. ii., p. 204, 1878. *Palmarum*, Scott, M.S.S. *Phineus*, Scott (*nec* Cram.), Aust., Lep., pl. xiv., 1890. *Erynnis sperthias*, M. and L., T.R.S., p. 113.

We formerly placed this species in *Erynnis*, Sch., but that genus is immediately known by the minute apiculus of club of antennæ, and so far as is known has no representatives in Australia. Elwes gives *comma*, Linn., as the type of the genus *Erynnis*. Mr. Meyrick, in his handbook, places that insect in *Pamphila*, Fabr.

Type ♂, in Coll. Felder; type ♀, in Coll. Mus. God.

Sydney to Cape York; from November to February. Larvæ feed on various *palms*.

Mr. Waterhouse tells me that Felder described this species from specimens obtained by Frauenfeld from A. W. Scott when in Sydney. Scott had given the M.S. name of *palmarum* to this species, according to Felder. In Scott's Australian Lepidoptera (pl. xiv., 1890) the name of *palmarum*, Scott, appears on the plate, and *phineus*, Cramer, on the explanatory plate. The latter name, *i.e.*, *phineus*, originated with Mr. G. F. Matthew, who, when breeding the species, misidentified it with the *Surinam* species. The reason why the name appears as *palmarum*, Scott, on the plate and *phineus*, Cramer, in the text is that the plates were struck off many years before the notes of Scott were published by A. S. Olliff.

87. C. TRICHOPEPLA, LOW.

T.R.S., S.A., p. 315, 1908. *E. palmarum*, M. and L. (*nec* Moore), *l.c.*, p. 110, 1902.

We formerly called this *palmarum*, Mre. (an Indian species), which the ♂ resembles somewhat above, but the ♀ is totally different, being similar to the ♂; whereas in *palmarum* the ♀ is dark-brown, with yellowish markings, and has not been taken in Australia up to the present.

Types in Coll. Lower.

Through the kindness of Mr. H. J. Elwes I have been fortunate enough to examine ♂ and ♀ specimens of Moore's *palmarum*. They are not to be confused with *trichopepla*. The drawings in P.Z.S. are excellent, and indicate the Indian *palmarum* with certainty. Unfortunately the under-side is not delineated.

Mackay to Port Darwin; from November to March.

88. C. AUGUSTULA, Herr.-Sch.

Pamphila augustula, Herr.-Sch., S.E.Z., p. 79, n. 58, 1869. *Erynnis augustula*, M. and L., T.R.S., p. 109.

Townsville, Queensland. One specimen; in October (Dodd). The type came from Fiji.

17. PARNARA, Mre.

Lep., Ceylon, i., p. 166, 1881. Watson, P.Z.S., 1893, p. 105.
Caltoris, Swinh., T.E.S., 1893, p. 393.

Type (*Caltoris*) *kumara*, Mre.; type (*Parnara*) *guttatus*, Brem.

Antennæ as long or longer than half of costa; club moderate, apiculus distinct, as long as or longer than greatest width of club. Second joint of palpi densely scaled, terminal joint obtuse, very short, almost concealed; vein 5 nearer 4 than to 6, curved upwards from base, 2 from about middle of cell. Hindwings with 2 from apical fourth of cell, 5 absent. Hind tibiæ with two pairs spurs; ♂ without stigma.

89. P. AMALIA, Semp.

Pamphila amalia, Semp., Mus. God. Lep., xiv., 1878. *Hesperilla fulgidus*, Misk., P.R.S., Qld., p. 151, 1889. *Erynnis fulgida*, M. and L., T.R.S., p. 116, 1902.

Type *amalia*, in Hamburg Museum; type *fulgidus*, in Queensland Museum.

Brisbane to Port Darwin; October to December.

90. P. LARACA, Swinh.

Caltoris laraca, Swinh., A.M.N.H. (7), xx., p. 434, 1907; T.E.S., pl. ii., fig. 21, 1908.

♂ ♀, 36-42 mm. Head, palpi, thorax, antennæ, and abdomen fuscous; palpi beneath pale-yellowish; thorax and abdomen haired with greenish-yellow, becoming paler and brighter beneath; antennæ beneath spotted with yellowish; club yellowish beneath; apiculus reddish. Legs reddish-yellow. Forewings elongate, triangular; costa very slightly arched, termen obliquely rounded; dark-fuscous; basal half of wing and dorsum clothed with short orange hairs; markings pale-yellowish, semi-transparent; two spots in end of cell, upper elongate, lower irregularly quadrate; an irregular transverse series of three small subapical spots lying between veins 6 and 9, middle one lying at base of veins 7 and 8; a rather elongate, somewhat quadrate spot lying at base of veins 2 and 3; a second, not quite half the size, immediately above, placed obliquely and excised posteriorly; a third, roundish, obliquely above, between veins 4 and 5; a somewhat cartridge-shaped yellow spot lying on vein 1 in middle; cilia yellowish-white. Hindwings with termen rounded, anal angle rounded, prominent; colour, orange hairs, and cilia as in forewings; two ovoid, pale-yellowish, semi-transparent spots lying beyond middle of wing between veins 2 and 4. Forewings beneath rather bright-greenish yellow or yellow, lower half of wing, which is fuscous, excepting terminal area; markings of upper-side reproduced; cilia as above. Hind-

wings bright-greenish yellow or yellow, especially in ♂; spots of upper-side reproduced, but appearing more transparent; cilia yellow.

Colonel Swinhoe places this species in *Caltoris*, Swinh. (type *kumara*, Mre.), but owing to its affinity to *colaca*, Mre., I see no reason for separating it from *Parnara*, as defined. It is somewhat like *mathias*, ♀; but the absence of stigma easily separates it.

Type in British Museum.

Port Darwin and Woodlark Island, New Guinea.

Mr. Dodd sent me a fine series, which show no variation. The footnote at end of description of *mathias*, T.R.S., S.A., p. 117, 1902, refers to this species. The type came from Woodlark Island.

91. P. COLACA, Mre.

Hesperia colaca, Mre., P.Z.S., 1877, p. 594, pl. lvii., fig. 7. *Parnara cingala*, Mre., Lep., Ceylon, i., p. 167, pl. lxx., figs. 3a, 3b, 1881. *Hesperia urejus*, Plötz, Berl., Ent. Zeit., xxix., p. 226, 1885, pl. mcccxcv. *H. saruna*, ib., l.c., xlvi., p. 90, 1886, pl. mcccxxix.

♂ ♀, 33-38 mm. Head, palpi, antennæ, thorax, and abdomen dark-fuscous. Palpi beneath pale-yellowish, antennæ rather short, hardly half the length of costa. Thorax and abdomen clothed above with golden-ochreous hairs, beneath ochreous-whitish. Legs ochreous fuscous. Forewings elongate, triangular, costa straight, termen oblique, slightly bowed; dark-fuscous, markings whitish, semi-hyaline; a transverse row of 3 small subapical spots, upper one often absent; a somewhat quadrate spot at base of veins 2 and 3; a small cartridge-shaped spot at base of veins 3 and 4; a small spot nearly at base of veins 4 and 5; some golden hairs along dorsum; cilia ochreous-fuscous, darker on basal half. Hindwings with termen rounded; generally two small dots in middle of wing at $\frac{2}{3}$ from base, sometimes obscure; cilia as in forewings. Forewings below dark-fuscous, costal, apical, and terminal areas finely irrorated with pale-ochreous; markings of upper-side reproduced. Hindwings below dark-fuscous wholly irrorated with pale-ochreous scales, markings of upper-side reproduced, somewhat obscure.

Swinhoe says (T.E.S., p. 23, 1908):—"At the end of the cell of forewings there are generally two spots. Sometimes only one and sometimes both are obsolescent; in the figures on pl. mcccxcv. there is only one; in pl. mcccxxix. both are absent. I have Indian examples like both."

De Niceville, in writing to Mr. Rowland Turner, says:—"Parnara colaca. This agrees exactly with specimens from

India. I expect it has probably been separately described from Australia."

Described from Australian specimens.

All the specimens I have seen are similar, and do not vary from my description. Mr. Turner states that our species does not agree with those *colaca* in British Museum.

Mackay, Atherton, and Kuranda, Queensland; in April.

92. P. IMPAR, Mab.

Pamphila impar, Mab., l.c., pl. xvi., vol. xxvii., 1883.

"Niger, alæ latæ; anticæ tria puncta offerentes, in seriem obliquam inter ramos; unum minimum ante cellulum, unum quadratum, magnum, albo argenteum inter primum et secundum ramum nervi compositi posterioris, et unum fere triangulare ad nervum simplicem, subluteum. Anticæ subtus apice rufescentis easdem maculas gerunt. Posticæ griseæ habent tria puncta albida, unum ad margineum anticum, et duo paulo inferius approximantia." "Le dessus des ailes est d'un brun foncé presque noir. Les ailes inférieures ont trois points blancs transparents en ligne oblique entre les rameaux; le premier est très petit, et le troisième, triangulaire, est placé contre la nervure simple postérieure et tenite de jaune pâle. Le dessous des ailes supérieures a l'apra et la côte lavés de rougâtre, avec les points du dessus plus marqués. Les ailes inférieures sont d'un brun grisâtre luisant, avec trois points blancs auprès du bord antérieur et deux du dessous, rapprochés et placés entre les rameaux. Le corps est brun. Une femelle d'Australie et onde Océanie." Apparently something like some forms of *colaca*, Mre.

93. P. SIGIDA, Mab.

Pamphila sigida, Mab., Comp. Rend. Soc., Ent. Belg., vol. xxxv., p. 177, 1891.

"Brun noir. Ailes supérieures à points et à taches blanc jaunâtre, transparents, savoir-trois pointe apicaux allongées, en ligne droite; trois taches sur le disque dans les intervalles, 2, 3, et 4 et ombrées de noir foncé intérieurement; deux petits points blanc jaunâtre au bout de la cellule. Inférieures avec trois points diffus sur le disque dans les intervalles, 4, 5, et 6. Frange jaune roussâtre. Dessous des supérieures noirâtre à la base, et brun rougeâtre sur la moitié terminale, taches reunies sur le disque. Inférieures brun rouge avec une éclaircie correspondante aux taches du dessus. Corps brun foncé, ventre blanchâtre ainsi que la poitrine et les palpes." 30 mm., Australia.

The description of this species (which I fail to recognize) reads somewhat like *amalia*, Semp., but it cannot be that

species, as Mabilie returned specimens as unknown to him with the words "*Parnara* (groupé *sèguttata*), Br." Possibly this and the former are not Australian. I refer them to *Parnara* with some doubt, but they appear rightly referred.

18. CHAPRA, Mre.

Lep., Ceylon., i., p. 169, 1881.

Type *mathias*, Fabr.

This genus differs from *Parnara* only by the presence of stigma of ♂.

94. C. MATHIAS, Fabr.

Hesperia mathias, Fabr., Ent. Syst. Supp., p. 433. n. 289. 290, 1798. *Hesperia thrax*, Led., Verh. Zool. Bot. Geis., Wien., 1855, p. 194, pl. i., figs. 9-10. *Chapra mathias*, Mre., Lep., Ceylon, i., p. 169, pl. lxx., figs. 1 and 1a, 1881. *Baoris mathias*, Dist. Rhop. Malay, p. 380, pl. xxxv., fig. 10, 1886. *Erynnis mathias*, M. and L., T.R.S., p. 117.

Elwes and Edwards (Rev. of Hesp.) give *ayna*, Mre., as a synonym. Colonel Swinhoe considers it distinct.

Brisbane to Cape York, Port Darwin; from October to May; also from India, Java, Borneo, etc.

19. SABERA, Swinh.

Trans. Ent. Soc., p. 30, 1908.

Type *cæsina*, Hew.

Palpi upturned, thickly hairy; *antennæ two-thirds length of costa*; club rather long and even, not thick; apiculus short and curved. Forewing with vein 2 from about middle of cell, 3 from lower end, 4 from end, 5 below middle of discocellular, 6 and 7 from upper end, 8 from close to upper-end, 12 ending on costa well beyond upper-end of cell; hindwings with vein 4 from end of cell, 2 and 3 from close before end at equal distances apart (? 5 from middle of discocellular), 6 and 7 from upper end, 8 coincident with 7 for a short distance from the base, thence well separated.

We formerly placed the type of this genus, *i.e.*, *cæsina*, in *Erynnis*, Sch., but the antennæ of this species and the following were discordant characters, as the length ($\frac{2}{3}$ of costa) indicated a different genus. I have followed Colonel Swinhoe in the generic description, but can find no vein 5 on hindwing; possibly this is a printer's error or *lapsus calami*.

The sexes are similar; the ♂ has no perceptible stigma, but has a peculiar small ovoid membranous spot lying on vein 1 just inside the small white spot at end of white band of forewing. It is easily passed over, but is constant, and may, and probably does, indicate an embryo stigma. The white discal macular band of forewings is narrower and more abbreviated

in the ♀. Mabilles referred *cæsina* to *Acerbas*, De Nic., of which *anthea*, Hew., is the type.

95. *S. CÆSINA*, Hew.

Carystus cæsina, Hew., T.E.S. (3), ii., 491, n. 15, 1866; ex. Butt., v. Hesp., t. 6, fig. 57, 1873. *Pamphila albifascia*, Misk., P.R.S., Qld., p. 148, 1889. *Erynnis cæsina*, M. and L., T.R.S., p. 118. *Sabera cæsina*, Swinh., T.E.S., p. 31, 1908.

Type *cæsina*, in Coll. Hewitson (British Museum); type *albifascia*, in Coll. Miskin (Brisbane Museum).

Cairns, Queensland; from December to April; also from New Guinea, North Borneo, and Humboldt Bay.

96. *S. FULIGINOSA*.

Pamphila fuliginosa, Misk., P.R.S., Qld., vi., p. 147, 1889; ♀ ♂, *ib.*, Ann. Qld. Mus., p. 76, 1891. *Erynnis fuliginosa*, M. and L., T.R.S., p. 115.

Types in Coll. Miskin (Queensland Museum).

Mackay to Cairns, Queensland; from January to May.

I think at present it would be better to widen the characters of *Sabera* by adding ♂ sometimes with stigma than to erect a new genus for this species. It is structurally similar, excepting that the ♂ has a stigma. It is an easily recognized species, the snow-white cilia of hindwings being specifically distinct and noteworthy. Probably it is more nearly related to *Telicota*.

97. *S. (? CARYSTUS) VALLIO*, Mab.

Comp. Rend. Soc., Ent. Belg., 1883, vol. xxvii., p. 60.

Rufo-fuscus; alæ anticæ cum triplici serie macularum; ad costam ante apicem sunt tria puncta alba hyalina, duæ maculæ in cellula junctæ et duæ aliæ inter ramos, coaduntæ luteo hyalinæ. Alæ posticæ immaculatæ, fimbria subfulva, alæ subtus viride variegatæ. Anticæ rubidæ cum marginis externi parte superiore et margine interno lilacino. Posticæ rubidæ cum vitta media cinereo lilacino.

Les trois séries de taches des ailes supérieures différent de couleur. Les trois points apicaux sont d'un blanc transparent; les taches de la cellule et du disque sont réunies deux par deux, également hyalines, mais jaune paille. Le dessous des ailes inférieures est traversé, en son milieu, par une bande courbe d'un gris lilac; le corps est concoloré, les palpes et la poitrine sont gris cendré. Le dernier article des palpes est aciculé droit et noir.

Nouvelle Hollande.

This description reads somewhat like *Hesperilla Doubledayi*, Feld., ♀, but the green (viride variegatæ) under-side does not agree with that used. I sent *Doubledayi* ♂ to

Mabille, who returned it with the remark "J'en ai ♂ sans nom," so that it is hardly likely he would fail to recognize the ♂—that is, supposing his description refers to a ♀, which is uncertain, as he gives no clue to the sex or size of same. I do not know this species, and am placing it here provisionally.

20. NOTO CRYPTA, De Nic.

Jour. Bomb., N.H. Soc., 1889, p. 188; Watson, P.Z.S., 1893, p. 112. *Plesioneura*, Feld., Wien., Ent. Mon., vi., p. 29, 1862 (nom. præocc.).

Type *curvifascia*, Feld.

Club of antennæ elongate, moderate, apiculus pointed, bent. Palpi subascending, terminal joint short, obtuse, porrected. Posterior tibiæ with all spurs, rather long. Forewings in male without stigma; 3 from rather near 4; 5 much nearer to 4 than to 6; 2 much nearer to base of wing than end of cell. Hindwings with vein 5 practically obsolete.

98. N. FEISTHAMELI, Bdv.

Thymele Feisthamelii, Bdv., Voy., "Astrolabe," Lep., p. 159, pl. ii., fig. 7, 1832; *Plesioneura curvifascia*, Feld., Wien., Ent. Mon., vi., p. 29, 1862. *P. alysos*, Mre., P.Z.S., 1865, 789; *ib.*, Lep., Ceylon, i., p. 178, pl. lxxviii., fig. 3 ♂, 3a ♀, 3b larvæ and pupæ, 1881; *P. albifascia*, *ib.*, P.Z.S., 1878, p. 843. *P. restricta*, *ib.*, *l.c.*, p. 178, 1881. *P. waigensis*, Plötz, Berl., Ent. Zeit., xxvi., p. 263, 1882, pl. ccxl. *P. volux*, Mab., Ann. Soc., Ent. Belg., 1883, p. 56. (?) *P. clavata*, Stand., *Iris*, ii., p. 153, pl. ii., fig. 9, 1899. *N. Feisthamelii*, M. and L., T.R.S., p. 119.

A variable species. All the varieties represent but one species. The Australian form is *restricta*, Mre. I have specimens varying in size from 25 to 46 mm., and the subapical spots number from 2 to 5.

N. waigensis, Plötz, figured by Colonel Swinhoe, T.E.S., pl. iii. fig. 10, is an excellent drawing of our species from Evelyn Scrub, Cairns.

Mackay to Cape York, Queensland; from November to April; also from India, Borneo, New Guinea, etc.

21. BADAMIA, Mre.

Lep., Ceylon, i., p. 156, 1881.

Type *exclamationis*, Fabr.

Club of antennæ elongate, apiculus pointed, bent. Palpi ascending, terminal joint long, slender, slightly swollen near apex, obtusely pointed, porrected. Posterior tibiæ with all spurs. Forewings in ♂ without stigma, 5 parallel and equidistant to 4 and 6. Hindwings with 3 and 4 remote. Five present. Contains only the following species.

99. *B. EXCLAMATIONIS*, Fabr.

Papilio exclamationis, Fabr., Syst. Ent., p. 530, 1775, Mre., Lep., Ceylon, i., p. 157, pl. lxvi., figs. 2a, 2b, 1881. *P. ladon*, Cr., Pap., ex. iii., pl. cclxxxiv., fig. c. ♀, *Ismene thymbron*, Feld., Sitz., A. K. Wiss., Math. Nat., clxl., p. 461, Lep., p. 14, 1860. *B. exclamationis*, M. and L., T.R.S., p. 120.

Sydney to Cape York, Port Darwin; also India, North-West Himalyas, etc.; from October to December.

22. *HASORA*, Mre.

Lep., Ceylon, i., p. 159, 1881; Watson, P.Z.S., 1897, p. 127.

Type *badra*, Mre.

Club of antennæ moderate, elongate, apiculus pointed, bent. Palpi ascending, terminal joint slender, long, slightly swollen near apex, obtusely pointed, porrected. Posterior tibiæ with all spurs. Forewings in male without stigma, 1*b* distorted downwards near base, 5 parallel to 4 and 6, approximated slightly at base. Hindwings with 3 and 4 closely approximated basally; 5 present. An Indo-Malayan genus of moderate extent.

100. *H. HASLIA*, Swinh.

Ann. Mag., N.H. (7), iii., 107. *H. bilunata*, M. and L. (*nec* Butl.), T.R.S., p. 122.

We formerly called this species *bilunata* and queried *haslia* as a synonym. I am now satisfied that the identification was erroneous; *haslia* is a true *Hasora* and a good species, while *bilunata* is a *Parata*, with the male stigma conspicuous.

Brisbane, Queensland; in November.

101. *H. DOLESCHALLI*, Feld.

Ismene doleschallii, Feld., Sitz., Akad., Wiss., Wien., Math. Cl., p. 460, 1860; Reis., Nov., Lep., iii., pl. lxxii., fig. 16, 1867. *H. Doleschallii*, M. and L., T.R.S., p. 126.

Felder's coloured figures are variable and indifferently delineated. Vein 1*b* in this species is distorted very little; the same peculiarity is observed in *Albertsi*, Oberth., from New Guinea, which is allied to *Doleschallii*, but is immediately separable by the tuft of hair on upper-side of hindwing of ♂ on vein 1 near anal angle.

Cooktown to Cape York, Queensland; in December; also from New Guinea, etc.

102. *H. DISCOLOR*, Feld.

Goniloba discolor, Feld., Wien., Ent. Mon., p. 405, 1859. *Ismene discolor*, Feld., Reis., Nov., Lep., iii., pl. lxxii., fig. 17, 1867. *H. discolor*, M. and L., p. 123.

Richmond River, New South Wales, to Cooktown, Queensland; in November and December.

23. PARATA, Mre.

Lep., Ceylon, i., p. 160, 1881.

Type *chromus*, Cr.

This genus differs from *Hasora* only by the presence of the stigma in ♂, which is somewhat crescentic. The genus is useful in separating the two groups.

103. P. CHROMUS, Cr.

Papilio chromus, Cr., Pap., ex., pl. cclxxxiv., fig. e, ♂, 1782.

Parata chromus, Mre., Lep., Ceylon, i., p. 161, pl. lxxv., fig. 1, 1881.

Hasora chromus, M. and L., T.R.S., p. 125 (*nec* Cramer). *Hasora lucescens*, Lucas, P.R.S., Qld., xv., p. 138, 1899.

♂ ♀, 42-48 mm. Head, thorax, and abdomen dark-fuscous, more or less densely clothed with greenish-golden hairs; face ochreous; palpi and antennæ dark-fuscous; palpi beneath ochreous-fuscous. Legs ochreous-fuscous. Forewings elongate, triangular; costa nearly straight, termen nearly straight, oblique; dark-velvety fuscous; almost blackish in some specimens; basal hairs greenish-golden; markings whitish in ♀; male without markings, except stigma, which is densely black; moderately narrow and curved inwards from base of vein 3 to dorsum before middle; a somewhat triangular spot near base of veins 3 and 4; a similar spot, excised posteriorly, obliquely below, between veins 2 and 3; sometimes a minute subcostal spot between veins 6 and 7, usually absent; cilia dark-fuscous, tips whitish. Hindwings with termen somewhat produced on vein 1; colour, as in forewings; basal hairs greenish-golden: dorsum broadly dull-light fuscous; cilia as in forewings. Under-side of both wings fuscous, washed with bluish-purple; cell of forewings blackish, markings of upper side of ♀ reproduced; dorsum broadly dull-ochreous whitish, limited by vein 1; a small similarly-coloured patch above anal angle. Hindwings with a moderately broad transverse white fascia, about 3 mm. wide; anterior edge moderately straight, posterior edge suffused and gradually mixing with ground-colour, from costa at $\frac{2}{3}$ to vein 1*b*; a large patch of velvety black on anal angle; an obscure dull-whitish streak along vein 1*a* to base; a small white patch on dorsum, just above anal angle; cilia as above, blackish on anal angle, and with a fine white basal line between veins 1*b* and 3.

The insects formerly described by us as *chromus* were small specimens of *haslia*, Swinh., which were known to Australian collectors as *chromus*. It was under these circumstances that Dr. Lucas renamed the present species *lucescens*. The description here given is drawn from Australian specimens, but a nice series sent me by Colonel Swinhoe from various Indian localities vary very little from our form, the

chief difference being the under side, which is not so lilacine. Brisbane to Port Darwin; from December to March; also India, Borneo, etc.

104. *P. CONTEMPTA*, Herr. Sch.

Ismene contempta, Herr.-Sch., M.S.S., Plötz, S.E.Z., vol. xlv., p. 56, n. 1167, 1886 (*nec contempta*), Herr.-Sch.

♂ ♀, 46-50 mm. Head, thorax, and abdomen brownish-fuscous, more or less clothed with greenish-golden hairs; thorax and abdomen beneath whitish-ochreous; face ochreous; palpi dark-fuscous above, ochreous-whitish beneath. Legs ochreous, fuscous-tinged. Forewings elongate, triangular; costa nearly straight; termen straight, oblique; light-brownish ochreous, darker on median portion of wings; basal pairs greenish-golden; markings in ♀ as in *chromus*, sometimes the spot between veins 2 and 3 is absent or scarcely perceptible above; apical spot well developed; stigma in ♂ as in *chromus*; cilia fuscous, terminal half whitish. Hindwings with termen somewhat produced on vein 1; colour, basal pairs and cilia as in forewings; under-side of both wings ochreous-fuscous; forewings washed with dull-purplish along costa and upper $\frac{2}{3}$ of termen, latter portion limited by an obscure violet-whitish streak, angulated near costa; markings of upper-side of ♀ reproduced; dorsum broadly dull-ochreous whitish, limited by vein 1; a small similarly-coloured patch above anal angle. Hindwings with the purplish better developed; a broad transverse white fascia about 2 to $2\frac{1}{2}$ mm. wide at greatest width, inner edge more irregular than in *chromus*, yet similar, from costa at $\frac{2}{3}$ to vein 1b: a large patch of black on dorsum at anal angle; an obscure whitish streak along vein 1a to base; a small white patch on dorsum, just above anal angle; cilia as above; blackish at anal angle and with a fine white basal line between veins 1b and 3.

This species appears constantly distinct from *chromus* by the different ground-colour of wings above, otherwise it is a close ally of that species; indeed, specimens of *chromus* from New Guinea, identified as such by Colonel Swinhoe, are scarcely perceptibly different, and personally I consider the single specimen submitted to him *is contempta*. The *under-side* of the abdomen of the present species is ochreous-fuscous; in *chromus*, including the Indian specimens, it is fuscous, with the segmental margins distinctly whitish or white. Whether this peculiarity is of any practical utility in separating the two species remains to be seen. I would not insist on the point, although it is quite constant in all the specimens before me. Plötz's drawing of the ♀ (No. 1167) does

not refer to the present species, and I have not met with a specimen agreeing exactly with the figure, the hindwings of which show a narrow (1 mm.) white, somewhat wavy, fascia, edged internally with half its width of brownish-red: the wing between this and base is dull light-chocolate, and between the white fascia and termen lilacine becoming brownish on termen. In Plötz's description he says, "Hindwings, under-side, with narrow white band." The other ♀ figure (called a ♂) delineates our species with certainty, but it cannot be a ♂, as the figure delineates the two lunate spots, which are absent in that sex, of the species under review, as mentioned in my description (*vide supra*). It is curious that neither of the figures shows the apical dot. I therefore consider that the species should stand as *P. contempta*, Herr. Sch., and Plötz's species, when discovered, will require a new name.

Townsville to Port Darwin; from November to March. The type came from Cape York (*vide Plötz*).

105. *P. CONTEMPTA*, Plötz.

S.E.Z., xlv., p. 56, 1884.

I append Plötz's description (translated by Mr. Waterhouse), which may prove useful in identifying the species. I have arranged the terminology in keeping with that adopted in this paper:—

"*Ismene contempta*, Plötz., S.E.Z., xlv., p. 56, 1884, pl. dclxvii. Upper-side blackish-brown, body and base of wings with green hairs, forewing—at least in ♀—with small spots or dots; those in cells 2 and 3 are hyaline or moon-shaped. *Cilia brown*. Under-side brownish-grey, suffused-violet grey. Forewings with narrow vanishing bands before the border, and a similar transverse spot at the last vein; a light mark at hinder margin. Hindwings with a *narrow white band running from costa to anal angle, almost linear from costa to cell 1c, becoming undecided toward the margin; at vein 1b it turns toward the anal angle, where there is a large black spot.*"

Nearest ally, *vitta*, Butl., from the Philippines; then *chromus* of Cramer.

23-24 mm. (one wing only), Cape York.

106. *P. HURAMA*, Butl.

Hesperia hurama, Butl., T.E.S., p. 498, 1870. Lep., ex., p. 166, pl. lix., fig. 10, 1874. *Ismene hurama*, Miskin, Ann. Qld. Mus., p. 74, 1891. *Hasora hurama*, M. and L., T.R.S., p. 124.

Type in Coll. Druce, taken at Cape York. The British

Museum has specimens from Champion Bay and Aru Islands (Butler).

Mackay to Cooktown; November to February; also from New Guinea (Meek).

107. P. LUGUBRIS, Bdv.

Thymele lugubris, Bdv., Voy., "Astrolabe," Lep., p. 160, 1832. *Hasora lugubris*, M. and L., T.R.S., p. 124.

I have but the single ♂ specimen. It is probably only a straggler from the adjacent islands. Cape York.

Note.—*Parata bilunata*, Butl., from Fiji, is very close to *chromus*, Cr. I have one indifferent specimen, and it cannot be satisfactorily separated from our *chromus*; probably a series from the type locality, Fiji, might show a recognizable distinction. I consider it a doubtfully good species. Colonel Swinhoe returned it as *chromus*.

FURTHER NOTES ON AUSTRALIAN COLEOPTERA WITH
 DESCRIPTIONS OF NEW GENERA AND SPECIES.
 No. XLI.

By the REV. CANON BLACKBURN, B.A.

[Read October 12, 1911.]

COPRIDES.

COPTODACTYLA.

In Deutsch. Ent. Zeitschr. (1909) Herr Felsche expressed the opinion that my *C. Baileyi* and *ducalis* are females of *C. glabricollis*, Hope. They are, however, perfectly distinct species. As regards *C. Baileyi*, Herr Felsche says, "Characters distinctive from *glabricollis* are '*tibiis anticis brevibus, apice acuminatis, externe inermibus.*' This sculpture is such for a *Coprid* that one can safely assume the author has had before him a specimen of *C. glabricollis* with worn tibiæ." In describing the characters that distinguish one species from another it is, I take it, usual that the author mentions first the character which he regards as the important one. A reference to my note (Proc. Linn. Soc., N.S.W., 1889, p. 1251) pointing out the distinctive characters of *C. Baileyi* will show that it commences thus: (*C. Baileyi* is) "different from it (*i.e.*, *C. glabricollis*) in the clypeus being evenly rounded in front without any emargination whatever." It is quite true that I proceeded to refer to the tibiæ as being without teeth, and that Herr Felsche's opinion that that is not a valid specific character is no doubt correct. Subsequent study of *Lamellicorn Coleoptera* led me to the conclusion Herr Felsche indicates, and in fact I have myself long ago expressed it (*e.g.*, Trans. Roy. Soc., S.A., 1904, pp. 286 and 287), *viz.*, that difference in the external form of tibiæ "may be due to some attrition to which the parts in question have been exposed." I have before me a long series of both sexes of *C. glabricollis*, Hope, from numerous places in Northern Australia, and have no hesitation in saying that the clypeal character I referred to as distinctive is perfectly reliable. However, I will now add that in *C. Baileyi* the clypeus is very much shorter than in *glabricollis* (its lateral outline running out a much less distance from the hind level of the eyes and being much less oblique, so that the widest part of the head is considerably narrower than the front margin of the prothorax). The strigose sculpture of the head does not occupy

nearly so large an area as in *glabricollis*, the greater part of that segment being occupied by a smooth gibbosity which is altogether absent in *glabricollis*. The outline of the clypeus has not the upturned margin that is present in *glabricollis*. Although these additional particulars are not needed to distinguish the two species, for the clypeal distinction mentioned in my description is quite sufficient, it is well doubtless that my attention is drawn to the matter, as it cannot be denied that I described *C. Baileyi* somewhat briefly, contenting myself with the mention of characters that clearly distinguish that species from those previously described in the genus.

C. ducalis, too, is very satisfactorily distinct from *glabricollis*. Apart from its size and build, which are notably larger and more massive than in any of the numerous specimens before me of *glabricollis*, it is at once distinguishable by the striæ of its elytra being all but without puncturation—those near the suture absolutely without—the lateral ones bearing extremely small punctures. It may be added that its pronotum is considerably less convex in the longitudinal direction (*i.e.*, viewed from the side) than is that of *glabricollis*.

I have before me what is evidently the female of one of the two Australian species of *Coptodactyla* described by Herr Felsche in the memoir quoted above, but as their author does not differentiate the females of the two, merely saying that they are altogether similar, it is impossible to give a name to my specimen. Is it not probable that the females referred to represent only one of his species, and that the female of the other remains undiscovered?

SERICOIDES.

HETERONYCIDES.

HETERONYX.

A recent visit to the Macleay Museum in Sydney has enabled me to supply information concerning two of the species mentioned in *Trans. Roy. Soc., S.A.*, 1910, p. 230, as requiring further study. They are as follows:—

H. scutatus, Macl. A member of Group VIII. In the tabulation of that Group (*Trans. Roy. Soc., S.A.*, 1910, p. 191) it stands beside *flavus*, Blackb., under "LL." line 8), and can be distinguished from it thus:—

- | | | |
|-----|---|---------------------|
| M. | Punctures of pronotum well defined
and quite strongly impressed | ... flavus, Blackb. |
| MM. | Punctures of pronotum extremely
fine and faint, scarcely visible | ... scutatus, Macl. |

H. marginatus, Blackb., belongs to Group VIII. In the tabulation (*loc. cit.*, p. 192) it stands beside *collaris*, under "MM." (line 1), and can be distinguished from it thus:—

- N. Base of prothorax wider than base of
 elytra *collaris*, Blackb.
 NN. Base of prothorax narrower than
 base of elytra *marginatus*, Blackb.

STETHASPIDES.

In my recent Revision of the members of this Group of *Lamellicornes* I accidentally omitted detailed treatment of the Australian genera of the aggregate called *Stethaspides* by Lacordaire, and by him regarded as a subsection of the *Sericoides*. The first part of my Revision (Trans. Roy. Soc., S.A., 1905) contains mention (on p. 281) of that aggregate, and distinguishes it from the other Australian aggregate of *Sericoides*: but when I reached the conclusion of the latter (in the Transactions for last year) I unfortunately forgot the genera of *Stethaspides*, and also in introducing (Trans. Roy. Soc., S.A., 1908, p. 364) the group of *Sericoid* genera with claws not simple referred to them as completing my Revision instead of as completing my Revision of one of the two main aggregates into which I had divided the Australian *Sericoides*. I therefore proceed now to consider the two known Australian genera of *Stethaspides*. These have been attributed to three genera: *Stethaspis*, *Colymbomorpha*, and *Phyllococerus*. Mr. Waterhouse—the author of *Phyllococerus*—characterized the genus without specifying what he regarded as its distinctions from *Colymbomorpha*, but an examination of the diagnosis indicates the following characters (only) as likely to have been considered by him to be generic, *viz.*:—Antennæ 9-jointed, with a 3-jointed club; clypeus somewhat deeply emarginate in middle. I have the two forms before me, and cannot find any other distinction likely to be generic between them. As regards the number of antennal joints, Blanchard, the author of *Colymbomorpha*, described the antennæ of that genus quite correctly as 9-jointed; while Burmeister, by attributing Blanchard's *Colymbomorpha* to *Calonota*, and stating that the antennæ of that genus have only 8 joints, numbered the antennal joints of *Colymbomorpha* incorrectly. It is possible that Mr. Waterhouse accepted Burmeister's statement as correct, and therefore regarded "9-jointed antennæ" as a character differentiating his genus from *Colymbomorpha*, though I think this unlikely. There remain, therefore, as probably relied on by Waterhouse, the number of joints in the antennal flabellum and the form of the clypeus. In *Colymbomorpha* the flabellum has five joints in both sexes (the first two of them very short in the female, which was evidently the sex

known to Blanchard), while the flabellum of *Phyllococerus* has only three joints. I am of opinion that neither the number of joints in the antenna or its flabellum, nor the form of the clypeal outline, is a character of more than specific value among the Australian *Sericoides*, and therefore must regard *Phyllococerus* as a synonym of *Colymbomorpha*. The tabulation in Trans. Roy. Soc., S.A., 1905 (p. 281), differentiates these insects and *Stethaspis* from the other Australian *Sericoides*. The former two are from Western Australia.

The third genus referred to above (*Stethaspis*) is really very close to *Colymbomorpha*, but the different facies and very much larger size of its species differentiate it strongly, for practical purposes. It is not so easy, however, to indicate a good structural difference. Burmeister, as mentioned above, merged *Colymbomorpha* in *Calonota*, and stated the number of its antennal joints (incorrectly) as eight. He distinguished it from *Stethaspis* on that character. Lacordaire placed the two genera in distinct "subtribes" of *Melolonthides*, attributing *Stethaspis* to the "true *Melolonthides*," which was certainly a mistake, as its ventral segments are certainly not formed as in that subtribe, nor are its front coxæ transversal. Blanchard placed *Stethaspis* in the *Rutelides*, quite incorrectly, since the claws of its species are not unequal. There can be no doubt that Burmeister was right in placing it near *Colymbomorpha* in the Sericoid group. It is, however, distinguished from *Colymbomorpha* by the first four joints of its tarsi being fringed beneath more or less closely with long hairs and the apical joint with stout bristles. This is, I think, a valid generic character in the Australian *Sericoides*. It may be added that in *Colymbomorpha* the labrum projects beyond the clypeus, so as to be visible from above, while in *Stethaspis* it is completely hidden (viewed from above) under the clypeus. This, however, is not in itself a valid generic difference in the *Sericoides*.

STETHASPIS.(1)

So much mention has been made of colour in the original descriptions of the species of this genus, and the species are so variable in colour, that it is difficult to arrive at any clear appreciation of the distinctive characters. All the Australian species except *nigrescens*, Blanch., and *lætus*, Blanch., are described as "olivaceous," or "olive-green." *Lætus* is called "*totus læte vividi-flavescens*," and is said to have green legs.

(1) In Ann. Nat. Hist., 1903, p. 303, Mr. Arrow showed conclusively that the name *Xylonychus* used for this genus by Lacordaire and other authors (also in Masters' Catalogue) is a synonym of *Stethaspis*.

Burmeister mentioned *latus* as perhaps identical with his *metrosideri*, thus implying that the legs of his specimen are green. I have not seen any species of *Stethaspis* (except *nigrescens*) which agrees in colour with the description of any one of them. The species that I cannot doubt is *Eucalypti* is, when fresh, of a clear green colour, with the legs light ferruginous, and in many specimens the extreme lateral margins and the apex of the elytra yellow. My unique specimen of the insect that I believe to be *S. metrosideri* (with which I think *latus* is probably, as Burmeister conjectures, identical) has head, prothorax, scutellum, and legs testaceous-ferruginous, elytra olivaceous, sterna mostly pale-ferruginous, abdomen coppery. My specimens of *piliger*, Blanch., have head, prothorax, and scutellum varying from olive-brown to a distinct green, elytra clear green with narrow ferruginous margin, legs and antennæ ferruginous. An old, and probably badly-kept, specimen agreeing otherwise with *Eucalypti* is of a dull pitchy-olive colour, with legs pitchy-ferruginous, and another, probably immature, is pale grass-green. It appears to me, therefore, probable that the colours of the *Stethaspides* are liable to fade or otherwise change under various circumstances, and that in respect of most of the species they should be disregarded for purposes of identification. As there is no species (in the genus) of which the type is in Australia I am obliged to rely upon descriptions for the identification of all the species, but fortunately there are descriptions (at least fairly good) of all of them, and I am of opinion that I have them all before me (except *latus*, if it is a valid species) and also an undescribed one. Under these circumstances a short note on each of the *Stethaspides* to set forth the grounds of my identification, in spite of colour discrepancies, seems desirable. *Stethaspides* (under the name of *Xylonychus*) bear six specific names in Masters' Catalogue, and I believe they include all the names correctly attributable to Australian members of the genus. One of these names (*Orpheus*, Fauv.), however, seems to have found its way into the Catalogue by mistake, since "New Caledonia" is the habitat its author assigned to it.

X. *Eucalypti*, Boisd. The original description is of little value, but nevertheless does not altogether agree with the insect commonly regarded as *Eucalypti*, inasmuch as it contains the phrase "*supra hirsutus*." Blanchard describes *Eucalypti* in seven words, "*Viridis, elytris olivaceis, pilis niveis majoribus densioribus*" (apparently a mere indication of differences from his *latus*). Burmeister says of it "*supra glaber*," but in the notes following the diagnosis says that there are "Borsten" on the elytra here and there between the

punctures. Probably Boisduval used an unduly strong expression in calling the insect before him "*supra* '*hirsutus*.'" At any rate, I have not seen any *Stethaspis* the elytra of which are more hairy than those of *Eucalypti* as Burmeister describes it. *S. piliger* is rightly called "*hirsutus*" in respect of its *pronotum*, but it is a Tasmanian species, and there can be little doubt that Boisduval's type of *Eucalypti* was from the neighbourhood of Sydney. I conclude, therefore, that the descriptions (of *Eucalypti*) of the authors mentioned all refer to the large green *Stethaspis* which occurs commonly in Victoria and New South Wales: fresh specimens of which always have, as Burmeister says, long, fine, erect hairs, very thinly distributed about the base and apex of the prothorax and between some of the punctures on the elytra, and also very sparsely placed short, white, adpressed hairs in single rows in the elytral striæ. All this pilosity is very easily rubbed off.

X. metrosideri, Burm. I have little doubt that a *Stethaspis* which I met with on the Blue Mountains is this species. Its differences in colour I have already referred to. Its author describes *metrosideri* as having 16 elytral striæ, and in describing *piliger* says that it has 14 striæ. I can count 16 striæ on the Blue Mountains specimen only by including two short and obscure striæ close to the apex in a part where in *piliger*, and also in *Eucalypti*, there is only confused puncturation. Burmeister does not, I think, attribute much importance to this character, as he does not allude to the number of elytral striæ in enumerating the differences between *metrosideri* and *Eucalypti*, and he could hardly fail to include it if there were a difference in the number of well-defined entire striæ, for that would be a much stronger and more conspicuous distinction than any that he specifies. He says that in *Eucalypti* the clypeus is more closely punctulate, that the long erect hairs of the upper surface and ventral segments are wanting in *metrosideri*, and that the hair fringes of the legs are longer and the tarsal bristles feebler in *Eucalypti*. The specimen before me, which I take to be *metrosideri*, presents all the above-mentioned differences from *Eucalypti*. It is an extremely good, well-preserved specimen, and therefore I have no doubt that the absence of erect pilosity on the dorsal surface and the ventral segments is a valid specific character. Burmeister does not mention in comparing the species that the transverse prominence near the apex of the elytra is evidently better defined and more carina-like in *metrosideri* than in *Eucalypti*, though in the description of the former he mentions it as very conspicuous. Another character of *metrosideri* omitted by Burmeister (if

my identification of that insect is correct) consists in the fine, adpressed, scale-like, white hairs in the elytral striæ running in double rows; but this would probably be noticeable only in a very fresh specimen.

S. latus, Blanch. It is not unlikely, as Burmeister says, that his *metrosideri* is identical with this species, in which case Blanchard's name has priority; but the colouring is so entirely different, and there are so many other small discrepancies between the descriptions, that it would not be wise to drop either name without further evidence. It is much to be desired that the types be compared. Blanchard says that the pronotum of *latus* is "dense punctatus," while the prothoracic puncturation of *metrosideri* is only mentioned as being much more sparse than that of the clypeus. In the species regarded by me as the latter, the pronotum certainly ought not to be called "closely" punctulate. Also "*abdomine albido-piloso*" seems inconsistent with identity with *metrosideri*, of which its author expressly notes that the abdomen is devoid of erect hairs—having only short, adpressed, scale-like hairs—which is the case in the species that I believe to be *metrosideri*. Pending further evidence I therefore retain both names, and in tabulating *latus* fall back for a distinction on the statement that its legs are green, which—if it is a good species—is not unlikely to be a valid character, as among all the many examples of *Stethaspis* before me there is not one with green legs.

S. piliger, Blanch. This is a readily identifiable species, and needs no special remarks.

S. nigrescens, Blanch., is also readily identifiable.

The following table will show characters distinctive of the known Australian *Stethaspides*, including a new species, the description of which follows the table:—

A. Legs not green.

B. Flabellum of antennæ of male not, or scarcely, longer than the preceding joints together (colour not black).

C. Erect hairs of pronotum at most very few and far between.

D. Ventral segments bearing long erect hairs

Eucalypti, *Boisd.*

DD. Ventral segments devoid of long erect hairs

metrosideri, *Burm.*

CC. Pronotum with dense erect pilosity.

D. Punctures of the inner 3 striæ of the elytra equal (colour brown)

monticola, *Blackb.*

- DD. Punctures of 1st and 3rd elytral striæ much smaller than of 2nd (colour of elytra green) piliger, *Blanch.*
- BB. Flabellum of male antenna notably longer than the preceding joints together (colour black) nigrescens, *Blanch.*
- AA. Legs green lætus, *Blanch.*

S. monticola, sp. nov. Supra pallide vel obscure brunnea, subtus nigra vix viridescens, palpis antennisque (harum flabello nonnullorum exemplorum dilutiori excepto) clypeo pedibusque dilute vel obscure ferrugineis; tota (elytris sparsim exceptis) dense pilosa; clypeo antice parum emarginato, crebre rugulose punctulato; fronte pronotoque minus subtiliter sat crebre punctulatis; hoc quam longiori ut 20 ad 11 latiori, antice fortiter angustato, lateribus (superne visis) fere rectis (a latere visis pone medium sinuatis), basi sat fortiter bisinuata; scutello puncturis sparsis impresso; elytris paullo ante apicem transversim obtuse prominentibus, fortiter punctulato-striatis, striis pilis brevibus sat adpressis seriatim sparsim instructis; pygidio crebre subtilius ruguloso; corpore subtus subtiliter crebre (abdomine minus crebre) punctulato.

Maris antennarum flabello quam articuli ceteri conjuncti manifeste breviori, articulo 4^o intus spiniformi.

Feminæ antennarum flabello quam maris, et illius articulo basali quam ceteris, multo brevioribus; antennarum articulo 4^o haud spinifero. Long., 9-10 l.; lat., $5\frac{1}{2}$ - $5\frac{3}{4}$ l.

A single example of this insect occurred to me on the Victorian Alps, flying in the sunshine, and recently Mr. H. J. Carter has sent me several specimens taken by him on Mount Kosciusko. The latter are all darker in colour than the former, though one of them is distinctly lighter than the other. The Victorian specimen has much more numerous short hairs in the elytral striæ than those from New South Wales; in fact, they run in regular series in all the striæ, while in those from New South Wales there are only a few here and there to be seen. My specimen was pinned and mounted at once when taken. The pilosity of all the *Stethaspides* of which I can speak from experience is so easily rubbed off that I think immediate mounting is necessary to secure specimens from abrasion. The puncturation of the pronotum is considerably stronger and closer than that of *S. Eucalypti*, Boisd.

Higher mountains of Victoria and New South Wales.

TRUE MELOLONTHIDES.

Lacordaire (whose classification I follow as closely as possible) divides the "Family" *Lamellicornes* into two "Legions," distinguished from each other by the arrangement of the abdominal stigmata—one of them exemplified plentifully in Australia by *Aphodius*, *Onthophagus*, and such like (usually known for the most part as "dung beetles"); the other of them exemplified even more plentifully in Australia by the beetles commonly called "chafers." This second "Legion" is divided by Lacordaire into four "Tribes," the first of which (*Melolonthides*) has formed the subject of the Revision that I have placed before the Royal Society of South Australia during recent years, beginning with 1905, and am still continuing. Lacordaire divided the "Tribe" into nine "subtribes," five of which are known to occur in Australia. My Revision of the third of these subtribes, "Sericoides," is concluded in the preceding pages of this paper, and I now pass on to the fourth of them, which Lacordaire calls "True Melolonthides." These he divides into three "groups," only the third of which (again called "True Melolonthides," the other two being regarded as less essentially *Melolonthid*) is known to occur in Australia. It contains the non-Australian genus *Melolontha* and other genera closely allied to it. The generic synonymy of the Australian members of this "tribe" is in much confusion, and must be dealt with before I proceed to deal with the species. Australian species of the tribe have been called by the following generic names: *Melolontha* (only by the earlier authors, at the time when the name was treated as including very diverse elements, some of which are not now recognized as members even of the tribe "true *Melolonthides*"), *Rhizotrogus*, *Rhopæa*, *Holophylla*, *Lepidiota*, *Lepidoderma*, and *Neolepidiota*.

Rhizotrogus is a genus of the second of Lacordaire's "groups" of the tribe. Burmeister regarded a species which he described under the name *tasmanicus* as belonging to *Rhizotrogus*, but he recognized it as so far aberrant in that genus that he formed a separate subgenus for it under the name *Antitrogus*. I have before me a species which is almost certainly that described by Burmeister, and it is decidedly not a *Rhizotrogus*, but a member of the group "true *Melolonthides*." *Antitrogus*, therefore, must be transferred to the tribe "true *Melolonthides*," while *Rhizotrogus* must drop out of the Catalogue of Australian *Coleoptera*. The names *Rhopæa* and *Holophylla* were proposed by Erichson (Ins. Deutschl., vol. iii., 1848) for Australian insects, which, however, their author did not name or describe as species. The former was placed by its author

among the true *Melolonthides*, the latter in a group which was separated by him under the name *Tanyproctini*. Comparing the very brief diagnoses of the genera one finds that they are distinguished from each other by the number of joints (six and seven) in the antennal flabellum and by the presence in *Holophylla* (but not in *Rhopæa*) of complete ventral sutures. The former of these characters is of no value at all; its acceptance would involve breaking up *Rhopæa* into five genera, in which the species most closely allied would be generically separated. Burmeister in 1855 stated that *Holophylla* has not complete ventral sutures—a statement that no doubt is correct in respect of the insect which he (Burmeister) regarded as *Holophylla* and named *H. furfuracea*—and that it is one of the true *Melolonthides*. But he does not appear to have had good authority for his identification. His remarks are too long to be quoted at full length here, but they imply his not having before him the actual specimen on which Erichson founded his genus; moreover, if he had had that specimen before him it seems most unlikely that he would not have described it and given it a specific name as being Erichson's type. At the time Burmeister wrote there was no Australian species known (apart from the undescribed species called *Holophylla*) of *Melolonthides* having transverse front coxæ and complete ventral sutures, and therefore a mistake on Erichson's part appeared the less unlikely, but since that time a genus has been described by Olliff (*Othnonius*) on a single species (*O. Batesi*) of which I have examples before me, and which undoubtedly falls (in Erichson's classification) in the *Tanyproctini* where he placed *Holophylla*—it having transverse front coxæ and complete ventral sutures, and might very well be the species that Erichson called *Holophylla* were it not for the generically valueless difference that its antennal flabellum has only six joints. It seems so unlikely that an author of Erichson's ability and reputation would definitely place a *Melolonthid* among those having complete ventral sutures (a very easily observed character), when that was not the case with it, as to suggest the probability of Burmeister's having been incorrect in his conjecture that the species he described as *Holophylla* is congeneric with Erichson's *Holophylla*, and the probability of the insect for which Erichson founded that genus being generically identical with, or very near to, that for which Olliff at a later date proposed the name *Othnonius*. To this must be added a very serious discrepancy between Erichson's and Burmeister's descriptions of the claws of *Holophylla*. Erichson says of them that they have "a single tooth at the base," distinguishing them from those of genera

whose claws have two teeth. Burmeister says of *Holophylla* that its claws are "fein mit kleinem spitzen Zahn vor der Mitte und zahnartig vortretender Basis." Is it to be supposed that Erichson wrongly observed both the claws and the ventral sutures? The conclusion seems inevitable that Burmeister's *Holophylla* is a genus of the "Groupe" "true *Melolonthides*" and is closely allied to *Rhopæa*, while Erichson's *Holophylla* belongs to the "Groupe" *Macrophyllides* (treated by Erichson as part of his "Tanyproctini") and is allied to, and possibly identical with, Olliff's genus *Othnonius*. As Burmeister's is the later use of the name, I propose the new name *Pseudholophylla* for his *Holophylla*.

I am sorry that I was myself in error in a former paper in accepting Burmeister's conclusions regarding *Holophylla*, for I described as doubtfully of that genus a species ("australis," Trans. Roy. Soc., S.A., 1887, p. 211) which I then regarded as probably congeneric with Burmeister's *H. furfuracea*. At the same time I drew attention to the extreme closeness of *Rhopæa* and Burmeister's *Holophylla*. As a result of studying Brenske's memoir (discussed later on in this paper) I have, however, subsequently satisfied myself that my *H. australis* is not truly congeneric with *H. furfuracea*, Burm., but must be referred to *Rhopæa*, to which *Pseudholophylla* (as I now call Burmeister's genus) is certainly extraordinarily close. The difference in the palpi which I referred to (*l.c.*) as separating my *R. (Holophylla) australis* from *Rhopæa* ceases to appear generic when a considerable number of species of *Rhopæa* are compared with each other.

Turning now to Burmeister's lengthy diagnosis of his genus *Holophylla*, its author does not point out its differences from *Rhopæa*, omitting it from his tabulation of generic characters, and in comparing the diagnosis, character by character, with that furnished by him of *Rhopæa* I should be disposed to think that the two might well be founded on different species of *Rhopæa* were it not for the one statement that the apical spurs of the posterior tibiæ in *Holophylla* are "somewhat blunt and at the apex leather-like." This last phrase is not very clear, but I take it to refer to the somewhat transparent ("parchment-like" I should prefer to call it) appearance of the apical part of the spurs of the hind tibiæ in those genera of the true *Melolonthides* which have the spurs blunt and dilated. The importance of this character will be found discussed later on in this paper; it will suffice here to say that it appears to be in itself a valid generic distinction between *Pseudholophylla* and *Rhopæa*. I have recently acquired a *Melolonthid* species occurring in

Queensland, which appears to be certainly congeneric and very probably conspecific, with that which Burmeister described as *H. furfuracea*. It agrees perfectly with the generic characters assigned (especially in respect of the large strongly convex eyes) with the qualification that the apex of the 3rd antennal joint can scarcely be called "strongly" produced in a point (certainly not a valid generic difference, however), and that I have not dissected and examined the inner mouth organs. Burmeister's specific description is undesirably brief, but my specimen agrees with it such as it is except in respect of the statement that the front tibiæ are without spurs. In my specimen the spurs in question are extremely short (much more so than in most species of *Rhopæa*), but they are not absolutely wanting. The spurs of the hind tibiæ furnish, I think, the decisive difference from *Rhopæa*, but it may be noted that the tooth of the claws is much further from the base than in *Rhopæa* (as is indicated in Burmeister's diagnoses of those genera).

The subdivision of Lacordaire's "Groupe" "true *Melolonthides*" is most perplexing, owing to the difficulty of finding well-marked characters that are, on the one hand, constant in aggregates of species evidently closely related *inter se*, and, on the other hand, constantly wanting in other such aggregates. In Berliner Entomolog. Zeitschrift., 1892, Herr Brenske discussed the classification of Lacordaire's "subtribe" "True *Melolonthides*" without limiting his remarks to the genera of any particular country. The portion of his memoir which refers to the "Groupe" "True *Melolonthides*" is, of course, the only portion that concerns genera known to be Australian. It is difficult to ascertain exactly how he would treat some of our genera because he referred only incidentally to the characters of some of them, the definite objective of his memoir being the discussion of an aggregate in which he mentioned only one of our Australian genera. It seems fairly clear, however, that his classification would not fit our Australian genera. All of them apparently would have to be divided between two aggregates, which he calls *Polyphyllides* and *Leucopholides*, distinguished from each other by the length of the third antennal joint. The typical species of *Rhopæa* (*R. Verreauxi*, Blanch.) falls into the former of these aggregates on account of the elongation of its third antennal joint, but the length of the third joint varies extremely among species which certainly ought not to be separated generically (and still less, placed in different groups of genera); in *R. morbillosa*, Blackb., for example, the 3rd joint being shorter in proportion to the 4th than it is in some species that obviously pertain to *Lepidiota*, which

Brenske places in the other aggregate. It, therefore, appears to me impossible to divide the Australian true *Melolonthides* into groups distinguished by the length of the 3rd antennal joint without arriving at a result that would be absolutely ludicrous.

Among the characters which Brenske attributes to his aggregate *Leucopholides* there is one which, although he does not definitely state that it distinguishes those species from the *Polyphyllides*, nevertheless does appear to be of considerable value in separating the Australian genera of true *Melolonthides* into two aggregates. That character lies in the apical spurs of the hind tibiae, which in Brenske's group *Leucopholides* are (or at any rate one of them is) greatly dilated in the females as compared with those of the other sex. Brenske does not characterize the spurs in the *Polyphyllides* having, when he reaches that stage in his paper where the spurs come in, already dismissed that aggregate as having the 3rd antennal joint elongate, and mentions only the *Rhizotrogides* (an aggregate not known to be Australian) as having the spurs alike in the two sexes. But, with some little hesitation, I think that character may serve as important for classifying the Australian genera of Lacordaire's "Groupe" "true *Melolonthides*."

Before explaining my use of the qualification "with some hesitation" it is necessary to refer to another character not mentioned by Brenske in the paper I am discussing, but which my studies of the Australian *Melolonthides* have led me to consider highly important from the generic point of view, though my knowledge of *Melolonthides* of other countries than Australia is not sufficient to qualify me for estimating its value in respect of other than Australian genera. The character that I refer to is the form and sculpture of the declivous front face of the clypeus. In the species of *Rhopaea* (i.e., of those species which one cannot doubt must be associated more or less closely with *R. Verreauxi*, Blanch.) the declivous front face of the clypeus is perpendicular or almost so, very high on the vertical line (the distance from base to summit being about equal to the length of the apical joint of a maxillary palpus), somewhat strongly and narrowly emarginate in the middle of its lower margin to receive the labrum, and having its whole surface (except a more or less narrow band along the summit) strongly and equally rugulose and set with long soft hairs. In *Lepidiota* and *Lepidoderma* the declivous front face of the clypeus is much less high (the distance from base to summit being much less than the length of the apical joint of a maxillary palpus), widely and feebly emarginate on its lower margin, and having

its surface (never as in *Rhopæa Verreauxi* but) rugulose and pilose only on the lateral parts (or with such sculpture extending across the middle only as a row of setigerous punctures).

Now in female *Rhopæa* (at any rate in the five species of which I have seen a female) the spurs of the hind tibiæ are of the same shape as in the male and are not (or scarcely) more dilated, the external sexual characters being in the antennæ and the hind tarsi, so that if the three genera I have already named were all that had to be reckoned with it would not be of practical importance to decide whether the clypeal or tibial generic structure should be regarded as the primary character for classification. But there are species which cannot be referred to any of those genera. There is *Antitrogus*, with the clypeus of a *Rhopæa* and spurs of hind tibiæ distinctly tending towards the *Lepidiota* type.

Next there is the insect which I described as *Rhopæa callabonensis*, but which on account of the structure of its labrum I do not now think can be included in *Rhopæa* or any other genus known to be Australian; it has the clypeus and antennæ of a *Rhopæa* and (although it is a male) the tibial spurs of a female *Lepidiota*. *Pseudholophylla* has head and antennæ exaggeratedly of the *Rhopæa* type, but again (though a male) tibial spurs that would befit a female *Lepidiota*. Another species before me has clypeus and tibial spurs like a *Lepidiota*, but antennæ of a *Rhopæa* (male with elongate 3rd joint and flabellum of 6 long joints). *Neolepidiota* in respect of clypeus, antennæ, and tibial spurs agrees (if it is a male) with *Lepidiota*.

The conclusion I have reached on full consideration of the data supplied above, and giving much weight to the practical inconvenience of a classification which is inoperative in species whose females are not known, is that for the Australian species of Lacordaire's "Groupe" "true *Melolonthides*" the best character for dividing them primarily into two aggregates is to be found in the structure of the clypeus. This classification brings together into one aggregate *Rhopæa*, *Pseudholophylla*, *Antitrogus*, and a genus characterized in the following pages as *Pararhopæa*, and places together in a second aggregate *Lepidoderma*, *Lepidiota*, *Neolepidiota*, and a genus characterized in the following pages as *Paralepidiota*. The former of these primary aggregates is no doubt capable of satisfactory subdivision founded on the spurs of the hind tibiæ, but in the absence of definite certainty as to the female of *Antitrogus* it would be unwise to make use of that character, and I therefore in both aggre-

gates found their subdivision on the presence (a) of three joints only, (b) of more than three joints, in the antennal flabellum, which seems to be a more important character in this group than it is in the *Sericoides*.

It may be noted here that *Rhopœa* is extremely close to the Fabrician genus *Melolontha*. Lacordaire distinguishes it from the latter by there being an additional lamina in its antennal flabellum (which is certainly not a valid generic character), and adds that it is of more cylindrical and parallel form, that its pygidium is slightly emarginate in the female (in *Melolontha* he calls the hind margin of the pygidium "of variable form"), and that it has no trace of a mesosternal process (in tabulating *Melolontha* he places it in the aggregate "no mesosternal process," but in the diagnosis of the genus says that its mesosternum is "slightly prominent"). I have before me *M. vulgaris*, Fab., which is, I believe, the typical species of the genus, and fail to discover in it any mesosternal process on which to found a generic distinction. Its extraordinarily produced pygidium is totally different from the pygidium of any known *Rhopœa*, but Lacordaire states that that elongation is wanting in some other European members of the genus. In fact, the only character that I can find (likely to be generic) constant in *Rhopœa* distinguishing it from *M. vulgaris* (now before me) and from the constant characters of *Melolontha* as stated by Lacordaire is in the claws, their tooth being in *Rhopœa* much larger and placed at a considerably greater distance from the base of the claw than in *Melolontha*.

I may now pass on to show in tabular form distinctive characters for those aggregates of the "Groupe" "true *Melolonthides*" which in my opinion should be regarded as valid genera, so far as concerns the Australian Fauna. I am doubtful, however, whether the species that I attribute to *Lepidiota* ought not to be divided into more than one genus; but since *Lepidiota* is of very wide distribution, and Australia does not appear to be its headquarters, a wider knowledge than I possess of the species occurring outside Australia should be at the disposal of an author to enable him to deal satisfactorily with that question.

- A. Front face of clypeus rugulose, and set all across with long soft hairs; distance from its base to its summit about equal to the length of the apical joint of a maxillary palpus.
- B. Antennal flabellum consisting of more than 3 joints.
- C. Labrum vertical or nearly so.

- D. Apical spurs of hind tibiæ in both sexes elongate and pointed, not dilated to middle Rhopæa.
- DD. Apical spurs of hind tibiæ (in ♂ and no doubt still more so in ♀) comparatively short and blunt, dilated from base to middle Pseudholophylla.
- CC. Labrum strongly directed forward, almost horizontal Pararhopæa.
- BB. Antennal flabellum consisting of only 3 joints Antitrogus.
- AA. Front face of clypeus in middle part not "rugulose and evenly set with long hairs"; distance from its base to its summit much less than in A.
- B. Antennal flabellum consisting of more than 3 joints.
- C. Laminæ of the antennal flabellum as long as the preceding joints together Paralepidiota.
- CC. Laminæ of the antennal flabellum much shorter Lepidoderma.
- BB. Antennal flabellum consisting of only 3 joints.
- C. Front tarsi very long Neolepidiota.
- CC. Front tarsi much shorter Lepidiota.

RHOPÆA.

So little has been reported of the Fauna of some parts of Australia that it is unsafe to generalize very positively regarding the geographical distribution of genera, but subject to that qualification it may be said that *Rhopæa* is chiefly a Southern Australia genus. I have no evidence of its occurrence further north than the Brisbane district except the possession of a single specimen labelled "N. Queensland." Neither have I seen any *Rhopæa* from any locality west of Yorke Peninsula. The genus seems to have its headquarters about the latitude of Sydney. Female *Rhopæa* are very much rarer in collections than males. Of the species of which I have seen the largest number of specimens (*R. magnicornis*) I have not seen a female, and the case is similar in respect of more than half of the other species. The antennal flabellum and the tarsi of the males are longer (generally very much longer) than those of the other sex. I have in my collection a female *Rhopæa* from New South Wales (not, I think, conspecific with any male known to me) with the extraordinary character of its antennæ consisting of only 9 joints. That number seems so improbable that I have examined the specimen over and over again thinking that I must have made some mistake, but always with the same conclusion—only 9 joints. Joint 3 is very elongate, 5

shortly spinose on its inner side, 6 a very short lamella, 7-9 fairly elongate lamellæ, each a little longer than joints 3-5 together. I can regard this structure only as a freak, either in the individual or the species, unfitting it for description without examination of more specimens. *Rhopæa castaneipennis*, MacI. (from North-West Australia) is incorrectly placed in this genus, and I think it will require a new generic name. There are two specimens (one of which is labelled "type") which I have inspected in the Macleay Museum; but as I had not available for comparison examples of the two new genera near *Rhopæa* that are diagnosed in the following pages I do not venture to deal with it at present. The structure of its labrum associates it with *Pararhopæa*, but the spurs of its hind tibiæ are of the *Rhopæa* type and the sculpture of the front face of its clypeus is notably less rugulose (with much shorter and coarser pilosity) than in *Rhopæa* and *Pararhopæa*, but nevertheless is distinctly of the *Rhopæa* rather than the *Lepidiota* type. It is clearly a very isolated form in the *Melolonthides*, and its habitat is very remote from any from which known species near *Rhopæa* have been reported, but probably the future will bring to light other species from the same region congeneric with it.

The following table indicates characters by which the males of the known species of *Rhopæa* can be distinguished:—

- | | |
|--|-----------------------------|
| A. Antennal flabellum consists of 8 laminae (7 of about equal length) ... | magnicornis, <i>Blackb.</i> |
| AA. Antennal flabellum consists of 7 laminae (at least 6 of them long and subequal). | |
| B. Punctures of pronotum very close throughout; for the most part confluent. | |
| C. Joint 3 of antennæ not longer than its width at the apex. | |
| D. Elytra, and dorsal surface of pronotum, having only close short pubescence. | |
| E. Prothorax very strongly narrowed in front, and with sides very strongly rounded | soror, <i>Blackb.</i> |
| EE. Prothorax not strongly narrowed in front, and with sides (viewed from above) lightly arched | heterodactyla, <i>Germ.</i> |
| DD. Elytra and whole surface of pronotum sparsely set with erect comparatively long hairs | hirtuosa, <i>Blackb.</i> |
| CC. Joint 3 of antennæ much more than twice as long as wide ... | assimilis, <i>Blackb.</i> |

- BB. Punctures of pronotum subconfluent on sides but distinctly spaced on disc, some intervals larger than the adjacent punctures.
- C. Width of prothorax considerably less than twice length.
- D. Disc of pronotum quite sparsely punctulate [Blackb. australis (*Holophylla*),
- DD. Disc of pronotum closely (though by no means confluent) punctulate pilosa, Blackb.
- CC. Width of prothorax fully twice the length of same laticollis, Blackb.
- AAA. Antennal flabellum consists of 6 laminae (1st of them usually very short).
- B. Punctures of pronotum confluent and very small Verreauxi, Blanch.
- BB. Punctures of pronotum very much larger and less close.
- C. Sides of prothorax distinctly angulate about the middle of their length dubitans, Blackb.
- CC. Sides of prothorax only rounded about the middle of their length.
- D. Joint 3 of antennae very short, scarcely longer than wide Mussoni, Blackb.
- DD. Joint 3 of antennae considerably longer than wide.
- E. Joint 3 of antennae abruptly rounded on inner side just before apex; body long and parallel consanguinea, Blackb.
- EE. Joint 3 of antennae cylindrical; body much wider and less parallel rugulosa, Blackb.
- AAAA. Antennal club consists of 5 laminae (only apical 3 of them full length).
- B. Front margin of clypeus widely upturned; pygidium very closely asperate without other punctures.
- C. Sides of prothorax evenly and not very strongly rounded incognita, Blackb.
- CC. Sides of prothorax abruptly, and very strongly, rotundate-dilate about middle morbillosa, Blackb.
- BB. Front margin of clypeus only very narrowly upturned; pygidium coriaceous and studded with much larger punctures planiceps, Blackb.
- Table of characters distinguishing the female *Rhopææ* known to me:—
- A. Puncturation of pronotum very close and fine (as in their males).
- B. Antennal flabellum with 6 long and subequal laminae soror, Blackb.

- BB. Antennal flabellum with only 5 long and subequal laminae Verreauxi, Blanch.
- AA. Punctures of pronotum much larger and less close (as in their males).
- B. Antennal flabellum with 5 subequal laminae, each equal to joints 1-5 of the antennæ together Mussoni, Blackb.
- BB. Antennal flabellum with only 3 of its laminae subequal, each of them much shorter than in *Mussoni* ... rugulosa, Blackb.

R. assimilis, sp. nov., Mas. Elongata; subtiliter pubescens, capite prothoracis margine antico sternis pedibusque pilis elongatis vestitis; rufo-brunnea, capite pronoto scutello pygidioque confertissime subtilissime nonnihil aspere (clypeo fortiter transverso, antice sat alte reflexo, minus crebre minus subtiliter) punctulatis; elytris dupliciter (subtiliter fere ut pronotum, et puncturis majoribus numerosis leviter impressis) punctulatis; palporum maxillarium articulo apicali supra profunde concavo; antennis 10-articulatis, articulo 3^o quam 1^{us} 2^{us} que conjuncti nonnihil longiori, flabello 7-articulato quam articuli ceteri conjuncti paullo longiori (illius articulo basali quam ceteri multo breviori); prothorace quam longiori ut 5 ad 3 latiori, antice sat fortiter angustato, lateribus crenulatis parum arcuatis, basi late leviter lobata angulis posticis obtusis; pygidio ad apicem anguste obsolete emarginato.

Fem. latet. Long., 11 i.; lat., 5 l. (vix.).

Easily distinguishable from its known congeners by its close fine puncturation (not much different from that of *R. Verreauxi*, Blanch., except in the puncturation of the pygidium being manifestly less close and fine) in combination with a 7-jointed antennal flabellum, the first joint of which is less than half as long as the second joint. It differs from all the other known species having very fine and close puncturation (except *Verreauxi*) by the elongate 3rd joint of its antennæ, and from all of them except *heterodactyla*, Germ., by the much less strongly arched sides of its prothorax, which when viewed from above appear almost evenly narrowed from base to apex—though viewed from the side they are seen to be quite strongly—but notably less strongly than in others except *heterodactyla*—rounded. The 3rd joint of the antennæ joins on to the flabellum much nearer to the hind extremity of the latter than in *heterodactyla*, *soror*, and *hirtuosa*.

New South Wales; sent to me by Mr. Sloane, as taken at Bulli.

R. pilosa, sp. nov., Mas. Minus elongata; subtiliter pubescens, capite pronoto elytrisque pilis erectis fulvis sat elongatis vestitis, sternis pedibusque longe fulvo-

pilosis; rufobrunnea; capite crebre sat fortiter (clypeo magis grosse, hoc sat transverso antice sat alte reflexo) punctulato; palporum maxillarium articulo apicali supra concavo; antennis 10-articulatis, articulo 3^o triangulari (intus quam articuli 1^{us} 2^{us} que conjuncti vix breviori, extus multo breviori, margine apicali ad flabellum applicato quam margo anticus sat longiori, cum hoc angulum plus minusve spiniformem efficienti), flabello 7-articulato quam articuli ceteri conjuncti sat longiori (illius articulo basali quam ceteri parum breviori); prothorace quam longiori ut 18 ad 11 latiori, antice sat angustato, supra inæqualiter (puncturis nonnullis quam ceteræ multo majoribus) sat crebre sat fortiter punctulato, lateribus crenulatis fortiter rotundatis, basi bisinuata, angulis posticis obtusis; elytris longitudinaliter obtuse obsolete costulatis, dupliciter (subtiliter, et puncturis majoribus numerosis leviter impressis) punctulatis; pygidio confertissime subtilissime nonnihil aspere punctulato.

Fem. latet. Long., $9\frac{1}{2}$ l.; lat., $4\frac{1}{2}$ l.

Somewhat closely allied to *R. (Holophylla) australis*, Blackb., but much less nitid, the sides of the prothorax more strongly rounded, the puncturation of the pronotum (especially of its disc) much closer and stronger. From *R. assimilis*, Blackb., it differs by, *inter alia*, the triangular shape of its 3rd antennal joint, from *heterodactyla*, *soror*, and *hirtusoa* by the very much less close puncturation of its pronotum, and from the rest of its known congeners by the number of joints in the flabellum of its antennæ. The peculiar form of the 3rd joint of the antennæ, as described above—that joint, moreover, meeting the flabellum considerably in front of the hind margin of the latter—is a structure common to all the *Rhopæa* known to me (except *assimilis*), having the flabellum of 7 joints. The erect pilosity of the dorsal surface of this species also distinguishes it from *heterodactyla*, *soror*, and *assimilis*.

New South Wales: sent by Mr. Froggatt, as from Boro (his No. 17).

R. lativollis, sp. nov., Mas. Minus elongata; subtiliter pubescens, capite pronoto elytrisque pilis erectis fulvis sat elongatis vestitis, sternis pedibusque longe fulvopilosis; rufobrunnea; clypeo (hoc minus transverso, antice alte reflexo) sat grosse nec rugulose, fronte confertim subtiliter aspere, punctulatis; palporum maxillarium articulo apicali supra depresso, parte depressa coriacea; antennis 10-articulatis, ut præcedentis (*R.*

pilosa) formatis; prothorace quam longiori duplo latiori, antice parum angustato, supra crebre (in disco nullo modo confluent) punctulato, lateribus crenulatis fortiter rotundatis, angulis posticis obtusis, basi in media parte manifeste lobata; elytris longitudinaliter obtuse sat perspicue costulatis, dupliciter (minus fortiter et puncturis majoribus numerosis sat fortiter impressis) punctulatis; pygidio puncturis minus crebre minus fortiter impresso.

Fem. latet. Long., 10 l.; lat., 5 l.

Differs from all the other species of *Rhopæa* known to me (except *pilosa*) by the characters cited above as distinguishing *R. pilosa* from them. It differs from all of them (including *pilosa*) by its prothorax fully twice as wide as long, and also by the sculpture of its elytra, the punctures of which are all strongly impressed—the smaller ones not nearly so small or closely placed as in other species (*e.g.*, *pilosa*)—a sculpture which causes the elytra to be distinctly rugulose and somewhat more nitid than is usual in many *Rhopææ*. The coriaceous space on the dorsal surface of the apical joint of the maxillary palpi is not, as it is in many *Rhopæa* (*e.g.*, the two described above), concave, but is merely depressed; I am, however, doubtful of the value of this character, as the depth of the concavity is certainly not quite invariable within the limits of a species.

New South Wales, Inverell; sent to me by Mr. Carter.

R. dubitans, sp. nov., Mas. Minus elongata; capite pronoto elytrisque pilis erectis fulvis sat elongatis sparsim vestitis, sternis pedibusque longe pilosis; rufo-brunnea; clypeo (hoc minus transverso peralte reflexo) sat crebre sat fortiter nec rugulose, fronte fere ut clypeus sed rugulose, punctulatis; palporum maxillarium articulo apicali supra concavo, parte concava coriacea; antennis 10-articulatis, articulo 3^o quam latiori circiter duplo longiori, flabello 6-articulato quam articuli ceteri conjuncti parum longiori (illius articulo primo quam ceteri fere triplo breviori); prothorace quam longiori ut 18 ad 11 latiori, antice fortiter angustato, supra sparsius minus profunde (latera basinque versus crebrius profundius) punctulato, lateribus crenulatis fortiter (in media parte obtuse subangulatum) rotundatis, angulis posticis rectis, basi media late leviter lobata; elytris longitudinaliter obtuse sat obsolete costulatis, fortiter inæqualiter rugulose sat crebre punctulatis; pygidio crebre subtiliter subaspere punctulato.

Fem. latet. Long., 10 l.; lat., 4½ l.

Somewhat close to *R. Mussoni*, Blackb., but easily distinguishable by the much longer joint 3 of its antennæ, the manifestly sparser and feebler puncturation of its pronotum, and the evident angularity of the latero-median dilatation of its prothorax.

New South Wales (exact locality not known).

R. rugulosa, sp. nov. Sat lata; supra subglabra, sternis pedibusque longe fulvo-pilosis; rufo-brunnea; capite pronotoque sat fortiter vix crebre vix rugulose punctulatis; clypeo minus transverso peralte reflexo; palporum maxillarium articulo apicali supra concavo, parte concava coriacea; antennis 10-articulatis; prothorace quam longiori ut 5 ad 3 latiori, antice sat angustato, lateribus crenulatis sat fortiter nec angulatim rotundatis, angulis posticis rectis, basi bisinuata; elytris longitudinaliter obtuse sat obsolete costulatis, rugulose subgrossæ vix crebre punctulatis; pygidio coriaceo, leviter minus confertim subtilius punctulato.

Maris antennarum articulo 3^o quam latiori multo longiori sat cylindrico, flabello quam articuli ceteri conjuncti sat longiori 6-articulato (illius articulo primo quam ceteri tribus partibus breviori).

Feminae antennarum flabello quam articuli ceteri conjuncti multo breviori, 6-articulato (illius articulis primo perbrevis, 2^o 3^o 4^o gradatim longioribus, 5^o 6^o que 4^o æqualibus); tarsis quam maris multo brevioribus. Long., 11 l.; lat., 5½ l.

Nearest to *R. dubitans*, but at once distinguishable from it by the evidently closer puncturation of its pronotum, the punctures of its pygidium much less close and much larger, and the sides of its prothorax evenly (without any angularity) rounded in the middle. There is no pilosity on the dorsal surface of either of the specimens before me, and this does not appear to be the result of abrasion.

Queensland, Brisbane; given to me by Mr. French.

R. consanguinea, sp. nov., Mas. Præcedenti (*R. rugulose*) affinis; multo magis angusta; antennarum articulo 3^o breviori, quam latiori haud multo longiori, ad apicem quam ad basin multo latiori, ante apicem intus manifeste anguliformi; antennarum flabelli articulo 1^o paullo longiori; prothorace antice magis angustata, ad basin manifeste lobato; elytrorum costulis multo minus obsoletis.

Fem. latet. Long., 10½ l.; lat., 5 l. (vix.).

Subject to the qualifications mentioned above the description of *R. rugulosa* applies to this species, and need

not be repeated at full length; the puncturation of the two presents no noteworthy distinction. The notably narrower more parallel and more elongate form is, I think, a reliable character in *Rhopæa*; the difference in the shape of the prothorax is very noticeable when the two species are side by side, and the very different structure of the 3rd antennal joint prevents any difficulty in distinguishing either from the other. In all probability these characters are distinctive of the females also. The greater development of the elytral costæ in the unique type of *R. consanguinea* is perhaps not so reliable as the other characters cited.

North Queensland.

R. incognita, sp. nov. Mas. Modice elongata; rufotestacea; fronte elytrisque pilis erectis fulvis sparsim vestitis, sternis pedibusque longe fulvo-pilosis; clypeo crebre rugulose subtilius punctulato, antice alte reflexo; fronte subgrosse rugulosa; exempli typici palpis maxillaribus carentibus; antennis 10-articulatis, articulis 3^o sat brevi quam latiori parum longiori 5^o brevi intus breviter spiniformi, flabello 5-articulato (articulis 1^o quam 2^{us} dimidio, 2^o quam 3^{us} fere dimidio, brevioribus) quam articuli ceteri conjuncti sat longiori; prothorace quam longiori ut 10 ad 6½ latiori, antice fortiter angustato, sat crebre sat fortiter punctulato, lateribus crenulatis minus fortiter rotundatis, angulis posticis acute rectis, basi sat fortiter lobata; elytris longitudinaliter obtuse minus obsolete costulatis, rugulose subgrosse vix crebre punctulatis; pygidio subtilissime creberrime punctulato.

Fem. latet. Long., 11½ l.; lat., 5½ l.

This species is near *R. morbillosa*, Blackb., but of narrower form, its antennæ similar, its clypeus a little less strongly elevated in front, its prothorax more strongly narrowed in front and having sides much less dilatate in the middle and base more lobate, its pygidium more finely and more closely punctulate. From *R. planiceps* it differs by, *inter alia*, its clypeus very much more strongly reflexed, its prothorax more strongly narrowed in front and more strongly lobed at base and its pygidium much more closely and finely punctulate. From both the above it differs by the much better defined *costulae* of its elytra.

Australia (locality uncertain, but I believe I took it in the Victorian Alpine Region).

R. planiceps, sp. nov., Mas. Minus elongata; supra subglabra, sternis pedibusque longe fulvo-pilosis; rufobrunnea; capite pronotoque sat fortiter vix crebre punctulatis; clypeo minus lato, antice parum reflexo;

palporum maxillarium articulo apicali supra concavo, parte concava coriacea; antennis 10-articulatis, articulis 3^o sat cylindrico quam latiori sat multo longiori 5^o brevi intus breviter spiniformi, flabello 5-articulato (articulis 1^o quam 3^{us} dimidio breviori, 2^o quam 1^{us} paullo longiori) articulis ceteris conjunctis longitudine sat æquali; prothorace quam longiori ut 18 ad 11 latiori, antice sat angustato, lateribus crenulatis minus fortiter rotundatis, angulis posticis rectis, basi manifeste lobata; elytris longitudinaliter obtuse sat obsolete costulatis, rugulose subgrosse vix crebre punctulatis; pygidio coriaceo, leviter minus crebre subtilius punctulato

Fem. latet. Long., 10 l.; lat., 4 $\frac{1}{2}$ l.

This species resembles *R. rugulosa*, Blackb., in respect of puncturation, but is easily distinguishable by, *inter alia*, the front of its clypeus only very lightly upturned, its antennal flabellum with only 5 joints, and the sides of its prothorax much less strongly rounded. The number of joints in its antennal flabellum distinguishes it from all the other known species of the genus except *R. morbillosa*, Blackb., and *incognita*, Blackb.

South Australia; type in South Australian Museum.

PSEUDHOLOPHYLLA (gen. nov. *Melolonthidarum verarum*, Lac.).

This is a new name for *Holophylla*, Burm. (*nec* Er.). Only one species (*furfuracea*, Burm.) has been described. The insect which I believe to be that species occurs in Queensland.

PARALEPIDIOTA (gen. nov. *Melolonthidarum verarum*, Lac.).

A. Lepidiota differt antennarum flabello laminas plures quam tres præbenti. *A. Lepidodermate* differt mas tibiærum posticarum spina interna ad mediam partem quam ad basin multo latiori, et antennarum flabello quam articuli præcedentes conjuncti longiori.

I place this genus near *Lepidiota* rather than *Rhopæa*, on account of the structure of its clypeus, the erect front face of which is not strongly elevated above the labrum (much less than the length of the apical joint of the maxillary palpi) and is very nitid, and bears very large punctures, which emit short, coarse, white hairs and scales. It differs from all the other known Australian genera of the *Lepidiota* group by its antennæ, which are like those of a *Rhopæa* (6 long laminæ in

the male flabellum of the species before me). It is also notable in respect of the inner spur of its hind tibiæ, which is dilated from its base in the male to beyond the middle of its length (and then suddenly narrowed almost to a point) and in the female quite to its rounded apex.

I must defer the description of this insect as a species until my next paper, as a memoir by Herr Brenske describing new species of *Lepidoderma* (among which it is just possible that this species is included) will not reach me until too late to be studied before the issue of my present paper, but it seemed desirable to place the genus in the preceding tabulation.

PARARHOPÆA (gen. nov. *Melolonthidarum rerarum*,
Lac.).

Rhopæa affinis. Mentum transversum; palpi labiales minus breves, articulo apicali oblongo ad apicem acuminato; palpi maxillares sat elongati, articulo apicali supra concavo; labrum sat magnum fere horizontale, antice profunde emarginatum; clypeus modicus, declivitate antica alta verticali æqualiter rugulosa et pilis sat elongatis obsita; antennæ 10-articulatæ, flabello maris valde elongato (hujus laminæ quam tres sunt plures); pedes sat elongati, tibiis anticis intus ad apicem spina brevi armatis extus dentatis, tibiis posticis maris ad apicem calcaribus 2 armatis (horum altero brevi spiniformi altero elongato laminiformi a basi ad mediam partem leviter dilatato), unguiculis pone medium dente valido armatis ad basin vix dentiformibus.

Femina latet.

Ad hoc genus tribuenda est *P. (Rhopæa) callabonensis*, Blackb.

This species has been sufficiently described in Trans. Roy. Soc., S.A., 1894, p. 205. It should perhaps be added that its front tibiæ have three external teeth. It differs from *Rhopæa* principally by the form of its labrum, by the more elongate and slender apical joint of its labial palpi, and by the spurs of its hind tibiæ.

ANTITROGUS.

All the specimens that I have seen of this genus are from the south-eastern quarter of Australia and from Tasmania. Examples, especially of the female, are not common in collections, but this is due probably (at any rate in respect of the males) to accidental circumstances, or perhaps to periodicity, as males of one of the species known to me were

found plentifully by Mr. Griffith flying in the evening at Henley Beach, near Adelaide. The *Antitrogi* are comparatively large *Melolonthides*, not closely resembling in facies any others known to me, but perhaps most like the less elongate species of *Rhopæa*, which indeed are, in my opinion, their closest allies. Brenske regarded them as a subgenus of *Lepidiota*, but in this I cannot follow him. I cannot find any statement of his reasons for this assignment but conjecture that it was founded on the number of joints in the antennal flabellum (to which I am convinced he attributed too much importance) and on the structure of the spurs of the hind tibiæ in the female. This latter character is no doubt of importance, but I doubt whether Brenske can have seen a female, which sex was not known to Burmeister, the author of the genus and of its only as yet described species; and as Brenske refers only to that species, and refers only to Burmeister's treatment of that species (which was certainly founded on a male), it seems quite possible that he had seen only the original type. As a fact the structure of the spurs of the hind tibiæ in the female is much more of the *Rhopæa* type than of the *Lepidiota* type. The inner spur of that sex is a little more definitely enlarged as compared with that of the male than in *Rhopæa*, and is blunted at the apex (probably indicating that the place of *Antitrogus* is between *Rhopæa* and *Lepidiota*), but it has no tendency towards the "spoon" shape which Brenske considers (so far as my knowledge of the genus extends, correctly) characteristic of *Lepidiota*, and, moreover, is not dilated from the base upward. The sculpture and vestiture of the front declivous face of the clypeus is absolutely of the *Rhopæa* type, a character which—as I have already indicated—I regard as of first importance. When to these considerations are added the fact that *Antitrogus* in facies considerably resembles *Rhopæa* and is particularly unlike a typical *Lepidiota*, and the fact that its vestiture (at any rate that of all the species I have seen) is entirely pilose (not squamiferous), it really seems to me a very clear case that Brenske misplaced it.

Burmeister made *Antitrogus* a subgenus of *Rhizotrogus*, and, of course, Brenske is right in disputing that assignment. It is no doubt very much nearer *Lepidiota* than *Rhizotrogus*.

The three species known to me of the genus are extremely close, *inter se*, and seem to be very variable in colour and in degree of pruinosity. I find, however, very little variation among the individuals of the only large batch of specimens that I have seen as taken in company, and therefore I think that the differences of colour and iridescence in the single individuals (or in some cases two) that I have seen

from other localities and in which I cannot find good structural specific differences, may possibly be found when more specimens of both sexes can be examined to be accompanied by distinctions of specific value.

The sexual differences in *Antitrogus* are not very conspicuous except in respect of the laminae of the antennal flabellum, which in the male are at least as long as—in the female much shorter than—the preceding antennal joints together, and in respect of the hind tarsi, which are more or less shortened in the female. The comparatively slight difference in the spurs of the hind tibiae has been referred to already.

Of the three species before me, either of two may possibly be Burmeister's species, as he mentions no character not found in them both, and gives no indication of locality beyond "Neu-Holland." One of the two referred to is from Victoria and Albury (New South Wales), the other from South Australia. The fact that European collections in early days received comparatively few species from the latter locality points to the probability of the *Antitrogus* from Victoria, etc., being *tasmanicus* Burm., and the conjecture is slightly strengthened by Burmeister's remark that the 3rd antennal joint is "nicht verlängerte"—a phrase that might fairly be applied to either of the two species I am discussing, but that indicates the Victorian one even more strongly than the other, in which the 3rd antennal joint, though short, is quite distinctly longer than the 4th joint. I presume the name "*tasmanicus*" to have been given in honour of the voyager Tasman. The species is assigned to Tasmania in Masters' Catalogue, but, as noted above, is not so assigned by the author. It may be noted here that an *Antitrogus* is found in Tasmania, but, even disregarding the author's statement of locality, is not likely to be his species, since it has black antennae, and the antennae of *tasmanicus* are especially mentioned as "red-brown."

The following tabulation indicates characters by which the *Antitrogi* known to me can be distinguished:—

- | | | |
|-----|---|-------------------------------------|
| A. | Joint 3 of antennae distinctly longer than joint 4 | Burmeisteri, <i>Blackb.</i> |
| AA. | Joint 3 of antennae not longer than joint 4. | |
| B. | Antennae red | <i>tasmanicus</i> , <i>Burm.</i> |
| BB. | Antennae black | <i>nigricornis</i> , <i>Blackb.</i> |

A. *nigricornis*, sp. nov., Mas. Subnitidus; nigropiceus, antennis nigris, pedibus et segmentis apicalibus 2 non-nihil rufescentibus; supra sat iridescens; prothoracis basi, coxis, sternisque dense fulvo-pilosis; elytris pilis

brevibus cinereis parum perspicuis sparsim vestitis; clypeo sat crebre subgrosse, fronte prothoraceque minus crebre magis subtiliter, punctulatis; antennis 10-articulatis, articulis 1^o piriformi, 2^o brevi subgloboso, 3^o quam 2^{us} parum longiori, 4^o 3^o sat æquali, 5^o quam 4^{us} paullo breviori intus dentiformi, 6^o 7^o que perbrevibus (intus spiniformibus), 8^o-10^o flabellum (hoc quam articuli ceteri conjuncti longiori) formantibus; prothorace quam longiori ut 5 ad 3 latiori, antice fortiter angustato, margine apicali emarginato, lateribus pone medium fortiter rotundatis (vel fere subangulatis), basi (partibus lateralibus exceptis) haud marginata; scutello transverso, fere ut prothorax punctulato; elytris sat crebre quam prothorax multo magis grosse punctulatis, costulis obtusis subobsoletis 3 instructis; pygidio crebrius subtilius (linea media sparsim excepta) punctulato; segmentis ventralibus fere ut pygidium punctulatis; pedibus longe ciliatis, sat crebre rugulose nec grosse punctulatis; tibiis anticis extus tridentatis; tarsis anticis quam tibiæ paullo longioribus, intermediis tibiis sat æqualibus, posticis quam tibiæ paullo brevioribus. Long., 11 l.; lat., 5 $\frac{3}{8}$ l.

This species is certainly somewhat close to that which I take to be *A. tasmanicus*, Burm., but differs strongly from Burmeister's description by its black antennæ and palpi and its piceous legs, and (from the specimens that I believe to be *tasmanicus*) also by its notably narrower and more parallel form. I have not seen the female. In one of the specimens before me the prothorax is a little rufescent on its sides.

Tasmania.

A. Burmeisteri, sp. nov., Mas. Subnitidus; fusco-brunneus, palpis pedibusque dilutioribus, antennis testaceis, abdomine antice piceo postice rufo; vix iridescens; prothoracis basi, coxis sternisque, dense fulvopilosis; elytris pilis brevibus pallidis sparsim vestitis; capite sat crebre subgrosse, prothorace minus crebre vix magis subtiliter, punctulatis; antennis 10-articulatis, articulis 1^o piriformi, 2^o brevi transversim globoso, 3^o quam 2^{us} sat longiori, 4^o quam 3^{us} sat breviori, 5^o quam 4^{us} parum breviori intus dentiformi, 6^o 7^o que brevibus intus spiniformibus, 8^o-10^o flabellum (hoc quam articuli ceteri conjuncti longiori) formantibus; prothorace quam longiori fere ut 5 ad 3 latiori, antice fortiter angustato, margine apicali emarginato, lateribus arcuatis, basi (parte mediana summa excepta) manifeste marginata; scutello transverso, fere ut prothorax punctulato; elytris sat

crebre quam prothorax multo magis grosse punctulatis, costulis obtusis subobsoletis 3 instructis; pygidio puncturis minutis confertis et aliis majoribus sat crebris impresso; segmentis ventralibus sat crebre punctulatis; pedibus longe ciliatis, sat crebre rugulose sat grosse punctulatis; tibiis anticis extus tridentatis; tarsis anticis quam tibiæ sat longioribus, posterioribus 4 tibiis sat æqualibus. Long., 11 l.; lat., $5\frac{1}{2}$ l.

Easily distinguishable from *A. nigricornis* and from the species that I regard as *tasmanicus* by the 3rd joint of its antennæ very distinctly longer than the 4th joint (the 4th joint about equals two-thirds of the 3rd). The typical specimen of this species (I have a second example exactly like it, but badly damaged, and evidently from style of mounting, etc., a companion specimen) also differs from them by its dark ferruginous—not at all piceous and scarcely pruinose—body and its clear ferruginous legs and by its evidently longer tarsi. Both examples are males. The *Antitrogus* which I have mentioned above as taken in numbers by Mr. Griffith agrees with *Burmeisteri*, so far as I can discover, in all respects except colouring, but its colour is that of the species that I believe to be *tasmanicus*. The type of *Burmeisteri* and its companion specimen are from South Australia, but I have lost record of exact locality. I am almost sure, however, that the locality is not near Adelaide. On the whole there seems to me to be a doubt whether the examination of a series of fresh specimens of both sexes coloured like the type may not eventually reveal grounds for regarding the Henley Beach examples as specifically distinct.

South Australia.

ELATERIDÆ.

CREPIDOMENINI.

PARABLAX.

Dr. Schwartz (D.E.Z., 1906, p. 368) formed a new genus of the above name for certain species which had previously been attributed to *Metablax*, among them his *M. trisulcatus*. Two species (*bicolor*, Blackb., and *quinesulcatus*, Blackb.) which I placed in the allied genus *Parasaphes* must also be transferred to this new genus *Parablax*.

ELATERIDÆ.

PHYSODACTYLINI.

The *Physodactylini* have been variously treated by authors. Lacordaire placed them in a family (*Cebrionides*) distinct from the *Elateridæ*. Dr. Schwartz, in the "Genera

Insectorum," places them in the latter family. I do not concur without hesitation in this arrangement, but as the classification of the "Genera Insectorum" will no doubt be widely followed, I accept it.

This group, like the *Cebrionidae*, is easily distinguished from the true *Elateridae* by tibiæ dilated and of triangular form (of the fossorial type) and furnished with strong development of spines. It has not hitherto been reported as occurring in Australia. It is represented in my collection by two specimens, for which it is necessary to form two new genera.

NULLARBORICA, gen. nov.

Frons declivis; labrum fortiter transversum; antennæ sat fortiter serratæ, articulis 3^o quam 2^{us} multo longiori, 11^o subappendiculato; prothorax a basi ad apicem angustatus, ad latera marginatus, margine (superne viso) sat continuo; prosternum antice truncatum, suturis sinuatis antice clausis postice nonnihil duplicatis; tarsi subtus haud laminati; coxæ intermediæ haud plane contiguæ; sulcus mesosternalis manifestus.

The characters cited above in combination distinguish this genus from those described in the "Genera Insectorum." It bears much superficial resemblance to *Antoligostethus*, but differs by its head obliquely declivous, the margins of its prothorax not bent down in the front part in such fashion as to be invisible from above, by the front of its prosternum more abruptly truncate and by its intermediate coxæ not in contact with each other but separated by a quite visible mesosternal cavity.

N. concinna, sp. nov. Rufo-brunnea; modice nitida; supra pilis brevibus suberectis sat dense vestita; antennis ultra prothoracis basin elongatis; capite crebre fortiter punctulato; prothorace quam trans basin latiori fere quarta parte breviori, supra sat æqualiter fere ut caput punctulato, antice modice angustato, margine antico bisinuato, lateribus fere rectis vix sinuatis, angulis posticis haud divaricatis intra marginem haud carinatis; scutello ovali; elytris quam prothorax plus quam triplo longioribus, sat fortiter striatis, interstitiis leviter convexis crebre minus subtiliter punctulatis, apice vix acuto fere rotundato; prosterno episternisque crebre subgrosse punctulatis; processu prosternali supra planato, postice abrupte declivi; coxis intermediis subcontiguis; sulco mesosternali manifesto; coxis posticis intus gradatim sat fortiter (sed supra trochanteres paullo magis fortiter) dilatatis; abdomine sat crebre sat fortiter punctulato;

tarsis posticis quam tibiæ vix brevioribus, articulis 1-4 gradatim brevioribus; unguiculis modice magnis. Long., $5\frac{1}{2}$ l.; lat., $2\frac{3}{5}$ l.

South-West Australia (Nullarbor Plains); given to me by Mr. French.

ANTOLIGOSTETHUS (gen. nov.).

Caput antice perpendiculare; labrum fortiter transversum; antennæ sat fortiter serratæ, articulis 3^o quam 2^{us} multo longiori, 11^o subappendiculato; prothorax a basi ad apicem angustatus, ad latera marginatus, margine antice fortiter deflexo (superne viso haud perspicuo); prosternum antice rotundatim truncatum, suturis sinuatis antice clausis haud duplicatis; tarsi subtus haud laminati; coxæ intermediæ contiguæ.

The characters cited above will serve in combination to distinguish this genus from all those described in the "Genus Insectorum." It is probably nearest to the South African genus *Oligostethus*, Schw., but differs from it by, *inter alia*, the antennæ strongly serrate from the 3rd joint inclusive, the strongly transverse labrum, and the prosternal sutures not open in front.

1. *lucidus*, sp. nov. Brunneo-testaceus; sat nitidus (præsertim pronotum); supra pilis brevibus erectis sat dense vestitus; antennis ultra prothoracis basin elongatis; capite crebre fortiter punctulato; prothorace quam trans basin latiori parum breviori, supra in disco sparsius subtilius (quam caput multo minus crebre multo minus fortiter) latera summa versus magis fortiter punctulato, antice sat fortiter angustato, margine antico rotundatim sat fortiter producto, lateribus fere rectis nonnihil sinuatis, angulis posticis haud divaricatis intra marginem haud carinatis; scutello ovali; elytris quam prothorax circiter triplo longioribus, sat fortiter striatis, striis latera versus fortiter punctulatis, interstitiis parum convexis sat crebre minus subtiliter punctulatis, apice vix acuminato fere rotundato; prosterno crebre fortiter, episternis sparsim subtilius, punctulatis; processu prosternali supra concavo, postice abrupte declivi; coxis intermediis contiguis; coxis posticis intus gradatim sat fortiter dilatatis; abdomine sat crebre sat fortiter punctulato; tarsis posticis quam tibiæ paulo brevioribus, articulis 1-4 gradatim brevioribus; unguiculis modice magnis. Long., $5\frac{1}{4}$ l.; lat., $1\frac{1}{2}$ l.

North-West Australia; Roebuck Bay.

NOTES ON SOUTH AUSTRALIAN MARINE MOLLUSCA
WITH DESCRIPTIONS OF NEW SPECIES.—PART XIV.

By JOS C. VERCO, M.D. (Lond.), F.R.C.S. (Eng.).

[Read October 12, 1911.]

PLATES XXVI. AND XXVII.

Genus DENTALIUM.

Since 1904, when I wrote a paper on *Dentalium intercalatum*, Gould. (Trans. Roy. Soc., S.A., 1904, vol. xxviii., p. 135), I have dredged in deeper waters, up to 300 fathoms, and have explored the coastline and dredged up to 35 fathoms as far west as St. Francis Island in Nuyts Archipelago, and Point Sinclair: also at Esperance Bay, King George Sound, Ellensbrook, Yallingup, off Bunbury in Geographe Bay, and at Rottnest Island, and off Fremantle in Western Australia.

As a great amount and a much varied kind of material has thus been accumulated I propose to review my previous Notes on *Dentalium* and other South Australian genera in the light of these collections.

Bossevain in "Scaphopoda of the Siboga Expedition, 1906," p. 22, under *Dentalium intercalatum*, Gld., reproduces my paper from the Trans. Roy. Soc. of S.A.

In the paper on *D. intercalatum*, Gld., referred to I write:—"I have vainly endeavoured to discover more than one species among them. They are exceedingly variable, and were it not for intermediate forms quite a dozen species might be created." In going through the literature of *Dentalium* several species already created may from the description and figures be matched by my specimens, and so would seem to be but variations of the one abundant and protean species. Among these are the following:—

***Dentalium duodecimcostatum*, Brazier.**

Dentalium duodecimcostatum, Brazier, Proc. Linn. Soc., N.S.W., vol. ii., 1877, p. 56. *Type locality*—Darnley Island, Torres Straits, 30 fathoms, sandy mud (Chevert Exped.); Pillsbury, Tryon, Man. Conch., 1897-8, vol. xvii., p. 13; Hedley, Records Austr. Mus., 1901, vol. iv., p. 128, pl. xvii., fig. 31; Bossevain, Scaphopoda of Siboga Exped., 1906, p. 15.

Dredged in 22 fathoms in Gulf St. Vincent, 22 in good condition, some alive.

The only difference between the unique type specimen and mine is that the latter attain the length of only 9 lines instead of 11.

Dentalium cheverti, Sharp and Pilsbry.

Dentalium cheverti, *nom. mut.*, Sharp and Pilsbry, Tryon, Man. Conch., 1897-8, vol. xvii., p. 9; Hedley, Records Austr. Mus., 1901, vol. iv., No. 3, p. 129, pl. xvii., fig. 34; Bossevain, Scaphopoda, Siboga Exped., 1906, p. 17.

Dentalium septemcostatum, Brazier, Proc. Linn. Soc., N.S.W., 1877, vol. ii., p. 57 (*nom. D. septemcostatum*, Abich, 1859). *Type locality*—Evan Bay, Cape York, North Australia, 6 fathoms, sand (Chevert Exped.).

Dredged in 22 fathoms in Gulf St. Vincent, 2 in good condition, 13 mm. long.

Dentalium katowense, Brazier.

Dentalium katowense, Brazier, Proc. Linn. Soc., N.S.W., 1877, vol. ii., p. 56. *Type locality*—Katow, New Guinea, 8 fathoms, sandy mud and coral; Pilsbry and Sharp, Tryon, Man. Conch., 1897-8, vol. xvii., p. 9; Hedley, Records Austr. Mus., 1901, vol. iv., No. 3, p. 129, pl. xvii., fig. 33; Bossevain, Scaphopoda, Siboga Exped., 1906, p. 16.

Dredged in 15 to 22 fathoms in Gulf St. Vincent, 4 in good condition. The longest is 22.5 mm. Mr. Hedley writes: "This answers fairly to my specimens from the Gulf of Carpentaria."

Brazier in the definition of his species writes, "interstices with minute lengthened striæ." If the specimens of *D. intercalatum*, Gld., from South Australia are carefully examined under a lens when their larger end is toward the light they will show their transverse accremental striæ very plainly, but when they lie with their side toward the light these are quite indistinct, and fine axial striæ are visible. The relative validity of these axial and concentric striæ varies in different examples. They are to be seen in my specimens labelled *D. katowense*.

Dentalium thetidis, Hedley.

Dentalium thetidis, Hedley, Memoirs Austr. Mus., 1903, vol. iv., p. 327, fig. 61. *Type locality*—"In 63-75 fathoms off Port Kembla; also in 41-50 fathoms off Cape Three Points."

Dredged in 6 fathoms off Black Point, Gulf St. Vincent, 1 fresh; in 15 to 22 fathoms Gulf St. Vincent, 2 good; in 130 fathoms off Cape Jaffa, 2 fresh, 7 dead; in 300 fathoms off Cape Jaffa, 3 dead. Identified by cotypes from Mr. Hedley. In the two fresh specimens from 130 fathoms, close to the posterior end, in the furrow on each side next to the central furrow on the convex surface, are four minute holes in an axial line. These are probably only accidental. They may be the boreholes of predacious molluscs. Still it is a curious coincidence to find them in two specimens, in identically the same position; and the coincidence is more striking

since they occur only in these two instances, among several hundred *Dentalium* shells. These are often bored, but generally only in one or two holes and in other parts of the shell. However, it would be perilous to construct another species to include these two examples, which in all other respects resemble the rest under this name. My longest individual measures 20 mm. by 2.25 mm. Hedley's type is 8 mm. by 1 mm., and probably immature.

***Dentalium bednalli*, Pilsbry and Sharp.**

Dentalium bednalli, Pilsbry and Sharp, Tryon, Man. Conch., 1897-8, vol. xvii., p. 248, pl. xxxix., figs. 1, 2, and 3. *Type locality*—Gulf St. Vincent, South Australia. (?) *D. octogonum*, Lam., Angas, Proc. Zool. Soc., 1878, p. 868; Adcock, Handlist Aquatic Moll., S.A., 1893, p. 10.

Dredged in 15-22 fathoms in Gulf St. Vincent, 59 specimens with 7 ribs posteriorly and a varying number anteriorly; after the previous 7-angled varieties have been picked out.

***Dentalium octopleuron*, n. var.**

This shell is like *D. bednalli*, Sharp and Pilsbry, except that it has 8 ribs at the posterior end instead of 7. In 4 specimens the 8 costæ run throughout the shell, which may measure 20 mm. in length. But in all the others riblets arise; it may be in only one or in two, or up to all the intercostal spaces. These riblets may number as many as 4 in a space; they may equal in size the primary ribs, if they are few, or they may remain small, especially if numerous.

Dredged in 15 to 22 fathoms in Gulf St. Vincent, 88 in good condition. This variety is the most common in our shallower waters, and this would be the form found by Angas on Henley Beach and named by him *D. octogonum*, Proc. Zool. Soc., 1878, p. 868.

Type in Dr. Verco's collection.

***Dentalium robustum*, Brazier.**

Dentalium robustum, Brazier, Proc. Linn. Soc., N.S.W., 1877, vol. ii., p. 56. *Type locality*—Katow, New Guinea, 8 fathoms, sandy mud and coral (Chevert Exped.); Pilsbry and Sharp, Tryon, Man. Conch., 1897-8, vol. xvii., p. 12; Hedley, Records Aust. Mus., 1901, vol. iv., No. 3, p. 128, pl. xvii., fig. 32; Bossevain, Scaphopoda, Siboga Exped., 1906, p. 29.

Dredged in 15 to 22 fathoms in Gulf St. Vincent, 16 in good condition. These, like the type, have 9 ribs throughout. Besides these 28 other specimens from the same locality have 9 ribs posteriorly and more than 9 anteriorly.

Dentalium decemcostatum, Brazier.

Dentalium decemcostatum, Brazier, Proc. Linn Soc., N.S.W., 1877, vol. ii., p. 55. *Type locality*—Katow, New Guinea, 8 fathoms, sandy mud (Chevert Exped.); Pilsbry and Sharp, Tryon, Man. Conch., 1897-8, vol. xvii., p. 8; Bossevain, Scaphopoda, Siboga Exped., 1906, p. 27.

Dredged in 15 to 22 fathoms in Gulf St. Vincent, 10 good; with 10 ribs throughout, with 10 ribs posteriorly, and more than 10 anteriorly, 24 good.

Dentalium francisense, n. sp. Pl. xxvi., figs. 1 and 1a.

Shell moderately solid, narrow, curved, less anteriorly, translucent white, with 14 broad, low, round ribs extending throughout, separated by distinct linear interspaces. Fine transverse microscopic growth lines. Anterior aperture circular, margins thin, scarcely scalloped. Posterior end truncate, aperture small, border thick, shape oval, elongate antero-posteriorly.

Dimensions.—Length, 28 mm.; diameter—anteriorly, 3.2 mm.; posteriorly, 1.6 mm. A much younger individual measures 13.5 mm. in length, 2.4 mm. in its anterior diameter, and 8 mm. in its posterior. It is much more curved and has a slightly projecting appendical tube.

Locality.—In 15 to 20 fathoms in Petrel Bay, St. Francis Island, type with 4 others (2 alive); in 35 fathoms off St. Francis Island, 1 good; in 15 to 22 fathoms in Gulf St. Vincent, 9 good; in 55 fathoms north-west of Cape Borda, 1 good; in 15 fathoms in Geographe Bay, Western Australia, 1 good.

This shell varies. There may be only 11 ribs throughout, of which I have two examples from Gulf St. Vincent, or 11 ribs posteriorly, and more anteriorly up to 22 from intercalated riblets, 13 examples from the same locality.

There may be 12 ribs posteriorly and 12 anteriorly, and these may be typically broad and round, or rather narrow and flat, 4 examples; or of intermediate width, 9 examples; or 12 ribs posteriorly and 2 or more additional riblets anteriorly, 4 examples, all dredged in 15 to 22 fathoms in Gulf St. Vincent.

There may be 13 ribs throughout, as in 11 examples from 15 to 22 fathoms in Gulf St. Vincent.

There may be 15 ribs throughout, as in 9 examples from 15 to 22 fathoms in Gulf St. Vincent.

There may be 18 ribs throughout, as in 1 example from Port Lincoln, but this is a large old individual, with a relatively great posterior diameter, and probably had fewer ribs earlier in life.

Type in Dr. Verco's collection.

I am inclined to think that even this species is but an extreme variant of the *D. intercalatum*, Gld. It would seem as though the more initial ribs are present at the posterior end, the fewer interstitial ribs arise, which is easily understood; and the more likely they are to be round and broad and encroach on the intercostal spaces. Still one may meet with an occasional specimen starting with 11 ribs which increase up to 24, and are rather narrow; or with one which starts with only a few ribs, 7 or 9, and these become broad and rounded.

The following species of *Dentalium* appear to be distinct from *Dentalium intercalatum*, Gld., with its many varieties:—

Dentalium hemileuron, n. sp. Pl. xxvi, fig. 2.

Shell long and narrow, very slightly curved, mostly at the hinder part, white opaque when dead, translucent when fresh, and glistening, rather thick. There are 10 axial ribs, valid, narrow, about one-fourth the width of their interspaces, less valid and less distant on the convex side. Well developed in the posterior half, then becoming quickly obsolete and absent from the anterior third. There is no increase in number as the shell grows larger, close transverse scratch marks, and circles of varying opacity make the ornament. Anterior aperture round. Posterior aperture round, but on the convex surface it has a sinus about as deep as wide with convex margins.

Dimensions.—Length, 30 mm.; greatest width, 2.4 mm.; smallest, .4 mm.

Locality.—Dredged in 300 fathoms off Cape Jaffa, type with 20 in good condition (some alive), 51 in poor; in 130 fathoms off Cape Jaffa, 37 (some alive); in 150 fathoms off Beachport, 1 poor; in 200 fathoms, 1 moderate.

In a young individual the ribs are traceable to within 2 mm. of the end, where the diameter was only .3 mm., beyond which ribs were absent and only transverse scratchings were visible; the extreme 2 mm. cap, as it were, the part beyond. The largest example measures 34 mm. Some have 9 ribs, some 8, some 11.

Diagnosis.—There are no axial interstitial riblets as in *D. thetidis*, Hedley, nor increase in the number of ribs by splitting or intercalation, as in *D. intercalatum*, Gld., and the anterior part is ribless.

Type in Dr. Verco's collection.

Dentalium zelandicum, Sowerby.

Dentalium zelandicum, Sowerby, *Thes. Conch.*, 1860, vol. iii., p. 101, sp. 31, pl. ccxxiii., fig. 13. *Type locality*—New Zealand; Reeve, *Conch. Icon.*, 1872, vol. xviii., pl. ii., fig. 8; Lesson, *Conch. Cab.* (Ed. Küster), 1896, Band. vi., Abt. 5, p. 15, sp. 23, pl. iv., fig. 4; Pilsbry and Sharp, *Tryon, Man. Conch.*, 1897-8, vol. xvii., p. 70, pl. vi., fig. 81; Murdoch and Suter, *Trans. New Zealand Institute*, 1905, vol. xxxviii., p. 304, 110 fathoms off Great Barrier Island. It is from one of these specimens kindly given me by Mr. Suter that mine are identified.

Dredged in 130 fathoms off Cape Jaffa, 5 good and 12 fragments; in 110 fathoms off Beachport, 1 dead; and in 200 fathoms, 1 fragment large but eroded.

The radula, pl. xxvii., fig. 7, has the formula 1.1.1.1.1., with a wide low central cusp, a lateral provided with several small denticles at its inner lower part, and an oblong rhomboidal marginal.

My largest specimen attains a length of 55 mm., with a width of 6 mm., and has 32 axial ribs, the smaller of which arise by intercalation. A specimen of 20 mm. in length, with about 2 mm. of the apical end unsculptured, has a distinct fissure of 4.75 mm. long on the convex surface; another of the same size and age shows none: a third younger still has 4 mm. unsculptured and no fissure. The fissure in this section of *Dentalium* appears to be only occasionally and not always present; just as does the appendical tube in another section.

Dentalium virgula, Hedley.

Dentalium virgula, Hedley, *Memoirs Austr. Mus.*, vol. iv., 1903, p. 328, fig. 62. *Type locality*—"Numerous examples were taken in 63-75 fathoms off Port Kembla, in 41-50 fathoms off Cape Three Points, in 54-59 fathoms off Wata Mooli, and in 50-52 fathoms off Botany Bay."

Dredged in 60 and 62 fathoms off Cape Borda, 43 moderately good; in 90 fathoms off Cape Jaffa, 23 alive and many dead and pieces; in 104 fathoms south-west of the Neptune Islands, 7 good, 44 moderate; in 110 fathoms off Beachport, 4 alive, 21 dead; in 130 fathoms off Cape Jaffa, 3 moderate; in 150 fathoms off Beachport, 93 moderate; in 200 fathoms off Beachport, 4 poor.

Some examples have slight annular constrictions at intervals of 3 mm. Here the shell is less opaque-white, and the opacity gradually increases anteriorly, as though at the constriction the shell were thinner, representing a more rapid growth after a period of lessened activity or of rest. The appendix is visible in very early life, when the shell is extremely narrow. There seems to be a great tendency to transverse fracture when the shell is nearly filled up by in-

ternal deposit, so that numerous fragments are found from 3 mm. upwards in length, and with the appendix projecting, resemble candle-ends. When the appendix is absent in the early stages of growth the shell is not unlike juvenile *D. lubricatum*, Sowerby, but does not increase quite so rapidly, and has more marked transverse striation.

Dentalium lubricatum, Sowerby. Pl. xxvi. figs. 4 and 4a.

Dentalium lubricatum, Sowerby, Thes. Conch., vol. iii., 1860, p. 97, sp. 3, pl. ccv., fig. 56. *Type locality*—Australia; Reeve, Conch. Icon., vol. xviii., 1872, pl. vii., fig. 55; Brazier, Proc. Linn. Soc., N.S.W., vol. ii., 1878, p. 370; Lesson, Conch. Cab. (Ed. Küster), Band. vi., Abt. 5, 1896, p. 14, sp. 22, pl. iv., fig. 3; Pilsbry, Tryon, Man. Conch., vol. xvii., 1897, p. 110, pl. xix., fig. 22; Hedley, Memoirs Austr. Museum, vol. iv., 1903, p. 328; Pritchard and Gatliff, Proc. Roy. Soc., Vic., vol. xv. (N.S.), 1903, part 2, p. 222.

Sowerby's definition in full is "shell polished, elongate, white, subpellucid, slightly curved, scarcely fissured, gradually increasing." Brazier adds "off Port Jackson Heads, 45 fathoms, hard sand bottom. This fine shell was obtained when H.M.S. 'Challenger' dredged one day off Sydney Heads." Lesson says the apex is whole and is not incised, but gives no authority, whereas Sowerby defines it as "scarcely fissured." Pilsbry supplies the dimensions of Sowerby's figure, "length, 64 mm.; greatest width, 6 mm.," but it is not known whether the figure was only life size.

Hedley records the species:—"Several specimens were obtained from 63-75 fathoms off Port Kembla, of which the largest is 32 mm. long; and from 41-50 fathoms off Cape Three Points; Pritchard and Gatliff extend the locality to Cowes, Port Phillip Island, Western Port."

Dredged in 40 fathoms off Beachport, 6 good; in 55 fathoms off Cape Borda, 7 good and 7 poor; in 60 and 62 fathoms off Cape Borda, 30 good of varying size and 93 immature; in 90 fathoms off Cape Jaffa, 6 good and 3 poor; in 104 fathoms 35 miles south-west of the Neptune Islands, 2 good and 18 poor and immature; in 110 fathoms off Beachport, 3 good and mature; and in 150 fathoms, 1 moderate. No living examples were taken.

With reference to the slit my material shows that in the very early stage of growth there is no slit, but a central posterior aperture; the length of the slit may vary from a mere notch to a fissure of 2.5 mm. in length in a shell of 36.5 mm., or of 8 mm. length in an individual of 26.5 mm. It is always on the convex or ventral aspect. It is sometimes a mere crack, the two sides of which seem in apposition. At others it is an open slit of nearly $\frac{1}{2}$ mm. in width; or the posterior

third may be a slit and the anterior two-thirds a crack; and this crack may seem to be wider inside the shell, as though it were absorbed from within; and sometimes the crack connects two or three holes where the erosion has come through. In two examples there project from the posterior end on each side a short lamina about $\frac{1}{2}$ mm. long, a continuation of the internal layer of the shell. The largest individual dredged is 36.5 mm. long and 3.25 mm. at its widest part. In some examples the dorsal part near the posterior end is spotted or blotched with opaque-white.

I was fortunate enough to dredge two specimens which show the extreme posterior end, figured in pl. xxvi., fig. 4a. It is an elliptical bulb, and has a very short, slightly-contracting, round tubular posterior prolongation set somewhat obliquely to the axis of the bulb, and directed toward the convex side of the shell. Transverse rings of varying opacity are visible in the first $1\frac{1}{2}$ mm. of the shell. The figure represents the earliest 2 mm. of the shell.

Cadulus acuminatus, Tate.

Cadulus acuminatus, Tate, Trans. Roy. Soc., S.A., 1887, vol. ix., p. 194. In 1904 vol. xxviii., p. 138, I discussed it fully.

Dredged since then in 26 fathoms 30 miles south-east of Newland Head, 2 alive; and in 28 fathoms close by, 6 alive; in 62 fathoms north-west of Cape Borda, 2; and in 90 fathoms off Cape Jaffa, 67 in good condition.

Cadulus angustior, n. sp. Pl. xxvi., figs. 5, 5a, 5b.

Shell thin, slightly curved, chiefly in the posterior half, cylindrical, very gradually increasing from behind, and very slightly narrowed at the front, scarcely compressed laterally.

Fractured at the posterior end at right angles to the curve, and with a small triangular spine, 1 mm. long, projecting backwards from the convex side. Anterior end open, sloping obliquely forwards from the convex side. Margins simple and smooth. Shell smooth, diaphanous.

Dimensions.—Length, 4.6 mm.; breadth, .6 mm.

There is a transverse milky line near the front; other specimens want this, and some may have one near the posterior end.

Locality.—Twenty-six fathoms 18 miles south-east of Newland Head, outside Backstairs Passage, type with several scores alive; 62 fathoms north-west Cape Borda, 8 good.

Diagnosis.—It differs from *C. acuminatus*, Tate, in being narrower and more cylindrical, with less bulging about the middle.

With these were found many specimens of two other forms—one like a very minute *Dentalium* of about the same length, much narrower at its posterior end, which is provided with a similiar spine projecting from the convex side. The anterior end is fractured. The other form gradually increases to a diameter just about equal to that of the posterior end of the *Cadulus*, then contracts, and then expands again, and gradually attains the diameter of the middle of the *Cadulus*; here it is fractured. These appear to be three progressive stages of its growth—first, as a *Dentalium*-like shell, which becomes constricted when it reaches a certain age, then begins to form the proper *Cadulus* shell, from which it subsequently breaks off, leaving the tiny projecting spine beyond the line of fracture.

Type in Dr. Verco's collection.

Cadulus spretus, Tate and May.

Cadulus spretus, Tate and May, Trans. Roy. Soc., S.A., 1900, vol. xxiv., p. 102. *Type locality*—Port Esperance, Tasmania, in 24 fathoms (W. L. May); Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 420, pl. xxv., fig. 52; Hedley, Memoirs Austr. Mus., 1903, vol. iv., p. 328, in 41-75 fathoms off coast of New South Wales; also 5 fathoms in Dusky Sound, New Zealand; Hedley and May, Records Austr. Mus., 1908, vol. vii., No. 2, p. 113, in 100 fathoms off Cape Pillar, Tasmania.

Dredged in 55 fathoms north-west of Cape Borda, 5 good; in 62 fathoms north-west of Cape Borda, 36 good; in 90 fathoms off Cape Jaffa, 6 good; in 110 fathoms off Beachport, 6 good; in 130 fathoms off Cape Jaffa, 18 good; in 150 fathoms off Beachport, 20 moderate; in 300 fathoms off Cape Jaffa, 1 poor. These are identical with cotypes sent to me by Mr. May.

At the following localities and depths a modified form was dredged:—Sixty-two fathoms north-west of Cape Borda, 3 good; in 90 fathoms off Cape Jaffa, 22 good; in 110 fathoms off Beachport, 3 good; in 130 fathoms off Cape Jaffa, 2 good; in 150 fathoms off Beachport, 5 good and 3 moderate. These have at one point in their length a sharp annular constriction, beyond which the shell often has a slightly altered axis, and at times a somewhat different curve. The relative length of the two portions varies; the earlier or the later part may form nearly the whole, or there may be any intermediate proportion. No complete *Cadulus* similar to *C. acuminatus*, Tate, was taken in these dredgings. Mr. May says that in the type locality, where several dozen cotypes were taken, no *C. acuminatus*, Tate, were obtained. Yet the constriction at the anterior end of *C. spretus* suggests that it is only the

initial half of a *Cadulus*, similar to *C. acuminatus*, and the presence of both portions of *C. angustior*, Verco, in its own locality heightens the probability; and these more or less fully formed individuals of *C. spretus* prove it.

***Cadulus (Polyschides) gibbosus*, n. sp.** Pl. xxvi., fig. 6.

Shell smooth, polished, narrow, somewhat fusiform, slightly compressed dorso-ventrally, smaller behind; greatest diameter at the junction of the middle and anterior third; dorsal surface obtusely angled at this point; ventral surface almost uniformly convex. Anterior end sloping forward from the convex to the concave surface, mouth rather wider than high. Posterior end with a slit on each side, one on the convex surface and a wider curve on the concave. Colour milky-white, least opaque in the middle third, most in the anterior and along the concave side of the shell. It is somewhat obliquely striatedly painted. At 1 mm. from the posterior end is a transverse colourless line.

Dimensions.—Length, 9·7 mm.; greatest diameter, 1·8 mm.; diameter of the posterior end, ·45 mm.; of the anterior end, 1·1 mm.

Locality.—In 300 fathoms off Cape Jaffa, type with 3 others full grown, and 18 immature or fragments; in 130 fathoms off Cape Jaffa, 4 moderately good and 2 immature.

Type in Dr. Verco's collection.

***Turbo jourdani*, Kiener.** Pl. xxvii., figs. 1 to 6a.

In the Transactions of this Society, vol. xxxii., 1908, pp. 338 to 340, I gave some notes on this species, with a description of its operculum. I was unaware at the time that Dr. Cox had described the operculum in Proc. Linn. Soc., N.S.W., ser. ii., vol. iv., 1889, p. 189, from a specimen taken in Geographe Bay, Western Australia.

His shell was 14 cm. long by 12·5 cm. wide, and its operculum was 95 mm. by 80 mm. Since my Note I have received a beautiful example from Mr. Elliot, of *The Register* office, which was found with the fish in it on Wedge Island at the entrance to Spencer Gulf. This measures 21 cm. in length by 18·5 cm., in the greatest diameter of its body-whorl, so that it is just half as large again as Dr. Cox's specimen. But at Esperance Bay, in Western Australia, one was given to me measuring 22·3 cm. in length by 21 cm. in the greatest and 14 cm. in the smallest diameter of its bordy-whorl. It is a splendid great shell. Dr. Cox's specimen extends its *habitat* to Geographe Bay; but I took it at Rottnest Island, opposite Fremantle, and the lighthouse-keeper there (Mr.

Waters) has taken it alive. This carries it a little farther north. In September of this year Mr. Arnold, of St. Francis Island, sent me a specimen in spirit which was taken alive in Petrel Bay. This measures 11 cm. by $9\frac{1}{2}$ cm., and has an operculum measuring 44 mm. by 39 mm., and 11 mm. in its thickest part. This thickest part is adjacent to the columella, and is white, while the part immediately over the depressed centre of the spiral and the narrower outer edge is of a cloudy-brown colour.

From the animal I was able to get the radula, which measured 40 mm. by 5 mm., and contained 76 rows of teeth. The formula is 39.5.1.5.39, or, as it might more exactly be written, (32.6.1) (1.4) .1. (4.1) (1.6.32). There is a central tooth (pl. xxvii., fig. 6), which has a flange on each side to overlap the adjacent edge of its neighbours. Each of these laterals overlaps the next tooth outside. The outermost lateral (fig. 4) has its upper border bent over and provided with a strong cusp at its inner end. This gives it a different appearance from all its fellows, and when the whole series is seen this tooth stands out very prominently, as in pl. xxvii., fig. 4. There are three kinds of teeth in the marginals. The first six (fig. 2) have stout bases surmounted by a bold polished cusp, and they gradually diminish in size outwardly, as seen in fig. 2 *in situ* and in fig. 2a, when dissected out; the three inner ones overlap the outer at their bases, and otherwise lie in part behind them. The three outer have not this overlapping lamina. Then follow 32 (approximately, varying in different rows) slightly-curved, narrow flat acicular teeth with obsoletely denticulated tops (fig. 1). But there is one tooth placed *immediately behind* the first and largest lateral, solitary, out of line with the rest, and when examined *in situ* appearing somewhat sickle shaped, as in pl. xxvii., fig. 3; but when separated resembling the others, as in fig. 3a. I have not seen any notice of this particular marginal tooth in the literature of the radula at my disposal; but I find it also in that of Turbo Grunerii.

Pseudamycla dermestoidea, Lamarck.

Buccinum dermestoideum, Lamarck, 1822, Hist. Nat. Anim. S. Vert., vol. vii., p. 275.

Pyrene lineolata, Tryon, Verco, Trans. Roy. Soc., S.A., vol. xxxiv., 1910, p. 131.

Pseudamycla dermestoidea (Lam.), Pace, Proc. Mal. Soc., Lond., 1902, vol. v., pp. 255, 267. Here Pace creates a new genus, *Pseudamycla*, for this species, which he separates from *Columbella*, and of which he gives a large bibliography. At the time of its publication I separated my cabinet specimens from *Columbella* and put them in the new genus *Pseudamycla* among the

Pisaniinae, and so overlooked them when working up my *Columbellas* last year and wondered how I had so little material. Consequently I can add the following locality:—Port Elliot and Middleton beach, fairly common.

***Pseudamycla miltostoma*, Tenison-Woods.**

Columbella miltostoma, n. sp., J. E. Tenison-Woods, Proc. Roy. Soc., Tas., 1877 (1876), pp. 134-5.

Pseudamycla miltostoma (Ten.-Wds., as *Columbella*), Pace, Proc. Mal. Soc., Lond., 1902, vol. v., pp. 268-9.

Pyrene miltostoma, Tenison-Woods, Verco, Trans. Roy. Soc., S.A., vol. xxxiv., 1910.

Dredged in Gulf St. Vincent, depth unrecorded, 18 moderate.

NOTES ON THE MARINE SHELLS OF WESTERN AUSTRALIA,
WITH DESCRIPTIONS OF NEW SPECIES.

PART I.

By JOS. C. VERCO, M.D. (Lond.), F.R.C.S. (Eng.).

[Read October 12, 1911.]

PLATE XXVI.

In December, 1910, and January, 1911, I visited Western Australia and collected shells from the shores at Esperance Bay, Hopetoun, and King George Sound on the south coast; and from Ellensbrook and Yallingup, south of Cape Naturaliste; from Bunbury, and the shores of Rottnest Island. I also dredged a little in Esperance Bay; had two casts with the bucket-dredge in 35 fathoms, a little west of Hopetoun, through the kindness of Captain Walden, of the S.S. "Ferret"; a good deal of dredging in 12 to 14 fathoms and 22 to 28 fathoms, and 35 fathoms in King George Sound; a good deal in Geographe Bay in 15 and in 22 fathoms; and several casts off Fremantle, in 6 fathoms and in 15 fathoms from the Government tug-boat "Penguin," through the kindness of Captain Winzor (the harbour master) and of Captain Airey (master of the "Penguin").

I propose, therefore, as I take up the different genera and deal with my more extensive South Australian material to identify and record also all known Western Australian forms gathered by me, and describe any new species found.

I may say that of more than 400 different species collected in the West the very large majority of them are identical with or closely resemble our "Adelaidean fauna," as Mr. Hedley has called it.

Dentalium intercalatum, Gould.

Dredged in 10 to 12 fathoms off Fremantle, 2 fragments, with valid narrow ribs and intercalated riblets, recalling the above species.

Dentalium francisense, Verco, *antea*.

Dredged in 35 fathoms off Hopetoun, 1 moderately good with an appendix; in Geographe Bay in 15 fathoms, 4 moderate; in 22 fathoms, 2 good and 6 moderate; off Fremantle in 6 fathoms, 1 good; and in 10 to 12 fathoms, 1 poor. Taken on Bunbury Beach, 4 rolled; and on Rottnest Island, 2 rolled.

Dentalium hyperhemileuron, n. sp. Pl. xxvi,
figs. 3 and 3a.

Shell long and narrow, very slightly curved, mostly at the hinder part, white when dead, translucent when fresh, and glistening, rather thin. There are 12 axial ribs, invalid, and narrow; no increase in number with age; becoming obsolete early, so as to leave the anterior two-thirds of shell smooth but for very fine accremental scratch lines. Interstices nearly flat, slightly concave. Anterior orifice round, margin thin and simple. Posterior end truncated, with a long narrow diaphanous appendix directed eccentrically dorsally. The growth lines on the appendix form a convexly bordered sinus on the ventral surface about as wide as deep, and a scarcely depressed margin on the dorsal surface.

Dimensions.—Length, 20·5 mm.; greatest width, 1·8 mm.; least width, ·7 mm.; length of appendix, 2·2 mm.; diameter, ·4 mm.

Locality.—King George Sound, Western Australia, in 12-14 fathoms, 200, several alive; in 22-28 fathoms, 60, several alive; in 35 fathoms, 4 dead but good; Geographe Bay in 15 fathoms, 6 dead but good; in 22 fathoms, 4 dead; off Fremantle in 10-12 fathoms, 20 poor.

Some individuals with perfect posterior ends run down to a diameter of ·3 mm., and are there diaphanous and ribless, and have only growth striæ. Others more mature and with a posterior end of 1 mm. in diameter, and without an appendix, are here bevelled internally and thinner on the convex side, where there is a shallow triangular notch. The largest example is 30·75 mm. long by 2·3 mm. wide. The ribs may vary in number from 10 to 16 in different individuals.

Diagnosis.—It very closely resembles *D. hemileuron*, Verco, in the ribless anterior portion and the never-increasing ribs of the posterior end, and in their extension to within 2 mm. of the end in very young individuals and in the ventral notch at the hinder extremity; but the latter has no appendix, and the ribs are more valid and do not so soon become obsolete, and it is not found in such shallow water. But I think probably the absence of the appendix may be only an accidental circumstance, and the shallower water in which the Western Australian species lives may account for the other differences, and that this is only a local variety.

One individual, dredged in Geographe Bay at a depth of 15 fathoms, measures 4 mm. in length by ·5 mm. in diameter at the anterior end. It has the apical end complete. The first portion of this, measuring 1·9 mm., has been

figured, and shows an initial elliptical section '35 mm. in length by '22 mm. in greatest width, and having a round hole in its end of about '15 mm. in diameter with a simple border; a second curved cylindrical section of '36 mm. long by '20 wide; a third slightly conical section of '60 mm. long by '35 mm. wide in its greatest diameter; and a fourth section of '65 mm. long by '40 mm. wide. The second section has its walls slightly corrugated, so as to give them a faintly undulating outline, with broad shaded transverse bands, which are visible also in the anterior half of the first section. The third segment is smooth but for very fine accremental transverse scratches. The fourth shows the commencement of the axial ribs, which gradually enlarge with the growth of the shell.

As this example so beautifully reveals the beginning of a *Dentalium* I have had it figured.

Type in Dr. Verco's collection.

***Dentalium lubricatum*, Sowerby.**

Dredged off Hopetoun in 35 fathoms, 5 good, dead.

***Cadulus occiduus*, n. sp. Pl. xxvi., fig. 7.**

Shell rather solid; ventral curve nearly uniformly slightly convex, more at the posterior part; dorsal side nearly straight in the anterior fourth, slightly convex in the next quarter, and slightly concave in the hinder half. It is cut off perpendicularly to the axis behind, rather obliquely in front, where the slope is backward toward the convex side. There is a slight dorso-ventral compression of the tube, so that both the apertures are slightly flattened, especially on the convex side. Surface smooth but for scanty transverse microscopic scratches. Colour white, more opaque anteriorly, and in transverse lines.

Dimensions.—Length, 9·6 mm.; anterior diameter, 1 mm.; posterior, '5 mm.; greatest diameter, 1·4 mm.

Locality.—Geographe Bay, off Bunbury, in 15 fathoms, type with 7 others; off Fremantle in 10 to 12 fathoms, very many.

Among the many specimens taken considerable variety obtains. Some full grown may measure only 5 mm. in length and be proportionally narrow, and the inflation on the concave side may be less in all degrees, almost to disappearance.

***Cadulus angustior*, Verco, *antea*.**

Dredged in 35 fathoms off Hopetoun, 3 good; in King George Sound in 12-14 fathoms, 40 good; in Geographe Bay in 15 fathoms, 30 good.



4A



1A



4



3



5



5A



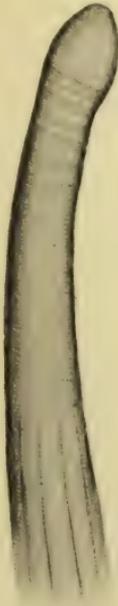
5B



1



2



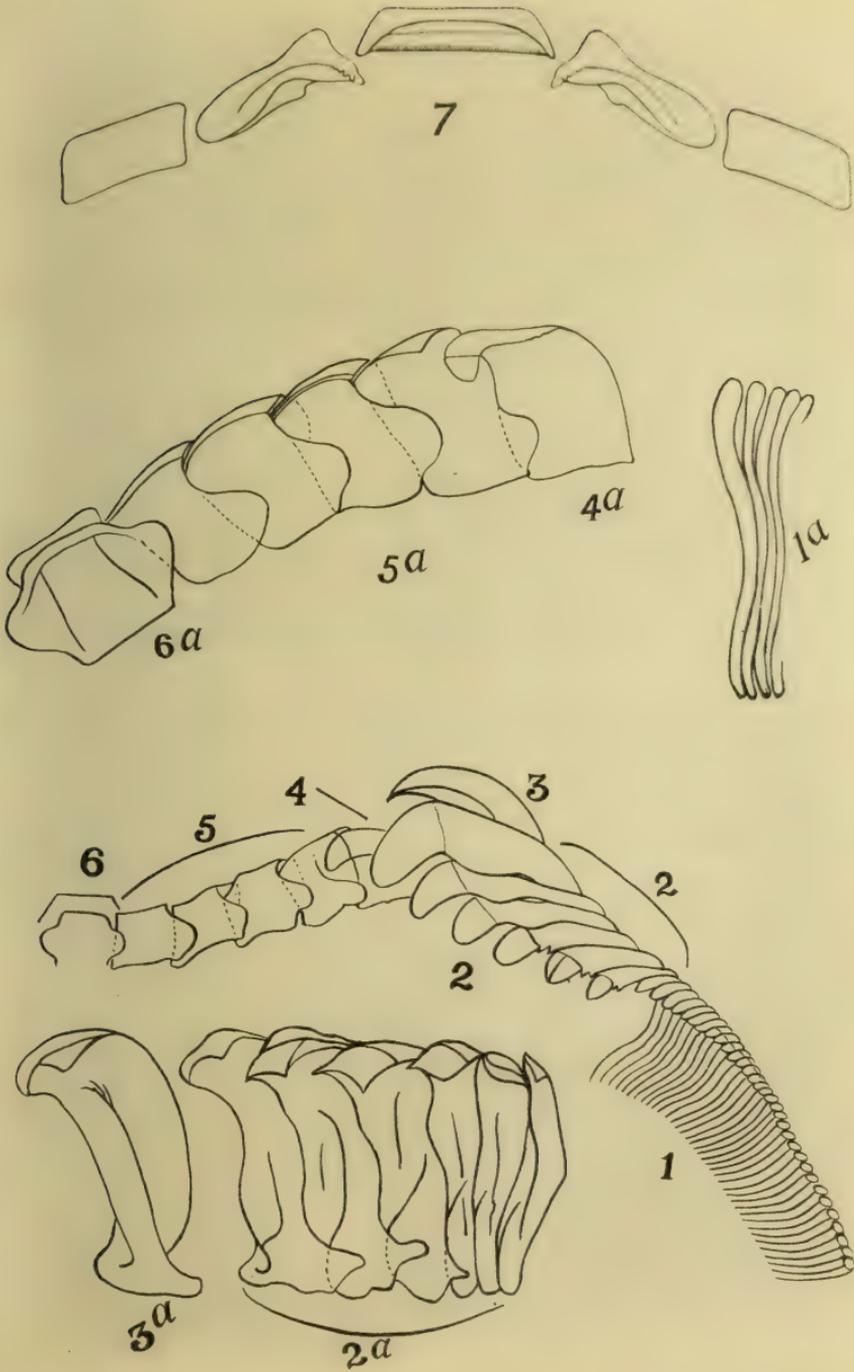
3A



6



7



EXPLANATION OF PLATES.

PLATE XXVI.

1. *Dentalium francisense*, Verco, n. sp.
- 1a. " " " " young.
2. " *hemileuron*, Verco, n. sp.
3. " *hyperhemileuron*, Verco, n. sp.
- 3a. " " " " early stage.
4. " *lubricatum*, Sowerby, early stage.
- 4a. " " " " apex.
5. *Cadulus angustior*, Verco, n. sp.
- 5a. " " " " initial stage.
- 5b. " " " " medium stage.
6. " *gibbosus*, Verco, n. sp.
7. " *occiduus*, Verco, n. sp.

PLATE XXVII.

- 1 to 6. *Turbo jourdani*, Kiener, half of one row from the radula.
 - 1, 2, 3. " " " " marginal teeth.
 - 4, 5. " " " " lateral teeth.
 6. " " " " central tooth.
 - 1a. " " " " outermost marginals.
 - 2a. " " " " inner marginals.
 - 3a. " " " " innermost maginal.
 - 4a. " " " " outermost lateral.
 - 5a. " " " " other laterals.
 - 6a. " " " " central.
 7. *Dentalium zelandicum*, Sowerby, one row from the radula.
-

ABSTRACT OF PROCEEDINGS
OF THE
Royal Society of South Australia
(Incorporated)
FOR 1910-11.

ORDINARY MEETING, NOVEMBER 1, 1910.

Mr. MAYO in the chair.

ELECTION.—Professor Bragg was elected an Honorary Fellow of the Society.

Mr. ASHBY drew attention to the recent destruction of kangaroos on Kangaroo Island and moved that a deputation of members of the Society wait on the Commissioner of Crown Lands in connection with the matter. Resolved "That the President, Secretary, Mr. Ashby, and Mr. Howchin form the deputation, with power to add to their number."

EXHIBITS.—Mr. ASHBY exhibited birds from the Dandenong Ranges, Victoria; Mr. TEPPER, insects; and Dr. PULLEINE, trapdoor spiders from Burnett River, Queensland.

PAPERS.—"On Tetrahedrite from Glen Osmond Quarry," "Further Notes on Radio-Active Minerals from Olary," "On Obsidianites," and "Mineralogical Notes on Sphene, Pegmatite, Cordierite, Sillimanite, Beryl, and Semi-artificial Gypsum Twin Crystals from a Steam-boiler at Block 14 Mine, Broken Hill, New South Wales," by DOUGLAS MAWSON, D.Sc.

ORDINARY MEETING, APRIL 4, 1911.

THE PRESIDENT (J. C. Verco, M.D., F.R.C.S.) in the chair.

EXHIBITS.—Mr. E. V. CLARK, B.Sc., exhibited silicified wood from Scone, New South Wales, where it is abundantly scattered about the country. In the opinion of several Fellows the wood belonged to a species of pine allied to *Araucaria*, as the structure of the wood and annual rings were easily recognizable. Mr. CLARK also exhibited native sulphur from Mount Wingen, near Scone, where a gradually moving area of subterranean combustion is seen on the hillside, probably caused by combustion of the deposits of pyrites. Mr. HOWCHIN described the spontaneous combustion of pyrites which took place in the waste coal heaps in England. Dr. E. A. JOHNSON exhibited specimens of *Trichina spiralis* in muscle.

PAPERS.—“Description of a Disturbed Area of Cainozoic Rocks in South Australia, with Remarks on its Geological Significance,” by W. HOWCHIN, F.G.S. Mr. E. V. CLARK, B.Sc., the original discoverer of this area, made some remarks on the subject. “Note on the Occurrence of *Trichina spiralis* in South Australia,” by E. A. JOHNSON, M.D. This important parasite occurring in the human muscular tissue has (according to the author) been recorded only three times in Australia.

ORDINARY MEETING, MAY 2, 1911.

THE PRESIDENT (J. C. Verco, M.D., F.R.C.S.) in the chair.

A motion was brought forward to alter the evening of meeting from the first Tuesday to the second Thursday in the month. This was sent as a recommendation to the Council.

EXHIBITS.—Mr. E. ASHBY exhibited birds from Anson Bay, Northern Territory, and from Mannum, River Murray, South Australia. Those from the former place included *Ptilinopus ewing*, *Pitta iris*, *Graucalus mentalis*, *Chalcophaps occidentalis*, *Chibia bracteata*, *Pezorhynchus nitidus*, *Rhipidura isura*, *R. concinna*, and *R. fulvifrons*, as well as several honey-eaters. Mr. HOWCHIN exhibited foraminifera from Rottnest Island, collected by Dr. VERCO. He remarked that one of these, *Orbitolites complanata*, has a diameter of from $\frac{1}{2}$ in. to $\frac{3}{4}$ in. in tropical seas. It used to live in our gulfs and is found sub-fossil in the Port River beds. It also occurs in the Miocene at Hallett Cove, reaching nearly 1 in. in diameter. Mr. HOWCHIN also exhibited photographs of granite boulders from Palmer, South Australia, showing the nature of weathering in granite, and described how the Cornish tors and cheese rings are formed by the weathering of the rock into boulders. Mr. J. G. O. TEPPER exhibited photographs and specimens of metamorphic rocks obtained at Barossa, South Australia. Mr. H. G. SMITH, F.G.S., Assistant Curator and Chemist at the Technological Museum, Sydney, and joint-author of the “Eucalypts of Australia,” made some remarks on the economic value of eucalypts. He stated that many tons of terpene oils were being used weekly in the separation of sulphide ores. For medicinal purposes alone the extraction of eucalyptus oils would never become a great industry. At present the medicinal eucalyptus oil trade is about £50,000 yearly. Mr. SMITH discussed the venation of the leaves of eucalypts as an indication of their qualitative oil content, and pointed out that there were three main groups, and nearly all eucalypts could be placed in one or other of these groups. The leaf venation and chemical constitution of the oil could be correlated. Professor Rennie,

D.Sc., remarked on the importance of technological work by competent men which has up to the present time not been recognized by our Governments.

ORDINARY MEETING, JUNE 8, 1911.

At the invitation of the Board of Governors of the Public Library, Museum, and Art Gallery the Fellows met in the lecture-room of the Institute to witness the exhibition of slides entitled "Native Ceremonies and Customs of Central Australian Aborigines," prepared by Mr. F. J. Gillen and described and explained by Prof. E. C. Stirling, M.D., F.R.S.

ORDINARY MEETING, JULY 12, 1911.

PROFESSOR RENNIE, D.Sc., in the chair.

NOMINATIONS.—E. Brown, M.B. (Melbourne), D.Ph. (Cambridge); B. S. Roach, editor, Education Department, Adelaide; W. H. Hughes, pastoralist, Gladstone; and H. H. Dutton, pastoralist, Anlaby.

EXHIBITS.—Mr. A. M. LEA, F.E.S., exhibited several rare and interesting insects, including *Hysterida* and *Pselaphidae* from the nests of ants; also a new genus and species of *Leucanidae* from North Queensland.

PAPERS.—"Additions to the Flora of South Australia," by J. M. BLACK. MR. BLACK remarked on the importance of notifying the date and place at which alien plants are first observed. "A Preliminary Report on the Discovery of Native Remains at Swanport, River Murray, South Australia, with an Inquiry into the Alleged Occurrence of a Pandemic among the Australian Aborigines," by E. C. STIRLING, M.D., F.R.S.

ORDINARY MEETING, AUGUST 10, 1911.

ELECTIONS.—E. Brown, M.B. (Melbourne), D.Ph. (Cambridge); B. S. Roach, editor, Education Department, Adelaide; H. H. Dutton, pastoralist, Anlaby; and W. H. Hughes, pastoralist, Gladstone, were elected Fellows.

NOMINATIONS.—H. R. Gillespie, carpenter, Adelaide, as a Fellow.

EXHIBITS.—Mr. A. M. LEA, F.E.S., exhibited stag beetles from various parts of Australia, notably *Neolamprina mandibularis* and numbers of the extensive Tasmanian genus *Lyssotes*, also various forms of blind beetles from ant-nests. Mr. EDQUIST exhibited specimens of saltbushes grown on the Adelaide Plains from cuttings received from the north. Mr. W. HOWCHIN, F.G.S., exhibited pseudo-meteorites which he said were sandy concretions consolidated by bush fires. He had found similar concretions in the fire circles of native camps,

and the Elder expedition had brought back some specimens which were labelled "Calced Sand from the Hollows of Burnt Trees." The interest attaching to these objects was that many people thought they were meteorites.

PAPERS.—"Notes Descriptive of a Stereogram of the Mount Lofty Ranges," by W. N. BENSON, B.Sc. This was communicated by Mr. W. HOWCHIN, F.G.S., who remarked that the present elevations of the Mount Lofty Ranges were geologically modern, instead of very ancient as was formerly believed. The new physiography was proving extremely valuable as a means of interpreting changes in earth movements and physical contours. "Revision of the Australian Hesperiadæ," by O. B. LOWER, F.L.S., F.E.S.

ORDINARY MEETING, SEPTEMBER 14, 1911.

THE PRESIDENT (J. C. Verco, M.D., F.R.C.S.) in the chair.

ELECTION.—H. R. Gillespie, carpenter, South Terrace, Adelaide, was elected a Fellow.

EXHIBITS.—Mr. J. G. O. TEPPER, F.L.S., exhibited some very minute scale insects from *Callitris verrucosa*, growing near Lyndoch Valley. Although too immature for certain identification it is probably *Fiorina camellæ*, described by Maskell, in 1897, from China. Mr. A. M. LEA exhibited two species of the tsetse-fly:—(1) *Glossina morsitans*, which attacks horses and not man; (2) *G. palpalis*, which attacks man and is the carrier for the trypanosome of sleeping-sickness. Mr. LEA mentioned that a closely-allied fly (*Stomoxys calcitrans*) is found in Australia. It has been asserted but not proved that this insect acts as an anthrax-carrier. Mr. W. HOWCHIN, F.G.S., exhibited a specimen of Miocene sandstone thickly studded with fossil shells (chiefly *Pecten antiaustralis*), obtained from an excavation at the Bank of New South Wales, North Terrace; also samples of an old fresh-water deposit containing numerous shells, laid down in a former lake area now forming a river terrace 15 ft. above the present level of the River Broughton, near Koolunga.

PAPER.—"Notes on the Cambrian Glacial Beds of South Australia," by F. NOETLING, M.A., Ph.D., communicated by the Honorary Secretary.

ANNUAL MEETING, OCTOBER 12, 1911.

THE PRESIDENT (J. C. Verco, M.D., F.R.C.S.) in the chair.

The annual report and balance-sheet were read and adopted.

ELECTION OF OFFICERS.—*President*, J. C. Verco, M.D., F.R.C.S.; *Vice-Presidents*, Professor Rennie, D.Sc., and Walter Rutt, C.E.; *Members of Council*, Walter Howchin, F.G.S., and Edwin Ashby; *Hon. Treasurer*, W. B. Poole; *Auditors*, J. S. Lloyd and Howard Whitbread. A vote of thanks was passed to the President and Council on the motion of Dr. TORR.

EXHIBITS.—Mr. S. DIXON exhibited a new *Orobanche* from Brighton. Mr. Black considered it is allied to *Orobanche ramosa*, and offered to send it to Kew for further identification. Mr. W. HOWCHIN exhibited a pseudo-meteorite sent from Mount Gambier. It appeared to be a quartzite, perfectly round, and has a ferruginous coating. Mr. SELWAY drew the attention of the meeting to the weathering of the well-known glacial surface exposed at Hallett Cove. Dr. TORR suggested that the matter be referred to the Council for consideration, with the view of taking some steps by which this interesting natural feature may be preserved from decay.

PAPERS.—“Australian Curculionidæ, Part IX.,” by A. M. LEA, F.E.S.; “Studies in Australian Coleoptera, Part XLI.,” by Rev. T. BLACKBURN, B.A.; “Western Australian Polyplacophora,” by Dr. TORR; “Notes on Some Species of the Isopod Family, Sphæromidæ, from South Australia, Part III.,” by W. H. BAKER; and “Notes on Marine Mollusca of South Australia, Part XIV.,” by J. C. VERCO, M.D., F.R.C.S.

THE EDITOR reported the publication of Memoir, part iii., vol. ii., on “Chiastolites from Bimbowrie,” by D. MAWSON, D.Sc.

The proposed discussion “On the Importance of Investigating the Influence of Metallic Minerals on Vegetation,” which was to have been opened by Mr. S. DIXON, was postponed on account of the lateness of the hour.

ANNUAL REPORT, 1910-11.

The Council has the pleasure to report that during the past year the scientific contributions, especially in geology and biology, have been many and important.

Five new Fellows have been elected and one old one reinstated, while two have resigned, one owing to leaving the State, the other from advancing age and inability to attend the meetings. Professor Bragg was elected an Honorary Fellow of the Society, and in his acknowledgment heartily

thanked our Society for the honour conferred on him. The arrival of one of our members and frequent contributor, Mr. A. M. Lea, F.E.S., from Tasmania, to fill a position in the South Australian Museum will give a stimulus to entomology and natural history generally in the State.

Dr. Verco has continued his series of papers on the marine mullusca of South Australia in part xiv. Geological contributions have been submitted by Mr. W. Howchin, F.G.S., and Dr. D. Mawson, as well as a short paper on a stereogram of the Mount Lofty Ranges by Mr. Noel Benson, B.Sc. Mr. A. M. Lea, F.E.S., and Canon Blackburn have written on the Coleoptera, while Mr. O. B. Lower has contributed a voluminous paper on a section of Lepidoptera.

Botanical science is richer for papers by Mr. J. M. Black, who has indefatigably followed the invasion of our State by alien plants and registered their localities of appearance.

Dr. E. C. Stirling has contributed a report of great historical and ethnological value, and of special interest to students in our own State.

A considerable number of interesting birds and insects, as well as plants and geological specimens, has been submitted at the meetings, and it is hoped that exhibits will be increasingly shown, as the discussions on them are very interesting to Fellows who may not be able to follow the more technical contributions.

During the year the Fauna and Flora Committee of this Society opened a campaign to advance the securing of a larger area on Kangaroo Island. Having obtained the support of all the Australasian Scientific Societies of note and the aid of some influential public men the Committee met the Commissioner of Crown Lands in deputation. The proceedings of the deputation were marked by enthusiastic utterances on the part of its members, and a promise was obtained from the Commissioner that all that was possible of the 300 square miles asked for would be secured for the reserve at the earliest possible date. The veteran workers Messrs. S. Dixon and Symonds Clark, with Mr. E. Ashby, had much to do with the success of the deputation.

The Library is in process of being catalogued under the Dewey card system by Mr. Clucas and his assistant. In order to classify the Library and make provision for additions tenders have been accepted for two bookstacks. For various reasons the binding of publications has been in abeyance, but it is hoped that during the coming year much will be done in this direction. During the year the Editor presented part iii.,

vol. ii., of the Memoirs, being a monograph on Chiastolites by Dr. Douglas Mawson.

The important scientific matter printed in the Society's Transactions continues to cause a demand for the publication, and several new exchanges have been arranged for.

The membership of the Society comprises 9 Honorary Fellows, 5 Corresponding Members, 69 Fellows, and 1 Associate.

J. C. VERCO, *President.*

ROBERT PULLEINE, *Hon. Secretary.*

ENDOWMENT FUND.

To Amount of Fund, October 1, 1910 ...	£	s.	d.	By £2,000 S.A. 3¼ per cent. Inscribed Stock	£	s.	d.
" Amount transferred from Revenue and Expenditure Account ...	2,006	0	0	" Deposit in Savings Bank ...	1,997	10	0
	150	0	0		158	10	0
	<u>£2,156 0 0</u>				<u>£2,156 0 0</u>		

Examined and found correct—
 J. S. LLOYD, } Hon. Auditors.
 HOWARD WHITEHEAD, }
 September 30, 1911.

W. B. POOLE, Hon. Treasurer.

MALACOLOGICAL SECTION
 OF THE
Royal Society of South Australia (Incorporated).

ANNUAL REPORT FOR THE YEAR 1910-11.

Nine meetings were held during the past year, at which the average attendance was six. There are now thirteen members on the roll.

The chief work of the year comprised a revision of South Australian mollusca.

F. R. ZIETZ, *Hon. Sec. and Treas.*

RECEIPTS AND EXPENDITURE FOR THE YEAR 1910-11.

Receipts.		Expenditure.					
	£	s.	d.				
To Credit Balance	0	13	10	By Postages	...	...	...
Subscriptions	...	1	7	Unbehaun & Johnstone, Limited	...	...	...
	...	7	6	Subscriptions to Royal Society	...	...	...
	...			" Balance in hand	...	...	...
	<u>£2 14</u>				<u>£2 14</u>		

F. R. ZIETZ, *Hon. Sec. and Treas.*

DONATIONS TO THE LIBRARY

FOR THE YEAR 1910-11.

TRANSACTIONS, JOURNALS, REPORTS, ETC.,

presented by the respective Editors, Societies, and Governments.

AUSTRALIA.

- AUSTRALIA. *Bureau of Census and Statistics*. Official year book, no. 4, 1901-10. Melb. 1911.
- AUSTRALIA. *Bureau of Meteorology*. Bulletin, 6-8. 1911.
- Maps: average rainfall map of Victoria. 1910.
- Monthly report, vol. 1, no. 2-11. 1910-11.
- Rainfall map for 1910.
- Rain and river observations in New South Wales, 1903-1908.
- AUSTRALIA. *Department of Trade and Customs*. Second report by the Director on fishing experiments carried out by the *F.I.S. Endeavour*, Sept., 1909, to Oct., 1910. Melb. 1911.
- ROYAL ANTHROPOLOGICAL SOCIETY OF AUSTRALIA. Journal: Science of man, vol. 12, no. 5-12; vol. 13, no. 1-6. Syd. 1910-11.

NEW SOUTH WALES.

- AGRICULTURAL GAZETTE OF NEW SOUTH WALES, vol 21, pt. 9-12 and index; vol. 22, pt. 1-8. Syd.
- AUSTRALIAN MUSEUM. Memoir 4, pt.13-15. Syd. 1911.
- Records, vol. 8, pt. 1-2. Syd. 1911.
- Report of the trustees, to June, 1910. Syd.
- Special catalogue, vol. 3, pt. 1-3. Syd. 1911.
- LINNEAN SOCIETY OF NEW SOUTH WALES. Abstract of proceedings, no. 286-293. Syd. 1910-11.
- Proceedings, vol. 35, pt. 3; vol. 36, pt. 1. Syd. 1910-11.
- MAIDEN, J. H. Forest flora of New South Wales, vol. 4, pt. 10; vol. 5, pt. 1-5. Syd. 1910-11.
- Critical revision of the genus eucalyptus, pt. 12-13. Syd. 1910-11.
- NEW SOUTH WALES. *Board of Fisheries*. Report on the fisheries of New South Wales for 1909. Syd. 1910.
- Brief review of the fisheries of New South Wales, present and potential. Syd. 1910.

- NEW SOUTH WALES. *Botanical Gardens and Government Domains*. Report of the director, 1909. Syd. 1910.
- NEW SOUTH WALES. *Department of Mines*. Annual report, 1910. Syd. 1911.
- NEW SOUTH WALES NATURALISTS' CLUB. *Journal: The Australian naturalist*, vol. 2, pt. 4-8. Syd. 1911.
- PUBLIC LIBRARY OF NEW SOUTH WALES. Report, 1910. Syd. 1911.
- ROYAL SOCIETY OF NEW SOUTH WALES. *Journal and proceedings*, vol. 42; vol. 43, pt. 1-4; vol. 44, pt. 1-3. Syd. 1910.
- SYDNEY UNIVERSITY. Calendar, 1911. Syd. 1911.

QUEENSLAND.

- QUEENSLAND. *Department of Mines*. Geological Survey publications, no. 222, 231-2, 234. Brisb. 1910-11.
- ROYAL SOCIETY OF QUEENSLAND. *Proceedings*, vol. 8, pt. 2; vol. 16, pt. 1-2; vol. 23, pt. 1. Brisb.

SOUTH AUSTRALIA.

- PUBLIC LIBRARY, MUSEUM, AND ART GALLERY OF SOUTH AUSTRALIA. Report of the Board of Governors, 1909-10. Adel. 1910.
- SOUTH AUSTRALIA. *Department of Mines*. Review of mining operations, no. 12. Adel. 1910.
- SOUTH AUSTRALIA. *Northern Territory*. Government Geologist's report on the Tanami goldfields and district. Adel. 1911.
- SOUTH AUSTRALIAN SCHOOL OF MINES AND INDUSTRIES AND TECHNOLOGICAL MUSEUM. Annual report, 1909. Adel. 1910.
- SOUTH AUSTRALIA. *Woods and Forests Department*. Annual progress report, 1909-10. Adel. 1910.

TASMANIA.

- ROYAL SOCIETY OF TASMANIA. Papers and proceedings, 1910. Hobart.
- TASMANIA. *Department of Mines*. Progress of the mineral industry of Tasmania, Sept., 1910; Dec., 1910; March, 1911; June, 1911. Hobart. 1911.
- *Geological Survey*. Bulletin, no. 8. Hobart. 1911.

VICTORIA.

- ROYAL SOCIETY OF VICTORIA. *Proceedings*, new ser., vol. 23, no. 1-2. Melb. 1910-11.
- VICTORIA. *Department of Agriculture*. *Journal*, vol. 8, pt. 10-12; vol. 9, pt. 1-11. Melb. 1910-11.
- Report, 1907-10. Melb. 1910.

- VICTORIA. *Department of Mines*. Annual report of the Secretary for Mines, 1910. Melb. 1911.
- VICTORIAN NATURALIST, vol. 27, no. 6-12; vol. 28, no. 1-7. Melb. 1910-11.
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WESTERN AUSTRALIA.

- WESTERN AUSTRALIA. *Geological Survey*. Bulletin, no. 38, 39, 41. Perth. 1910-11.

ENGLAND.

- BRITISH ANTARCTIC EXPEDITION, 1907-09. Report on the scientific investigations, vol. 1, pt. 5-6; vol. 2, pt. 1-4. Lond. 1910-11.
- CAMBRIDGE PHILOSOPHICAL SOCIETY. Proceedings, vol. 15, pt. 6; vol. 16, pt. 1-2. Camb. 1910-11.
- CAMBRIDGE UNIVERSITY LIBRARY. Report of the Library Syndicate, 1910. Camb. 1911.
- CONCHOLOGICAL SOCIETY. Journal of conchology, vol. 13, pt. 4-8. Lond. 1910-11.
- ENTOMOLOGICAL SOCIETY OF LONDON. Transactions, 1910. Lond. 1911.
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- Proceedings, Oct., 1910. Lond. 1910.
- LIVERPOOL BIOLOGICAL SOCIETY. Proceedings and transactions, vol. 24. L'pool. 1910.
- MANCHESTER FIELD NATURALISTS' AND ARCHAEOLOGISTS' SOCIETY. Report and proceedings, vol. 50. Manch. 1911.
- MANCHESTER LITERARY AND PHILOSOPHICAL SOCIETY. Memoirs and proceedings, vol. 54, pt. 3; vol. 55, pt. 1-2. Manch. 1910-11.
- NATIONAL PHYSICAL LABORATORY. Collected researches, vol. 7. Teddington. 1911.
- Report, 1910. Teddington. 1911.
- ROYAL BOTANICAL GARDENS, KEW. Bulletin, 1910. Lond. 1910.
- ROYAL MICROSCOPICAL SOCIETY OF LONDON. Journal, 1910, pt. 4-6; 1911, pt. 1-3. Lond. 1910-11.
- ROYAL SOCIETY OF LONDON. Proceedings, ser. A, no. 570-581. Lond. 1910-11.
- Ser. B, no. 559-571. Lond. 1910-11.
- UNITED EMPIRE, new ser., vol. 1, no. 1-12; vol. 2, no. 1-10. Lond. 1910-11.

IRELAND.

- BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.
Report and proceedings, session 1909-10. Belfast. 1911.
- ROYAL DUBLIN SOCIETY. Economic proceedings, vol. 2, no. 2.
Dublin. 1910.
- Scientific proceedings, new ser., vol. 12, no. 30-37;
t.p. and index to vol. 12; vol. 13, no. 1-10. Dublin.
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- ROYAL IRISH ACADEMY. Proceedings: Section A, vol. 28,
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Dublin. 1910-11.
- Section B, vol. 28, no. 7-8 and index to vol.
28; vol. 29, no. 1-6. Dublin. 1910-11.
- Section C, vol. 28, no. 7-12; t.p. and index to
vol. 28; vol. 29, no. 1-4. Dublin. 1910-11.

SCOTLAND.

- EDINBURGH GEOLOGICAL SOCIETY. Transactions, vol. 9, no. 5.
Edin. 1910.
- GLASGOW GEOLOGICAL SOCIETY. Transactions, vol. 14, pt. 1.
Glasg. 1910.
- ROYAL PHYSICAL SOCIETY FOR THE PROMOTION OF ZOOLOGY,
ETC. Proceedings, vol. 18, no. 3. Edin. 1911.
- ROYAL SOCIETY OF EDINBURGH. Proceedings, vol. 30, pt. 7;
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- KAISERLICHE AKADEMIE DER WISSENSCHAFTEN. Anzeiger,
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- K.K. GEOLOGISCHE REICHANSTALT. Verhandlungen, Jahrg.
1910, Nr. 2-18; Jahrg. 1911, Nr. 1-11. Wien.
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- K.K. NATURHISTORISCHES HofMUSEUM. Annalen, Bd. 23,
Nr. 3-4; Bd. 24, Nr. 1-2. Wien. 1910.
- K.K. ZOOLOGISCHE-BOTANISCHE GESELLSCHAFT. Verhand-
lungen, Bd. 60, H. 4-8; Bd. 61, H. 1-5. Wien.
1910-11.

BELGIUM.

- BELGIQUE, MUSEE ROYAL D'HISTOIRE NATURELLE. Extrait
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tom. 4-5. Brux. 1910-11.
- BELGIQUE SOCIETE ROYAL DE BOTANIQUE. Bulletin, tom. 47,
fasc. 1-4. Brux. 1910-11.
- BRUXELLES JARDIN BOTANIQUE DE L'ETAT. Bulletin, vol. 3,
fasc. 1. Brux. 1911.

- OBSERVATOIRE ROYAL DE BELGIQUE, L'. Annales, n.s.: Annales astronomiques, tom. 2, fasc. 2. Brux.
 ——— Annuaire astronomique, 1911. Brux. 1910.
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- BRAZILIANISCHE RUNDSCHAU, Jahrg. 1, Heft 1. Rio de Janeiro. 1910.
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 SOCIEDAD SCIENTIFICA DE SAO PAULO. Revista, vol. 5. Sao Paulo. 1910.

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- ALBANY MUSEUM. Records, vol. 2, pt. 3. Grahamstown. 1911.
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LIST OF FELLOWS, MEMBERS, Etc.,

OCTOBER, 1911.

Those marked with an asterisk have contributed papers published in the Society's Transactions.

Any change in address should be notified to the Secretary.

NOTE.—The publications of the Society will not be sent to those whose subscriptions are in arrears.

Date of
Election.

HONORARY FELLOWS.

1910. *BRAGG, W. H., M.A., F.R.S., Professor of Physics, University of Leeds, England.
1893. *COSSMAN, M., Rue de Maubeuge, 95, Paris.
1897. *DAVID, T. W. EDGEWORTH, C.M.G., B.A., D.Sc., F.R.S., Professor of Geology, University of Sydney.
1890. *ETHERIDGE, ROBERT, Director of the Australian Museum of New South Wales, Sydney.
1905. GILL, THOMAS, I.S.O., Under-Treasurer, Adelaide.
1905. *HEDLEY, CHAS. H., Naturalist, Australian Museum, Sydney.
1892. *MAIDEN, J. H., F.L.S., F.C.S., Director Botanic Gardens, Sydney, New South Wales.
1898. *MEYRICK, E. T., B.A., F.R.S., F.Z.S., Thornhanger, Marlborough, Wilts, England.
1894. *WILSON, J. T., M.D., Professor of Anatomy, University of Sydney.

CORRESPONDING MEMBERS.

1881. BAILEY, F. M., F.L.S., Colonial Botanist, Brisbane, Queensland.
1880. *FOELSCH, PAUL, Inspector of Police, Palmerston, Northern Territory.
1893. STRETTON, W. G., Palmerston, Northern Territory.
1905. THOMSON, G. M., F.L.S., F.C.S., Dunedin, New Zealand.
1908. *WOOLNOUGH, WALTER GEORGE, D.Sc., F.G.S., Lecturer in Geology, University of Sydney. (Fellow from 1902.)

FELLOWS.

1895. *ASHBY, EDWIN, Royal Exchange, Adelaide.
1902. *BAKER, W. H., F.L.S., Glen Osmond Road, Parkside.
1908. *BENSON, W. NOEL, B.Sc., University of Sydney.
1907. *BLACK, J. McCONNELL, Alfred Street, Norwood.
1887. *BLACKBURN, Rev. Canon THOMAS, B.A., Woodville.
1909. BRADLEY, EDGAR J., Civil Engineer, Hydraulic Engineer's Department, Adelaide.
1911. BROWN, EDGAR J., M.B., D.Ph. (Cambridge), 3, North Terrace, Adelaide.
1883. BROWN, H. Y. L., F.G.S., late Government Geologist, Adelaide.
1893. BRUMMIT, ROBERT, M.R.C.S., Medindie.
1904. BRUNSKILL, GEORGE, Semaphore, South Australia.

1906. BUNDEY, Miss ELLEN MILNE, 148, Molesworth Street, North Adelaide.
1907. *CHAPMAN, R. W., M.A., B.C.E., Professor of Mathematics and Mechanics, University of Adelaide.
1904. CHRISTIE, W., Rundle Street, Adelaide.
1910. *CLARK, E. V., B.Sc., Lecturer in Electrical Engineering, University of Adelaide.
1867. CLARK, M. SYMONDS, Bunyip Buildings, Gawler Place, Adelaide.
1879. *CLELAND, W. L., M.B., Ch.M., J.P., Colonial Surgeon, Resident Medical Officer Parkside Lunatic Asylum, Lecturer in Materia Medica, University of Adelaide.
1895. CLELAND, JOHN B., M.D., Government Bureau of Microbiology, Sydney, New South Wales.
1907. *COOKE, T. W., D.Sc., Lecturer, University of Adelaide.
1907. DARLING, JOHN, Kent Terrace, Norwood.
1887. *DIXON, SAMUEL, Bath Street, New Glenelg.
1911. DUTTON, H. H., Anlaby.
1902. EDQUIST, A. G., Tate Terrace, Croydon.
1911. GILLESPIE, H. R., South Terrace, Adelaide.
1904. GORDON, DAVID, Gawler Place, Adelaide.
1880. *GOYDER, GEORGE, A.M., F.C.S., Analyst and Assayer, Adelaide.
1910. GRANT, KERR, Professor of Physics, University of Adelaide.
1904. GRIFFITH, H., Henley Beach.
1896. HAWKER, E. W., F.C.S., Calcanina, Clare (Eagle Chambers, Adelaide).
1891. *HOLTZE, MAURICE, F.L.S., Director Botanic Gardens, Adelaide.
1883. *HOWCHIN, WALTER, F.G.S., Lecturer in Geology and Palaeontology, University of Adelaide.
1911. HUGHES, W. H., Booyoolie, Gladstone.
1893. JAMES, THOMAS, M.R.C.S., Moonta.
1910. *JOHNSON, E. A., M.D., M.R.C.S., Franklin Street, Adelaide.
1897. *LEA, A.M., F.E.S., South Australian Museum, Adelaide.
1884. LENDON, A. A., M.D. (Lond.), M.R.C.S., Lecturer in Forensic Medicine and in Chemical Medicine, University of Adelaide, and Hon. Physician, Children's Hospital, North Adelaide.
1856. LLOYD, J. S., Alma Chambers, Adelaide.
1888. *LOWER, OSWALD B., F.E.S. (Lond.), Broken Hill, New South Wales.
1905. *MAWSON, DOUGLAS, B.Sc., B.E., Lecturer in Mineralogy and Petrology, University, Adelaide.
1874. MAYO, GEO. G., C.E., 116, Franklin Street, Adelaide.
1907. MELROSE, ROBERT THOMSON, Mount Pleasant.
1897. *MORGAN, A. M., M.B., Ch.B., Angas Street, Adelaide.
1907. MUECKE, HUGO, C.E., Grenfell Street, Adelaide.
1884. MUNTUN, H. S., North Terrace, Adelaide.
1886. POOLE, W. B. (Hon. Treasurer), Savings Bank, Adelaide.
1908. POPE, WILLIAM, Solicitor, Adelaide.
1907. PULLEINE, R. H., M.B. (Hon. Secretary), North Terrace, Adelaide.
1907. PURDUE, R. F., Mining Agent, St. Helen's, Tasmania.
1885. *RENNIE, EDWARD H., M.A., D.Sc. (Lond.), F.C.S., Professor of Chemistry, University of Adelaide.

1911. ROACH, B. S., Education Department, Flinders Street, Adelaide.
1905. *ROGERS, R. S., M.A., M.D., Flinders Street, Adelaide.
1869. *RUTT, WALTER, Chief Assistant Engineer, Adelaide.
1891. SELWAY, W. H., Treasury, Adelaide.
1893. SIMSON, AUGUSTUS, Launceston, Tasmania.
1871. SMITH, ROBERT BARR, Adelaide.
1906. SNOW, FRANCIS H., Adelaide.
1910. *STANLEY, E. R., University, Adelaide.
1881. *STIRLING, EDWARD C., C.M.G., M.A., M.D., F.R.S., F.R.C.S., Professor of Physiology, University of Adelaide, Director of South Australian Museum.
1907. SWEETAPPLE, H. A., M.D., Park Terrace, Parkside.
1904. TAYLOR, WILLIAM, St. Andrew's, North Adelaide.
1886. *TEPPER, J. G. O., F.L.S., Elizabeth Street, Norwood. (Corresponding Member since 1878.)
1897. *TORR, W. G., LL.D., M.A., B.C.L., Brighton, South Australia.
1894. *TURNER, A. JEFFERIS, M.D., Wickham Terrace, Brisbane, Queensland.
1889. VARDON, SENATOR JOSEPH, J.P., Gresham Street, Adelaide.
1878. *VERCO, JOSEPH C., M.D., F.R.C.S., Lecturer on the Principles and Practice of Medicine and Therapeutics, University of Adelaide.
1883. WAINWRIGHT, E. H., B.Sc. (Lond.), McLaren Vale.
1878. WARE, W. L., J.P., Adelaide.
1859. WAY, RIGHT HON. SIR SAMUEL JAMES, Bart., P.C., D.C.L., Chief Justice and Lieutenant-Governor of South Australia, Adelaide.
1907. WEBB, NOEL A., Barrister, Waymouth Street, Adelaide.
1904. WHITBREAD, HOWARD, Currie Street, Adelaide.

ASSOCIATE.

1904. ROBINSON, MRS. H. R., "Las Conchas," Largs Bay, South Australia.
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APPENDICES.

FIELD NATURALISTS' SECTION

OF THE

Royal Society of South Australia (Incorporated).

TWENTY-EIGHTH ANNUAL REPORT OF THE
COMMITTEEFOR THE YEAR ENDED SEPTEMBER 19, 1911.

The monthly meetings and the excursions held during the past twelve months may be considered fairly as equal in work and interest to any that have gone before. The membership has increased, and it may be mentioned with much satisfaction that among those who have joined are several who belong to the teaching profession. Such additions to the roll are particularly welcome as adding strength to the practical workers in natural history. Worthy of note, too, is the addition to the roll of the name of Mr. A. M. Lea, whose reputation as a naturalist preceded his advent to South Australia, and whose activities in the field of science will no doubt be of much service to the Section.

MEETINGS.

At the last annual meeting the Chairman (Mr. W. H. Selway) continued his review of "The National Parks and Forests of Australia." This second part of his review, like the first, was a valuable record of the work that was being achieved in the direction of conserving tracts of country for the preservation of Australian flora and fauna, and for holding in reserve areas of land for the benefit of the people, as a whole, against the rapid strides of settlement for agricultural, pastoral, and other means of production from the land. It is gratifying to know that this review has been printed in pamphlet form and is thus retained as a valuable record for future reference.

Following upon this, as showing the active interest that the Section has always evinced in the subject, Mr. Walter Gill, F.L.S., was requested to deliver an address on "Forestry

in South Australia." This was given with illustrated views, and Mr. Gill's enthusiasm in his work as Conservator of Forests showed how closely his life-work was bound up with this important industry.

On May 16 Mr. J. W. Mellor delivered a lecture on his visit to the Capricorn Group of Islands, on the Great Barrier Reef, north-west coast of Queensland. The visit was made in connection with the Congress of the Ornithological Union held last year. Mr. Mellor's address was full of interest in bringing under notice the life history of the birds, as well as the marine zoology and plant growth new to those who have not had the opportunity of visiting the places referred to. Many specimens collected on the trip were shown and described.

Following upon this lecture Captain S. A. White, who was also with the same party, gave an interesting address, illustrated by numerous views of the life and habits of the birds that live on and frequent the coastal islands of Queensland.

Members, having caught on to the charm of travels abroad, next requested Dr. R. S. Rogers to give some information regarding the natural history and other phases of life in Africa. This lecture proved equally fascinating, as by the aid of lantern views Dr. Rogers described a journey he and Mrs. Rogers took through Natal during the progress of the Boer war. These observant naturalists were able to describe many matters of interest in the fauna and flora, as well as adventures peculiar to the stirring times of war.

EXHIBITS.

While natural history abroad was of absorbing interest objects nearer home were not neglected, and the next meeting was devoted to the description of exhibits. Mr. A. M. Lea showed a case of beetles, Dr. Pulleine a collection of spiders, Mr. Elkan a specimen of micaceous ironstone from near Paradise, Mr. J. F. Mellor leaves, pods, and seeds of a Queensland *Stottea*, Miss Phillipson a ball of kauri-gum from New Zealand, and Mr. Stokes chitons, spiders, and land shells. The exhibits were described and commented upon by the exhibitors and others, and a profitable meeting was held. At most of the evening meetings exhibits have proved an interesting and instructive feature.

EXCURSIONS.

The field work for the year has maintained its usual interest, but the attendance at the engagements has been somewhat spasmodic. Some have been poorly attended, while others have drawn the largest attendances for many years.

This is accounted for by the excursions having been arranged during the winter months and the variability of the weather. Following is a list of the engagements:—October 29, 1910, National Park; November 12, Houghton; December 10, Mount Lofty; March 17, 1911, Adelaide Observatory; May 5, Adelaide Observatory; May 6, Upper Sturt; May 20, Brighton; July 22, Norton Summit; August 5, Aldgate to Mount Lofty; September 2, Eden Hills.

ROBERT PULLEINE, *Chairman.*

E. H. LOCK, *Hon. Secretary.*

TWENTY-THIRD ANNUAL REPORT OF THE NATIVE
FAUNA AND FLORA PROTECTION COMMITTEE
OF THE FIELD NATURALISTS' SECTION OF THE
ROYAL SOCIETY OF SOUTH AUSTRALIA FOR
THE YEAR ENDED SEPTEMBER, 1911.

FLINDERS CHASE, KANGAROO ISLAND.

In October last circulars enclosing a reprint of a portion of last year's report were sent to members of Parliament soliciting their support to the movement for more firmly establishing this reserve and extending its area. In November a deputation from the Royal Society waited upon the Commissioner of Crown Lands to urge upon him the necessity for better protection being given to kangaroos, and, as a means towards this end, the completion of the Kangaroo Island reserve. The Commissioner expressed his sympathy and said he would give a reply as soon as possible. In May last your Committee distributed nearly 300 circulars with a plan of the western portion of the island, in response to which a deputation numbering nearly 100 persons, including representatives of the Universities of Adelaide, Sydney, and Melbourne, of the Royal Society and the affiliated Societies, the Australian Natives' Association and many South Australian Societies, the Royal Societies of New South Wales, Victoria, and Tasmania, the Royal Australasian Ornithologists' Union, the Corporations of Adelaide, Brighton, Glenelg, Norwood, Port Adelaide, St. Peters, and Unley, and the District Councils of Burnside, Crafers, Payneham, and Woodville, waited upon the Commissioner of Crown Lands on June 13 to reiterate the requests already made to his predecessors in office and to himself. The Minister received the deputation favourably, and

said he would recommend to the Government that a larger area than the 140 square miles already promised should be granted, but that he desired to inspect the country himself before deciding upon the extent of the additional area. He would also recommend that a sum be placed upon the Estimates for a fence to be put across the island to protect the settlers' crops from the kangaroos.

PROTECTION OF OPOSSUMS.

Under the existing Game Act there is no power given to transfer animals from the unprotected to the protected list, and consequently no power of establishing a close season for opossums. The Secretary drew up an amending Bill for the purpose of overcoming this difficulty, and this was placed in the hands of the Government.

BIRDS PROTECTION ACT.

The names of several birds have been added to the schedule of those to be wholly protected, among them those mentioned in the last report, comprising bee-eaters, native pheasants, black cockatoos, gang-gang cockatoos, pigeons, doves, and bustards. Efforts are being made to get pelicans again placed on the partially protected list. The close season for the partially protected birds has been extended from December 20 to the middle of January. Your Committee having been asked to furnish the Commissioner of Crown Lands with the amendments to the Birds Protection Act desired by them, a sub-committee was appointed to confer with the President of the Ornithological Association, and a number of suggested amendments have been sent to the Minister. With these passed into law many of the difficulties now experienced in carrying out the obvious intentions of the Act will be overcome.

The members of your Committee note with pleasure the increasingly rapid spread in the community of their views regarding the necessity for protecting our fauna and flora, enunciated by them some twenty-three years ago and since then repeatedly urged upon the public.

SAML. DIXON, *Chairman.*

M. SYMONDS CLARK, *Hon. Secretary.*

September 19, 1911.

APPENDIX.

A FAREWELL ADDRESS TO THE FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY BY THE CHAIRMAN OF THE NATIVE FAUNA AND FLORA PROTECTION COMMITTEE, S. DIXON.

[Read September 19, 1911.]

After occupying the chair for twenty-three consecutive years it is time to make way for a younger man, and I propose to place before you an outline of what has been accomplished, and what remains to be done to fully accomplish the objects aimed at when the original Committee was formed. After reading a paper on August 21, 1888, advocating the better protection of our native fauna and flora the late Mr. A. F. Robin moved the appointment of the Committee which was, I believe, the first with these objects in Australia. The late Professor R. Tate and Messrs. A. Zietz, S. Dixon, J. G. O. Tepper, and A. F. Robin (Secretary) were appointed; at the first meeting three or four days after I had the honour to be appointed Chairman, and after Mr. Robin had explained his views I suggested they could be effectively carried out only in a special area, and finally my resolution was carried to be placed before you—"That in furtherance of the proposed objects this Section desires to recommend that Government Farm be declared a Public Park and handed over to trustees to manage." I propose to summarize our further policy and deal with the Park question later. Our next step was to get an amended Game Bill providing for the partial protection of kangaroos and opossums, but it was rejected in the second reading without a division by the Legislative Council. The Commissioner of Crown Lands, however, agreed to circulate placards containing the chief provisions of the Game Act, and the police were instructed to secure their observance. Since then the Committee has year after year to acknowledge the sympathetic assistance rendered to our objective by the Under-Secretary for Lands (Mr. Thos. Duffield), and his cordial help we gratefully acknowledge. The same year we waited upon the Minister of Education requesting more direct instruction in schools in natural science, particularly as to insectivorous birds, and this was the beginning of the movement afterwards carried out in Victoria and at last carried out here under the able supervision of Mr. A. G. Edquist, B.Sc.; the future welfare of this State is largely bound up with habits of accurate observation and deduction inculcated thereby.

FORESTRY.

On various occasions by deputations and otherwise we have successfully protested against and prevented the alienation of our extremely small forest reserves by perpetual leases, which were too often granted, and we tried to secure for a natural redgum forest 11,000 acres at Mount Crawford, but they were unwisely let on miscellaneous leases. These are now nearly expired, and we confidently expect the realization of this scheme under the present Commissioner of Crown Lands, whose enlightened policy in this respect is a welcome contrast to that of some of his predecessors.

We were able in 1891 to secure an alteration of the Game Act providing for the protection of kangaroos in proclaimed areas, and Kangaroo Island was at once proclaimed, and subsequently Eyre Peninsula for three years; but the persistent poaching did not allow the natural increase to take place, and at the termination of every successive period the proclamation has been renewed.

The numerous alterations in Game Acts have involved a great deal of work, and the present Birds Protection Act is a very great improvement on previous legislation. Under these very successful efforts seals are now protected, and also the breeding places of seagulls, penguins, and mutton-birds—The Pages, Casuarina Island, Dangerous Reef, and the islands in Coffin Bay, Port Douglas, and Mount Dutton and Kellidie Bays. Much of our legislation and general policy have gradually been copied more or less in the other States, and all patriotic and well-informed public opinion in Australasia is in favour now of still further advances being made to secure the great principle of preservation of our native fauna and flora, and in this State we have particularly to acknowledge the assistance of the Press, especially from the very first of *The Register*, and on every occasion we have asked for it the active sympathy and support of the A.N.A. Under the provisions in the various Game Acts we have always contended for special areas as spheres for natural increase, and it has been a great pleasure to see Mr. Vaughan's wise use of them—the islands in the Coorong for waterfowl and Pearson's Island for its special wallaby.

PARKS.

I now turn to the history of the Parks, the National Park at Belair and Flinders Chase, Kangaroo Island, which we confidently hope to see established in the near future, and in the expectant hope that the constitution of the latter will be an improvement on the first, which has taken twenty years to partially fulfil the objects we have so very strenuously fought for since 1888, hence some detail is necessary.

The immediate result of this section approving of my motion as above was the important deputation organized by Messrs. W. H. Selway and A. F. Robin to wait upon the Hon. T. Playford, then Premier, in October, 1888. It was introduced by the Hon. Sir E. T. Smith. We only obtained a promise "that reserves of this character will be made." The giving up of the Government Farm was strongly objected to, as it was wanted for workmen's blocks, and, indeed, plans were then in the Land Office to carry out this policy, which was popular at the moment. Had our agitation been delayed this would without doubt have been carried out, as Mr. Walter Gooch's Act passed in 1883 necessitated only the sanction of the Parliament. It was particularly unfortunate that this Act had such a meagre scope, as in the intervening five years the Forest Department cut down £800 worth of redgum and denuded the western portion of the Farm of the magnificent trees, the growth of previous centuries, to the value of £800. The next year (1889) the report of the Surveyor-General said "a portion of the Government Farm with the Botanical and Zoological Gardens, as well as the acclimatization reserve (some 80 acres), should suffice for native fauna and flora." On July 29, 1890, Mr. Krichauff moved for the production of the Surveyor-General's Reports on National Parks. These contained

suggestions that 540 acres of Government Farm and other lands in the Onkaparinga, 3,250 acres in the vicinity of Mount Crawford, and 1,200 acres in various places should be set apart for our objects. In August Dr. Cockburn intimated that his Government approved of the reservation of the farm as a National Park. This followed upon the Public Service Commission report, but the Cockburn Government retiring it was necessary to organize another deputation. Mr. Alderman Bullock carried a motion in the City Council, and subsequently Mr. T. Worsnop (Town Clerk), acting with us, prepared a Bill vesting the whole area in trustees as a National Park. This measure was intrusted to the Hon. S. Tomkinson, but was not introduced owing to a technical question raised by the President. This deputation obtained an intimation from Mr. Playford that he was willing to set aside 1,700 acres, reserving 300 acres for workmen's blocks. Our final effort in 1891 obtained Mr. Playford's promise, and the Act was assented to on December 19, 1891.

This Act provides for twelve Commissioners—seven *ex officio* and five appointed by the Government—and that of these appointees the two who attended the fewest meetings during the previous twelve months retire and the Government appoint two more. In practice this is a dead-letter, and although we have repeatedly endeavoured since my resignation in 1905 to obtain the appointment of two naturalists, so far we have failed, and two recent occurrences illustrate the harm resulting from the absence of expert guidance.

In 1909 our Committee learnt with much surprise and regret that firearms were habitually allowed in the Park, and in answer to remonstrances we were officially informed that "rabbits increased enormously; the shooting of rabbits had been permitted to approved persons, market-gardeners and others, on condition that the birds were not interfered with, and suggesting that city lads always had been a source of trouble to the Park, the railway line affording them every facility of shooting in the park and escaping along the line again before being caught." Two serious blunders are here evident; allowing rabbits to increase so greatly and disturbing a sanctuary for birds.

Again the latest report of the Commissioners says that "provision has been made for kangaroos by fencing in a small area of 40 acres abutting on Long Gully and near the reservoir, and that it was thought about £500 (!!) would cover the cost of fencing; but after the boundaries had been surveyed it was known that the above estimate would be exceeded owing to the rough hilly nature of the ground necessitating continual changes of grade, and the irregular shape of the piece of country selected considerably lengthening the line of fencing." The ground is unsuited for the purpose. It is a damp cold locality and altogether too rugged, for kangaroos (except the Euro, now nearly extinct, and the great dark wallaroo of New England) always prefer plain country, and how a flying doe can exhibit her marvellous speed in such a locality I do not in the least understand. The Upper Park is an ideal site, and very little further expense would have fenced in about 700 acres, affording ample room for emus, kangaroos, wallaby, bandicoot, etc., and have also protected that portion from the larrikin. I repeatedly endeavoured to get this done, but without success.

These details as to our part in the Park history have been rendered necessary by repeated assertions at variance with facts.

One of the strangest was contained in an account of the Park over the initials "R.O.C." in *The Register* of October, 1901, in which the whole credit for obtaining the Park—and with somewhat fulsome praise was given to Mr. Walter Gooch, whose abortive Act of 1883 was actually ignored by the Government when Mr. Robin's paper originating this Committee was read. I wish in this place to bear testimony to Mr. Robin's active and ceaseless exertions as Secretary, for he not only organized three deputations but conducted a voluminous correspondence, colonial and abroad, and his resignation in 1895, followed by his long illness and death, was very deeply regretted by myself and colleagues. But the first idea of a Park originated in the late seventies or early eighties with Mr. James Page, of Mitcham, who became aware that the then Commissioner of Lands was taking steps to offer the Government Farm for sale. He went straight to the Chief Secretary, who at once put a stop to it, and thus the property was saved to the community. All these full details were printed in October 7, 1901, and a copy sent to each Commissioner. Hence they cannot plead ignorance of the true facts when they permitted a booklet to appear containing misleading statements, published by their authority last year, in which no mention whatever is made of the continuous and prolonged labours of my committee, quite forgetting the fact that Sir E. T. Smith and Mr. W. Gooch owe their appointments to our nomination.

FLINDERS CHASE.

In 1893 the late Professor Tate, Mr. Robin, and myself attended the Hobart meeting of the Association for the Advancement of Science, and we carried my motion asking our Government to dedicate the Cape Border Lighthouse reserve for our objects. In 1896 the Marine Board reported to the Commissioner of Lands that the Cape Border reserve was required as affording fresh food to the keepers, but in 1906 we received a letter from the Secretary of the Marine Board asking for reasons why a lease of the reserve for a cattle-run should not be granted. On July 26 of that year a meeting was called by us in the Mayor's Parlour, the Mayor (the late Mr. Theo. Bruce) in the chair. After a sympathetic letter from His Honor Sir S. J. Way had been read I laid a scheme before the meeting for vesting in trustees the whole of the western end of Kangaroo Island. The speakers were Drs. Verco, Stirling, F.R.S., Rennie, and Rogers, also Messrs. W. H. Selway and Mellor, Councillor Isaacs, and Mr. Kreusler (A.N.A.). Subsequently on August 8 these gentlemen and others waited upon the late Hon. T. Price, who promised that the 67 square miles at Cape Border should be at once reserved, and that the Government was in full sympathy with us and would consider the request. Subsequently we presented a plan asking for all the land west of the line from Castle Hill due south, containing 300 square miles, and including Rocky River, Snug Cove, and several lagoons and smaller streams. Mr. Price requested a plan for appointing trustees, and we suggested eight trustees—one for each branch of natural history, namely, general zoology, ornithology, marine zoology, and botany, to be nominated by the University and the Royal Society respectively. At a subsequent interview arranged by Major Smeaton, Mr. Ashby and myself were informed that the lessees paying an annual rent of £28 10s. demanded in round

numbers £28,000 for compensation. We pointed out that the leases could be cancelled as required for parklands, but, unhappily, the Land Office subsequently granted on perpetual lease one-tenth of each lease, allowing the lessee to thus pick out the eyes of the country, and just what that means appears in the evidence given before the Kangaroo Island Railway Commission. Mr. E. B. Jones said that "with the exception of a few isolated patches in various bays the country was inferior. At Rocky River there was 1,500 acres of fair country, most of it heavily timbered, and he could not advise people to settle for agricultural purposes, and it was indifferent from a pastoral point of view." Professor Angus said the central ridge was a solid block of ironstone fit for nothing. We cannot but regret that the cancellation clause was not acted on. The perpetual leasees have since asked very many times the value of what they wanted before we waited on Mr. Price. When Mr. Coombe was Commissioner he granted an additional 79 square miles. In May of this year an extremely large and important deputation waited upon the Commissioner for Lands. It was introduced by Major Smeaton and the late Hon. Theo. Bruce, and was of an Australasian character, including as it did representatives from the Sydney and Melbourne Universities and the various State scientific societies, and South Australian Societies, Corporations, and District Councils. The Hon. C. Vaughan said the Government had every sympathy with our request to secure the whole 300 square miles, and something more must be done than had hitherto been done. He would make a recommendation to his colleagues, but the extent of it would be a matter for consideration and he would make a personal inspection. He thought it would be necessary to introduce a Bill to define the powers granted in connection with the reserve, and would provide in the Estimates for a vermin-proof fence.

In this advanced condition we hopefully look forward to the completion of an invaluable scheme, invaluable to the scientists of the world and of the very greatest value as a sanatorium and centre for biological studies, attracting visitors from the civilized world when the complete realization of our ideals takes place. It is of the greatest importance to its success that the error made by Parliament be avoided in altering our programme for the National Park, that the scientific bodies with their specialists should nominate the preponderating elements in the new governing body, having no *ex-officio* members or others who have no special knowledge of or interest in natural history.

WORK FOR THE FUTURE.

After twenty-three years of pioneering work very much requires to be done, and it may be useful to outline a programme of what remains for the lovers of our extremely beautiful and unique flora and fauna to preserve both from irremediable destruction.

In both directions a good healthy public feeling has been cultivated in old and young, and from the latter especially the indications for an intelligent and appreciative knowledge of the importance of the subject economically may be hopefully expected. In all the States there now exist some legislation and interest, and this requires guidance. We are fortunate here at present in having the Hon. Crawford Vaughan as Commissioner of Lands.

Not one of his predecessors has shown anything like the sympathy he has with our object, but a strong Society is needed to see that the law is carried out when made. The Kangaroo Protection Act, for instance, has been violated systematically for years by the cupidity of the ignorant. The Birds Protection Act everywhere needs volunteer observers to enforce its provisions and a central authority to meet the cost of and enforce prosecutions. In the botanical section of knowledge there is an enormous field for the propagation of knowledge to prevent the utter disappearance of many species of the greatest importance to the world of knowledge. It appears to me that a Society for the Conservation of our Fauna and Flora is greatly needed, and with the increased public interest which we have done our best to cultivate in the past ample funds could be obtained by appealing to rich Australians. Such a Society could by the appointment of life members and annual subscriptions obtain an income sufficient to publish literature, encourage original observation and experiments, undertake prosecutions, and when the Flinders Chase is in the hands of trustees stock it with birds and animals and cultivate plants now nearing extinction.

Visitors to Australia, if scientists, note the amazing absence of native plants, shrubs, and trees. The suggested Society could by obtaining seeds and plants for public parks and private gardens wipe off this reproach. It is never realized how near to extinction some representative species are. A notable example is *Newcastlia Dixoni*, a dense-growing bush up to 4 ft. high, with sage-like leaves. I found one single plant in a chain road near Crystal Brook twenty-five years ago. Professor Tate subsequently got a specimen from Cal Lal, New South Wales, and Baron Von Müller had a single leaf from north-west Victoria. Then there is the Alexander palm confined to about 150 trees in Glen Helen and the Western Australian eucalypti, such as *E. ficifolia*, *E. tetraaptera*, and *E. funeralis*, are but very limited in distribution. The first and last were originally confined to a square mile or two. Botanists are aware of many more equally scarce. These instances suffice to illustrate the need of conserving and cultivating our rarer plants. In the Melbourne Gardens Mr. Guilfoyle collected many native species, and Mr. Maiden is doing the same in Sydney; but anything like an adequate collection of the flowers, shrubs, and trees I have not seen in any State in Australia. I hope Australia will yet produce a gardening genius who will utilize the amazing potentiality for producing unequalled landscape beauties by grouping such extraordinary contrasts of growths, foliage, and colour as are to be obtained from the wonderful variety in each State of Australia. In our State take the *E. vocarpos*, vulgarly native-cherry. What greater contrast could be desired than *E. cupressiformis*, with *E. stricta* and *E. sparta*, the latter very abundant at Streaky Bay, its long pendant twigs forming a veritable cataract of pale-green gracefully waving in the breeze? Then again the wattles. What glorious contrasts exist between the desert forms, all spines and thorns, and the broad phylodes of *A. pycnantha*, the brilliant bluish grey foliage of *A. spillerani*, and the Queensland *A. podalyriaefolia*. The drooping foliage of the scented Myal, *A. pendula*, as upright as a Lombardy poplar, in outline up to 30 ft. in height; or the Broughton willow *A. salicina* contrasted with *A. dealbata* or *A. decurrens*, and the stiff spare foliage of *A. aneura* (mulga).

Then our eucalypti contrast of vivid-coloured flowers, crimson, scarlet, deep-pink and creamy-white, varying in height from 3 to 300 ft.; the casuarinas, some stiff and rigid, others gracefully drooping. Our Caper trees, especially *Capparis Mitchellii*, with thick dense masses of leaves and large whitish-yellow blooms, the brilliant flowered *Hibiscus Hugelli* or the yellow *H. lakæafolia* blooming most in hottest weather; the rare desert *Sterculia Gregorii*, with brilliant pale-green dense foliage. All these, with innumerable others, are peculiar and endemic to Australia.

Difficulties there are to be surmounted, and by money grants the proposed Society could surmount them—difficulties arising from our ignorance of the mineral requirements of the soil and the conditions needed to propagate them. Take *Eoocarpus*, believed to be parasitic in its youth, a point yet to be proved. And the same applies to *Nuytsia florabunda*, the brilliant orange-flame coloured Christmas-tree of Western Australia. If one or two of our numerous parks surrounding Adelaide were set apart to grow desert forms and cultivate with due knowledge and insight into the landscape requirements the rarer casuarinas, eucalypts, melaleucas, sterculias, and acacias it would soon become famous throughout the world and its growing reputation greatly increased for singular beauty. No other capital city of Australasia has our natural advantages, and many of those rare curious growths from desert regions will not grow with them. A due appreciation and knowledge of our own flora and its æsthetic qualities would have prevented the intended rockeries on North Terrace, almost sure to become “ratteries” bye and bye. These rockeries suit St. Kilda Road, in Melbourne, but how monotonous and wearying to the eyes is the Alexandra Drive along the Yarra, how commonplace and artificial compared with its lovely shady native growths of forty years ago with hundreds of water-fowl in the Princes Bridge lagoon. It has been said of North Terrace that the soil is poor. So it is for exotic vegetation common to all warm climates, but it is rich and suitable for many of our indigenous Australians. To me it seems unfortunate that the distinctive beauties peculiarly Australian should be sacrificed to uniform imitation of European gardens, palling to the eyes by their mechanical repetitions.

One large section of natural history is now splendidly cared for by the Ornithological Society, the members of which are to be heartily congratulated on the successful transportation of the mallee hen (*Leipoa*) to Flinders Chase. I feel sure of their cordial help and assistance if the proposed Society provides the funds to secure that inimitable joker and mimic the lyre-bird (*Malura*). If that is once established on Kangaroo Island no other bird can equal it in attractiveness. I trust, too, that Captain White and Mr. Mellor will add the brush turkey also, and as opportunity arises all the ground-nesting birds suited to the island climate.

I cannot hope to see the full fruition of these ideals, but trust the rising generation will hand on the torch, and though much of the continent is despoiled and vulgarized, and my successors cannot enjoy the delightful wanderings in unstocked, unspoilt Australia which I have had, still increasing knowledge in science will compensate them for the deprivation, and there yet are rare plants to be found and named which invite the rambler and lover of wild nature to cast off the trammels of luxury and spend his holidays in the solitary bush.

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TRANSACTIONS AND PROCEEDINGS

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(INCORPORATED).

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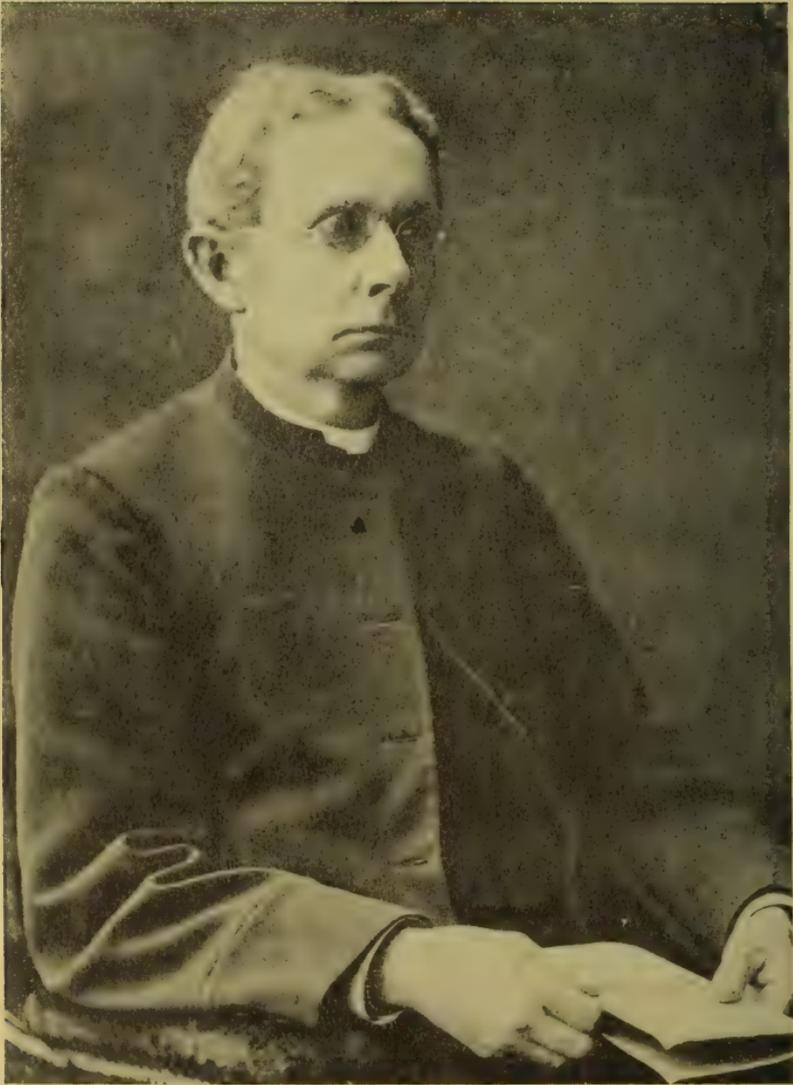
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REV. CANON BLACKBURN, B.A.

THE LATE REV. CANON THOMAS BLACKBURN, B.A.,
AND HIS ENTOMOLOGICAL WORK.

(With portrait.)

By ARTHUR M. LEA.

[Read October 10, 1912.]

There passed away at Woodville, near Adelaide, on May 28, 1912, a quiet and unassuming naturalist in the person of Thomas Blackburn; and with him Australia lost one of its best entomologists. Although formerly well known in England, and later doing good work in Honolulu, it was nevertheless in Australia that most of his work was done.

He was born at Islington, near Liverpool, on March 16, 1844. Matriculated at London University in 1866 and took his B.A. degree in 1868. For a time he was in the Imperial Civil Service, having gained first place in a competitive examination for a position in the Department of the Secretary for Inland Revenue, but he soon left it for the Church of England. He was ordained a Deacon by the Bishop of Manchester in May, 1869, and the following May as a Priest. He had charge of the Parish of Greenhithe, 1870-76. Thence he was transferred to Honolulu, where he remained for six years as Senior Priest and Chaplain to the Bishop. He then came to Australia and took charge as Rector of St. Thomas', at Port Lincoln, in 1882. In 1886 he was appointed Rector of St. Margaret's, at Woodville—a position he retained for the remainder of his life. A few years ago he was also appointed Honorary Canon of St. Peter's Cathedral in Adelaide.

He was twice married. First, in August, 1870, to Jessie Anne Wood, daughter of C. W. Wood, Q.C., of Wandsworth, England, by whom he had three sons: Gavin Wordsworth, now at Vancouver; Charles Bickerton, now in Sydney; and Edward Forth William, now at Wagin, in Western Australia. His first wife died in May, 1885. In September, 1886, he married Margaret Harriette Stewart Browne, daughter of John Stewart Browne, S.M., of Port Lincoln, by whom he had three sons and a daughter: John Stewart, Harry Kenneth Baines, Margaret Browne, and Arthur Seaforth. His second wife died in 1904, but all their children are now resident at Woodville.

For the greater portion of his life he enjoyed good health, but severe rheumatism and other constitutional weaknesses marred some of his later years and interfered considerably with both his parish and entomological work. The Sunday preceding his death he was preparing to conduct morning service at his church when he was stricken down with paralysis, from which he never recovered, passing quietly away a week afterwards.

He was essentially a busy man, and devoted the best of his time and efforts to his parish duties. As a consequence he was seldom able to start entomological work till about 9 p.m., and such work on hot summer nights must have been very trying.

In Honolulu he published two works; the first, entitled "Visions of the King," a book of sermons, and the second, entitled "True and False Issues between Christianity and Science," the substance of a course of lectures that he delivered in Honolulu.

He also wrote two musical cantatas, the first entitled "The Story of the Crucifixion," and the second, "The Story of Calvary." In his spare time, and when travelling, he also composed some poetical pieces, mostly of a religious nature.

I applied to Dr. D. Sharp for some particulars of his early life in England, and, in reply, he wrote:—"He began very young. Fifty years ago he came into notice. The first note published appears to be one in conjunction with his brother, J. B. Blackburn—a list offering various Lepidoptera in exchange for *Noctuidina*, to which they had then resolved to limit their collection. This note appeared in 'The Entomologists' Weekly Intelligencer,' November 24, 1860. In 1861 'The Weekly Intelligencer' was abandoned by its hitherto editor, H. J. Stainton, and after an interval of nine months the two Blackburns published and edited 'The Weekly Entomologist,' the first number of which appeared in August, 1862. It was continued for two years, and then gave place to the present 'Entomologists' Monthly Magazine,' of which Mr. Blackburn was one of the original editors. In 1862 he appears to have been Secretary of the Bowdon and Altrincham Entomological Society. His first note on Coleoptera appeared in 'The Weekly Entomologist' of January, 1863, and was a list of captures of Coleoptera during 1862. At this period his entomological work was chiefly of a minor character, but he published a great many notes."

When only a boy he received encouragement from Mr. C. O. Waterhouse, of the British Museum, and it was pos-

sibly through his influence that his attention was diverted from the Lepidoptera to the Coleoptera.

When in England he contributed many notes to entomological publications, and especially to "The Weekly Entomologist." About half of the leaders of that rather short-lived publication were from his pen. The leaders were not published with their writers' names, but in his own bound copy of that publication the author's initials are marked in pencil, some of his own being on such diverse subjects as "Union is Strength," "Wanted, Entomologists!" "Discoveries," "Notes from Lacordaire," "Mites," "The Natural History of the Tineina," "Nunquam Moriemur Inusti."

He was then nineteen years of age! After his transfer to Honolulu he also wrote a few notes on insects. But in Australia, except for a paper read before a meeting of the Australasian Association for the Advancement of Science held in Adelaide, he confined himself to descriptive work.

He began his work on Lepidoptera in England, but soon afterwards took up the Coleoptera. After his transfer to Honolulu he collected insects of all Orders, and many of these he worked out, either alone or in collaboration with Messrs. Cameron and Kirby and Dr. Sharp. He also sent numerous specimens from the Hawaiian Islands to various specialists, who published the results, and in this way it was from his work alone that the insect fauna of that interesting group of islands became very well known in comparison to what it was before. After landing in Australia, however, he practically dropped all work on insects other than beetles, such specimens of a general kind that came in his way he simply handed over to the South Australian Museum.

As previously stated, Mr. Blackburn arrived in Australia in 1882, and his first paper was contributed to the Royal Society of South Australia in 1887. In 1888 he contributed his first paper to the Linnean Society of New South Wales, to which Society he was elected a Corresponding Member in the same year. For some years also he belonged to the Australasian Association for the Advancement of Science, and for many years he was Honorary Curator in Entomology to the South Australian Museum.

His descriptions were drawn up with great care, the diagnosis being in Latin, followed by comparative notes in English.

In his early years in Australia he made large collections in the Port Lincoln district, and after his transfer to Woodville he collected in that neighbourhood, and also made special collecting trips to Oodnadatta and other districts in South Australia.

Of late years he usually made an annual trip to one of the other States, New South Wales and Victoria being often visited. But the specimens obtained on these trips represented a comparatively small fraction of the total he examined. He had all the beetles of the South Australian Museum at his disposal, and thousands of these bear labels in his writing. He examined all the beetles taken on the Elder Expedition,⁽¹⁾ the Horn Expedition, Mr. Zietz's trip to Lake Callabonna, etc. For many years specimens were sent to him at such an accelerating rate that he found he could not spare time to attend to all of them, and in consequence of late years his entomological correspondence was considerably curtailed.

In his early years in Australia some of his finest species were sent by the late Sir William Macleay, by the late Mr. George Masters, and the late Mr. A. S. Olliff. Mr. French sent him many fine *Buprestidæ*, *Cerambycidæ*, and other showy insects to be named. He obtained a fine lot of Western Australian insects in exchange with Mr. Meyrick for some Lepidoptera from the Hawaiian Islands. Mr. Bailey, the Queensland Botanist, sent him many specimens. Messrs. Koebele and Perkins also gave him many specimens from New South Wales and Queensland, especially from the north. From the late Dr. Bovill he obtained many species from the Northern Territory. Mr. Aug. Simson contributed largely from Tasmania. Mr. T. G. Sloane, Mr. H. H. D. Griffith, the late Professor Tate, his own children, and myself gave him species from various parts of Australia, but probably every worker at Australian Coleoptera during the past twenty-five years sent him specimens at one time or another.

He was a systematist, pure and simple, taking no interest, or, at any rate, very little, in the life histories of the insects themselves; although in his earlier days he appeared to have been interested in the transformation of Lepidoptera.

He worked at most families of beetles at various times, both from interest in them and from working through collections taken during various expeditions; but of late years he had almost confined himself to the *Scarabæidæ*, a family that had always been first favourite with him. He was, however, preparing to work through the *Elateridæ*, and was arranging his collection of that family when his call came.

Groups that would have presented insurmountable difficulties to many entomologists he attacked conscientiously; thus the largest and most difficult genus of all Australian

(1) A Mountain in Central Australia discovered during the Elder Expedition was named after him.

beetles—*Paropsis*—was well worked out: so also was the next most difficult—*Heteronyx*. To the latter genus he returned again and again: but of *Paropsis* he told the present writer that he never wished to look at it again. Other large and difficult genera such as *Iacon*, *Monocrepidius*, *Liparetrus*, *Amarygmus*, *Chalcopterus*, *Monolepta*, and many others, were worked through, in most cases tables being given to render the species more readily identifiable.

Following is a list of his entomological publications, totalling 3,696 pages, not including short notes:—

In Entomologists' Monthly Magazine:—

Vol. 13—Four Species of *Helophorus* New to Britain, pp. 39, 40. Insect Notes from the Sandwich Islands, pp. 227, 228.

Vol. 14—Characters of a New Genus and Descriptions of two New Species of *Cossonida* from the Sandwich Islands, pp. 4, 5. Characters of a New Genus and Descriptions of New Species of *Geodephaga* from the Sandwich Islands, pp. 142-148.

Vol. 15—Characters of New Genera and Descriptions of New Species of *Geodephaga* from the Hawaiian Islands: Part 1, pp. 119-123; Part 2, pp. 156-158; Part 3, pp. 104-109 (Vol. 16); Part 4, pp. 226-229 (Vol. 17); Part 5, pp. 62-64 (Vol. 18).

Vol. 17—Notes on Species of *Aculeate Hymenoptera* Occurring in the Hawaiian Islands (Blackburn and Kirby), pp. 85-89. Descriptions of Four New Species of *Cossonida* from the Hawaiian Islands, pp. 199-201.

Vol. 19—Descriptions of the Larvæ of Hawaiian Lepidoptera, pp. 55, 56.

Vol. 21—Notes on Some Hawaiian *Carabida*, pp. 25, 26. *In the Scottish Naturalist*:—

Outline Descriptions of British Coleoptera (Reprinted in pamphlet form, 1875, pp. 1-71).

In Annales de la Société Entomologique de Belgique:—

Some Observations on the Genus *Oodemas* of the Family *Cossonida*, 1878, pp. 73, 74.

In Annals and Magazine of Natural History:—

Notes on Hawaiian Neuroptera, with Descriptions of New Species, 1884, pp. 412-421.

In The Scientific Transactions of the Royal Dublin Society:—

Memoirs on the Coleoptera of the Hawaiian Islands (Blackburn and Sharp), 1885, pp. 119-300, plates iv. and v.

In Memoirs of the Manchester Literary and Philosophical Society:—

The Hymenoptera of the Hawaiian Islands (Blackburn and Cameron), 1885-86, pp. 194-295.

In Transactions of the Royal Society of South Australia:—

Notes on Australian Coleoptera with Descriptions of New Species: No. 1—1887, pp. 12-30; No. 2—1887, pp. 36-51.

Further Notes on Australian Coleoptera, with Descriptions of New Species: No. 3—1887, pp. 52-71; No. 4—1887, pp. 177-287; No. 5⁽²⁾—1888, pp. 176-214; No. 6—1889, No. vi., pp. 134-148.

Further Notes on Australian Coleoptera, with Descriptions of New Genera and Species:—No. 7—1890, Part vii., pp. 82-93; No. 8—1890, Part viii., pp. 121-160; No. 9—1891, Part ix., pp. 65-153; No. 10—1891, Part x., pp. 292-345; No. 11—1892, Part xi., pp. 20-73; No. 12—1892, Part xii., pp. 207-261; No. 13—1893, Part xiii., pp. 130-140; No. 14—1893, Part xiv., pp. 294-315; No. 15—1894, Part xv., pp. 139-168; No. 16—1894, Part xvi., pp. 200-240; No. 17—1895, Part xvii., pp. 27-60; No. 18—1895, Part xviii., pp. 201-258; No. 19—1896, Part xix., pp. 35-109; No. 20—1896, Part xx., pp. 233-259; No. 21—1897, Part xxi., pp. 28-39; No. 22—1897, Part xxii., pp. 88-98; No. 23—1898, Part xxiii., pp. 18-64; No. 24—1898, Part xxiv., pp. 221-233; No. 25—1899, Part xxv., pp. 22-101; No. 26—1900, Part xxvi., pp. 35-68; No. 27—1900, Part xxvii., pp. 113-169; No. 28—1901, Part xxviii., pp. 15-44; No. 29—1901, Part xxix., pp. 99-131; No. 30—1902, Part xxx., pp. 16-30; No. 31—1902, Part xxxi., pp. 288-321; No. 32—1903, Part xxxii., pp. 91-182; No. 33—1903, Part xxxiii., pp. 261-309; No. 34—1904, Part xxxiv., pp. 281-297; No. 35—1905, Part xxxv., pp. 270-332; No. 36—1906, Part xxxvi., pp. 263-324; No. 37—1907, Part xxxvii., pp. 231-299; No. 38—1908, Part xxxviii., pp. 362-386; No. 39—1909, Part xxxix., pp. 18-64; No. 40—1910, Part xl., pp. 146-230; No. 41—1911, Part xli., pp. 173-203; No. 42⁽³⁾—1912, Part xlii., pp. 40-75.

Descriptions of Twenty New Species of South Australian Coleoptera:—No. 43—1888, pp. 1-11.

Scientific Results of the Elder Exploring Expedition, Coleoptera:—No. 44—1892, pp. 16-61; No. 45—1892, pp. 177-202.

In Proceedings of the Linnean Society of New South Wales:—

Notes on the Hemiptera of the Hawaiian Islands:—1888,⁽⁴⁾ pp. 343-354.

(2) The first five parts not numbered originally.

(3) Posthumously.

(4) Not numbered, as no Australian Coleoptera described in same.

Notes on Australian Coleoptera, with Descriptions of New Species:—No. 46, p.p. 805-875.

Further Notes on Australian Coleoptera, with Descriptions of New Genera and Species—No. 47, pp. 1387-1506.

Notes on Australian Coleoptera, with Descriptions of New Species:—No. 48—Part iii.,⁽⁵⁾ pp. 445-482; No. 49—Part iv., pp. 707-746; No. 50—Part v., pp. 1247-1276; No. 51—Part vi., pp. 147-156; No. 52—Part vii., pp. 303-366; No. 53—Part viii., pp. 553-592; No. 54—Part ix., pp. 775-790; No. 55—Part x., pp. 479-550; No. 56—Part xi., pp. 65-151; No. 57—Part xii., pp. 283-300; No. 58—Part xiii., pp. 185-208; No. 59—Part xiv., pp. 245-286; No. 60—Part xv., pp. 85-108.

Revision of the Genus *Heteronyx*, with Descriptions of New Species:—No. 61—Part i., pp. 1321-1362; No. 62—Part ii., pp. 137-170; No. 63—Part iii., pp. 426-444; No. 64—Part iv., pp. 661-706; No. 65—Part v., pp. 1217-1246.

Revision of the Genera *Colpochila* (including *Haplonycha*), *Sericesthis*, and their Allies, with Descriptions of New Species:—No. 66—Part i.,⁽⁶⁾ pp. 517-552.

Revision of the Australian Amarygmides:—No. 67—Part i., pp. 411-470; No. 68—Part ii., pp. 53-106.

Revision of the Genus *Paropsis*:—No. 69—Part i., pp. 637-693; No. 70—Part ii., pp. 166-189; No. 71—Part iii., pp. 218-263; No. 72—Part iv., pp. 656-700; No. 73—Part v., pp. 482-521; No. 74—Part vi., pp. 159-196.

Revision of the Australian Species of *Bolboceras*, with Descriptions of New Species:—No. 75, pp. 481-526.

In Proceedings of the Royal Society of Victoria:—

On some New Genera and Species of Australian Coleoptera:—No. 76—1899, pp. 206-233.

Revision of the Australian Aphodiides and Descriptions of three New Species Allied to them:—No. 77—1904, pp. 145-181.

In Report of the Horn Expedition to Central Australia:—

Coleoptera:—No. 78—1896, pp. 254-308.

Australasian Association for the Advancement of Science:—

Importance of Ascertaining Distribution of Australian Fauna:—1893, pp. 446-451.

He described or named a little over 3,000 species of Australian *Coleoptera*.⁽⁷⁾

(5) The first two parts were not numbered.

(6) All published.

(7) 3,069. A total far ahead of that of any other Australian entomologist.

As with many others, he at first did not specially mark his types, but of late years he did mark them, and all of those that were sent to the British Museum, and most of those remaining in his collection, were marked T.

Shortly before his death he sent many of the types to the British Museum, and a list of these was kept. At the time of his death he had two boxes filled with types, and these, after being examined and listed, were also sent to the British Museum.

He also named many species from the collections of the South Australian Museum. At the foot of his descriptions of many of these the types are explicitly stated to be in that institution. In talking the matter over with him only about a month before his death he informed the writer that when he had described specimens from the Museum only he returned the types to that institution, even when there were numerous specimens of a species. Thus the types of the beetles named from the Elder Exploring Expedition, from Mr. Zietz's trip to Lake Callabonna, Mr. J. G. Otto Tepper's from Kangaroo Island and elsewhere, and Mr. J. P. Tepper's from the Northern Territory, etc., should, with few exceptions, all be in the Museum.⁽⁸⁾

Co-types of many of his species, however, are scattered largely through his own and other collections, and his labels at the present time are well known to all Australian Coleopterists.

The increasing importance attached to type specimens of insects causes it to be of importance to Australian Coleopterists to know exactly where his types may be seen. I therefore went through all his papers and prepared a list of the species described from Australia. He named many other beetles, bugs, etc., from the Hawaiian Islands, but in the appended list only the Australian beetles are dealt with.

For the purposes of this list it was not considered desirable to give the usual abbreviations of the Transactions or Proceedings of the Societies in which the descriptions appeared, but to give a reference number to each paper containing descriptions of Australian beetles. The following abbreviations are also used:—

Sub. Substitute-name, for preoccupied names. For these names the types, of course, would originally bear different names, and the actual specimens were usually not known to Mr. Blackburn.

(8) In some instances, however, he retained the actual type specimens and sent them to the British Museum. Where, therefore, the specimens so sent were marked as types, the present writer, in all cases, regards them as such.

- B. Type is in British Museum.
 M. Type is, or should be, in Macleay Museum, Sydney.
 N. Type is, or should be, in National Museum, Melbourne. Most of these were originally in Mr. C. French's collection; some were from the Horn Expedition, and a few were originally from the Museum. Unfortunately, in many instances, Mr. French removed Mr. Blackburn's labels, substituting some in his own writing for the sake of uniformity. He often, however, attached a special "type" label to the specimens.
 S. Type is, or should be, in South Australian Museum.

In a few instances no letter follows the reference, and in such cases the location of the type is unknown to me at present.

Many of the species were first referred to genera from which they were subsequently removed; but in the list the species are all noted as if belonging to the genera to which they were originally referred. In some cases, however, the specimens were sent to the British Museum under their revised names, and these exceptions are noted.

For facility of reference the families, genera, and species are arranged in alphabetical sequence.

LIST OF SPECIES NAMED BY MR. BLACKBURN.

- | | |
|-----------------------------------|--|
| Abacetus crenulatus, 49-726 (B) | Adelotopus creberrimus, 23-19 (B) |
| macleayi, 49-727 (Sub) | micans, 23-18 (B) |
| simplex, 49-726 (B) | tasmani, 23-18 (B) |
| Acalonoma pusilla, 59-256 (B) | Adimonia lugei, 19-36 (B) |
| Acantholophus franklinensis, 7-92 | mastersi, 19-37 (B) |
| (type in coll. J. Anderson) | richmondensis, 19-37 (B) |
| niveovittatus, 53-576 | Adoryphorus, 47-1412 |
| simplex, 78-292 (B) | Ægosoma carpentariae, 58-191 (N) |
| tatei, 78-292 (B) | Æolus queenslandicus, 57-296 (B) |
| Acrogenus tinctus, 19-38 (N) | Æthinodes, 9-109 |
| Acrogenys australis, 6-132 (B) | marmoratum, 9-109 (B) |
| Acroniopus pallidus, 47-1423 (S) | Agelastica impura, 47-1499 (B) |
| Acupalpus morganensis, 53-556 (B) | lineata, 5-175 (B) |
| Acylophorus indignus, 43-4 (B) | Agestra punctulata, 53-584 (B) |
| Adelaidia, 9-130 | Agetinus æqualis, 47-1478 (S) |
| rigua, 9-130 (B) | Agonocheila fenestrata, 56-80 (B) |
| Adelium æquale, 55-539 (B) | koebelei, 18-201 (B) |
| alpicola, 55-536 (B) | perplexa, 16-201 (B) |
| angulatum, 55-538 (B) | stictica, 18-201 (B) |
| ellipticum, 16-219 (B) | Agrilus frenchi, 10-302 (N) |
| inconspicuum, 55-536 (B) | terræ-reginæ, 12-220 (B) |
| lindense, 55-538 (B) | Alaus darwini, 50-1259 (B) |
| occidentale, 53-574 (B) | Alcides terræ-reginæ, 27-141 (B) |
| pustulosum, 55-534 (B) | Alcmæonis punctulaticollis, 13-134 (B) |
| simplex, 44-44 (S) | |
| tropicum, 55-537 (B) | |
| victoriae, 55-535 (N) | |

- Aleochara insignis*, 2-47 (B)
 læta, 2-46 (B)
 occidentalis, 2-46 (B)
 pelagi, 2-45 (B)
 Only head and prothorax now remaining.
Alleleidea viridis, 10-302 (B)
Amarygmus æger, 68-94 (B)
 alienus, 68-93 (B)
 diaperoides, 47-1435 (S)
 frenchi, 68-97 (B)
 lilliputanus, 68-100 (B)
 lindensis, 68-104 (B)
 pectoralis, 68-96 (B)
 perplexus, 68-102 (B)
 pinguis, 68-102 (B)
 porosus, 68-98 (B)
 queenslandicus, 68-101 (B)
 rimosus, 68-103 (B)
 ruficornis, 68-96 (B)
 rugaticollis, 68-104 (B)
 rutilipes, 68-100 (B)
 stolidus, 68-99 (B)
 suavis, 68-95 (B)
 tardus, 50-1271 (B)
 uniformis, 50-1272, 68-105 (B)
Amblytelus brevis, 56-87 (B)
 discoidalis, 54-782 (B)
 inornatus, 54-781 (B)
 sinuatus, 56-87 (B)
Amphichroum adelaidæ, 11-23 (B)
Amphimela australis, 47-1491 (B)
 piceicornis, 19-42 (B)
Amphiops australicus, 24-226 (B)
 duplopunctulatus, 24-226 (B)
Amphirhœ sloanei, 48-453 (B)
Anacanthopus, 23-42
 inermis, 23-43 (B)
Anacheirotus, 26-39
 inornatus, 26-40 (B)
Ananca boisduvalii (see *Silis* (australis)
 zietzi, 17-55 (S)
Anaplopus, 52-311
 tuberculatus, 52-313 (B)
Anarciarthrum, 52-354
 viride, 52-355 (B)
Anatisis frenchi, 54-789 (N)
 muelleri, 22-59 (N)
Anaxo æreus, 10-308 (B)
 affinis, 10-309 (B)
 ater, 10-310 (B)
 lindensis, 10-309 (B)
 obscurus, 10-309 (B)
 occidentalis, 10-311 (B)
 puncticeps, 10-311 (N)
 sparsus, 10-310 (N)
 sydneyanus, 13-134
Ancita didyma, 28-35 (B)
 dispar, 28-34 (B)
Anepius, 30-29
 koebelei, 30-30 (B)
 raucus, 30-30 (B)
Aneucmidides, 23-34
 coloratus, 23-35 (B)
 hirticollis, 42-44 (B)
Aneurystypus, 4-230
 aurilegulus, 20-257 (B)
 calvus, 4-231 (B)
 collaris, 57-286 (B)
 dives, 20-258 (B)
 pauxillus, 39-81 (B)
 richardsæ, 51-149 (B)
Anilara angusta, 10-296 (N)
 læta, 10-297 (B)
 planifrons, 4-248 (B)
 soror, 10-296 (N)
 subcostata, 10-296 (S)
Anodontonyx antennalis, 37-266 (B)
 chalceus, 37-263 (B)
 consanguineus, 37-262 (B)
 creber, 37-262 (B)
 gravicollis, 37-260 (B)
 hirticeps, 37-266 (B)
 indignus, 37-264 (B)
 rectangulus, 37-264 (B)
 tetricus, 37-261 (B)
Anomala australasiæ, 56 113 (B)
Anoplognathus brevicollis, 55-493 (B)
 concinus, 26-41 (B)
 macleayi, 55-495 (B)
Anorthorrhinus, 52-327
 pictipes, 52-328 (B)
Anthicidæ; 10-336, 16-219
Anthrenus flindersi, 9-132 (B)
 ocellifer, 9-132 (B)
Anthribidæ, 27-141, 28-31
Antitrogus burmeisteri, 41-200 (B)
 nigricornis, 41-199 (B)
Antoligostethus, 41-203
 lucidus, 41-203 (B)
Antyllis alternata, 52-345 (B)
 bella, 53-587 (B)
Aoplocnemis loweri, 58-188 (B)
 tasmanicus, 14-301 (B)
Aparete nodosa, 45-179 (S)
Apate lindi, 50-1263 (B)
Apatodes, 47-1429
 macleayi, 47-1429 (S)
Apellatus apicalis, 47-1440 (B)
 nigricornis, 10-315 (B)
 nodicornis, 10-314 (B)
Aphanasium variegatum, 45-196 (S)
Aphileus ferox, 17-56 (B)
Aphodius andersoni, 77-154 (B)
 baldensis, 77-156 (B)
 callabonnensis, 17-32 (S)
 frenchi, 11-35 (B)
 insignior, 77-156 (B)
 lindensis, 11-35 (B)
 suberosus, 77-155 (B)
 victoriæ, 22-88 (B)
 yorkensis, 12-209 (B)
Aphthona cowleyi, 19-76 (B)
Apion terræ-reginæ, 56-151 (B)
Aposites gracilis, 58-198 (N)
 lanaticollis, 11-61 (B)
 niger, 11-62 (B)
Aprosiectus intricatus, 47-1464 (S)
Aræocerodes, 27-167
 lilliputanus, 27-167 (B)

- Aræocerus asperulus*, 27-166 (B)
 bicristatus, 27-163 (B)
 koebelei, 27-164 (B)
 lindensis, 27-165 (B)
- Arsipoda æneofulva*, 19-47 (B)
 ænesceus, 19-52 (B)
 collaris, 19-54 (B)
 concolor, 19-46 (B)
 consanguinea, 19-48 (B)
 deceptrix, 19-50 (B)
 detersa, 19-49 (B)
 fossipennis, 19-53 (B)
 hepatica, 19-54 (B)
 jocosa, 19-47 (B)
 jugularis, 19-53 (B)
 kingensis, 37-298 (B)
 læviceps, 19-46 (B)
 languida, 19-46 (B)
 laticollis, 19-56 (B)
 pallidicornis, 19-50 (B)
 paradoxa, 19-51 (B)
 picturata, 19-55 (B)
 podontoides, 19-52 (B)
 spectabilis, 19-48 (B)
 striatipennis, 19-49 (B)
 terminalis, 19-51 (B)
 variabilis, 19-55 (B)
- Arthropterus foveipennis*, 11-24
 occidentalis, 11-25
- Articerus asper*, 6-138 (B)
- Asemantus*, 20-248
 leai, 21-29 (B)
- Aspidomorpha lauta*, 19-108 (B)
 planipennis, 19-107 (B)
- Aspidophorus humeralis*, 60-92 (B)
- Astræus major*, 50-1257 (B)
 meyricki, 50-1256 (B)
 simplex, 12-211 (N)
 tepperi, 50-1259 (B)
- Atenius coloratus*, 77-169 (B)
 consors, 77-168 (B)
 deserti, 60-95 (B)
 gibbus, 77-166 (B)
 goyderensis, 78-264 (B)
 imparilis, 77-163 (B)
 koebelei, 77-162 (B)
 macilentus, 77-167 (B)
 mendax, 11-36 (B)
- Sent as *Saprosites mendax*.
 moniliatus, 77-161 (B)
 nudus, 77-166 (B)
 palmerstoni, 9-135 (B)
 sparsicollis, 77-164 (B)
 speculator, 9-135 (B)
 spissus, 77-167 (B)
 torridus, 11-36 (B)
 tweedensis, 77-165 (B)
 walkeri, 77-170 (B)
 zietzi, 17-32 (S)
- Ateratocerus*, 52-357
 intricatus, 52-357 (B)
- Atermonocheila*, 37-238
 longipes, 37-239 (B)
- Aterpus abruptus*, 56-132 (B)
 raucus, 56-132 (B)
- Atesta eremita*, 45-194 (S)
 tatei, 4-284 (B)
- Athemistus cristatus*, 58-200 (B)
 monticola, 58-201 (B)
 torridus, 58-202 (N)
- Atomaria australis*, 9-119 (B)
 eucalypti, 11-33 (B)
 lindensis, 9-119 (B)
- Atractocerus victoriensis*, 10-306 (N)
- Atychoria rudis*, 78-294 (B)
- Augomela acervata*, 47-1488 (B)
- Aulacocyclus collaris*, 20-233 (B)
 errans, 20-233 (B)
- Aulacophora australis*, 47-1498 (B)
 cucullata, 19-83 (B)
 denticornis, 19-83 (B)
 palmerstoni, 47-1497 (B)
 richmondensis, 52-360 (B)
- Aulicus amabilis*, 27-133 (B)
 cribratus, 27-134 (B)
 cresus, 27-127 (B)
 dives, 27-128 (B)
 eremita, 27-133 (B)
 modestus, 27-135 (B)
 mundus, 27-131 (B)
 nigrohirtus, 27-129 (B)
 parvulus, 13-131 (B)
 robustus, 27-131 (B)
- Automolus funereus*, 36-283 (B)
 irrasus, 36-285 (B)
 major, 36-286 (B)
 opaculus, 36-285 (B)
 pictus, 36-284 (B)
 semitifer, 36-283 (B)
- Axynaon*, 21-34
 championi, 21-35
- In the British Museum list no species of *Axynaon* was mentioned; but there was a *Chalcopterus championi*. But Blackburn did not name a *Chalcopterus championi*, so probably the name *Chalcopterus* was used in error for *Axynaon*.
- Bagous adelaidæ*, 59-285 (B)
 australasiæ, 59-284 (B)
 clarenciensis, 15-163 (B)
- Baris orchivora*, 26-61 (B)
- Barronica*, 18-202
 scorpio, 18-203 (B)
- Barycistela*, 10-327
 robusta, 10-328 (B)
- Basitropis pallida*, 27-156 (B)
 relicta, 27-154 (B)
- Bebius variegatus*, 11-64 (B)
- Belus abdominalis*, 45-187 (B)
 adelaidæ, 45-189 (B)
 bison, 45-184 (B)
 difficilis, 45-181 (S)
 distinctus, 45-190 (B)
 elegans, 45-187 (B)
 flindersi, 45-185 (B)
 frater, 45-182 (S)
 helmsi, 45-182 (S)
 insipidus, 47-1455 (S)
 mundus, 45-186 (B)
 perplexus, 45-184 (B)

- Belus regalis*, 45-188 (B)
tibialis, 45-190 (B)
ventralis, 45-182 (S)
- Bembidium dubium*, 2-43 (B)
errans, 2-43 (B)
hobarti, 29-123 (B)
ocellatum, 2-44 (B)
proprium, 2-43 (B)
secalioides, 54-786 (B)
victoriense, 54-785 (B)
wattsense, 29-123 (B)
- Berosus auriceps*, 48-447 (B)
debilipennis, 24-224 (B)
decipiens, 46-827 (B)
discolor, 46-829 (B)
duplopunctatus, 46-828 (B)
findersi, 46-831 (B)
gravis, 46-826 (B)
macumbensis, 78-259 (B)
majusculus, 46-824 (B)
munitipennis, 17-30 (B)
queenslandicus, 24-225 (B)
simulans, 46-832 (S)
- Bethelium mundum*, 11-57 (B)
spicorne, 25-91 (B)
tricolor, 11-56 (B)
- Bledius adalaidæ*, 2-49 (B)
caroli, 1-14 (B)
cowleyi, 30-22 (B)
infans, 9-76 (B)
injucundus, 1-14 (B)
insignicornis, 9-75 (B)
minax, 1-14 (B)
ovensensis, 9-76 (B)
pontilis, 30-22 (B)
- Blepegenes nitidus*, 55-533 (N)
- Bolboceras aratum*, 75-502 (B)
basedowi, 75-512 (S)
bovilli, 75-503 (B)
carinatum, 75-523 (B male, S female)
chelyum, 47-1395 (B)
clypeale, 75-511 (B)
fenestratum, 46-845 (B)
fraternum, 75-517 (B)
froggatti, 75-509 (B)
impressicolle, 75-520 (B)
lævipes, 75-517 (B)
loweri, 75-515 (B)
macleayi, 75-500 (B)
mandibulare, 75-513 (B)
nitens, 75-519 (B)
nitidiceps, 75-516 (B)
obscurius, 75-522 (B)
pontiferum, 75-525 (S)
richardsæ, 8-159 (B)
simpliciceps, 46-844 (B)
sloanei, 47-1393 (B)
subretusum, 75-518 (B)
tatei, 46-842 (S)
tenax, 75-507 (B)
terræ-reginæ, 25-25 (B)
truncatum, 75-509 (B)
- Bostrychidæ*, 13-131, 22-92, 44-39, 47-1429, 50-1261, 78-273
- Bothrideres costatus*, 4-197 (B)
tibialis, 4-196 (B)
variabilis, 4-196 (B)
victoriensis, 9-117
- There was no specimen bearing this label in Mr. Blackburn's boxes of types. But in his general collection there is a label, "*Bothrideres victoriensis*, *Blackb.*", with a card on which are parts of two legs; these apparently being all that is left of the type.
- Brachypeplus barronensis*, 31-305 (B)
cowleyi, 31-304 (B)
kemblensis, 31-306 (B)
koebelei, 31-304 (B)
olliffi, 31-302 (B)
wattsensis, 31-303 (B)
- Brachysphyrus*, 32-160
irroratus, 32-160 (B)
- Brenthidæ*, 19-36
- Bruchidæ*, 26-62
- Bruchus lyndhurstensis*, 26-62 (B)
oodnadattæ, 26-63 (B)
persimulans, 26-64 (B)
quornensis, 26-63 (B)
- Bryaxis harti*, 9-78 (B)
inuitata, 9-79 (B)
lindensis, 9-77 (B)
ovensensis, 9-80 (B)
paludis, 9-81
- Bubastes inconstans*, 47-1414 (B)
laticollis, 47-1415 (B)
occidentalis, 10-293 (N)
splendens, 10-294 (N)
vagans, 12-313 (B)
- Bubastodes*, 12-212
sulcicollis, 12-212 (B)
- Bucolellus*, 5-210
ornatus, 5-210 (B)
- Bucolinus*, 12-252
longicornis, 12-252 (B)
- Bucolus convexus*, 11-72 (B)
frater, 18-255 (B)
posticalis, 18-256 (B)
- Bupala bovilli*, 31-317 (B)
dentata, 31-318 (B)
- Buprestidæ*, 4, 234, 8-146, 9-136, 10-293, 11-41, 12-211, 13-130, 14-295, 15-140, 16-207, 19-35, 21-30, 25-28, 26-41, 28-22, 29-130, 32-181, 33-306, 42-72, 44-35, 46-860, 47-1414, 50-1256, 51-152, 52-307, 54-788, 55-496, 57-287, 60-98, 78-268
- Byrrhidæ*, 6-138, 9-133, 32-173, 60-92
- Byrrhomorpha*, 56-109
anomala, 37-275 (B)
ponderosa, 56-111 (B)
verres, 56-110 (B)
- Byrrhus raucus*, 9-133 (B)
 Sent as *Pedilophorus raucus*.
torrensensis, 6-138 (B)
- Cacephatus*, 27-151
sericeus, 27-151 (B)
- Cacochroa obscura*, 46-858 (B)

- Cædiomorpha*, 4-272
 australis, 4-272 (B)
Cædius lindii, 4-271 (B)
Cælius occidentalis, 2-48 (B)
Cairnsia, 18-224
 cowleyi, 18-225 (B)
Callabonica, 17-36
 propria, 17-36 (S)
Callirhipis cardwellensis, 20-258 (N)
Calloodes frenchi, 51-148 (B)
 Sent as *Anoplognathus frenchi*.
Calochromus cucullatus, 26-56 (B)
 simillimus, 26-57 (B)
 rostratus, 26-58
Calomela apicalis, 47-1489 (S)
 distinguenda, 47-1490 (S)
 eyrei, 51-155 (B)
 flavescens, 52-358 (B)
 imperialis, 45-201 (S)
 lauta, 78-302 (B)
 satelles, 45-200 (B)
 tassalis, 47-1490 (B)
Candozea bovilli, 5-179 (B)
 leai, 16-287 (B)
 palmerstoni, 5-178 (B)
 sculpta, 52-363 (B)
Cantharidæ, 6-141, 12-228, 25-59, 44-46
Canthydus bovilli, 48-446 (B)
Car, 21-35
 condensatus, 21-36 (B)
Carabidæ, 1-12, 2-36, 3-52, 4-177,
 6-132, 7-82, 9-65, 11-20, 14-294,
 15-139, 16-200, 17-27, 18-201,
 26-35, 28-16, 29-99, 32-91,
 33-261, 38-362, 43-1, 44-17,
 46-805, 47-1387, 48-445, 49-707,
 50-1247, 52-304, 53-553, 54-775,
 55-479, 56-65, 60-85
Cardiophorus eucalypti, 55-516
 victoriensis, 55-516
Cardiothorax aeripennis, 12-226 (B)
Carenum cupreomarginatum, 3-63 (B)
 fugitivum, 3-61 (B)
 inconspicuum, 3-59 (B)
 macleayi, 3-64 (B)
 rugatum, 3-62 (B)
Cassida adelaidæ, 19-106 (B)
 prothoracica, 19-107 (B)
Catasarcus armatus, 59-271 (B)
 farinosus, 78-288 (B)
 sericeus, 59-270 (B)
Cathartus cairnsensis, 32-151 (B)
Catocalphe, 18-220
 minans, 18-221 (S)
Catypnes planicollis, 17-58 (B)
Caulobius advena, 23-51 (B)
 compactus, 23-53 (B)
 discedens, 23-52 (B)
 evanescens, 23-54 (B)
 Sent as *Automolus evanescens*.
 imitis, 36-289 (B)
 punctulatus, 23-51 (B)
 rotundus, 36-290 (B male, S
 female)
Cavonus parvus, 4-224 (B)
 sculpturatus, 4-223 (B)
 sharpi, 4-223 (B)
Centyres delens, 25-89 (B)
 sinuatus, 56-129 (B)
Cephalodesmus minor, 26-36 (B)
Cerambycidæ, 4-294, 8-127, 10-342,
 11-56, 11-69, 12-233, 15-165,
 17-57, 18-222, 19-37, 20-259,
 21-37, 22-97, 25-90, 28-31, 31-319,
 36-323, 37-296, 38-386, 45-194,
 47-1456, 48-450, 49-742, 50-1273,
 51-154, 54-789, 55-543, 58-191,
 59-286, 60-106, 76-227, 78-299
Ceratognathus frenchi, 21-28 (B)
 froggatti, 60-94 (B)
 gilesi, 18-215 (B)
Cercyon fossum, 46-840 (B)
 kingense, 37-231 (B)
Cerylon alienigenum, 32-133 (B)
Cestrinus angustior, 16-211 (B)
 asperus, 16-210 (B)
 championi, 16-210 (B)
 eremicola, 16-211 (B)
 minor, 16-212 (B)
 zietzi, 16-212 (S)
Chætocnema (see *Flectroscelis*)
Chalcolampra adelaidæ, 48-479 (B)
 distinguenda, 48-482 (S)
 eremita, 45-200 (S)
 hursti, 48-480 (B)
 rustica, 8-138
Chalcomela sloanei, 52-356 (B)
Chalcophora beltanæ, 60-100 (B)
 exilis, 60-98 (B)
 frenchi, 9-136 (N)
 pedifera, 52-307 (N)
Chalcopterus acutangulis, 25-47 (B)
 arthuri, 31-319 (B)
 bellus, 67-433 (B)
 boops, 25-45 (B)
 bovilli, 67-453 (B)
 brevipes, 67-434
 In the British Museum list a species
 was marked as being sent without the
 name. As *brevipes* is the only species
 whose type cannot be accounted for,
 the specimen sent was probably *brevipes*.
 Mr. Blackburn's number for it was 4442.
 cairnsi, 68-72 (B)
 cariniceps, 67-468 (B)
 carus, 67-430 (B)
 catenulatus, 67-469 (B)
 clypealis, 67-420 (B)
 colossus, 67-454 (B)
 confluens, 67-440 (B)
 costatus, 25-46 (B)
 crassus, 25-44 (B)
 cribratus, 28-25 (B)
 cylindricus, 67-452 (B)
 difficilis, 67-426 (B)
 eremita, 44-44 (B)
 exoletus, 68-70 (B)
 eyrensis, 67-442 (B)
 froggatti, 67-436 (B)
 gracilicornis, 25-45 (B)

- Chalcopterus gracilior*, 68-81 (B)
hunterensis, 68-77 (B)
imperialis, 67-455 (B)
inconspicuus, 67-466 (B)
interioris, 52-311 (N)
intermedius, 67-439 (B)
iridiventris, 67-458 (B)
iris, 25-43 (B)
jucundus, 25-50 (B)
juvenis, 67-429 (B)
kochi, 26-59 (B)
lætus, 67-428 (B)
laticollis, 68-81 (B)
leai, 68-79 (B)
lepidus, 67-465 (B)
longiusculus, 47-1435 (S)
longulus, 67-455 (B)
macer, 67-464 (B)
major, 67-449 (B)
mastersi, 68-73 (B)
mercurius, 67-449 (B)
meyricki, 44-45 (B)
micans, 67-441 (B)
mimus, 67-450 (B)
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 longior, 36-308 (B)
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 nelsonensis, 32-114 (B)
 sloanei, 32-113 (B)
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 uniformis, 9-104 (B)
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 debilis, 44-42 (S)
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 ingens, 44-43 (B)
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 modicus, 25-39 (B)
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Helodes fenestratus, 57-300 (B)
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¹¹ Type sent to British Museum, although stated to be in Mr. J. Anderson's collection.

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confertus, 40-219 (B)
conjunctus, 40-204 (B)
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cribripennis, 42-45 (B)
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cygneus, 62-159 (B)
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fraternus, 64-673 (B)
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No specimen found bearing this name

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pygidialis, 61-1356 (B)
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quadraticollis, 65-1237 (B)
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queenslandicus, 39-37 (B)
randalli, 65 1226 (B)
rapax, 64-679
raucinasus, 62-152 (B)
rectangulus, 40-179 (B)
relictus, 39-79 (B)
rhinastus, 64-688 (B)
rhinoceros, 57-284 (B)
rothei, 64 683 (B)
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simius, 64-675 (M)
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solidus, 61-1342 (M)
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sordidus, 40-182 (B)
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spissus, 39-40 (B)
spretus, 61-1340 (B)
squalidus, 38-380 (S)
striatus, 39-70 (B)

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submetallicus, 61-1360 (B)
sulcifrons, 39-70 (B)
suturalis, 17-37 (B)
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tæniensis, 39-61 (B)
tarsalis, 39-26 (B)
tasmanicus, 39 54 (B)
tenebrosus, 39-29 (B)
tepperi, 61-1339 (S)
terrena, 55-486 (B)
testaceus, 61-1350 (B)
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torvus, 61-1335 (B)
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tristis, 61-1333 (B)
tropicus, 39-28 (B)
umbrinus, 39-30 (B)
unicus, 26-38 (B)
vacuus, 64-674 (B)
vagans, 64-694 (B)
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variegatus, 61-1351 (B)
viator, 65-1228 (B)
vicinus, 40-158 (B)
victoris, 61-1346 (S)
viduus, 40-176 (B)
waterhousei, 40-201 (B)
xanthotrichus, 40 200 (B)
yilgarnensis, 53-557 (B)
zalotus, 40-148 (B)

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Holophylla australis, 4 212 (B)

Homalium adelaidæ, 4-191 (B)
morrisi, 30-28 (B)
tasmanicum, 30-27 (B)

Homethes angulatus, 56-68 (B)
gracilis, 56 69 (B)
parvicollis, 56-69 (B)
rotundatus, 56-70 (B)

Homœmota lætabilis, 76-232 (B)

Homœolacon, 7-90
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Homotrysis arida, 17-53 (B)
callabonnensis, 17-53 (S)
fusca, 10-326 (B)
limbata, 10-323 (B)
lugubris, 10 322 (B)
nitida, 10-326 (B)
princeps, 10-325 (B)
rufa, 10-324 (B)
ruficornis, 10-322 (B)
sitiens, 17-53 (B)
tenebrioides, 10-325 (B)

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carpentariæ, 16-213 (B)
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darlingense, 16 216 (B)
darwini, 16-217 (B)
elderi, 44-39 (S)

- Hopatrum longicorne*, 44-39 (S)
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meyricki, 16-213 (B)
misellum, 37-288 (B)
victoriæ, 16-218 (B)
- Hoplostines*, 52-361
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- Hoplozonitis*, 12-228
mira, 12-229 (B)
- Hormocerus fossulatus*, 19-36 (B)
- Hyborrhynchus aurigena*, 25-89 (B)
- Hydræna evanescens*, 24-229 (B)
 Sent as *Ochthebius evanescens*.
rudallensis, 78-261 (N)
simplicicollis, 78-261 (N)
torrensensis, 46-836 (B)
 Sent as *Ochthebius torrensensis*.
- Hydrobaticus australis*, 46-823 (B)
clypeatus, 52-305 (B)
tatei, 78-258 (N)
- Hydrobiomorpha*, 46-814
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helenæ, 49-741 (B)
tepperi, 46-817 (B)
- Hydrobius macer*, 46-818 (B)
- Hydrocanthus waterhousei*, 3-65 (S)
- Hydrochus adelaidæ*, 46-832 (B)
diversiceps, 24-228 (B)
horni, 78-259 (N)
interioris, 78-260 (B)
læte-viridis, 78-260 (N)
palmerstoni, 17-29 (B)
regularis, 46-833 (B)
victoriæ, 46-834 (B)
- Hydrophilus scissipalpus*, 29-128 (B)
- Hydrophyllidæ*, 9-66, 12-207, 16-203,
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- Hycis nigra*, 60-101 (B)
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punctulatus, 16-209 (B)
- Hypaulax interioris*, 47-1451 (B)
iridescens, 47-1453 (S)
- Hyperomma abnorme*, 11-22 (B)
- Hyphæria beltanensis*, 45-179 (B)
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variabilis, 45-181 (B)
- Hyphaltica*, 19-70
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lauta, 19-71 (B)
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occidentalis, 19-72 (B)
- Hypharpax obsoletus*, 56-84 (B)
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- Hyphoryctes*, 17-37
maculatus, 17-38 (B)
- Hypocaccus piscarius*, 32-108 (B)
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- Hypocilibe heroina*, 73-279 (B)
inconspicua, 53-572 (B)
læta, 53-567 (B)
lugubris, 53-570 (B)
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rotundata, 53-568 (B)
sculpturata, 53-569 (B)
veternosa, 27-140 (B)
vittata, 60-104 (B)
- Hypocrema*, 12-250
pauillum, 12-251 (B)
- Hypostigmodera*, 12-215
variegata, 12-215 (B)
- Idæthina cincta*, 9-107 (B)
- Idiocephala palmerstoni*, 47-1473 (S)
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- Idiophyes*, 18-234
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- Illæna meyricki*, 48-455 (B)
- Iphiaustus dispar*, 58-204 (N)
- Ischiopsopha bourkei*, 17-44 (B)
- Isodon bidens*, 20-239 (B)
intermedius, 20-241 (B)
lævipennis, 20-240 (B)
meyricki, 20-237 (B)
nasutus, 20-239 (B)
novitius, 21-28 (B)
terræ-reginæ, 20-238 (B)
- Isotira raucipennis*, 12-225 (B)
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- Læcon adelaidæ*, 55-505 (B)
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brightensis, 55-503 (B)
duplex, 55-506 (B)
eucalypti, 55-507 (B)
farinensis, 26-49 (B)
lindensis, 55-504 (B)
mansuetus, 57-288 (B)
murrayensis, 55-504
squalescens, 57-289
yilgarnensis, 57-289
zietzi, 17-48 (S)
- Læmophlæus australasiæ*, 11-30 (B)
diemenensis, 32-140 (B)
difficilis, 46-840 (B)
frenchi, 32-146 (B)
insignior, 32-143 (B)
lindi, 46-841 (B)
murrayensis, 32-141 (B)
pusulæ, 32-142 (B)
victoriæ, 32-182 (B male, S
 female)
- Lagria tineta*, 48-449
- Lagriidæ*, 10-335, 48-449, 78-280
- Laius conicicornis*, 4-262 (B)
distortus, 4-264 (B)
eremita, 17-51 (B)
eyrensis, 55-531 (B)
femoralis, 55-531 (B)
major, 47-1426 (S)
nodicornis, 4-263 (B)
pretiosus, 55-532 (B)
variegatus, 47-1426 (S)

- Lasiodactylus obscurus*, 9-106 (B)
Lathridiidae, 4-201, 9-120, 73-264
Lathridius apicalis, 4-204 (B)
costatipennis, 4-202 (B)
minor, 4-204 (B)
nigromaculatus, 4-203 (B)
punctipennis, 4-204 (B)
satolles, 4-202 (B)
semicostatus, 4-203 (B)
Lathrobium adalaidae, 43-8 (B)
exiguum, 3-66 (B)
victoriense, 9-71 (B)
Lathropus brightensis, 32-147 (B)
Lecanomerus flavocinctus, 4-188 (B)
lindi, 4-189 (B)
major, 55-479 (B)
nitidus, 54-779 (B)
obscurus, 4-189
striatus, 55-479 (B)
Lemidia angustula, 12-224 (B)
leoparda, 12-224 (B)
munda, 12-223 (B)
pictipes, 12-222 (B)
pulchella, 12-223 (B)
simulans, 12-222 (B)
soror, 12-223 (B)
Lepidiota bovilli, 42-54 (B)
caudata, 7-85, 42-60 (B)
darwinii, 46-850 (B)
deceptrix, 42-59 (B)
degener, 46-853 (S)
delicatula, 46-852 (S)
frenchi, 42-58 (B)
gilesi, 42-62 (B)
grata, 7-86 (B)
koebelii, 42-54 (B)
leai, 42-57 (B)
negatoria, 42-63 (B)
perkinsi, 42-56 (B)
rubrior, 42-55 (B)
rufa, 46-854 (S)
rothei, 4-213 (B)
suavior, 42-56 (B)
townsvillensis, 42-61 (B)
Lepispilus rotundicollis, 6-140 (S)
Leptacinus filum, 43-7 (B)
picticornis, 43-7 (B)
 Sent as *Xantholinus picticornis*.
Leptops areolatus, 44-58 (S)
baileyi, 47-1444 (B)
biordinatus, 44-55 (S)
contrarius, 44-60 (S)
frontalis, 47-1445 (S)
gravis, 44-57 (B)
horni, 73-287 (B)
insignis, 47-1443 (S)
interioris, 44-59 (B)
palmensis, 73-287 (B)
planicollis, 44-58 (B)
raucus, 44-56 (B)
sculptus, 73-285 (B)
sulcicollis, 44-60 (S)
tempeensis, 73-286 (B)
Leptognathus minor, 49-740 (B)
Leucocraspedum elegantulum, 30-18 (B)
- Leucocraspedum lugens*, 30-18 (B)
validum, 30-17 (B)
Licinoma pallipes, 55-542 (B)
sylvicola, 16-219 (B)
Licymnius bicolor, 13-133 (B)
Lindia, 4-275
angusta, 4-275 (B)
Liparetrus adalaidae, 56-101 (S)
agrestis, 1-25 (B)
alienus, 35-324 (B)
¹² *alpicola*, 55-483 (B)
amabilis, 35-321 (B)
analis, 1-23 (S)
aridus, 17-34 (B)
¹² *aureus*, 1-27 (B)
¹² *bicolor*, 1-28 (B)
blanchardi, 35-328 (B)
brevipes, 35-328 (B)
brunneipennis, 55-484
- The type has disappeared, but there are two co-types in the collection of the South Australian Museum. The name is a synonym of *ubiquitosus*.
- caviceps*, 1-19 (B)
cinctipennis, 35-327 (B)
confusus, 42-43 (B)
consanguineus, 35-322 (S)
dispar, 1-25 (S)
distans, 35-318 (B)
distinctus, 17-34 (S)
diversus, 1-21 (B)
fallax, 46-849 (S)
fimbriatus, 1-18 (B male, S female)
gracilipes, 1-20 (B)
granulatus, 1-28
gravidus, 35-326 (B male, S female)
incertus, 35-320 (B)
insolitus, 35-330 (B)
insularis, 1-24 (S)
juvenis, 46-849 (S)
laticulus, 47-1397 (B)
laetus, 1-26 (B)
leai, 35-329 (B)
lividipennis, 35-319 (B)
lugens, 56-100 (B male, S female)
macleayi, 1-27 (B)
maurus, 56-99 (B)
melanocephalus, 17-34 (S)
minor, 35-327 (B)
modestus, 1-25 (S)
mysticus, 47-1398 (S)
necessarius, 35-318 (B male, S female)
nigroumbratus, 1-22 (B)
palmerstoni, 46-847 (S)
perkinsi, 35-324 (B)
perplexus, 2-50
- No specimen in collection marked as the type. But one labelled as *perplexus* placed as *craniger*, *Macl.*

¹² These species sent under *Automolus*.

- Liparetrus posticalis*, 46-848 (B)
 puer, 35-323 (B)
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Penthea mastersi, 22-97 (B)
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- Pentodon australis*, 4-216 (B)
Pephricus nanus, 59-270 (B)
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Perperus convexipennis, 28-28 (B)
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Phalota obscura, 48-454 (B)
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 burruindiensis, 48-447 (B)
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Philonthus glenelgi, 32-94
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Philophlæus confertus, 56-78 (B)
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 ornatus, 44-19 (S)
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 sydneyensis, 56-76 (B)
 tasmaniaë, 56-78
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Philoscaphus crassus, 2-37 (S)
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 tepperi, 2-36 (S)
Phlæocarabus farinaë, 29-112 (B)
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Phoracantha elegans, 58-192 (B)
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Phormesa carpentariaë, 32-118 (B)
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Phorticosomus brunneus, 4-178 (S)
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 robustus, 6-135 (B)
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Phyllostocidium, 23-24
Phyllostocus dispar, 7-83 (B)
 meyricki, 1-15 (B)
 occidentalis, 1-15 (B)
Phyllotreta australis, 8-146 (B)
Physolesthus pallidus, 50-1250 (B)
Pimelopus crassus, 4-221 (B)
 dubius, 4-222 (B)
 sydneyanus, 20-256 (B)
Pinophilus latebricola, 43-10 (B)
Plæsiorhinus, 14-303
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Platycotylus coloratus, 32-147 (B)
Platydoma championi, 91-139 (Sub)
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Platydesmus inamœnus, 37-272 (B)
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Platynus murrayensis, 49-741 (B)
Platymopsis frenchi, 8-132 (B)
Platyomus baccæformis, 18-242 (B)
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 Sent as *Scymnodes obscuricollis*.
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Platyphanes creber, 12-225 (N)
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¹³ *Plectroscelis aciculata*, 19-63 (B)
 alpicola, 19-61 (B)
 calida, 19-59 (B)
 crassipennis, 19-66 (B)
 crebra, 19-62 (B)
 eyrensis, 19-65 (B)
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 impressipennis, 19-64 (B)
 lindensis, 19-61 (B)
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 meyricki, 19-66 (B)
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 olliffi, 55-548 (B)
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 tumbyensis, 19-63 (B)
 varipes, 19-61 (B)
Polyoptilus costatus, 25-97 (B)
 gracilis, 8-133 (B)
 robustus, 8-134 (B)
 torridus, 25-98 (B)
Polyphrades fortis, 59-276 (B)
 fulvus, 59-273 (B)
 inconspicuus, 59-279 (B)
 lætus, 59-281 (B)
 laminatus, 59-277 (B)
 modestus, 59-274 (B)

¹³ All sent as belonging to the genus *Chaetocnema*.

Polyphrades perplexus, 59-280 (B)
pictus, 59-278 (B)
rostralis, 59-272 (B)
rugulosus, 44-52 (S)
satelles, 53-575 (B)
tibialis, 59-275 (B)
tumidulus, 44-51 (S)
Porithea plagiata, 58-193 (B)
Prasonetha bimaculata, 18-223 (B)
 Sent as *Prasonotus bimaculata*.
Prasonotus chapuisi, (Sub)
Prasyptera mastersi, 19-84 (B)
Prionopleura erudita, 8-136
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Pristonychus australis, 46-811 (B)
Proctammodus, 11-37
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Promecoderus sloanei, 28-19 (B)
Prosayleus intermedius, 59-253 (S)
Prostomis gladiator, 32-135 (B)
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Proxyrus gibbicollis, 59-261 (B)
Prypnum squamosum, 56-115 (B)
Psammodius australicus, 77-173 (B)
obscurior, 77-173 (B)
Psammœcus incertior, 32-154 (B)
T-notatus, 32-154 (B)
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Pseudananca, 13-135
ruficollis, 13-135 (B)
Pseudeba, 32-119
novica, 32-120 (B)
Pseudocædius, 7-91
squamosus, 7-91 (B)
Pseudocavonus, 7-87
antennalis, 7-88 (B)
Pseudocistela, 10-316
ovalis, 10-317 (B)
Pseudoheteronyx, 56-111
creber, 38-366 (B)
helæoides, 56-111 (B)
laticollis, 38-366 (B)
Pseudoholophylla, 41-196
Pseudohydrobius, 24-231
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Pseudolacon, 7-89
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Pseudolycus elegantulus, 25-86 (B)
puberulus, 25-87 (B)
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Pseudoparopsis, 25-99
Pseudopimelopus, 4-217
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Pseudoryctes monstrosus, 17-39 (N)
tectus, 12-211 (S)
trifidus, 17-40 (M)
Pseudotoxotus, 47-1470
lineata, 47-1471 (S)
Psylliodes lubricata, 19-78 (B)

¹⁴ *Pterohelæus ater*, 4-279 (B)
bagotensis, 78-274 (B)
brevicornis, 37-294 (B)
fraternus, 17-51 (B)
geminatus, 51-153 (B)
gracilicornis, 37-293 (B)
insignis, 4-277 (B)
ovalis, 4-281 (B)
puer, 37-295 (B)
raucus, 50-1266 (B)
regularis, 37-292 (B)
simplicicollis, 37-292 (B)
ventralis, 37-294 (B)
Ptinidæ, 10-306, 57-300
Pycnomerus interstitialis, 32-131 (B)
rustobicollis, 32-131 (B)
sulcicollis, 32-132 (B)
Pylus pygmæus, 10-306 (B)
Pythidæ, 10-322, 13-134
Quedius andersoni, 43-6 (B)
baldiensis, 9-69 (B)
diemensis, 60-91 (B)
ferox, 3-66 (B)
inconspicuus, 43-5 (B)
koebelei, 18-203 (B)
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pictipennis, 11-21 (B)
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Rhinobolus, 48-463
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Rhinophthalmus modestus, 48-451 (B)
 Sent as *Stephanops modestus*.
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Rhipidophorida, 25-51, 26-60, 45-178,
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¹⁵ *Rhizobius apicalis*, 12-256 (B)
approximatus, 5-208 (B)
aurantii, 12-255 (B)
australis, 5-204 (B)
cæcus, 11-71 (B)
cœruleus, 12-256 (B)
crotchii, 18-256 (B)
cyaneus, 5-199 (B)
debilis, 5-201 (B)
discipennis, 18-257 (B)

¹⁴ In the British Museum list a species is noted as *Pterohelæus subcylindricus*. But I cannot find that Mr. Blackburn ever named such a species.

¹⁵ In the British Museum list a species was noted as *Rhizobius proprius*. But I cannot find that Mr. Blackburn ever named such a species.

- Rhizobius dorsalis*, 11-70 (B)
eminens, 18-257 (B)
fasciculatus, 12-256 (B)
fugax, 11-70 (B)
gosfordensis, 18-257 (B)
insipidus, 5-201 (B)
laticollis, 5-200 (B)
lanosus, 11-71 (B)
 Sent as *Erithionyx lanosus*.
lindi, 5-202 (B)
major, 5-206 (B)
nigronotatus, 12-253 (B)
nitidus, 5-206 (B)
occidentalis, 5-207 (B)
ornatipennis, 12-253 (B)
plebeius, 12-257 (B)
pulcher, 11-71 (B)
ruficollis, 5-202 (B)
satelles, 12-255 (B)
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- Rhodæa assimilis*, 41-191 (B)
callabonnensis, 16-205 (S)
consanguinea, 41-194 (B)
dubitans, 41-193 (B)
hirtuosa, 23-63 (B)
incognita, 41-195 (B)
laticollis, 41-192 (B)
magnicornis, 4-210 (S)
morbillosa, 23-64 (B)
mussoni, 56-112 (B)
pilosa, 41-191 (B)
planiceps, 41-195 (S)
rugulosa, 41-194 (B)
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- Rhomosternus minor*, 58-207 (B)
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obscurus, 58-205 (B)
pallidus, 58-206 (B)
- Rhyparida æneotincta*, 47-1479 (S)
amplicollis, 47-1481 (S)
discopunctulata, 47-1485 (S)
herbacea, 47-1484 (S)
interioris, 47-1486 (B)
mastersi, 12-236 (B)
mediopicta, 47-1480 (S)
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satelles, 47-1485 (S)
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- Rhytiphora fasciata*, 60-106 (B)
frenchi, 18-225 (N)
maculosella, 31-320 (B)
simsoni, 23-41 (B)
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uniformis, 28-40 (B)
- Rhytisternus bovilli*, 49-728 (B)
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splendens, 56-93 (B)
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- Rupilia angulaticollis*, 26-66 (B)
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brevipennis, 78-307 (B)
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imprensa, 47-1499 (B)
rugulosa, 12-238 (B)
- Saprinus australasiae*, 32-107 (B)
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westraliensis, 32-106 (B)
- Saprosites mansuetus*, 77-175 (B)
sternalis, 77-176 (B)
- Saprus*, 77-178
griffithi, 77-179 (B)
- Saragodinus tuberculatus*, 46-873 (B)
- Saragus addendus*, 78-275 (B)
inæqualis, 46-867 (B)
latus, 46-869 (S)
lindi, 46-868 (B)
macleayi, 46-871 (B)
mediocris, 46-870 (B)
satelles, 46-872 (B)
tricarinatus, 44-43 (S)
- Sarothrocrepis suavis*, 49-711 (B)
- Sarothromerus*, 37-237
- Sarrotrium australe*, 9-115 (B)
- Sarticus brevicornis*, 44-23 (S)
obscurus, 44-23 (S)
- Sastra obscuricornis*, 19-84 (B)
- Scalotomerus*, 10-330
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- Scaphidiidæ*, 9-90, 32-97
- Scaphidium alpicola*, 9-90 (B)
- Scaphisoma fernshawense*, 32-99 (B)
novicum, 9-91 (B)
perelegans, 32-98 (B)
queenslandicum, 32-98 (B)
- Scarabæidæ*, 1-15, 2-50, 4-206, 7-83,
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 22-88, 23-18, 25-25, 26-36, 27-113,
 28-21, 33-262, 34-281, 35-270,
 36-263, 37-233, 38-363, 40-146,
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 53-557, 55-481, 56-99, 57-283,
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- Sciatrophes*, 32-100
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- Scimbalium agreste*, 43-8 (B)
lætum, 43-9 (B)
- Scirtes helmsi*, 55-524 (B)
- Scitala ambigua*, 37-253 (B male, S
 female)
celescens, 37-252 (B male, S
 female)
convexicollis, 37-248 (B)
coxalis, 37-254 (B)
hospes, 37-251 (B male, S
 female)
ino, 37-249 (B)
juvenis, 37-256 (B)
nemesis, 37-250 (B male, S
 female)

- Scitula nemoralis*, 37-248 (B)
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- Sciton*, 56-101
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 variicollis, 37-275 (B)
- Sclerocyphon*, 55-523
 maculatus, 55-523 (B)
- Scolecobrotus simplex*, 47-1465 (B)
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 variegatus, 47-1466
- Scolytus obscuripes*, 50-1247 (B)
- Scopæus dubius*, 9-73 (B)
 femoralis, 11-22 (B)
 latebricola, 3-71 (B)
 obscuripennis, 9-73 (B)
- Scopodes flavipes*, 16-202 (B)
 intermedius, 16-202 (B)
 intricatus, 18-202 (B)
 rugatus, 60-85 (B)
 simplex, 16-201 (B)
- Scraptia lunulata*, 22-95 (B)
- Scymena australis*, 4-270 (B)
- Scymnodes*, 5-189
 difficilis, 5-190 (B)
 eugeniæ, 12-243
 Var. of *koebelæi*.
 fulvohirtus, 12-243 (B)
 immaculatus, 12-243 (B)
 koebelæi, 11-69 (B)
 varipes, 12-243
 Var. of *koebelæi*.
- Scymnomorpha*, 12-242
 duplopunctata, 12-242 (B)
- Scymnus ambulans*, 18-252 (B)
 aspersus, 5-194 (B)
 aurugineus, 5-196 (B)
 australasiæ, 12-243 (B)
 australis, 5-195 (B)
 brisbanensis, 18-246 (B)
 casuarinæ, 5-193 (B)
 cowleyi, 18-248 (B)
 cucullifer, 12-244 (B)
 ementitor, 18-248 (B)
 flavifrons, 5-195 (B)
 impictus, 18-247 (B)
 inaffectatus, 12-246 (B)
 insidiosus, 5-191 (B)
 inuitatus, 5-191 (B)
 jocosus, 12-244 (B)
 kamerungensis, 18-249 (B)
 lubricus, 5-192 (B)
 mareebensis, 18-249 (B)
 meyricki, 5-192 (B)
 mitior, 18-251 (B)
 notescens, 5-196 (B)
 obumbratus, 18-247 (B)
 occidentalis, 5-196
 Var. of *flavifrons*.
 operosus, 18-246 (B)
 oscillans, 5-197 (B)
 parallelus, 5-198 (B)
 planulatus, 18-251 (B)
 poonindiensis, 5-193 (B)
 pretiosus, 12-246 (B)
 queenslandicus, 12-247 (B)
- Scymnus sedani*, 5-197 (B)
 simplex, 5-194 (B)
 styx, 18-249 (B)
 subclarus, 18-250 (B)
 subelongatulus, 12-245 (B)
 subevanidus, 18-250 (B)
 sublatus, 12-246 (B)
 sydneyensis, 12-243 (B)
 terræ-reginæ, 18-247 (B)
 vagans, 12-248 (B)
 varipes, 18-252 (B)
 victoriæ, 5-196 (B)
 victoriensis, 12-245
 whittonensis, 12-247 (B)
 yarrensii, 18-253 (B)
- Seirotiana dispar*, 55-542 (N)
 • *major*, 12-228 (B)
 Sent as *Adelium major*.
 monticola, 55-541 (B)
 simplex, 55-540 (B)
- Selenurus fernshawensis*, 27-115 (B)
 sydneyanus, 12-221 (B)
 variegatus, 12-220 (B)
- Semanopterus angustatus*, 4-232 (B)
 carinatus, 17-43 (B)
 concentricus, 20-251 (B)
 dentatus, 17-43 (B)
 distributus, 20-252 (B)
 longicollis, 47-1412 (B)
 meridianus, 20-250 (B)
 minor, 4-233 (B)
 persimilis, 17-42 (B)
 rectangulus, 17-41 (B)
 tricastatus, 20-252 (B)
- Serangium*, 5-209
 bicolor, 18-255 (B)
 hirtuosum, 11-73 (B)
 maculigerum, 11-73 (B)
 mysticum, 5-210 (B)
- ¹⁶ *Sericesthis dispar*, 66-549 (B)
 ¹⁶ *erosa*, 66-551 (B male, S female)
 ¹⁷ *micans*, 66-546 (B)
 ¹⁶ *parallela*, 66-545 (B)
 ¹⁶ *parvipes*, 66-549 (B)
 ¹⁷ *planiceps*, 66-547 (B)
 ¹⁶ *puncticollis*, 66-551 (B male, S female)
- Silis australis*, 55-530
 Name altered to *Ananca boisduvalii* and so sent to the British Museum.
- Silphidæ*, 9-86, 11-25, 15-139, 31-288, 32-94
- Silphomorpha boops*, 46-807 (B)
 cordifer, 60-86 (B)
 difficilis, 28-17 (B)
 rufoguttata, 14-295 (B)
 spretæ, 46-805 (S)
- Silvanus aridulus*, 32-151 (B)
 armatus, 9-118 (B)
 monticola, 9-118 (B)
- Simodontus murrayensis*, 49-737 (B)

¹⁶ These species sent under *Scitula*.¹⁷ These under *Anodontonyx*.

- Sisyrium fraternum*, 11-58 (B)
 lævigatum, 11-80 (N)
 sparsum, 11-60 (B)
 ventrale, 11-59 (B)
 vittatum, 11-58 (B)
Solenia cowleyi, 19-88 (B)
Soronia simulans, 9-105 (B)
Sparactus costatus, 9-117
 No specimen marked as type in collection, but a named specimen marked as a synonym of *productus*, *Reitter*.
 elongatus, 9-116 (B)
 proximus, 9-116 (B)
 pustulosus, 9-116 (B)
Sphæroderma baldiensis, 19-77 (B)
Sphyrocallus bicolor, 35-277 (B)•
Spilopyra olliffi, 55-544 (B)
Staphylinidæ, 1-13, 2-45, 3-66, 4-190,
 9-68, 10-292, 11-21, 16-203,
 18-202, 25-22, 30-16, 31-288,
 32-93, 43-3, 54-788, 60-91,
 78-262
Stenotarsus arithmeticus, 18-233 (B)
 commodus, 18-233 (B)
Stenus australicus, 54-788 (B)
Sternolophus cæruleus, 53-555 (B)
 tenebricosus, 46-813 (S)
Stethaspis monticola, 41-180 (B)
 sternalis, 42-48 (B)
Stethomela caudata, 12-237 (B)
Stigmatium bimaiculatum, 22-91 (B)
Stigmodera arborifera, 11-51 (S)
 campestris, 21-31 (B)
 canaliculata, 11-51 (N)
 capucina, 12-218 (N)
 cara, 12-216 (B)
 caroli, 15-141 (B)
 carpentariæ, 11-53 (N)
 cincta, 8-157 (Sub. B)
 dawsonensis, 8-155 (B)
 dispar, 11-50 (N)
 dulcis, 26-41 (Sub)
 elderi, 44-36 (S)
 equina, 11-48 (B)
 eremita, 8-153 (B)
 erubescens, 28-23
 filiformis, 12-217 (N)
 frenchi, 8-150
 guttata, 8-158 (B)
 guttaticollis, 8-157 (B)
 guttigera, 28-24 (B)
 hostilis, 11-46 (B)
 ignea, 12-219 (B)
 insignicollis, 26-45
 insignis, 12-217 (N)
 insularis, 21-30 (N)
 jubata, 8-150 (N)
 karattæ, 8-149 (S)
 kerremansi, 8-147 (Sub)
 longula, 11-54 (N)
 macleayi, 11-48 (N)
 magnifica, 19-35 (N)
 marcida, 11-52 (N)
 marmorea, 8-148 (S)
 minuta, 11-45 (B)
Stigmodera oleata, 15-142 (B)
 ornata, 11-53 (N)
 pallas, 28-22 (B)
 pallidipennis, 8-154 (B)
 pictipes, 15-140 (B)
 princeps, 9-137 (N)
 pulchripes, 21-31 (B)
 quadrinotata, 11-49 (N)
 rectipennis, 9-138
 regia, 12-218 (N)
 rubriventris, 26-46 (B)
 septemmaculata, 11-45 (S)
 skusei, 11-46
 Type in Australian Museum.
 sternalis, 11-47 (N)
 stillata, 8-148 (Sub)
 subgrata, 26-41 (Sub)
 subpura, 33-307 (B)
 terræ-reginæ, 14-295 (N)
 tyrrhena, 33-307 (B)
 victoriensis, 8-152 (B)
 wimmeræ, 8-151 (N)
Streneoderma, 27-157
 contemptum, 27-158 (B)
 planatum, 27-157 (B)
Strigoptera australis, 55-501 (B)
 frenchi, 55-500 (N)
 marmorata, 55-501 (B)
Strongylurus minor, 58-199 (N)
Styrus clathratus, 53-573 (B)
Sunius æqualis, 43-9 (B)
Sutrea mastersi, 19-68 (B)
 speciosa, 19-69 (B)
Sybra mastersi, 15-168 (B)
Syllitus heros, 76-231 (B)
 microps, 76-232 (B)
 uniformis, 45-197 (B)
Symbothinus, 53-582
 nasutus, 15-151 (B)
 puer, 14-302 (B)
 squalidus, 53-583 (B)
Symphyletes compos, 31-319 (B)
 dentipes, 58-202 (B)
 deserti, 78-301 (B)
 fasciatus, 28-39 (B)
 fraserensis, 45-198 (S)
 lentus, 28-38 (B)
 modestus, 8-131 (B)
Syzeton lætus, 10-337 (B)
 lateralis, 10-338 (B)
Syzetonellus, 10-340
 alpicola, 10-340 (B)
Syzetoninus, 10-339
 inconspicuus, 10-330 (B)
 mundus, 10-339 (B)
Tachinus novitius, 9-68 (B)
Tachys adelaidæ, 2-40 (B)
 baldiensis, 54-782 (B)
 brightensis, 54-785 (B)
 captus, 2-42 (B)
 flindersi, 2-41 (B)
 infuscatus, 2-38 (B)
 lindi, 2-39 (B)
 ovensensis, 54-784 (B)
 semistriatus, 2-41 (B)
 similis, 2-39 (B)

- Tachys uniformis*, 2-40 (B)
 yarrensis, 11-20 (B)
Talaurinus imitator, 78-290 (B)
 inæqualis, 78-289 (B)
 rufipes, 78-290 (B)
 strangulatus, 17-56 (B)
Taromorpha, 60-85
 alternata, 60-85 (B)
Tarsotenodes, 27-139
 simulator, 27-139 (B)
Teinogenys inermis, 53-561 (B)
Teispes frenchi, 12-234 (B)
Telenica subfasciata, 59-261 (B)
Telephorus andersoni, 4-261 (B)
 fusicornis, 55-529 (B)
 galeatus, 55-529 (B)
 palmerstoni, 47-1424 (S)
 pauillus, 4-261 (B)
 proprius, 4-260 (B)
 tepperi, 47-1424 (S)
 vibex, 4-261 (B)
 victoriensis, 55-528 (B)
Telmatophilus breviformis, 18-218 (B)
 cairnensis, 18-217 (B)
 koebelei, 18-217 (B)
 sharpi, 18-216 (B)
 singularis, 18-218 (B)
 stygius, 18-218 (B)
 sublautus, 32-158 (B)
Temnopalpus, 4-283
 bicolor, 4-283 (B)
Temnoplectron diversicolle, 16-204 (B)
Tenebrionidæ, 4-269, 6-140, 7-91, 9-139,
 12-224, 13-132, 14-297, 16-210,
 17-51, 19-36, 21-34, 22-93,
 25-35, 26-59, 27-140, 28-25,
 31-319, 33-308, 37-286, 44-39,
 46-863, 47-1430, 50-1266, 51-153,
 52-309, 43-564, 55-533, 57,300,
 59-252, 60-101, 78-273
Tentegia parva, 78-299 (B)
 spenceri, 78-298 (B)
Teretriosoma gradile, 32-110 (B)
 sorellense, 32-111 (B)
Teretrius doddi, 32-109 (B)
Terillus carinatus, 47-1476 (S)
 micans, 47-1475 (B)
 politus, 47-1476 (B)
 suturalis, 48-461 (B)
Tessaromma nanum, 25-93 (B)
Tetracha helmsi, 44-16 (S)
Tetralobus thoracicus, 52-309 (N)
Tetrigus australicus, 19-35 (B)
Thallis dentipes, 18-231 (B)
 femoralis, 18-230 (B)
 macleayi, 18-228 (B)
 perplexa, 18-228 (B)
 subvinula, 18-229 (B)
 venustula, 18-229 (B)
Thalycrodes, 9-110
 cylindricum, 9-112 (B)
 pulchrum, 9-111 (B)
 tenebrosum, 9-111 (B)
 Var. of *australe*, *Germ.*
Thanasimomorpha, 10-304
 intricata, 10-304 (B)
Themelia, 15-159
 inconspicua, 15-160 (B)
Thenarotes australis, 4-184 (B)
 discoidalis, 4-184 (B)
 metallicus, 4-185 (B)
 Sent as *Notophilus metallicus*.
 minor, 4-185, 29-115 (B)
 nigricornis, 54-780 (B)
Thoris mœrens, 76-229 (B)
 septemguttata, 76-228 (B)
Thyregis, 77-145
 kershawi, 77-146 (B)
Timareta concolor, 59-264 (B)
 lineata, 59-263 (B)
 munda, 59-264 (B)
 pusilla, 59-265 (B)
 subfasciata, 59-266 (B)
Titinia bicolor, 56-120 (B)
 brevicollis, 56-118 (B)
 cremita, 56-119 (B)
 læta, 56-119 (B)
Todima lateralis, 32-118 (B)
Tomyris ænea, 48-471 (B)
 antennata, 48-472 (B)
 difficilis, 48-473 (B)
 gracilis, 48-468 (B)
 impressicollis, 48-469 (B)
 læta, 48-468 (B)
 longicornis, 48-470 (B)
 minor, 48-475 (B)
 negligens, 48-466 (B)
 obscura, 48-467 (B)
 paradoxa, 48-473 (B)
 rasa, 48-465 (B)
Toxicum addendum, 47-1431 (S)
 curvicorne, 4-276 (B)
 spretum, 4-276 (S)
Trechodes, 29-119
 gibbipennis, 29-119 (B)
Trechus baldiensis, 60-88 (B)
 simsoni, 60-90 (B)
 solidior, 29-118 (B)
 subornatellus, 29-117 (B)
 tasmaniae, 29-118 (B)
 victoriæ, 60-89 (B)
Trichalus funereus, 26-51 (B)
Trichananea, 10-341
 victoriensis, 10-341 (B)
Trichelasmus basalis, 37-236 (B)
Trichocarenium, 44-20
 elderi, 44-21 (S)
Trichoreus, 11-73
 cinctus, 11-73 (B)
Trichosalpingus, 10-332
 brunneus, 10-333 (B)
 obscurus, 13-134 (B)
Trichosaragus, 50-1269
 pilosellus, 50-1271 (S)
Trigonothops lindensis, 56-66
 Var. of *pacifica*.
 occidentalis, 56-66 (B)
Triphyllus intricatus, 9-123 (B)
Tristaria labralis, 11-30 (B)
Trogoderma adelaidæ, 9-125 (B)
 alpicola, 9-124 (B)
 antipodum, 9-128 (B)

- Trigoderma baldiense*, 9-127 (B)
debilius, 32-164 (B)
difficile, 9-126 (B)
exsul, 32-164 (B)
eyrense, 9-124 (B)
froggatti, 11-34 (B)
lindense, 9-125 (B)
longius, 32-165 (B)
macleayi, 9-126 (B)
maurulum, 32-165 (B)
meyricki, 9-128 (B)
occidentale, 9-127 (B)
reitteri, 12-207 (B)
singulare, 9-128 (B)
tolarensis, 32-163 (B)
varipes, 12-208 (B)
yorkense, 9-127 (B)
- Trogophlæus paludicola*, 2-49 (B)
- Trogositidæ**, 9-112, 31-311
- Tropideres evanescens*, 27-150 (B)
- Trox augustæ**, 11-39 (B)
elderi, 11-37 (B)
- Sent as *Megalotrox elderi*.
eremita, 11-38 (B)
euclensis, 11-39 (B)
eyrensis, 34-293 (B)
insignicollis, 78-265
mentitor, 78-266 (B)
perhispidus, 34-296 (B)
quadridens, 11-38 (B)
setosipennis, 34-292 (B)
strzleckensis, 17-33 (B)
tasmanicus, 34-292 (B)
- Sent as *Megalotrox tasmanicus*.
tatei, 34-291 (B)
- Sent as *Megalotrox tatei*.
tricolor, 34-295 (B)
velutinus, 11-40 (B)
- Tryphocharia frenchi**, 12-233 (B)
princeps, 47-1460 (S)
punctipennis, 47-1462 (B)
solida, 58-194 (N)
uncinata, 47-1461
- Typhosecis adspersa*, 17-59 (B)
- Uromoides**, 4-274
humeralis, 4-274 (B)
- Uracanthus acutus**, 48-451 (B)
froggatti, 60-106 (B)
- Volvulus punctatus*, 46-839 (B)
- Xantholinus picticornis** (see *Leptacinus*)
- Xanthophæa concinna*, 29-102 (B)
cylindricollis, 29-103 (B)
filiformis, 14-294
loweri, 52-304 (B)
satelles, 14-294 (B)
- Xeda magistra**, 15-153 (B)
notabilis, 15-153 (B)
- Xenidia bizonata**, 19-43 (B)
melancholica, 19-43 (B)
picticornis, 19-42 (B)
- Xuthea formosa*, 19-77 (B)
- Xylopertha canina**, 13-131 (B)
hirticollis, 22-92 (B)
mystica, 50-1264 (B)
vidua, 50-1265 (B)
- Xylophilidæ**, 10-336, 16-219
- Xynedria**, 58-185
interioris, 58-186 (B)
- Xynotropis**, 27-152
micans, 27-152 (B)
- Yorkeica**, 25-90
marmorata, 25-90 (B)
- Zietzia**, 16-205
geologa, 16-206 (S)
- Zonitis andersoni**, 6-142 (B)
aspericeps, 25-69 (B)
brevicornis, 6-143 (B)
carpentariæ, 25-68 (B)
cowleyi, 25-65 (B)
gloriosa, 6-147
helmsi, 44-46 (S)
longipalpis, 25-67 (S)
murrayi, 6-146 (B)
queenslandica, 25-66 (B)
rustica, 6-145 (B)
subrugata, 25-66 (B)
yorkensis, 25-68 (B)
- Zygocera concinna**, 28-36 (B)
- Zymaus inconspicuus**, 47-1446 (B)

Mr. Blackburn had also some types of *Chrysomelidæ* named by Chapuis, and these were sent to the British Museum. Following is a list of same, according to a list received from that institution:—*Cadmus alternans*, *C. arrogans*, *C. lutatus*, *C. ornatus*, *C. purpurascens*, *C. sculptilis*, *C. strigillatus*, *C. trispilus*; *Cryptocephalus æger*, *C. argentatus*, *C. bihamatus*, *C. chrysomelinus*, *C. conjugatus*, *C. convexicollis*, *C. dichisus* (no doubt *dichrous*), *C. eumolpus*, *C. gracilior*, *C. iridipennis*, *C. perlongus*; *Edusa suturalis*; *Loxopleurus æneolus*, *L. corruscus*, *L. dæmoniacus*, *L. pauxillus*; *Neocles sulcicollis*; *Paropsis irrorata*, *P. populosa*.

THE IONIZATION PRODUCED BY THE IMPACT OF SOLID BODIES IN AIR.

By KERR GRANT, M.Sc., and G. E. M. JAUNCEY, B.Sc.

[Read April 11, 1912.]

INTRODUCTION.

This paper contains an account of experimental investigations made by the authors on the phenomenon of the ionization which accompanies the impact of solid bodies in air.

The magnitude of the effect and of the total charge on the air, and the dependence of these magnitudes upon the nature of the surfaces of the impinging bodies and upon the energy of impact, as well as the character of the ions produced, have been more or less fully determined.

Two different methods of investigation have been employed, impact being produced in the one by a rifle bullet striking a metal target, and in the other by allowing a stream of shot or similar material to fall upon a plate.

The paper is divided into three sections:—The first containing a brief historical review; the second a description of the methods and results of the experiments; the third a brief summary and discussion of the results. The second section is divided into two subdivisions—the first relating to experiments made with the air-gun, the second to those made with the stream of falling shot or beads.

I. HISTORICAL REVIEW.

In 1892 Lenard discovered that the air at the foot of a waterfall was powerfully electrified, and showed by experiment that this was due to the splashing of the water on the rocks and consequent rupture of the water surface.

This effect and other allied phenomena have since been studied in detail by many observers and shown to occur with many different liquids and solutions; but so far as we can find the corresponding effect for solids has not been observed, much less studied.

The first observations of this effect were made in September, 1910, for the case of a leaden bullet striking an iron target. The air in the vicinity of the target was examined in the usual way by means of an insulated electrode of brass wire connected to an electrometer, an electric field being

applied across the space between target and electrode. On impact of the bullet on the target the electrometer indicated the reception of a considerable charge, and this independently of the direction of the field, showing that ions of both signs were present in the air between target and electrode.

In the earlier experiments a Winchester rifle was employed, but in order to avoid effects due to exploded gases accompanying the bullet the Winchester was discarded in favour of an air-rifle, with which no such parasitic effects could be detected.

The rifle was mounted with its muzzle at a distance of about 6 ft. from the target; it threw a leaden bullet weighing .96 gram, with a velocity of about 700 ft. per second.

The results of preliminary qualitative experiments were stated in a paper read by one of us ⁽¹⁾ before the Australasian Association for the Advancement of Science at Sydney, January, 1911.

II.A. METHODS AND RESULTS OF EXPERIMENTS WITH AIR-RIFLE.

The method of investigation employed in the first instance, *i.e.*, when the ions are produced by the impact of a bullet on a target, will be understood best by reference to the accompanying diagram (fig. 1). The bullet fired from the air-gun perforates a thin sheet of paper, *LV*, and impinges upon the target, *P*, the nature of which can be varied at will. An annular metal electrode, *AB*, is supported in front of the target at a distance from it of about 1.5 cm. and insulated as shown with sulphur and guard-ring. Target and electrode are enclosed in hollow metal box, the lid, *CD*, of which is removable. This box with the target can be raised to any desired potential by means of a battery of 500 small accumulators and the charge driven on to the electrode measured by a Dolezalek electrometer of suitably arranged sensibility.

In making measurements of the total ionization the electrometer reading (mean of two or three successive swings) was taken 15 seconds after impact of the bullet, in which time practically all ions of a given sign produced in the chamber were found to be collected. A number of measurements (usually five or six) were made in each experiment and the arithmetic mean of these taken. The amount of variation in the effect is indicated by the mean error of these measurements. Where necessary, correction was made for the natural leak of the instrument. The order

(1) Notes on Ionization by Impact, by Kerr Grant, M.Sc.

FIG. 1

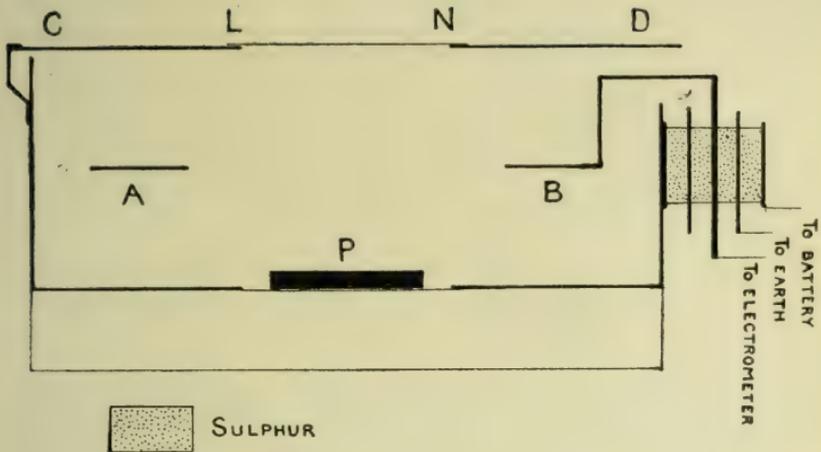
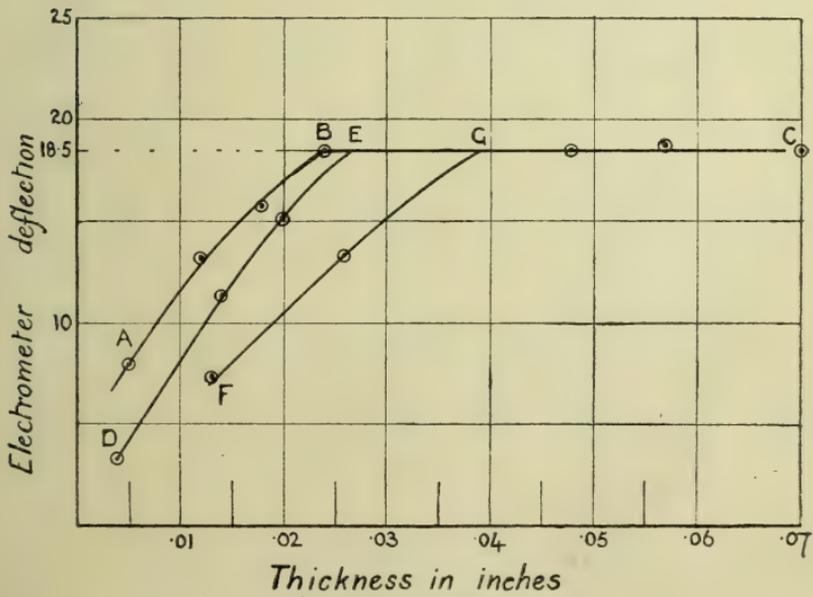


FIG. 2



of magnitude of the effect when a 1-gram bullet strikes a metal target with a velocity of about 700 ft. per second is six E.S. units, and approximately the same for *+ve* and *-ve* ions, *i.e.*, one E.S. unit per 3×10^7 ergs of kinetic energy destroyed. Little variation was produced by varying the material of the target so long as this is of metal. This is shown by the following table of measurements:—

Material of Target.	Reading.
Lead (A)	16 \pm 3
“ (B)	69 \pm 4
Iron (A)	35 \pm 3
“ (B)	60 \pm 3
Zinc (A)	36 \pm 3
Copper (A)	34
Brass (B)	63

Two sets of observations (A) and (B) are tabulated, the sensibility of the electrometer being higher in the latter set. The lead target used in (A) had been battered by previous usage, that in (B) was a fresh plate. This is the probable cause of the anomalous behaviour of the lead in the first case. When a wooden target was used the deflection of the electrometer needle was very much smaller than in the above cases.

In the above cases the target was not perforated by the bullet. When targets of lead-foil or sheet-lead were used the effect was found to vary with the thickness of the target, increasing with the thickness, but reaching a certain maximum value, while the target was still easily perforable. This is exhibited in the curve, *ABC*, shown in fig. 2. Other metals were found to behave similarly as shown in the curve, *DEC*, given for sheet-copper, the maximum ionization being the same in all cases, but the critical thickness decreasing with increasing density of the metal. The curve, *FGC*, is for sheet-zinc.

When the bullet perforates a target of sheet-metal the air in front of the target is found to be ionized, but practically no ionization could be detected in the air behind the target. For example, with the electrode and chamber in front a reading of 34 scale divs. was obtained, whereas the reading when both were transferred to the rear was only 0.32 scale divs.

If two perforable targets were placed in series the total ionization was found to be equal to the sum of the ionizations produced by each separately, provided the front target is not allowed to act as an electrostatic shield to the rear one.

FIG. 3

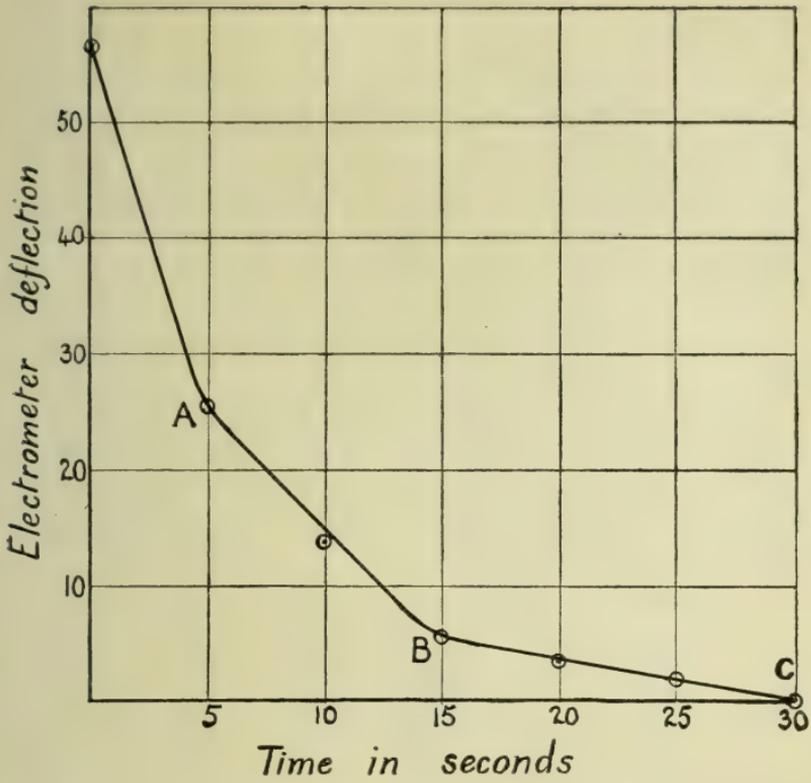
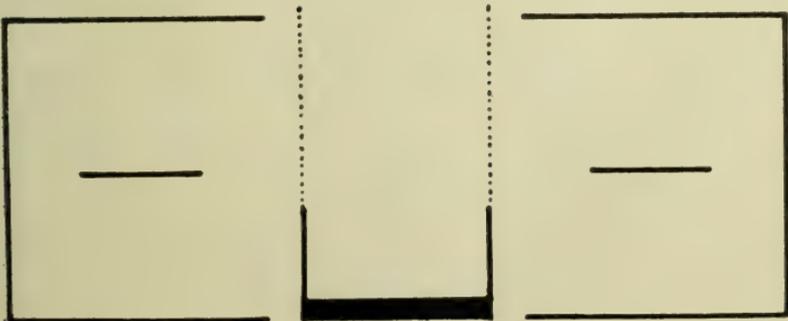


FIG. 4



Cleaning the surface of the target produced little if any difference in the magnitude of the effect; neither was any variation observed when a light target was backed by a heavy metal plate.

The mobility of the ions was roughly determined by a modification of Langevin's method (J. J. Thomson, *Conduction of Electricity through Gases*, 2nd Ed., p. 64). The distance of electrode from target was 1.9 cm. and the P.D. 600 volts. The curve showing the number of ions collected when the electrometer circuit was closed at different intervals after impact of the bullet is shown in fig. 3. This curve, for *-ve* ions, shows three tolerably distinct kinks at *A*, *B*, *C*, due to species of ions having mobilities 2×10^{-4} cm./sec. per volt/cm., 4×10^{-4} cm./sec. per volt/cm., and 1.2×10^{-3} cm./sec. per volt/cm. The coefficient of recombination was found to be of the mean value 38 ϵ .

The dependence of the ionization produced on the velocity of the bullet was investigated by allowing the bullet to impinge after penetrating varying thicknesses of lead-foil, in doing which its velocity was, of course, reduced. The velocity was measured by the ballistic method. The following table exhibits the results:—

Velocity.	Ionization.	V^2	$\frac{V^2}{I}$	$\frac{V}{I}$
126	33	16013	485	382
106	26	11293	434	408
96	17	9271	545	565
69	11	4888	444	627

The amount of ionization is seen to be, within the limits of experimental error, proportional to the square of velocity of impact, *i.e.*, to the energy of impact.

It was also sought to discover whether any radiations of a penetrating character akin to β or γ radiations from radioactive substances were associated with the impact of the bullet. To test for this effect the target was separated from the ionization chamber by a cylinder made of metal near the target and of wire-gauze covered with thin tissue-paper farther away (see fig. 4) to prevent any ions produced at the target from reaching the electrode. Under these conditions the charge received by the electrometer was so nearly equal to the natural leak that the existence of an ionizing radiation is made very improbable. Thus, with paper removed from wire-gauze the mean electrometer reading was 240, with paper covering gauze the reading was only 1.8, the natural leak being of the same order as this last.

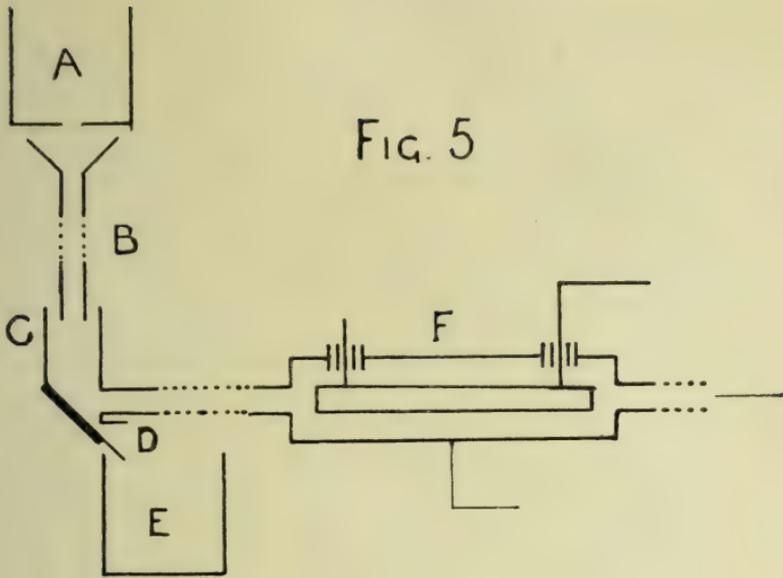
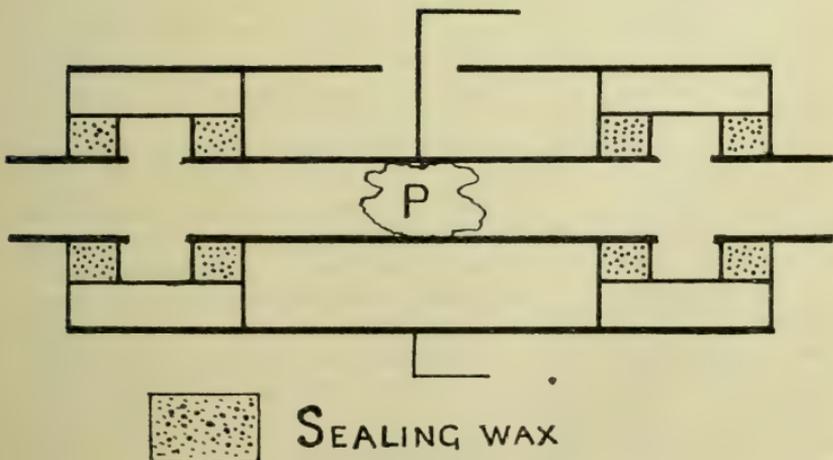


FIG. 5A



II.B. METHODS AND RESULTS OF EXPERIMENTS WITH STREAM OF FALLING SHOT OR BEADS.

In all the above experiments the bullet was of lead. Attempts to make bullets for the air-rifle of other material were not successful, and since it was desirable to investigate fully the influence of the nature of the impinging material other methods of producing the effect were sought. After tentative experiments by firing an arrow tipped with different materials and dropping bodies from a height upon a plate, in all of which a slight ionization in the immediate vicinity of the target was detectable, we were finally led to the construction of the apparatus sketched in fig. 5, by means of which a steady stream of shot or similar material was allowed to fall upon a solid plate. A steady stream of air drawn over the plate could then be examined, and was found to contain, under given conditions, a remarkably constant number of ions. The order of magnitude of the effect in the case of lead shot was such that one E.S. unit of charge was collected per 3×10^8 ergs of kinetic energy destroyed. This, however, can be regarded only as a very rough approximation, owing to the difficulty of getting a sufficiently rapid current of air to prevent loss by recombination and for other obvious reasons.

The shot is contained in a copper vessel, *A*, and falls freely, when a shutter covering the hole in its bottom is drawn aside, down a brass tube, *B*, from this into a wider tube, *C*, at the base of which is the target inclined at 45° to the horizontal. The shot by an aperture at *D* escapes into the vessel *E*. A current of air is drawn by means of a filter pump over the target and either through a Zeleny tube, *F*, or through a Faraday tube (fig. 5A), which serve respectively to measure the total ionization of a given sign or mobility of the ions and the total charge. The outline, *P*, in fig. 5A represents a plug of cotton wool. The height of the vessel, *A*, and the material of the target can be varied at will.

The first experiments with this apparatus were directed to a confirmation of the law that the ionization is proportional to the energy of impact, *i.e.*, in this case, to the height of fall. The accuracy with which this law holds for the impact of a stream of leaden shot on a brass target is shown by fig. 6.

The mobility of the ions was determined by Zeleny's method (J. J. Thomson, *Conduction of Electricity through Gases*, 2nd Ed., p. 58). The saturation curves for the positive and negative ions respectively are shown in fig. 7, A and B. The values of the mobilities when the abscissæ of the points *X* and *Y* were used in calculating were 1.6×10^{-3} cm./sec. per volt/cm. for both positive and negative ions, but the

FIG. 6

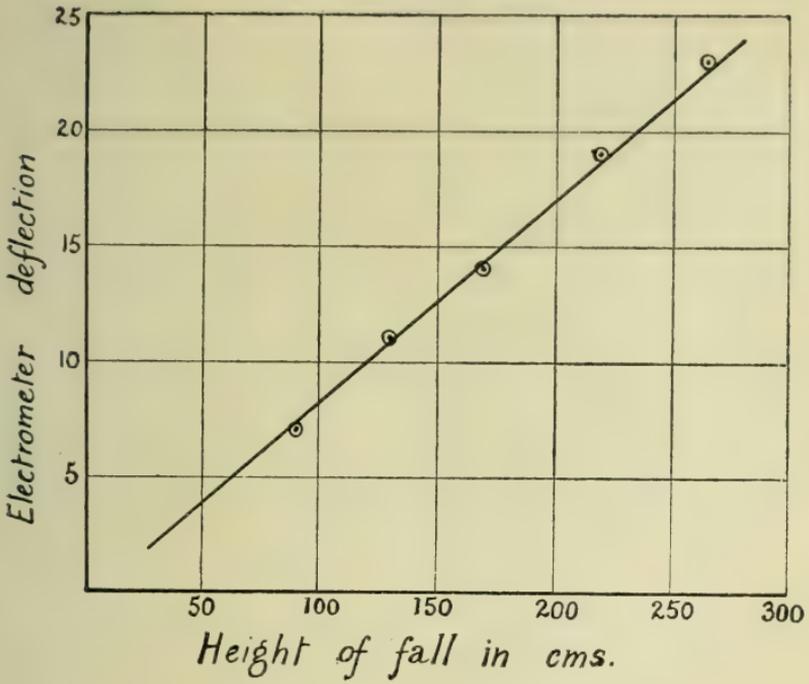
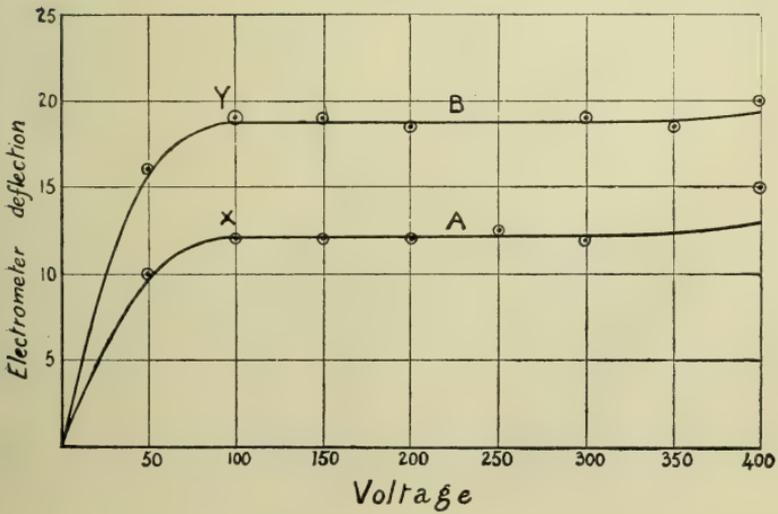


FIG. 7



nature of the curves shows that they are produced by a mixture of ions of varying mobility, the mean mobilities, however, being the same for positive and negative ions.

No point of inflexion could be found in the mobility curves, even when the field reached a value of 400 volts/cm.

The shot used in these experiments and in the preceding weighed .0392 gm. per shot. When glass beads (diameter .036 in.) were substituted for the shot and allowed to fall through a glass tube on a glass target the saturation curves shown in fig. 8 were obtained. The character of these curves shows that the variety of ions is still greater than in the case of those produced by lead shot. Calculating for the points *P* and *Q* as the elbows of the curves the mobilities are found to be 1.0×10^{-3} for both positive and negative ions.

The sign of the total charge on the air drawn over the target was determined by drawing it through the Faraday tube. When lead shot fell upon a target of any metal the total charge on the air was small and of variable sign. On the other hand, when the shot fell upon an insulator (glass, ebonite, silk) the charge on the air was invariably positive. The following are typical measurements:—

Target.	Reading.
Brass	0 ± .2
Zinc	+ .2 ± .2
Ebonite	+ 1.1 ± .2
Glass	+ 6.9 ± .5
Silk	+ 10.0 (q.p.)

When glass beads are used the charge on the air is always negative:—

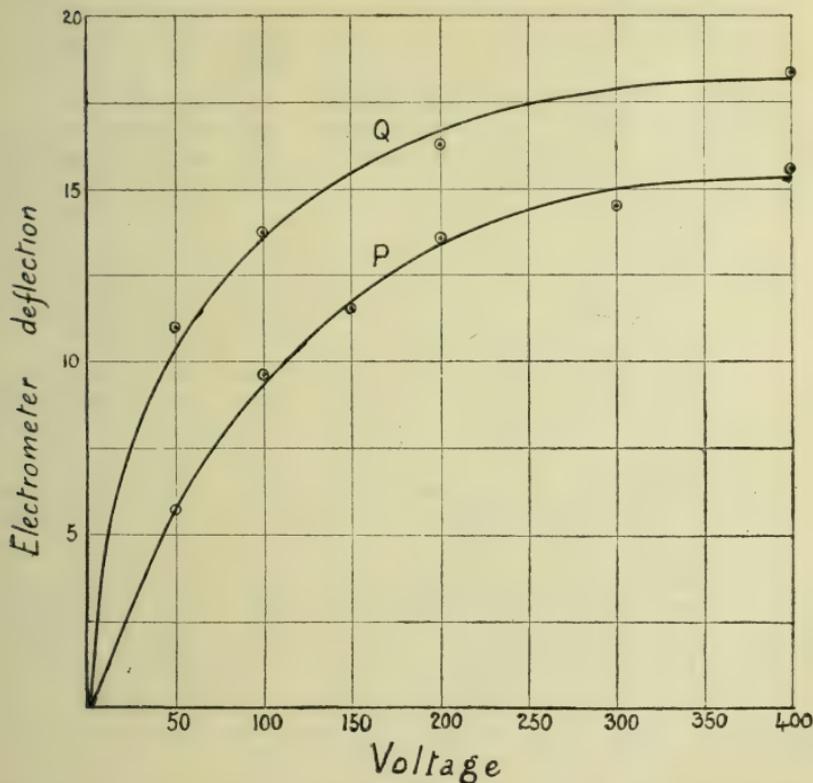
Target.	Reading.
Brass	—10.0 ± .1
Ebonite	— 8.1 ± .6
Glass	— 4.5
Silk	— 3.0

To test whether electrification incurred by the beads in touching the metal tube in their fall had any influence a glass tube was substituted for this, and was found to exert no important influence on the readings. The ionization produced in the process of falling through the fall-tubes was also measured, and found to be less than 10 per cent. of the total ionization.

In making experiments with the stream of lead shot falling upon a metal target it was observed that if unused shot were allowed to fall upon a new target (say, of brass) the

amount of ionization in the air drawn off was at first very large, but decreased at first rapidly and then more slowly as the shot continued to fall, asymptoting, apparently, to a definite minimum value. A typical set of readings exhibiting this "fatigue" effect is as follows:—7.0, 6.2, 5.2, 4.9, 4.3, 4.1, 4.0, 3.9, 3.7, 3.5. For this reason it was found impossible to compare satisfactorily the magnitude of the effect with targets of different metal and also with shot of different

FIG. 8



diameters. When targets of glass or ebonite were employed the above effect was insignificant, a steady reading being obtained from the outset. Thus with a glass target the successive readings 1.9, 2.2, 2.2, 2.1 were obtained; with an ebonite one 3.1, 3.0, 3.05.

Ionization is likewise found to occur whatever substance be allowed to fall on the target, *e.g.*, with sugar, salt, caustic soda, etc., the effect with sugar being larger than for any other substance examined.

III. SUMMARY AND DISCUSSION OF THE EXPERIMENTAL RESULTS.

The results of the experiments described above sufficiently establish—

- (1) That ionization is a general consequence of the collision of solid bodies in air.

The Lenard effect is thus produced both by solid and liquid bodies.

- (2) That for bodies of a given kind the amount of ionization is proportional to the energy of collision.
- (3) That the amount of ionization depends in general on the nature of the colliding bodies, or at least on the nature of their surfaces.

The constancy of the effect when a leaden bullet strikes a metal target is perhaps explicable on the assumption that the ions are formed mainly, if not entirely, at the surface of the lead, invariably the softer metal.

- (4) That the number of positive ions produced when two metallic bodies collide is equal to the number of negative, but when one of the bodies is an insulator the numbers are unequal.
- (5) That the ions formed are of very small mobility, comparable with that of the large ions in the air, those produced in the slow oxidation of phosphorus, the splashing of liquids, etc.
- (6) That the ions are produced mainly, if not entirely, at those portions of the surface of the bodies where contact takes place in collision.

The evidence for this last statement is to be found in the additive law for targets of thickness giving the maximum effect, when placed in series. Thus, if an ionization x be produced by a target of thickness a , and an ionization y for a target of thickness b , the bullet having already traversed a target of thickness a outside the chamber, then the total ionization due to both targets placed within the chamber is found to be x and y , whereas the effect due to a single target of thickness a and b is simply x . The "fatigue" effect exhibited when lead shot falls upon a metal target also finds ready explanation on the assumption that the ionization is a surface effect.

- (7) When a leaden bullet perforates a metal target the ionization increases with thickness of target up to a certain maximum, after which increasing the target, even to the point at which the bullet no longer pierces it, produces no further effect.

The explanation of this fact may possibly be found in the existence of an electrical double layer on the surface of target or bullet, from which the ions are set free in proportion to the energy lost by the bullet on striking the surface. Thus, the number of ions formed will increase with the amount of kinetic energy destroyed up to the point at which the "double layer" in region of impact is entirely disintegrated. If this explanation hold, however, it is obvious that a critical velocity should also exist above which no further variation of ionization with velocity should occur. No evidence of such a limit was obtained with the speeds employed.

In the present state of ignorance with regard to the causes and mechanism of ionization in general, no complete explanation can be offered of the above results. The cause is no doubt to be sought in the destruction of kinetic energy at the moment of impact, and the transformation of this energy into energy of intra-molecular vibration. It may plausibly be assumed that the internal energy of a certain number of molecules would be increased to the limit at which instability and consequent ionization result.

It is more difficult, perhaps, to offer even a general explanation of the inequality in number of the positive and negative ions which occurs when one or both of the bodies is an insulator. Such an inequality might naturally be connected with the existence of an electric field, due to the electrification of the colliding bodies; but the fact that the total charge in the air when glass beads fall upon a target of any material, whether this latter be electro-positive or electro-negative to glass, is invariably negative, renders this mode of explanation improbable. The same inequality has, of course, been observed in the Lenard effect, and the same explanation will probably cover both cases.

It may be suggested, in conclusion, that this effect plays a part in certain other phenomena, *e.g.*, in the luminescence of meteoric swarms, such as Saturn's rings, and possibly in tribo-luminescence. An attempt was made to reproduce the well-known luminescence of a vacuum tube containing mercury by substituting glass beads. This was unsuccessful.

Nevertheless, the apparent ease with which bodies electrify by friction in high vacua may be associated with the absence of such ionization as we have investigated above.

ON AN OUTLIER OF OLDER CAINOZOIC ROCKS IN THE
RIVER LIGHT NEAR MALLALA.

By WALTER HOWCHIN, F.G.S., Lecturer in Geology and
Palæontology, University of Adelaide.

[Read April 11, 1912.]

PLATE I.

The distribution of the older Cainozoic rocks in South Australia is such as to suggest that, at one time, there was a continuous sheet of these beds over the maritime districts, including much of the highlands, and extending inland to an unknown distance. The occurrence of these marine fossiliferous rocks in their present positions give proof of a former lower level of the land which allowed an epicontinental extension of the sea margins. They also tell of a subsequent elevation of the land, including the submerged continental shelf, amounting to many hundreds of feet, which made of South Australia an upland plateau. These elevatory movements exposed the marine sediments to severe weathering and erosion, by which they have been entirely denuded from large areas that they once occupied.

It is only in the extreme western and eastern sides of the southern portion of South Australia that the older Cainozoic rocks have been preserved in extensive sheets—the one occupying the head of the Great Australian Bight and extending inland for a distance of, at least, 150 miles; the other includes the Murray Plains (extending northwards into New South Wales) and the South-East to the Victorian borders. Between these extreme localities, where the main outcrops occur, crust movements of great importance have transpired, which have broken up and removed the greater part of the beds referred to, leaving only isolated fragments as outliers of the main formation, some of which are so small that they would not yield sufficient material to make a good quarry. Of these outlying fragments the following groups may be indicated:—

1. In southern Yorke Peninsula, resting on glacial clay of Permo-Carboniferous age:—Outcrops occur in the neighbourhood of Troubridge, on the south coast; along the south-eastern coast, from Edithburgh to near Black Point; Point Turton, Hardwicke Bay; and several inland patches.

2. In northern Yorke Peninsula:—On the western side, cliffs at Wallaroo Bay, also at Tickera Bay, and extending inland to Boor's Plains. On the eastern side there is a small capping resting on older rocks at Ardrossan, and outcrops occur, mostly in cultivated fields, around Kulpara.

3. Small occurrences on Kangaroo Island:—Along the shore at Queenscliffe; resting on granite at Cape Willoughby; and a small outlier, inland from Smith Bay, on the north coast.

4. On the eastern side of Gulf St. Vincent:—A high-level patch on the Hindmarsh Tiers; and another, at much lower level, at the railway bridge over the Finnis, on the eastern side of the ranges; a narrow fringe on the coast of Gulf St. Vincent, near Sellick's Hill; on ploughed land on Mr. Oliver's farm near Bellevue; along the sea cliffs at Port Willunga, and at Port Noarlunga; the beds have been proved in several well-sinkings, near Paradise, in the Torrens valley, as well as in the Kent Town bore; at a high level above Gawler; and in the deep bore at Croydon on the Adelaide Plains.

The small outcrop which forms the subject of the present paper was discovered in an unexpected situation, in the middle of the Adelaide Plains, where there is usually a great thickness of alluvium of recent age. It is also interesting from the fact that it is the most northerly exposure of these beds, at present known, on the eastern side of Gulf St. Vincent.

The River Light is a juvenile river that pursues an erratic course, first, as a longitudinal stream taking its rise near Waterloo, and flowing north and south; it subsequently takes an easterly direction but, instead of finding its way to the Murray flats, it suddenly turns and takes a westerly course, cutting through the low ranges, transversely, and loses itself on the plains. In its upper portions the river flows over an old Cambrian peneplain, consisting mainly of rotten aluminous rocks, which are well seen at Hamley Bridge. At a distance of about five miles below Hamley Bridge the river ceases to have a rocky bed and enters on the maritime plains, which, as flood plains of great extent, owe their existence to an antecedent system of drainage entirely distinct from the present. Here it has cut for itself a passage through alluvial deposits, which, in places, form steep and high banks: the flow of water becomes sensibly diminished after leaving the rocky portion of its course, and, in summer, the lower portions of the river are either dry or

contain only a few small stagnant pools at distant intervals. The river fails to reach the sea, becoming lost in the absorbent soil near the township of Lower Light.

The Red Banks, where the outlier of Lower Cainozoic rocks occurs, take their name from a series of large washouts on the left bank of the River Light (Section 5, Hundred of Grace), near the bridge on the main road to Mallala. At this point the river makes a remarkable bend to the south and then returns north by a course almost parallel with itself. The inside of the loop consists of alluvial deposits, somewhat lower than the normal banks, built up largely by flood waters. On the east side of the bend a few small and local streams (which only run when heavy rain occurs) have cut deeply into the banks by falling over the cliffs, and the latter have retreated, irregularly, from the river for nearly a quarter of a mile. The banks consist of red clay (which is sometimes white or mottled), loamy clay, sand, coarse grit to fine gravel. The walls are steep—in places perpendicular—and are undergoing rapid waste.

Between the river level and the top of the retreating clay banks there is an extensive platform, or middle terrace, rising slightly in level towards the head of the washout and, opening out inwards, the banks are arranged around this middle platform in amphitheatre form.

This middle platform, or terrace, owes its existence to a hard floor of Cainozoic limestone which underlies the alluvial cover, and has presented a greater resistance to the erosive action of the streams than the soft sediments. The following measurements were determined by aneroid:—From river level to limestone platform, 40 ft. ; from top of limestone to highest point of adjacent cliffs, 40 ft.

A complete section of the beds is as follows:—

- (a) Marly soil with nodules of surface travertine, 6 ft.
- (b) Light-reddish-coloured clay loam, 14 ft.
- (c) Dark-red and mottled clays and loam, 20 ft.
- (d) Fossiliferous Cainozoic limestone (thickness not proved), 20 ft.

Near the head of the washout, the stratum (b) is replaced by light-coloured to reddish sand and fine gravel which occupy a gutter of erosion about 40 ft. in width. This gutter does not seem to pass down into stratum (c) and is covered unconformably by the superficial bed (a). It has no accordance with the present lines of drainage.

The chief point of geological interest in this section is the occurrence of the marine Cainozoic beds, which form the surface of much of the middle terrace towards its upper limits. These beds occupy the entire width of the washout, which is at this point 68 yards, and are seen to pass under the alluvial banks on either side. They are apparently horizontal, and form a small scarp near their upper limits (plate i.). A small creek on the northern side of this area makes a series of small waterfalls by flowing over ledges of the Cainozoic limestone. This creek gives a section of about 16 ft. of these beds, and as they crop out again at the surface, about half-way between the main exposure and the river, it may be estimated that the beds in question must be, at least, 20 ft. in thickness.

The beds, for the most part, are a fairly pure limestone, but they have been considerably leached, and from this cause the rock is open in texture and most of the gastropods, bivalves, and some other forms, are present only by casts and impressions. A thin siliceous layer proved to be exceptionally rich in its fossil contents.

The following palæontological determinations have been made:—

FORAMINIFERA (seen only in section by fracture):—
Miliolina, sp.; *Nodosaria*, sp.

ACTINOZOA:—Cast of an Aporose coral.

ECHINODERMATA:—*Lovenia forbesi*, Duncan; *Monostychia australis*, Laube; *Fibularia gregata*, Tate; *Echinolampas posterocrassus*, Gregory.

POLYZOA:—*Retepora*, sp.

BRACHIOPODA:—*Magellania pectoralis*, Tate.

LAMELLIBRANCHIATA:—*Pecten hochstetteri*, Zittel; *Trigonia semiundulata*, McCoy; *Pectunculus convexus*, Tate; *Venus (Chione)*, sp.; *Dosinia*, sp.; *Leda*, sp. (cast).

GASTROPODA:—*Ancillaria ligata*, Tate; *Turritella aldingæ*, Tate; *Conus*, sp. (cast); *Natica*, sp. (cast).

SCAPHOPODA:—*Dentalium*, sp. (cast).

The above list of fossils shows no peculiar features, the occurrences are such as are found in the contiguous outliers of the same age, at Aldinga, Adelaide, and Gawler. The Echinodermata are the most abundant of the forms present. *Pecten hochstetteri* is also very common. The siliceous band carries numerous examples of *Pectunculus*, *Chione*, *Trigonia*,

and *Leda*, while fragmentary Polyzoa make up the greater part of the finer material of the limestone.

To what extent these marine Cainozoic beds occur in the district is unknown, as the country is uniformly covered with alluvium of considerable thickness. There is reason to believe, however, that the small outcrop at the Red Banks forms part of an extended sheet of these beds existing in the neighbourhood, but hid from sight by the newer deposits. The extensive development of travertine limestone in the district favours this view. A few miles out from Wasleys railway station, on the road to the River Light, the ground becomes distinctly calcareous and nodules of travertine are thickly strewn over the cultivated land and are gathered up and used for road metal. In several places this surface limestone is sufficiently thick to be quarried. All the stone buildings of Mallala and neighbourhood are constructed of travertine limestone, the stone being obtained from local quarries. Whilst it is not maintained that the marine limestones are concurrent with this surface-travertine limestone throughout the district, the very considerable development of the latter, locally, can be best explained by assuming that the extensive leaching of the older limestone has yielded the greater part of the travertine, which is always a secondary product.

This small outlier of Lower Cainozoic rocks in the Light is of considerable interest as bearing on the ancient topography of the country, especially when studied in relation to other outliers of similar beds in adjacent districts. The nearest locality for rocks of the same age is at Gawler, situated about 15 miles in a direction south-easterly from the Red Banks. The two outcrops are, however, of distinctly different lithological types. In the case of the Gawler beds, the fossils occur in a coarse grit, while the beds at Red Banks, on the Light, are true limestones. Such strong contrasts must be referred to different conditions of deposition. The Gawler beds give evidence of strong currents, probably a shore-line, while the Red Banks deposits were laid down at some distance from the shore and in a position that was protected from land wash. The material obtained from the Kent Town and Croydon bores was fine-grained and strongly calcareous with a greater likeness to the Red Banks outcrop than to the Gawler.

The most interesting feature, however, is the remarkable discordance which these several outliers, although relatively adjacent, exhibit in relation to their respective elevations. In the Kent Town bore the Lower Cainozoic beds were proved, in their upper limits, at a depth from the surface of 127 ft.,

or 12 ft. above sea-level. At the Croydon bore, two and a half miles west of Adelaide, the upper limit of the same beds occurs at about 700 ft. below sea-level. At Gawler, they have an elevation of about 400 ft. above sea-level; and at the Red Banks (as determined by aneroid) they are about 230 ft. above sea-level.

This great discordance, within short geographical distances, can only be reasonably explained by the occurrence of step-faulting, probably more or less influenced by differential erosion of the beds. It has been demonstrated⁽¹⁾ that such step-faulting has occurred in localities, further south, since the period when the marine beds of this age were laid down, and it is highly probable that the effects of such earth-movements would be felt marginal to Gulf St. Vincent throughout its entire length.

The results of step-faulting would be to produce a series of distinct shelvings of the older rocks at different depths. It is believed that the Red Banks Cainozoics rest on such a shelf or platform of Cambrian rocks. That is the usual order in which the geological formations mentioned occur in this part of the country. Moreover, about a mile to the north of the Red Banks, the Cambrian slates outcrop in a small gully near the middle of Section 1, Hundred of Grace. This is the first evidence of Cambrian outcrops in the Lower Light, but about two and a half miles further up the valley, to the north-east, in Sections 151 and 153, strong outcrops of these rocks occur in the bed of the river and continue from this point to Hamley Bridge. I was informed by Mr. Marshman, of Mallala, that in a well-sinking near the Woolsheds Methodist Church, at the five cross-roads, about three miles out from Wasleys, the old "blue-rock" (Cambrian) was struck at a depth of 40 ft., and no water tapped.

It is therefore certain that each of the Cainozoic outliers, included within the Adelaide and Red Banks groups, rests on Cambrian steps or platforms. The highest of these steps is that which carries the Gawler fragment, at an elevation of about 400 ft., above present sea-level. The Red Banks platform is about 200 ft. above sea-level. The Kent Town bore proved the Cambrians at 221 ft. below sea-level; and at the Croydon bore at 2,206 ft. below sea-level. It is possible that the Cainozoic sea-floor was uneven originally, which might account for some differences of level, but can scarcely account for the extraordinary disparity, within short dis-

(1) Howchin, Trans., Proc., and Rep. Roy. Soc., S.A., vol. xxxv., 1911, p. 47.

tances, amounting to about 2,600 ft. These facts are set forth in the following Table:—

LOCAL OUTLIER.	SURFACE LEVEL	UPPER LIMITS OF EOCENE.		CAMBRIAN PLATFORM.	
		Above sea level.	Below sea level.	Above sea level.	Below sea level.
	Feet.	Feet.	Feet.	Feet.	Feet.
1. Gawler ...	415	400	—	360	—
2. Red Banks	270	230	—	210	—
3. Kent Town	139	12 ⁽²⁾	—	—	221
4. Croydon ...	56	—	700	—	2,206
5. Dry Creek	16	—	(?)	—	(?)
6. Smithfield...		—	(?)	—	(?)

Bores have been put down at Dry Creek and Smithfield. In the first locality named, the bore penetrated to 410 ft., and at that depth touched the base of a Pliocene marine deposit. The same geological horizon was met with, at about the same depth, in the Smithfield bore, and also in the Croydon bore; and although the sinking at Dry Creek and Smithfield was not in either case carried down to bed-rock, it seems probable that these bores are within the deeply-sunken area revealed by the Croydon bore, and are shown in the above Table for comparison.

The chief points of interest in the observations now submitted are in extending the known area of the older Cainozoic sea limits, and also in the additional evidence it affords of the shelving-distribution of the remnants of these old marine deposits consequent on the sinking of the gulf area by successive steps.

My acknowledgments are due to Mr. T. Nevin, late head teacher of Mallala public school; Rev. C. E. Schäfer, and Mr. Marshman, for supplying interesting local information; and to Mr. R. E. Stanley, an undergraduate at the Adelaide University, for calling my attention to this outcrop.

DESCRIPTION OF PLATE I.

View of washout in Red Banks, River Light. The ledge on which the bag and hammer rest is the upper limit of the Cainozoic outcrop.

(2) When Tate described the Kent Town section he had not distinguished between the two lower marine series, but classed them all as "Miocene." Guided by the nature of the material I have assumed that, in Tate's section, the Miocene beds are included from Nos. 13 to 16; an interval of erosion is represented by No. 17, and the Eocene from Nos. 18 to 24. The upper limit of No. 18 is 12 ft. above sea-level.

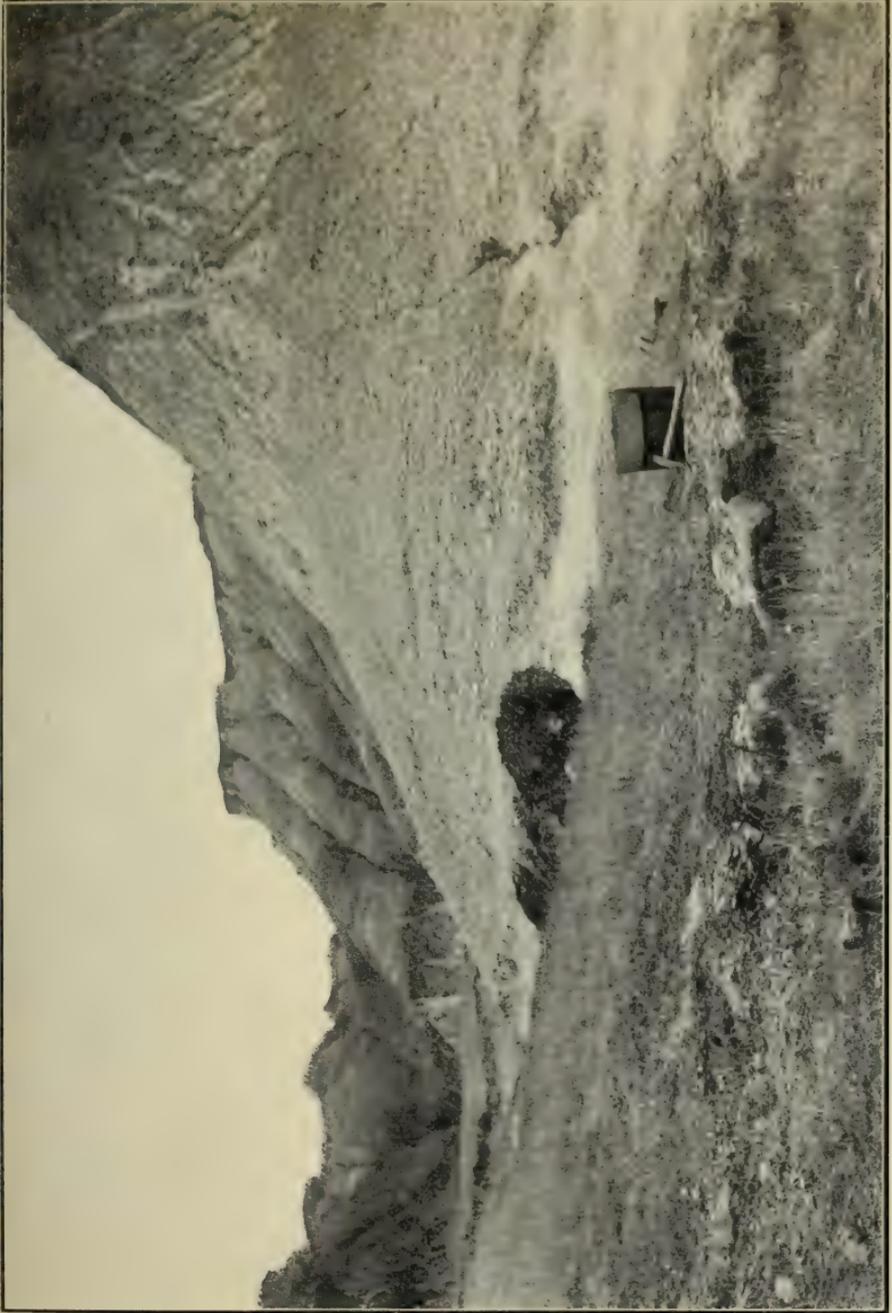


Photo. by W. Howchin.

Washout in Red Banks, River Light. The ledge where bag and hammer rest is upper limit of Cainozoic outcrop.

ADDITIONS TO THE FLORA OF SOUTH AUSTRALIA.

By J. M. BLACK.

[Read May 9, 1912.]

PLATES II. AND III.

The subjoined list is mainly the result of botanical investigations carried out during the past year. The plants marked with an asterisk are aliens which have been found more or less well established in this State.

DILLENIACEÆ.—*Hibbertia sericea*, Benth., var. nova *major*. Differt a formâ typicâ sepalis et foliis majoribus (illis 10-15 mm., his 15-20 mm. longis), necnon numero staminum (20-25) et ovulorum (8 in quoque carpello).

Near Port Lincoln (H. H. D. Griffith).—A stouter plant than the typical form, and larger in all its parts, the sepals densely villous with long silky hairs.

Hibbertia acicularis, F. v. M., var. nova *sessiliflora*. Floribus sessilibus, sepalis glabris, staminibus 4 rarius 6, carpellis pubescentibus 3-4-ovulatis.

Frequent in the Mount Lofty Ranges and often growing near *H. stricta*, R. Br. Mentioned in 1862 by Mueller in *Plants Indigenous to the Colony of Victoria*, i., 17, where, after describing *H. acicularis*, he wrote:—"On stony mountains at Glen Osmond, in the Bugle Ranges, and towards Mount Remarkable (within the colony of South Australia), occurs a closely allied species, of which the fruit is as yet unknown. It differs chiefly in higher erect growth and glabrous sepals." In *Fragmenta*, xi., *H. acicularis* with sessile flowers is mentioned as growing on the Loddon and at Stawell, as well as in South Australia, but the variety was not named by Mueller, as far as I know. This appears to be the only form of the species in South Australia. It is distinguished from *H. stricta* by its narrow, pungent-pointed leaves, glossy on the upper surface. As forms with both sessile and pedicellate flowers are admitted under *H. stricta* there seems no reason why the definition of *H. acicularis* should not be widened in the same way.

LINACEÆ.—**Linum strictum*, L. Maitland, Yorke Peninsula (A. G. Edquist). "Grew on rubbish tip and is spreading over uncultivated land."—Mediterranean region.

CISTACEÆ.—**Cistus hirsutus*, Lamk. Roadsides, Mount Lofty (H. H. D. Griffith).—Ornamental plant from the Mediterranean region.

RUTACEÆ.—*Asterolasia muricata*, sp. nova. Frutex humilis ramosus, ramulis stellato-pubescentibus, foliis breviter petiolatis late oblongis crassis rigidis 7-14 mm. longis superne tuberculato-muricatis glabris inferne concavis albo-tomentosis, floribus flavis subsessilibus solitariis axillaribus vel 1-3 terminalibus, calyce minuto, petalis induplicato-valvatis externe stellato-pilosis, staminibus 10, ovario tomentoso bilobato, stigmatibus magno emarginato.

Near Mount Thisbe, Kangaroo Island (H. H. D. Griffith, October, 1908). The only species of *Asterolasia* as yet found in South Australia. It belongs to Bentham's section *Urocarpus* (*Fl. Aust.*, i., 352), all the other species of which are Western Australian. (Plate ii.)

LEGUMINOSÆ.—**Vicia gracilis*, Lois. Longwood.—Europe.

NOTE.—*Pultenaea graveolens*, Tate, has been found at Mount Remarkable (E. C. Black), leaves glabrous above and with margins much more revolute than in the specimens from the Mount Lofty Ranges. *P. trifida*, Black (*Trans. Roy. Soc.*, S.A., xxxiii., 224). This species is nearest to *P. densifolia*, F. v. M., which it resembles in the spreading leaves with recurved tips, but in *P. trifida* they are hairy, larger, distinctly mucronate, and without the prominent lateral nerves below; bracteoles trifid and flowers lighter in colour. The Tate Herbarium contains a specimen of *P. trifida* in leaf only, labelled "Mount Pleasant Station, 6/3/86."

UMBELLIFERÆ.—*Carum sioides*, sp. nova. Herba perennis aquatica glabra, rhizomate stolonifero, caule erecto sulcato fistuloso ramoso, foliis pinnatisectis inferioribus 8-10-jugatis, foliolis ovato-oblongis sessilibus æqualiter serratis base truncatis, foliis superioribus paucijugatis, foliis inæqualiter inciso-dentatis, floribus albis, umbellis pedunculatis 8-12-radiatis oppositifoliis et terminalibus, involucri et involucelli bracteis 4-8 lineari-lanceolatis sæpius integris, calycis dentibus obsoletis, petalis albis emarginatis cum acumine inflexo, fructu parvulo subgloboso ($1\frac{3}{4}$ mm. longo) a latere compresso ad commissuram constricto, mericarpii jugis angustis, vittis subpericarpio sitis solitariis latis totam valleculam occupantibus, carpophoro bipartito cruribus mericarpio plus minus adnato.

Growing in or close to running water at National Park, Belair, at Willunga, and beside North Para River, Nuriootpa.

In habit, carpophore, and petals this species might belong to *Sium*, but the absence of calyx-teeth and the solitary vittas are not characters of that genus. Specimens forwarded to two great botanical establishments have been determined variously as *Sium latifolium*, L., and *S. erectum*, Huds. (*S. angustifolium*, L.), evidently without examination of the fruit. In the *Naturalized Flora of S.A.*, p. 71, I described it under the name of *Sium latijugum*, Clarke. This is an Indian species, for whose inclusion in *Sium* Clarke altered one of the generic characters by making the furrows of the fruit univittate. Since then specimens have been sent from South Australia to Calcutta and carefully examined by the Director of the Royal Botanic Garden at Sibpur (Major Gage) and Mr. M. S. Ramaswami, who find that our plant differs from *S. latijugum* in the narrow slender ridges of the carpels and in the shape of the leaflets. They advise placing it in *Apium* and instance its resemblance to *A. nodiflorum*, Reichb. It seems to me, however, that the bipartite carpophore and the emarginate petals exclude it from that genus, and I have placed it in *Carum*, with which it agrees very fairly, especially when the generic character is extended so as to include *Petroselinum*, Hoffm. Although in our plant the branches of the carpophore usually remain united to the carpels and fall off with them, they are sometimes seen, in the ripe fruit, free from them for a considerable part of their length. It is only in specimens from Nuriotpa that I have found 1 or 2 pinnatifid bracts in the involucre, and of these specimens I have not been able to obtain fruits. The plant here described is very probably the *Sium latifolium*, L., mentioned in *Fl. Aust.*, iii., 336, as an introduction. There can be little doubt that it is a native. (Plate iii.; 1, flower; 2, petals; 3, transverse section of fruit; 4, fruit.)

COMPOSITÆ.—*Helipterum floribundum*, D.C., var. *nova tubulipappum*. Corollæ lobis inæqualibus, uno profunde inciso, pappi setis planis 6-8, dimidio inferiore in tubulum connatis.

Oodnadatta (Miss Staer). A variety with slightly woolly, rigid branches, the involucreal bracts all pure white, as in the type, but pappus semitubular, as in *H. Trædelii*, F. v. M. Similar specimens from Mount Lyndhurst, labelled "*H. floribundum*," are in the herbarium of the Museum of Economic Botany. Differs not only in pappus, but in the larger leaves and stouter stems, from the slender form found in the mallee country from Dublin northwards towards Port Augusta, with the outer bracts golden-brown and the appearance of an annual (? var. *Sturrianum*, Benth.). The flowers

in each head of var. *tubulipappum* number over 100. (Plate ii.)

Senecio odoratus, Hornem., var. *nova obtusifolius*. Differt a formâ typicâ foliis obovatis glaucis crassiusculis flaccidis confertis, auriculis parvis parce dentatis, paniculâ densiore.

Along the coast at Port Elliot. This low, leafy shrub seems to be a maritime form of *S. odoratus*. Although it has a very distinct aspect, I can see no difference in the flower-heads which would justify raising it to the rank of a species. (Plate iii.; 1, flowerhead; 2, leaf of var. *obtusifolius*; 3, leaf of typical form.)

STYLIDIACEÆ.—*Leeuwenhoekia Sonderi*, F. v. M. *Tintinnarra*, in very poor soil among the scrub. Hitherto only recorded for Victoria. Distinguished from *L. dubia*, Sond., by the labellum with dark crimson hood, shorter corolla (2 mm. as against 4 mm.), and calyx-lobes glabrous, instead of glandular-hairy.

EPACRIDACEÆ.—*Leucopogon hirtellus*, F. v. M., var. *nova glabrifolius*. Eyre Peninsula (S. A. White), exact locality not given. Differs from the type, which is only recorded from Victor Harbour, in its glabrous leaves, glossy-green on the upper side. In my specimen they are shorter than in the typical form (4-5 mm. as against 7-8 mm.). The Museum of Economic Botany contains specimens of var. *glabrifolius* from Kangaroo Island.

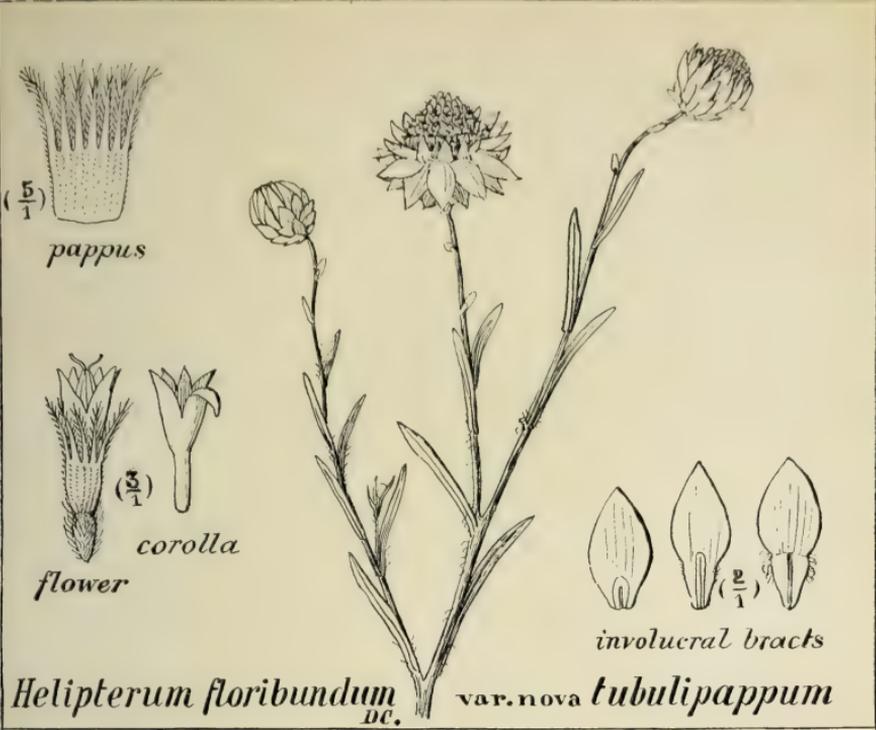
PLUMBAGINACEÆ.—**Statice psiloclada*, Boiss. Well established in places on Lefevre Peninsula (F. S. Salisbury).—An ornamental plant from the Mediterranean region.

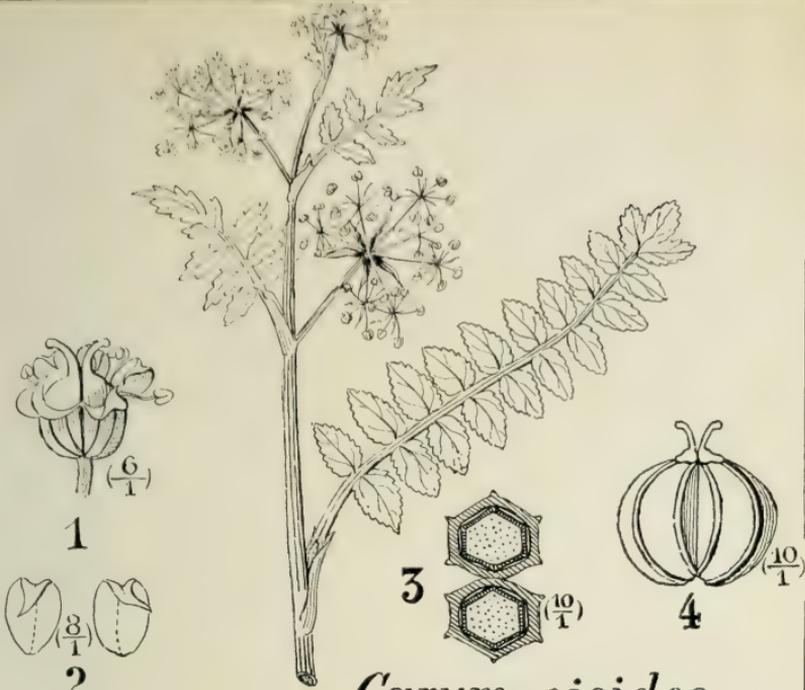
BORAGINACEÆ.—**Anchusa capensis*, Thunb. Robe (C. D. Black). A garden escape.—South Africa.

LABIATÆ.—**Calamintha Nepeta*, Savi. ("Lesser Calamint"). Roadsides near Mitcham.—Europe. **Salvia horminoides*, Pourr. This species may be very well separated from **S. Verbenaca*, L. ("Wild Sage"), as is done by many botanists. It is distinguished by corolla only slightly exceeding the calyx and leaves less deeply cut. Both species are common here.—Southern Europe.

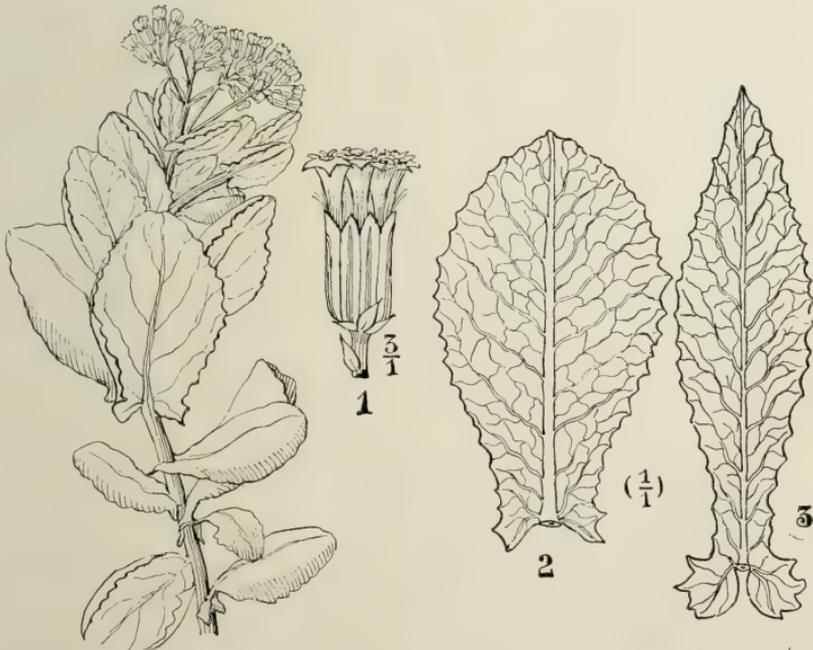
CHENOPODIACEÆ. — **Chenopodium ambrosioides*, L. ("Mexican Tea"). Port Lincoln (H. H. D. Griffith).—Southern Europe, America.

ILLECEBRACEÆ.—*Scleranthus minusculus*, F. v. M. Murray Bridge (H. H. D. Griffith).—Hitherto only recorded for Victoria.





Carum sioides sp.n.



Senecio odoratus, Hornem., var. nov. *obtusifolius*.

SCROPHULARIACEÆ.—**Linaria græca*, Chav. Common near Clarence Park.—Mediterranean region.

PLANTAGINACEÆ.—**Plantago Bellardii*, All. Bordertown (Miss Turner).—Mediterranean region.

OROBANCHACEÆ.—**Orobanche Mutelii*, Schultz. Sands near Glenelg (S. Dixon).—Mediterranean region.

PROTEACEÆ.—Note on *Grevillea quinquenervis*, Black (Trans. Roy. Soc., S. A., xxxiii., 325). This species seems to be most closely allied to the broad-leaved form of *G. oleoides*, Sieb., var. *dimorpha*, Benth. (*G. dimorpha*, F. v. M., var. *latifolia*), of Victoria and New South Wales. It is distinguished from the eastern species by leaves shorter and 5-nerved, a shorter perianth-tube with whitish tomentum and the lower half bearded internally (instead of a reddish tomentum and the upper half of the tube bearded internally). It has also a much shorter pistil.

EUPHORBIACEÆ.—**Euphorbia falcata*, L. Reephram, near Adelaide (F. S. Salisbury).—Mediterranean region.

NAIADACEÆ.—**Aponogeton distachyum*, Thunb. ("Cape Pondweed"). Creeks near Mount Lofty (H. H. D. Griffith). Probably a garden escape.—South Africa.

LILIACEÆ.—**Ornithogalum arabicum*, L. Robe. A garden escape.—Mediterranean region.

GRAMINEÆ.—**Schismus fasciculatus*, P. B. (*S. marginatus*, P. B.). Near Cockburn.—Mediterranean region and South Africa. *Sporobolus indicus*, R. Br. Banks of Torrens near Botanic Park (F. S. Salisbury) and Adelaide Park Lands.—Most warm countries, including the Eastern States of Australia and the Northern Territory.

DESCRIPTION OF PLATES.

PLATE II.

Helipterum floribundum, D.C., var. *nova tubulipappum*.—Flower, pappus, corolla, and involucral bracts.

Asterolasia muricata, sp. nov.—Flower and section of pistil.

PLATE III.

Carum sioides, sp. nova.—1, flower; 2, petals; 3, transverse section of fruit; 4, fruit.

Senecio odoratus, Hornem., var. nov. *obtusifolius*.—1, flower-head; 2, leaf of var. *obtusifolius*; 3, leaf of typical form.

OBSERVATIONS ON THE HABITS OF THE LARGE CENTRAL AUSTRALIAN MONITOR (*VARANUS GIGANTEUS*), WITH A NOTE ON THE "FAT BODIES" OF THIS SPECIES.

By E. C. STIRLING, M.D., Sc.D., F.R.S.

[Read June 13, 1912.]

PLATE IV.

As the opportunity of observing, at close quarters, the large Central Australian Monitor lizard, *Varanus giganteus*—and for that matter the same may be said of many other of our native fauna—does not often occur, I have thought that a few notes respecting some of their habits may not be without interest to members of the Society.

By the kindness of Mr. G. K. Grant Warren, of Balariung, William Creek, the National Museum received on February 9 of this year two living specimens of this species, both males, as was subsequently ascertained by dissection. Unfortunately by the misapplication of terms which is so common in Australia, the name "goanna" is commonly applied to this, as well as to some other species of Australian Varanidæ, the word being generally understood to be a corruption of iguana, which properly belongs to quite a different group of lizards that is unrepresented in Australia. The origin of the name Monitor, which constitutes the vernacular designation of the Varanidæ, is peculiar. The native name of the Egyptian representative of this group is "ouaran," which is the Arabic term for lizards in general; this word written as "waran" has been confused with the German "Warnen," to warn, hence these reptiles have been called Warn-eidechsen, or warning lizards, and it is this erroneously derived idea of warning, or admonition, which has found expression in the Latin term Monitor.⁽¹⁾

The particular species, *Varanus giganteus*, is known locally in regions adjacent to Lake Eyre as "Perentie," or by its variants "Perinthie," or "Parenthie," which words I believe have originated from a native name, though I am not aware of the tribe to which it belongs. Further north, in the MacDonnell Ranges, it is called Echunpa, in the Arunta language, and it gives its names to one of the most important totem divisions of that tribe.

For some time we have been anxious to prepare for the Museum collection some properly-mounted specimens of this reptile, and, with that view, we were glad to have the opportunity of keeping them under observation so that we might

(1) "Royal Natural History," R. Lydekker, Section ix., p. 150.

learn something of their habits and attitudes, of which very little appears to be known. With this view they were placed together in a large wire-netted cage, about 10 ft. long by 4 ft. wide by 3 ft. high, which gave them plenty of room to move about.

Though, from what can be gleaned from books, there appears to be a general similarity as to habits in all the members of this well-marked and widely-spread group, I could find but the scantiest references to this Australian species, and, supplementing our own observations by the results of inquiries made from those who know the animal in its wild state, I am able to offer a few notes of a little-known reptile that may not be without interest. Incidentally our observations have enabled us now to mount specimens in natural attitudes and so to correct various errors into which even the most careful taxidermist can scarcely avoid falling if he has never seen the animal he deals with alive.

In this connection one may express regret that so many reproductions of badly, or unnaturally, mounted specimens, or of inaccurately-drawn plates, have found their way into books of natural history purporting to give true representations of the animals in their natural state. These reproductions, repeated as they so often are from book to book, or serving as models for other mounted specimens, lead to the perpetuation of very erroneous ideas as to the real attitudes and true appearance of the animals in life. It is hoped that the illustrations accompanying this paper, which are reproductions from photographs of the living animals, will, so far as the species is concerned, at least serve as faithful models, either for the taxidermist or zoological artist, of an animal not often observed at close quarters. I think it will also be acknowledged that the Museum taxidermists have in their recently mounted specimens very accurately reproduced some of the unsuspected yet, as it appears, very characteristic attitudes of these reptiles.

The two monitors, received in a perfectly sound and healthy condition, and in process of shedding their skin in patches, were kept under observation in their cage for over three months. From what I had heard of their great voracity and comprehensive tastes in their wild state I anticipated that there would be no difficulty in feeding them, but though eggs, dead and live mice and sparrows, live guinea pigs, and a live rabbit were at different times placed in the cage, they voluntarily ate nothing, and, with the exception to be mentioned directly, they did not attempt to interfere with any of these animals, nor did the latter show any fear of their formidable companions. Thinking the reptiles might at

length be feeling the effects of starvation, and it was evident that they were becoming emaciated and less active, they were on two occasions taken out of their cage and forcibly fed with strips of raw meat—a matter of some little difficulty in the case of the larger specimen on account of his size and strength. It was after the second of these feedings, when possibly excited by the handling or by the taste of meat, that the larger reptile seized the live rabbit, then in the cage, by the loins, holding on to it with a bulldog grip that was never changed or relaxed until the victim died. But it made no attempt to eat the rabbit, though this was left dead in the cage for two days. The guinea pigs used to run over the reptiles, sometimes even perching on their heads in the most confiding way.

The result of this abstinence from food was a progressive emaciation and dwindling vigour, though on being excited they showed themselves still capable of powerful and active movements. Even at the end of the starvation period of three months the larger specimen still retained, as was shown by dissection, two solid masses of fat weighing a pound each. These will be subsequently described.

In their wild state, Mr. Warren informs me, the Perentie is practically omnivorous as regards flesh foods, its diet mainly consisting of other lizards, snakes, birds, eggs, the smaller animals, and, of late years, the rabbit, the only animal of small size that is immune to its attacks being the echidna. The late Mr. Gillen told me he saw one catch and kill a one-third grown kangaroo, and then, placing his forefeet on the body, it tore out pieces of flesh like a dog.

Everyone that has seen these reptiles in their wild state testifies to the extraordinary pace with which they can travel over the ground, and that agility was still manifest in our specimens under the limitations of their cage. In this, when moving quickly, their gait was distinctly quadrupedal, the body, head, and tail being raised some inches above the ground, but, I am informed by Mr. P. Barbe Ayliffe, that when travelling at their topmost speed the forelimbs are raised from the ground, so that their gait then becomes bipedal. We had, however, no opportunity of observing this under the restricted space in which our specimens were confined. I have myself seen this mode of progression, which recalls that attributed to some of the extinct dinosaurs, to take place in the Frilled Lizard (*Chlamydosaurus kingii*), and it has also been noticed by Mr. J. Rau, one of our taxidermists, in the case of *Amphibolurus cristatus* under extreme speed. It is probable, I think, that closer observation would show a similar mode of progression for other of the more swiftly moving lizards.

One feature of the Perentie became immediately apparent.

viz., the habitual use of the long and muscular tail as a weapon of offence. Whenever the animals became excited either by the suspicious movements of one another, or by being touched by a rod, or even by the too close presence of spectators, most vigorous blows that resounded against the sides of the cage were struck with this organ. The striking of the blow could generally be anticipated by the preparatory attitude in which the tail was held, that is to say, it was flexed well to one side in a curved position, the muscles being manifestly tense. To prevent any obstruction to the blow the thick proximal part and the end of the tail were held clear of the ground so that it touched only by a limited length of its middle portion. Mr. Gillen, who was well acquainted with these animals, informed me that he once saw a large Perentie knock down a native woman in this way by a blow on the legs, and Mr. Warren writes that he had known both forelegs of a dog to be broken in a similar manner. No one who has seen the force of these blows could have any difficulty in accepting such statements.

This offensive use of the tail is described ² in the case of *Varanus salvator*, apparently the largest member of this group, which inhabits Ceylon, the Malay Peninsula, and the islands of the Malay Archipelago, and extends, according to the British Museum Catalogue of Lizards (1885), to the Cape York Peninsula of Queensland, but I have not seen the habit noticed in the case of *Varanus giganteus*. It is, however, not unlikely a common feature of the larger members of the group. When alarmed the Perenties have a habit of running up trees in their efforts to escape, which they do with extraordinary swiftness; they have been known, also, to run up a man or a horse, probably, in their alarm, mistaking these vertical objects for trees. On one occasion, at Alice Springs, Mr. Gillen treated the lacerated breasts of a lubra who had been attacked by one, and, according to this informant, the blacks, who have a fear of these animals, state that such attacks were not uncommon. It may be, however, that the attacks are not deliberate, but that in their alarm and desire to escape they run up the first vertical object that presents itself, under which circumstances wounds would not unlikely result from the very sharp and strong claws or even from the teeth.

Notwithstanding the fear of the natives for these reptiles their flesh is esteemed a great delicacy, and it is no doubt in consequence of the appreciation of it by the adults that it is one of the foods (which, it may be observed, are generally of some gastronomic merit) that are forbidden to uninitiated boys

² "Reptiles of the World," R. L. Dismars.

of the tribe.⁽³⁾ I have also heard white men speak approvingly of the flesh of the tail of the Perentie, though in the case of one man who had often tried he stated that it always induced vomiting.

The aspect of the head and neck is very snakelike, and it was noticed that in moving amongst the branches of a dead limb placed in the cage in imitation of a small tree that the Perentie was able, while holding on by the grasp of its hind limbs only and by utilizing the tail as a lever, to project the rest of the unsupported body into space while seeking for a hold for the fore paws.

When excited or provoked they utter a sound which may be described as a combination of a hiss and of a continuous blowing sound like that of a blacksmith's bellows, and under these circumstances of provocation the throat is inflated into a large and conspicuous pouch, often to a more considerable degree than is shown in pl. iv., figs. 1 and 2; the long-forked tongue is also protruded and withdrawn with lightning-like rapidity.

They are stated to be capable of being readily tamed, and I have been told of one that used to appear regularly at stated times to be fed and to follow its adopted master about.

In their native habitat they usually live in holes in the ground, and, according to Mr. Warren, they prefer a hole that enters under a rock to one in the open ground. In these holes they hibernate from May to August, living sometimes singly and sometimes male and female together.

Distribution.—As is so often the case with many of our Australian animals, we have very little information as to the exact distribution of this species. Many, indeed, of our animals have already become extinct without our having been able to answer this question, and it will probably be the same with many others. Mr. Gillen told me that they occur in Central Australia from about Strangways Springs, in the south, to Hann's Range, about 80 miles north of the MacDonnell Ranges, but as to its range east and west of this tract I have no information. Its favourite habitat being rough, stony country, its distribution is no doubt largely determined by these conditions. The late Mr. John Bagot used to speak of them as common and of large size on what was, then, his Peake Station, which comprised the country around Warrina, and Mr. Warren writes that they are only found on certain limited parts of the rough country on Anna Creek Station.

So far these limits constitute *Varanus giganteus* a Central Australian species, but in the British Museum Catalogue of Lizards (1885) one, the type of the species, is stated as having come from the "North Coast of Australia," which seems to

(3) Spencer and Gillen, "Native Tribes of Central Australia," p. 471.

indicate that the species may have a more extended range than is indicated by its Central Australian distribution.

Size.—In this respect, as might be anticipated of such relatively large lizards, one hears most exaggerated statements. The late Mr. John Bagot, however, assured me that he had seen specimens 7 ft. 6 in. in length, and I have it from Mr. Gillen that one killed by himself measured 7 ft. 2 in. The total length of the largest of the few stuffed specimens recorded in the British Museum Catalogue of Lizards (1885)⁽⁴⁾ is given as 206 cm., or 6 ft. 9 in., but it is not stated whether this measurement referred to the actual animal, to the skin, or to the mounted specimen. A detailed statement of the dimensions of our own specimens will appear directly, but in the meantime it may be said that the total length of the larger of the two was 5 ft. 10½ in., and of the smaller 5 ft. 4½ in., and that their weights, at the close of what was practically a starvation period of more than three months, during which they manifestly lost bulk, were respectively 17 lb. and 9 lb. It will thus be seen that though not differing greatly in length there was a very marked difference in the weight of these two specimens. Not long ago we received the skin of a specimen from William Creek, the length of which, when mounted, is identical with that of the larger of our two living specimens, but this skin may have been somewhat stretched in its removal, which is very liable to happen under the hands of an unskilled operator, who was in this case an aboriginal. Relatively large amongst other lizards as are these land reptiles, they are, nevertheless, the dwarfed descendants of much larger lacertilian forms, for we have in the Museum a few vertebræ of an extinct Monitor (*Varanus priscus*, Owen) obtained at the Warburton River which, if the size may be reckoned by crocodilian comparisons, must have been 20 ft. in length, or possibly even larger.

Table showing dimensions of two specimens of *Varanus giganteus*:—

	Male A. cm.	Male B. cm.	Longest Specimen in British Mus. Cat. of Lizards (1885).
Total length	179.5	163	206
Head (maxm.)	13.6	12	14 (5)
Neck	18	15	22
Body	47.8	42.5	53
Tail	100	93.5	117
Fore limb	25.2	21	27
Hind limb	32.1	29	35
Weight, in lbs. (after 100 days' starvation period)	17	9	—

(4) This is the type specimen.

(5) It is not stated whether this refers to the maximum length of the head or to that taken in the median line, which falls short of the former. In our own specimens the maximum length is given.

In the description of the conspicuous colour-markings of this species the British Museum Catalogue, while correctly stating the neck and throat to be marked with large blackish reticulations on a white ground, adds that the belly is immaculate. In the larger of the two above-mentioned Museum specimens the chest was marked by four well-marked single, irregularly zig-zagging, but on the whole, transverse black bands, and the belly by six double bands of similar disposition, the reticular pattern appearing on the sides. A very little fore-and-aft approximation, however, of the ventral bands would have formed a reticular pattern by the meeting of the angles of the zig-zag lines. In the smaller specimen the belly was marked with a reticular pattern similar to that on the sides of the neck, only much fainter in colour.

Fat-bodies (Corpora adiposa).—A median longitudinal incision through the front of the abdominal walls exposed on either side a large lobulated, dorsoventrally compressed mass of firm, bright-yellow fat, which, but for its slender vascular attachments at the posterior end, lay free in an apparently closed extra-peritoneal cavity. The inner or median wall of this cavity was formed by a smooth, tough membrane, which apparently constituted the parietal peritoneum of the abdomen, while on the outer side the fat mass lay in close contact with the glistening inner surface of the lower ribs and abdominal walls.

The constituent lobules composing these fat masses were, for the most part, irregularly, transversely arranged, the length of the lobules being generally coincident with the width of the adipose mass, though some fell short of this, and, in consequence of their close and accurate coaptation, the body as a whole appeared as a more or less superficially lobulated, but otherwise compact, mass. The compactness was, however, only apparent, for the constituent lobules were very easily and naturally separable from one another, being held together only by a superficial connective tissue capsule of extreme tenuity and slight vascularity on the front and back of the organ, but of rather firmer texture at the ends of the lobules, where these together formed the lateral margins of the body. Thus, when the removed fat mass was held up by one end, the weight of the dependent lobules was sufficient to rupture to a great extent the connective tissue attachments of the lobules on the front and back, so that these fell away from one another for the greater part of their length, remaining joined chiefly at their ends, that is to say, at the lateral edges of the body, where the inter-lobular attachments were strongest. The appearance under these circumstances was that of a thick pad or cushion of fat perforated by transversely disposed fenestræ,



these apertures being widest at points corresponding to the centres of the lobules and becoming narrower and more slit-like towards their ends, where they still remained attached.

The combined weight of the two masses in the largest specimen at the close of a three and a half months' starvation period was 2 lb.

Concerning the full significance of these fat bodies our knowledge is still incomplete, but according to C. K. Hoffmann⁽⁶⁾ they correspond to the *corpora adiposa* of Amphibians and have some relation to the sexual activities, a view which is supported by their periodic increase and decrease of size. They reach, says this writer, their maximum of development in Spring. From the composition of these bodies it is also reasonable to suppose that they may serve as reservoirs of fat to be utilized for nutritional purposes during the hibernation period, but if so it is remarkable that they should still have been so large (constituting 12 per cent. of the total body weight) at the close of the long fast, when all other obvious adipose tissue had disappeared from the body. As, however, the animals when killed had evidently shrunk in bulk, particularly in respect to the region of the trunk, it is very probable that some amount of reduction in the fat masses had taken place.

DESCRIPTION OF PLATE IV.

Varanus giganteus.

The three figures, taken from life, represent the animals in characteristic attitudes. In figs. 1 and 2 the larger specimen shows the gular pouch inflated to a moderate degree; the latter figure also shows the body completely raised from the ground, and the tail, here concealed behind the body, was also similarly raised, as well as strongly flexed. The great length of the tail is shown in figs. 1 and 3, and the snake-like appearance of the head is seen in the case of the smaller animal in both these figures.

⁽⁶⁾ Bronn's Thierleben Abt 3, Reptilien (Eidechsen und Wassertiere, p. 994).

**NOTES ON RECURRENT TRANSGRESSIONS OF THE SEA
AT DRY CREEK.**

By WALTER HOWCHIN, F.G.S., Lecturer in Geology and
Palæontology, University of Adelaide.

[Read July 11, 1912.]

By the courtesy of Mr. T. G. Ellery, Town Clerk of Adelaide, my attention was called to an interesting section exposed by the sinking of a drainage tank connected with the City Abattoirs. The tank is situated in the south-east corner of Section 920 (Grand Junction), Hundred of Port Adelaide, at the five cross-roads, about a mile to the south of the Dry Creek Railway Station. I visited the spot in company with Mr. Filmore, an officer of the City Council, and was enabled to make a careful examination of the section, which proved to be as follows:—

	ft. in.
1. Surface soil—loamy clay	5 6
2. Reddish sharp sand, slightly argillaceous ...	2 0
3. Very compact red clay	7 6
4. Bluish, grey, to whitish clay, thickly beset with fragmental shelly matter	2 6
5. Bed of <i>Ostrea</i> , <i>Arca</i> , etc., in great numbers ...	2 0
6. Blue clay of unknown depth	0 6
	20 0

The flats between Port Adelaide and Dry Creek Railway Station have been but recently elevated above sea-level. The railway at Dry Creek is, according to the official figures, 16 ft. above low-water mark, and as the average height of the tidal wave is estimated at $8\frac{1}{2}$ ft., it follows that the railway is only $7\frac{1}{2}$ ft. above high-water level. Indeed, the elevation of the maritime plains is still incomplete, as is evidenced by the extensive estuarine area of the North Arm, with numerous reticulating creeks and swamps which occupy most of the area. The intervening land surfaces are mostly saline and covered with samphire growths. These flats have been built of estuarine mud containing shells characteristic of such a habitat. The shells can be found abundantly strewn over the surface of the ground and along the sides of the creeks, but especially on the artificial embankments that have been constructed by heaping up the adjoining mud. Among the commonest forms thus found are *Chione corrugata*, *Ampullarina quoyana*, species of *Risella*, and *Bittium estuarium*.

Several small creeks in the neighbourhood of Dry Creek arise from seepings from the higher ground, are moderately fresh, and flow north-westerly into the North Arm inlet—the tidal waters of the latter come up to within about a mile of Dry Creek.

On the eastern side of Dry Creek Railway Station there is a gradual rise of the land, which is at once made evident by a change of herbage, but in some directions the marine shells can be traced on the eastern side of the railway as well as on the western. It is, however, difficult to draw the limits of the old estuarine area as, since the retreat of the sea, a certain amount of land-wash and the accumulation of a humus soil have made a covering that obscures the estuarine silts. In constructing the new portion of the line to the Abattoirs, on the north-east side of the railway station, and at about a quarter of a mile from the latter, it was found necessary, in making an embankment, to excavate to a shallow depth the soil on either side of the permanent way, and in doing this the shelly marine clays that underlie the top soil became exposed. In this situation *Ampullarina quoyana* is very common, *Risella* is less so, and *Chione* is rare—at least so far as surface indications go. The elevation of this bed above present sea-level (tested by aneroid) appears to be about the same as that of the Dry Creek Railway Station. The slightly drier conditions at this point have permitted the growth of a travertine crust overlying the shelly bed, varying in thickness from $\frac{1}{2}$ in. to 3 in. It is not a pure limestone, but the partial decomposition of the shells has yielded a cementing agent by which the immediately overlying soil has become consolidated into a crust. The material thrown out from recently dug post-holes, adjacent to the shelly bed, supplies evidence that much of the underlying red sands have also been hardened, probably from a like cause, into a sand-rock. Marine shells were rarely found thrown out from these post-holes, which suggests that the shelly bed is superficial and, in this position, of no great thickness.

The occurrence of this raised sea-bed was recognized by the late Professor Ralph Tate soon after his arrival in South Australia, and in his Presidential Address before this Society (then known as the Adelaide Philosophical Society) in 1879, stated, "The estuarine limestone, which fringes the Dry Creek salt marsh, and which is of about 6 to 12 in. thick, and crowded with *Amphibola* [*Ampullarina*] *quoyana*, *Risella melanostoma*, and other littoral shells, is not more than 12 ft. above ordinary high-water mark. The limestone overlies the drift, but graduates into the estuarine muds and sands which occupy the salt marsh. The marsh is at rare intervals over-

flown, but extraordinary tides do not reach the estuarine limestone." (1)

The geological section exposed in the present excavation at Dry Creek is of very great interest as showing alternations of the height of the land in relation to the sea that has led to repeated modifications of our coast-line. It has been a complex movement in which the sea has twice transgressed upon the land and twice retired during recent geological times. This conclusion is reached by a twofold testimony—(1) the stratigraphical succession, and (2) the zoological evidence.

With regard to the geological succession, there are two fossiliferous horizons, one at or near the surface and the other at a depth of 18 ft. below the surface, and in between these two marine horizons there are some 16 ft. or 18 ft. of alluvial wash. The upper marine bed was not detected in the sinking now under description, but its prevalence in the neighbourhood is abundantly evident. The bed of triturated shells (No. 4 in section) which immediately overlies the oyster bed, may have accumulated, at least in part, by the action of surface water acting on the fossiliferous material after the retirement of the sea; but if we exclude this doubtful bed, there remains 15 ft. of fresh-water deposits that mark the interregnum between the two encroachments of the sea. The blue clay (No. 6 in section) that underlies the oyster bed is no doubt the tenacious blue clay of the Adelaide plains, probably of Pleistocene Age, which is met with in most sinkings in Adelaide and neighbourhood, and forms the brick-earth of our local potteries and brick-making. It is a fresh-water deposit, and marked the base of the water-level in the present sinking at Dry Creek, as the oyster bed, which is immediately above it, carried a strong runner of water.

There is a marked contrast in the organic facies of the two shell-bearing beds. The upper-bed carries just such mollusca as live in our estuaries to-day, and in about the same relative proportions. It is essentially a present-day type of deposit. The lower marine bed, in addition to carrying such forms as still live in the Port Creek, contains others that do not exist there at the present day. The large oyster, *Ostrea angasi*, which is the most striking shell in the lower bed, although plentiful, in places, in Spencer Gulf, no longer occurs, or but rarely, in our local waters; and *Arca trapezia*, which is also a very common form in the Dry Creek lower marine bed, is no longer an inhabitant of South Australian waters. These two shells do not occur in the superficial

(1) Trans. Philosoph. Soc. of Adelaide [Roy. Soc., S.A.], 1878-9, p. lxix.

marine bed, but they are the principal forms that make up the lower marine bed. The altered distribution of these two species in our local sea-areas marks an important interval of time—a measure of time that must have been sufficiently long to permit of a gradual change of conditions that led up to the total extinction of one species and local limitations of another species, in South Australian waters.

A sample of the lower marine bed was washed and on examination the following foraminifera were noted:—

Miliolina secans, d'Orb.; *M. circularis*, Bornem.; *M. undosa*, Karrer; *M. boueana*, d'Orb.; *M. oblonga*, Montagu.

Triloculina trigonula, d'Orb.; *T. tricarinata*, d'Orb.

Spiroloculina grata, Terq.

Pulvinulina repanda, Fichtel and Moll; *P. punctulata*, d'Orb.

Rotalia beccarii, Linn.

Polystomella crispa, Linn.

The above are all shallow-water forms, but scarcely typical of estuarine conditions. *Polystomella crispa* is in great numbers, and *Triloculina trigonula* and *Rotalia beccarii*, although not so plentiful as the first named, are common forms in the material. All the species present are represented by strongly built examples and are more typical of open sea conditions than a brackish estuary. On the other hand there is a remarkable absence of some of the commonest species which occur in the shallow waters of our present seas, more especially *Nubecularia*, which is the commonest foraminifer of our coasts and, in most gatherings, number more than all the other foraminifera together—yet not a single example of this form was observed in the Dry Creek material. In addition to the foraminifera several species of *Entomostraca* (*Ostracoda*) were noted.

All the shells contained in this bed were honeycombed by boring organisms to an unusual degree. Many of the shells had been perforated to such an extent that scarcely any portion of the shell preserved its solid form—and every shell appeared to have been more or less attacked in this way. The parasitic intruder was probably the minute boring sponge, *Cliona*, which makes a host of any shell or calcareous rock that it may find handy to utilize for this purpose. The waters, at the locality referred to, must have supplied congenial conditions for the development of this particular organism.

The geological section at Dry Creek shows a close accordance with similar sections that have been exposed in excava-

tions near Port Adelaide. In 1886 I submitted to the Society a short paper ⁽²⁾ on one such an exposure, and therein stated that "there are strong presumptive evidences, based on several collateral lines of proof, that the Post-Tertiary beds of the seaboard do not represent a regular succession of marine beds, but that there was a break in the continuity of their deposition. In the view we have taken, there is an *older* and a *newer* bed of recent marine, with an intercalated formation of fresh-water origin dividing the same, and connected with the fresh-water bed two horizons representing dry-land conditions."⁽³⁾

The above conclusion, reached twenty-six years ago, has received its confirmation in the Dry Creek section. When allowance is made for the different situations and the natural thinning of the beds to landward, the two sections may be regarded, in their main geological features, as practically identical. In the Glanville section the upper marine bed was laid down on an open sea beach, consisting of white sand, littoral waste, and layers of sea-weed deposited by wave action; while at Dry Creek the corresponding bed is an estuarine clay, laid down in a land-locked back-water, of which the present North Arm inlet is the shrunken remnant. The lower marine bed at Glanville is highly calcareous, in places almost a limestone, and was laid down probably under some depth of water, while the corresponding bed at Dry Creek is a silt that accumulated under shallower conditions. The range of life was much more restricted in the Dry Creek area than it was in the open sea conditions represented at Glanville. The large warm-sea foraminifer, *Orbitolites complanta*, which occurs plentifully in the Glanville section, is entirely absent from the Dry Creek bed, probably excluded by the shallowness of the waters and their more muddy condition, but the important time-indicator shell, *Arca trapezia*, is abundant in both localities.

By the courtesy of the officers of the Engineer-in-Chief's Department I am informed that the level-crossing at the railway, situated a short distance to the west of the excavation at Dry Creek, is 19.84 ft. above low-water mark. The difference of level between this crossing and the excavation is inappreciable, so that it may be said that the upper limits of the *Ostrea-Arca* bed is about 2 ft. above present low-water mark, and that, were it not for the land-wash that has dammed back the sea, the bed in question at Dry Creek would

(2) "Remarks on a Geological Section at the new Graving Dock, Glanville, with Special Reference to a supposed Old Land Surface now Below Sea-level," Trans Roy. Soc., S.A., vol. x., pp. 31-35.

(3) *Loc. cit.*, p. 35.

be submerged at high water to the extent of $6\frac{1}{2}$ ft. At Glanville the same bed, if relieved of the overburden, would be submerged at high water by about 25 ft. or 26 ft., which difference can be easily accounted for by the gradual slope of the old sea floor towards the west. In the Dry Creek section, 12 ft. to 15 ft. of fresh-water sands and clays separate the two marine deposits, while, at Glanville, the thickness of the alluvial wedge amounts to 11 ft., if we recognize the beach deposits as the base level of the upper marine bed, and 26 ft. if we take the full thickness between the lower marine and the fossiliferous estuarine clay at the top of the section, which seems to be the same horizon as that represented in the upper marine at Dry Creek.

At both Dry Creek and Glanville the lower marine bed rests on alluvium. The next marine horizon below those dealt with in this paper is that of the Lower Pliocene, proved in the boring for water put down by the Australian Smelting Company, at their works, at Dry Creek.⁽⁴⁾ The site of the bore was at the margin of the recent marine sites, 14 ft. above sea-level. The Lower Pliocene marine sands were met with at a depth of 320 ft., so that a period sufficiently long to permit of the laying down of 300 ft. of alluvial material must have intervened between the withdrawal of the Pliocene sea and its return in Pleistocene times. It may be interesting to point out that we now have evidences of five distinct recurrences of sea-intrusion in the neighbourhood of Adelaide, *viz.*, Recent, Sub-Recent, Pliocene, Miocene, and Eocene, each of which intrusions was separated from the others in the succession by long periods of dry-land conditions.

⁽⁴⁾Tate "On the Discovery of Marine Deposits of Pliocene Age in Australia," Trans. Roy. Soc., S.A., vol. xiii., p. 172, 1890.

FURTHER NOTES ON AUSTRALIAN COLEOPTERA, WITH
 DESCRIPTIONS OF NEW GENERA AND SPECIES.
 NO. XLII.

By the (late) REV. CANON BLACKBURN, B.A.
 (Communicated by Mr. A. M. LEA.)

[Read August 8, 1912.]

[Just prior to his death Mr. Blackburn had completed descriptions of numerous species of the genus *Lepidota*; he had also described a few species of other genera, and was preparing to systematically investigate the *Dynastides*. As his writings are quite ready for publication, and the types of the new species are marked as such, it appears very desirable that these, his final descriptions and notes, should be published.—A. M. LEA.]

LAMELLICORNES.

LIPAROCHRUS.

L. hackeri, sp. nov. Minus nitidus; piceo-niger, sat convexus; ovatus; supra glaber; clypeo subtiliter punctulato, antice late truncato, lateribus ante oculos subito fortiter dilatatis; prothorace fortiter transverso, antrorsum fortiter angustato, supra in disco sat lævi latera versus subtiliter subobsolete punctulato, lateribus leviter arcuatis, angulis anticis acutis posticis rotundato-obtusis, basi subtiliter marginata; elytris subtilius geminatim striatis, striis subtiliter punctulatis, interstitiis planis sparsim subtilissime punctulatis; tibiis anticis extus bidentatis. Long., 6 l.; lat., $3\frac{1}{2}$ l.

Its larger size distinguishes this species from all its allies known to me. In my tabulation of characters of the known Australian *Liparochri* (Trans. Roy. Soc., S.A., 1905, p. 271) it falls beside *L. sculptilis*, Westw., from which it differs by, *inter alia multa*, its dorsal surface almost without puncturation, the elytral interstices (the alternate ones very wide) quite flat, the much stronger crenulation of the external margin of its front tibiæ, its much longer tarsi.

L. hackeri is probably nearer to some *Liparochri* described from New Guinea than to any previously known as Australian. From the descriptions of these it differs, *inter alia*, as follows:—From *L. dux*, Arrow, by the very distinct puncturation of its elytral striæ; from *L. ingens*, Felsche, by the smooth non-tessellated interstices of its elytral striæ; from *L. papuus*, Lansb., by its dark antennæ (the flabellum, of paler colour, excepted) and quite evidently punctulate

elytral interstices; and from *L. alternans*, Macl., by its non-costulate elytra. The type seems to be a female.

North Queensland (Little Mulgrave River); Mr. Hacker; given to me by Mr. Lea.

L. geminatus, Westw. This species is very variable in respect of sculpture—especially that of the pronotum. I have examples from various localities in South and Western Australia which I cannot regard as representing more than one species, but among which there are very definitely two quite distinct types of sculpture on the pronotum—in some specimens that segment bearing extremely fine short transverse scratches, while in others the scratches (similar in shape) are very much larger and deeper (quite twice as large). The specimens with finer puncturation have also the external teeth of the front tibiæ smaller and blunter than those of the others and are on the average of smaller size. Both these forms occur near Adelaide. I observe similar differences among specimens all of which I have taken to be *L. multi-striatus*, Har., the only other *Liparochrus* of which I possess numerous specimens. I have hitherto regarded these differences as sexual. I cannot, however, discover any marked difference between the front claws of the two forms which, as pointed out by Mr. Arrow (Trans. Ent. Soc., London, 1909) distinguishes the sexes of two *Liparochri* of which I do not possess a male. I notice that in the paper quoted Mr. Arrow describes a *Liparochrus (timidus)* allied to *L. geminatus* of which he had before him “a series of specimens” and does not refer to its sexual characters, from which I assume that in it the sexual difference of the claws is wanting. The species which I take to be *silphoides*, Har., presents the sexual distinction in the claws. Mr. Arrow’s two species mentioned above as having the claw distinction and the species which I take to be *silphoides* (probably = *L. raucus*, Fairm.)—also the species described above as *L. hackeri*, of which the type is probably a female—another species which I take to be *H. sculptilis*, Westw. (probably = *H. ciliboides*, Har.), and of which I believe my specimen to be a female—*L. alternans*, Macl. (not *alternans*, as quoted by Arrow), and *L. papuus*, Har., are the only species known to me as having only two external teeth on the front tibiæ (I do not possess the description of *L. sulcatus*, Montrouz.). All of the above-mentioned species of which the male is known (and no others, so far as known) present a sexual distinction in the front claws, and all of them, so far as I know them, are of *facies* markedly different from the rest of the species attributed to *Liparochrus* (one of which, *L. geminatus*, Westw., is apparently the type species). If it should prove that the males of all of them have

asymmetrical claws it will probably be desirable to regard them as forming a genus distinct from *Liparochrus*. It may be added that Mr. Arrow, in the valuable memoir noted above, does not refer to the genus *Antiochrus*, Sharp, to the type of which he presumably has access, and on which I wrote some notes in Trans. Roy. Soc., S.A., 1905, pp. 273-5, those notes being conjectural to the extent involved in my not having seen the typical species.

PROCHELYNA.

P. heterodoxa, Burm. I have a specimen before me taken flying in the sunshine on Eyre Peninsula by Mr. J. S. Blackburn which there can be little doubt is this species. It agrees with Burmeister's description in every respect except in the scarcely perceptible tendency to reddish colouring at the base of its elytra, its being a trifle smaller than the type, and (as far as I can see) its mentum not particularly narrow. It unfortunately died with its head much depressed towards the prosternum, so that the form of its mentum—which is densely pilose—cannot be examined satisfactorily without breaking the specimen—indeed, in any case, dissection would be necessary. But even if the form of the mentum does not quite square with Burmeister's description, the close agreement with the decidedly unusual characters of sculpture, etc. (especially the elytra completely and quite strongly striate in their hinder half, but in front non-striate except close to the suture, the strongly pointed pygidium, the red bristles fringing the elytra), would certainly, I think, point to the probability that Burmeister's description of the mentum is defective rather than to the likelihood of two species occurring in South Australia so closely resembling each other and yet differing in the form of the mentum. I note some hairs about the margin of the pronotum suggestive of the probability that my specimen is abraded (as was, in that case, probably Burmeister's type), and that in a fresh specimen the pronotum is more or less pilose.

P. rubella, Schauf. There is no mention in the brief description of this species of any character indicative of its being rightly referred to *Prochelyna*, or even to the *Systellopid* Group—nor, on the other hand, of any character inconsistent therewith. I have hitherto considered that the phrase “(*pronoto*) *utrinque medio tubere prædito*” rendered it unlikely to be a *Systellopid*, but the examination of a specimen referred to below under “*Atholerus*” has shaken that opinion, and there seems to be no definite ground left, apart from Schauffuss having called it a *Prochelyna*, for referring it to any particular genus. It is much to be desired that the type be examined and reported on.

ATHOLERUS.

A specimen from the Swan River belonging to Mr. Lea is, I think, certainly a member of this genus, and I can find no reason to separate it generically from the specimen discussed above as being probably *Prochelyna*, unless a dissection of the mouth organs of both species should serve the purpose. Even as *species* the two are decidedly close. The specimen from Swan River agrees very well with the description of the typical species (*A. obscurus*, Shp.)—also from Swan River—except in its elytra being wholly fuscous (the lateral margins excepted) and not at the base only. It seems, however, to be certainly distinct sexually from the specimen I refer to *Prochelyna*, its antennal flabellum being much shorter, its tarsi evidently shorter, its pygidium notably less vertical and much more convex, and its ventral segments distinctly longer. Its most remarkable character, however, consists in the presence on the middle of the pronotum, a little behind the front, of a small deep fovea on the level of the general surface in its hinder part, but in its front part sinking into the general surface in such fashion that its front part has a semi-circular vertical wall, on either side of which there is a small but distinct tubercle. As the other characters of the specimen are fairly conclusive of its being a female, and this prothoracic fovea seems like a male character, I should be disposed to regard it as an accidental abnormality, were it not for the reference mentioned above to the presence of two tubercles on the pronotum of a species which Schaufuss has referred to *Prochelyna*. Unfortunately the *Systellopides* are so rarely met with that I have never yet been able to examine two specimens that are unquestionably the sexes of a single species. It should perhaps be added that the present insect and that I have discussed under *Prochelyna* can scarcely be the sexes of a single species, on account of considerable difference in elytral striation—which is not likely to be of a sexual character.

LIPARETRUS.

L. confusus, sp. nov., Mas. Sat breviter ovalis; parum nitidus; niger, antennis palpis tarsis et (basi excepta) elytris plus minusve rufis; corpore toto pilis erectis vestito, his in capite pronoto et elytris obscure fulvis alibi cinereis; antennis 8-articulatis; clypeo subnitido, leviter subgrosse punctulato, antice late leviter emarginato; fronte confertim subtilius rugulosa; prothorace sat fortiter transverso, antice sat angustato, supra æquali, confertim sat fortiter ruguloso, lateribus arcuatis; elytris crebre fortiter nec grosse vix seriatim punctulatis, haud striatis, costulis vix manifestis circiter 2 instructis; tibiis

anticis extus 3-dentatis; tarsorum posticorum articulo 2^o quam basalis sat longiori.

Fem. latet. Long., 3½ l.; lat., 1¼ l.

This species is a member of my 14th Group of *Liparetri* (Trans. Roy. Soc., S.A., 1905), and in the tabulation (*loc. cit.*) must stand beside *nigrinus*, Germ., from which it differs by, *inter alia*, smaller size, bicolorous almost absolutely non-costulate elytra, darker pilosity of dorsal surface, and much more asperate pygidium and propygidium. It is perhaps nearest to the species I have treated as *L. sylvicola*, Fab., but differs from it by the very much less coarse sculpture of its dorsal surface (especially of the pronotum and propygidium), the much narrower black base of its elytra, etc. It differs from both the species just mentioned by the front of its clypeus widely emarginate.

Victorian Alps; Buffalo Mountain.

ANEUCOMIDES.

With much reluctance I find it necessary to refer provisionally to *Aneucomides*, the insect to be described below, since, in spite of great difference in facies and in some structural characters that would be generic in many groups of *Coleoptera*, I can find no structural distinction except in respect of characters that are certainly variable within the limits of some genera in the *Sericoides*. Unfortunately I have been unable to examine some of the mouth parts of the type-species of *Aneucomides*, as its specimen still remains unique, and it is not unlikely that the maxillæ might furnish a valid generic difference if they could be dissected in *A. coloratus*, but without such dissection the present insect must certainly be placed in *Aneucomides*.

A. hirticollis, sp. nov., Mas. Sat elongatus, subparallelus; sat nitidus; testaceus, capite antennis pedibusque nonnihil rufescentibus; capite sparsim, pronoto pygidio et corpore subtus dense, hirsutis; palpis maxillaribus valde elongatis, articulis 2^o quam 3^{us} multo longiori, 3^o 4^o que inter se sat æqualibus; maxillarum lobo externo sat fortiter bidentato; mento et palpis labialibus fere ut *A. colorati*, Blackb.; labro fere ut *A. colorati* sed magis exstanti; antennis sat elongatis, 8-articulatis, laminis 4 instructis (his articulis basalibus 4 conjunctis longitudine sat æqualibus, antennarum articulo 4^o intus angulato; oculis sat magnis vix manifeste granulatis; capite confertim subtiliter punctulato; clypeo antice rotundatum modice reflexo; prothorace quam longiori duplo latiori, fere ut caput punctulato, antice parum angustato, lateribus leviter arcuatis, angulis anticis sat

rectis posticis leviter obtusis; elytris subtiliter geminatim striatis, sat sparsim vix subtiliter nec profunde punctulatis, interstitiis alternis quam cetera multo angustioribus obsolete convexis; pygidio abrupte verticali, antice subtiliter leviter (postice vix manifeste) punctulato; abdomine brevi confertim subtiliter sat profunde punctulato (segmento apicali fere lævi excepto); pedibus sat robustis, femoribus posticis sat fortiter tumidis, tibiis anticis extus tridentatis (posticis brevibus transversim unicarinatis a basi ad apicem fortiter dilatatis), tarsis elongatis gracilibus quam tibiæ multo longioribus; unguiculis gracilibus elongatis simplicibus.

Fem. latet. Long., 7 l.; lat., $3\frac{1}{2}$ l.

A much more elongate and narrow species than *A. coloratus*, Blackb., with the facies of a somewhat narrow *Haplonycha*. The antennæ are structurally much like those of *A. coloratus*, but decidedly longer and more slender, the maxillary palpi very different, but not more so than is frequent between species of *Haplonycha*. The abdomen short, strongly punctulate, and with extremely strong ventral sutures is characteristic of both species.

Western Australia (exact locality not known). Given me by Mr. French.

HETERONYX.

H. cribripennis, sp. nov. Modice elongatus, postice parum dilatatus; subnitidus; ferrugineus; supra pilis brevibus adpressis vestitus; clypeo crebre subtilius ruguloso, antice truncato, oculos in exteriorem partem haud superanti; labro clypei planum superanti; capite antice (a tergo oblique viso) tripliciter convexo (parte mediana quam laterales haud multo angustiori); fronte subgrosse vix crebre punctulata; hac clypeoque ut plana vix disparia visis; antennis 8-articulatis, articulo 3^o quam 2^{us} sat multo breviori; prothorace quam longiori ut 7 ad 4 latiori, antice minus angustato, vix crebre nec profunde punctulato (puncturis circiter 20 in segmenti longitudine), lateribus (superne visis) leviter arcuatis, angulis anticis parum productis posticis (superne visis) rectis vix retrorsum productis, basi leviter bisinuata, margine basali sat æquali; elytris confertim subtiliter punctulatis (trans elytron puncturis circiter 45); pygidio sat fortiter sat crebre punctulato; coxis posticis quam metasternum sat brevioribus, quam segmentum ventrale 2^{um} sat longioribus; tarsorum posticorum articulo basali quam 2^{us} parum breviori quam 3^{us} paullo longiori; unguiculis appendiculatis, parte apicali parva. Long., $3\frac{1}{2}$ l.; lat., $1\frac{2}{5}$ l.

This is an easily recognizable species, the feebly impressed puncturation of its pronotum and elytra with the punctures of the latter very much finer and closer than of the former being unusual in *Heteronyx*. It is a member of my Group VI. (Trans. Roy. Soc., S.A., 1910, pp. 149, etc.), and in the tabulation of species of that group falls beside *cygneus*, Blackb., on account of its clypeus not extending laterally beyond the contour of the eyes. The two may be thus distinguished:—

- H. Punctures of pronotum deeply impressed
and sparse (about 15 in the length) *cygneus*, Blackb.
HH. Punctures of pronotum much smaller,
fainter, and closer *cribripennis*, Blackb.

South Australia (Cleve); taken by Mr. J. S. Blackburn.

H. johannis, sp. nov. Ovatus, sat brevis; parum nitidus; ferrugineus, elytris nigro-fuscis; supra pilis adpressis minus brevibus cinereis vestitus; clypeo subtilius minus crebre ruguloso, antice subtruncato, oculos in exteriorem partem haud superanti; labro clypei planum superanti; antice haud perpendiculari; capite antice (a tergo oblique viso) tripliciter convexo (parte mediana quam laterales fere duplo angustiori); fronte crebre sat subtiliter punctulata; hac clypeoque fere planum continuum efficientibus; antennis 9-articulatis; prothorace quam longiori ut 9 ad 5 latiori, antice minus angustato, supra subtiliter sat crebre nec profunde punctulato (puncturis circiter 26 in segmenti longitudine), lateribus (superne visis) sat rotundatis, angulis anticis manifeste productis posticis (superne visis) rotundato-obtusis, basi vix bisinuata, margine basali sat æquali; elytris subtiliter confertim nec profunde punctulatis (trans elytron puncturis circiter 55), obsolete striatis; pygidio minus crebre minus subtiliter nec profunde punctulato; coxis posticis quam metasternum haud brevioribus, quam segmentum ventrale 2^{um} multo longioribus; tarsorum posticorum articulo basali 2^o longitudine sat æquali; unguiculis posticis elongatis appendiculatis, parte basali quam apicalis haud longiori. Long., 4 l.; lat., 2½ l.

The colouring of this species (entirely ferruginous except black-brown elytra) if constant distinguishes it from nearly all other *Heteronyces*. It is a member of my Group VIII., and in the tabulation of the species of that group (Trans. Roy. Soc., S.A., 1910, pp. 187, etc.) falls beside *waterhousei*, Blackb., from which it differs (besides colour) by, *inter alia*, labrum (as in *H. xanthotrichus*, Blackb.) not hav-

ing the front face perpendicular, middle lobe of trilobed outline of head much narrower, form shorter and wider, dorsal surface notably less nitid, prothorax more transverse, with sides more rounded, elytra quite visibly striate, basal two joints of hind tarsi scarcely different in length. It is to be noted that the punctures of the pygidium are very notably less close and less fine than those of the rest of the dorsal surface.

South Australia (Cleve); taken by my son, Mr. John S. Blackburn.

H. difficilis, sp. nov. Sat elongatus, postice vix dilatatus; minus nitidus; ferrugineus; supra pilis adpressis brevis vestitus; clypeo crebre subtilius ruguloso, antice emarginato, oculus in exterioriorem partem haud superanti; labro clypei planum superanti; capite antice (a tergo oblique viso) tripliciter convexo (parte mediana quam laterales duplo angustiori); fronte subtilius sat crebre punctulata; hac clypeoque ut plana minus disparia visis; antennis 9-articulatis; prothorace quam longiori ut 9 ad 5 latiori, antice modice angustato, supra crebre subtiliter punctulato (puncturis circiter 35 in segmenti longitudine), lateribus (superne visis) sat arcuatis, angulis anticis sat acutis modice productis posticis (superne visis) obtusis, basi leviter bisinuata, margine basali sat æquali; elytris confertim subtiliter punctulatis (trans elytron puncturis circiter 50), obsolete substriatis; pygidio nitido piloso sparsius punctulato; coxis posticis quam metasternum vix brevioribus quam segmentum ventrale 2^{um} multo longioribus; tarsorum posticorum articulo basali quam 2^{us} multo (quam 3^{us} parum) breviori; unguiculis posticis elongatis, appendiculatis, parte basali quam apicalis vix longiori. Long., 5 l.; lat., 2 $\frac{2}{3}$ l.

A member of my Group VIII. In the tabulation of species of that group (Trans. Roy. Soc., S.A., 1910, pp. 187, etc.) stands next to *H. scalptus*, Blackb. Compared with *scalptus* the present species (which is really very close to it) is notably smaller, with sides of prothorax more rounded, puncturation of pronotum and elytra distinctly a little less extremely fine, pygidium much more nitid and considerably less closely punctulate, etc. This insect is also near *H. waterhousei*, Blackb., and *H. johannis*, Blackb., differing from the former by, *inter alia*, its substriate elytra; from the latter by, *inter alia*, very different colouring and conspicuously convex subsutural interstice; and from both by larger size and narrower form.

South Australia (Cleve); taken by Mr. J. S. Blackburn.

STETHASPIS.

Since I dealt with this genus (Trans. Roy. Soc., S.A., 1911) I have obtained specimens which enable me to supplement my former notes with some important additions. Mr. Carter has sent me a male of each of the two species that I regard as *S. eucalypti*, Boisd., and *metrosideri*, Burm., and of which I had previously known only the females. *Metrosideri* was described on a female. The examination of these males is conclusive as to the distinctness of the species which I have regarded as *eucalypti*, Boisd., from the species that I have called *metrosideri*. The male sent by Mr. Carter of the former species has an antennal flabellum of 6 laminae, while in the flabellum of the other male the laminae are only 5, and so there can remain no doubt that the species I have considered to be *metrosideri* and *eucalypti* are distinct species. In my former memoir (*loc. cit.*) I expressed a doubt about my identification of *metrosideri*, and the examination of the male does not throw fresh light directly upon the point. It, however, brings out the fact that the absence of erect hairs on the ventral segments, which Burmeister regarded as a specific character, is only sexual, as this male has erect hairs like those of *eucalypti*. Indirectly, however, the study of this male tends to confirm my identification, inasmuch as the legs of the specimen in question are green, and that character (together with the presence of erect hairs on its ventral segments) removes practically all doubt about the identification of it with *S. latus*, Blanch.—discussed in my former notes—and settles the point, I think, that *latus* and *metrosideri* are, as conjectured in my former paper, one species—the latter being the female. The name *latus* has priority. It should be added that the green colouring of the legs of the male is probably not a sexual character, since it appears also in a female of *eucalypti* sent by Mr. Carter with the male. The male *latus* has in its elytral striæ the double rows of short white setæ which my former paper noted as present in the female, and that character is certainly a valid specific distinction from *eucalypti*; also the punctures in the elytral striæ are much closer in *latus* than in *eucalypti*, and the external teeth on the front tibiæ of the male are much stronger in the former than in the latter. *Latus* and *eucalypti* differ from all the other *Stethaspides* known to me in their much longer metasternal process.

S. sternalis, sp. nov., Mas. Supra viridis, capite pronoto elytrisque plus minusve testaceo-marginatis, sternis obscure ferrugineis, abdomine pygidioque obscuris, antennis palpis pedibusque rufis; pilis erectis sat elongatis albidis (in fronte pygidio femoribus et segmentis

ventralibus sat crebre, in pronoto elytrisque sparsissime, in sternis dense) vestitus; capite fortiter sat crebre punctulato, clypeo antice truncato-vix-emarginato subtiliter marginato nec reflexo; antennis 9-articulatis, articulo 3^o valde elongato, flabello 6-laminato, laminis quam antennarum articuli ceteri conjuncti parum brevioribus, lamina basali quam ceteræ parum breviori; prothorace quam longiori ut 10 ad 5 $\frac{2}{3}$ latiori, antice valde angustato, supra sparsim (ad latera magis crebre) punctulato, lateribus pone medium sinuatis, angulis anticis obtusis posticis acute rectis, basi piloso-fimbriata fortiter bisinuata; scutello fere ut pronotum punctulato; elytris, fere ut *S. eucalypti*, Boisd., fortiter punctulato-striatis, puncturis setæ albidas perbreves uniseriatim ferentibus, interstitiis convexis lævibus; pygidio crebre subtilius (quam *S. eucalypti* multo minus subtiliter) aspero; processu sternali nullo, sterno antice declivi-carinato; tibiis anticis extus modice bidentatis (quam *S. eucalypti* magis, quam *S. læti*, Blanch., minus, fortiter); tarsis elongatis sat gracilibus; segmentis ventralibus minus crebre minus subtiliter punctulatis.

Fem. latet. Long., 10 $\frac{1}{2}$ l.; lat., 5 $\frac{1}{2}$ l.

Five specimens (all males) of this insect occurred to me on the Buffalo and other mountains of the Victorian Alps, at a high elevation. The species resembles *S. eucalypti*, Boisd., of same sex, in its 6-laminate antennal flabellum (the laminae, however, are distinctly longer, especially the basal one in proportion to the others), but differs strongly in the absence of a sternal process; the sternum ending at the level of the intermediate coxæ as an obtuse carina vertically truncate. Other notable distinctions consist in the clypeus not reflexed in front, the much less fine asperity of the pygidium, the much less fine and less close puncturation of the ventral segments, the greater length and less robustness of the tarsi, the evidently more strongly developed external teeth of the front tibiæ. From the insect mentioned above as *lætus*, Blanch., this species differs by, *inter alia multa*, the 6-laminate antennal male flabellum and the absence of a sternal process; from *S. monticola*, Blackb., by the male antennal flabellum with 6 long laminae, the pronotum non-pilose and thinly punctulate, etc.; from *piliger*, Blanch., and *nigrescens*, Blanch., by, *inter alia multa*, its very much greater size. It should, perhaps, be added that I have taken a *Stethaspis* (female only) in the Dividing Range of Victoria which may possibly be the female of this species, but since its sternal process is distinctly less obsolete than in the males from the Alps (not, apparently, a sexual character in other

species), and there are other minor differences, it is more likely to be the female of another species of which I have not seen the male.

Victorian Alps.

The additional material that is now before me enables me to supply a much more satisfactory statement in tabular form than my previous paper contained of the distinctive characters of the known Australian *Stethaspides*, as follows:—

- A. Sternal process elongate and acuminate, very strongly passing the middle coxæ.
- B. Punctures of elytral striæ small and close, and bearing white setæ in a double row. Flabellum of male antennæ with only 5 laminæ ... lætus, *Blanch.*
- BB. Punctures of elytral striæ notably larger and less close; setæ very sparse and not in double rows. Flabellum of male antennæ with 6 laminæ ... eucalypti, *Boisd.*
- AA. Sternal process scarcely, or not, passing the middle coxæ.
- B. Pronotum non-pilose (except a few hairs about front and base) and thinly and finely punctulate. Flabellum of male antennæ with 6 long laminæ ... sternalis, *Blackb.*
- BB. Pronotum entirely pilose.
- C. Pygidium confluently asperate. Colour not black.
- D. Punctures of elytral striæ 1-3 similar. Flabellum of male antennæ with only 5 long laminæ (1) ... monticola, *Blackb.*
- DD. Punctures of 2nd elytral stria notably larger and sparser than of 1 and 3. Flabellum of male antennæ with 6 long laminæ ... piliger, *Blanch.*
- CC. Pygidium not nearly confluently sculptured. Colour black. Flabellum of male antennæ with 6 very long laminæ (much longer than joints 1-3 together) ... nigrescens, *Blanch.*

RHOPÆA.

In the tabulated statement of the distinctive characters of species of this genus (*Trans. Roy. Soc., S.A., 1911, p. 189*) there is the following error to be noted, *viz.*, against the letter "C." the word "twice" is omitted. The lines should

(1) Joint 4 of the antennæ is scarcely more than dentiform within.

read "Joint 3 of antennæ not longer than *twice* its width at the apex," corresponding to "Joint 3 of antennæ much more than twice as long as wide" against "CC."

PARALEPIDIOTA.

P. lepidoptera, sp. nov., Mas. Sat elongata, postice parum dilatata; rufotestacea, antennarum flabello dilutiori; supra squamis parvis albidis vestita, his in capite pronoto pedibusque sparsis sat crassis in elytris sparsis subtilibus magis setiformibus in pygidio subtilibus sat confertis; sternis et meso-thorace pallide fulvo-villosis; segmentis ventralibus squamis minimis albidis sat confertim vestitis; clypeo latera versus grosse sparsim punctulato, alte reflexo, antice emarginato; fronte in parte postica crebre minus grosse punctulata; palporum maxillarium articulis 2^o modico 3^o brevi 4^o quam 2^{us} 3^{us} que conjuncti nonnihil longiori, hoc supra late profunde excavato; antennis 10-articulatis, articulis 3^o quam 2^{us} sat longiori 4^o brevi intus spiniformi 5^o-10^o fortiter laminiformibus (lamina basali quam ceteræ paullo breviori; prothorace quam longiori ut 5 ad 3 latiori, antice sat fortiter angustato, supra sparsim subfortiter punctulato, lateribus fortiter crenulatis mox pone medium subangulatis, angulis posticis acute rectis, basi subtiliter marginata; scutello sat crebre minus fortiter punctulato; elytris longitudinaliter leviter costulatis, sat crebre vix fortiter punctulatis; pygidio crebre subtilius punctulato; tibiis anticis extus fortiter tridentatis, posticis transversim vix manifeste carinatis; tarsis posticis quam tibiæ paullo brevioribus; unguiculis magnis, intus pone medium dente parvo instructis; segmento ventrali apicali postice late emarginato. Long., 11 l.; lat., 5¼ l.

Feminae palpis maxillaribus quam maris brevioribus, antennarum articulo 4^o haud spiniformi flabello multo breviori, prothorace ad latera dilatato vix angulatum, elytris minus concinne punctulatis, tarsis brevioribus, segmento ventrali, apicali haud emarginato. Long., 12 l.; lat., 5½ l.

In this species the prothorax is somewhat conspicuously small as compared with the elytra, and is very strongly convex. The lamellæ of the antennal flabellum of the male are fully as long as joints 1-4 together. A thick fringe of long fulvous hairs protrudes over the base of the elytra from beneath the basal margin of the pronotum. There is no apparent sternal projection behind the front coxæ. I am fairly certain that the male and female described are specifically identical, since the only differences I find between

them are in respect of obviously sexual characters, with the exception of the slight difference in the lateral curve of the prothorax, which is perhaps a little puzzling; but the general agreement in non-sexual characters is too close to allow of their being considered two species. The male was given to me by Mr. Lea, labelled "Cairns"; the female by Mr. Perkins, labelled "N. Queensland."

North Queensland.

LEPIDODERMA.

I have recently procured a type-written copy of Brenske's treatise on this genus referred to in my previous paper (Trans. Roy. Soc., S.A., 1911, p. 197), and find that its author had not extended the limits of the genus to include species that, in my opinion, should not be placed there. It was his inclusion of *Antitrogus* in *Lepidiota* which led to the thought that a similar extension of *Lepidoderma* might possibly bring into the number of the new species he described under that name the insect for which I founded the genus *Paralepidiota*. I have now given to it a specific name and description (*vide supra*). As Brenske's treatise occurs in a publication of the *Societas Entomologica*, which, I am informed, is out of print, a brief *resumé* of its contents will probably be useful to Australian workers on the *Coleoptera*. The treatise is, on the whole, rather disappointing for the reason that, although it contains a lengthy note on the relation of *Lepidoderma* to the *Leucopholides*, there is no reference in it to the spurs of the hind tibiæ, which in his former paper on the *Leucopholides* discussed by me (*loc. cit.*) Brenske regarded as of value higher than even generic; and that omission leaves one in doubt whether he had perhaps come to the conclusion expressed by me that the importance he gave in his earlier paper to the character in question ought not to be accepted without hesitation.

In his general remarks on *Lepidoderma* Brenske expresses the opinion which I also expressed (*loc. cit.*), that the ordinarily accepted subdivision of the "True Melolonthides" cannot be satisfactorily applied to the Australian genera, and he states that although *Lepidoderma* under the ordinary classification would fall among the *Polyphyllides*, he thinks its true place is among the *Leucopholides* (where I placed it). He does not refer to the clypeal character which determined me in the matter, but bases his opinion on the *facies* and on the build of some of the mouth characters. He also mentions a character in *Lepidoderma* as distinguishing it from other *Melolonthid* genera known to him in the hind femora being

narrowed in the basal part (not, as in other genera, of evenly curved outline). I had not observed that character myself; though it is not very strongly marked, the note of its presence is certainly a valuable contribution to the diagnosis of the genus. Brenske finds a reason for the inapplicability to Australian genera of the ordinary classification in the theory that some primitive forms which have disappeared elsewhere have survived in Australia.

Brenske then proceeds to add three new species to the genus, but does not give a formal description of them, merely placing them in a tabular statement of the distinctive characters of the *Lepidodermata* and stating their size and habitat. The habitat of only one of them (*waterhousei*, from Queensland) is exactly known, *lansbergei* being attributed to "Australia" and *glaber* apparently being of altogether doubtful habitat ("Cornwallis Island?"). Without a formal description it is, of course, impossible to identify these species confidently except by comparison with the types, but I have in my collection two species of the genus (both from Queensland) which agree in respect of the characters mentioned in the tabulation with *waterhousei* and *glaber*. As Brenske's memoir is not procurable I subjoin an extract from his tabulation (which includes species from New Guinea and Arou) showing how he differentiates Australian species:—

- | | | |
|------|--|-----------------------------|
| A. | Pronotum smooth, with small dispersed punctures. Elytra likewise nitid, with diffused shallow punctures in which are white scales. Long., 28-31 mm. | glaber, <i>Brenske</i> |
| AA. | Pronotum smooth, with dispersed punctures larger. Elytra closely punctured with numerous raised smooth wrinkles interspersed. The scales are small, not covering the surface. Long., 24 mm. | waterhousei, <i>Brenske</i> |
| AAA. | Pronotum closely punctulate, with smooth raised spaces intermingled. | |
| B. | Elytra very closely punctulate, without coarser punctures intermingled, but with some smooth spaces behind the middle. Scales very close. Long., 27-30 mm. | albohirtum, <i>Waterh.</i> |
| BB. | Elytra very closely and finely punctured with numerous coarser punctures intermingled, with dispersed feeble wrinkles, and a spot on either side behind the middle. The scales are strong but not covering the surface. The pygidium is coarsely wrinkled, sparsely scaled. Long., 32 mm. | lansbergei, <i>Brenske</i> |

LEPIDIOTA.

L. bovilli, sp. nov., Mas. (?) Sat elongata, postice modice dilatata; obscure rufa, antennis tarsis elytrisque plus minusve dilutioribus; squamis albidis, his supra parvis nonnihil setiformibus subæqualiter vix crebre dispositis (in pygidio magis crebre, apice glabro excepto), subtus paullo majoribus magis crebre dispositis, vestita; metasterno haud piloso; capite crebre fortiter ruguloso, clypeo sat alte reflexo antice sat fortiter emarginato; palporum maxillarium articulo apicali sat elongata subcylindrico, supra haud excavato; antennarum articulo 3^o quam 2^{us} quamque 4^{us} manifeste longiori, flabelli laminis quam antennarum articulus basalis subbrevioribus; prothorace quam longiori ut 7 ad 4 latiori, antice haud marginato parum angustato, supra sat crebre (latera versus creberrime) sat fortiter punctulato, lateribus crenulatis paullo pone medium fortiter dilatato-rotundatis, angulis anticis parum productis obtuse rectis posticis (superne visis) acute rectis, basi haud marginata manifeste bisinuata; seutello fere ut pronotum punctulato; elytris crebre sat fortiter nonnihil rugulose punctulatis; costulis bene definitis instructis; pygidio crebre minus fortiter punctulato, ad apicem subito declivi in hac parte nitido nec squamifero tibiis anticis extus fortiter tridentatis; tibiaram posticarum calcaribus sat angustis modico elongatis; segmento ventrali apicali transversim leviter impresso; tarsis posticis quam tibiæ sat brevioribus.

Femina minus angustata, postice magis dilatata, calcaribus posticis magis dilatatis, pronoti disco (exempli typici) paullo minus crebre magis grosse punctulato. Long., $8\frac{1}{2}$ l.; lat., $3\frac{3}{5}$ -4 l.

The sexual characters in this species are very slight. The stronger and less close puncturation of the pronotum of the female may be only an individual variation. In general appearance *L. bovilli* resembles *L. rothei*, Blackb., and *koebeleri*, Blackb., differing from them both, however, by, *inter alia*, its pronotum scarcely narrowed in front and its more strongly emarginate clypeus.

Northern Territory (Port Darwin); sent by the late Dr. Bovill.

L. koebeleri, sp. nov., Mas. Minus elongata, postice sat dilatata; obscure rufa, antennis dilutioribus; sat nitida; squamis albidis, his supra parvis nonnihil setiformibus vix crebre sat æqualiter dispositis, subtus paullo majoribus magis crebre dispositis, vestita; metasterno haud piloso;

capite inæqualiter subgrosse punctulato, clypeo minus fortiter reflexo antice leviter emarginato; palporum maxillarium articulo apicali minus elongato subovali, supra haud excavato; antennarum articulo 3^o quam 2^{us} et quam 4^{us} nonnihil longiori, flabelli laminiis quam antennarum articulus basalis vix longioribus; prothorace quam longiori ut 7 ad 4½ latiori, antice haud marginato leviter angustato, supra subinæqualiter sat crebre sat fortiter (latera versus confertim) punctulato, lateribus vix crenulatis postice vix marginatis paullo pone medium fortiter dilatato-rotundatis, angulis anticis minus productis sat rectis posticis (superne visis) acute rectis, basi subtilissime vix perspicue marginata leviter bisinuata; scutello fere ut pronotum punctulato; elytris nisi circa scutellum magis crebre sat rugulose punctulatis manifeste leviter costulatis; pygidio subtilius sat crebre punctulato; tibiis anticis extus sat fortiter tridentatis; tibiarum posticarum calcaribus angustis modice elongatis; segmento ventrali apicali sat æquali; tarsis posticis quam tibiæ sat brevioribus. Long., 7½ l.; lat., 4½ l.
North Queensland; sent to me by Mr. Koebele.

L. rubrior, sp. nov., Fem. Minus elongata, postice sat dilatata; obscure rubra, pedibus plus minusve piceis; sat nitida; supra squamis minutis subsetiformibus pallide fulvis sparsim (in pygidio magis crebre), subtus squamis manifeste majoribus vix setiformibus vix fulvescentibus (in medio abdomine et in pedibus sparsim, alibi crebre) vestita, metasterno haud piloso; capite crebre profunde subgrosse ruguloso, clypeo sat fortiter reflexo, antice profunde emarginato; palporum maxillarium articulo apicali subcylindrico sat elongato, supra haud excavato; antennarum articulo 3^o quam 2^{us} et quam 4^{us} manifeste longiori, flabelli laminiis antennarum articulo basali longitudine sat æqualibus; prothorace quam longiori ut 7 ad 4½ latiori, antice marginato sat fortiter angustato, longitudinaliter inæqualiter in medio lævi subelevato, antice fere ut caput sed postice minus crebre punctulato, lateribus fortiter crenulatis paullo pone medium sat fortiter dilatato-rotundatis antice quam postice manifeste magis alte reflexis, angulis anticis sat acutis sat productis posticis (superne visis) obtusis fere rectis, basi marginata vix bisinuata; scutello crebre sat fortiter punctulato; elytris manifeste costulatis (costula externa postice quam ceteræ multo magis perspicua), sat crebre sat rugulose quam pronotum manifeste subtilius punctulatis; pygidio sat crebre subrugulose sat fortiter punctulato, apice emarginato tibiis anticis extus fortiter

tridentatis; tibiaram posticarum calcaribus sat brevibus sat dilatatis; segmento ventrali apicali postice late transversim impresso; tarsis posticis quam tibiæ sat brevioribus. Long., $8\frac{1}{2}$ l.; lat., $4\frac{1}{5}$ l.

This species is easily recognizable by the characters cited in the tabulation.

Queensland. I have no note of the exact locality.

L. suavior, sp. nov., Mas. Minus elongata, postice sat dilatata; castanea, antennarum media parte, palpis, pedibusque plus minusve obscurioribus; squamis ovalibus albidis crebre vestita, squamis in capite elytris pygidioque quam alibi manifeste minoribus; metasterno sparsim piloso; supra crebre minus fortiter punctulata; clypeo in media parte lævi, antice minus fortiter emarginato, modice reflexo; palporum maxillarium articulo apicali breviter late ovali, supra fortiter excavato; antennarum articulo 3^o 2^o sat æquali quam 4^{us} manifeste longiori, flabelli laminis quam antennarum articulus basalis sat longioribus; prothorace quam longiori ut 9 ad 5 latiori, antice sat angustato haud marginato, longitudinaliter inæqualiter in medio lævi subelevato, lateribus leviter crenulatis sat longe pone medium modice dilatato-rotundatis antice quam postice vix magis alte reflexis, angulis omnibus rotundato-obtusis, basi leviter bisinuata haud marginata; scutello in media parte longitudinaliter lævi; elytris subtiliter parum manifeste costulatis; tibiis anticis extus fortiter tridentatis; tibiaram posticarum calcaribus elongatis modice angustis; segmento ventrali apicali æquali; tarsis posticis tibiis longitudine sat æqualibus.

Feminae antennarum flabello quam maris sat breviori; calcaribus posticis magis dilatatis; segmento ventrali apicali antice foveis duabus profundis impresso; corpore subtus (exempli typici) minus perspicue squamifero; pygidio apicem versus nitido sparsim punctulato nec squamifero. Long., 10 l.; lat., $5\frac{1}{5}$ l.

The puncturation and scaling of this species is very even, in the sense that there is very little difference in them in the different parts of the insect, beyond that the scales of the dorsal surface are quite evidently a little smaller than those of the ventral segments, legs, etc.

North-West Australia (Roebuck Bay).

L. perkinsi, sp. nov., Mas. Sat elongata, sat parallela; rufo-castanea, antennis dilutioribus; squamis parvis rotundis albidis vestita [in capite pronoto et elytris minus crebre, in pygidio magis crebre, in corpore subtus confertim, in

pedibus (in his squamis paullo majoribus) sparsim]; metasterno sparsim fulvo-piloso; capite crebrius minus fortiter punctulato; clypeo in media parte lævi, modice reflexo, antice sat fortiter emarginato; palporum maxillarium articulo apicali subcylindrico, quam latiori triplo longiori; supra haud excavato; antennarum articulis 2^o-4^o longitudine sat æqualibus, flabelli laminis antennarum articulo basali longitudine sat æqualibus; prothorace quam longiori ut 9 ad 5 latiori, antice subtiliter marginato leviter angustato, supra crebrius subfortiter punctulato, lateribus crenulatis mox pone medium fortiter dilatato-rotundatis antice quam postice vix magis alte reflexis, angulis anticis obtusis nullo modo prominulis posticis (superne visis) acute rectis, basi minus fortiter bisinuata haud continuatim marginata; scutello et elytris fere ut pronotum punctulatis (his suturam versus paullo magis crebre et magis rugulose), elytrorum costulis bene definitis; pygidio crebrius subtilius nonnihil acervatim punctulato; tibiis anticis extus minus fortiter tridentatis (dente summo parum definito); tibiaram posticarum calcariibus angustis sat elongatis, subtus pernitidis; segmento ventrali apicali postice foveatim leviter impresso et ad apicem in medio anguste leviter emarginato; tarsis posticis quam tibiæ parum brevioribus.

Feminae antennarum flabello quam maris sat breviori; calcariibus posticis dilatatis, subtus opacis ad apicem leviter concavis; segmento ventrali apicali postice profunde semicirculariter late impresso; corpore subtus (exempli typici) vix perspicue squamifero. Long., 10-11 l.; lat., 4½-4¾ l.

Differs from all the preceding by the raised edging of its pronotum being (where it margins the front of the front angles) an extremely fine line not raised above the general surface, together with those angles being quite blunt and not directed forward.

North Queensland: Cairns (Mr. Lea—his No. 8900—and Mr. Perkins).

L. leai, sp. nov., Mas. Minus elongata, postice leviter dilatata; minus nitida; picea, plus minusve rufescens, antennarum et femoribus dilutioribus flabello dilutiori; squamis sat parvis albidis (nonnullis ochraceis intermixtis) crebre vestita (his in pygidio minoribus, in pedibus sparsioribus, in elytris oblongis setiformibus); supra crebre minus fortiter (pygidio subtilius) punctulata; metasterno sparsim fulvo-piloso; clypeo leviter reflexo, antice sat fortiter emarginato; palporum maxil-

larium articulo apicali sat breviter ovali, supra sat fortiter excavato; antennarum articulo 3^o basali longitudine sat æquali quam 4^{us} paullo longiori, flabelli laminis quam antennarum articulus basalis vix brevioribus; prothorace quam longiori ut 11 ad 6½ latiori, antice haud marginato parum angustato, lateribus crenulatis sat longe pone medium leviter dilatato-rotundatis antice quam postice paullo magis alte reflexis, angulis anticis sat rectis posticis (superne visis) acutis retrorsum directis, basi modice bisinuata haud marginata; elytris vix perspicue costulatis; tibiis anticis extus minus fortiter tridentatis; tibiarum posticarum calcaribus angustis elongatis; segmento ventrali apicali æquali; tarsis posticis quam tibiæ parum brevioribus.

Fem. latet. Long., 12 l.; lat., 5½ l.

The presence of ochraceous scales mixed with the white ones gives this species a very mottled appearance suggestive of the species that I take to be *squamulata*, Waterh.; but in the latter that appearance is even more conspicuous, owing to the scales being notably larger, of rounded form, and those of ochraceous colour more numerous (especially on the elytra). On the ventral segments, however, the ochraceous scales are almost wanting in the latter, while in *L. leai* the lateral parts are almost entirely clothed with them.

Western Australia.

L. frenchi, sp. nov., Mas. Sat elongata, sat parallela; obscure ferruginea, antennis palpisque dilutioribus; leviter pruinosa; squamis minutis albidis vestita [in capite pronoto et elytris sparsius, in pygidio magis crebre, in corpore subtus creberrime, in pedibus (in his squami paullo majoribus) sparsim]; metasterno coxisque posticis fulvo-pilosis; capite crebre fortiter punctulato, clypeo leviter reflexo, antice sat fortiter emarginato; palporum maxillarium articulo apicali subcylindrico, quam latiori fere triplo longiori, supra haud excavato; antennarum articulo 3^o quam 2^{us} et quam 4^{us} nonnihil longiori, flabelli laminis quam antennarum articulus basalis vix longioribus; prothorace quam longiori ut 11 ad 6½ latiori, antice marginato leviter angustato, supra subtiliter sat crebre nonnihil acervatim punctulato, lateribus crenulatis mox pone medium sat fortiter dilatato-rotundatis antice quam postice multo magis alte reflexis, angulis anticis sat rectis posticis (superne visis) subacutis nonnihil retrorsum directis, basi modice bisinuata haud continuatim marginata; scutello et elytris fere ut pronotum punctulatis, his perspicue costulatis; pygidio crebre subtilissime punctulato; propygidio diffirmi; tibiis

anticis extus sat fortiter tridentatis; tibiaram posticarum calcaribus elongatis, minus angustis; segmento ventrali apicali æquali; tarsis posticis quam tibiæ sat brevioribus. Long., 13 l.; lat., $5\frac{3}{4}$ l.

Femina quam mas minus parallela, magis lata; illius antennarum flabello vix breviori, tarsis robustioribus et paullo brevioribus; pygidio postice in medio tuberculo parvo instructo et ad apicem dente minuto armato; tibiaram posticarum calcaribus brevioribus magis dilatatis, calcare longiori apicem versus subtus concavo.

This species differs from all other *Lepidiotæ* known to me by the structure of its propygidium. Apart from that character it is near *L. negatoria*, Blackb., but differing from it by, *inter alia*, notably closer and finer puncturation of dorsal surface (pygidium very much more, instead of less, closely punctured than the elytra); prothorax much less narrowed in front with sides as viewed from above much less strongly arched. Differs from *caudata*, Blackb., and *deceptrix*, Blackb., by base of pronotum not continuously margined, and, *inter alia*, from the former by very much finer sculpture of dorsal surface, and from the latter by punctures of pronotum very much finer, punctures of elytra much closer, prothorax notably wider in front and having hind angles much less acute. The structure of the propygidium is very peculiar. That segment is very strongly and widely emarginate in the middle and is on two planes; its front part is not punctured and the hind edge of this front part is more or less reflexed and defined; behind the hind edge of the front part the segment becomes declivous—almost vertical—and this narrow declivous hind piece is punctured and furnished with very fine whitish scales.

Queensland (Cairns); male from Mr. French; female from Mr. Lea (his No. 13011).

L. deceptrix, sp. nov., Fem. Robusta, postice manifeste dilatata; rufo-ferruginea; supra squamis minutis albidis sparsim vestita; subtus squamis minutis albidis vestita (in media parte sparsim, latera versus confertim); metasterno et coxis posticis pilis elongatis pallide fulvis dense vestitis; capite crebre subfortiter punctulato; clypeo sat alte reflexo, antice sat fortiter emarginato; palporum maxillarium articulo apicali subcylindrico, quam latiori triplo longiori, supra haud excavato; antennarum articulo 3^o quam 2^{us} manifeste (quam 4^{us} haud) longiori, flabelli lamini quam antennarum articulus basalis vix longioribus; prothorace quam longiori ut 23 ad 13 latiori, antice marginato sat fortiter angustato, supra minus

crebre sat fortiter nonnihil acervatim punctulato, lateribus crenulatis mox pone medium fortiter dilatato-rotundatis antice quam postice multo magis reflexis, angulis anticis obtuse rectis posticis (superne visis) fortiter acutis divergentibus, basi marginata sat fortiter bisinuata; scutello fere ut pronotum punctulato; elytris sparsim subtilius punctulatis, obsolete costulatis; pygidio sparsius subtiliter punctulato, ad apicem in medio dentiformi; tibiis anticis extus sat fortiter tridentatis; tibiis posticarum calcaribus modice dilatatis opacis; segmento ventrali apicali vix impresso. Long., 12 l.; lat., $6\frac{3}{4}$ l.

This is the species that I formerly regarded as the female of *L. caudata*, Blackb. (Trans. Roy. Soc., S.A., 1890, p. 85). The subsequent examination of more numerous specimens of *Lepidiota* has satisfied me that the type of *caudata* (which I regarded as a male) is a female, and consequently that the differences which I regarded as sexual are specific.

Queensland.

L. caudata, Blackb. Sat elongata, postice minus dilatata; piceo-ferruginea, nonnihil iridescens; supra squamis minutis albidis sparsim vestita; subtus squamis minutis albidis vestita (in media parte et in pedibus sparsim, latera versus confertim); metasterno pilis elongatis pallide fulvis dense vestitis; clypeo crebre fortiter punctulato, minus alte reflexo, antice sat fortiter emarginato; fronte subgrosse punctulato; palporum maxillarium articulo apicali subcylindrico, quam latiori fere triplo longiori, supra haud excavato; antennarum articulo 3^o quam 2^{us} manifeste (quam 4^{us} nonnihil) longiori, flabelli lamina antennarum articulo basali longitudine sat æqualibus; prothorace quam longiori ut 12 ad 7 latiori, antice minus fortiter angustato marginato, supra minus crebre sat fortiter vix acervatim punctulato, lateribus crenulatis mox pone medium sat fortiter dilatato-rotundatis antice quam postice multo magis alte reflexis, angulis anticis obtuse rectis posticis (superne visis) sat acute rectis nec divergentibus, basi marginata sat fortiter bisinuata; scutello fere ut pronotum punctulato; elytris sparsius minus subtiliter punctulatis, sat manifeste costulatis; pygidio crebre rugulose nec grosse punctulato, ad apicem in medio dentiformi; tibiis anticis extus sat fortiter tridentatis; tibiis posticarum calcaribus modice dilatatis minus nitidis; segmento ventrali apicali pone apicem profunde semicirculariter impresso; tarsi posticis quam tibiis harum tertia parte breviori. Long., 12 l.; lat., $6\frac{1}{4}$ l.

Maris antennarum flabello quam feminae vix longiori; coxis posticis pilosis; tibiaram posticarum calcaribus nitidis sat angustis; pygidio quam feminae paullo minus crebre punctulato, postice inermi; segmento ventrali apicali sat aequali; forma magis angusta magis parallela. Long., 12 l.; lat., $5\frac{3}{5}$ l.

When I described this species I erroneously believed the type to be a male and *L. deceptrix* to be its female. There is now no doubt of their being females of two species. I have therefore redescribed them both. A comparison of the descriptions will indicate numerous slight differences, but the most conspicuous differences are: the hind angles of prothorax divergent in *deceptrix*, together with, in that species, dorsal surface non-iridescent and of lighter colour, hind coxae distinctly pilose in female, and elytra and pygidium distinctly more finely punctulate. The male described above was given to me some time ago by Mr. Lea (his No. 5535), and is certainly the male of this species (Brenske's notes on the spurs of the hind tibiae being assumed correct).

Queensland.

L. townsvillensis, sp. nov., Mas. Modice elongata, postice minus dilatata; rubro-ferruginea; supra (pygidio excepta) haud squamosa; subtus et in pygidio squamis minutis albidis vestita (his in pygidio sparsis, in corpore subtus in media parte sparsissimis latera versus confertis; sat nitida; metasterno coxisque posticis fulvo-pilosis; capite grosse punctulato; clypeo sat alte reflexo, antice leviter emarginato; palporum maxillarium articulo apicali ovali, quam latiori circiter duplo longiori, supra profunde excavato; antennarum articulo 3^o quam 2^{us} vix quam 4^{us} haud longiori, flabelli laminis quam antennarum articulus basalis duplo longioribus; prothorace quam longiori ut 9 ad $5\frac{1}{2}$ latiori, antice sat fortiter angustato marginato, supra coriaceo et sparsius subgrosse punctulato, utrinque pone medium fovea magna et fere ad medium altera minore impresso (his oblique positis), lateribus leviter crenulatis mox pone medium minus fortiter dilatato-rotundatis antice quam postice multo magis alte reflexis, angulis anticis rotundato-obtusis posticis (superne visis) obtusis, basi marginata sat fortiter bisinuata; scutello fere ut pronotum punctulato; elytris fere ut pronotum sed multo magis leviter punctulatis, vix perspicue costulatis; pygidio minus fortiter sat crebre subrugulose punctulato; tibiis anticis extus tridentatis, dente summo subobsoleto; tibiaram posticarum (his ad apicem haud dilatatis) calcaribus nitidis sat gracilibus spiniformibus; segmento ventrali apicali sat anguste

minus perspicue emarginato; tarsis posticis quam tibiæ vix brevioribus. Long., 9-10 l.; lat., $4\frac{2}{3}$ - $4\frac{1}{2}$ l.

This species is probably near *L. crinita*, Brenske, but is clearly distinct from it by numerous differences—among others, the quite strongly bisinuate base of its pronotum, the absence of hairs and scales on its dorsal surface, and its elytra with scarcely any indication of longitudinal costæ, which are faintly traceable here and there only from certain points of view. The flabellum of the antennæ is about equal in length to the five preceding joints together. The conspicuous foveæ on the pronotum, being exactly similar in the two specimens before me, seem likely to be more than a merely accidental character. I do not think the specimens are abraded. It should be noted that the puncturation of the dorsal surface becomes distinctly finer near the lateral margins than in the middle parts.

Queensland (Townsville). From Mr. Perkins.

L. gilesi, sp. nov., Mas. Elongata, sat augusta, postice minus dilatata; rubro-ferruginea; minus nitida; supra pilis minutis albidis setiformibus in capite et elytris sparsim, in pronoto confertim, vestita; pygidio ventrique pilis brevibus vestitis; metasterno coxis posticis et pedibus longe pallide fulvo-pilosis; femoribus posticis autem squamis albis sat crassis sparsim vestitis; capite crebre inæqualiter sat grosse ruguloso; clypeo modice reflexo, antice parum emarginato; palporum maxillarium articulo apicali sat dilatato, supra excavato; antennarum articulo 3^o quam 2^{us} haud (quam 4^{us} vix) longiori, flabelli lamina quam antennarum articulus basalis fere triplo longioribus; prothorace quam longiori ut 8 ad $5\frac{1}{2}$ latiori, antice sat fortiter angustato marginato, supra confertim subtilius ruguloso, areis nonnullis præsertim in media parte glabris nitidis instructo, lateribus nonnihil crenulatis mox pone medium rotundatis parum dilatatis antice quam postice multo magis alte reflexis, angulis anticis rotundato-obtusis posticis (superne visis) fere rotundatis, basi subtiliter marginata minus fortiter bisinuata; scutello fere ut elytra punctulato; his subfortiter sat crebre ruguloso-punctulatis, parum manifeste costulatis; pygidio crebre subtilius ruguloso; tibiis anticis extus fortiter tridentatis; tibiarum posticarum calcaribus modice angustis, nec a basi ad medium dilatatis; segmento ventrali apicali simplici; tarsis posticis quam tibiæ vix brevioribus. Long., 9 l.; lat., 4 l.

North-West Australia (Giles); sent by Mr. Carter (his No. 12).

L. negatoria, sp. nov., Mas. Elongata; sat parallela; ferruginea, nonnihil picescens, elytris antennis tarsisque dilutioribus; sat pruinosa; supra squamis minutis albidis sparsim vestita; subtus squamis minus minutis albidis vestita (in media parte, et in pedibus, sparsim, latera versis confertim); metasterno coxisque posticis pilis elongatis pallide fulvis dense vestitis; capite crebre fortiter punctulato; clypeo minus alte reflexo, antice sat fortiter emarginato; palporum maxillarium articulo apicali subcylindrico, quam latiori triplo longiori, supra haud excavato; antennarum articulo 3^o quam 2^{us} et quam 4^{us} vix longiori, flabelli laminis quam antennarum articulis basalis manifeste longioribus; prothorace quam longiori ut 11 ad 6½ latiori, antice marginato fortiter angustato, supra sparsius subtilius nonnihil acervatim punctulato, lateribus leviter crenulatis mox pone medium fortiter dilatato-rotundatis antice quam postice multo magis alte reflexis, angulis anticis obtuse rectis posticis (superne visis) acutis retrorsum directis, basi modice bisinuata haud continuatim marginata; scutello et elytris fere ut pronotum punctulatis, his perspicue costulatis; pygidio sparsius subtiliter punctulato; tibiis anticis extus sat fortiter tridentatis; tibiis posticarum calcaribus nitidis angustis spiniformibus; segmento ventrali apicali æquali; tarsis posticis quam tibiæ parum brevioribus. Long., 13 l.; lat., 5½ l.

This species is near *L. deceptrix*, Blackb., and *caudata*, Blackb., but differs from both by its pronotum not margined at the base. From *caudata* it differs also by, *inter alia*, the acute hind angles of its prothorax (which is much more strongly narrowed in front) and the very much finer and sparser puncturation of its pygidium. From *deceptrix* it differs by its prothorax very evidently more strongly narrowed in front and by the finer and much less close puncturation of its pronotum (about 20 instead of about 30 punctures in the length of the segment).

Queensland (Port Mackay).

A. Metasternum pilose.

B. A well-defined nitid beading all across front of pronotum, and front part of lateral margins of pronotum strongly reflexed and with strong reflexed margins continued round front of angles.

C. Base of pronotum with a continuous raised beading preceded by a distinct transverse stria.

D. Front angles of pronotum strongly and sharply defined.

E. Basal angles of pronotum sub-spiniform and divergent ...

deceptrix, Blackb.

- EE. Basal angles of pronotum not as in E. caudata, *Blackb.*
- DD. Front angles of pronotum obtusely rounded.
- E. Pronotum sparsely punctured townsvillensis, *Blackb.*
- EE. Pronotum confluentely punctured gilesi, *Blackb.*
- CC. Base of pronotum not with a continuous distinct edging.
- D. Pronotum sparsely punctured (about 20 punctures in its length). Metasternum densely albido-pilose negatoria, *Blackb.*
- DD. Pronotum notably more closely punctured. Metasternum thinly pilose.
- E. Propygidium as two planes frenchi, *Blackb.*
- EE. Propygidium normal perkinsi, *Blackb.*
- BB. Front of pronotum not continuously margined, or not as B.
- (2)C. Middle tooth of front tibiæ much nearer to apical than to basal one darwini, *Blackb.*
- D. Clypeus feebly emarginate. Scutellum feebly punctured squamulata, *Waterh.*
- E. Hind angles of pronotum sharp leai, *Blackb.*
- EE. Hind angles of pronotum roundly obtuse suavior, *Blackb.*
- AA. Metasternum not pilose.
- B. Pronotum quite strongly narrowed in front.
- C. Clypeus strongly emarginate (a line across clypeus at back of emargination at least no further from clypeal suture than from furthest front of clypeus).
- D. Pygidium very finely and confluentely punctured (elytral costæ well defined) grata, *Blackb.*
- DD. Pygidium much less finely and closely punctured (elytral costæ very feeble).
- E. Pronotum distinctly margined both at base and apex rubrior, *Blackb.*
- EE. Pronotum distinctly margined neither at base nor apex degener, *Blackb.*
- CC. Clypeus very feebly emarginate.
- D. Elytra very closely punctured rothei, *Blackb.*
- DD. Elytra less closely punctured.
- E. Pronotum very coarsely rugulose rufa, *Blackb.*
- EE. Pronotum not as E. koebelei, *Blackb.*
- BB. Pronotum very wide in front bovilli, *Blackb.*

(2) The table as drawn up by Mr. Blackburn was evidently intended to be rewritten, as many of the words were abbreviated, some notes not intended for publication were on it, and there is no CC. to correspond with the present one, nor any DD. Still I think it will be found useful as now given.—A. M. LEA.

MACROPHYLLIDES.

This aggregate stands in Lacordaire's classification as the 7th "subtribe" of the *Melolonthides*, the *Melolonthides* being treated by him as the first "Tribe" of the second "Legion" (*Lamellicornes Pleurostictiques*) of the "Family" *Lamellicornes*. As, however, a "subtribe" (*Systellopides*) has been added in the Tribe since the date of Lacordaire's work, and is (rightly, I think) placed as its first member, the *Macrophyllides* become the 8th subtribe. Of the eight subtribes three are not as yet known to occur in Australia, and therefore this subtribe is the 5th as far as Australian *Melolonthides* are concerned. I have already discussed this classification more fully in former papers (e.g., Trans. Roy. Soc., S.A., 1905, p. 276), and now merely summarize the outline for the sake of convenience. A tabular statement of the characters of the subtribes will be found in the memoir just referred to. It should be noted, however, that in the statement the *Macrophyllides* stand as the *last* of the subtribes known to be Australian, whereas in the following pages of this present memoir I am referring an Australian species to the 8th of Lacordaire's subtribes (the 9th including the *Systellopides*)—viz., the *Pachypodides*, and that that subtribe should therefore be added after the *Macrophyllides*. Lacordaire distinguishes the *Pachypodides* from the other subtribes by its "mouth organs partly atrophied." The *Systellopides* also have mouth organs partly atrophied, but differ from the *Pachypodides* by, *inter alia*, their labrum on the plane of the clypeus projecting forward from that organ.

Of known Australian *Melolonthid* species only one appertains to the *Macrophyllides*, viz., *Othnonius batesi*, Olliff. There can, however, be little doubt that the Australian insect on which Erichson founded his genus *Holophylla* (without naming the species) is a *Macrophyllid*, and is distinct from *Othnonius batesi*. I have discussed that genus in a former paper (Trans. Roy. Soc., S.A., 1911, pp. 181, etc.), in removing it from the true *Melolonthides*, and have nothing fresh to be added now concerning it.

PACHYPODIDES.

ZIETZIA.

When I described this genus (Trans. Roy. Soc., S.A., 1894, p. 205) I attributed it to the *Macrophyllides*, but my subsequent study of the Australian *Melolonthides* has made me very doubtful for some time past whether I was right in placing it there, on account of its simple claws and its facies. The fact is that at the time I described it I had the

misfortune to break my dissections of the mouth parts and was not able to furnish details of them, beyond such as I could gather from inspection of the fragments. A small fragment of a maxilla had a small tooth, and so I merely stated of the maxilla that it was "toothed," and on that ground considered it excluded from the *Pachypodides* and excluded from that aggregate I could only regard it as a *Macrophyllid* aberrant in facies and in respect of its claws. I have now made a more successful dissection, with the result of considering it an aberrant *Pachypodid*. The outer lobe of its maxillæ is not altogether atrophied, as Lacordaire states those of the *Pachypodides* to be, but it is extremely feeble—a mere short, straight, ciliated projection, which, however, becomes corneous at the extreme apex, and is there bifid, so as to simulate two minute teeth, which in a fragmentary maxilla I took to be apices of a larger tooth. In all other respects the mouth parts agree well with those of the *Pachypodides*, the mentum being very small without a visible ligula and the labial palpi having their apical joint cylindrical and about three times as long as the preceding joints (which are extremely minute) together. I feel no doubt that this very remarkable insect is a *Pachypodid*, aberrant to the extent of having the outer lobe of its maxillæ a little more developed than is usual in that aggregate.

This seems to be the first true *Pachypodid* recorded from Australia, for although Erichson referred to the aggregate a genus which he characterized under the name *Prochelyna*, Dr. Sharp has pointed out the probability that that genus (of which, however, he had not seen a representative) ought to be placed in his "*Systellopides*," and in this I have no doubt of his correctness, as I have before me an insect recently taken by my son, Mr. J. S. Blackburn (and also discussed in this paper), which is almost certainly *Prochelyna heterodoxa*, Burm. (Erichson did not describe a species of the genus), and it is certainly a *Systellopid*.

I have already referred to the characters and position of the *Pachypodides* in this present memoir under the heading "*Macrophyllides*." This is the last of the *subtribes* of *Melolonthides* known at present to inhabit Australia.

RUTELIDES (Second Tribe of *Melolonthides*).

The essential characters distinguishing this Tribe from the other Tribes of *Melolonthides* are shown in a tabular statement in a former paper of this series (Trans. Roy. Soc., S.A., 1905, p. 276). The *Rutelides* are fairly numerous in Australia, and include many of our largest and most beautifully coloured *Melolonthid* species. I do not, however, pro-

pose to deal with them in this Revision of the Australian *Melolonthides*, because an eminent European student (Dr. F. Ohaus, of Hamburg) has made them the special object of his investigation. He has published already (Stett. ent. Zeit., 1904, pp. 57, etc.) a most interesting "Revision der *Anoplognathiden*" (a subtribe of *Rutelides* to which nearly all the known Australian species of the Tribe appertain), and is at present—as he informs me—proceeding with his work on the remaining subtribes. I therefore gladly refer Australian students of this aggregate to his valuable treatises, and for the present, at any rate, abstain from dealing with the matter more particularly.

DYNASTIDES.

The classification of the Australian genera of this Tribe (which is the third of the Tribes into which Lacordaire divides his second "Legion" of *Lamellicornes*—vide Trans. Roy. Soc., S.A., 1905, pp. 275, etc.) cannot be satisfactorily ordered in accordance with that set forth by Lacordaire. That author reduces below the level of even generic rank a character which, as far as the Australian *Dynastides* are concerned, appears to me to be the primary one by which the Tribe should be divided into two main aggregates, viz., the structure of the apex of the posterior tibiæ which is either (a) ciliate or (b) non-ciliate. In this Tribe it is particularly difficult to find available generic characters which are neither sexual nor such as involve the dissection of the mouth organs—both of them, no doubt, of great importance (especially the former), but both of them highly inconvenient for practical purposes; the structure of the posterior tibiæ, however, is easily observed, and divides the Australian genera into two aggregates, all in one of which resemble each other in facies much more than they resemble any genus in the other aggregate. M. Lacordaire's classification must be discussed here, in order to show the objection to its use for Australian genera. He separates from all the rest of the Tribe two small subtribes characterized one by the structure of the mandibles, the other by the position of the base of the labial palpi. The former of those is not known to be Australian, and therefore need not be discussed here. To the latter he attributes *Cryptodon* and (conjecturally) *Semanopterus* of Hope (which he calls, probably by a clerical error, *Semanotus*, making no remark on the change of name). I have dissected a number of species of *Semanopterus*, and find that the labial palpi are inserted as Lacordaire conjectures them to be, under the edge of the mentum, so that the basal joint is more or less concealed; but inasmuch as the subtribe

(*Phileurides*) to which this decidedly obscure character would refer *Semanopterus* is treated as containing genera both with ciliate and non-ciliate posterior tibiæ, it does not appear to me a natural arrangement in respect of the Australian *Dynastides* to regard *Semanopterus* (including *Asemantus*) and *Cryptodus* as representing an aggregate of equal rank with one containing all the other genera, as would have to be done if Lacordaire's classification were strictly adhered to, especially since there is no other conspicuous character that I have been able to discover that would suggest *Semanopterus* being widely distinct from several other genera of those having the posterior tibiæ ciliate. As regards *Cryptodus* there is so little resemblance between its mouth organs and those of *Semanopterus* (beyond the bare fact that the labial palpi are not entirely exposed in either), and the two are so ultra-dissimilar in facies and in almost all characters that I have no doubt they ought to be placed in distinct primary divisions of the Tribe. My want of knowledge of *Phileurides* occurring in other countries than Australia disqualifies me for the task of criticising the contents of that aggregate in general, but I find it hard to believe that genera with posterior tibiæ truncate and ciliate ought to be associated with genera having those tibiæ digitated and non-ciliate, and still harder to believe that species so differing from each other ought to be placed in the same genus, as Lacordaire places species which he attributes to the genus *Phileurus*.

After distinguishing the two subtribes referred to above from the rest of the *Dynastides*, Lacordaire divides the remainder into subtribes founded on the structure of the front tibiæ of the male. It may well be, and probably is, the case that this is in reality of great importance in a natural classification, but (as Mr. Arrow has pointed out—Tr. Ent. Soc., Lond., 1908) characters appertaining to one sex only are objectionable—in the sense of "inconvenient," no doubt, he means. The reason of that, I take it, is simply that it prevents generic apportionment of species of which only one sex is known; but there seems to be no reason for saying that it does not, in the scheme of Nature, represent a divergence as fundamental as that connected (say) with the form of the mentum. My limited knowledge (and I admit it is limited) of *Dynastides* outside Australian forms seems to point to the probability that the presence of sexual characters in the front tibiæ is much more than a trivial character; but I agree that, so long as there are numerous species of which one sex only is known, the character is unworkable, and therefore that M. Lacordaire's aggregates founded on it should be rejected for the present. In one of these aggregates M.

Lacordaire places three subtribes, only one of which (*Oryctides*) is known as Australian, and he distinguishes that subtribe from the other two by its presenting sexual characters in the head and prothorax. That particular character, so far as concerns Australian *Dynastides* known to me, need not be discussed here, inasmuch as the subtribes without sexual characters in either front tibiæ or head or prothorax are not known to occur in Australia, but its classificatory value is certainly discounted by the extraordinary variability of development in the sexual structure of the head and prothorax within the limits of a genus or even of a species (some males of *Dasygnathus*, for example, having head and pronotum very little, and others enormously, different from those segments in the female).

M. Lacordaire divides the *Dynastides* having sexual characters in the front tibiæ into two subtribes (distinguished from each other by non-sexual characters), but as only one of these (the "true *Dynastides*") is known, or likely to be Australian, their differences need not be discussed in this memoir. The following, then, is M. Lacordaire's arrangement of the *Dynastides* so far as concerns those of his subtribes known to be Australian:—

- | | |
|--|------------------------|
| A. Labial palpi inserted on the sides of
the mentum. | |
| B. Front tibiæ similar in the two sexes | Oryctides |
| BB. Front tibiæ sexually elongate in
the males | true <i>Dynastides</i> |
| AA. Labial palpi inserted in the internal
face of the mentum | Phileurides |

The first of the above subtribes (*Oryctides*) includes in Lacordaire's arrangement nearly all the *Dynastid* genera of Australia, and is subdivided into four "Groups" (all of them Australian). Here for the first time the structure of the posterior tibiæ finds a place in the tabulations, three groups being distinguished from the other group (true *Oryctides*) by having those organs truncate and ciliate at their apex, though for some unaccountable reason he places in the true *Oryctides* *Dasygnathus*, which has posterior tibiæ strongly ciliate. The three groups with ciliate posterior tibiæ are distinguished by the presence of sexual characters in the antennæ (*Oryctomorphides*) and the feebly (*Pentodontides*) or strong (*Pimeloides*) triangular form of the basal joint of the hind tarsi. The antennal sexual character (though no doubt an extremely important one) is, like other sexual characters, unsatisfactory, at any rate for the present. As regards the distinction, *inter se*, of the two Groups not having sexual characters in the antennæ by the more or less triangular form of the basal joint of the hind tarsi there are too great differences in that

respect within the limits of a genus to justify the importance that Lacordaire assigns to it. For example, *Cheiroplatys* is placed in the Group having that joint feebly triangular and *Horonotus* in the other Group, but there is really very little difference between the degree of triangularity in some species of *Cheiroplatys* and some of *Horonotus*. This same character moreover is variable with sex, the males (in at least some species) of *Pimelopus*, for instance, having the basal joint of the hind tarsi quite evidently less strongly dilated at the apex than their females. The result of all this is that a female *Dynastid* cannot be confidently referred to its Group by the use of Lacordaire's subtribal or group characters, and the same remark may be applied to Burmeister's classification, at any rate in respect of Australian species, that author also basing his main aggregates on sexual characters.

The classification of the *Dynastides*, excluding characters that either are sexual or cannot be ascertained without dissection, is no doubt extremely difficult, and some characters that one would naturally turn to as hopeful are found to fail when a long series of species are examined. The form of the mandibles is one of those, the presence of teeth or notches on the external outline being very conspicuous in some mandibles and entirely wanting in others; but it is certainly not strictly and invariably a generic character, the greatest possible diversity existing within the limits of *Isodon* (for example) in the form of the external outline of those organs; in the species which I take to be *I. pecuarius*, Reiche (for instance), the external edge of the mandibles is strongly dentate, while in the species that I have no doubt is *I. australasiae*, Hope, the external edge is not even distinctly sinuate, although there is an obtuse projection directed forward at the apex—not on the lateral margin—which is, no doubt, what Lacordaire refers to when he says "*mandibules terminées en dehors par une dent seule large et obtuse.*" So again with the greater or less *projection* of the mandibles; it varies either specifically or according to their attitude when the insect died. In *Novapus* a generic character is asserted "*mandibulæ crassæ porrectæ,*" which is the case with all my specimens of *N. crassus*, Shp. (the typical species), but in the closely allied *N. adelaidæ*, Mihi, the appearance of the mandibles is scarcely different from that in *Isodon australasiae*, Hope.

The presence and form of organs of stridulation again is not always generic. In *Isodon puncticollis*, Macl., they are present as two short lines of a transverse rugæ, in *I. australasiae* they are wanting, in an undescribed species before me which I hesitate to separate from *Isodon* they are present

as two rugate carinæ running the whole length of the propygidium. If this and the last-mentioned character were insisted on as generic *Isodon*, as it now stands, would need to be broken up into four genera, and still further division would be necessary in it if the sexual characters of the tarsi were taken into account.

The number of transverse carinæ on the posterior tibiæ would suggest itself as likely to be a character of generic rank; but, again, it falls short of more than specific value, for in some genera (notably *Pimelopus*) species with posterior tibiæ transversely bicarinate are quite closely allied with others in which those tibiæ are only unicarinate.

Even in the mouth organs there is similar uncertainty. M. Lacordaire records variation in the number of teeth in the external lobe of the maxillæ in genus after genus; in all the genera in which I have dissected the mouth organs of any considerable number of individuals I have found that the number of teeth in the outer lobe of the maxillæ varies with the species.

When all these difficulties in the way of classification have been considered there seem to be but few characters left from which a better result can be looked for, and I am obliged to acknowledge that the best scheme I can suggest for the arrangement of the Australian *Dynastides* is unsatisfactory to the extent of failing to associate together, in some cases, species that probably ought to stand near each other in a natural arrangement, which, I believe, would be one that should treat sexual characters as of at least secondary importance. In the scheme that I propose to follow I have excluded sexual characters as, for the present, unworkable; but in some instances have added, in the tabulation of characters,⁽³⁾ some sexual peculiarities in brackets (especially where they distinguish the female) that seem sufficiently marked and constant to be useful.

As already indicated, I think the Australian *Dynastides* should be divided into two main aggregates, in the former of which the hind margin of the posterior tibiæ is fringed with ciliæ or (rarely) short spines, and is more or less widely truncate on its lower face, while in the latter it is non-ciliate and non-truncate. The former of these includes nearly all the Australian genera.

The former of these aggregates I propose to divide into two secondary aggregates distinguished by the structure of the clypeus, which is best observed from a point obliquely in

(3) This tabulation was not with the papers ready for publication.—A. M. LEA.

front of that organ. In the first of these secondary aggregates the free outline of the clypeus is seen to consist of three distinct lines (the sides and the front), of which the middle (front) line is usually shorter than the others and always notably uneven—either raised as a conspicuous lamina or notched in the middle or dentiform at its extremities. In the genera that I regard as forming the other secondary aggregate the free outline of the clypeus is usually a continuous curve, the appearance of sides and front as three distinct lines being exceptional (scarcely existent outside *Dasygnathus* and *Adoryphorus*), but in either case the free outline in its front is level (or all but level, at most slightly sinuous) in the sense of not being raised in any part as a lamina (as in some *Isodontes*) nor toothed (as in some *Isodontes*, etc.) nor arched upward (as in various *Semanopteri*, etc.) nor notched in the middle (as in *Horonoti*, etc.). In this secondary aggregate, moreover, the clypeus (when its outline is not a regular curve such that the front can hardly be considered distinct from the sides) is never conspicuously narrowed in front, its front in no case being much narrower than its base, while in the former secondary aggregate the width of the clypeus in front exceeds that of half its width at its base in no genus, I think, except *Horonotus*, which genus, however, the conspicuous notch in the middle of the front of the clypeus assigns without doubt to the former secondary aggregate.

Mr. Arrow (Ann. Nat. Hist., 1911, p. 156) proposes a new generic name—*Metanastes*—for two species, one of which is my *Pentodon australis*.

BUPRESTIDÆ.

NEOSPADES.

In his paper on the Classification of the *Buprestidæ*, M. Kerremans placed this genus beside *Cisseis*—which is certainly its right place—and distinguished it from the latter by its antennæ dentate only from the fifth joint, adding a note that he had not seen a member of the genus, and therefore had taken the distinctive character as stated by the author. That character is not, however, the essential one, although the diagnosis of *Neospades* perhaps justified M. Kerremans in his use of it. In the diagnosis it was stated as a second distinctive character that the 5th antennal joint is the first that is “distinctly” dentate. At the time I had seen only one species of the genus, which I believed with hesitation to be *Coræbus chrysopygius*, Germ. I have since seen other species (two of which I have described) and have increased

my doubt of the identity of *chrysopygius*, Germ., with the type *Neospades*, as the acceptance of that identity would involve a greater instability of markings than I have found in other species of the genus. I feel, however, no doubt about *chrysopygius* being a *Neospades*. In the type of the genus—which I may call *chrysopygius*, Blackb. (? Germ.)—the 4th antennal joint is decidedly triangular, intermediate in form between the 3rd and 5th (which I intended to express by calling it “not distinctly” of the serrate series); but with very much more numerous species of *Cisseis* before me than I had in 1887, I am satisfied that a satisfactory generic distinction cannot be founded on that antennal character since the 4th antennal joint is certainly in some species of *Cisseis* not more serrate than in some of *Neospades*. Nevertheless the tendency in *Neospades* is distinctly to a less dilated 4th antennal joint [in one species *N. (Buprestis) cruciatus*, Fab., that joint is quite simple] than in *Cisseis*.

It is, however, in respect of the characters mentioned first in the diagnosis (those of the tarsi and especially the claws) as distinctive from *Cisseis* that the essential difference is to be found. Under *Cisseis* there now stand species differing from each other so much in their tarsal and claw characters that I have no doubt other genera still remain to be cut out of that aggregate; but at any rate there is a wide difference between *Neospades* and *Cisseis* in respect of tarsi and claws. Apparently *C. duodecimmaculata*, Fab., is the type of *Cisseis*. Compared with *Neospades* its tarsi are seen to be moderately elongate and but little compressed, with the basal two joints together much longer than the claw joint, and the claws are of the type which Lacordaire in dealing with the *Lamiides* calls “divaricate,” and are shortly bifid at the apex; while in *Neospades* the tarsi are very short and very strongly compressed, with the claw joint not much shorter than the basal two joints together and the claws very strongly of the type which Lacordaire calls “divergent” (the two almost parallel with each other) and so deeply bifid that from a certain point of view the joint appears somewhat as if there were four almost equal and almost parallel claws. In facies, too, *Neospades* differs notably from *Cisseis*, especially in respect of colouring, all the species with tarsi as described above having elytra with at least two bright and well limited metallic colours, which is at most very feebly approximated in any *Cisseis* known to me.

Neospades, then, is thus differentiated from *Cisseis*:—
 “Tarsi very short and very strongly compressed; claws of the divergent type, almost parallel with each other and very deeply bifid.”

As far as I know the following names are all that have been given to species of *Neospades*, viz.:—(*Buprestis*) *cruciatu*s, Fab.; (*Coræbus*) *chrysopygius*, Germ.; (*Cisseis*) *apicalis*, Macl.; (*Cisseis*) *dimidiata*, Macl.; (*Cisseis*) *cuprifera*, Gestro; *N. lateralis*, Blackb., and *simplex*, Blackb.; (*Cisseis*) *splendida*, Kerr.

It may be mentioned here that the claws of *Ethon* are like those of *Neospades*, but the tarsi of the former are longer and not, or but little, compressed, resembling those of *Cisseis*.

GERMARICA.

Mr. Carter has stated (Proc. Linn. Soc., N.S.W., 1909, p. 122) of my *G. casuarinæ*:—"I have little doubt but that this is the insect described as *Aphanisticus liliputanus*, Thoms., but the entirely misleading and inadequate description is a strong justification for Mr. Blackburn's re-description." If Mr. Carter has compared an authentic specimen of *G. casuarinæ* with Thomson's type, I suppose there is nothing more to be said in the matter; but if not it may be noted that Thomson's description is misleading indeed if it was founded on a specimen of the insect I described. Thomson's type was from New South Wales (mine from South Australia), has elytra at apex "*subtruncata et biacuta*" (the elytra of my species are rounded at the apex), and is scarcely more than half the size of *G. casuarinæ*; Thomson calls it "the smallest *Buprestid* known to us." I may add that I have numerous specimens of a *Germarica* from New South Wales of the size that Thomson attributes to *liliputanus* (with elytra, however, not at the apex agreeing with Thomson's description), and differing from *casuarinæ* by, *inter alia*, its notably narrower and more elongate form.

ELATERIDÆ.

PARACREPIDOMENUS.

In characterizing this genus Dr. Schwartz does not refer to the sexual characters of its species, nor does he mention the sex of the two species he describes, which are both known to me as occurring on the Dividing Range of Victoria. The sexes do not present any very noticeable external distinctions except in the antennæ, which are shorter in the female (equalling in length about the first nine joints of those of the male in *P. fasciculatus* and in *P. linearis* about the first ten joints), and in the prothorax, which is (conspicuously in *fasciculatus*, less so in *linearis*) less sinuate on the sides, and carrying its width further forwards towards the apex. The tumidity and coarse sculpture of the apical ventral seg-

ment of *fasciculatus* is evidently a specific, not a sexual, character. The specimens described by Dr. Schwartz appear to be males.

Dr. Schwartz states that *Crepidomenus filiformis*, Cand., must be referred to this genus, but in describing his two new species mentioned above he does not differentiate them from *filiformis*. However, it may be inferred that they differ from that species by the third joint of their antennæ longer than the fourth, for he attributes that character to them both in describing them, and in the diagnosis of the genus he states that the third antennal joint is either exactly equal to, or longer than, the fourth; and as he recognizes only the three species the third antennal joint must be exactly equal to the fourth in the species that he regards as *filiformis*. That is the case in respect of the insect that I have myself believed to be *filiformis*.

Nevertheless, it now appears that my identification of Candèze's species was, according to its author, not correct. Many years ago I sent to Dr. Candèze specimens of what I regarded as his *C. filiformis*, on which he did not write me any remarks, confirmatory or otherwise. Lately, however, I have acquired the 6th part (1896) of Candèze's "Elaterides nouveaux" which I had not previously seen, and I find it stated there that the species I sent to the author is a new one closely allied to *filiformis*, and which he describes under the name *sulcicollis*. He erroneously attributes it to Adelaide, doubtless through that being my place of residence. Its *habitat*, however, is Victoria—the *habitat* of *filiformis* also. As I have a fairly extensive collection of Victorian *Elateridæ*, including numerous *Paracrepidomeni*, from various localities in that State, and Candèze refers to his having seen *filiformis* from Victoria in four different collections, it is improbable that that species is not before me. Candèze differentiates *sulcicollis* from *filiformis* as being less pubescent, with the prothorax of the male more elongate and parallel, and with the median sulcus of the pronotum not abbreviated. As I find in the series of specimens which I have attributed to *filiformis* varying differences (in respect, sometimes of one, sometimes of another, sometimes of all, of those characters) among individuals taken in a single locality, I cannot accept *sulcicollis* as even a well-marked variety of the older species. Dr. Schwartz, when he formed the genus *Paracrepidomenus*, seems to have overlooked *sulcicollis*—at any rate, he made no mention of it.

DESCRIPTIONS OF AUSTRALIAN CURCULIONIDÆ, WITH
NOTES ON PREVIOUSLY DESCRIBED SPECIES.

PART X.

By ARTHUR M. LEA.

[Read September 12, 1912.]

Subfamily OTIORHYNCHIDES.

HACKERIA VIRIDIVARIA, Lea.

Mr. H. Elgner has recently taken this beautiful weevil on Darnley Island, in Torres Straits.

Subfamily LEPTOSIDES.

MANDALOTUS FOVEATUS, n. sp.

♂. Black; antennæ, tarsi, and trochanters more or less red. Densely clothed in parts with muddy-grey scales, with fairly numerous and evenly distributed suberect setæ.

Head with dense, concealed punctures. Rostrum acutely carinate throughout. Antennæ moderately long, first joint of funicle distinctly longer than second. *Prothorax* about as long as wide, sides almost evenly rounded, but base slightly wider than apex; with fairly large and round, somewhat flattened granules, each with a setiferous puncture. *Elytra* with moderately-rounded shoulders, sides parallel to beyond the middle; with regular rows of large, more or less concealed punctures; alternate interstices feebly raised. *Metasternum* and basal segment of abdomen with a large deep fovea, common to both; abdomen with granules at sides. *Legs* rather long; front coxæ moderately separated; femora stout; tibiæ with more or less distinct granules, the first pair denticulate on their lower edge. Length (excluding rostrum), 4-6 mm.

♀. Differs in having the antennæ shorter, prothorax not quite as long as wide, elytra slightly wider than prothorax instead of the exact width of same, metasternum and abdomen not foveate, the latter with more distinct and evenly-distributed granules, legs shorter and femora thinner.

Hab.—New South Wales: Guyra (H. J. Carter).

All the (seven) specimens before me appear to be abraded, so that the prothoracic granules are conspicuous. Should this character, however, be natural the species in my table would be associated with *seticollis* and *reticulatus*;

from the latter it is distinguished by its much larger size, different shape and colour, etc.: from the former by the much less distances between the coxæ. But, regarding the granules as normally more or less obscured, then, as the front coxæ are not widely although very distinctly separated, it would be associated with *subglaber*, *cellaris*, and *spureus*, from all of which it is readily distinguished by the abdomen. In size and outlines it approaches *piliventris*, but that species has the coxæ more distant from each other, abdomen of male less excavated and prothoracic granules smaller.

At the base of the elytra on one specimen there are two obscurely whitish spots of scales, so it is probable that on well-preserved specimens the clothing would be variegated.

MANDALOTUS BICARINATUS, n. sp.

♂. Black; antennæ and tarsi more or less red, femora and tibiæ in parts obscurely diluted with red. Densely clothed with muddy-grey scales, feebly variegated in places with dingy-white. With rather short, semi-decumbent setæ.

Head wide, punctures normally concealed. *Rostrum* short and stout; scrobes extending backwards almost to eyes; carina vaguely traceable through clothing. *Antennæ* moderately long; first joint of funicle stouter and slightly longer than second. *Prothorax* moderately transverse, sides strongly and evenly rounded; with dense, round, flattened, and normally partially-concealed granules. *Elytra* rather short, at base as wide as widest part of prothorax, sides feebly dilated to beyond the middle, and then coarctate to apex; with regular rows of rather large, but more or less concealed punctures; alternate interstices very feebly raised. *Meta-sternum* flat across middle. *Abdomen* with basal segment very feebly depressed in middle, a feebly-curved and shining carina occupying one-third of its apex, a second but smaller carina at apex of second segment. *Legs* rather short; front coxæ moderately separated. Length, 3-3½ mm.

♀. Differs in being wider, elytra subcordate, abdomen without carinæ, the basal segment gently convex, and the legs and antennæ somewhat shorter.

Hab.—Tasmania: Hobart, under logs (A. M. Lea).

In general appearance like very small specimens of *blackburni*, but abdomen with two carinæ; the second one is certainly less distinct than the first, but, as it is traceable on the three males before me, I presume it is constant. In size, and to a certain extent in appearance, it is fairly close to *bryophagus*, but, apart from the carinæ, it differs in having the apex of the first abdominal segment incurved to the middle, and the front coxæ not touching.

On each of three specimens before me there is a moderately distinct longitudinal patch of obscurely-whitish scales on each side of the prothorax, on two other specimens these patches are ochreous. The sides of the sterna and abdomen are sometimes supplied with rather distinct whitish patches.

MANDALOTUS TENUICORNIS, n. sp.

♂. Blackish-brown; appendages more or less reddish. Densely clothed with pale dingy-greyish or subochreous scales, feebly mottled with whitish scales in places; with rather short, semi-decumbent setæ.

Head wide; sculpture normally entirely concealed. Rostrum short, carina scarcely traceable through clothing. Antennæ decidedly longer and thinner than usual, passing middle of elytra; scape distinctly curved; funicle with two basal joints as long as the rest combined, first thicker, but not longer than second; club briefly ovate. *Prothorax* decidedly transverse, sides rather strongly dilated to near base; with large, round, flat, feebly-elevated granules, normally almost entirely concealed. Elytra oblong-cordate, widest at about middle; with regular rows of large, almost-concealed punctures; interstices just perceptibly alternately elevated, and of even width except towards sides. *Metasternum* shorter than usual. Abdomen long, basal segment gently concave, its apex straight, fifth slightly longer than third and fourth combined, somewhat elevated but slightly impressed in middle. *Legs* rather long; front coxæ touching; femora stout; tibiæ almost straight. Length, $2\frac{1}{2}$ -3 mm.

♀. Differs in being larger and wider, elytra widest beyond the middle, abdomen nowhere concave, the apical segment not elevated, and the legs shorter.

Hab.—Victoria: Warrnambool (H. W. Davey); Tasmania: Ulverstone (A. M. Lea).

Readily distinguished, from others of the genus, by the long thin antennæ, with the combined lengths of the first and second joints fully half the total length of the funicle.

MANDALOTUS RUFIPES, n. sp.

Of a rather dingy reddish-brown, appendages paler. Rather lightly clothed with fine scales (almost setæ) closely applied to derm, interspersed with some suberect and rather fine setæ.

Head with dense partially-concealed punctures. Rostrum moderately long; carina indistinct. Antennæ moderately long; scape lightly curved; first joint of funicle stouter but scarcely longer than second. *Prothorax* almost as wide as

long, base wider than apex, but widest at about one-third from apex, where the sides are subangularly dilated; surface very uneven. *Elytra* at base as wide as widest part of prothorax, slightly and somewhat irregularly dilated to beyond the middle; with rows of large, but in places interrupted, punctures; suture thickened posteriorly; third interstice thickened about base, with a distinct tubercle about middle and another beyond same, and again thickened near apex; fifth interstice with two small tubercles posteriorly; some of the others somewhat thickened or subtuberculated in places. *Metasternum* gently concave. Abdomen moderately large, basal segment somewhat convex, its apex strongly incurved to middle. *Legs* moderately long; front coxæ moderately separated; femora stout; tibiæ rather short, near apex widely and gently emarginate. Length, $2\frac{2}{3}$ mm.

Hab.—Tasmania: Waratah, in moss (A. M. Lea).

I am unaware as to the sex of the type, but its comparatively narrow form, with emarginated tibiæ, would appear to be masculine features; although these seem negated by the convexity of the abdomen. But, in any case, the species should be readily distinguished by its upper-surface. In my table it would be associated with *coatesi*, which is a larger species with elytral tubercles smaller and differently disposed, and front coxæ more widely separated, etc. In general appearance it is not close to any previously described species.

The surface of the pronotum appears to be covered with small tubercles and irregular granules, but I have not abraded the type to examine it more in detail.

MANDALOTUS LATUS, n. sp.

Blackish-brown, antennæ and tarsi more or less reddish. Very densely clothed with pale-greyish scales, variegated with ochreous; with rather numerous suberect setæ.

Head wide; derm entirely concealed. Eyes smaller and more prominent than usual. Rostrum moderately long; median carina scarcely traceable through clothing. Antennæ moderately long; scape rather suddenly thickened at apex; first joint of funicle slightly longer and stouter than second. *Prothorax* almost twice as wide as long; sides strongly rounded, base not much wider than apex; surface uneven, and with dense, but normally-concealed punctures. *Elytra* short and wide; base strongly and evenly arcuate; shoulders thickened, sides feebly dilated to about apical third, thence strongly narrowed to apex; with rows of large, but almost-concealed punctures; alternate

interstices irregular, the third with a rather large tubercle just before summit of posterior declivity, and another between it and apex, fifth with a rather large tubercle, so placed that with the two on the third they form an equilateral triangle; elsewhere with feeble tubercular swellings. *Abdomen* with basal segment feebly convex. *Legs* comparatively short and stout; front coxæ touching. Length, 5 mm.

Hab.—Tasmania: Mount Wellington, in moss (A. M. Lea).

The type is probably a female. I have described it, however, as its unusually dense clothing, and conspicuous post-median tubercles, render it very distinct.

The femora are distinctly ringed with whitish scales, and the tubercles about the summit of the posterior declivity are supplied with dark scales; but otherwise there are no distinct markings, the ochreous and grey obscurely running into each other.

MANDALOTUS INCISUS, Lea.

Dr. Ferguson has taken at Blackheath (New South Wales) some specimens that are in better condition and larger (up to $6\frac{1}{2}$ mm.) than the types. They all have whitish rings on the legs, dull-white spots at the sides of the abdomen, and an ochreous spot at the middle of the base of the prothorax.

MANDALOTUS SEVERINI, Lea.

A well-marked specimen of this species was recently taken from under a chip near the springs on Mount Wellington. Its prothorax has several sooty spots on each side, so disposed as to cause an appearance as of longitudinal stripes, outside of which the clothing is more or less ochreous; there is also a small round dark spot on each side of the middle. On the elytra many of the punctures are ringed with white. The head and rostrum are feebly striped. The apical half of the front tibiæ (as also those of the type) are armed with some small teeth on their lower surface.

MANDALOTUS SABULOSUS, Lea.

Recently taken by Mr. Carter at Eden (New South Wales).

MANDALOTUS NIGER, Lea.

The male of this species has the inner edge of the hind tibiæ traversed by from 15 to 20 carinæ; rather feeble towards the apex, but very pronounced towards the base. From certain directions they are remarkably distinct; but from most directions they are quite invisible.

Subfamily CRYPTORHYNCHIDES.

The new genera proposed here are all more or less closely allied to *Poropterus*.

NEODECILAUS, n. g.

Head large, convex, not at all concealed. *Eyes* depressed, almost circular, finely faceted. *Rostrum* moderately long and wide, curved; with a shallow groove on each side above scrobe. *Antennæ* rather stout; scape inserted nearer base than apex of rostrum and shorter than funicle; basal joint of the latter elongate; club ovate, subcontinuous with funicle. *Prothorax* transverse, sides moderately rounded, base very feebly bisinuate, constriction absent, ocular lobes obtuse. *Scutellum* absent. *Elytra* subovate, outline almost continuous with that of prothorax. *Pectoral canal* moderately deep and wide, terminated between intermediate coxæ. *Mesosternal receptacle* feebly raised, walls equal throughout, emargination semicircular; slightly cavernous. *Metasternum* less than half the length of the following segment; episterna narrow. *Abdomen* large, sutures distinct; two basal segments large, first not much longer than second, its apex incurved, intercoxal process moderately wide; third and fourth combined the length of fifth and slightly shorter than second. *Legs* rather short; posterior coxæ not touching elytra; femora sublinear, edentate, not grooved; posterior terminated before apex of abdomen; tibiæ rather short, third joint wide and deeply bilobed. *Ovate*, convex, squamose, non-tuberculate, apterous.

The mesosternal receptacle appears to be truly open, but on probing it is felt to be slightly cavernous. The genus is allied to *Decilaus*, from which it may be readily distinguished by the finely-faceted eyes. It appears also to be allied to *Coptomerus*, but in that genus the posterior femora are said to be dentate. In general appearance both the species described below resemble the members of *Aonychus*, but the tarsi, metasternum, rostrum, etc., are utterly different. The sexes are easily distinguished; the ♂ has the rostrum clothed almost to apex, whilst in the ♀ it is shining and clothed only on each side at base; the eyes also are rather larger in the ♂ than in the ♀.

Clothing black and white picus, n. sp.
Clothing of various shades of grey gratus, n. sp.

NEODECILAUS PICUS, n. sp.

Blackish-brown, antennæ and tarsi somewhat paler. Closely covered with black scales, a stouter one in each elytral puncture; almost snowy-white scales condensed into small

patches on each side at base of rostrum, each side of apex of prothorax and at base and apex along middle, four spots at base of elytra (on third and seventh interstices) and rather numerous small ones (often composed of but two or three scales) elsewhere, and especially beyond the middle; on the legs rather large patches at base and apex of femora, and at apex of tibiæ; under-surface with white scales.

Head regularly convex, with dense but rather small and concealed punctures. Rostrum the length of prothorax, sides rather strongly incurved to middle, base once and one-half the width of apex; with rather strong but concealed punctures to apex in ♂; basal third only in ♀ strongly punctate, elsewhere finely punctate and shining. Funicle with first joint as long as second and third combined, third to seventh transverse. *Prothorax* moderately transverse; with dense, rather small, round, clearly-cut but partially-concealed punctures. *Elytra* scarcely twice the length of prothorax and at base scarcely wider, widest at about the middle, gently rounded and nowhere parallel-sided; with series of moderately large, distant punctures, each of which is almost filled by a scale; interstices not separately convex and considerably wider than punctures. *Under-surface* with rather small, concealed, and not very dense punctures. Length, $4\frac{2}{5}$ mm.; rostrum, $1\frac{1}{5}$ mm.; width, $2\frac{1}{4}$ mm.

Hab.—Queensland (J. Faust): Endeavour River (Macleay Museum).

The scales are soft and round, and, with a little trouble, each is individually traceable. Several specimens under examination are entirely without white scales except at base of rostrum; in others (males) almost the entire rostrum is clothed with white scales, and there is almost a continuous median line of white scales on the prothorax. The small postmedian spots on the elytra are very variable in number and disposition.

NEODECILAUUS GRATUS, n. sp.

Blackish-brown, antennæ and tarsi somewhat paler. Densely clothed with soft scales, varying from a dull-white to a dark smoky-grey; prothoracic scales larger (except than those in punctures) and looser than on elytra. Length, 4 mm.; rostrum, 1 mm.; width, 2 mm.

Hab.—Queensland: Cairns (Macleay Museum).

I can find no structural differences whatever between this and the preceding species, except that the body of the present species is a trifle wider and that the eyes are slightly larger in both sexes. The clothing, however, is very different, both as regards colour and density. In *gratus* the paler scales

clothe the under-surface and legs (except at apex of femora and base of tibiæ), form three lines on prothorax (the lateral ones sometimes indistinct), and cause the elytra to appear speckled. In *picus* the prothoracic punctures, although covered by the scales, are very decidedly traceable; in *gratus*, on the contrary, they are entirely concealed by the scales, which there are larger and looser. The clothing of *gratus* is peculiarly soft and pretty, whilst that of *picus* is strongly contrasted black and white.

CEDILAUS, n. g.

Head large, partially concealed. Eyes small, convex, ovate, widely separated, coarsely faceted. Rostrum rather short, wide, sides incurved to middle, very feebly curved. Scape inserted nearer apex than base of rostrum, the length of funicle; two basal joints of funicle elongate; club ovate, subcontinuous with funicle. *Prothorax* convex, transverse, base truncate, sides rounded, apex feebly produced, constriction feeble; ocular lobes obtuse. *Scutellum* not traceable. *Elytra* briefly ovate, sides and apex rounded. *Pectoral canal* deep and wide, terminated between four anterior coxæ. *Mesosternal receptacle* strongly and suddenly raised in front, emargination strongly transverse, cavernous. *Metasternum* much shorter than the following segment; episterna not traceable posteriorly, but the triangular inner projection very largely developed. *Abdomen* large, sutures straight and distinct; first segment as long as the three following combined, intercoxal process very wide and truncate, third and fourth combined slightly longer than second or fifth. *Legs* moderately long; posterior coxæ touching elytra; femora deeply grooved, edentate, almost equal in width throughout, posterior not extending to apex of abdomen; tibiæ compressed, straight beneath, each with a large triangular projection near the base; tarsi short, third joint wide and deeply bilobed, fourth long and thin. Ovate, convex, squamose, nontuberculate.

The tibiæ are very remarkable, and would appear to denote an approach to *Psepholax*, whilst the polished sides and strongly-elevated mesosternal receptacle would seem to lead more towards *Idotasia*. I may, therefore, very likely be wrong in associating the genus with *Poropterus*, but, at any rate, most of the characters denote affinity with *Decilaus*. The metasternal episterna are also very remarkable, each posteriorly is not traceable, but its anterior inner projection becomes so largely developed that it is almost as long as the basal segment of the abdomen; it is besides plated with shining yellowish scales, so that its extent is easily seen.

Having only one specimen under examination I have not been able to see whether the wings are present or not, but the species appears to be apterous.

CEDILAUS AMBIGUUS, n. sp.

Piceous-brown and shining through clothing, legs and antennæ red. Moderately-densely clothed with loose scales, varying from dingy-yellow to sooty-brown, and interspersed with longer suberect scales; flanks of elytra glabrous; under-surface, legs, head, and rostrum rather sparsely clothed; metasternal episterna densely clothed with shining yellowish scales.

Head convex; coarsely punctate; eyes prominent. Rostrum as wide at apex as at base, sides incurved to middle; coarsely but subseriately punctate. First joint of funicle noticeably longer and stouter than second, the rest transverse. *Prothorax* rather widely transverse, apex more than half the width of base; with rather large, round, deep punctures: with a depressed and highly-polished median line, which disappears before apex. *Elytra* wider than prothorax and about twice as long, widest before middle, not much longer than wide; punctate-striate, punctures oblong and not very distinct; striæ moderately deep; interstices scarcely convex, the first narrower, the eighth wider than the others, all wider than striæ. *Under-surface* with moderately dense and large punctures. *Femora* densely punctate; each of the tibiae with a large outer triangular extension, that of the anterior basal, of the intermediate at basal third, and of the posterior just before middle. Length, $2\frac{3}{4}$ mm.; rostrum, $\frac{3}{4}$ mm.; width, $1\frac{2}{3}$ mm.

Hab.—New South Wales (Macleay Museum).

Only one specimen of this remarkable weevil has been under observation. The club is slightly paler than the preceding joints of the funicle, not darker, as is usually the case.

HOPLODECILAUS, n. g.

Head rather large, convex, partially concealed. Eyes small, briefly ovate, widely separated, coarsely faceted. Rostrum rather short and stout, feebly curved. Scape inserted nearer apex than base of rostrum, shorter than funicle; basal joint of the latter elongate; club large, its outline continuous with that of funicle. *Prothorax* convex, transverse, sides rounded, base truncate, apex produced, constriction feeble, lobes obtuse. *Scutellum* absent. *Elytra* truncate at base, ovate, convex, shoulders, sides, and apex rounded. *Pectoral canal* deep and wide, terminated between intermediate coxæ. *Mesosternal receptacle* feebly raised, walls narrow and semicircular; slightly cavernous. *Meta-*

sternum considerably shorter than the following segment; episterna narrow but distinct and almost parallel-sided throughout, the anterior inner projection absent. *Abdomen* moderately large, sutures distinct, that between first and second curved; first as long as the two following combined, intercoxal process wide; third and fourth combined about equal in length to second or fifth. *Legs* rather short; posterior coxæ touching elytra; femora distinctly grooved, dentate, posterior terminated before apex of abdomen; tibiæ compressed, straight or feebly bisinuate beneath; tarsi rather short, third joint wide and deeply bilobed, fourth elongate. Ovale, convex, nontuberculate, apterous.

In this genus, which is undoubtedly very close to *Decilaus*, the shape of the metasternal episterna is very remarkable, each being almost parallel-sided throughout and with the anterior inner projection entirely absent. From *Decilaus* it is distinguished by the shape of the metasternal episterna and by the dentate femora; from the preceding genus, to which it also appears to be close, it is distinguished by the mesosternal receptacle, metasternal episterna, and femora.

HOPLODECILAEUS MARMORATUS, n. sp.

Black, shining, more or less mottled with red or testaceous; antennæ pale-red. Sparsely clothed with whitish scales, longer and denser on under-surface and legs than elsewhere.

Head convex; densely and coarsely but equally punctate; ocular fovea not traceable. Rostrum shorter than prothorax, increasing in width from base to apex; rather coarsely punctate, but along middle with an interrupted shining impunctate space. Basal joint of funicle as long as second and third combined, third to seventh transverse and closely united. *Prothorax* moderately transverse, with dense, moderately large, round punctures; with a feebly-impressed median line. *Elytra* not twice the length of prothorax, widest at about middle, the outline subcontinuous with that of prothorax; with series of large, suboblong, deep, subapproximate punctures, of almost equal size throughout; interstices the width of or slightly wider than punctures, themselves finely punctate. *Under-surface* moderately densely punctate. *Femora* stout, densely punctate, feebly but rather acutely dentate. Length, 3 mm. (vix.); rostrum, $\frac{2}{3}$ mm.; width, $1\frac{1}{2}$ mm.

Hab.—Western Australia: Albany (R. Helms).

The head is dark-brown and darker than the rostrum; the prothorax is black, except at apex and along middle; the base, sides, and beyond middle of the elytra are more or

less mottled; the abdomen and legs are stained in places with piceous. The clothing of the upper-surface is very sparse and indistinct.

IMALIODES SCITULUS, n. sp.

♂. Black, antennæ almost black. Head and rostrum (almost to apex), prothorax and legs with dense whitish-grey scales, a few tufts of similar scales on elytra; elytra at base and a distinct subtriangular patch on each side of apex, and the greater part of the under-surface, with white scales.

Head with rather small concealed punctures; eyes finely faceted. Rostrum moderately curved; apical fourth densely punctate, behind antennæ coarsely punctate and with four grooves and three ridges, which, however, are more or less concealed. Antennæ inserted nearer apex than base of rostrum; second joint of funicle distinctly longer than first. *Prothorax* as long as wide, basal two-thirds subparallel, apex rounded, base feebly bisinuate; feebly impressed along middle; with small punctures which are concealed by clothing. *Elytra* wider than prothorax at base, which is almost truncate, with the shoulders not produced, widest before middle; with series of large, subquadrate punctures, wider than the interstices; these (especially the second) are in places subtuberculate; each separately rounded and produced at apex. *Metasternum* depressed along middle, the depression continued on to abdomen. *Femora* stout (but thinner than in *subfasciatus* or *terreus*), feebly dentate. Length, $6\frac{1}{2}$ mm.; rostrum, 2 mm.; width, $3\frac{1}{4}$ mm.

♀. Differs in having the rostrum smoother and shining, the punctures smaller, and the scales not continued beyond the middle, and the antennæ inserted at a greater distance from the apex.

Hab.—New South Wales: Illawarra, Kurrajong (Macleay Museum).

The prothorax as long as wide, with the sides subparallel for part of their length, and each elytron separately rounded at apex, render this a very distinct species. It appears to be close to *nodulosus*, which, however, is said to have a scutellum and the elytra sulcate-punctate. I have described the best-preserved specimen; two others have the scales of a uniform pale dingy-brown and almost without a trace of the very distinct basal and apical patches of white scales on the elytra of the type.

IMALIODES OVIPENNIS, n. sp.

Black, scapes and claws dingy-red. Densely clothed with suberect scales, confused amongst small mud-like ones, all of a uniform shade of dingy-brown.

Head with coarse concealed punctures; eyes finely faceted. Rostrum the length of prothorax, feebly curved, sides incurved to middle, coarsely and irregularly punctate, a feeble shining impunctate line along middle. Scape inserted almost in exact middle of rostrum, the length of three basal joints of funicle; of the latter the first joint is distinctly longer than the second, the others are transverse. *Prothorax* slightly transverse, base almost truncate; with moderately large but almost entirely-concealed punctures. *Elytra* ovate, as deep as wide, rather suddenly elevated above prothorax, shoulders not projecting and no wider than prothorax, widest at about middle; seriate punctate or foveate, punctures subquadrate, close together, partially obscured by clothing. Punctures of *under-surface* concealed. *Legs* long; femora with dense partially-concealed punctures, finely but acutely dentate, posterior just passing apex of elytra. Length, $4\frac{4}{5}$ mm.; rostrum, $1\frac{1}{2}$ mm.; width, $2\frac{3}{8}$ mm.

Hab.—Queensland: Barron Falls (A. Koebele), Cairns (Macleay Museum).

In outline much like *nigricornis*, but the legs longer and thinner and the clothing very different.

IMALIODES FRATER, n. sp.

Dark blackish-brown, antennæ and tarsi dull-red. Densely clothed with suberect stout ochreous-brown scales; a feeble but distinct median fascia of paler scales on the elytra, the convex side of which is directed towards the base; each elytral puncture containing a scale, and outlined by scales, except beneath the fascia and towards base.

Funicle with the second joint longer but not much thinner than first. Length, $5\frac{3}{4}$ mm.; rostrum, $1\frac{3}{4}$ mm.; width, $2\frac{3}{4}$ mm.

Hab.—Queensland: Mount Dryander (type in Mr. A. Simson's collection).

Remarkably close in appearance to *edentatus*, but larger, the clothing paler and with a feeble elytral fascia. The principal difference, however, lies in the funicle. In this species the second joint is distinctly longer than the first and not much thinner, the two combined being as long as the rest combined; in *edentatus* the second joint is shorter and much thinner than the first, and the two combined are shorter than the rest combined. I can find no other structural differences, but the punctures of the elytra are more clearly defined than in *edentatus*.

ANCHITHYRUS CALIGINOSUS, n. sp.

Piceous-brown, antennæ dull-red. Not very densely (denser on legs than elsewhere) clothed with fawn-coloured scales.

Head densely but indistinctly punctate. Rostrum the length of prothorax, sides distinctly incurved to middle; with large, dense punctures, larger towards base and leaving an impunctate line along middle. Scape the length of three basal joints of funicle; of these the first is slightly longer than second, whilst none of the others are distinctly transverse. *Prothorax* with dense and rather strong punctures, except at apex, the interspaces feebly granulate. *Elytra* ovate, fully twice the length of and at base no wider than base of prothorax, widest at about middle: with series of large subquadrate punctures, each separated by a rounded ridge: interstices narrower than punctures and with small clusters of small granules. *Abdomen* rather coarsely but indistinctly punctate; intercoxal process rather narrow, third and fourth segments combined about equal to second or fifth; sutures of all deep. *Legs* densely punctate; posterior femora slightly passing elytra. Length, 6 mm.; rostrum, 2 mm.: width, $3\frac{1}{2}$ mm.

Hab.—Queensland: Cairns (Macleay Museum).

In certain lights the elytra, when seen from behind, appear to be supplied with numerous transverse ridges; the interstices are much narrower than the punctures, and not continuously convex, but each is raised at the corner of and depressed in the middle of each puncture, the raised spaces being crowned with a few small granules (becoming very feeble towards the sides), so that each puncture is bounded on its four corners by clusters of feeble granules.

ANCHITHYRUS RETICULATUS, n. sp.

Almost black, antennæ dull-red. Rather densely (except on rostrum) clothed with stout, subspathulate, reddish fawn-coloured scales, becoming subsetose on legs: a few darker scales at apex of prothorax.

Head with dense indistinct punctures. Rostrum almost the length of prothorax, sides distinctly incurved to middle; basal third coarsely punctate, elsewhere shining and with scattered and comparatively small punctures. Scape the length of four basal joints of funicle; of these the first is considerably stouter but not much longer than second, the others are transverse. *Prothorax* with dense and large but almost-concealed punctures. *Elytra* ovate, about twice the length of prothorax, but at base no wider; sides strongly

rounded; with series of large subquadrate deep punctures, each of which is separated by a rounded ridge; interstices much narrower than punctures. *Abdomen* indistinctly but rather coarsely punctate; third and fourth segments combined slightly longer than second or fifth; intercoxal process rather narrower; sutures of all the segments deep. *Legs* long; posterior femora passing elytra for about one-fourth their length. Length, $3\frac{2}{3}$ mm.; rostrum, 1 mm.; width, 2 mm.

Hab.—Queensland: Cairns (Macleay Museum).

In appearance close to the preceding species; but besides being much smaller it may be readily distinguished by the entire absence of granules. Each elytral puncture appears to be surrounded by four ridges that are thickened at the intersecting corner: towards the sides, however, the transverse ridges become very feeble. The eyes are smaller and with larger facets, and the scales are considerably larger than in either the preceding species or in *muticus*. The specimen described appears to be ♀.

POROPTERELLUS, n. g.

Head rather large, partially concealed. *Eyes* small, ovate, widely separated, coarsely faceted. *Rostrum* short, wide, and almost straight. *Scape* inserted nearer apex than base of rostrum, the length of funicle; two basal joints of funicle elongate; club large and briefly ovate. *Prothorax* convex, base truncate, sides and apex rounded, apex produced, constriction feeble; ocular lobes obtuse. *Scutellum* not traceable. *Elytra* ovate. *Pectoral canal* deep and wide, terminated between four anterior coxæ. *Mesosternal receptacle* wide, raised in front, emargination feebly semicircular; cavernous. *Metasternum* much shorter than the following segment; episterna not traceable. *Abdomen* moderately large; two basal segments large, the suture between them traceable at sides only, first as long as second and third combined, intercoxal process very wide (wider than third segment), third and fourth combined the length of second or fifth. *Legs* moderately long; posterior coxæ touching elytra; femora moderately thin, feebly dentate, not grooved, posterior curved and passing elytra; tibiæ compressed, almost straight; tarsi not very thin, third joint moderately wide, deeply bilobed, fourth elongate. Subelliptic, convex, squamose, apterous.

Close to *Poropterus*, but the femora dentate, suture between first and second abdominal segments not continuous and mesosternal receptacle differently shaped. The club is unusually large. The specimen described below looks from above

very much like a small *Poropterus*; its head is flat, except the basal portion, which is glabrous and with a slight bluish iridescence.

POROPTERELLUS INTERCOXALIS, n. sp.

Black, opaque; antennæ and tarsi dull-red. Not very densely clothed with stout, suberect, brown scales, on the prothorax confined to the punctures, except for four feeble fascicles across middle, and two still more feeble ones at apex; elytra irregularly clothed, the sides almost naked, with feeble fascicles in places; each puncture of under-surface containing a scale; legs rather densely clothed. Head between eyes and base of rostrum feebly clothed.

Head rather large, flattened and punctate between eyes, basal portion bald, lightly punctate and with a faint-bluish iridescence, with a feeble median impression, and which is traceable to base; eyes separated from head by a feeble groove posteriorly. Rostrum shorter than prothorax, apex as wide as base, sides feebly incurved to middle, base and sides rather coarsely but not densely punctate, apex moderately-densely punctate; along middle smooth and shining. *Prothorax* as long as wide; with rather large, round, non-confluent punctures. *Elytra* wider than and not twice the length of prothorax, base truncate, shoulders rounded, widest before middle; with series of large, round, deep punctures, of almost equal size throughout; interstices regular, convex, narrower than punctures. *Metasternum* with a shallow elliptical impression on each side. Basal segment of abdomen with two curved series of punctures; those of the first very large and subbasal, but at sides curved round coxæ, those of the second subapical and not continuous to sides; suture between first and second segments deep at sides, marked in middle by a large puncture or fovea, and not traceable elsewhere; second segment with a row of rather large punctures. *Femora* coarsely punctate, feebly dentate, posterior strongly curved and passing elytra for about one-fifth of their length; fourth joint of tarsi noticeably longer than first. Length, 4 mm.; rostrum, 1 mm.; width, 2 mm.

Hab.—Queensland: Cairns (Macleay Museum).

The abdominal punctures are very remarkable. The ocular fovea is scarcely distinguishable amidst the surrounding punctures. On the middle of each elytron of the type there is a small and indefinite patch of pale scales.

GLYPTOPOROPTERUS, n. g.

Head large and partially concealed. Eyes ovate, widely separated, very finely faceted. Rostrum moderately long and

wide, almost straight. Scape inserted nearer apex than base of rostrum, slightly shorter than funicle; two basal joints of the latter elongate; club ovate, subcontinuous with funicle. *Prothorax* subconical, base bisinuate, constriction shallow, ocular lobes almost rectangular. *Scutellum* absent. *Elytra* briefly subovate, base trisinuate. *Pectoral canal* deep and wide, terminated between four anterior coxæ. *Mesosternal receptacle* strongly and suddenly raised, emargination widely transverse; cavernous. *Metasternum* very short; episterna somewhat curved and very narrow, widened and rounded but without an inner projection anteriorly. *Abdomen* not very large; basal segment as long as the three following combined, its suture with second deep at sides but fine across middle, intercoxal process wide; three apical segments depressed, the third and fourth combined shorter than second or fifth, second sloping and slightly longer than fifth. *Legs* long and thin; posterior coxæ touching elytra; femora linear, not grooved, edentate, posterior passing elytra; tibiæ rounded and almost straight; tarsi rather short, third joint wide and deeply bilobed. Ovate, convex, squamose, tuberculate, apterous.

Closely allied to *Poropterus*, but the eyes are very finely faceted, the mesosternal receptacle strongly raised, and the metasternal episterna traceable; from *Microporopterus* it is readily distinguished by the long legs, the posterior femora of which considerably pass the apex of the elytra.

Poropterus sharpi, Faust, and *P. cucullata*, Heller (for specimens of these species I am indebted to Dr. Heller), from New Guinea should be referred to this genus.

GLYPTOPOROPTERUS ASPER, n. sp.

Black, antennæ and claw-joints almost black. Densely clothed with small thin grey scales; under-surface and legs with longer and rather numerous scales scattered about.

Head flat between eyes, but the ocular fovea rather deep; with small and irregular granules; punctures indistinct. Rostrum slightly shorter than prothorax, sides incurved to middle: densely but not very coarsely and almost regularly punctate. Scape inserted very slightly in advance of the middle, the length of six basal joints of funicle; of the latter the first joint is slightly shorter than the second, the fifth and sixth are feebly, whilst the seventh is moderately transverse. *Prothorax* about as long as wide, base slightly bisinuate, sides rather strongly rounded, apex produced, bluntly bifurcate and about one-third the width of base; with numerous small shining granules scattered about and crown-

ing four tubercles that are transversely placed in middle; punctures concealed. *Elytra* considerably (but not suddenly) wider than prothorax, and much less than twice its length, not much longer than wide; punctures large but (except at sides) much obscured by granules and tubercles; with moderately small, numerous, shining granules scattered about and crowning tubercles; of these there are about thirty altogether. *Abdomen* indistinctly punctate. *Femora* indistinctly punctate and granulate, posterior passing elytra for about one-third their length. Length, 10 mm.; rostrum, $3\frac{1}{2}$ mm.; width, $5\frac{1}{2}$ mm.

Hab.—New South Wales (type in Macleay Museum).

A short, broad species, which should be easily recognized by the number of tubercles and the shining and numerous granules: the elytral tubercles are sometimes of considerable size: three on the third interstice, one (postmedian) on the fifth, and one humeral, being the largest; others, however, almost approach them in size. The clothing is almost setose in character. In general appearance it is moderately close to *sharpi* (from New Guinea), but differs in being shorter and broader, the elytral tubercles considerably larger, and the granules of both prothorax and elytra smaller and less crowded together.

ILLIDGEA, n.g.

Head large, partially concealed; ocular fovea distinct. Eyes ovate, widely separated, moderately faceted. Rostrum rather short and stout, curved. Antennæ rather stout; scape inserted almost in exact middle of rostrum, shorter than funicle; two basal joints of funicle elongate; club briefly ovate, its sutures more or less oblique. *Prothorax* convex, base truncate, sides rounded, constriction deep, ocular lobes obtuse. *Scutellum* small. *Elytra* not much wider than prothorax, posterior declivity abrupt. *Pectoral canal* deep and wide, terminated between four anterior coxæ. *Mesosternal receptacle* transverse, rather strongly raised in front, emargination widely transverse, cavernous. *Metasternum* much shorter than the following segment; episterna not traceable. *Abdomen* moderately large, sutures deep and straight; first segment as long as second to fourth combined, intercoxal process rather narrow, second just perceptibly longer than third, third and fourth combined equal to fifth. *Legs* long; posterior coxæ touching elytra; femora sublinear, neither grooved nor dentate, posterior passing elytra; tibiæ scarcely compressed, almost straight; tarsi stout, third joint not much wider than long, bilobed to basal fourth, fourth elongate. Elliptic, strongly convex, squamose, fasciculate, tuberculate, apterous.

Allied to *Poropterus*, but the three intermediate segments of the abdomen equal or almost so, and with the sutures of the club oblique. *Hexymus*, to which it is also allied, has distinct metathoracic episterna.

ILLIDGEA 16-TUBERCULATA, n. sp.

Black, subopaque, antennæ and claws almost black. Upper-surface rather sparsely clothed with distinct reddish-brown adpressed scales, becoming more numerous and subfasciculate on tubercles; those of the two anterior and of two of the median prothoracic tubercles sooty; legs rather densely squamose, on the femora sooty and brown scales intermingled, on apex of femora and on the tibiæ the scales are almost entirely sooty.

Head large, base depressed, indistinctly punctate; ocular fovea large. Sculpture of rostrum concealed by clothing but evidently coarsely punctate. Scape noticeably shorter than funicle; first joint of the latter longer and stouter than second, third and fifth subglobular, sixth and especially the seventh strongly transverse. *Prothorax* about as long as wide, sides rounded, base narrowly depressed; each side of apex with a small fasciculate tubercle, four tubercles across middle, the lateral ones small, the median ones large, rounded, and almost double; along middle an opaque median carina, indistinctly terminated in front, but posteriorly forming a distinct scutellar lobe. *Scutellum* longer than wide. *Elytra* scarcely wider than prothorax, and not twice as long; shoulders excavated to receive the posterior angles of the prothorax; with two transverse series consisting of four large rounded tubercles, the first at about one-fourth from base, the second at summit of posterior declivity, a small tubercle on each side just below summit; with a number of mixed, small, and moderately large, distant punctures, becoming very small posteriorly and larger and seriatly arranged on the sides. *Metasternum* and abdomen with small sparse punctures, the apical segment, however, densely punctate. Posterior *femora* passing elytra for about one-third their length. Length, 9 mm.; rostrum, 3 mm.; width, 4 mm.; depth, 4 mm.

Hab.—Queensland: Brisbane (R. Illidge); New South Wales: Wentworth Falls (A. Simson).

The clothing of the specimen described appears to be in perfect preservation, it is dense only on the scutellum, tubercles, legs, and apical segment of abdomen. The tubercles in the middle of the prothorax are impressed in the middle so that they appear to be double; this appearance is enhanced by the clothing of the anterior portion being darker than that

of the posterior. The elytral tubercles appear to be on the third and fifth interstices, the largest being on the third at the summit of the posterior declivity (this part is fully as long as the part preceding it); the tubercles entirely interrupt the sequence of the punctures, so that these are seriate in arrangement only on the sides and posteriorly.

OMYDAUS SUBFASCICULATUS, n. sp.

Moderately densely clothed with ochreous-brown scales, the elytra with sooty scales subfasciculate in arrangement.

Head coarsely punctate; with a narrow median carina; eyes not very finely faceted. Rostrum inflated near (but not at) base; basal half coarsely punctate, and with a distinct median carina, apical half shining and with small punctures. Scape the length of funicle; first joint of the latter distinctly longer than second. *Prothorax* feebly convex, sides very feebly rounded, base bisinuate but apparently widely and rather deeply emarginate; with a moderately distinct median carina; with dense large and round but somewhat irregular punctures; posterior angles produced beyond the median lobe. *Elytra* somewhat angular, shoulders produced; with series of large, deep, oblong punctures, becoming smaller towards sides and much smaller towards apex; interstices punctate, the alternate ones distinctly raised, except posteriorly. *Under-surface* with large punctures. Second abdominal segment very decidedly elevated above third. *Tibiæ* striated, the anterior strongly trisinate beneath. Length, 8 mm.; rostrum, 2 mm. (vix.); width, $3\frac{1}{2}$ mm.

Hab.—New South Wales: Galston (A. M. Lea).

In appearance nearer *fuliginosus* than any here described, but this is in consequence of the raised elytral interstices; otherwise they are very distinctly separated by the rostrum, abdomen, base of prothorax, tibiæ, etc. The rostrum is thinner and less parallel-sided than in any of the others except of the following species. The fascicles on the elytra are confined to the third and fifth interstices except at summit of posterior declivity. In consequence of the subapical tooth of the anterior tibiæ being rather large, and the tibiæ themselves feebly dentate in the middle, they are strongly trisinate beneath.

OMYDAUS CONTRACTUS, n. sp.

Moderately-densely clothed with stoutish scales, varying from a dingy-grey to sooty-black, and subfasciculate on elytra.

Head rather coarsely punctate; with a distinct median carina; eyes comparatively coarsely faceted. Rostrum sud-

denly bent near base, much wider near (but not at) base than elsewhere: basal third coarsely punctate, apical two-thirds highly polished and almost impunctate. Antennæ rather thin; scape the length of funicle. *Prothorax* feebly convex, sides moderately rounded, suddenly decreasing to apex and rather strongly to base, base feebly sinuate; with a moderately distinct median carina not continuous to base; disc with three distinct subcircular impressions: one on each side of middle, the other in middle of base; with rather large, round, shallow punctures; posterior angles about rectangular. *Elytra* elongate-subcordate, base trisinuate, median sinus very feeble, the others small and semicircular; with series of large, deep, oblong punctures, becoming smaller towards the sides, and much smaller posteriorly; alternate interstices scarcely visibly raised. *Under-surface* coarsely punctate. Second abdominal segment decidedly raised above third. *Tibiæ* indistinctly striated, the anterior not very distinctly bisinuate beneath, subapical tooth rather indistinct; tarsi thinner than usual. Length, 7 mm.; rostrum, 2 mm.; width, $3\frac{1}{4}$ mm.

Hab.—New South Wales: Richmond River (A. M. Lea).

The outline of this species is strongly suggestive of *Exithius cariosus*; the sides of the prothorax and elytra rather rapidly decrease to their junction; the elytra at their base are considerably narrower than the widest part of the prothorax, whilst in all the other species they are at least as wide.

OMYDAUS IMPRESSICOLLIS, n. sp.

Clothing much as in the preceding species.

Head coarsely and irregularly punctate; median carina not traceable; eyes rather finely faceted. Rostrum coarsely and irregularly punctate, punctures dense but finer in front of antennæ than elsewhere. Antennæ stout; scape noticeably shorter than funicle. *Prothorax* slightly longer than wide, feebly convex, base strongly bisinuate, basal two-thirds subparallel; with a distinct median carina on apical three-fourths; disc with shallow but distinct depressions; with dense, large, round, somewhat irregular punctures. *Elytra* with the sides subparallel from basal fifth to apical third; with series of large, deep, suboblong punctures, becoming smaller, rounder, and deeper at sides, and much smaller posteriorly; alternate interstices irregularly elevated and feebly granulate. *Under-surface* coarsely punctate. *Tibiæ* striated, each much wider at than close to apex, anterior feebly bisinuate beneath, the subapical tooth rather small, the terminal hook unusually long. Length, 9 mm.; rostrum, $2\frac{1}{2}$ mm.; width, $3\frac{3}{4}$ mm.

Hab.—New South Wales (Macleay Museum).

The narrowest of the genus. I cannot find the least trace of a carina on the head of the specimen described, but this is probably a character that is not to be too strictly relied upon, as in *oblongopunctatus* one specimen has the head carinate, whilst another has not. The depressions on the prothorax, although not very deep, are sufficiently distinct; there are three subbasal ones, and a semicircular one (at its posterior end rather deeper than elsewhere) on each side of the carina.

OMYDAUS CONFUSUS, n. sp.

Clothing somewhat as in *oblongopunctatus*.

Head coarsely punctate; with a feeble median carina; eyes moderately faceted. Rostrum almost parallel-sided; coarsely punctate on basal half, not very coarsely on apical. Antennæ rather stout; scape noticeably shorter than funicle. Shape much as in *oblongopunctatus*, but rather narrower; the *prothorax* with larger and deeper punctures and the median carina more pronounced; the *elytra* with smaller punctures, much less clearly defined and more or less confluent. Length, $7\frac{1}{2}$ mm.; rostrum, $1\frac{1}{2}$ mm.; width, $2\frac{1}{3}$ mm.

Hab.—New South Wales: Tamworth (A. M. Lea).

Close to *oblongopunctatus* but smaller and narrower, and with different punctures. The elytral interstices are feebly connected in places, causing feeble transverse subtubercular spaces; the anterior tibiæ are not very strongly bisinuate, and are without the median tooth of *oblongopunctatus*, the subapical tooth, however, is rather distinct.

PSEUDOMYDAUS, n. g.

Eyes rather small, coarsely faceted. Rostrum rather stout. Scape much shorter than funicle, inserted almost in middle. *Prothorax* longer than wide. *Elytra* more than twice the length of prothorax. *Abdomen* with the second segment almost as long as the two following combined, its suture with first deep at sides only and curved across middle. *Legs* moderately long; femora stout, edentate. Other characters as in *Omydaus*.

The species described below is not unlike a small variety of *Omydaus impressicollis*, but the characters given above are so much at variance with those of *Omydaus* that it certainly should not be placed in that genus.

PSEUDOMYDAUS TENUIS, n. sp.

Black, antennæ and tarsi of a dingy-red. Moderately-densely clothed with reddish-brown and rather elongate scales, on the prothorax one in each puncture; elytra in addition

with minute scales on the interstices, a distinct oblique fascia of whitish scales at summit of posterior declivity, and a small round spot of similar scales on third interstice at one-third from base; under-surface and legs with denser and longer clothing than on upper-surface.

Long, thin, and subparallel. *Head* moderately large, somewhat coarsely and irregularly punctate; ocular fovea wide, but shallow and indistinct. *Rostrum* rather stout, the length of prothorax, moderately curved, sides feebly incurved to middle, base (but not extreme base) wider than apex; coarsely punctate throughout, but behind antennæ the punctures subseriate in arrangement. *Antennæ* rather stout; scape inserted just perceptibly nearer apex than base, the length of the three following joints: first joint of funicle slightly stouter and longer than second, third to seventh subcylindrical and feebly transverse; club briefly ovate. *Prothorax* slightly longer than wide, base strongly bisinuate, basal four-fifths subparallel, towards apex suddenly but not largely narrowed; with dense and moderately large and round but rather shallow punctures; surface somewhat uneven; with a feeble median carina; walls slightly inwardly oblique. *Elytra* not much wider than and about twice and one-half the length of prothorax, sides subparallel, apex widely rounded and not much narrower than base, base strongly trisinuate, shoulders produced; with series of large, round, deep, subapproximate punctures, not much smaller posteriorly than elsewhere; interstices punctate, indistinctly and very feebly granulate, narrower than series of punctures, the alternate ones slightly raised. *Pectoral canal* deep and wide, terminated at base of anterior coxæ. *Meso-sternal receptacle* raised in front, sides oblique, apex much wider than base and almost truncate; cavernous. *Meta-sternum* moderately large, but considerably shorter than the following segment; densely punctate; episterna rather narrow, each with a series of punctures. *Abdomen* long and coarsely punctate, two basal segments depressed in middle in ♂, feebly convex in ♀, first as long as second and third combined, intercoxal process wide and almost truncate, second almost as long as third and fourth combined and considerably longer than fifth. *Femora* stout, edentate, indistinctly (the anterior not at all) grooved, posterior scarcely extending to apical segment, densely punctate; tibiæ rather short, in addition to the terminal hook each with a small subapical tooth; tarsi rather narrow, third joint not much wider than second and bilobed for scarcely half its length, fourth long, thin, and setose. Length, $6\frac{1}{2}$ mm.; rostrum, $1\frac{1}{2}$ mm.; width, $2\frac{1}{2}$ mm.

Hab.—New South Wales: Burrawang (T. G. Sloane), Illawarra (Macleay Museum).

A long, thin species, somewhat like the European *Plinthus caliginosus*. The prothorax is flattened, but is rendered uneven by rather feeble depressions: at the base three of these are distinct, the median one divides on each side of the median line and is continued on each side to near apex, the lateral ones are traceable to about the middle. The subapical tooth of the anterior tibiæ in the ♂ is rather large.

I have described the clothing of the most distinctly marked specimen; of two others under examination one has the elytra almost uniformly clothed, whilst the other has the small whitish spots absent and the postmedian fascia just traceable.

POROPTERINUS, n. g.

Head almost concealed by prothorax. Eyes ovate, widely separated, coarsely faceted. Rostrum moderately long and not very stout, curved. Scape inserted closer to apex than base of rostrum, shorter than funicle; second joint of funicle elongate, the first joined to the scrobe by a small lateral node at the base; club ovate, subcontinuous with funicle. *Prothorax* transverse, constriction deep and continuous across summit, ocular lobes obtuse, base bisinuate. *Scutellum* distinct. *Elytra* wider than prothorax, shoulders produced, sides strongly arcuate towards apex. *Pectoral canal* deep, terminated between four anterior coxæ, encroached upon by the anterior pair. *Mesosternal receptacle* V-shaped, depressed in front; open. *Metasternum* shorter than the following segment; episterna rather narrow. *Abdomen* large; two basal segments large, first scarcely as long as second and third combined, its suture with second curved at middle, third and fourth combined longer than second or fifth, their sutures deep and wide. *Legs* moderately long; femora moderately stout, neither grooved nor dentate, posterior not extending to apex of abdomen; tibiæ slightly compressed, bisinuate beneath; tarsi slender, almost glabrous above, third joint not much wider than second but deeply bilobed, fourth elongate; claws rather long and thin. Subovate, depressed, squamose, apterous.

A remarkable genus, which belongs to the *Poropterus* group; it is not close to any with which I am acquainted. The mesosternal receptacle sloping downwards (instead of upwards) to the front is a most unusual feature; the first joint of the funicle is also remarkable.

POROPTERINUS TRILOBUS, n. sp.

Blackish-brown, antennæ and tarsi of a rather pale-red. Very densely clothed with muddy-grey and sooty scales (which entirely conceal the punctures), interspersed with stouter and

suberect scales, which form feeble fascicles on the alternate interstices of the elytra.

Head with dense but concealed punctures. *Rostrum* densely punctate but punctures concealed except in front of antennæ; scrobes deep in front but abruptly turned beneath, at sides scarcely traceable to eyes. *Funicle* with the first joint stouter and considerably shorter than second, third to seventh transverse. *Prothorax* transverse; divided into three lobes by the deep anterior constriction, and a still deeper and wider median depression, basal lobes larger than the anterior one; with dense, deep, and rather large punctures, which are entirely concealed, as is also a feeble carina along the middle of the median depression. *Elytra* considerably wider than prothorax and more than twice as long, widest near base, then slightly diminishing in width to apical two-thirds, which are strongly arcuate; seriate-punctate, punctures large, subquadrate, entirely concealed, third, fifth, and seventh interstices decidedly elevated and causing the base to appear multisinuate, the third and fifth broken up into feeble tubercles beyond the middle. *Under-surface* evidently with large punctures, but which are entirely concealed, as are also the sutures of the metasternal episterna. *Posterior femora* (although somewhat longer than the others) not extending to apex of penultimate segment. Length, $6\frac{3}{4}$ mm.; rostrum, $1\frac{1}{2}$ mm.; width, $3\frac{1}{4}$ mm.

Hab.—New South Wales: Cootamundra, Forest Reefs (A. M. Lea).

The strong impressions on the prothorax (dividing it into three distinct lobes) and the peculiar shape and sculpture of the elytra give this species a remarkable appearance, so that, although the derm and punctures are hidden, the species is a very distinct one. The four specimens under examination were taken from under very old logs.

POROPTERCULUS, n. g.

Head convex, not concealed. *Eyes* rather large, ovate, not very widely separated, rather coarsely faceted. *Rostrum* moderately long and rather wide, feebly curved; a shallow groove on each side above scrobe. *Antennæ* moderately stout; scape inserted nearer apex than base of rostrum, the length of funicle; basal joint of the latter rather long; club ovate, subcontinuous with funicle. *Prothorax* transverse, sides rounded, base almost truncate, constriction not traceable, ocular lobes obtuse. *Scutellum* small. *Elytra* ovate, shoulders rounded. *Pectoral canal* deep and wide, terminated between front and intermediate coxæ. *Mesosternal receptacle* feebly raised, crescent-shaped, emargination widely transverse;

cavernous. *Metasternum* short; episterna narrow but traceable throughout. *Abdomen* with straight sutures; first segment as long as second and third combined, intercoxal process rather narrow, third and fourth combined slightly longer than second and fifth. *Legs* moderately long; posterior coxæ almost touching elytra; femora not stout, grooved, edentate, posterior terminated before apex of abdomen; tibiæ rather long and almost straight; tarsi moderately long, third joint wide and deeply bilobed, fourth elongate. Elongate-ovate, strongly convex, striate, squamose, winged.

Evidently belongs to the *Poropterus* group, but I know of no closely related genus.

POROPTERCULUS SUBNITIDUS, n. sp.

Piceous-brown and somewhat shining, antennæ and tarsi paler. Not densely clothed with depressed and suberect sooty scales, intermingled with a few white ones, and which are more numerous on the under-surface than elsewhere.

Head convex; indistinctly punctate. Rostrum the length of prothorax, sides very feebly incurved to middle; basal half with coarse, partially-concealed punctures; apical half shining and moderately punctate, an impunctate line along middle. First joint of funicle obconical, the length of second and third combined and much wider, third to seventh transverse. *Prothorax* lightly transverse, base not much wider than apex; with dense, round, deep, clearly cut, non-confluent punctures, suddenly becoming much smaller on apical fourth. *Elytra* not much wider than, about once and two-thirds the length of, and outline subcontinuous with, that of prothorax; punctate-striate, punctures indistinct, although rather large; interstices regular, convex, shining, slightly narrower than striæ. *Abdomen* with dense, round, deep, clearly-cut, scarcely-concealed punctures. *Femora* with dense but rather small punctures, posterior extending to apical segment. Length, $2\frac{1}{4}$ mm.; rostrum, $\frac{2}{3}$ mm.; width, 1 mm.

Hab.—Western Australia: King George Sound (Australian Museum).

The elytral punctures are indistinct, except towards the sides, but are not concealed by the clothing, which is almost absent, except posteriorly.

PTEROPOROPTERUS, n. g.

Head convex, partially concealed. Eyes ovate, very finely faceted. Rostrum not very long and rather wide, lightly curved, a shallow groove on each side above scrobe. Antennæ moderately stout; scape shorter than funicle, inserted nearer

apex than base of rostrum; two basal joints of funicle moderately long; club ovate. *Prothorax* as long as wide, sides rounded, base bisinuate, constriction slight, ocular lobes almost rectangular. *Scutellum* minute. *Elytra* ovate, convex, each separately rounded at base. *Pectoral canal* deep and wide, terminated between four anterior coxæ. *Mesos-teral receptacle* raised, almost crescent-shaped, emargination rather widely transverse; cavernous. *Metasternum* short; episterna not traceable. *Abdomen* with distinct sutures; first segment rather large, as long as second and third combined, apex incurved, intercoxal process rounded and rather narrow; third and fourth combined the length of fifth and slightly shorter than second. *Legs* rather long; posterior coxæ touching elytra; femora feebly grooved, edentate, posterior just passing elytra; tibiæ rounded, almost straight; tarsi rather short, third joint wide and deeply bilobed. Elongate-ovate; strongly convex, squamose, nontuberculate, winged.

Allied to *Poropterus*, but winged, the elytra separately rounded at the base, the eyes very finely faceted, and the femora feebly grooved.

PTEROPROPTERUS LACUNOSUS, n. sp.

Of a rather dark reddish-brown. Moderately-densely (dense on legs and rostrum) clothed with large, soft, dingy, whitish scales; prothorax and elytra, in addition, with stout, suberect, sooty setæ.

Head and rostrum coarsely punctate, but punctures scarcely traceable. *Rostrum* the length of prothorax, sides incurved to middle; punctures unconcealed only at extreme apex. *Scape* inserted two-fifths from apex of rostrum, the length of six basal joints of funicle; first joint of funicle stouter and almost twice the length of second, fourth to sixth feebly, seventh strongly transverse. *Prothorax* convex, base lightly bisinuate, apex produced and rounded; with dense, round, and rather large, but shallow punctures. *Elytra* elongate-ovate, not much wider than and about twice the length of prothorax; with regular series of large, subquadrate, clearly-defined and crowded, but not confluent, punctures: interstices much narrower than punctures, each appearing as a series of feeble granules (a granule at each corner of a puncture). *Under-surface* coarsely but not clearly punctate. Length, 6 mm.; rostrum, $1\frac{2}{3}$ mm.; width, $2\frac{2}{3}$ mm.

Hab.—Queensland: Cairns (Macleay Museum).

On the elytra the clothing (except on shoulders and posterior declivity) is almost confined to the interstices, on the

prothorax it forms a feeble (but distinct) median line and a much more feeble line on each side. The dark setæ are confined to the upper-surface, but (except those at apex of prothorax) are almost invisible elsewhere than from the side. The sides of the prothorax appear granulate through the clothing, but this appearance is caused by the sides of the punctures being partially exposed; on the elytra, however, there are true granules, each of which bears a seta; the interstices between puncture and puncture (on the elytra) are actually wider (though less pronounced) than between row and row.

TENTEGIA QUADRISERIATA, n. sp.

Black, legs piceous-brown, antennæ paler. Clothing as in *anopla*.

Head with irregular punctures. *Rostrum* with large round punctures, arranged in four regular series behind antennæ, but without leaving elevated ridges. *Prothorax* with dense, round, large, shallow punctures; apex more produced than usual, with the extreme apex feebly notched and the constriction less pronounced; a feeble median carina from apex to behind middle. *Elytra* subcordate; subtuberculately produced behind shoulders; with series of very large punctures or foveæ, becoming larger at sides and smaller towards apex; interstices with shining somewhat distant granules, largest in vicinity of shoulders, third, fifth, and seventh scarcely visibly raised but with more distinct granules than the others. *Sterna* densely and irregularly punctate. Two basal segments of abdomen with round shallow foveæ, those on the second forming two complete rows. *Femora* edentate, with large shallow punctures, posterior just passing apex of elytra; tibiæ grooved, lower subapical tooth distinct but upper obsolete; third tarsal joint noticeably wider than second and rather deeply bilobed. Length, 5 mm.; rostrum, $1\frac{1}{4}$ mm.; width, $3\frac{1}{4}$ mm.

Hab.—Queensland: Cairns, Rockhampton (Macleay Museum).

The shape (in consequence of the feeble notch at apex of prothorax) resembles that of the species belonging to *Microporopterus*; the femora are stouter with the third tarsal joint wider than usual.

TENTEGIA TORTIPES, n. sp.

Black, legs and antennæ piceous. Clothed with yellowish stout setæ or setose scales, very sparse on elytra, where, however, there are small and obscure patches of small white scales, and which are sparsely and irregularly distributed.

Head with dense and round but (for the genus) small punctures. Rostrum densely punctate between antennæ and apex, without distinct punctures behind antennæ, but with five very distinct carinæ, the median one of which is perfectly straight, but the others slightly waved. *Prothorax* with dense, short, shining ridges of unequal lengths; the sides punctate. *Elytra* subcordate, base almost perfectly straight, sides scarcely inflated behind shoulders; punctate-striate, the striæ wide and rather shallow, the punctures (except towards sides, where they are rather large) small, distant, and comparatively indistinct; interstices feebly shining and with small (almost seriate) punctures, the second and fourth not quite continuous to base, but the second feebly raised near base and the fourth very distinctly raised about summit of posterior declivity, the others there being but little raised; declivity itself abrupt and almost inwardly oblique. *Sterna* irregularly and not coarsely punctate. *Mesosternal receptacle* with very thin walls. Two basal segments of abdomen with (for the genus) small and not at all foveate punctures, those on the second in two very irregular series. *Legs* (especially the posterior) longer and thinner than usual; femora edentate, with shallow punctures, the posterior strongly arcuate; tibiæ with eight distinct grooves, with a feeble subapical tooth below but a very distinct one above, posterior very decidedly curved both longitudinally and outwardly; third tarsal joint wider than second and rather deeply bilobed. Length, $7\frac{1}{2}$ mm.; rostrum, $2\frac{1}{2}$ mm.; width, 5 mm.

Hab.—Northern Territory: Port Darwin (type in Macleay Museum).

A remarkable species: the elytra without granules, the fourth interstice very decidedly raised, the posterior declivity very abrupt, the punctures of the two basal segments of abdomen comparatively small, long and crooked hindlegs, etc. Only the sides of the prothorax are distinctly punctate, the disc being covered with numerous short shining ridges of unequal lengths (becoming granules towards apex), but with a more or less inwardly oblique trend, the whole being reminiscent of *Neomelanterius carinicornis*. The length given is that of a straight line from apex of prothorax to apex of elytra, but along the curve of the back the distance between the same points is $13\frac{1}{2}$ mm.

ANILAUUS COSTIROSTRIS, n. sp.

♂. Reddish-brown, antennæ and tarsi paler. Moderately densely and uniformly clothed with short, stout scales, interspersed with longer and suberect ones, varying from dingy-grey to sooty, but giving the surface a dingy-brown appearance.

Head with dense but almost concealed punctures. Rostrum coarsely punctate throughout, but especially at base, behind antennæ with three very distinct, shining, slightly-waved ridges; wider at apex than at base. Funicle with the first joint stouter and slightly longer than second. *Prothorax* almost twice as wide as long; with coarse, deep, partially concealed punctures; with a narrow (slightly dilated in middle), shining median carina. *Elytra* not much longer than wide; with series of rather large, rounded punctures; interstices gently convex, wider than punctures near suture, but not as wide as sides. *Under-surface* and *legs* coarsely punctate. Length, $3\frac{1}{2}$ mm.; rostrum, $1\frac{1}{3}$ mm.; width, $2\frac{1}{2}$ mm.

♀. Differs in having the rostrum longer and thinner, wider at base than at apex, less coarsely punctate but punctures more distinct, the three basal costæ wider and much less distinct, and the antennæ slightly nearer the middle.

Hab.—Queensland: Endeavour River, Cairns (Macleay Museum).

Differs from *sordidus* in being differently and much less densely clothed, prothorax wider and more suddenly contracted anteriorly; elytral interstices regular, and the whole body rather more depressed. The teeth of the four posterior femora are slightly larger, whilst those of the posterior are not quite so large as in *sordidus*.

MYRTESIS NASUTA, n. sp.

♀. Dingy-black, rostrum piceous-brown, antennæ red. Clothing as in *caligata* but much sparser, except on the legs and metasternal episterna.

Head densely punctate. Rostrum very long and thin, terminated considerably beyond posterior coxæ, its apex scarcely dilated; with distinct but rather small punctures and which are evenly and sparsely distributed, except that they become coarse on the flanks near apex. Antennæ very thin; scape inserted slightly nearer base than apex; two basal joints of funicle equal in length. *Prothorax* as in *caligata* except that the tubercular elevations are less pronounced, more numerous and irregular, and the excavated portion of each larger, so that they frequently look like small elevated rings; with a median carina which is elevated in front and traceable to base. *Elytra* as wide as long, depressed along suture; with almost regular series of large punctures, the interstices with a few feeble hollow tubercles, appearing like slightly-raised rings, and few of which are seta-bearing. *Pectoral canal* extending to apex of basal segment of abdomen.

Abdomen with foveæ as in *caligata*, but of larger size. Length, 7 mm.; rostrum, $4\frac{1}{3}$ mm.; width, 4 mm.

Hab.—Queensland: Mount Dryander (type in Mr. A. Simson's collection).

This species differs from *caligata* in having the rostrum longer (it is actually longer than the greatest elytral width), thinner, less dilated at apex, and with smaller punctures, the antennæ inserted nearer base than apex (all possibly sexual characters) with the two basal joints of the funicle equal in length, prothorax differently sculptured, elytra with smaller, much sparser, and hollower tubercles, very few of which are seta-bearing; but in particular by the pectoral canal extending to the apex of the basal segment of the abdomen instead of terminating before its middle. The species strongly resembles *caligata*, and I may be wrong in regarding it as new; if it is a female of *caligata*, then the two specimens of that species that are known to me must be males, although they have every appearance of being females.

MYRTESIS PULLATA, n. sp.

♂. Dingy-black, rostrum piceous-brown, antennæ red. Densely clothed with pale muddy-brown setose scales, mingled (especially on prothorax) with ochreous ones.

Head densely punctate. Rostrum comparatively stout, terminated just before abdomen, parallel-sided except near apex; with large punctures close together, in four series behind antennæ, in front more crowded and irregular. Antennæ thin; scape inserted two-fifths from apex, two basal joints of funicle equal. *Prothorax* densely and coarsely punctate, with numerous feeble and hollow tubercular elevations; with a distinct and slightly shining carina, which is continuous to base and apex. *Elytra* as wide as long, not depressed along suture; with series of large punctures or foveæ, which are sometimes almost hidden by the clothing; interstices with almost regular series of small hollow shining granules; across the median half with feeble and feebly fasciculate tubercles. *Pectoral canal* terminated at abdomen. Two basal segments of *abdomen* with very large punctures or foveæ, forming three irregular rows on the first and two on the second. Length, $5\frac{1}{2}$ mm.; rostrum, 2 mm.; width, $3\frac{3}{4}$ mm.

♀. Differs in having the rostrum much longer ($2\frac{1}{2}$ mm.) and thinner, terminated at abdomen, punctures much smaller and crowded together; antennæ thinner, scape inserted in exact middle of rostrum and club more elongate.

Hab.—Queensland: Mount Dryander, Burdekin River (type in Mr. A. Simson's collection).

This is the only species in which I am acquainted with both sexes. The clothing and tubercles are different to those of *nasuta* and *caligata*, and the pectoral canal is shorter; the most readily seen difference, however, is the absence of a sutural depression. The type male and female have been returned to Mr. Simson, a second female being retained by myself.

TETENGIA, n. g.

Head rather large, partially concealed. *Eyes* ovate, not very widely separated, coarsely faceted. *Rostrum* rather short and stout, feebly curved. *Antennæ* stout, scape shorter than funicle, inserted nearer base than apex; two basal joints of funicle elongate, the others transverse and increasing in width; club stout, continuous with funicle. *Prothorax* widely transverse, base truncate, sides at base excavated to receive femora, constriction absent; ocular lobes very obtuse. *Scutellum* absent. *Elytra* closely applied to, with the outline continuous with, that of prothorax. *Pectoral canal* deep and wide, terminated between intermediate coxæ. *Mesosternal receptacle* very feebly raised in front and depressed at the sides, walls equal throughout, emargination semicircular; cavernous. *Metasternum* much shorter than the following segment; *episterna* rather narrow but distinct throughout. *Abdomen* moderately large; first segment as long as the three following combined, second depressed below first, its sutures straight, third and fourth combined distinctly longer than second or fifth, their sutures deep and wide. *Legs* short and stout; femora deeply grooved to receive tibiæ, edentate, posterior terminated before apex of abdomen; tibiæ very wide, outer edge strongly rounded and thin, inwardly excavated to receive tarsi; tarsi rather short and stout, third joint not much wider than second and not bilobed to base, fourth long and very thin; claws feeble. Briefly ovate, feebly convex, nontuberculate, apterous.

The shape of the prothorax, abdomen, and legs render this a highly remarkable genus; its true position I am very doubtful of, but it appears to approach *Tentegia*.

TETENGIA SOLENOPIA, n. sp.

Blackish-brown or dark-brown; prothorax pale, antennæ red. Prothorax moderately-densely clothed with ochreous scales, with a few white ones in small spots; elytra with whitish scales, not very densely distributed, and frequently condensed into small spots, second interstice at apex with similar scales to those on prothorax.

Head with dense, regular and not very large punctures; each eye encircled by a narrow impression. *Rostrum* coarsely punctate in ♂, moderately coarsely in ♀. *Prothorax* almost twice as wide as long, sides strongly but not suddenly rounded, apex less than half the width of base; with dense, round, uniform, clearly-defined punctures; a very feeble impunctate space along middle. *Elytra* not much longer than wide, very little wider than prothorax, widest immediately behind base, thence gently and continuously rounded to apex; striate-punctate, punctures deep oblong and feebly connected; interstices flat, wider than striæ, rather densely punctate, third to seventh terminating separately instead of the third and seventh and fourth and sixth being conjoined; flanks of basal half inwardly oblique curved and polished. *Under-surface* with punctures increasing in size, from rather small on the mesosternal receptacle, to large on the first segment of abdomen; second segment of the latter strongly and suddenly depressed below first, with a series of very large punctures becoming foveæ (four) in the middle; third and fourth each with a row of small punctures, fifth densely punctate. *Legs* densely punctate; femora oblong, thin at base, their grooves running out at the base, posterior not extending to apical segment; tibiæ lightly striated. Length, 4 mm.; rostrum, 1 mm.; width, 3 mm.

Hab.—Western Australia: King George Sound (Austrian Museum), Bridgetown (A. M. Lea).

The punctuation of the under-surface is remarkable. Owing to the peculiar interstices each elytron appears to be supplied with a preapical callus, although such is not the case. The ciliation of the ocular lobes is silvery and remarkably short. The clothing appears to be easily abraded.

TEPALICUS, n. g.

Head excavated towards base, partially concealed. Eyes rather coarsely faceted. *Rostrum* long, thin, and curved. *Antennæ* moderately thin; scape inserted nearer apex than base of rostrum, the length of funicle; two basal joints of the latter elongate; club elongate-ovate, subcontinuous with funicle. *Prothorax* transverse, sides lightly rounded, base bisinuate, walls vertical, constriction slight, ocular lobes obtuse. *Scutellum* minute. *Elytra* subcordate, considerably wider than prothorax. *Pectoral canal* deep and narrow, terminated between intermediate coxæ. *Mesosternal receptacle* scarcely raised, walls not stout and of equal thickness throughout, emargination U-shaped; cavernous. *Metasterum* short; episterna narrow but distinct throughout and divided from the

middle by deep sutures. *Abdomen* moderately large, sutures distinct, that between first and second segments feeble but traceable across middle, first as long as second and third combined, intercoxal process not very wide; third and fourth combined longer than second or fifth. *Legs* moderately long; posterior coxæ touching elytra; femora not stout, feebly grooved, edentate, posterior just passing elytra; tibiæ feebly compressed, almost straight; tarsi long, thin, and shining, third joint very little wider than second and bilobed for about half its length, fourth elongate. Ovate, moderately convex, squamose, nontuberculate, apterous.

Closely allied to *Paleticus*, but the femora feebly grooved and edentate, the mesosternal receptacle U-shaped; the abdomen with the apical segments not suddenly narrowed by elytra, the suture between first and second traceable across middle, and the combined length of the third and fourth greater than that of the second or fifth.

TEPALICUS SEMICALVUS, n. sp.

Black, antennæ and tarsi of a rather pale-red. Densely clothed with muddy-brown scales, thickly interspersed with dark fawn-coloured erect scales that form feeble fascicles on the prothorax and elytra.

Head slightly convex, semicircularly depressed towards and naked at base; ocular fovea not traceable. *Rostrum* long, rather strongly curved, parallel-sided: with strong punctures in grooves on basal half, apical half polished and minutely punctate. *Scape* inserted at apical third: second joint of funicle considerably longer than first, the others transverse. *Prothorax* moderately transverse, base strongly bisinuate; punctures small, sparse, and entirely concealed: from middle to apex a distinctly elevated but narrow and squamose carina. *Elytra* subcordate, about once and one-half the width and twice and one-half the length of prothorax, base trisinate, shoulders rounded, behind shoulders subparallel to apical third; with rather large round punctures, not very close together, and subgeminatè in arrangement, becoming very small posteriorly; alternate interstices irregularly and very feebly raised. *Metasternum* with a transverse median impression, notched in the middle anteriorly. *Intercoxal process* of abdomen with a semicircular impression on each side; punctures (if present) entirely concealed. Length, 7 mm.; rostrum, $2\frac{1}{2}$ mm.; width, 4 mm.

Hab.—Queensland: Cairns (Macleay Museum).

In appearance this species rather strongly resembles *Paleticus frontalis*. The prothorax could scarcely be called

fasciculate, as the erect scales, though thickly distributed, are nowhere in small patches; on the elytra the fascicles are almost confined to the third, fifth, and seventh interstices; the stout scales are very thickly distributed on the legs.

OUROPOROPTERUS, n. g.

Head moderately large, not visible from above. Eyes ovate, widely separated, finely faceted. Rostrum moderately long and rather thin, moderately curved; a shallow groove on each side above scrobe. Antennæ thin; scape inserted nearer apex than base of rostrum, the length of funicle: two basal joints of funicle elongate; club ovate, subcontinuous with funicle. *Prothorax* transverse, subconical, sides rounded, base bisinuate, constriction feeble, ocular lobes obtuse. *Scutellum* small. *Elytra* subovate, base very little under than base of prothorax and trisinuate. *Pectoral canal* deep and moderately wide, terminated between four anterior coxæ. *Mesosternal receptacle* U-shaped, walls of equal thickness throughout but rather strongly raised posteriorly: feebly cavernous. *Metasternum* considerably shorter than the following segment; episterna narrow. *Abdomen* rather large; sutures distinct; first segment not much longer than second, its suture with it curved, intercoxal process rather narrow, second slightly longer than third and fourth combined and considerably longer than fifth. *Legs* not very long; femora not grooved, indistinctly dentate, posterior terminated before apex of abdomen; tibiæ compressed, feebly bisinuate; tarsi moderate, third joint wide and deeply bilobed, fourth moderately long but not thin. Elliptic, convex, squamose, tuberculate, apterous.

Very close to *Emethylus*, from which it differs, especially in the shoulders and absence of wings; the ocular lobes are also much less prominent, and the mesosternal receptacle is differently shaped. The latter organ is decidedly raised, but slopes *down* to the front instead of *up*, as is usually the case; seen from behind (or when probed) it appears to be cavernous, but when viewed from in front it appears to be almost open.

OUROPOROPTERUS DIURUS, n. sp.

♂. Dark reddish-brown, antennæ and claw-joints somewhat paler. Very densely and almost uniformly clothed, with rather stout, dark fawn-coloured scales, subfasciculate at apex of prothorax, and absent only at extreme apex of rostrum.

Head with dense, small, entirely-concealed punctures. Rostrum the length of prothorax, base noticeably wider than apex, sides incurved to middle; densely and rather coarsely

punctate, punctures concealed except at apex. Scape inserted at apical third; first joint of funicle as long as second and third combined. *Prothorax* moderately transverse, apex produced and bluntly bifurcate; with small and rather sparse and dense and minute punctures, all of which are concealed. *Elytra* about thrice the length of prothorax and at base very little wider, widest before middle, base lightly trisinate, sides strongly rounded, towards apex strongly arcuate, each separately produced at apex; with series of rather large and rounded, or subquadrate punctures, becoming smaller posteriorly; interstices in places subtuberculate, the alternate ones feebly raised; suture on basal half with small, shining granules. *Under-surface* with minute, concealed punctures. *Femora* densely punctate, minutely dentate, posterior just passing apex of third abdominal segment. Length, 8 mm.; rostrum, 2 mm.; width, $4\frac{1}{8}$ mm.

♀. Differs in having the rostrum rather longer and thinner, squamose at base only, shining and lightly punctate elsewhere, and the scape inserted two-fifths from apex of rostrum.

Hab.—New South Wales: Illawarra (Macleay Museum).

There are about eighteen small tubercles on the elytra, nearly all of which are placed about the middle. The femoral teeth are acute, but very small, and are invisible from all directions until the clothing is removed.

BRACHYPROPTERUS VERMICULATUS, n. sp.

Black, apex of rostrum almost black, antennæ and claw-joints pale-red. Very densely clothed with fawn-coloured scales, paler on posterior declivity and darker on three apical segments of abdomen than elsewhere; elongate stout scales scattered about (rather thickly on the under-surface and legs) and forming numerous feeble fascicles on prothorax and elytra.

Head very feebly convex; punctures concealed; forehead feebly bisinuate. Rostrum the length of prothorax, sides feebly incurved to middle; basal half with coarse concealed punctures, apical half shining and with moderately strong punctures. Scape inserted slightly nearer apex than base of rostrum, not much shorter than funicle; first joint of funicle slightly longer than second, seventh transverse. *Prothorax* lightly transverse; with a number of tubercular elevations all of the same height near apex forming a feeble O, at base forming a feeble M (but the median V very distinct), a small tubercle on each side of middle and three moderately long ones on each flank; punctures concealed except a few on flanks. *Elytra* not much wider than prothorax and not twice as long, deeper than wide; posterior declivity steep and longer

than the rest of elytra, crowned on each side with an obtuse transverse tubercle; third and fifth interstices distinctly raised from base to basal third (less distinctly raised near apex); with several feeble tubercles about middle, a distinct oblique one on fifth interstice; with series of rather large round punctures, not very close together, and more or less interrupted by tubercles; a few small, shining, sutural granules on basal half. Punctures of *under-surface* entirely concealed. Posterior *femora* extending almost to apex of abdomen. Length, $6\frac{2}{3}$ mm.; rostrum, $2\frac{1}{2}$ mm.; width, $3\frac{2}{3}$ mm.

Hab.—New South Wales: Clarence River (Macleay Museum).

The elongate tubercular elevations and short deep elytra give this species a most peculiar appearance. It differs from *apicigriseus* in having much paler and more uniform clothing. The rostrum longer, eyes smaller and rather more coarsely faceted, posterior declivity considerably longer, pectoral canal longer and terminating at hindmargin of middle coxæ instead of in a somewhat more advanced position, mesosternal receptacle narrower and second segment of abdomen not transversely impressed, etc.

EURYPROPTERUS TENUIFASCIATUS, n sp.

Black, antennæ (club infuscate) and claw-joints of a rather pale-red. Moderately densely clothed with small, round, brown scales; on prothorax a few elongate ones scattered about and moderately dense at sides and apex, each side of middle with a small, round, whitish spot; each elytral puncture with a moderately large scale, longer and paler scales scattered about, and, to the naked eye, appearing to form an oblique row of three small dots on each elytron; a distinct and very narrow white oblique fascia on each side, at summit of posterior declivity, extending from sixth interstice almost to suture. Under-surface, head, and basal half of rostrum sparsely squamose, pectoral canal moderately squamose; legs feebly ringed. Ciliation silvery and unusually minute.

Head very feebly convex; forehead widely and shallowly but distinctly bisinuate; indistinctly punctate; ocular fovea small and round. Rostrum the length of prothorax, sides lightly incurved to middle; with very feeble series of rather small punctures; apical half shining. Funicle with the second joint distinctly longer than the first, none of the others transverse. *Prothorax* rather strongly transverse, posterior angles produced; surface uneven from rather large scattered punctures; feebly (more distinctly at base) de-

pressed along the middle: across middle with several very feeble tubercular elevations. *Elytra* wider than prothorax and (along middle) about twice as long, not much longer than wide; shoulders oblique and produced on to prothorax; with several feeble tubercular elevations, more noticeable on third interstice than elsewhere: suture towards base with a few depressed shining granules; with series of large (moderately small posteriorly), round, rather deep, and distant punctures: interstices not separately convex. *Mesosternal receptacle* as long as wide, each side strongly emarginate (or foveate). *Abdomen* with small sparse punctures; first segment as long as the three following combined, intercoxal process with a foveate impression on each side; suture between first and second segments deep at sides, in middle with a large transverse fovea: second as long as third and fourth combined. *Femora* distinctly grooved, the four anterior with a thin but acute and distinct tooth, posterior just passing apex of elytra. Length, 6 mm.; rostrum, $1\frac{3}{4}$ mm.; width, $3\frac{1}{2}$ mm.

Hab.—New South Wales (A. M. Lea).

The mesosternal receptacle and abdomen are at variance with the other species of the genus, but the insect is so evidently allied to *annulipes* that it was thought advisable not to generically separate it. The specimen described (probably a female) is from the Tweed or Richmond River; it was put aside in spirits with some duplicates for over four years without apparent injury to the remarkable clothing. Near the base of the elytra there is a short groove, formed by punctures, such as is often seen behind the posterior coxæ.

EXITHIUS FERRUGINEUS, n. sp.

Very densely clothed with ochreous-brown scales of a uniform tint throughout, except that the scutellum bears whitish scales. Fascicles on each of the elytral tubercles and six on prothorax.

Head densely and somewhat rugosely punctate; forehead very distinctly but not deeply trisinuate. Rostrum shining; coarsely punctate at base, densely but not coarsely elsewhere. Antennæ inserted almost in exact middle. *Prothorax* feebly transverse, sides moderately rounded, towards apex rather suddenly and strongly narrowed; with dense concealed punctures. *Elytra* not twice the length of prothorax; shoulders strongly projecting; posterior declivity abrupt, its summit crowned by four rather large tubercles placed in a line; elsewhere (but especially on the third and fifth interstices) with a few small tubercles; with series of concealed punctures. Two basal segments of *abdomen* with dense, round punctures.

All the *femora* very acutely and distinctly dentate. Length, $5\frac{2}{3}$ mm.; rostrum, $1\frac{2}{3}$ mm.; width, 3 mm.

Hab.—Tasmania (type in Mr. A. Simson's collection).

The specimen described appears to be a female. The species resembles the preceding one, especially as regards the shoulders, but the clothing is very different, the prothorax is less transverse, the elytra are much shorter (in consequence of the posterior declivity being very abrupt), and the tubercles are differently disposed and less uniform in size; the femoral teeth are also considerably larger and more acute.

EXITHIUS CONSPICIENDUS, n. sp.

Densely clothed with dingy-brown scales; prothorax with a very distinct patch of large, soft, pale, rounded scales, commencing at the middle of the base, curved round and terminating in the median fascicle on each side of the middle. Prothorax with six fascicles, each elytral tubercle feebly fasciculate.

Head coarsely punctate but not at base; forehead very distinctly and moderately deeply trisinate. Rostrum shining; densely but not very coarsely punctate (except at base) in ♂, almost impunctate (except at base) in ♀. *Prothorax* moderately transverse, sides rounded, with dense concealed punctures. *Elytra* almost truncate at base; the alternate interstices with small tubercular elevations; with series of large (almost concealed) punctures. Two basal segments of *abdomen* with dense round punctures. *Femora* not very distinctly punctate. Length, 5 mm.; rostrum, $1\frac{1}{3}$ mm.; width, $2\frac{1}{2}$ mm.

Hab.—Tasmania (Macleay Museum): Hobart (L. Rodway, H. H. D. Griffith, R. A. Black, and A. M. Lea); Mount Wellington (A. M. Lea).

The shape of the patch of pale scales on the prothorax is remarkable.

Two specimens differ in being smaller (4 mm.), in having the patch of scales on the prothorax snowy-white, and (very feebly) narrowly continued to apex, each side with a narrow pale stripe; the scutellum is white; each shoulder is white, the whole of the posterior declivity for the width of three interstices on each side with a triangular lateral extension near the summit is white, and the femora are very decidedly ringed. I cannot regard these specimens, however, as representing more than a variety.

EXITHIUS LOCULOSUS, n. sp.

Densely clothed with soft, sooty scales. Prothorax and elytra with the usual fascicles.

Head densely punctate; forehead not trisinuate. Rostrum wider at base than at apex; base coarsely punctate, elsewhere (except at sides) rather sparsely and finely punctate. Antennæ inserted nearer base than apex. *Prothorax* moderately transverse, subtriangular, owing to the sides decreasing in width from near base; with rather larger punctures than usual. *Elytra* not much wider than prothorax, just perceptibly widest about middle, thence arcuate to apex, which is truncate; base feebly trisinuate; each with about ten small tubercular elevations, most of which are beyond the middle; with series of large subquadrate punctures or foveæ, wider than the interstices and in places only slightly obscured. Two basal segments of *abdomen* with dense, round, deep punctures. *Femora* scarcely visibly dentate. Length, $5\frac{1}{4}$ mm.; rostrum, $1\frac{1}{3}$ mm.; width, $2\frac{1}{3}$ mm.

Hab.—New South Wales: Galston (D. Dumbrell).

The build of this species is suggestive of *Microporopterus*, the femoral teeth are traceable with great difficulty and only from behind; the punctures of the abdomen are unusually deep and those of the elytra large.

EXITHIUS SCULPTILIS, n. sp.

♂. Sparsely clothed with dingy-brownish scales, with pale scales along the middle of the prothorax and rather denser there than elsewhere. Prothorax with six fascicles (the two median ones white); elytra scarcely fasciculate.

Head coarsely punctate between eyes; forehead shallowly but distinctly trisinuate. Rostrum slightly wider at apex than at base; with unusually large punctures, subseriately arranged behind antennæ, in front of antennæ the punctures are larger than usual but much smaller than those behind them. Antennæ inserted one-third from apex of rostrum; scape shorter (but not by much) than funicle. *Prothorax* as long as wide, with large but not very numerous punctures or foveæ; with a moderately distinct, but short, median carina. *Elytra* strongly convex, subovate, widest just beyond middle, apex feebly rounded; with large punctures or foveæ, becoming small posteriorly but much larger (and also more distinct) on the sides; third and fifth interstices each with two feeble tubercular elevations: one at basal third and one at summit of posterior declivity. Two basal segments of *abdomen* with very large round punctures. *Femora* edentate; narrowly grooved. Length, $4\frac{1}{4}$ mm.; rostrum, 1 mm.; width, 2 mm.

Hab.—New South Wales (Macleay Museum).

The clothing and punctures are very different to those

of the other species here described, the scape is unusually long, the body is strongly convex and comparatively narrow, and the femora are edentate; so that I may be wrong in referring it to *Exithius*—it is, at any rate, very closely allied to that genus.

EXITHIUS INAMABILIS, n. sp.

Moderately densely clothed with sooty and muddy-grey scales, irregularly distributed, and forming feeble fascicles on elytra, but not on prothorax.

Head densely punctate; forehead not trisinate. Rostrum subopaque in ♂, shining in ♀, rather thinner than usual; base and sides with coarse punctures, elsewhere not coarsely or densely punctate. Antennæ inserted almost in exact middle. *Prothorax* moderately transverse, sides strongly rounded; with dense, round, shallow, partially-concealed punctures. *Elytra* briefly subovate, widest just beyond middle, base feebly trisinate; all the interstices slightly convex and each feebly produced at base; with series of large punctures, becoming not much smaller posteriorly. *Meso-sternal receptacle* very feebly and not suddenly elevated; densely punctate. Abdomen with dense, round punctures. *Femora* stouter than usual; rather feebly dentate. Length, 4 mm.; rostrum, $1\frac{1}{3}$ mm.; width, 2 mm.; variation in length, $3\frac{1}{2}$ - $4\frac{1}{2}$ mm.

Hab.—New South Wales: Forest Reefs (A. M. Lea).

A short broad species, having the rostrum rather longer than usual and the prothorax without fascicles; on one specimen that has been entirely abraded each elytral puncture appears to be bounded by four minute granules, and which give the elytra a curious appearance, but these granules are usually not traceable.

EXITHIUS BREVIS, n. sp.

Black, antennæ and tarsi dull-red. Densely clothed with large, soft, sooty-brown scales, that on the prothorax and elytra form feeble fascicles.

Head densely and confusedly punctate; forehead not trisinate. Rostrum the length of prothorax; sides feebly incurved to middle; densely and coarsely punctate, punctures concealed except on apical fourth. Scape inserted in exact middle of rostrum; first joint of funicle stouter but scarcely longer than second. *Prothorax* moderately transverse, sides strongly rounded, apex about half the width of base; with dense, round punctures, becoming smaller anteriorly. *Elytra* about once and one-third the width and about twice the length of prothorax, slightly longer than wide; with series of

large, suboblong punctures, which are more or less concealed; interstices narrower than punctures, themselves lightly punctate. *Under-surface* with dense, round, regular punctures. *Mesosternal receptacle* not suddenly raised. *Femora* stout, very feebly dentate. Length, $4\frac{1}{3}$ mm.; rostrum, $1\frac{1}{2}$ mm.; width, $2\frac{1}{4}$ mm.

Hab.—New South Wales: Forest Reefs (A. M. Lea).

A short, broad species, closely allied to the preceding one, from which it may be distinguished by its greater width, denser clothing, much more irregular punctures of head, and stouter and more coarsely punctured rostrum.

EXITHIOIDES, n. g.

Head large, feebly convex, partially concealed. *Eyes* ovate, widely separated, coarsely faceted. *Rostrum* comparatively short and wide, feebly curved; a shallow groove on each side above the scrobe. *Scape* inserted nearer apex than base of rostrum, the length of funicle; two basal joints of the latter elongate; club ovate, subcontinuous with funicle. *Prothorax* subquadrate, constriction slight; ocular lobes obtuse. *Scutellum* small. *Elytra* oblong-ovate. *Pectoral canal* deep and wide, terminated immediately behind anterior coxæ. *Mesosternal receptacle* raised, almost as long as wide, sides incurved to base, ridged along middle, emargination widely transverse; cavernous. *Metasternum* rather short; episterna not traceable. *Abdomen* moderately large, sutures straight; basal segment as long as the three following combined, intercoxal process rather narrow; third and fourth depressed below, and their combined length slightly less than that of second or fifth. *Legs* moderately long; posterior coxæ touching elytra; femora feebly grooved, edentate, posterior terminated before apex of abdomen; tibiæ lightly compressed, almost straight; tarsi rather thick, third joint very little wider than second and deeply bilobed, fourth rather long and thin. Oblong-elliptic, convex, squamose, non-tuberculate, winged.

Allied to *Exithius*, but the abdominal sutures straight and the body winged.

EXITHIOIDES PUNCTATUS, n. sp.

Black, opaque, antennæ and tarsi dull-red. Sparsely (the legs moderately densely) clothed with sooty-brown scales; base and posterior declivity of elytra with dense pale scales; under-surface with a few pale scales. *Prothorax* with four very feeble fascicles, elytra with several feeble fascicles and with four distinct (but still feeble) ones crowning the summit of posterior declivity.

Head feebly convex; densely punctate throughout; basal portion scaleless but opaque, separated from the scaly portion by a very feeble semicircular impression. Rostrum shorter than prothorax, sides incurved to middle; densely and rather coarsely punctate and opaque throughout, punctures larger and arranged in four feeble rows behind antennæ, with a very feeble median ridge on basal half. Scape inserted at apical third; first joint of funicle slightly longer than second, the others transverse. *Prothorax* moderately convex, almost as long as wide, sides moderately rounded, base truncate and not much wider than apex; with dense, large, round, deep punctures; with a short and very indistinct median carina. *Elytra* slightly wider than prothorax and about once and one-half its length; parallel-sided and cylindrical from near base to apical third; with dense, large (twice the size of those on prothorax), round, deep, closely approximate, but non-confluent punctures or foveæ, becoming smaller posteriorly; a few small feebly-shining granules on suture near base. Two basal segments of *abdomen* with large, round, deep punctures, larger on second than on first; fifth densely punctate. Length, $4\frac{1}{2}$ mm.; rostrum, $1\frac{1}{5}$ mm.; width, 2 mm.

Hab.—New South Wales: Glen Innes (A. M. Lea).

The punctures on both prothorax and elytra are perfectly regular, but on the latter they are so large and close together that the interspaces between them do not form regular interstices (except towards the sides), each being surrounded by a ring of more or less even thickness.

EUFAUSTIA, n. g.

Head rather large, strongly convex, not concealed. Eyes large, briefly ovate, widely separated, finely faceted. Rostrum wide, dilated at apex, curved throughout; scrobes shallow, continuous to but very feeble at lower edge of eyes, anterior portion visible from above. Antennæ moderately stout; scape inserted slightly before base of scrobe and slightly nearer apex than base of rostrum, shorter than funicle; two basal joints of funicle elongate; club ovate, rather large, much wider than funicle. *Prothorax* obcordate, apex and sides rounded, base feebly bisinuate; constriction scarcely traceable; ocular lobes very feeble. *Scutellum* small but convex and distinct. *Elytra* subtriangular, base truncate except for the shoulders. *Pectoral canal* wide, terminated between intermediate coxæ. *Mesosternal receptacle* transverse, walls thin and abruptly vertical throughout; open. *Metasternum* large, slightly longer than basal segment of abdomen; episterna rather narrow. *Abdomen* moderately

large, first segment just perceptibly longer than fifth but considerably longer than second, its suture with second moderately distinct at sides only; third and fourth with distinct and moderately deep sutures, their combined length slightly more than that of second and less than that of fifth. *Legs* (especially the anterior) long; coxæ large, the posterior touching elytra; femora stout, subclavate, not grooved, dentate, posterior passing elytra; tibiæ compressed, arched at base, feebly bisinuate beneath, in addition to the terminal hook with an obtuse subapical tooth; tarsi feebly clothed, basal joint considerably longer than second and third combined, third short, wide, and deeply bilobed, fourth long and thin; claws moderate. Elliptic, moderately convex, feebly clothed, winged.

This remarkable and extremely distinct genus is dedicated to the memory of the late Herr Johannes Faust, of Libau, Russia, the well-known specialist on *Curculionidæ*.

In a tabulation the genus should be placed near *Onidistus*, which, indeed, appears to be its nearest ally, although the shape of the rostrum, mesosternal receptacle, prothorax, and elytra are utterly different. The most noticeable features of the only known species are the long anterior legs, acutely dentate femora, long basal joint of tarsi, very wide (especially at apex) rostrum, with apex of scrobes visible and the peculiarly-distributed highly-polished granules.

EUFUSTIA MIRABILIS, n. sp.

Black, subopaque; rostrum and legs brownish-red, antennæ (club excepted) paler. Sparsely clothed with thin white scales, sparser on disc of prothorax and elytra than elsewhere; in addition the sides are clothed with flat, indistinct scales; ciliation of ocular lobes unusually long.

Head densely punctate, flat between eyes; ocular fovea deep but smaller than many of the surrounding punctures. Rostrum shorter than prothorax, sides dilated to base and apex, at the middle allowing scrobes to be seen from above; densely but not coarsely punctate, each side of apex with a shallow impression. Mandibles large and strong but not projecting. Scape the length of five basal joints of funicle; of these the first is almost as long as second and third combined, the second almost as long as third and fourth combined, the third is longer than the fourth, the fifth and sixth are feebly, the seventh strongly transverse; club narrowly joined to funicle. *Prothorax* slightly longer than wide, middle of base with a shining scutellar lobe; with minute shining granules scattered about, except along middle;

densely punctate, the punctures rather small and towards the base and sides concealed. *Elytra* not more than twice the length of prothorax; shoulders produced and shining; near base and scutellum with about fourteen highly-polished granules or small tubercles of irregular size; with series of small and distinct punctures, behind nearly every one of which is a small shining granule, the first row is straight, the second slightly, and the third decidedly curved about the middle; interstices with very small punctures and with small, shining, irregularly and sparsely distributed granules. *Metasternum* slightly concave. *Abdomen* with the first segment feebly concave, raised above, and its suture with second concealed across the middle, except when viewed directly from behind, fifth, and the third and fourth at sides, rather densely punctate. Each of the four posterior *femora* with a small and acute tooth, of the anterior with a large and very acute tooth, all transversely rugulose; apical half of anterior tibiae obsoletely dentate or serrate beneath, basal half of intermediate with a very narrow compressed space above. Length, 7 mm.; rostrum, $1\frac{3}{4}$ mm.; width, $3\frac{1}{6}$ mm.

Hab.—New South Wales: Richmond River (A. M. Lea).

At a glance the surface appears to be almost glabrous. The shining granules and small tubercles at the base of the elytra are usually different on each elytron and are not alike in the three specimens under examination; the largest, however, is always on the third interstice. From certain directions the abdomen appears to be supplied with a feeble plate like in *Amydala* and its allies. The rostrum is not twice as long as its width at the apex.

ONIDISTUS SUBFORNICATUS, n. sp.

Dark blackish-brown, antennæ (club excepted) and tarsi pale-red. Densely clothed with minute muddy-grey scales which entirely conceal the derm; prothorax with stout, brown, curved, setose scales, each arising from a puncture; elytra with similar scales on the interstices, but which are often scarcely traceable when viewed from above.

Head very distinctly quadri-impressed; excavated between eyes. Rostrum comparatively stout; rather coarsely (for the genus) punctate at base and leaving a distinct shining carina behind the antennæ (punctures and carina less noticeable in ♀ than in ♂). Antennæ as in *araneus*, except that they are rather stouter. *Prothorax* with rather strong and rather dense, equally distributed punctures, which, however, are entirely concealed. *Elytra* striate-punctate, punctures very large (almost foveate) on basal third, becoming

smaller and compressed posteriorly, but still distinctly traceable through clothing, with, or without, small, shining, sutural granules. *Mesosternal receptacle* U-shaped, slightly cavernous. *Metasternum* slightly more than half the length of the following segment. *Wings* present. Length, $6\frac{1}{3}$ mm.; rostrum, $1\frac{2}{3}$ mm.; width, 3 mm.; variation in length, $5\frac{1}{2}$ - $6\frac{1}{2}$ mm.

Hab.—Queensland: Cairns (Macleay Museum).

Appears to be an abundant species, judging by the number of specimens in the Macleay Museum. It is abundantly distinct from *nodipennis* and *araneus* by the shape of the mesosternal receptacle and the strong (although concealed) prothoracic punctures; in shape it is intermediate. The clothing is much denser, and of a slightly different shade of colour to that of *araneus*.

This species agrees fairly well with Mr. Pascoe's description of *odiosus*, except that the elytra are not callose towards the base, and that the punctures are not distinct, being in fact closer together than usual. But if the locality given for *odiosus* (King George Sound) is correct (a subject, however, that appears to me to be doubtful judging by the distribution of *Onidistus* and its allies) there should be no liability to confound the two species.

PSEUDONIDISTUS, n. g.

Head partially concealed, forehead trisinate. *Eyes* large, ovate, moderately faceted. *Rostrum* moderately long and rather thin, each side with a shallow groove above the scrobe. *Antennæ* thin; scape inserted nearer apex than base of rostrum, longer than funicle; two basal joints of funicle elongate; club ovate, moderately large. *Prothorax* transverse, base bisinate, sides rounded, apex feebly produced, constriction slight, ocular lobes obtuse. *Scutellum* not traceable. *Elytra* cordate. *Pectoral canal* rather shallow and not very wide, wider between coxæ than in front, terminated between intermediate coxæ. *Mesosternal receptacle* transverse, sides produced, hinder margin semicircular; open. *Metasternum* much shorter than the following segment; episterna narrow but distinct throughout. *Abdomen* moderately large, sutures distinct, first segment as long as the two following combined, intercoxal process wide; third and fourth combined slightly longer than second and considerably longer than fifth. *Legs* long; posterior coxæ touching elytra; femora stout, subpedunculate, acutely dentate, not grooved, posterior passing elytra; tibæ somewhat compressed, thin, bisinate beneath;

tarsi long and very thin, third joint longer than wide and not much wider than second, bilobed to basal fourth. Convex, squamose, fasciculate, apterous.

Closely allied to *Onidistus*, from which it differs in the forehead being tri- instead of quadri-sinuate, the scutellum absent, and the shape of the mesosternal receptacle; the outline of the latter is much the same as that of the copper-plates that decorate the breasts of many aboriginal kings.

PSEUDONIDISTUS CORDATUS, n. sp.

Black, antennæ, tarsi, and tibial hooks of a rather pale-red. Densely clothed with muddy-brown scales, which are more or less thickly interspersed with stout, suberect, paler (sometimes darker) scales; prothorax with four dark fascicles across middle; clothing of under-surface and legs much the same, but the stout scales more elongate. Head between eyes and basal half of rostrum densely clothed.

Head bald, shining and impunctate except between eyes, forehead trisinate, the median excavation deeper and more distinct, but not as wide as the lateral ones; these narrowly margin the eyes. Rostrum slightly longer than prothorax, moderately curved, feebly decreasing in width from base to middle; basal half evidently coarsely punctate, but punctures concealed; with a distinct, shining, median carina; apical half polished and impunctate. Antennæ inserted two-fifths from apex of rostrum; two basal joints of funicle subequal in length, third to sixth subglobular, seventh transverse. *Prothorax* moderately transverse, convex; with rather dense and large, round punctures; base feebly bisinuate. *Elytra* cordate, considerably wider than and about twice the length of prothorax; shoulders, sides, and apex rounded; with series of large, round, deep, somewhat irregular punctures, very large on basal half of disc, and becoming smaller on the sides and posteriorly; alternate interstices irregularly thickened and feebly raised; four or five granules on each side of suture towards the base. *Metasternum* with an irregular series of rather large punctures on each side, a subcariniform process behind each side of the receptacle. Basal segment of abdomen with a semicircular row of large punctures (the inner one on each side decidedly foveate) margining the coxæ; second depressed below first, its basal half (except at sides) with moderately large, irregular punctures, apical segment with dense and rather large punctures. *Femora* with large curvilinearly triangular teeth, those of the anterior largest. Length, 5 mm. (vix.); rostrum, 1½ mm.; width, 2½ mm.

Hab.—Queensland: Cairns (Macleay Museum), Mulgrave River (Henry Hacker).

The punctures (except on sides of elytra), foveæ, and granules are entirely concealed by the clothing. On abrasion the derm of the prothorax is seen to be opaque, whilst that of the elytra is shining; the punctures of the latter, though smaller posteriorly than elsewhere, are still of considerable size there, fully as large as those of the prothorax.

PALETONIDISTUS, n. g.

Head moderately large; forehead trisinuate; ocular fovea deep. Eyes moderately large, subovate, rather finely faceted. Rostrum moderately long and rather thin, curved, with a shallow groove on each side above the scrobe. Scape not the length of funicle, inserted nearer apex than base of rostrum; two basal joints of funicle elongate; club briefly ovate. *Prothorax* moderately convex, walls almost vertical, base bisinuate, sides and apex moderately rounded. *Scutellum* absent. *Elytra* subovate, much wider than prothorax. *Pectoral canal* deep and rather narrow, terminated between four anterior coxæ. *Mesosternal receptacle* raised, longer than wide, ridged along middle, emargination semicircular; cavernous. *Metasternum* very short; episterna narrow but traceable throughout. *Abdomen* rather large; two basal segments large, suture between them rather feeble but traceable throughout; first as long as second and third combined, intercoxal process wide, third and fourth combined the length of fifth and slightly shorter than second. *Legs* rather long; posterior coxæ not touching elytra; femora subclavate, acutely dentate, not grooved, posterior not extending to apex of body; tibiæ thin and compressed, bisinuate beneath, tarsi long, thin, and polished above, third joint not much wider than second but deeply bilobed, claws thin. Elliptic-ovate, convex, squamose, tuberculate, apterous.

Allied to *Paleticus* and *Onidistus*, from both of which it may be distinguished by the shape of the mesosternal receptacle.

PALETONIDISTUS TRISINUATUS, n. sp.

Black, opaque; antennæ and tarsi red and shining. Densely clothed with muddy scales, interspersed with longer and stouter but almost unicolourous scales, becoming subfasciculate on tubercles; under-surface sparsely clothed. Head and basal half of rostrum with large and moderately-dense scales.

Head moderately convex, basal portion visibly punctate; forehead distinctly but not deeply trisinuate; ocular fovea

rather deep and narrow. Rostrum almost the length of prothorax; basal half coarsely punctate and along middle feebly carinate; apical half shining and finely punctate. Scape noticeably shorter than funicle; of the latter the first joint is slightly longer and thicker than the second, the second to sixth are almost cylindrical, and the seventh is as long as wide. *Prothorax* as long as wide, apex not suddenly narrowed, sides rather feebly rounded, depressed along middle, the depression more distinct on apical third than elsewhere; with dense, round, and deep but not very large punctures, and which are more or less concealed. *Elytra* about twice and one-half the length of prothorax and at base considerably wider, widest just beyond middle; each side strongly lessened on apical third, each feebly separately rounded at apex; shoulders produced; each with about nine, small, rounded tubercles; three sub-basal and six about summit of posterior declivity; a small shining elevation on each side of the scutellar region; with series of large, round, deep, more or less distant punctures, which become small posteriorly, and are more or less concealed. *Under-surface* almost without punctures, except for a row of rather large ones across metasternum and a similar row on basal segment of abdomen. *Legs* rather long; femora each with a large, triangular, acute tooth (equal in all), posterior extending almost to apex of abdomen. Length, 7 mm.; rostrum, $1\frac{2}{3}$ mm. (vix.); width, $3\frac{1}{2}$ mm.

Hab.—New South Wales (A. M. Lea).

There appears to be a feeble impunctate space along the middle of the prothorax. The clothing on the specimen described appears to be partially abraded, but the species is so distinct that I have not hesitated to describe it.

ECILDAUS, n. g.

Head moderately large, partially concealed; forehead trisinate. Eyes small, ovate, widely separated, coarsely faceted. Rostrum rather short and thick, strongly bent at base; scrobes wide, shallow, and highly polished; a shallow groove on each side above them. Antennæ stout; scape inserted nearer base than apex of rostrum and shorter than funicle; two basal joints of the latter subelongate, the others transverse; club ovate. *Prothorax* moderately or not at all transverse, sides rounded, base almost truncate, disc flattened, constriction shallow, ocular lobes obtuse. *Scutellum* absent. *Elytra* subovate, base lightly trisinate and suddenly (but not by much) wider than prothorax. *Pectoral canal* deep and wide, terminated between hinder part of anterior coxæ. *Meso-sternal receptacle* raised, longer than wide, emargination widely

transverse; cavernous. *Metasternum* less than half the length of the following segment; episterna rather narrow. *Abdomen* with straight sutures; two basal segments rather large; first as long as second and third combined, intercoxal process moderately wide; third and fourth combined slightly longer than second or fifth. *Legs* short; posterior coxæ touching elytra; femora stout, outwardly curved on apical half, grooved, edentate, posterior terminated before apex of abdomen; tibiæ short, curved at base only; tarsi rather short, moderately wide or rather narrow, feebly or not at all clothed above and shining, third joint very little wider than, or about once and one-half the width of second, fourth thin and rather long. Elliptic-ovate, moderately convex, squamose, non-tuberculate, apterous.

One of the few genera in which the tarsi are variable, in *glabricornis* they are almost as in *Methidrysis*, whilst in the others they are feebly (but very decidedly) clothed above, with the third joint distinctly wider than the second. The forehead is trisinate, the median sinus being very wide; the lateral ones rather deeply margin the eyes; the polished base of the head looks as if an iron cap had been drawn over that portion of it, this is especially noticeable in *personatus*. Although four specimens are under examination, the metasternal episterna cannot be distinctly seen in any (on account of the clothing), they appear, however, to be rather narrow. The three species described below are closely allied in general appearance.

Tarsi glabrous on upper surface, head feebly carinate	... ..	glabricornis
Tarsi not entirely glabrous, head not carinate.		
Emargination of forehead encroached upon by punctures	... ..	melancholicus
Emargination of forehead not encroached upon	... ..	personatus

ECILDAUS PERSONATUS, n. sp.

Black, antennæ and tarsi red. Densely clothed with large, soft, sooty-brown scales, obscurely spotted with scales of a lighter shade of brown, more noticeable on shoulders than elsewhere; tarsi distinctly clothed.

Head convex, shining, and lightly punctate, except on anterior two-fifths; forehead trisinate, the median sinus much wider than the lateral ones. Rostrum shorter than prothorax, base wider than apex, sides incurved to middle; basal half with coarse, concealed punctures, apical half shining, but rather strongly punctate. Second joint of funicle just perceptibly longer than first. *Prothorax* feebly transverse; with

dense, round, partially-concealed punctures. *Elytra* about once and one-half the length of prothorax; striate-punctate, punctures rather large but concealed; interstices regular and wider than striæ. Punctures of *under-surface* concealed; basal segments of abdomen slightly concave in middle. *Femora* widely grooved, posterior not extending to apical segment. Length, 4 mm.; rostrum, 1 mm.; width, 2 mm.

Hab.—Queensland: Cape Upstart (A. Simson).

Two specimens under examination, each of which appears to be ♂.

ECILDAUS MELANCHOLICUS, n. sp.

Black, antennæ and tarsi dull-red. Densely clothed with moderately large, soft, sooty-brown scales, very obscurely speckled with lighter brown ones; tarsi distinctly clothed.

Head shining and lightly punctate on basal third; elsewhere coarsely punctate; forehead trisinate, but the sinuations slightly interrupted by punctures. Rostrum shorter than prothorax, base wider than apex, sides incurved to middle; coarsely punctate throughout (except for a median space between antennæ) but punctures concealed on basal half, apical half shining. First joint of funicle slightly longer than second. *Prothorax* moderately transverse; with dense (but not confluent), round, shallow, clearly-cut punctures; with a short and very feeble median carina. *Elytra* as in the preceding species. *Under-surface* (except that the abdomen is flat) and *legs* as in the preceding species. Length, $4\frac{1}{2}$ mm.; rostrum, 1 mm. (vix.); width, 2 mm.

Hab.—New South Wales: Forest Reefs (A. M. Lea).

ECILDAUS GLABRICORNIS, n. sp.

Black, antennæ and tarsi red and shining. Clothing much as in the preceding species, except that the tarsi are glabrous above.

Head glabrous but rather coarsely punctate on basal third, punctures elsewhere concealed; forehead trisinate, the sinuations slightly encroached upon by punctures; with a very feeble median carina. Rostrum slightly shorter than prothorax, base considerably wider than apex, sides incurved to middle; coarsely punctured throughout, punctures on basal third concealed, but leaving a feeble median carina visible; elsewhere shining. First joint of funicle longer than second. *Prothorax* as long as wide, with dense (but not confluent), round, shallow, clearly-cut punctures; with a narrow, wavy, median carina, traceable from near base to near apex. *Elytra* as in the two preceding species. *Abdomen* with dense, round, concealed punctures; basal segments feebly concave in

middle. *Femora* densely punctate; posterior extending to apical segment. Length, $4\frac{3}{4}$ mm.; rostrum, 1 mm. (vix.); width, 2 mm. (vix.).

Hab.—New South Wales: Forest Reefs (A. M. Lea).

In appearance close to the preceding species, but at once distinguished by the prothorax being as long as wide, and by the tarsi. The antennæ, except the apical joints of the club, are glabrous and polished. The median prothoracic carina is sufficiently distinct; in the preceding species it is much shorter and traceable with difficulty. Where the elytral clothing has been removed the interstices are seen to be narrow and waved, although they are evidently regular throughout.

NOTOCALVICEPS, n. g.

Head of moderate size, not concealed; forehead strongly quadrisinuate; bald and highly polished except between eyes. Eyes large, ovate, rather widely separated, finely faceted. Rostrum long, thin, and curved, each side with a rather deep groove above the scrobe. Antennæ rather thin; scape inserted nearer apex than base of rostrum, the length of funicle; two basal joints of funicle elongate; club elongate-ovate, its joints oblique. *Prothorax* transverse, sides rounded, base bisinuate, constriction feeble but continued across summit; ocular lobes obtusely rounded. *Scutellum* transversely oblong, distinct. *Elytra* much wider than prothorax, base lightly trisinuate. *Pectoral canal* deep and narrow, terminated between intermediate coxæ. *Mesosternal receptacle* feebly raised, U-shaped, walls equal throughout; cavernous. *Metasternum* slightly but noticeably shorter than the following segment; episterna distinct throughout. *Abdomen* moderately large, sutures deep; first segment not as long as second and third combined, its suture with second curved, intercoxal process rather narrow; third and fourth rather large, their combined length considerably more than that of second or fifth. *Legs* long and rather thin; posterior coxæ not touching elytra; femora dentate, not grooved, posterior passing elytra or not; tibiæ feebly compressed, almost straight; tarsi thin, first and fourth joints equal in length, third moderately wide and deeply bilobed; claws long and very thin. Subovate, convex, squamose, punctate, nontuberculate, apterous.

Allied, but not very closely so, to *Methidrysis*; indeed, but for the situation of the forehead, I should have imagined it as being widely removed from *Paleticus*. There are a number of species, belonging to allied genera, in which the hinder part of the head is more or less shining, but in the two species

described below the base of the head is highly polished and entirely bald.

Posterior femora passing elytra; prothoracic punctures more or less confluent . . . punctipennis, *n. sp.*
 Posterior femora not extending to apex of abdomen; prothoracic punctures not confluent rarus, *n. sp.*

NOTOCALVICEPS PUNCTIPENNIS, *n. sp.*

Black, subopaque; antennæ, tarsi, and tibial hooks dull-red. Not very densely clothed with stout reddish-brown scales; on the prothorax one in each puncture, on the elytra forming feeble decumbent clusters on the interstices, suture with minute scales, each puncture with a small scale, a distinct patch of pale scales on each side at apex; abdomen with sparse elongate scales; legs rather densely clothed. Head between eyes (elsewhere perfectly bald) and basal half of rostrum sparsely squamose.

Head highly polished (except between eyes) and finely but distinctly punctate; forehead strongly quadrisinuate, the median excavations deeper and narrower than the lateral ones, and separated by a distinct ridge, the lateral excavations margining the eyes; between eyes rather coarsely punctate; the ocular fovea rather deep and large. Rostrum long and thin, feebly decreasing in width from base to apex; basal third subopaque, subseriately punctate and with a very distinct, narrow, shining, median carina; apical two-thirds polished and finely punctate. Scape inserted at about two-fifths from apex of rostrum; two basal joints of funicle subequal, none of the others transverse. *Prothorax* moderately transverse, sides rather strongly rounded, base moderately bisinuate; coarsely foveate-punctate, punctures more or less confluent, the interspaces subtuberculate; along middle of apical half a feeble waved carina. *Elytra* subcordate, about once and one-fourth the width, and not thrice the length of prothorax; seriate-punctate or foveate, punctures large, deep, distant, triangular or conical, and largest along suture and base, becoming smaller at sides and much smaller posteriorly. *Metasternum* and basal segment of abdomen each with a curved row of large punctures. *Legs* densely punctate; femora acutely dentate, posterior passing elytra. Length, 9 mm.; rostrum, $2\frac{3}{4}$ mm.; width, $4\frac{1}{4}$ mm.

Hab.—Queensland: Mossman River (type in Macleay Museum).

The scales on the unique specimen under examination are condensed into small clusters on the elytra, and some of these clusters are paler than the others. The elytral punctures are

very peculiar, they are shining, those of the first row are almost triangular (the basal and deepest end directed towards the base of the elytra), those of the second row are more conical, whilst towards the sides they become ovate, the spaces between the punctures and between the rows are on the same general level.

NOTOCALVICEPS RARUS, n. sp.

Black, subopaque; antennæ, tarsi, and tibial hooks dull-red. Not very densely clothed with moderately stout, sub-erect, brownish scales, on the prothorax confined to the punctures, on the elytra on the interstices as well; elytra in addition with a distinct oblique patch of whitish scales on each side, at about basal third and extending from the third to the seventh interstices; under-surface and tibiæ with long, thin scales; femora rather densely clothed. Head between eyes (elsewhere perfectly bald) and base of rostrum with a few elongate scales.

Head highly polished (except between eyes) and very finely punctate; forehead strongly quadrisinuate; coarsely punctate between eyes, the ocular fovea not traceable. Rostrum and antennæ as in the preceding species, except that the median carina of the rostrum is continued on the head almost to its middle. *Prothorax* moderately transverse, sides rather strongly rounded, base moderately trisinuate; with large, round, clearly-defined punctures, somewhat variable in size but nowhere confluent; with a feeble median carina, not traceable to base or apex. *Elytra* oblong-cordate, about once and one-third the width and almost thrice the length of prothorax, shoulders rounded, each feebly separately rounded at apex; seriate-punctate or foveate, punctures large, deep, distant, subconical, becoming smaller and more rounded towards sides, and very small posteriorly. *Metasternum* and basal segment of abdomen each with a curved impression containing large punctures. *Legs* densely punctate; femora rather feebly dentate, posterior scarcely extending to apex of abdomen. Length, 8 mm.; rostrum, $2\frac{1}{4}$ mm.; width, 4 mm.

Hab.—New South Wales (J. Faust).

The white oblique patches of scales on the elytra are very distinct, the general scales are rather longer and thinner than in the preceding. The median sinuations of the forehead are fully as wide and just about as deep as the lateral ones; they are slightly interrupted by punctures. The elytral punctures, though similar in character, are rather more elongate than in the preceding species, whilst those of the prothorax are not at all confluent; the femoral teeth are considerably smaller; the elytra are wider at the base and more decidedly arcuate posteriorly.

TERPOROPUS, n. g.

Head partially concealed, forehead lightly sinuous. Eyes rather large, ovate, rather coarsely faceted. Rostrum rather long and thin, moderately curved, with a shallow groove on each side above scrobe. Antennæ thin; scape inserted at about middle of rostrum, shorter than funicle; all the joints of the latter elongate; club ovate, twice the width of funicle. *Prothorax* subquadrate, constriction slight; ocular lobes obtuse. *Scutellum* absent. *Elytra* rather long and deep, almost parallel-sided. *Pectoral canal* deep and narrow, terminated immediately behind anterior coxæ. *Mesosternal receptacle* raised, longer than wide; sides incurved to base, emargination widely transverse; cavernous. *Metasternum* about half the length of the following segment; episterna narrow and depressed. *Abdomen* rather small, narrow, and nowhere suddenly lessened, sutures deep, straight, and distinct; first segment moderately large, as long as the three following combined, intercoxal process narrow; second very little longer than third; third and fourth combined slightly longer than fifth. *Legs* long and thin; posterior coxæ touching elytra; femora not grooved, acutely dentate, posterior passing elytra; tibiæ thin and lightly compressed, diminishing from base to apex; tarsi long, thin, shining, and very sparsely clothed above, third joint not much wider than second, deeply bilobed, but not to base, fourth long and thin. Elongate-elliptic, strongly convex, squamose, tuberculate, apterous.

The nearest ally of this genus appears to be *Stenoporopterus*, from which it can be readily distinguished by the legs, antennæ, and frontal excavations.

TERPOROPUS TENUICORNIS, n. sp.

Black, antennæ pale-red, the tarsi darker. Moderately densely clothed with muddy-brown scales, interspersed with longer and suberect scales, that on the prothorax and elytra form feeble fascicles.

Head feebly convex; basal half rather coarsely punctate, subopaque, and scaleless; forehead lightly quadrisinuate; anterior half with moderately-dense concealed punctures; a very feeble elevation on each side of middle. Rostrum slightly longer than prothorax, sides feebly incurved to middle; basal third with strong punctures in feeble rows, separated by feeble ridges, elsewhere polished with moderately small and rather dense punctures. Scape the length of five following joints; first joint of funicle slightly shorter than second and slightly longer than third, third slightly longer than fourth, the others

feebly decreasing in length but none transverse. *Prothorax* as long as wide, sides moderately rounded, base truncate and not much wider than apex; with large but not very dense punctures, and which are more or less concealed except on flanks, feebly depressed along middle; towards each side with several very obtuse elevations. *Elytra* scarcely twice the length of prothorax and very little wider, as deep as wide, sides very feebly rounded except towards apex; seriate-punctate (or foveate), punctures very large and deep, becoming smaller posteriorly, much obscured by clothing (less so on sides); third and fifth interstices each with three obtuse tubercles, the largest on third at summit of posterior declivity. *Under-surface* with large, concealed punctures. *Femora* with distinct but rather thin, triangular, acute teeth, subequal on all; posterior passing elytra for about one-third their length; posterior tibiae gently arched throughout, the others at base only. Length, 6 mm.; rostrum, 2 mm.; width, $2\frac{3}{4}$ mm.

Hab.—Queensland: Cairns (Macleay Museum).

A narrow species, with more or less concealed but very coarse punctures. The flanks of the elytra commence from the fifth interstice. The funicle is unusually thin.

AUSTRECTOPSIS, n. g.

Head moderately large and partially concealed, forehead sinuous. Eyes moderately large, ovate, widely separated, moderately faceted. Rostrum moderately long and curved, with a shallow groove on each side above scrobe. Antennae moderately thin; scape inserted nearer apex than base of rostrum, the length of funicle; two basal joints of funicle elongate; club elongate-ovate, its outline continuous with that of funicle, the joints oblique. *Prothorax* transversely suboblong, base bisinuate, ocular lobes slightly obtuse. *Scutellum* distinct. *Elytra* suboblong, base trisinuate, shoulders rounded. *Pectoral canal* deep and rather wide, terminated between intermediate coxæ. *Mesosternal receptacle* not raised, base slightly wider than sides, emargination briefly U-shaped; cavernous. *Metasternum* rather long, but shorter than the following segment; episterna rather wide. *Abdomen* with distinct sutures; two basal segments rather large, first the length of second and third combined, its apex incurved, intercoxal process rather narrow and rounded; third and fourth rather large, their combined length rather more than that of second, second longer than fifth. *Legs* rather long; posterior coxæ not touching elytra; femora moderately stout, not grooved, dentate, posterior passing elytra; tibiae compressed, rather strongly arched at base; tarsi rather long, thin, and feebly clothed, third joint

moderately wide and deeply bilobed, fourth the length of first. Subelliptic, convex, squamose, nontuberculate.

The affinities of this genus are not very obvious. It is placed in the *Poropterus* group on account of the sinuated forehead, narrow tarsi, sutural granules and rostrum approaching those of *Paleticus* and many allied genera, but some of its characters appear to denote affinity with the *Chatectetorus* group, whilst the long club is not in harmony with either.

Since this description was written I have examined a specimen of the New Zealand genus *Ectopsis* (for a specimen—*E. ferrugalis*—of which I am indebted to Major Broun). At a glance the two species—*ferrugalis* and *oblongus*—appear to be congeneric, but comparing them in detail *Ectopsis* is seen to differ in having smaller eyes, club not at all ovate, mesosternal receptacle raised, the canal terminated before the middle coxæ, the base narrower than the sides, but in particular by the femora being very distinctly grooved and the posterior terminated considerably before apex of abdomen.

AUSTRECTOPSIS OBLONGUS, n. sp.

Of a very dark-brown, rostrum (except at apex) black, antennæ and tarsi pale-red. Very densely clothed (apical two-thirds of rostrum nude) with fawn-coloured scales, paler before, and darker on, posterior declivity; apical segments of abdomen with darker scales except at sides; a distinct stripe of dark scales on flanks of meso- and meta-sternum and continued on flanks of prothorax almost to apex. Prothorax with stout, suberect scales, thickly but evenly scattered about and not forming fascicles; elytra with similar scales but condensed into feeble fascicles on the suture and alternate interstices, each elytral puncture with a scale that is white except posteriorly; elsewhere with stout scales, rather thickly distributed.

Head feebly compressed, forehead 5-sinuate. Rostrum longer than prothorax, sides almost parallel; basal third with coarse concealed punctures; elsewhere polished and lightly punctate. Scape inserted two-fifths from apex; first joint of funicle slightly shorter than second, fourth to sixth slightly the seventh strongly transverse; club the length of six preceding joints combined. *Prothorax* rather flat, strongly transverse, basal three-fourths almost perfectly parallel-sided, base lightly bisinuate, but the scutellar lobe distinct, posterior angles rectangular; surface feebly and irregularly elevated; punctures entirely concealed. *Elytra* fully thrice the length of prothorax and at base once and

one-third the width, parallel-sided to near apex; with series of rather large, round, distant punctures; interstices wider than punctures, the third with three, the fifth with four feeble elongate tubercles; suture thickened from before to about middle of posterior declivity; each side of suture towards base with small, shining granules. Punctures of *under-surface* entirely concealed. *Femora* with triangular teeth, those of the posterior large, of the four anterior considerably smaller, but still large. Length, $6\frac{1}{2}$ mm.; rostrum, 2 mm.; width, 3 mm.

Hab.—Queensland: Cairns (Macleay Museum), Kuranda (G. E. Bryant).

The forehead is very distinctly sinuate, but each emargination is slight. From some directions the third and fourth abdominal segments are seen to be drawn slightly backwards at the sides.

ROPTOPERUS TERRÆ-REGINÆ, n. sp.

♂. Dark-brown, antennæ and tarsi of a rather pale-red. Very densely clothed with loose fawn-coloured scales, forming ten fascicles on prothorax and about twenty on elytra. Head and base of rostrum and the legs very densely clothed, the latter in addition with elongate scales.

Head moderately convex, depressed towards base; punctures concealed. Rostrum shorter than prothorax, noticeably wider at base than at apex; punctures of basal two-thirds coarse and concealed, apical third shining but rather strongly punctate. First joint of funicle stouter and slightly longer than second, the others feebly transverse. *Prothorax* distinctly transverse, punctures nowhere traceable. *Elytra* more than twice the length of prothorax; apparently rather strongly tuberculate beneath fascicles; punctures everywhere concealed. Two basal segments of *abdomen* with rather large and not entirely concealed punctures. Posterior *femora* extending to apical segment of abdomen. Length, 4 mm.; rostrum, 1 mm.; width, 2 mm.

Hab.—Queensland: Cairns (Macleay Museum).

The clothing is much the same as in *tasmaniensis*, except that it is considerably denser (except on the two basal segments of abdomen, where it is sparser) and that the legs (at least in the unique specimen under examination) are not at all ringed. It may be at once distinguished, however, by the decidedly transverse prothorax. The base of the head is as in the following species, but the clothing, especially of the rostrum, is very different.

ROPTOPERUS OCCIDENTALIS, n. sp.

Almost black, antennæ and tarsi of a rather pale-red. Moderately-densely clothed with scales, varying on different individuals, from a muddy-brown to black, and forming ten fascicles on prothorax and about twenty on elytra. Head, base of rostrum, and legs densely squamose, the latter in addition with obscure whitish rings and long setæ.

Head moderately convex; base depressed and with a shining impunctate ring; punctures elsewhere concealed. Rostrum shorter than prothorax, shorter and wider in ♂ than in ♀; in ♂ coarsely punctate (the punctures concealed on basal half), shining and moderately coarsely punctate on apical half; in ♀ coarsely punctate on basal third, lightly punctate and shining elsewhere. Scape in ♂ inserted just before middle of rostrum, in ♀ at basal third; first joint of funicle the length of second and third combined, third to seventh transverse. *Prothorax* as long as wide, subobcordate, feebly impressed along the middle; with dense, round, concealed punctures; subtuberculate beneath fascicles. *Elytra* about twice the length and once and one-third the width of prothorax; striate-punctate, punctures oblong; striæ rather deep and narrow, interstices wider than striæ, and subtuberculate beneath fascicles; suture with a few small shining granules towards base. *Under-surface* and *legs* as in *tasmaniensis*. Length, $4\frac{1}{2}$ mm.; rostrum, $\frac{4}{5}$ mm.; width, 2 mm.; variation in length $3\frac{3}{4}$ - $4\frac{1}{4}$ mm.

Hab.—Western Australia: Swan River, Rottnest Island (A. M. Lea).

In both sexes the rostrum is almost parallel-sided in front of the antennæ, and increases in width behind them. The granules of the elytral suture are usually concealed. The clothing is more like that of *tasmaniensis* than of the preceding species, but is sparser and apparently very easily abraded; some of the elytral fascicles are crowned with dingy-whitish scales. All the specimens under examination (two of which were taken *in cop.*) were obtained under loose blocks of limestone.

CAIRNSICIS, n. g.

Head moderately large, not concealed. Eyes ovate, widely separated, coarsely faceted. Rostrum moderately long and curved, comparatively wide. Antennæ moderately thin; scape inserted nearer apex than base of rostrum and the length of funicle; two basal joints of the latter elongate; club ovate, wider than funicle. *Prothorax* transverse, base bisinuate, constriction feeble, ocular lobes obtuse. *Scutellum* absent. *Elytra* elongate-subovate, not much (and not suddenly) wider than prothorax. *Pectoral canal* deep and wide, terminated be-

tween four anterior coxæ. *Mesosternal receptacle* raised, sides incurved to base, emargination semicircular; cavernous. *Metasternum* much shorter than the following segment; episterna very narrow. *Abdomen* moderately large, sutures (except between first and second segments in middle) deep and distinct; first as long as second and third combined; third and fourth combined slightly longer than second or fifth. *Legs* moderately long; femora comparatively thin, feebly grooved, edentate, posterior terminating before apex of abdomen; tibiæ compressed and feebly bisinuate beneath, in addition to the terminal hook with a very feeble subapical tooth; tarsi moderately thin, not shining, third joint moderately wide and deeply bilobed, fourth elongate. Elliptic, convex, squamose, fasciculate, apterous.

Very close to *Ropterus*, but the scape inserted nearer apex than base of rostrum and the length of funicle, the abdomen convex, the femora thinner and grooved, the tarsi (though rather thin) not shining, and with the third joint rather wide and deeply bilobed.

CAIRNSICIS OPALESCENS, n. sp.

Black, antennæ and claw joints of a rather pale-red. Very densely clothed (except on under-surface) with fawn-coloured scales, denser on prothorax than on elytra; on the former they are large, circular, and condensed into numerous small fascicles, on the latter they are smaller and less rounded and the scales of the (rather numerous) fascicles are shining. Head (except at base) and base of rostrum moderately-densely clothed.

Head feebly convex; base impunctate and shining; near base a circular line formed by dense, small, and confluent punctures, before this line shining, elsewhere with coarse, concealed punctures. Rostrum the length of prothorax, almost parallel-sided throughout; basal third with coarse, concealed punctures, elsewhere polished and lightly punctate. Scape inserted at apical third; two basal joints of funicle equal in length, the others transverse. *Prothorax* slightly transverse; punctures concealed; subtuberculate beneath fascicles, with a very feeble shining median carina. *Elytra* slightly wider than prothorax and about once and one-half as long; shoulders emarginate to receive posterior angles of prothorax; with series of large, round, partially-concealed punctures; subtuberculate beneath fascicles; a small, shining, conical granule on each side of scutellar region. *Under-surface*, except third and fourth abdominal segments, with moderately large and dense but partially-concealed punctures. Posterior *femora* extending almost to

apex of abdomen. Length, 5 mm.; rostrum, $1\frac{1}{2}$ mm.; width, $2\frac{1}{8}$ mm.

Hab.—Queensland: Cairns (Macleay Museum).

The prothoracic scales, and a few along suture of elytra, of the unique specimen under observation, have a greenish-opalescent gloss; but unless closely examined this gloss is not seen, although here and there a scale may show up green; on the sides and apex of the elytra some of the scales have a rosy gloss, but it is rather indistinct.

ZENOPOROPTERUS, n. g.

Head rather large, not concealed. Eyes small, ovate, widely separated, coarsely faceted. Rostrum not very long, wide and feebly curved. Antennæ moderately stout; scape inserted closer to base than apex and shorter than funicle; two basal joints of the latter elongate; club elliptic-ovate and rather large. *Prothorax* subquadrate, base bisinuate, constriction feeble, ocular lobes very obtuse. *Scutellum* absent. *Elytra* subovate, at base very little wider than prothorax, widest at about middle. *Pectoral canal* deep and wide, terminated between four anterior coxæ. *Mesosternal receptacle* flat between coxæ, but raised in front, emargination semicircular; cavernous. *Metasternum* much shorter than the following segment; episterna rather narrow. *Abdomen* large, sutures straight and distinct, first segment as long as second and third combined, intercoxal process wide; third and fourth combined slightly longer than second or fifth, fifth slightly longer than second. *Legs* moderately long; posterior coxæ almost touching elytra; femora stout, edentate, very feebly grooved, posterior terminated before apex of abdomen; tibiæ feebly compressed, bisinuate beneath, in addition to terminal hook with a small subapical tooth; tarsi thin and somewhat shining, third joint moderately wide, fourth long and thin. Elliptic ovate, moderately convex, squamose, tuberculate, apterous.

Very close to *Roptoperus*, but the third and fourth abdominal segments with very narrow (though distinct) sutures.

This does not appear to be a very satisfactory character to separate two genera, but in the species described below the flanks of the elytra are inwardly oblique and highly polished, a character rendering it exceedingly distinct. The head is depressed at the base, and at the extreme base is shining.

ZENOPOROPTERUS MIRUS, n. sp.

Black, rostrum and legs brownish-red, antennæ pale-red. Moderately-densely clothed with muddy-brown or ocherous-

red scales, on prothorax and elytra condensed into feeble fascicles; legs with elongate scales.

Head depressed and shining at base; in middle convex and with dense concealed punctures. Rostrum shorter than prothorax, sides very feebly incurved to middle, wider at base than at apex; wider and shorter in ♂ than in ♀; basal third with coarse concealed punctures, which, however, leave a short distinct median carina (very indistinct in ♀); elsewhere polished and lightly punctate. First joint of funicle longer than second. *Prothorax* feebly convex; basal three-fourths subparallel, base distinctly trisinuate, not much wider than apex, walls almost vertical; with dense, not very small, and somewhat irregular punctures; surface nowhere level nor distinctly tuberculate; with a narrow, distinct median carina continuous from base to apex. *Elytra* about once and one-half the length of prothorax and at base very little wider, sides not rounded but considerably increasing in width to middle, thence strongly diminishing to apex; seriate-punctate punctures oblong, neither very large nor close together; third, fifth, and seventh interstices raised in places, but especially at base, the seventh with a somewhat sinuous outline; below the seventh the flanks from base to apical third are inwardly oblique highly polished and with three distinct rows of small, distant punctures. *Abdomen* with dense concealed punctures. Posterior *femora* extending to apical segment. Length, $3\frac{1}{2}$ mm.; rostrum, $\frac{4}{5}$ mm.; width, $1\frac{4}{5}$ mm.

Hab.—New South Wales: Richmond River (A. M. Lea).

In one of the (two) specimens under examination the upper-surface has been considerably abraded, and it is from this one that the sculpture has been described; the punctures of the other specimen are almost concealed except on the glabrous portion of the elytra. The sutures between the metasternum and its episterna are rather indistinct.

GYMNOPTERUS, n. g.

Head large, convex, not concealed. Eyes small; elongate-ovate, widely separated, moderately coarsely faceted. Rostrum short, wide and feebly curved, a shallow groove on each side above scrobe. Antennæ stout; scape inserted in middle of rostrum, shorter than funicle; basal joint of the latter elongate; club large, ovate, much wider than funicle. *Prothorax* convex, transverse, sides rounded, base truncate, constriction lightly impressed, ocular lobes obtuse. *Scutellum* absent. *Elytra* ovate, base truncate, shoulders rounded. *Pectoral canal* wide and deep, terminated between four anterior coxæ. *Mesosternal receptacle* rather suddenly elevated, emar-

gination widely transverse; cavernous. *Metasternum* short; episterna not traceable. *Abdomen* with distinct sutures; two basal segments large, first as long as second and third combined, apex rather strongly incurved, intercoxal process widely truncate; third and fourth narrow, with deep sutures, their combined length equal to that of fifth and slightly shorter than that of second. *Legs* rather long; posterior coxæ touching elytra; femora linear, feebly grooved, edentate, posterior passing elytra; tibiæ compressed and (except at base) straight, tarsi moderately long, third joint wide and deeply bilobed, fourth elongate. Ovale, strongly convex, feebly squamose, non-tuberculate, apterous.

Placed amongst the allies of *Poropterus*, although perhaps not very close to any of them. The small size and shining body of the only known species is suggestive of affinity with *Idotasia*, but the abdomen and femora are utterly different to those of that genus. It is perhaps a connecting-link between the two groups.

GYMNOPTERUS PICTIPES, n. sp.

Black, shining, antennæ and tarsi red. Upper-surface glabrous except for a few indistinct scales contained in punctures; sides of rostrum, under-surface and legs, with white, stout, round scales, usually in feeble clusters.

Head with rather large punctures, base impunctate and slightly iridescent. Rostrum not much longer than head, about twice as long as wide, sides incurved to middle; with large, round punctures. *Prothorax* moderately transverse; with moderately large but irregularly, and not very thickly, distributed punctures. *Elytra* not twice the length of and at base no wider than prothorax, widest at basal third, nowhere parallel-sided; with series of rather small and distant, but round and deep punctures, with series of much smaller punctures intervening; interstices between the punctures not separately convex. Two basal segments of *abdomen* with large, round, sparse punctures; apical segment rather densely punctate. *Femora* densely punctate. Length, 3 mm.; rostrum, $\frac{2}{3}$ mm.; width, $1\frac{1}{2}$ mm.

Hab.—Queensland (Rev. T. Blackburn, No. 4685), Endeavour River (Macleay Museum).

The elytra are absolutely without striæ. The patches of white scales are very distinct on the legs and sides of rostrum.

MICROCRYPTORHYNCHUS ECHINATUS, n. sp.

Brownish-red, antennæ and tarsi paler. Very densely clothed with muddy-grey scales, which entirely conceal the

derm, except the apical half of rostrum (which is smooth and shining). Upper-surface and legs with numerous long, dark, more or less erect, stout scales or setæ: these project forward from the front of the prothorax, on the elytra are confined to the alternate interstices, and condensed into a loose fascicle on the third interstice at summit of posterior declivity; they are as numerous on the femora as on the tibiæ.

Rostrum moderately coarsely punctate in front of antennæ; sculpture concealed behind them. *Prothorax* not much longer than wide, sides rounded near base, slightly constricted near apex; with dense and rather large but entirely concealed punctures. *Elytra* raised above, not twice as long as prothorax and not much wider; from basal fifth to apical third subparallel; with series of large, round and deep, but entirely concealed punctures; alternate interstices feebly raised. Length, $1\frac{1}{2}$ mm.; rostrum, $\frac{1}{3}$ mm.; width, $\frac{2}{3}$ mm.

Hab.—New South Wales: Sydney, Gosford (A. M. Lea).

The size varies to a slight extent, but there is not half a millimetre difference between the largest and smallest specimens under examination. I have been unable to abrade the under-surface, but the punctures there (or at least on the metasternum and two following segments) are evidently of large size. The postmedian fascicles of the elytra are very distinct, although each is seldom composed of more than six or seven of the elongate scales; and will readily distinguish the species from *pygmæus*, than which it is also slightly larger.

MICROCRYPTORHYNCHUS CYLINDRICOLLIS, n. sp.

Reddish-brown, antennæ paler. Densely clothed with muddy-grey scales, which entirely conceal the derm, except the apical half of the rostrum (which is smooth and shining). Upper-surface and legs with stout, suberect, moderately long (but much shorter than in the preceding species) and rather pale scales.

Prothorax about once and one-fourth as long as wide, sides almost perfectly parallel, apex as wide as base. *Elytra* slightly wider than, not twice the length of and slightly raised above prothorax. Length, 2 mm.

Hab.—Western Australia: Mount Barker (A. M. Lea).

The figure⁽¹⁾ of the Japanese *Catabonops monachus* will give a very good idea of the appearance of this minute weevil. The punctures are evidently much the same as in the preceding species, the clothing is rather less dense, the stout

(1) A. S. E. Belg., xviii., 1875, pl. ii., fig. 7.

erect scales are paler, much shorter, and less (though still very) distinct; the most noticeable differences, however, are the shape of the prothorax and non-elevation of the elytra. Only having one specimen under examination it has not been abraded.

Subfamily COSSONIDES.

COSSONUS INCISUS, Pasc.⁽²⁾

Two specimens of this species were sent to me by Dr. Gestro, of the Genoa Museum. One from Celebes (the type locality) and one from Somerset (Queensland); the latter locality was not recorded by Pascoe in dealing with the insects collected by D'Albertis. The species may be readily distinguished by the shape of the prothoracic impression; this is in the form of an elongate triangle, with a carina across the middle, so that it resembles the letter A.

(2) Ann. Mus. Civ. Gen., 1885, p. 317.

SOUTH AUSTRALIAN POLYPLACOPHORA.

By WILLIAM G. TORR, M.A., B.C.L. (Oxon.), LL.D.
(Dublin and Adelaide).

[Read September 12, 1912.]

PLATES V. TO VII.

I have been invited by the President of the Royal Society of South Australia, Dr. J. C. Verco, to write a paper on the Polyplacophora, or multivalve-molluscs, of South Australia.

Since the publication of Mr. W. T. Bednall's paper on "South Australian Polyplacophora" in the Proceedings of the Malacological Society of London, vol. ii., part 4, April, 1897, a great impetus has been given to this interesting study in South Australia, and numbers of collectors have been at work, the following having written papers on the subject:—

W. G. Torr and Edwin Ashby, *Trans. Roy. Soc., S.A.*, 1898; Edwin Ashby, *Trans. Roy. Soc., S.A.*, 1900; M. M. Maughan, *Trans. Roy. Soc., S.A.*, 1900; W. T. Bednall and E. H. Matthews, *Proc. Mal. Soc., London*, vol. vii., part 2, June, 1906; Tom Iredale, *Proc. Mal. Soc., London*, June, 1910, and September, 1910.

To these writers I make my acknowledgments, as well as to the publishers of Tryon's *Man. Conch.*, vols. xiv. and xv.; E. R. Sykes, on Victorian Polyplacophora, *Proc. Mal. Soc., London*, vol. ii., part 2, July, 1896; A. F. Basset Hull, *Australian Naturalist*, April, 1908; W. G. Torr, *Western Australian Polyplacophora*, *Trans. Roy. Soc., S.A.*, vol. xxxv., 1911; Torr and May, *Proc. Royal Society of Tasmania*, 1912; Henry Suter, *New Zealand Polyplacophora*, *Journ. Mal.*, 1905, vol. xii., part 4; C. Hedley and A. F. Basset Hull, *Records Australian Museum*, vol. vii., No. 4, 1909; and Prof. J. Thiele (Berlin), *Die Fauna Südwest-Australiens*, Band iii., Lieferung ii., 1911.

There are other numerous references to Polyplacophora in various papers which I have examined:—

G. F. Angas' list, *Proc. Zool. Soc., London*, January, 1865, consisted of fourteen species; of these four have been omitted as uncertain.

D. J. Adcock's list, published in 1893, contained eighteen species, of which eight have not been identified.

Mr. Bednall, in the *Proc. Mal. Soc., London*, 1897, published thirty-seven species, of which one has been omitted.

Messrs. Maughan, Torr and Ashby, and Bednall and Matthews have brought up the list to fifty-two species, and this paper will raise the number to sixty-one identified species. Some of the names have had to be changed owing to Dr. Thiele and Mr. Tom Iredale's observations of the original specimens of Blainville and others.

My collection of chitons extends over practically the whole of the South Australian coastline from Port MacDonnell to Nuyt Archipelago in the Australian Bight.

The South Australian Polyplacophora include the following families:—*Lepidopleuridæ*, Pilsbry; *Ischnochitonidæ*, Pilsbry; *Mopalidæ*, Pilsbry; *Acanthochitidæ*, Pilsbry; *Cryptoplacidæ*, Dall; and *Chitonidæ*, Pilsbry.

The order of exposure of South Australian Polyplacophora, *mutatis mutandis*, is *P. albida*, Blainville, on exposed rocks at or near high-water mark, sometimes accompanied by *P. costata*, Blainville, with *P. matthewsi*, Iredale, under rocks in deeper water. *I. crispus* is in abundance almost everywhere a foot or two below high-water mark, sometimes accompanied by *I. thomasi* or *I. vergatus*. The *Acanthochites* are found in sheltered pools on sandy weed-covered rocks. In deeper pools *I. contractus*, *I. cariosus*, *I. ustulatus*, *I. sulcatus*, and other *Ischnochitonidæ* are found, and deeper still *I. smaragdinus*, *I. ptychius*, *Lorica volvox*, *Loricella angasi*, *I. pilsbryi*, and most of the true chitons, *jugosus*, *tricostalis*, *exoptandus*, *calliozona*, and *torrianus*. On the west side of St. Vincent Gulf I have found true chitons on exposed rocks in shallow pools at low water. *I. tateanus*, *C. verconis*, *A. verconis*, and *C. bednalli* are, as a rule, obtained only by dredging.

Fam. LEPIDOPLEURIDÆ, Pilsbry.

1. *Lepidopleurus inquinatus*, Reeve, 1847.

Chiton inquinatus, Reeve, Conch. Icon., sp. 154.

Ischnochiton inquinatus, Reeve: Pilsbry, Man. Conch., ser. i., vol. xiv., p. 90.

Lepidopleurus liratus, H. Adams and Angas, Proc. Zool. Soc., 1864, p. 192; Angas, *loc. cit.*, 1865, p. 187; Pilsbry, Man. Conch., ser. i., vol. xv., p. 101.

L. inquinatus, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 141; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 86.

Specimens of this diminutive chiton have been found all along the coast of South Australia extending from Port MacDonnell to St. Francis Island, Nuyt Archipelago. The writer has specimens from Corney Point, Wool Bay, Marino,

Noarlunga, Robe, Cape Jaffa, Minlacowie, and St. Francis Island. Large specimens, 20 mm. long and 8 mm. broad, have been dredged in St. Vincent Gulf by Dr. Verco.

2. **Lepidopleurus matthewsianus**, Bednall, 1906.

Lepidopleurus matthewsianus, Bednall, Proc. Mal. Soc., London, vol. vii., part 2, June, 1906.

Specimens have been obtained from Port MacDonnell, Encounter Bay, Normanville, Noarlunga, Marino, Wool Bay, Corney Point, Hardwicke Bay, and St. Francis Island. I have also taken it at Burnie and Devonport, on the north-west coast of Tasmania. The sanguineous appearance of the foot of this animal is peculiar.

Fam. ISCHNOCHITONIDÆ, Pilsbry.

3. **Callochiton platessa**, Gould, 1846.

Callochiton platessa (Gould): Haddon, "Challenger" Report, p. 15; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 141; Proc. Acad. Nat. Sci., Philad., 1894, p. 71; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 86.

Chiton platessa, Gould, Proc. Boston Soc. Nat. Hist., vol. ii., 1846, p. 143; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 49; Gould, U.S. Explor. Exped., p. 320, atlas, figs. 434, 434a.

Lepidopleurus platessa, Gould, Otia (Rectifications), 1862, p. 242.

Chiton crocinus, Reeve, Conch. Icon., pl. xxii., fig. 146, 1847.

Callochiton crocinus, Reeve: Pilsbry, Man. Conch., ser. i., vol. xiv., p. 50; vol. xv., p. 67.

Leptochiton versicolor, A. Adams, Proc. Zool. Soc., 1852, p. 92, May, 1854; Angas, Proc. Zool. Soc., 1867, p. 223.

Lepidopleurus empleurus, Hutton, Trans. N.Z. Inst., vol. iv., p. 178; Man. N.Z. Moll., p. 113, 1880; Pilsbry, Man. Conch., ser. i., vol. xv., p. 67.

Common in New South Wales, but rare in South Australia. Specimens have been obtained from Cape Jaffa, Second Valley, Aldinga, Marino, Corney Point, and valves have been dredged in Spencer Gulf. A very fine specimen, measuring 24 × 13 mm., was found by Mr. F. L. Saunders at Marino.

4. **Callochiton rufus**, Ashby, 1910.

Callochiton rufus, Ashby, Trans. Roy. Soc., S.A., 1900, p. 87; Die Fauna Südwest-Australien, Thiele, Band. iii., Lieferung ii., 1911.

One specimen only of this beautiful chiton was dredged by Dr. Verco in St. Vincent Gulf. It has been found by Dr. Thiele in Shark Bay, Western Australia.

5. **Ischnochiton** (*Stenochiton*) **juloides**, Adams and Angas, 1865.

Stenochiton juloides, Adams and Angas, Proc. Zool. Soc., 1864, p. 193; *op. cit.*, 1865; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 55.

Ischnochiton (*Stenochiton*) *juloides*, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 142; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 87.

Hab.—Holdfast Bay (Angas), Largs Bay (Adcock), Yorke Peninsula (Matthews).

I have specimens (whole or valves) from St. Francis Island (dredging and shore), Port MacDonnell, Carrowa (West Coast), Hardwicke Bay, Spencer Gulf (dredging), Kangaroo Island, Troubridge Reef, Glenelg, Brighton, Largs Bay, and Fowler Bay. Valves are frequently found in shell sand. Mr. A. R. Riddle informs me that he has found them on *Pinna inermis*, old boots and bottles, and especially near the roots of *Zostera* at an extremely low tide, by dredging or with a grappling-iron. They are rarely found in shallow water.

6. **Ischnochiton** (*Stenochiton*) **pilsbryanus**, Bednall, 1896.

Ischnochiton (*Stenochiton*) *pilsbryanus*, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 142.

Type specimens found on seaweed, Troubridge Shoal, St. Vincent Gulf.

I have specimens from Tapley Shoal living in *Zostera* (seaweed), dredged specimens from Spencer Gulf and off St. Francis Island, live specimens and numerous valves in from 6 to 20 fathoms of water. Two large specimens were found by Mr. F. L. Saunders on seaweed at Aldinga; they measured 9.5 × 3 mm. A number of very fine variegated specimens of this chiton have been found near the roots of *Zostera* at Wool Bay and other places by Mr. A. R. Riddle. The largest specimen measures 17 × 5 mm.

7. **Ischnochiton** (*Stenochiton*) **pallens**, Ashby, 1900.

Ischnochiton (*Stenochiton*) *pallens*, Ashby, Trans. Roy. Soc., S.A., 1900.

Dredged in St. Vincent Gulf by Dr. Verco. I found one specimen in shell sand at Aldinga, and Mr. Zietz collected a pretty buff specimen from Largs Bay. This species differs from *I. pilsbryanus* in the rapid tapering of the tail valves. As I have not had access to the type specimens of either *pilsbryanus* or *pallens*, it may be that my specimens may have to be reconsidered.

8. **Ischnochiton** (*Heterozona*) **cariosus**, Carpenter, MS. :
Pilsbry, 1873.

Heterozona cariosa, Carpenter, MS. : Pilsbry, Man. Conch., ser. i., vol. xiv., p. 65; vol. xv., p. 82.

Ischnochiton (*Heterozona*) *cariosus*, Pilsbry: Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 143; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 87.

This shell is widely distributed. It is abundant in Spencer and St. Vincent Gulfs, and the writer has collected it on St. Francis Island and all around the coast of Western Australia as far as Fremantle. It is often covered with *Serpularia* and has a *cariosus* appearance, hence its name.

9. **Ischnochiton pilsbryi**, Bednall, 1896.

Ischnochiton pilsbryi, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 143.

Found at Sultana Bay (Bednall) and at Hickey Point, Y.P., and St. Francis Island by the writer. Most of the specimens were found on rocks embedded in the sand. At first sight it might be mistaken for *crispus* or *cariosus*, but markings and girdle scales are very distinct, and all the specimens are "uniform ochraceous-yellow."

10. **Ischnochiton ustulatus**, Reeve, 1847.

Chiton ustulatus, Reeve, Conch. Icon., sp. 102; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 96.

Ischnochiton ustulatus, Carpenter, MS. : Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 88.

Lepidopleurus ustulatus, Angas, P.Z.S., 1867, p. 222.

When alive this shell is very brilliant, almost crimson; but it loses its colour in formalin, methylated spirits, or when dry, and retains its singed appearance from which it derives its name. The writer has traced it all around the coast from Cape Jaffa to St. Francis Island. He also found it in Western Australia. An abnormal specimen was found by Mr. F. L. Saunders at Second Valley. It is much broader than the usual types; it measures 37 × 18 mm.

This chiton easily changes its *habitat*. Scores of specimens seen by Mr. Matthews on Yorke Peninsula one week were not able to be discovered the week following.

11. **Ischnochiton crispus**, Reeve, 1847.

Chiton crispus, Reeve, Conch. Icon., sp. 120; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 89.

Ischnochiton haddoni, Pilsbry, Man. Conch., ser. i., vol. xiv., p. 88.

Ischnochiton crispus, Reeve: Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 145; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 87.

Chiton longicymba, Blainville: Sowerby, Conch. Illus., fig. 67; Reeve, Conch. Icon., pl. xxiv., fig. 163 (*non* Blainville).

Ischnochiton longicymba, Blainville: Hutton, "Challenger" Report, p. 17 (*non* Blainville).

This very variable shell is found abundantly on the coasts of New South Wales, Victoria, Tasmania, and South Australia. The writer has specimens from almost every part of the South Australian coast from Port MacDonnell to St. Francis Island in the Australian Bight. It is not found in Western Australia. I collected a *five-valved* specimen at Ulverstone, Tasmania.

No chiton varies so much in colouration as *I. crispus*. I have pale emerald-green, black with a white stripe on the dorsal area, and white with a black stripe, brown and yellow. The commonest kind is a pale-yellow ochre colour. A very beautiful species has been called var. *decoratus*. It has a milky-white ground with regular green or brown longitudinal markings continued throughout the valves. The description given by Pilsbry, *loc. cit.*, of *I. haddoni* agrees with the shell better than any other I have seen.

12. *Ischnochiton fruticosus*, Gould, 1846.

Chiton fruticosus, Gould, Proc. Boston Soc. Nat. Hist., ii., p. 142; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 91; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 145.

Ischnochiton fruticosus, Gould: Pilsbry, Proc. Acad. Nat. Soc., Philad., 1894, p. 72.

This common New South Wales species is very rare in South Australian waters. The writer has examined hundreds of specimens similar to *fruticosus* and has only found one in South Australia with the striations on the girdle scales. One specimen only was found by Mr. E. H. Matthews on Southern Yorke Peninsula.

13. *Ischnochiton contractus*, Reeve, 1847.

Chiton contractus, Reeve, Conch. Icon., sp. 78; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 93.

Ischnochiton contractus, Reeve: Pilsbry, Man. Conch., ser. i., vol. xiv., p. 93; Nautilus, vol. viii., p. 129; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 87; Bednall, Proc., Mal. Soc., London, vol. ii., part 4, April, 1897, p. 145.

Chiton pallidus, Reeve, Conch. Icon., sp. 92, March, 1847; Pilsbry, Man. Conch., ser. ix., vol. xiv., p. 89.

Other synonyms are given by Pilsbry which are evidently intended, according to Bednall and Iredale, for *I. decussatus*.

Many scores of specimens are in my cabinet from both Gulf St. Vincent and Spencer Gulf, also from Hopetoun and Albany, in Western Australia. I have dried specimens 46 mm. long and 22 mm. broad.

14. **Ischnochiton variegatus**, Adams and Angas, 1864.

Lepidopleurus variegatus, H. Adams and Angas, Proc. Zool. Soc., 1864, p. 192; Pilsbry, Man. Conch., ser. i., vol. xv., p. 102.

Ischnochiton variegatus, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 146.

This species is found in Spencer and St. Vincent gulfs. It will probably be classed under *I. crispus*, which it closely resembles. Pilsbry has no plates of this variety in his Manual, and the description given would equally apply to *I. crispus*. Bednall says it attains a length of two-thirds of an inch. I have a number of specimens from the coasts of Yorke Peninsula, Port MacDonnell, Cape Jaffa, and Marino. It is probably a cream-coloured variety of *crispus*.

15. **Ischnochiton sulcatus**, Quoy and Gaimard, 1834.

Chiton sulcatus, Quoy and Gaimard, Voy. "Astrolabe," Zool., 1834, vol. iii., p. 385.

C. decussatus, Reeve, Conch. Icon., 1847, pl. xviii., fig. 107.

C. castus, Reeve, op. cit., pl. xxii., fig. 145.

Lepidopleurus speciosus, Adams and Angas, P.Z.S., 1864, p. 192; 1865, p. 187.

Gymnoplax urvillei, Rochebrune, Bull. Soc. Philom., Paris, 1880-1, p. 121.

Ischnochiton sulcatus, Quoy and Gaimard: Pilsbry, Man. Conch., 1893, ser. i., vol. xiv., p. 138; Iredale, Proc. Mal. Soc., London, vol. ix., part 2, June, 1910, p. 91.

I. decussatus, Reeve: Bednall, Proc. Mal. Soc., London, 1897, vol. ii., p. 146.

The most beautiful of the South Australian *Ischnochitons* may be easily distinguished by being broader in proportion to its length than the majority of *Ischnochitons*. It favours the edges of rocks, and is often found on top of stones and on the razor-like bivalve, *Pinna inermis*. The colours are very various—blue-green, rich brown, cream with brown dorsal areas, ochreous-yellow with splashes of purple, straw-colour with dark-brown splashes, brown and green with cream-white dorsal areas, and uniformly cream. I have dried specimens, 46 mm. long and 27 mm. broad. Juveniles may be easily distinguished by the regular pustules in the anterior and posterior valves and the lateral areas of the median valves. They are common in Spencer and St. Vincent gulfs, Streaky Bay, and West Coast.

16. *Ischnochiton ptychius*, Pilsbry.

Ischnochiton ptychius, Pilsbry: Nautilus, vol. viii., p. 53; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 147.

It is often placed among *crispus*, but as a rule is found in much deeper water. I have specimens from Robe, Cape Jaffa, Second Valley, Normanville, Marino, and Southern Yorke Peninsula. Good specimens were taken by Mr. A. R. Riddle on broken *Haliotidæ* at Marion Reef, and also in a deep rock pool at Black Hill, near Port Moorowie. The strong serrations at the sutural margins of the valves, mentioned by Mr. Bednall, are plainly distinguishable in some specimens. In others they are missing, although taken at the same spot and similar in every other particular.

"It is a small oval pink-tinged shell, with wrinkled striations on the dorsal areas, and somewhat coarse concentric sulcations on the lateral areas, which are strongly serrated at the sutural margin."

It is somewhat difficult for a beginner to separate it from *I. crispus*.

I. ptychius has finely striated girdle scales.

17. *Ischnochiton tateanus*, Bednall, 1896.

Ischnochiton tateanus, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 147; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 87.

It may be distinguished by its form. In well-preserved specimens the width is nearly two-thirds of the length, and the fine serrations on the posterior edge of the lateral areas of the median valve are distinctly seen in most of the specimens.

I. tateanus is rarely found near the shore. It is a deep-water species. Dr. Verco has dredged several in St. Vincent and Spencer gulfs, and valves have been taken at St. Francis Island in 19 fathoms of water. A beautiful specimen was taken by Mr. F. L. Saunders at Marino. It is a pale-chocolate on the dorsal area, throughout the valves, and the lateral and pleural areas of the second, sixth, and seventh valves are creamy-white.

17A. *Ischnochiton wilsoni*, Sykes, 1896.

Ischnochiton wilsoni, Sykes, Proc. Mal. Soc., vol. ii., part 2, July, 1896, p. 89.

One specimen dredged by Dr. Verco and one procured by Mr. Matthews are probably all that have been found in South Australian waters. The writer has one specimen 9 × 5 mm. from Marino (?). In this sample the granulations

in the pleural area are, under a $\frac{1}{4}$ -in. lens, arrow-shaped, with the point towards the dorsal area.

Mr. Matthews has kindly sent me a very fine specimen, 24×14 mm., which I take to be *I. wilsoni*. It has not the rosy-pink of the *type*, but the splashes of grey-brown and white correspond with Syke's drawing. The girdle scales are black, amber, and pearly-white, the rich brown splashes predominating. As far as I can decide with an undissected specimen, the anterior valve has nine and the posterior valve eight slits. The striations of the girdle scales are very distinct, four to seven striæ on each scale.

18. *Ischnochiton smaragdinus*, Angas, 1867.

Lophyrus smaragdinus, Angas, Proc. Zool. Soc., 1867, p. 115; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 137, vol. xv., pl. xv., fig. 27.

Lepidopleurus smaragdinus, Carpenter, MS.

Ischnochiton smaragdinus, Bednall, Proc. Mal. Soc., London, vol. ii., part 4., April, 1897, p. 148.

I. (Haploplax) smaragdinus, Angas: Pilsbry, Proc. Acad. Nat. Sci., Philad., 1894, p. 72.

The drawing of this shell in Pilsbry's Manual is very unsatisfactory. Both Angas' and Carpenter's descriptions seem incomplete. This shell may be distinguished by the blue-green spots on an olive-brown ground and the very pearly scales on the girdle. It is generally found in deeper water than the majority of *Ischnochitons*. It has the blue spots of *I. lentiginosus* of New South Wales, but it is not so carinated nor are the lateral areas so distinct as in *I. lentiginosus*. I have specimens from Yankalilla, Normanville, Second Valley, Aldinga, Marino, and elsewhere. It is exceedingly common on the north-west coast of Tasmania, where it is found in shallower water than in South Australia. I have considerable difficulty in separating this species from *Ischnochiton resplendens*, Bednall and Matthews, Proc. Mal. Soc., London, vol. ii., part 2, June, 1906.

19. *Ischnochiton virgatus*, Reeve, 1848.

Chiton virgatus, Reeve, Conch. Icon., sp. 192; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 78.

Trachydermon virgatus, Reeve: Carpenter, MS., p. 22.

Ischnochiton virgatus, Reeve: Carpenter, MS., p. 106; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 148.

This very pretty diminutive chiton, so ably described by Mr. Bednall, *loc. cit.*, has been found all along the South Australian coast from Port MacDonnell to St. Francis Island. I have specimens from nineteen different places, in-

cluding Kangaroo Island. I also collected it at Albany, Western Australia. Some very dark specimens were collected at Streaky Bay, which seemed a variety if not a new species. Under a $\frac{1}{4}$ -in. lens the girdle scales of *virgatus* are minutely striated. Carpenter says they are *not* striated. I have counted from ten to twelve striæ.

20. **Ischnochiton thomasi**, Bednall, 1896.

Ischnochiton thomasi, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897.

The polished mottled appearance and pearly girdle scales are the distinctive features of this chiton. There are several varieties. I have specimens from Robe, Cape Jaffa, Second Valley, Normanville, Aldinga, Marino, Minlacowie, Southern Yorke Peninsula, and Venus Bay. It thus traverses the greater part of the South Australian coastline.

21. **Ischnochiton resplendens**, Bednall and Matthews, 1906.

Ischnochiton resplendens, Bednall and Matthews, Proc. Mal. Soc., London, vol. vii., part 2, June, 1906.

After careful examination of a number of specimens of this very beautiful *Ischnochiton* I can only place it as a colour variety of *I. smaragdinus*. While the appearance of some specimens varies considerably from *smaragdinus*, by putting a series, they run into one another, till it becomes practically impossible to separate them. I have *smaragdinus* 20 mm. long by 12 mm. broad, which is nearly as large as the type specimen of *resplendens*, and the colour-marking is hardly sufficient to make a new species. I have specimens from Port MacDonnell, Beachport, Cape Jaffa, Robe, Encounter Bay, Marino, Kangaroo Island, Minlacowie, Hardwicke Bay, and Corney Point. My specimens from Robe resemble Mr. Bednall's description. Specimens have also been taken in Wool Bay by Mr. A. R. Riddle.

22. **Ischnochiton gryei**, Filhol, 1880.

Tonicia gryei, Filhol, Comptes Rendus, 1880, vol. xci., p. 1095.

Lepidopleurus melanterus, Rochebrune, Bull. Soc. Philom., Paris, 1883-4, p. 37.

Ischnochiton parkeri, Suter, Proc. Mal. Soc., 1897, vol. ii., p. 186.

I. fulvus, Suter, Journ. Malac., 1905, vol. xii., part 4, p. 66; Iredale, Trans. N.Z. Inst., 1907 (1908), vol. xi., p. 373.

I. gryei, Filhol: Iredale, Proc. Mal. Soc., London, vol. ix., part 2, June, 1910, p. 91.

Going through Mr. Suter's specimens in Auckland, New Zealand, the author remarked that he had seen specimens

of a red *crispus* in South Australia similar to what Suter called *I. fulvus*. On his return to South Australia some specimens were sent to Mr. Suter, some of which were identified with *I. fulvus*, others with *I. crispus*. Some very beautiful specimens of *I. gryei* were taken off Port MacDonnell jetty and Cape Jaffa. The identification will require future consideration. Mr. Sanders found several diminutive specimens at Second Valley, which I take to be *gryei*.

23. **Ischnochiton** (*Ischnoradsia*) **novæ-hollandiæ**,
Gray and Reeve, 1847.

Chiton novæ-hollandiæ, Gray, M.S.: Reeve, Conch. Icon., sp. 142; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 145.

C. (Lophyrus) australis, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1877, p. 46 (non Pilsbry).

Ischnochiton (Ischnoradsia) novæ-hollandiæ, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 150.

Strongly resembles *I. australis*, Sowerby, but the lateral areas of *australis* are much more deeply sulcated than those of *novæ-hollandiæ*, and the pleural areas of the former are longitudinally ribbed, although I have found some *novæ-hollandiæ* slightly ribbed in the pleural areas.

Some specimens in my collection labelled Marino, South Australia, are certainly *I. australis*, but further investigation must be made before placing it on the list of South Australian chitons.

I. novæ-hollandiæ favours the open ocean beaches. I have specimens from Encounter Bay, Tungkalilla (large numbers), Kangaroo Island, and Second Valley; also from Penguin, Stanley, Wynyside, and Devonport in Tasmania, and Beaumaris, New South Wales. One dried specimen is 65 mm. long and 35 mm. broad. *I. australis* is common in New South Wales. The Tasmanian species show longitudinal riblets in the pleural areas.

Subfam. CALLISTOPLACINÆ, Pilsbry.

24. **Callistochiton antiquus**, Reeve, 1847 (?).

Chiton antiquus, Reeve, Conch. Icon., t. 25, f. 169 (poor).

Lepidopleurus antiquus, Angas, P.Z.S., 1867, p. 223.

Callistochiton antiquus, Carpenter, MS., and Haddon, "Challenger" Polyplac., p. 20.

Chiton (Callistochiton) antiquus, E. A. Smith, Zool. Coll. "Alert," p. 79.

Callistochiton sarcophagus, Carpenter, MS.

C. antiquus, Reeve: Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 150; Pilsbry, Proc. Acad. Nat. Sci., Philad., 1894, p. 73.

Very often found covered with calcareous matter. I have traced it from Port MacDonnell through both gulfs to St. Francis Island. Some beautiful dark-brown specimens came from Mr. Anderson, of Second Valley, and rich red (iron-stained?) ones from Cape Jaffa. Its sculpture and rounded appearance easily differentiates it from other chitons. It is our only South Australian *Callistochiton*. "This genus differs from *Ischnochiton* in the peculiar insertion-teeth, which are curved into ribs as if festooned, in the relation of the slits to the external ribs, and in the tail valve, which is often peculiarly humped" (Pilsbry, *Man. Conch.*, ser. i., vol. xiv., p. 260). This chiton has a very wide range, and has been collected by the author in places as far apart as Queensland and Western Australia.

Fam. CHITONIDIÆ, Pilsbry.

25. **Onithochiton ashbyi**, Bednall and Matthews, 1906.

Onithochiton ashbyi, Bednall and Matthews, *Proc. Mal. Soc.*, London, vol. vii., part 2, June, 1906, p. 92.

As far as I am aware, only one specimen of this chiton has been discovered. It was found by Mr. Ashby at Aldinga, and to him I am indebted for the specimen. It is our only *Onithochiton*, and the eyes are of a pearly appearance set in its cream-coloured valves. The smooth warty appearance will easily distinguish this shell.

26. **Chiton tricostalis**, Pilsbry, 1894.

Chiton (canaliculatus, var. ?) tricostalis, Pilsbry: *Nautilus*, vol. viii., 1894, p. 54.

C. tricostalis, Pilsbry: Bednall, *Proc. Mal. Soc.*, London, vol. ii., part 4, April, 1897.

This "handsomely sculptured shell" assumes an endless variety of colour. I have specimens, red and green, pink and black, green and white, creamy, cream with black spots, yellow with black spots, etc. The second valve is often of a distinctive colour. It is *bicostalis* in small specimens, the middle rib in the lateral areas begins when about half-grown. Some valves have four ribs. I have specimens from Capes Jaffa and Jervis, several places in Gulf St. Vincent, Southern Yorke Peninsula, and St. Francis Island. I have collected it in Western Australia, and have specimens from New South Wales.

27. **Chiton calliozona**, Pilsbry, 1894.

Chiton (Æreus, var.) calliozona, Pilsbry: *Nautilus*, vol. viii., 1894, p. 55.

C. calliozona, Pilsbry: Bednall, *Proc. Mal. Soc.*, London., vol. ii., part 4, April, 1897, p. 151.

This is the largest of our true chitons. I have one dried specimen measuring 55 × 25 mm. Colour markings very variable; pinks, greens, and bronze-browns are wondrously intermingled, while the minute pearls of the girdle are like rubies, emeralds, etc. It is found on smooth stones in clean sandy pools among seaweed. I have samples from Second Valley, Normanville, Marino, Wool Bay, Hardwicke Bay, and St. Francis Island. Fine specimens were taken at Marion Reef from the shell of living *Pinna inermis* and from broken bottles by Mr. A. R. Riddle. It is very like *Chiton areus*, Reeve, from New Zealand, but there are marked differences.

28. *Chiton jugosus*, Gould, 1846.

Chiton jugosus, Gould, Proc. Boston Soc. Nat. Hist., ii., 1846, p. 142; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 178; Gould, Expl. Exped., xii., Moll. and Sh., p. 317, atlas, t. 28, f. 430, 1852; Smith, Zool. Coll. "Alert," p. 78, 1884; Had-don, "Challenger" Polyplac., p. 22, 1886; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 151.

C. concentricus, Reeve, Conch. Icon., 1847, sp. 95.

Lophyrus jugosus, Gould, Otia, p. 3, 212, 1862; Angas, P.Z.S., London, 1867, p. 222.

L. concentricus, P.Z.S., 1867, p. 221.

Hedley and Hull's comparison of *C. jugosus*, *C. torri* (*torrianus*), and *C. coxi*, in Records Australian Museum, vol. vii., No. 4, 1909, p. 262, is very valuable. The New South Wales specimens are not, as a rule, as brightly coloured as those from South Australia. Some from Watson Bay, New South Wales, are pink and brown, others a creamy-white in the six median valves, and the whole shell is broader than those from South Australia. The South Australian specimens are uniform in colour, the pale-blue green markings in the sulcations of the pleural areas are very distinct. It is found in fairly deep water, and loves the ocean rocks. I have specimens from Port MacDonnell, Beachport, Robe, Middleton, Cape Jaffa, Cape Jervis, Second Valley, Normanville, Aldinga, Marino, Venus Bay, and St. Francis Island. It has also been found at Kangaroo Island and Corney Point. Specimens from the last place measure 47 × 25 mm. Strange to say, I have no specimens from Spencer Gulf.

29. *Chiton torrianus*, Hedley and Hull, 1909.

Chiton coxi, Pilsbry: Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 151.

C. torri, Hedley and Hull, Records of the Australian Museum, Sydney, vol. vii., No. 4, 1909, p. 262.

C. hullianus, Iredale, Proc. Mal. Soc., London, vol. ix., part 2, June, 1910, p. 103.

C. torrianus, Hedley and Hull, Mal. Soc. Journ., March, 1911, vol. ix., part 4.

Specimens of this very beautiful chiton were misnamed *C. coxi* for some years till the comparison of *C. jugosus*, *C. torrianus*, and *C. coxi*, by Hedley and Hull, *loc. cit.* The concentric lines on all valves differentiate it from *C. coxi*, and the sulcations of the pleural areas make it impossible to put it with *C. jugosus*. It is rarely found in the gulfs. I have collected it from Cape Jervis, Kangaroo Island, and Corney Point. Large numbers were found at the latter place by Mr. Walter Klem. Mr. Bednall reports it from Sultana Bay. I have South Australian specimens measuring 42×25 mm. and Western Australian 52×29 mm. I have collected it all around the coast of Western Australia from Esperance to Fremantle.

30. *Chiton limans*, Sykes, 1896.

Chiton muricatus, A. Adams, Proc. Zool. Soc., 1852 [May, 1854], p. 91, pl. xiii., fig. 6; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 175, pl. xxxvii., figs. 12, 13; non Telesius, Mem. Acad. Sci., St. Petersb., ser. v., vol. ix., 1824, p. 483.

Lophyrus muricatus, Angas, Proc. Zool. Soc., 1865, p. 186, *loc. cit.*, 1867, p. 222.

Chiton limans and *C. carnosus*, Carpenter, MS.: Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 93.

The pointed girdle scales differentiate this rare South Australian chiton from all others of the family in South Australian waters. I have only one specimen from Dr. Verco, labelled Hardwicke Bay, Spencer Gulf. Its colour is a pale-ochreous yellow with light- and dark-brown on the first, second, fourth, fifth, and anterior valve. The markings and girdle scales correspond with specimens of *C. muricatus* from New South Wales.

31. *Chiton exoptandus*, Bednall, 1896.

Chiton exoptandus, Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 152.

This "much desired" chiton is easily distinguished from others by the uniformity of its pinkish colour-marking so well described by Mr. Bednall, *loc. cit.* It runs through all the gradations of a pinkish-yellow to a burnt sienna. One specimen in my possession has a uniform rich reddish brown strip the full length of the dorsal areas of each valve. I have specimens from Second Valley and valves from Normanville. It is frequently found at Marino, Troubridge, and Edithburgh, and is very plentiful at low tides in Wool Bay. I collected one small specimen in the crevice of a rock at Min-

lacowie and a valve at Corney Point. It has been dredged by Dr. Verco, and seems to confine itself to Spencer and St. Vincent gulfs. My specimens are not the largest found, although I have them 45×25 mm.

32. *Chiton bednalli*, Pilsbry, 1895.

Chiton bednalli, Pilsbry: Nautilus, ix., 1895, p. 90; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896.

This, the most beautiful of all South Australian *Chitonida*, may be only a colour variety of *exoptandus*, but the uniformity of its green colouring differs so much from the pinkish tinges of *exoptandus* that it may well be classified and named after the *doyen* of *Polyplacophora* writers in South Australia. I have a specimen from Sultana Bay, a valve from St. Francis Island, a valve dredged from 25 fathoms in Thorny Passage, and several specimens dredged by Dr. Verco in Gulf St. Vincent. Size, 40×20 mm. One specimen was found by Mr. Kimber at Aldinga (South Australia), and Mr. Sykes reports it from Port Philip.

33. *Chiton verconis*, Torr and Ashby, 1898.

Chiton verconis, Torr and Ashby, Trans. Roy. Soc., S.A., 1898, p. 215.

This chiton strongly resembles the drawings of *Chiton huttoni*, Suter, Trans. N.Z. Inst., vol. xxxviii., 1905, p. 321, pl. xviii., figs. 1-6; but the slope of the tail valve is much steeper in *C. verconis*, and the pointed girdle scales are decidedly different. These scales are very similar to *C. limans*, but in the latter there are no striations. *C. verconis* has been dredged by Dr. Verco in Yankalilla Bay, 9 fathoms; Rapid Head, 9 to 11 fathoms; and in Spencer Gulf. All my specimens have been dredged. Mr. W. D. Reed has dredged it in Spencer Gulf, and it has been taken at Aldinga by Mr. Kimber. I have a very fine specimen labelled Port Fairy (Victoria), from the late Mr. Adcock's collection.

34. *Chiton oruktus*, Maughan, 1900.

Chiton oruktus, Maughan, Trans. Roy. Soc., S.A., 1900, p. 89.

This shell has been found only on the south-east coast of South Australia. One specimen comes from Cape Jaffa and several have been taken at Port MacDonnell. It ought to be in Victorian waters. Mr. Maughan's description is very helpful, but the plates are very indistinct.

35. **Chiton aureo-maculata**, Bednall and Matthews, 1906.

Chiton aureo-maculata, Bednall and Matthews, Proc. Mal. Soc., London, vol. vii., part 2, June, 1906, p. 91.

The type specimen was reported from Marion Reef, Troubridge Island. Mr. Gatcliffe sent me one from Victoria, which at the time I was unable to identify. The Rev. S. J. Martin took a fine specimen at Minlacowie. I have three specimens—one about the size of the type specimen, dredged by Dr Verco in Backstairs Passage (?), one from Corney Point, and the other from Port MacDonnell. It is probably a deep-water shell. I have been unable to detect the "golden spots" on any of my specimens, but one was identified by Mr. Matthews. It is similar to *C. verconis* and *C. limans*, but the girdle scales differentiate it from either. Mr. Martin's specimen is very handsome, a bright reddish-brown colour all over, mottled with dark splashes. It measures 19 × 11 mm.

36. **Lorica volvox**, Reeve, 1847.

Chiton volvox, Reeve, Conch. Icon., sp. 31; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 237.

C. cimolius, Reeve, Conch. Icon., sp. 14.

Lorica cimolia, H. and A. Adams, Ann. Mag. N.H. (2), ix., p. 355; Angas, P.Z.S., 1867, p. 224; 1871, p. 97.

Aulacochiton volvox, Shuttl., Bun. Mittheil, 1853, p. 68.

Chiton rudis, (?) Hutton, Trans. N.Z., Inst., iv., 1872, p. 179; Man. N.Z. Moll., 1880, p. 113.

Lorica volvox, Reeve: Haddon, "Challenger" Polyplac., p. 31; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 153; Suter, Proc. Mal. Soc., London, vol. vii., part 5, June, 1907, p. 297.

I have specimens from Cape Jaffa, Normanville, Second Valley, Marino, Wool Bay, Hardwicke Bay, Corney Point, and some very handsome specimens, with dark-brown dorsal areas, measuring 76 × 45 mm., from St. Francis Island. It has been dredged by Dr. Verco in Gulf St. Vincent, and Mr. A. R. Riddle reports it from Black Hill, near Port Moorowie. In one or two samples I have noticed spiny tufts similar to the *Acanthochitidæ*. I cannot detect any sign of tufts in full-grown specimens. *L. volvox* is often encrusted with limy matter.

37. **Loricella angasi**, Adams and Angas, 1864.

Lorica angasi, H. Adams and Angas, Proc. Zool. Soc., 1864, p. 193; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 238.

Loricella angasi, Adams and Angas: Pilsbry, Proc. Acad. Nat. Sci., Philad., 1894, p. 87; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 153.

Found in deep water, sometimes washed up on the beach after storms. It is reported from Sultana Bay (Matthews),

Rapid Bay (Angas), Holdfast Bay (Bednall), and New South Wales (Cox, Brazier). I have specimens dredged by Dr. Verco in Backstairs Passage, and either good specimens or valves from Cape Jervis, Normanville, Aldinga, and Brighton. The splashes of pink colouring are very vivid when preserved in spirits. The peculiarly large and broad anterior valve easily differentiates this species from *L. volvox*. It flattens itself so closely to the rocks and is so covered with foreign growth that I have had the greatest difficulty in detecting one on a rock which I had been examining for some minutes.

Fam. MOPALIIDÆ, Pilsbry.

38 *Plaxiphora albida*, Blainville, 1825.

Chiton albidus, Blainville, Dict. Sci. Nat., 1825, vol. xxxvi., p. 547; Pilsbry, Man. Conch., 1893, vol. xv., p. 105.

C. glaucus, Quoy and Gaimard, Voy. "Astrolabe," Zool., 1834, vol. iii., p. 376.

(?) *C. petholatus*, Sowerby, Mag. Nat. Hist., new series, iv., p. 289, May, 1840; Conch. Illustr., f. 64, 65, and var. *porphyrius*, f. 59.

Chætopleura conspersa, Adams and Angas, P.Z.S., 1864, p. 193; P.Z.S., 1865, p. 187.

Plaxiphora albida, Blainville: Thiele, Zool. Chun, 1909, Heft lvi., p. 24, pl. iii., figs. 22, 23.

P. tasmanica, Blainville: Thiele, *loc. cit.*, p. 25, pl. iii., figs. 24-26.

P. bednalli, Blainville: Thiele, *loc. cit.*, p. 25, pl. iii., figs. 27-30.

P. petholata, Sowerby: Pilsbry, Man. Conch., vol. xiv., p. 323; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 154.

P. albida, Blainville: Iredale, Proc. Nat. Soc., London, vol. ix., part 2, June, 1910, p. 98.

South Australian chiton-hunters will always be grateful to Mr. Iredale for his elaborate paper on the *Plaxiphoras*, and to Dr. Thiele for his "Revision des Systems der Chitonien." But we part with the old name of *petholata* with regret. Sowerby's description of *petholata*, *loc. cit.*, is a complete account of our *albida*, while Blainville's description of *albida* in Pilsbry, *loc. cit.*, is very poor, and might be that of any of our *Plaxiphora*. Is not there a danger in making the posterior valve the basis of decision? I have several hundred specimens of *Plaxiphora* before me from all parts of Australia, most of them collected by myself, and the tail valves differ so much in the same species according to size and growth that I agree with Iredale that Dr. Thiele, "through lack of specimens, has laid too much stress upon the value of the shape of the valves." The three South Australian *Plaxi-*

phora are easily separated. The zigzag markings of *albida* (? *petholata*), the smooth reticulated markings of *costata* (? *glauca*), and the strongly raised nodules of the lateral area in *matthewsi* (? *conspersa*) make the separation easy except in worn specimens.

Mr. Gatcliffe, of Victoria, has taken considerable pains in identifying the *Plaxiphora*, and agrees with Dr. Thiele in identifying our *P. glauca* with *P. albida*, Blainville.

P. albida is often found at and above high-water mark, and generally adheres to one spot without moving about like other chitons. At Robe I have seen hundreds alive, blistering in the sun. I have collected it all around the coast of South Australia, from Port MacDonnell to Streaky Bay, as well as Queensland, Victoria, and Tasmania. Going out from Streaky Bay 40 miles to St. Francis Island, *P. costata* takes the place of *albida*, and that would seem to continue right on to Western Australia, for I obtained *costata* at Albany, Bunbury, Rottneest Island, and saw nothing of *albida*.

I don't know if pearls are often found in chitons, but I extracted a blue egg-shaped pearly substance from the interior edge of a *Plaxiphora albida*.

39. *Plaxiphora matthewsi*, Iredale, 1910.

Plaxiphora conspersa, non Adams and Angas: Bednall, Proc. Mal. Soc., London, 1897, vol. ii., p. 154.

P. matthewsi, Iredale, Proc. Mal. Soc., London, vol. ix., part ii., June, 1910, p. 99.

This is the rarest of South Australian *Plaxiphora*. It is found in deeper water than either *albida* or *costata*. Its great breadth in proportion to its length easily distinguishes it from either of these. I have specimens from Marino, Troubridge, Second Valley, and St. Francis Island. I have also collected it on the north-west coast of Tasmania. Iredale's description, *loc. cit.*, is very good, but the absence of plates is a hindrance to identification.

The description of *Chætopleura conspersa*, Adams and Angas, P.Z.S., 1864, p. 193; Angas, P.Z.S., 1865, p. 187, agrees so well with *matthewsi* that I place it under a new nomenclature with considerable diffidence.

A very pretty half-grown specimen was taken by Mr. F. L. Saunders at Port Noarlunga. The nodules on the lateral areas are like tear-drops.

40. *Plaxiphora costata*, Blainville.

Chiton costatus, Blainville, Dict. Sc. Nat., xxxvi., p. 548; Pilsbry, Man. Conch., vol. xv., p. 105.

C. glaucus, Quoy and Gaimard, Voy. "Astrolabe," Zool., iii., p. 376.

P. glauca, Quoy and Gaimard: Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 154; Pilsbry, Man. Conch., ser. i., vol. xiv., p. 325; Suter, Journ. Mal., 1905, vol. xii., part 4, p. 66.

Plaxiphora costata, Blainville: Iredale, Proc. Mal. Soc., London, vol. ix., part 2, June, 1910, p. 97; Thiele, Zool. Chun., 1909, Heft lvi., p. 24.

Mr. Gatliffe, of Victoria, identifies this shell with *P. bednalli*, Thiele.

I have specimens from Port MacDonnell, Robe, Middleton, Bluff, Encounter Bay, Second Valley, Noarlunga, Wool Bay, Troubridge, Hardwicke Bay, Spencer Gulf, and St. Francis Island. Only an occasional specimen is found on the South-East coast. Numbers were found at Port Noarlunga by Mr. F. L. Saunders. It is more common in Spencer Gulf, and is abundant on St. Francis Island. I have also collected it in Tasmania and in several places in Western Australia. Blainville's description of this shell, in Pilsbry's Manual, *loc. cit.*, is very unsatisfactory. Quoy and Gaimard's description of *P. glauca* does not correspond with my specimens in every particular. I can find no marginal striæ in the anterior portions of the valves. The whole of the shell in unworn specimens is covered with minute microscopic granulations or reticulations. Some specimens have beautiful parallel longitudinal lines of green and black on the median valves. It has seven or eight ribs on the anterior valves.

Fam. ACANTHOCHITIDÆ, Pilsbry.

41. *Acanthochites asbestoides*, Smith, 1884.

Chiton (Acanthochiton) asbestoides, Carpenter, MS.: Smith, Zool. Coll. "Alert," p. 83, pl. vi., fig. 6; Pilsbry, Man. Conch., ser. i., vol. xv., p. 17.

Acanthochites asbestoides, Carpenter: Pilsbry, Proc. Acad. Nat. Sci., Philad., 1894, p. 79; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 155.

Pilsbry's description of the Fam. *Acanthochitidæ* is very helpful. The South Australian species are constantly being increased, and a splendid opportunity awaits a student who will make this field a special study. The *Acanthos.* differ from nearly all other chitons by having tufts at the sutures, by the large fleshy girdle, and there being little or no distinction between the lateral and pleural areas.

The golden or silvery tufts of *asbestoides*, lying neatly along the suture between the valves, easily distinguishes it from other *Acanthos.*

I have found it in numbers in a sheltered cave at high-water mark on Kangaroo Island. I have specimens from

Beachport, Aldinga, Ardrossan, Stansbury, Point Soutar, Minlacowie, Streaky Bay, and all along the West Coast to St. Francis Island, Albany (Western Australia), and San Remo (Victoria). Dr. Verco has dredged it in Gulf St. Vincent.

Tom Iredale, in Proc. Mal. Soc., London. vol. ix., part 3, September, 1900, p. 155, quotes Dr. Thiele ("Revision des Systems der Chitonen," i., p. 48), "that *lueurii*, Blainville, must replace the familiar *asbestoides*, Smith."

42. *Acanthochites bednalli*, Pilsbry, 1894.

Acanthochites bednalli, Pilsbry, Proc. Acad. Nat. Sci., Philad., 1894, p. 81; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896.

After going through a great number of specimens of this species and *A. granostriatus*, I am unable to separate them. A series shows the striations in the dorsal area to vary from almost smooth to deep microscopic sulci. I have only one specimen of *A. coxi* from New South Wales. If it had been found in South Australia, I should certainly put it in with *A. bednalli*.

It occurs all around the coast of South Australia. Specimens in my collection are from the South-East (Port MacDonnell, Middleton), Gulf St. Vincent (Second Valley, Normanville, Aldinga, Marino, Sultana Bay (Troubridge), Spencer Gulf (Corney Point, Minlacowie), West Coast as far as St. Francis Island. A number of very large specimens, measuring 30 × 14 mm., were found at Kangaroo Island. I have similar ones from Port MacDonnell, Troubridge, and the West Coast.

43. *Acanthochites granostriatus*, Pilsbry, 1894.

Acanthochites granostriatus, Pilsbry: Nautilus, vol. vii., 1894, p. 119; Proc. Acad. Nat. Sci., Philad., 1894, p. 81, pl. ii., figs. 1-6, pl. iv., fig. 37; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897.

Similar to *A. bednalli*. Found all along the coast from Port MacDonnell to St. Francis Island.

44. *Acanthochites speciosus*, H. Adams, 1861.

Cryptoplax (Notoplax) speciosus, H. Adams, Proc. Zool. Soc., 1861, p. 385.

Acanthochites speciosus, H. Adams: Pilsbry, Man. Conch., ser. i., vol. xv., p. 32, pl. i., figs. 23-26; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 156; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 91.

A. (Notoplax) speciosus, H. Adams: Pilsbry, Proc. Acad. Nat. Sci., Philad., 1894, p. 83, pl. iv., figs. 31-33.

This very hairy chiton, with a girdle, when alive, four or five times wider than the tegmentum, is rare. I have specimens from Aldinga, Marino, Stansbury, and St. Francis Island. Dr. Verco dredged some very large specimens in Gulf St. Vincent. I have one specimen from Stansbury with three very distinct horny riblets on the anterior valve. This may be a monstrosity or a new variety of *speciosus*. I found one specimen at Albany, Western Australia, in which the riblets in the interior valve are distinct but nodulose. Mr. Maughan found a fine specimen washed ashore at Aldinga.

45. ***Acanthochites (Notoplax) matthewsi***, Bednall
and Pilsbry, 1894.

Acanthochites matthewsi, Bednall and Pilsbry: Nautilus, vol. vii., 1894, p. 120; (*Notoplax*?) Pilsbry, Proc. Acad. Nat. Sci., Philad., 1894, p. 83, pl. iv., figs. 27-30; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 156; Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 91.

This is the most beautiful and elaborately sculptured of all South Australian *Acanthochitidæ*. It somewhat resembles *A. glyptus*, Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 92. I have specimens from Robe, Cape Jaffa, Normanville, Marino, and valves (?) from St. Francis Island. I have seen them collected by Rev. S. J. Martin at Wool Bay. Mr. F. L. Saunders has taken it at Port Victor. A number of specimens were taken from the stomach of a whiting caught near Edithburgh. Robe specimens in spirits measure 30×15 mm. The girdle is very fleshy and wider than the valves themselves. They are of a very delicate milky colour, crossed with splashes of green. Pilsbry evidently had only a dried specimen. The specimens from Cape Jaffa and Normanville are of a ruddy tint—stained, I think, by their proximity to some ferruginous matter on lighthouse or jetty. One remarkable feature in nearly every specimen collected has been the presence of a light-green marking at the beak of the dorsal area on the fifth valve. This helps to distinguish this shell in nearly every instance.

46. ***Acanthochites (Loboplax) variabilis***, Adams
and Angas, 1864.

Hanleya variabilis, Adams and Angas, Proc. Zool. Soc., 1864, p. 194; Pilsbry, Man. Conch., ser. i., vol. xv., p. 101.

Acanthochites (Notoplax?) variabilis, Pilsbry, Proc. Acad. Nat. Sci., Philad., 1894, p. 84.

A. (Loboptax) variabilis, Adams and Angus: Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 156; Hedley and Hull, Records Australian Museum, vol. xiii., No. 4, 1909, p. 266.

This is the most widely distributed of all South Australian *Acanthochitons*. I have found it all around the coast from Port MacDonnell to St. Francis Island. It is found on the South-East coast, St. Vincent and Spencer gulfs, and on the West Coast as well as on Kangaroo Island. I have specimens from twenty-three different places. The pinnatifid appearance of the dorsal area and the very tiny spicules at the sutures, sometimes only horny protuberances, easily differentiate this species from other *Acanthos*. It assumes every variety of shade and colour from a creamy-white to almost black, greens generally predominating. Lighter-coloured varieties are plentiful on Kangaroo Island and the west coast of Yorke Peninsula.

In young specimens the girdle of the *Acanthos* is very small, but when full-grown it has a large fleshy girdle, often twice as wide as the tegmentum. If not kept in spirits this girdle shrinks up considerably.

47. *Acanthochites crocodilus*, Torr and Ashby, 1898.

Acanthochites crocodilus, Torr and Ashby, Trans. Roy. Soc., S.A., 1898, p. 216, pl. vi., fig. 2.

Two specimens were found at a very low tide at Marino, one valve was taken by Mr. Klem at Corney Point, and Mr. Hedley, Records Aus. Mus., vol. vii., No. 2, 1908, Hedley and May, reports having taken it off the coast of Tasmania. May and Torr, Proc. Roy. Soc., Tasmania, 1912, pp. 35, 36, say this is not *crocodilus*.

The remarkably foliated appearance of the dorsal area and the shagreened pustules on the latero-pleural area make it easy to distinguish this rare species.

48. *Acanthochites cornutus*, Torr and Ashby, 1898.

Acanthochites cornutus, Torr and Ashby, Trans. Roy. Soc., S.A., 1898, p. 217, pl. vi., fig. 3.

This is evidently a deep-water species. It was dredged by Dr. Verco in 14 fathoms off Ardrossan. Mr. A. R. Riddle took one at Wool Bay. Specimens have been taken at Marino, Normanville, and St. Francis Island.

Its pinnatifid dorsal area, decided carination, and regular rows of pustules are its distinguishing features. Mr. Hedley found eyes on the dorsal area of *A. cornutus*. He used $\frac{1}{4}$ -in. lens.

49. *Acanthochites* (*Notoplax*) *wilsoni*, Sykes, 1896.

Acanthochites (*Notoplax*) *wilsoni*, Sykes, Proc. Mal. Soc., London, vol. ii., part 2, July, 1896, p. 92, pl. vi., figs. 2, 2a.

A. verconis, Torr and Ashby, Trans. Roy. Soc., S.A., 1898, p. 217, pl. vi., figs. 4a-f.

I have to thank Mr. Hedley for drawing my attention to the similarity between *A. wilsoni* and *A. verconis*. I have gone through a number of specimens. There is a great difference between the small and large specimens in colour-markings, the smaller being pearly-white mottled with rose-pink and seemingly more carinated, while the larger specimens are reddish to a deep maroon tint.

Taken in dredgings in St. Vincent and Spencer gulfs by Dr. Verco, by Mr. Ashby at Aldinga, Mr. Kerrison at Cape Jaffa, by Mr. Basset Hull on Long Reef (New South Wales), and by the writer at Robe, Marino, Kingscote, and Minlacowie.

Sykes' description is ably assisted by Mr. Hedley's drawings in Torr and Ashby's paper, *loc. cit.*

50. *Acanthochites maughani*, Torr and Ashby, 1898.

Acanthochites maughani, Torr and Ashby, Trans. Roy. Soc., S.A., 1898, p. 218, pl. vii., figs. 5a-f; Hedley and Hull, Records Australian Museum, vol. vii., No. 4, 1909, p. 265.

This species has been found only at Port Victor (Maughan), Bottle and Glass Reef, and Freshwater Bay, New South Wales (Hedley and Hull). I have a number of New South Wales specimens in spirits.

Acanthochites lachrymosus, May and Torr, just being published (1912) by the Royal Society of Tasmania, is somewhat similar to *A. maughani*. The shell is much larger, 26×10 mm., but on comparing a co-type with the type of *maughani*, though there is a striking resemblance in detail, there are decided differences.

51. *Acanthochites exilis*, Torr and Ashby, 1898.

Acanthochites exilis, Torr and Ashby, Trans. Roy. Soc., S.A., 1898, p. 218, pl. vii., figs. 6a-f.

Three specimens of this very diminutive chiton were dredged by Dr. Verco in 15 fathoms in Spencer Gulf. It is the smallest of all our South Australian *Polyplacophora*, and may be easily distinguished by the bright-red dorsal area of the third valve. One very handsome specimen, measuring 3×2 mm., was dredged by Dr. Verco in 15 fathoms off Wallaroo.

52. *Acanthochites tatei*, Torr and Ashby, 1898.

Acanthochites tatei, Torr and Ashby, Trans. Roy. Soc., S.A., 1898, p. 219, pl. vii., figs. 7a-f.

One specimen only of this beautiful little *Acantho* was found at Middleton, Encounter Bay, by the writer. Mr. Gabriel reported finding one at Torquay, Victoria.

53. *Acanthochites costatus*, Adams and Angas, 1864.

Acanthochites costatus, Adams and Angas, P.Z.S., 1864, p. 194; Angas, *loc. cit.*, 1867, p. 224.

Macandrellus costatus, Dall, Proc. U.S. Nat. Mus., i., p. 81, f. 40 (dentition).

Chiton (Macandrellus) costatus, E. A. Smith, Zool. Coll. "Alert," p. 83, t. 6, fig. f.

Acanthochites costatus, Adams and Angas: Pilsbry, Man. Conch., ser. i., vol. xv., p. 40, pl. iii., fig. 74.

I have seen two specimens of this chiton. It was taken by Mr. Klem at Corney Point and named by Mr. Bednall. One other very similar I have from St. Francis Island. This shell agrees with the description in Pilsbry, *loc. cit.*, with the exception of the colour, which is of a pinkish hue, and the posterior valve has not the "six more or less distinct radiating ridges," as described by Smith from Coppinger's collection. Mr. Klem's specimen has a hairy girdle. The St. Francis Island specimen is fleshy.

Fam. CRYPTOPLACIDÆ, Dall.

54. *Cryptoplax striatus*, Lamarck, 1819.

Chitonellus striatus, Lamarck, An. S. Vert., vi., p. 317, 1819; Desh. in Lam., vii., pp. 481, 136; Sowerby, Genera of Shells, t. 139, f. 4; Conch. Illustr., f. 62; Blainville, Dict. Sc. Nat., xxxvi., p. 555, 1825; Reeve, Conch. Syst., ii., t. 135, f. 1; Conch. Icon., f. 4.

C. gunnii, Reeve, Conch. Icon., f. 5, 1847.

C. rostratus, Reeve, *loc. cit.*, f. 6.

C. oculatus, Reeve, *loc. cit.*, f. 7a,b (not of Quoy and Gaimard).

Cryptoplax striata—*gunnii*—*rostrata*, H. and A. Adams, Gen. Rec. Moll., i., p. 484; Angas, P.Z.S., 1867, pp. 224, 225.

Chiton (Chitonellus) striatus, Smith, Zool. Coll. "Alert," p. 84.

Cryptoplax striatus, Haddon, "Challenger" Report, xv., p. 39, t. 1, f. 9; t. 3, f. 9a-9m.

C. striatus, Lamarck, var. *gunnii*, Reeve; Bednall, Proc. Mal. Soc., London, vol. ii., part 4, April, 1897, p. 157; Torr, Trans. Roy. Soc., S.A., 1911, p. 100.

After examination of a large number of specimens from many parts of Australia, I have satisfied myself that the

Chitonellus striatus of Lamarck describes our South Australian species admirably. Most of the specimens are covered with soft velvet seal-like hair, which hardens into bristles when dried. I have a few hairless specimens, but this may be accounted for by local attrition or disease. The breadth of the valves varies so much in *striatus* that there seems no room for var. *gunnii*.

C. striatus is found all around the coast of Australia and Tasmania. I have collected it in about twenty places on the South Australian coast from Port MacDonnell to Nuyt Archipelago. The valves in some specimens are of a rich deep salmon-pink, while others are a dark-brown. The girdle is of a nut-brown when alive, going darker as it dries. It delights in the recesses of bunches of *Serpularia*, and I have taken macerated specimens from the stomach of a schnapper. I have seen living specimens nearly a foot long. I have dried ones 90 × 10 mm.

55. **Callochiton mayi**, Torr, 1912. Pl. v., figs. 1a-f.

C. mayi, Torr, Proc., Roy. Soc. Tasmania, 1912, p. 1.

General Appearance.—Shell oblong, very much elevated, strongly carinated, side slopes straight. *Colour*.—Creamy-white variegated with splashes of reddish-brown; the anterior and posterior valves are nearly always red, and this colour extends to the girdle.

Anterior Valve.—Red, smooth to the unaided eye, but microscopically regularly granulated and dotted all over with minute black dots which look like eyes, 14 to 16 pectinated teeth.

Median Valve.—*Lateral area* distinctly raised, smooth or with slight growth-lines. A broad shallow transverse sulcus in the centre of the area containing numbers of eye-dots somewhat regularly arranged. On one lateral area on one side of a valve 61 of these eye-dots were counted.

Pleural area deeply longitudinally sulcated with eight to twelve grooves, extending from the margin to the dorsal area, but growing shorter towards that area.

Dorsal area triangular, with microscopical irregular striations running into the pleural area.

The median valves have two distinct slits.

Posterior Valve.—Divided into two distinct areas by a raised riblet, the posterior part being similar in colour and granulations to the anterior valve, and the upper part creamy-white with splashes of red, microscopically granulated, numerous eye-dots, mucro median. The division between the two parts of this valve is very distinct. The pleural area has the same longitudinal sulci as that of the median valve.

Interior of Shell.—Porcelaneous, with raised riblets on posterior part of valve, sinus shallow and wavy, sutural laminæ very short.

Girdle.—Covered with irregular appressed spinelets, coarser towards the outer margin. In curled specimens these spines are erect, creamy-white with red sashes.

Measurement.—10 × 5 mm.

Hab.—Dredged by Dr. Verco in Spencer Gulf. One specimen was found by the writer on the north-west coast of Tasmania, and another from the same locality is in the possession of Mr. Basset Hull.

Remarks.—I have had considerable difficulty in determining the *genus* of this shell. It has pectinated teeth and eyes like *Tonicia*, but the girdle is not leathery, nor are the valves so polished. It may be a *Chætopleura*. The description is repeated, as the dredged South Australian specimens differ from the account given by Dr. Torr in the Proc. Roy. Soc., Tasmania. No eye-dots can be seen in the Tasmanian specimen.

56. **Lepidopleurus pelagicus**, *sp. nov.* Pl. v., figs 2a-f.

General Appearance.—Ovate, decidedly arched and strongly carinated. Side slopes straight. The shell gradually tapers towards the tail valve. The valves overlap the girdle. *Colour.*—Uniform, pale sulphur-yellow; the girdle has a slightly deeper shade, almost brown when dried.

Anterior Valve.—Broader than the median valves. It has three or four concentric grooves or growth markings parallel to the girdle, crossed by a number of minute striations converging towards the apex. The interior is pearly-white. No dentition nor sutural laminæ. The posterior edge of the valve is serrated.

Median Valve.—The lateral area is gradually elevated above the central area. The whole of the valve is covered with minute tubercles in longitudinal rows in the dorsal and pleural areas. Under the microscope, these appear like strings of beads. The rows are transverse in the lateral areas. The sutural plates are diminutive and semi-transparent, the sinus very broad. The posterior edge of the valve is serrated. Interior pearly and semi-transparent, the striations of the tegmentum distinctly shows through.

Posterior Valve.—Mucro median elevated, with concave slope to girdle. Pustulose liræ converge to the mucro. Sutural plates delicately diminutive.

Girdle.—Leathery and spiny to the unaided eye. Under $1\frac{1}{2}$ -in. lens it is covered with minute specules.

Measurement.—Dried, 8×4 mm.

Hab.—Dredged by Dr. Verco from 130 fathoms off Cape Jaffa. Several valves were dredged from 300 fathoms off the south-east coast of South Australia.

Remarks.—In detail this shell strongly resembles *Lepidopleurus inquinatus*, but the whole shell is much more carinated and the lateral areas differ in the massing of the pustules.

57. **Ischnochiton bednalli**, *sp. nov.* Pl. v., figs. 3a-f.

General Appearance.—Elliptical, valves wide, rounded, slightly carinated, side slopes curved, cream colour uniform in valves and girdle. The posterior margins of the valves project considerably and give a verandah-like appearance. The valves are exceedingly delicate.

Anterior Valve.—Two or three ill-developed grooves or growth-lines parallel to the girdle crossed by about twenty microscopically pustulose liræ converging towards the apex. About twenty slits with regularly scalloped pectination between.

Median Valve.—Dorsal area uniform in width composed of five or six rows of pustules either worn or compressed. Pleural areas divided into five irregular diagonal rows of pustules by reticulated sulci, which gives the appearance of open network. Lateral areas distinctly raised and crossed transversely with four rows of pustulose liræ converging towards the dorsal area. Four of these pustules project from the posterior margin. Interior pearly-white. Valves project considerably. Sutural laminæ small and delicate. Sinus very wide. Diminutive slit rays under $\frac{1}{4}$ -in. lens.

Posterior Valve.—Mucro ante-median almost covered by the seventh valve. Concave between the mucro and the girdles. The mucro is covered with pustules, and the rest of the valve has two or three concentric rings of pustulose liræ parallel to the girdle. The pustules grow smaller towards the mucro. About twenty-six slit rays.

Girdle.—Covered with microscopically striated scales.

Hab.—Two specimens only from St. Francis Island, Nuyt Archipelago, Australian Bight.

Measurement.—Dried specimen, 6×3 mm.

Remarks.—I have named this chiton after Mr. Bednall, the doyen of Polyplacophora work in Australia. It is an exquisite chiton, and somewhat resembles *Ischnochiton pilsbryi* and *Lepidopleurus inquinatus*.

58. *Acanthochites rufus*, *sp. nov.* Pl. vi., figs. 4a-f.

General Appearance.—Elliptical, roundedly arched, much more so than *A. variabilis*, valves beaked, colour uniformly terra-cotta.

Anterior Valve.—Five very indistinct riblets, which are really waves in the pustules. The pustules are in regular lines, appearing continuous with those on the second valve.

Median Valve.—Covered with pustules arranged in longitudinal liræ. There is little difference between the dorsal, lateral, and pleural areas. There are about twelve rows of these pustules on the latero-pleural area divided by sulci, and about fourteen rows on what may be termed the dorsal area. The microscopic pustules in these are much smaller than those in the latero-pleural areas. There is a gradual elevation towards the posterior end of each valve, and the pustules in this lateral region are more irregular.

Posterior Valve.—Mucro very indistinct, post median. A deep sulcus parallel to the girdle separates it from the outer edge of the shell. Rows of pustules converge towards the mucro and appear continuous with the rows on the median valves. Nine rows on the latero-pleural areas and twelve on the dorsal areas. The mucro is almost at right angles to the girdle, and the rows of pustules are concentric below the mucro.

Girdle.—Leathery, very narrow in dried specimen, covered with spinelets. Five corneous spots on the girdle surrounding the anterior valve and one at each suture, very indistinct in some.

Measurement.—10 × 5 mm.

Hab.—One specimen only from Kangaroo Island.

Remarks.—The detailed description of this shell approaches *A. variabilis*, but the absence of the distinction between the dorsal and the latero-pleural areas and the marked difference in the appearance and shape of the shells when placed side by side make it necessary to place it in a new species.

The name *rufus* is given on account of its rich terra-cotta colour.

59. *Acanthochites kimberi*, *sp. nov.* Pl. vi., figs. 5a-f.

General Appearance.—Long, narrow, tapering towards the ends. Valves rounded, beaked. *Colour*.—Either cream with splashes of dark- and light-green or, in some specimens, the green predominating over the cream with splashes of pink on some valves.

Anterior Valve.—Three sharply-defined riblets. Covered with rounded or oblong pustules larger at the margin and decreasing in size towards the apex. Interior pearly. Insertion plates deep, three slits.

Median Valve.—Dorsal area, wedge-shaped, foliated, covered with microscopic triangular pustules. Alternate black and white spots separate the dorsal from the pleural areas. Latero-pleural area, covered with irregular rounded and elliptical tubercles, small near the dorsal area, growing much larger as they approach the girdle and the posterior edge. Sinus broad, insertion plates deep, one slit on each side.

Posterior Valve.—Diminutive, mucro median, a distinct dorsal area similar to the median valves with irregular pustules below the mucro. Five microscopic riblets run from the mucro to the eaves. The dorsal area is concave. Articulation, bluish-green, rounded, excavated, deep insertion plates, two slits.

Girdle.—Leathery, covered with spinelets. Five erect silvery tufts stand out prominently around the anterior valve and one tuft at each suture. The hollows in which these tufts are placed is surrounded by a prominent ridge.

Hab.—Aldinga (by Mr. Kimber, after whom the shell is named), Kangaroo Island.

Measurement.—Dried specimen, 10×4 mm.

Remarks.—I have four specimens, varying somewhat in appearance, but similar in detail.

60. *Ischnochiton levis*, *sp. nov.* Pl. vi., figs. 6a-f.

General Appearance.—Smooth, rounded, decidedly carinate, pale-cream colour with spots of yellow, very broad in proportion to length, valves narrow.

Anterior Valve.—Smooth, except for a series of concentric growth-lines, microscopically granulated.

Median Valve.—Regular growth-lines appear over the dorsal, lateral, and pleural areas. The lateral areas are slightly raised, the growth-lines making four very large fine longitudinal riblets. The pleural area is minutely reticulated.

Posterior Valve.—Mucro ante-central. Two distinct areas, dorsal and pleural, consisting of microscopic regular granulations. The rest of the valve is smooth, almost flat, with two or three concentric lines. Eight or nine irregular slits.

Girdle.—Covered with rounded scales, microscopically striated.

Measurement.— 12×6 mm.

Hab.—Edithburgh (Mr. Matthews).

Remarks.—This belongs to the smooth variety of *Ischnochitonida*. It resembles *I. wilsoni*, but its surface is not so granular. My one specimen is damaged. The name *levis* is given on account of its smoothness.

61. ***Acanthochites rubrostratus***, *sp. nov.*

Pl. vii, figs. 7a-f.

General Appearance.—Shell elliptical, broad, girdle wider than the valve. Tegmentum cream-coloured, dorsal areas bright-green tipped with rosy-pink, which gives it its name.

Anterior Valve.—Three to five distinct pustulose riblets with probably five slits. My dissected specimen was damaged. In one co-type the pustulated riblet becomes one elongated pustule. The tegmentum is covered with flattened pustules.

Median Valve.—The lateral area is separated from the pleural area by a rib covered with pustules. The lateral and pleural areas are covered with nine rows of rounded appressed pustules, somewhat regular, converging towards the apex. The dorsal area is narrow, corneous, showing growth-lines, no striæ, somewhat foliated, one slit.

Posterior Valve.—Mucro posterior with rows of pustules between it and the girdle, to which it is at right angles. A dorsal area is seen which is almost smooth with irregular pustules on the sides. The interior is pearly, deeply hollowed, five slits, insertion plates large.

Girdle.—Leathery covered with minute spinelets, having long silky tufts at the sutures and five tufts around the anterior valve. In a spirit specimen the girdle is as wide as the valves.

Measurement.—Dried specimen, 11 × 6 mm.

Hab.—Two specimens from St. Francis Island and one collected by Mr. Baker at Henley Beach.

Remarks.—Somewhat resembles *A. speciosus*, but the girdle is very much smaller and is not continued between the valves. The *Acantho* tufts are also much more decided than in *speciosus*.

62. ***Ischnochiton bakeri***, *sp. nov.* Pl. vii., figs. 8a, b, c, f.

General Appearance.—Shell almost round, valves narrow, flattened, colour greyish-white mottled with brown.

Anterior Valve.—Covered with microscopic imbricating pustules, closely packed, resembling girdle scales.

Median Valve.—Dorsal area, triangular, smooth, spotted. Lateral areas distinctly raised with four or five irregular pustules. Median valves covered with microscopic granules.

Posterior Valve is missing.

Girdle.—Covered with imbricating striated scales. The outer edge of the girdle is fringed with delicate specules.

Measurement.— 4×3 mm.

Hab.—Henley Beach (Mr. Baker).

Remarks.—Strongly resembles a juvenile *Loricella angasi*, but its striated girdle-scales distinguish it. I have much pleasure in naming it after its discoverer.

EXPLANATION OF PLATES.

- a*—Dorsal view of entire shell.
- b*—Anterior valve.
- c*—Median valve.
- d*—Posterior valve.
- e*—Lateral view of posterior valve.
- f*—Portion of girdle magnified.

The sizes of type specimens are marked in each case.

PLATE V.

- 1*a,b,c,d,e,f*—*Callochiton, mayi*, Torr.
- 2*a,b,c,d,e,f*—*Lepidopleurus pelagicus*, sp. nov.
- 3*a,b,c,d,e,f*—*Ischnochiton bednalli*, sp. nov.

PLATE VI.

- 4*a,b,c,d,e,f*—*Acanthochiton rufus*, sp. nov.
- 5*a,b,c,d,e,f*—*Acanthochiton kimberi*, sp. nov.
- 6*a,b,c,d,e,f*—*Ischnochiton levis*, sp. nov.

PLATE VII.

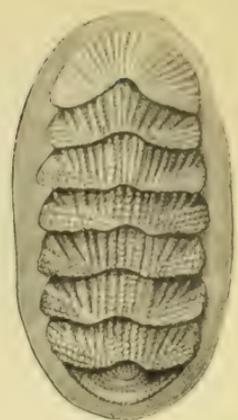
- 7*a,b,c,d,e,f*—*Acanthochites rubrostratus*, sp. nov.
 - 8*a,b,c,d,e,f*—*Acanthochites bakeri*, sp. nov.
-



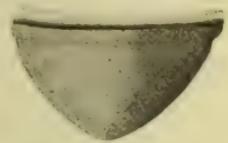
1a



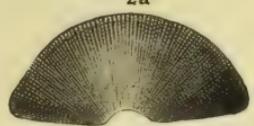
2a



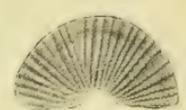
3a



1b



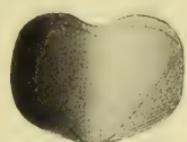
2b



3b



1c



2c



3c



1d



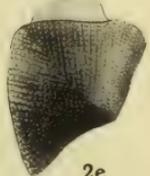
2d



3d



1e



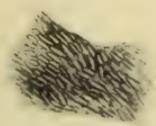
2e



3e



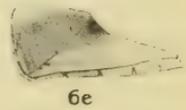
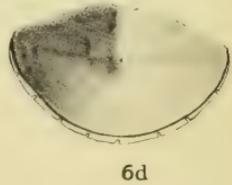
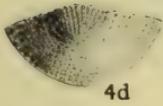
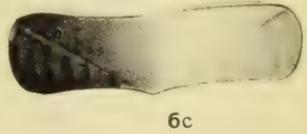
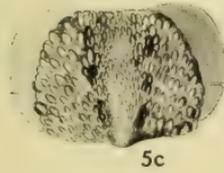
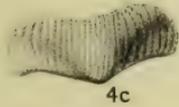
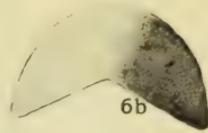
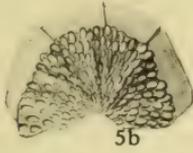
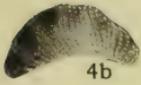
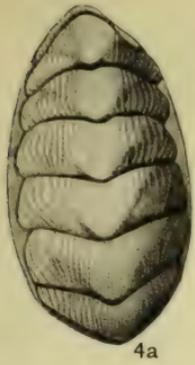
1f



2f

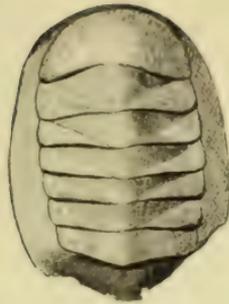


3f





7a



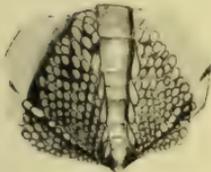
8a



7b



8b



7c



8c



7d



7e



7f



8f

ADDITIONS TO THE FLORA OF SOUTH AUSTRALIA.

By J. M. BLACK.

[Read October 10, 1912.]

PLATE VIII.

This list includes a record of some alien plants which have been recently found growing wild in our State, and the description of two new species—an *Acacia* and a *Goodenia*—collected near Tarcoola in June of this year by Mr. J. W. Mellor during his ornithological visit to that district. The introduced plants are distinguished by an asterisk.

CRUCIFERÆ.—**Eruca sativa*, Lamk. (salad rocket). Received from several parts of the State as a weed in lucerne.—Mediterranean region.

LEGUMINOSÆ.—*Acacia tarculensis*, sp. nova. Frutex, ramulis resinoso-angulatis minute puberulis, phyllodiis oblongo-lanceolatis vel oblongis coriaceis 25-50 mm. longis arcte multinerviis (sæpe nervis 3 evidentioribus) lineâ resinosâ crenulatâ decurrente marginatis plerumque acumine recurvo terminatis, junioribus appresse albo-pubescentibus, floribus pentameris, spicis axillaribus patulis laxis brevissime pedunculatis sæpius geminatis phyllodio circiter dimidio brevioribus, spicæ rhachi canotomentosâ, calyce $1\frac{1}{2}$ mm. longo pubescente lobis obtusis tubo longioribus, petalis usque supra medium connatis calyce vix duplo longioribus, bracteis concavis cum acumine inflexo, ovario pubescente, legumine immaturo sericeo, seminibus transversis.

Tarcoola (J. W. Mellor, June, 1912). Belongs to Bentham's series viii., *Juliflora*, subseries D, *Falcata*. Differs from *A. kempeana*, F. v. M., in the angular branchlets and smaller leaves with resinous margins and relatively shorter corolla; from *A. resinomarginea*, W. V. Fitzg., in the broader and shorter leaves, downy branchlets, peduncles and young leaves; from both in the long calyx-lobes and twin flower-spikes. The unripe pods (15-23 mm. long) are on specimens gathered in the Gawler Ranges in September by Captain A. S. White. (Plate viii.)

COMPOSITÆ.—*Helipterum pterochætum*, Benth. Specimens in J. W. Mellor's collection from Tarcoola have 2-3 outer female flowers and about 14 bisexual flowers in each head. Bentham (Fl. Aust., iii., 648) says: "Florets 15-20, all apparently hermaphrodite." *Helichrysum cinereum*, F.

v. M. The specimens from Tarcoola are noteworthy, as this has hitherto been considered only a coastal shrub. The Tarcoola specimens agree exactly with those from Port Elliot. **Tanacetum boreale*, Fischer. Glen Osmond and Green Hill Roads (H. H. D. Griffith). Inadvertently named *T. huronense*, Fischer, in *Nat. Fl. of S.A.*, 83.—Russia and Siberia.

GOODENIACEÆ.—*Goodenia modesta*, sp. nova. Herba glabrescens humilis, caule tenui rigidulo 20-25 cm. alto, foliis radicalibus longe petiolatis ovatis vel lanceolatis integris vel basi paucidentatis, caulinis, integris brevioribus, pedunculis axillaribus solitariis unifloris bibracteolatis, axillis lanatis, bracteolis grandibus foliaceis pedicellum articulatum superantibus, calyce pubescente lobis lineari-lanceolatis, corollâ flavâ saccatâ 12-14 mm. longâ extus puberulâ lobis superioribus inæqualiter alatis, indusio ciliato, stylo piloso, ovarii septo fere ejus apicem attingente, ovulis numerosis dense sub-4-seriatis.

Tarcoola (J. W. Mellor). Belongs to Bentham's section iii., *Amphichila*, but differs from any of the described species in the inflorescence and the large bracteoles. (Plate viii.)

GENTIANACEÆ.—**Microcala quadrangularis*, Griseb. Roadsides near Knightsbridge (Adelaide).—A dwarf yellow-flowered annual from California and extra-tropical South America.

SCROPHULARIACEÆ.—**Bartsia viscosa*, L. Established at Myponga (H. H. D. Griffith).—Mediterranean region and northwards to England. *Veronica arvensis*, L. (wall speedwell). Near Adelaide.—Europe and Western Asia.

CHENOPODIACEÆ.—**Chenopodium opulifolium*, Schrad. Sandy land near Henley Beach.—Mediterranean region.

MYOPORACEÆ.—**Eremophila subfloccosa*, Benth. Coorabie (Australian Bight). Sent by secretary local branch of Agricultural Bureau. Hitherto recorded only for Western Australia. Corolla greenish.

GRAMINEÆ. **Eragrostis minor*, Host. Along Broken Hill railway and from as far north as Alice Springs.—Southern Europe and Western Asia. **Hordeum maritimum*, With. (sea barley), has been found growing as far inland as Nuriootpa.

DESCRIPTION OF PLATE No. VIII.

Acacia tarculensis, sp. nova. 1, flower and two bracts; 2, pistil; 3, calyx spread open.

Goodenia modesta, sp. nov. 1, corolla spread open; 2, one face of placenta, with ovules in about 4 rows; 3, style and indusium; 4, vertical section of unripe capsule: a, a, calyxlobes; b, pouch of corolla-tube; c, articulation of pedicel.



Acacia
tarculensis sp.n.



Goodenia
modesta sp.n.

NOTES ON SOME OCCURRENCES OF SILICA NEAR
MOUNT PAINTER, FLINDERS RANGES.

By A. C. BROUGHTON.

[Read October 10, 1912.]

The locality from which the examples referred to were obtained is situated in the Far North-Eastern portion of South Australia, the north-easterly termination of the Flinders Ranges.

The specimens were collected from an area occupying about 24 square miles, extending from the divide of the ranges near Mount Pitt, 12 miles across the eastern slopes, to Parallana, on the edge of the great eastern plain.

The country rocks of the area examined have been determined as Pre-Cambrian by Dr. Mawson. They consist of granites, gneiss, schists, altered porphyries, and a felspathic and siliceous rock having the features of an eutectic mixture. The area has abundant evidence of having been subjected to great earth movements, as indicated by great crushed zones, faults, and slicken-sided faces exposed on excavating.

These fissures and crushed belts permitted the easy circulation of highly mineralized waters rich in silica and iron. The waters were evidently hot and from deep-seated sources. The final traces of such activity are probably to be found today at the hot springs at Parallana.

This water, travelling along the cracks and faults, deposited its mineral contents, cementing the crushed fragments into a solid whole. It is with some of the results of this cementation and deposition from solution that the paper deals.

These belts of iron-and-quartz-cemented zones have a greater resistance to the action of the weather than the more alkaline felspathic country rock, and their outcrops, with the crystal-lined cavities and caves, are a feature of the country.

The greater part of the cementing material consists of iron and quartz. The iron mineral being either specular and micaceous hæmatite, a porous ironstone, or a very massive tough iron rock. The quartz is either distributed irregularly throughout or else lining cavities.

Along Radium Ridge there are small aggregates of amethyst in the centre of a large mass of dense ironstone; cavities, lined with beautifully developed crystals of ordinary

colourless quartz, amethyst, and black quartz, often covered with a film of brilliantly green flashes of the radio-active mineral torbernite; in other places there are small quartz-lined cavities completely filled with a brilliant canary-yellow powder, which is another radio-active uranium mineral. Some of the quartz crystals have radiating fibres of the radio-active mineral, uranophane, passing through them.

Walking along the Ridge one can notice growths of quartz sticking out from the ground up to 3 ft. in height, and broken pieces lying around. Their shape at once suggests the stalactites in caves. On closer inspection they are found to have a hollow rectangular cavity passing up the centre, the length of the growth, and that the quartz has a radiating structure away from this hollow, suggesting it has grown outward from a nucleus which has since disappeared. This type of quartz was traced over an area of at least four square miles.

In places the loose rubble and soil can be scraped away, disclosing a cavity, the top of which has been worn off by erosion, with these growths pointing centrewards from all around. In other places are fissures in the country rock lined with this type of quartz formation.

In the solid rock, some feet from the surface and where atmospheric weathering has not penetrated, there are found masses of quartz with these long rectangular cavities filled with a powdery substance like clay. Probably at greater depth the original nucleus would be found in an unaltered state.

Beautifully coloured crystals tinted with various shades of red, brown, pink, and yellow may be collected at various places along the Ridge; also bunched aggregates and tabular masses.

Continuing in an easterly direction, pieces of quartz occur with a warty formation on the upper-surface and irregular sharp-edged rectangular protrusions on the lower, as if it had been formed in a mould produced by the cracking of rocks.

In some of the caves there occur small stalactites of silica hanging from the tops and projecting from the sides, and streaky formations on some of the rock faces, as if the silica-bearing waters deposited some of their load while slowly trickling along.

The Ridge takes a sudden turn to the south about three miles from its westerly end, and continues for about a mile, where it terminates in Mount Gee, or Crystal Mount, which is of considerable interest. Outcrops and cliffs, of jasper (up to 50 ft. high) and ironstone and quartz, with great

boulders of the same materials scattered around its flanks, are features of this part of the Ridge.

Numbers of crystal-lined cavities and caves are found in the quartz and ironstone outcrops. At the very top of Mount Gee is a small cave lined with what at first sight appears to be mud-covered quartz crystals. On breaking them, however, one is astonished at an unexpected snow-whiteness and purple in banded layers. An outcrop of similar quartz is found on the opposite side of Mount Gee; so, presumably, this formation passes through the top of the mountain. Banded quartz of various designs and structures are to be found here. Some are simply alternating layers of coloured quartz, generally pinks, whites, and yellows; others have iron layers alternating with the quartz; while again, some have the quartz and iron indiscriminately mixed. Much of the quartz has a delicate fibrous structure, at right angles to the layers in some cases, and radiating from centres in others, giving it a satin-like appearance. This fibrous structure is due to actual quartz material and not inclusions, as evidenced by breaking it, when the quartz splinters into long needle-like fragments.

Carnelian is often met with in bands passing around and through masses of quartz which have a well-defined crystal formation. On breaking, the common white quartz splits up into the individual crystals, and the carnelian may be obtained in small irregular fragments.

Quartz pseudomorphs after fluorspar occur here, as well as pseudomorphs after other minerals.

A common feature noticed was the alternate depositions of silica, both in individual crystals and large deposits, as indicated by a cap-in-cap formation. In places the complete upper part of a quartz crystal could be removed and yet have a regularly developed crystal underneath, with the six pyramid faces and their proper interfacial angles.

It was possible to do this on account of a drusy set of faces being covered with more silica not in optical continuity with the older quartz. Such an effect may occur several times in a single crystal. In some examples collected a layer of clay, oxide of iron as a thin film, or a layer of hæmatite up to $\frac{1}{4}$ in. thick, separated layers of silica which could be so removed. Quartz covered with hæmatite, which in turn was covered with more quartz with a different structure from the lower silica, was commonly met with.

This alternating feature gives rise to some beautiful examples of coloured quartz crystals. In some examples collected, four different colours, in layers conformable with the exterior of the crystal, occurred. The common colours met

with in such cases are blacks, pinks, reds, yellows, greens, browns, and the whites of milky quartz.

Inclusions, both solid and liquid, are frequent. Some layers, richer in inclusions than others, occur in the same crystal. It is also possible to find different layers with different types of inclusions. Thus in one layer you may find small dark specks of iron, the next may have liquid inclusions or perhaps not any, and the next layer may be rich in coloured particles giving a distinct colour to the layer.

Some fine examples of milky quartz, alternating with the transparent glassy variety, perhaps in six or eight alternating layers in the same crystal, are found lying about on the slopes of the mountain.

Another novel feature is the way most of the quartz breaks up on hitting. The individual crystals separate out with the pyramid termination at one end and a sharp point at the other which commences from the base of the pyramid faces, such pieces reminding one of single teeth of some animals. Many of the pyramid faces have warted developments on them. Some crystal faces are completely covered with these rough nodular elevations.

Continuing easterly, along Radium Ridge, instead of turning south to Mount Gee, we come to a creek on the remote side of which Mount Painter is situated.

This mountain, which is roughly four miles around the base and 1,000 ft. at its highest point above the creek, consists almost entirely of the crushed and ironstone rocks. Stiff climbing over boulder and rock-strewn flanks and up steep cliff faces and scrambling over scree, reveals on a grand scale the excessive crushing, with subsequent cementation, that the area has been subjected to. Great caves and hollows, weathered out of the less-resisting material of some of the cliffs, reveal great faces of country rock and crushed zones with the bands and cavities of quartz of different varieties. At the very summit of the mountain a band of amethystine quartz runs through the ironstone rock. The two highest points of the mountain are outcrops of ironstone-cemented crushed zones.

Many varieties of quartz are to be met with on the flanks and lower hills of this mountain; for example, sardonyx, amethystine-quartz, jasper, chalcedony, coloured quartz crystals, quartz formations of various shapes, and all more or less coloured.

Passing north-easterly from Mount Painter we traverse some four miles of granite country, all more or less intersected with the iron-and-quartz-cemented zones, and it is

worth noting that nearly all of them carry the radioactive minerals, autunite or torbernite, in isolated patches. Several miles of quartzites and schistose rocks are then encountered: the schists are copper-bearing in places.

Approaching the foot hills of the eastern flanks of the ranges highly siliceous rocks are again encountered, and seams of beautifully-coloured opaque quartz crystals are found intersecting the country rock. Fine examples of chalcedony and jasper occur. It is here that the present hot springs occur. The water is not boiling, but the hand cannot be held in it a moment. Sufficient water is ejected to flow along the boulder-and-gravel-strewn creek for about half a mile. Mounds of gypsum occur at the commencement of the great plain, which extends towards Queensland and New South Wales, about two miles from these springs, such mounds suggesting the recent activity of other springs. The whole locality is rich in seams of chalcedony, of which some fine examples were collected.

DESCRIPTIONS OF WILD HYBRIDS OF AUSTRALIAN DUCKS
CONTAINED IN THE S.A. MUSEUM COLLECTION.

By F. R. ZIETZ, Ornithologist of the South Australian
Museum.

[Read October 10, 1912.]

PLATE IX.

The following are descriptions of six interesting specimens of ducks which are, without doubt, hybrids bred in the wild state; they were shot, associated with other wild ducks, on Lakes Alexandrina and Albert, of the lower Murray. Specimens referred to as A, B, C, and D show characters of both *Anas superciliosa*, Gm., and *Nettion gibberifrons*, S. Müll.; specimen E, those of the former and *Spatula rhynchotis*, Lath., female; and specimen F, those of *Nettion gibberifrons* and *Spatula rhynchotis*, female.

A.—General plumage above dark-brown, the feathers broadly margined with greyish and rufous buff; upper part of the head and a band from the forehead through the eyes to the occiput brown-black, each feather narrowly edged with buff; superciliary stripe, cheeks and sides of neck buffy-white minutely streaked with brown; a band of buff feathers streaked with brown runs from the gape to the ear-coverts; chin and throat white immaculate; feathers of the breast with a blackish-brown crescentic band broadly edged with fulvous, those in the centre of the breast tipped with white, forming a silvery-white patch; feathers of the abdomen brown broadly edged with buff; sides of body and upper and under tail-coverts darker; wings brown, speculum on secondaries metallic-green, bordered anteriorly by a black band with a narrow buffy-white edging at the tips of the greater wing-coverts, and similarly posteriorly by another but broader black band with a broader white edging at the tips of the secondaries; wing-coverts dark greyish-brown with an olive lustre and light edges; the greater row brown with a sub-terminal black band and tipped with buffy-white; the greater under wing-coverts grey on the outer webs and nearly the whole of their inner webs white; the lesser ones white with a brown spot at the base; axillaries white; upper and lower mandibles bluish-black, nail black; legs and feet plumbeous with a yellowish tint, claws black. Wing, 9; tail, 4; culmen, 1.7; tarsus, 1.5; sex, (?). Locality: Lake Albert, South Australia, February 12, 1910. Plate ix., fig. 4.

B.—Differs from A in having the sides of head, neck, and throat pale-buff, deeper fulvous on the breast; the feathers of the lower breast and abdomen tipped with white, giving those parts a silvery wash; wing speculum coppery-green; basal half of lower mandible brown, the remainder yellow, with a few small brown spots. Wing, 9·5; tail, 4; culmen, 1·85; tarsus, 1·6; sex, (?). Locality: Lake Albert, South Australia.

C.—Differs from A in having the sides of head, throat, and the whole of the under-surface washed with ochreous-yellow; the feathers of the breast margined with bright ochreous-brown; lower mandible plumbeous with a small yellow spot near apex. Wing, 9·35; tail, 4; culmen, 1·7; tarsus, 1·5; sex, (?). Locality: Meningie, Lake Albert, South Australia, July 30, 1908.

D.—This specimen is much smaller than the three preceding ones, being about the size of *Nettion gibberifrons*, and also agreeing with that species in general colouration and markings with the following exceptions:—Facial markings similar to those of A; a white spot on each side of the head at the base of the upper mandible; greater wing-coverts not white, but olive with faint black subterminal band and broadly tipped with reddish-buff; greater under wing-coverts greyish-brown broadly edged with white on their inner webs, the lesser ones white with a brown spot at the base. Wing, 8; tail, 3·5; culmen, 1·65; tarsus, 1·45; sex, female. Locality: Lake Alexandrina, South Australia, May 16, 1895.

E.—Crown of head, facial markings, and throat similar to those of *Anas superciliosa*, the sides of the neck are more distinctly freckled, and the feathers of the under parts brown with broad reddish edges, as in the female of *Spatula rhynchotis*; upper parts brown with greenish reflections, each feather edged with buffy-grey; the scapularies brown, lighter along the shaft-line and richly glossed with green; upper wing-coverts dull-blue, those near the margin of the wing narrowly edged with white; the greater row brown with greenish reflections, having a subterminal black band glossed with metallic-green and broadly tipped with white; wing speculum on the secondaries metallic-green, each feather having a subterminal black band narrowly edged with white at the tip; the two outer tertials of each wing are brown with a broad velvety-black margin on their outer webs glossed with green; under wing-coverts white, some of the greater ones tipped with grey; axillaries white; primaries and tail-feathers brown, glossed with olive, the latter and also the rump and upper tail-coverts narrowly margined with reddish-

buff; bill black, slightly spatulate, lower mandible brown, the nail clouded with yellow; lamellæ of upper mandible more developed than in *Anas superciliosa* and slightly projecting beyond the lower margin of the bill; irides yellowish-brown; legs and feet orange. Wing, 10·25; tail, 3·65; culmen, 2·3; tarsus, 1·75; width of bill at base ·75, at apex 1; sex, male. Locality: Lake Albert, South Australia, January 16, 1899. Plate ix., fig 5.

F.—In general colouration and markings this bird agrees with *Nettion gibberifrons*, but in other respects, as noted, it shows characters which approach those of the female of *Spatula rhynchotis*. The feathers of the forehead, cheeks, and sides of neck are tinged with buff, and their brown shaft-streak is more pronounced, the scapularies and tertials are more acuminate and show greenish reflections, the upper wing-coverts are brown with bluish-grey margins; the under wing-coverts white, the marginal ones brown edged with white; the greater row silvery-grey; four secondaries metallic-green on their outer webs, the remainder olive with a greenish lustre; bill spatulate, width at base ·57, greatest width at apical end ·8; upper mandible yellowish-brown; lower mandible yellow; lamellæ of upper mandible well developed and projecting below to its lower margin; legs and feet orange. Wing, 7·75; tail, 4; culmen, 1·75; tarsus, 1·35; sex, female. Locality: Lake Alexandrina, April 11, 1895. Plate ix., fig. 6.

EXPLANATION OF PLATE IX.

- Fig. 1.—*Anas superciliosa*.
 .. 2.—*Nettion gibberifrons*.
 .. 3.—*Spatula rhynchotis*, female.
 .. 4.—*Anas superciliosa* × *Nettion gibberifrons*. Hybrid.
 .. 5.—*Anas superciliosa* × *Spatula rhynchotis*. Hybrid.
 .. 6.—*Nettion gibberifrons* × *Spatula rhynchotis*. Hybrid.
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1



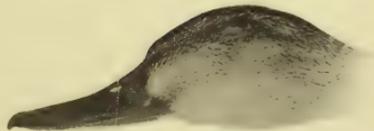
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6



NOTES ON SOUTH AUSTRALIAN MARINE MOLLUSCA,
WITH DESCRIPTIONS OF NEW SPECIES.—PART XV.

By JOS. C. VERCO. M.D. (Lond.), F.R.C.S. (Eng.).

[Read October 10, 1912.]

PLATES XV. AND XVI.

This paper is a continuation of the series from page 215 of vol. xxxv. of 1911, and embraces all the known South Australian species of *Helcioniscus*, *Patella*, *Nacella*, *Acmaea*, *Phenacolepas*, *Haliotis*, *Scissurella*, and *Schismope*. It discusses also several species which have been attributed to South Australia, but are not recognized as occurring here.

***Helcioniscus tramosericus*, Martyn.**

Patella tramoserica, Martyn, Univ. Conch., t. 16, P. (*Helcioniscus*) *tramoserica*, Martyn, Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 205.

Helcioniscus diemenensis, Philippi, Gatliff and Gabriel, Proc. Roy. Soc., Victoria, 1908, vol. xxi. (New Series), part 1, p. 282.

Gatliff and Gabriel discarded the name *P. tramoserica*, Martyn, because the type locality was North America, and no Victorian specimen was exactly like his figure; but in answer to enquiries by Mr. Gabriel, Dall has since written that Martyn's species does not occur on the coasts of America, and that it is probably Australian or New Zealand. Very likely Martyn obtained it from Australia, but by mistake gave it an American habitat.

It occurs all along the South Australian coast from the east as far towards the west as Venus Bay. At St. Francis Island it is very rare and small, up to 18 mm.; so it seems to fade out along our west coast. It was not taken at any place along the south or west coast of Western Australia, its place being taken by *Patella neglecta*.

***Helcioniscus illibratus*, Verco.**

Helcioniscus illibratus, Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 205, pl. x., figs. 6-14: *Type locality*—Spencer Gulf; Hedley, Commonwealth of Australia, Fisheries, part 1, 1911, p. 93, "100 fathoms, 40 miles south of Cape Wiles, South Australia."

Dredged in 15 to 20 fathoms off St. Francis Island, 5 dead. Taken in Western Australia, as far round as Rottneet Island.

Helcioniscus limbatus, Philippi.

Patella limbata, Philippi, *Abbild und Besch*, *Conch.*, vol. iii., p. 71; (*Helcioniscus*) Verco, *Trans. Roy. Soc., S.A.*, 1907, vol. xxxi., p. 100.

It is very common, large, and beautiful in St. Francis Island, where *H. tramosericus*, Martyn, is very rare and small. I did not take it anywhere in Western Australia. Mr. Hedley in "The Marine Fauna of Queensland," in the Australasian Association for the Advancement of Science, 1909, p. 355, does not include either of these species, nor in his Addendum, p. 809. It would seem, therefore, to be restricted to Tasmania and the southern shore of Australia.

Patella ustulata, Reeve.

Patella ustulata, Reeve, *Conch. Icon.*, 1855, vol. viii., pl. xxxi., figs. 88a, 88b; Verco, *Trans. Roy. Soc., S.A.*, vol. xxx., 1906, p. 206, and vol. xxxi., p. 99.

Taken at Venus Bay, and many at St. Francis Island, up to 32 mm. long by 26 mm. broad.

Patella aculeata, Reeve.

Patella aculeata, Reeve, Verco, *Trans. Roy. Soc., S.A.*, 1906, vol. xxx., p. 207.

Taken alive on the rocks on St. Francis Island up to 36 mm. by 26 mm., so that as far west as this the size is maintained.

Patella stellæformis, Reeve.

Patella stellæformis, Reeve, *Conch. Systematica*, 1842, vol. ii., p. 15, pl. cxxxvi., fig. 3; Pilsbry, *Man. Conch.*, vol. xiii., 1891, p. 98, pl. xvii., figs. 25-27, pl. lvi., figs. 62-65; Tate and May, *Proc. Linn. Soc., N.S.W.*, 1901, vol. xxvi., part 3, p. 410.

Patella pentagona, Reeve, *Conch. Icon.*, 1854, pl. xx., figs. 48a, 48b, 48c (non Born Mus. Test. Vindobonensis).

Var. Patella chapmani, Tenison-Woods, *Proc. Roy. Soc., Tasmania*, 1876 (1875), p. 157; Verco, *Trans. Roy. Soc., S.A.*, 1906, vol. xxx., p. 208.

Var. Acmaea alba, Tenison-Woods, *Proc. Roy. Soc., Tasmania*, 1877 (1876), pp. 155, 156; Verco, *Trans. Roy. Soc., S.A.*, 1906, vol. xxx., p. 208.

I think Tate and May were right in regarding *P. chapmani*, Tenison-Woods, as conspecific with *P. stellæformis*, Reeve; but the two types are so unlike that the former may well be regarded as a good variety of the latter.

Taken at Rosetta Head, Encounter Bay (Tate), Tyinga Beach, Venus Bay, numerous and foliaceous but small, and Fowler Bay on the west coast; and on St. Francis Island up to 27 mm. by 20 mm. by 7.5 mm.

The species is rare and rather small on the South Australian coast, both the typical and the variant form, and it is only when we get west as far as St. Francis Island that we find it of fair size and in good variety. Here we take both the craggy typical shell and the extreme variant (*Acmæa alba*).

Nacella parva, Angas.

Nacella parva, Angas, Proc. Zool. Soc., 1878, p. 862, pl. liv., fig. 12; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 208, and 1907, vol. xxxi., p. 101.

Taken on the beach at Sceales Bay, and at St. Francis Island in 6 fathoms, and in 15 to 20 fathoms, many and in good condition, with the axial line of dorsal spots of a delicate blue colour; in 35 fathoms, 2 much more depressed than those from shallower waters.

Nacella crebrestriata, Verco.

Nacella crebrestriata, Verco, Trans. Roy. Soc., S.A., 1904, vol. xxviii., p. 144, pl. xxvi., figs. 20, 21; 1906, vol. xxx., p. 208; and 1907, vol. xxxi., p. 101.

Dredged in 55 fathoms off Cape Borda, 1; taken on the beach at Venus and Sceales Bays, Port Sinclair, and St. Francis Island.

Var. **roseoradiata**, Verco.

Was taken at Guichen Bay and St. Francis Island.

Nacella stowæ, Verco.

Nacella stowæ, Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 209, pl. x., figs. 4, 5, and 1907, vol. xxxi., p. 101; Gatliff, Proc. Roy. Soc., Victoria, 1907, vol. xx. (New Series), part 1, p. 34, recorded for Victoria.

Kingston Beach, many; St. Francis Island beach, 4 good.

Acmæa alticostata, Angas.

Patella alticostata, Angas, Proc. Zool. Soc., London, 1865, p. 56, pl. ii., fig. 11; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 209.

Taken at Venus Bay and Port Sinclair, also on St. Francis Island, abundant, typical, good condition, and in considerable variety. *Radula*, pl. xvi., figs. 3, 4.

Acmæa flammea, Quoy and Gaimard.

Patelloidea flammea, Quoy and Gaimard, Voy. "Astrolabe," Zool., 1834, vol. iii., p. 354, pl. lxxi., figs. 15, 16; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 212.

A form like the type, which I have from the Derwent estuary, the type locality, has not been found by me in South

Australia. It is questionable whether this is really conspecific with *A. jacksoniensis*, Reeve, and *A. crucis*, Tenison-Woods.

Var. *A. jacksoniensis*, Reeve (*Patella*), Conch. Icon., vol. viii., 1855, pl. xxxix., figs. 127*a* and 127*b*.

Var. *A. gealei*, Angas (*Patella*), Proc. Zool. Soc., London, 1865, p. 57.

Var. *A. crucis*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1877 (1876), p. 52.

Taken at Venus and Streaky Bays and St. Francis Island, many and various, with or without the cross.

***Acmaea calamus*, Crosse and Fischer.**

Patella calamus, Crosse and Fischer, Journ. de Conch., 1864, p. 348, and 1865, p. 42, pl. iii., figs. 7, 8; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 211.

Sceales Bay, West Coast.

Var. ***polyactina***, *nov. var.* Pl. xv., figs. 1, 2.

This is a colour variety. It has the shape of *A. calamus*, C. and F., though sometimes narrower in front, and has the fine radial sculpture. It may reach 21 mm. long by 17 mm. broad and 7 mm. high, but it has brown rays gradually widening, generally seven, the odd one in the posterior centre; but there may be six, or as many as fourteen, by secondary intercalation. They may be broken up into blotches or specks, and may tend to be united by reticulating spots and lines. The shell is sometimes polyangulate as well as rayed. They grade into typical *A. calamus*, Crosse and Fischer.

Gulf St. Vincent, Sceales Bay, Wallaroo Bay 15 fathoms.

***Acmaea septiformis*, Quoy and Gaimard.**

Patelloida septiformis, Quoy and Gaimard, Voy. "Astrolabe," Zool., 1834, vol. iii., p. 362, pl. lxxi., figs. 43, 44; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 215.

"Quoy gave it the name of '*septiformis*,' because in colour it resembles the *Navicella*, called by some authors '*Septaires*.'" —Lamarck, Anim. S. Vert. (2nd Edition, Deshayes, etc.), 1836, vol. vii., p. 550.

Port Elliston, many, large, flat, and eroded; Streaky Bay, many and large; St. Francis Island, few and small.

***Acmaea marmorata*, Tenison-Woods.**

Acmaea marmorata, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1876 (1875), pp. 156, 157; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 210.

It was taken at Venus and Streaky Bays, St. Francis Island, and Point Sinclair, along the west coast of South Australia. At Streaky Bay it may be 26 mm. long and at St.

Francis Island 19 mm. I did not find any examples anywhere in Western Australia, so that it would seem to disappear somewhere between St. Francis Island and Esperance. The examples from New South Wales and Queensland sent to me are much smaller than those taken at Guichen and Streaky Bays, which may be regarded as the metropolis of the species.

***Acmaea subundulata*, Angas.**

Acmaea subundulata, Angas, Proc. Zool. Soc., London, 1865, p. 155; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 214.

I took it alive in Streaky Bay in considerable numbers in very shallow water at low tide on wood and bottles and other shells, also at Murat Bay and on St. Francis Island, and at Esperance Bay, Western Australia.

***Phenacolepas calva*, Verco.**

Scutellina calva, Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 217, pl. viii., figs. 9, 10; Hedley and May, Records Austr. Mus., 1908, vol. vii., No. 2, p. 110, "100 fathoms, off Cape Pillar, Tasmania"; Hedley, Commonwealth of Australia, Fisheries, part 1, 1911, p. 93, "100 fathoms, 40 miles south of Cape Wiles, South Australia."

Dredged in 200 fathoms off Beachport, 3.

***Phenacolepas alboradiata*, Verco.**

Scutellina alboradiata, Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 217, pl. viii., figs. 1, 2.

Gulf St. Vincent, depth unrecorded, 4; Salt Bay Creek, Edithburgh; 110 fathoms off Beachport.

***Haliotis albicans*, Quoy and Gaimard.**

Haliotis albicante, Quoy and Gaimard, Voy. "Astrolabe," 1834, Zool., vol. iii., p. 311, pl. lxxviii., figs. 1, 2. *Type locality*—"King George Sound, upon rocks at the entrance."

Haliotis albicans, Quoy and Gaimard, Lamarck, Anim. S. Vert. (2nd Edition, Deshayes, etc.), 1843, vol. ix., p. 31, sp. 16; Reeve, Conch. Icon., 1846, vol. iii., pl. x., fig. 30; Philippi, Abbild. Besch. Conch., 1846, vol. ii., p. 69, pl. iv., figs. 1a and 1b; Angas, Proc. Zool. Soc., London, 1865, p. 183, recorded for South Australia; Sowerby, Thes. Conch., 1882, vol. v., p. 30, sp. 57, pl. iii. (430), fig. 20; Weinkauff, Conch. Cab. (Ed. Küster), Band. vi., Abt. 1.B., 1883, p. 71, pl. xxi., fig. 6, pl. xxviii., fig. 2; Pilsbry, Tryon, Man. Conch., 1890, vol. xii., p. 78, pl. v., fig. 27; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 407, Tasmania; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1903, vol. xv. (New Series), part 2, p. 178, Victoria.

Taken all along coast of South Australia from Glenelg River to St. Francis Island.

Quoy used the specific name "*albicante*," which is grammatically correct, as *hous*, *hotis* is a neuter noun.

Lamarck and Sowerby give New Zealand as the habitat, but Hutton does not record it in his Manual of the New Zealand Mollusca, 1880, so it is probably a mistake.

In Adcock's Handlist of the Aquatic Mollusca of South Australia, 1893, p. 9, No. 366, it was given as *H. glabra*, Chemnitz, with *albicans*, Quoy and Gaimard, as its synonym.

***Haliotis elegans*, Koch.**

Haliotis elegans, Koch, in Philippi, *Abbild. und Besch. Conch.*, 1844, vol. i., p. 119, pl. i., figs. 1, 2; Reeve, *Conch. Icon.*, 1846, pl. vii., fig. 21; Sowerby, *Thes. Conch.*, 1882, vol. v., p. 27, Sp. 44, pl. xi. (438), fig. 82, and pl. xiv. (440 bis.), fig. 119; Weinkauff, *Conch. Cab.* (Ed. Küster), 1883, Band. vi., Abt. 1.B., p. 51, Sp. 39, pl. xx., figs. 2, 4; Pilsbry, Tryon, *Man. Conch.*, 1890, vol. xii., p. 103, pl. xiii., fig. 70; Adcock, *Handlist*, etc., 1893, p. 9, No. 370.

Koch gives as the type locality "the western shore of New Holland," but Reeve and all who follow give "Port Adelaide," including Pilsbry, who says he has not seen the species. Koch correctly says it is "very rare" and gives its proper *habitat*. But it has not been found at Port Adelaide nor anywhere along the southern coast of Australia to my knowledge. It occurs on the western shore of Australia. Swainson, in *Proc. Roy. Soc.*, Tasmania, 1855, p. 51, writes:—"I have seen but two specimens, in the collection of my friend G. W. Walker, who thinks he procured it on some island in Bass Straits." Probably, however, Mr. Walker made a mistake.

***Haliotis nævosa*, Martyn.**

Haliotis nævosa, Martyn, *Univ. Conch.*, 1784, vol. ii., f. 63, reproduced in *Chenu's Bibliothéque Conch.*, Ser. 1, Tome ii., 1845, p. 23, No. 63, pl. xxii., fig. 1; Cab. Jno. Hunter, *Hab. Nouv. Galles du Sud*; Lamarck, *Anim. S. Vert.* (2nd Edition, Deshayes, etc.), vol. ix., 1843, p. 34, No. 20, *hab.* New Zealand; Reeve, *Conch. Icon.*, vol. iii., pl. viii., fig. 27a, pl. ix., figs. b, c; 1865, *Angas, Proc. Zool. Soc.*, London, p. 183, No. 178, *hab.* South Australia, and 1867, p. 218, No. 203, *hab.* New South Wales; Sowerby, *Thes. Conch.*, vol. v., 1882, p. 31, No. 59, pl. x. (437), fig. 73, *hab.* New Zealand, Van Diemen Land, and Philippines; Weinkauff, *Conch. Cab.* (Ed. Küster), Band. vi., Abt. 1.B., 1883, p. 34, No. 25, pl. xiv., figs. 1-3; Watson, "Chall.," *Zool.*, 1886, vol. xv., p. 49, No. 1; 1890, Pilsbry, Tryon, *Man. Conch.*, vol. xii., p. 116, pl. xi., figs. 56, 60; Tate and May, *Proc. Linn. Soc.*, N.S.W., 1901, vol. xxvi., p. 407; Pritchard and Gatliff, *Proc. Roy. Soc.*, Victoria, 1903, vol. xv. (New Series), part 2, p. 178, *hab.* Victoria.

Haliotis clathrata, Reeve, *Conch. Icon.*, fig. 72; Sowerby, *Thes. Conch.*, 1882, vol. v., pl. vi. (433), fig. 39, who says it is a synonym of *H. nævosa*, Martyn, in which Pilsbry, *loc. cit.*, con-

ours, as a juvenile, from the Philippines: Sowerby also gives *H. ruber*, Leach, and *H. sulcata*, Philippi, as synonyms.

This occurs all along the South Australian coast from the Glenelg River to St. Francis Island.

***Haliotis conicopora*, Peron.**

Haliotis conicopora, Peron, Voy. "Terr. Austr.," vol. ii., 1816, p. 80; Hedley, Proc. Linn. Soc., N.S.W., 1905, part 4, p. 520; Gatliff and Gabriel, Proc. Roy. Soc., Victoria, 1908, vol. xxi. (New Series), part 1, p. 380.

Haliotis tubifera, Lamarck, Anim. S. Vert. (2nd Edition, Deshayes, etc.), vol. ix., 1843, p. 24, No. 3, *hab.*, the seas of New Holland.

Haliotis cunninghamii, Gray, King's Survey of Australia, vol. ii., Appendix, p. 494, *teste* Gatliff and Gabriel, *loc. cit.*

Haliotis granti, Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1902, vol. xiv. (New Series), part 2, p. 183, pl. x., and 1903, vol. xv., p. 180. *Type locality*—Victoria.

Hedley, *loc. cit.*, drew attention to Peron's name and locality, Kangaroo Island, and suggested its conspecificity with *H. tubifera*, Lamarck, and *H. granti*, Pritchard and Gatliff. I think, too that this is the shell figured by Philippi in *Abbild und Beschr. Conch.*, p. 147, pl. iv. and v. (Gen. 2 and 3), under the name *H. nævosa*, Martyns, and which, according to Preiss, came from Mistaken Island, in New Holland. It has both from the figure and description the pipe-like holes, which in profile are well shown.

From an examination of a considerable number of specimens it seems open to question whether this is not really a variety of *H. nævosa*, Martyns, and though some individuals can be easily distributed in their typical species, others cannot be placed in one rather than the other. The validity of the spiral cords and of the axial corrugations, and the extent of projection of the spire above the dorsal surface, so as sometimes to show the basal angle and in other cases not, the consequent downward slope of the surface from the suture to the perforations, or even an upward slope or its rounded curve all vary considerably.

Taken all along the South Australian coastline, at Beachport measuring 17.5 cm. by 13.5 cm.

***Haliotis iris*, Martyn.**

Haliotis iris, Martyn, Univ. Conch., vol. ii., fig. 61; Martini and Chemnitz, Conch. Cab., 1788, vol. x., p. 317, pl. 167, figs. 1612, 1613; Wood's Index Test., 1825, p. 175, No. 13, New Zealand; Gmelin, Syst. Nat., 1789, vol. vi., p. 3691, No. 19.

H. iris, Gmelin, Lamarck, Anim. S. Vert. (2nd Edition, Deshayes, etc.), 1843, vol. ix., p. 23.

H. iris, Martyn, Deshayes, *Encycl. Meth.*, 1830, vol. ii., p. 178; Reeve, *Conch. Icon.*, 1846, fig. 37; Hutton, *Man. New Zea-*

land Moll., 1880, p. 104; *H. iris*, Gmelin, Sowerby, Thes. Conch., 1882, vol. v., p. 20, Sp. 9, pl. iii. (430), figs. 24, 25; *H. iris*, Martyn, Weinkauff, Conch. Cab., Band. vi., Abt. 1.B., p. 11, Sp. 8, pl. iv., figs. 3, 4; Pilsbry, Tryon, Man. Conch., 1890, vol. xii., p. 110, pl. xiii., figs. 65, 66.

Lamarck correctly gives "the seas of New Zealand" as the *habitat*, Reeve gives Kangaroo Island, but Swainson, in Proc. Roy. Soc., Tasmania, 1855, p. 51, wrote: "By some unaccountable mistake it is stated to inhabit Kangaroo Island. It is well known, however, in these colonies (the Australian) to be altogether peculiar to the islands of New Zealand." It has not been taken on Kangaroo Island or on the shore of South Australia.

Haliotis roei, Gray.

Haliotis roei, Gray, King's Voy., vol. ii., Appendix, 1827, p. 493, no locality given; Reeve, Conch. Icon., 1846, pl. iv., fig. 10; Sowerby, Thes. Conch., vol. v., 1882, p. 31, Sp. 60, pl. x. (437), figs. 77, 78; Weinkauff, Conch. Cab. (Ed. Küster), Band vi., Abt. 1.B., p. 37, No. 28, pl. xv., figs. 4-6; Pilsbry, Tryon, Man. Conch., 1890, vol. xii., p. 117, pl. xviii., fig. 1, pl. xlviii., figs. 11-13.

Haliotis scabricosta, Menke, Moll. Nov. Holl. Spec., 1843, p. 31, No. 172: *Type locality*—Mistaken Island; Philippi, Abbild und Beschreib, Conch., vol. i., 1844, p. 120, No. 4, pl. i., fig. 6.

Sowerby, Pilsbry, and Weinkauff give *H. hargreavesii*, Cox, as a synonym; but Hedley denies the identity, Proc. Linn. Soc., N.S.W., 1905, vol. xxx., part 4, p. 520. The two small examples of this species which the author, Dr. Cox, gave me support Hedley's contention.

It was recorded in Adcock's Handlist of Aquatic Mollusca of South Australia, 1893, p. 9, No. 367, as *H. rugosa-plicata*, Chemn. I have Tate's specimens thus named by him, but they are typical *H. roei*.

The species is rare in South Australia, but has been taken at Encounter Bay, at Aldinga (Mr. Kimber), up to 8.2 cm. long, by 6.5 cm. broad, and at St. Francis Island.

It has not been recorded from Victoria or Tasmania, but is common in Western Australia.

Sowerby gives "New Holland" as the *habitat*; Menke "Mistaken Island," in King George Sound.

Haliotis cyclobates, Peron.

Haliotis cyclobates, Peron, Voy. "Terr. Austr.," vol. ii., 1816, p. 80: *Type locality*—Kangaroo Island; Hedley, Proc. Linn. Soc., N.S.W., 1905, vol. xxx., part 4, p. 520; Gatliff and Gabriel, Proc. Roy. Soc., Victoria, 1908, vol. xxi. (New Series), part 1, p. 380.

Haliotis excavata, Lamarck, Anim. S. Vert., 1822, vol. vi., p. 215; 1843 (2nd Edition, Deshayes, etc.), vol. ix., p. 25, No. 4, "the seas of New Holland"; Deshayes, Encyc. Meth., 1830, vol. ciii., vers, vol. ii., p. 179; 1841, Delessert, Recueil, p. 33, figs.

4a, 4b, "Java seas," also figs. 6a, 6b (error in text 2a, 2b), "Java seas"; Reeve, Conch. Sys., 1842, vol. ii., p. 42, pl. cl., fig. 1; Reeve, Conch. Icon., 1846, vol. iii., pl. viii., fig. 25; H. and A. Adams, Gen. Recent Moll., vol. i., p. 443 (*Padollus*); Sowerby, Thes. Conch., 1882, vol. v., p. 30, Sp. 56, pl. iii. (430), figs. 21, 26; Weinkauff, Conch. Cab., 1883 (Ed. Küster), Band. vi., Abt. I.B., p. 39, Sp. 29, pl. xvii., figs. 1, 2; Pilsbry, Tryon, Man. Conch., 1890, vol. xii., p. 119, pl. ix., fig. 51, pl. xlix., fig. 23; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1903, vol. xv. (New Series), part 2, p. 180, "Portsea, Port Phillip."

Dredged alive up to 15 fathoms and taken alive on the rocks at low water along the South Australian coastline in both gulfs from Yankalilla Bay to Streaky Bay, and Murat Bay in the west. I did not get it at St. Francis Island nor anywhere in Western Australia. It is recorded from Port Phillip, Victoria, but not from Tasmania. It would seem to be very localized and confined to the southern coast of Australia.

Haliotis emmæ, Gray.

Haliotis emmæ, Gray, MSS., Brit. Mus. Cat.; Reeve, Conch. Icon., 1846, vol. iii., pl. x., fig. 29; also Elements of Conch., 1860, vol. ii., pp. 12, 13, pl. xxiii., fig. 131; Sowerby, Thes. Conch., 1882, vol. v., p. 32, Sp. 68, pl. ii. (429), fig. 16, "New Zealand"; Weinkauff, Conch. Cab. (Ed. Küster), Band. vi., Abt. I.B., p. 56, Sp. 43, pl. xxii., figs. 1, 2; Pilsbry, Tryon, Man. Conch., 1890, vol. xii., p. 122, pl. xiv., fig. 75; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., pp. 407, 447, "Tasmania"; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1903, vol. xv. (New Series), part 2, p. 178, "Victoria."

Padollus emmæ, Gray, H. and A. Adams, Gen. Recent Moll., 1858, vol. i., p. 443.

W. Swainson, in Proc. Roy. Soc., Tasmania, 1855, p. 48, says, "*H. tricostatus*, Lam.; *H. pulcherrima*, Auct.; and our *H. costata*, are (in Reeve's Conch. Icon.) erroneously called *H. emmæ*," and cited as Australian species. But *H. costata*, Swainson, is given by Pilsbry as a synonym of *H. rugosoplicata*, Chem. Again, on page 51, "I see no difference between the species figured at plate x., fig. 29 (Conch. Icon., Reeve), under the singular name of *H. emmæ*, and that described by me in the Bligh Catalogue as *Haliotis carinata*. . . . Dr. Milligan has fine specimens from the Tasmanian coasts, but we do not think it also inhabits New Holland, as here stated."

It was recorded for South Australia in Adcock's Handlist of Aquatic Mollusca, 1893, p. 9, No. 372, as *H. (Padollus) carinata*, Martyn, with *emmæ*, Gray, as a synonym; but this was compiled from Tate's manuscript list, and he, in the Tasmanian Census in Proc. Linn. Soc., N.S.W., 1901, pp. 407 and 447, withdrew *H. carinata* in favour of *H. emmæ*.

Taken at the Glenelg River, Lacepede Bay, Edithburgh, St. Francis Island, and Le Hunte Bay, *i.e.*, the whole length of the South Australian coast where examined. It was not found in Western Australia.

Variations consist in the stoutness of the spiral cords, and especially in the prominence of the spiral ridge above the row of holes; this may be barely perceptible, or it may be so marked as to resemble *H. tricostalis*—in fact, it is open to question whether *H. emmae* is not the eastern variant of the western *H. tricostalis*.

Haliotis tricostalis, Lamarck.

Haliotis tricostalis, Lamarck, Anim. S. Vert., 1882, p. 218.

This species was recorded for South Australia in Adcock's Handlist of Aquatic Mollusca, South Australia, 1893, p. 9, No. 373, as *Haliotis (Padollus) rubicundus*, Montfort, with *tricostalis*, Lamarck; *canaliculata*, Schbt. and Wag.; *scalaris*, Leach, as synonyms. I have not taken it in South Australia, and do not know that it has been collected here. Some of our examples of *H. emmae*, Gray, approach it. Swainson, in Proc. Roy. Soc., Tasmania, 1855, p. 48, speaking of Reeve's Mon. of the genus in Conch. Icon., says, "*H. tricostatus* (meaning *tricostalis*), *H. pulcherrima*, Auct., and our *Haliotis costata*, here erroneously called *H. emmae*," evidently regarding all four as conspecific; whereas Pilsbry makes *tricostalis*, *pulcherrima*, *costata* (a synonym of *rugosoplicata*) and *emmae* four distinct species.

Haliotis parva, Linne.

Haliotis parva, Linne., Sys. Nat., vol. x., p. 780; Gmelin, Sys. Nat., 1789, Tome i., vol. vi., p. 3689, No. 7; Pilsbry, Tryon, Man. Conch., 1890, vol. xii., p. 120, pl. xiv., fig. 74; Adcock, Handlist Aquatic Moll., South Australia, 1893, p. 9, No. 374.

Adcock records it for South Australia, but no authentic specimen from our shores is known.

Haliotis pulcherrima, Martyn.

Haliotis pulcherrima, Martyn, Univ. Conch., pl. lxii., Pilsbry, Tryon, Man. Conch., 1893, vol. xii., p. 124, pl. xiii., fig. 69; Adcock, Handlist Aquatic Moll., South Australia, 1893, p. 9, No. 371.

Pilsbry gives South Australia as one of its localities, and Adcock records it, but no authentic specimen from our shores is known.

Haliotis rugoso-plicata, Chemnitz.

Haliotis rugoso-plicata, Chemnitz, Conch. Cab., vol. x., p. 311, figs. 1603, 1604, 1604a; Pilsbry, 1890, vol. xii., p. 110, pl. xx., figs. 12, 13.

Pilsbry gives South Australia as one of its localities, but it is unknown here. The shell listed by Adcock under this name is *H. roei*, Gray.

Scissurella australis, Hedley.

Scissurella australis, Hedley, Memoirs Austr. Mus., 1903, part 6, vol. iv., p. 329, fig. 63; Verco, Trans. Roy. Soc., S.A., vol. xxxiv., p. 115; 1911, Hedley, Commonwealth of Australia, Fisheries, part 1, p. 92, "100 fathoms, off Cape Wiles, South Australia."

Schismope atkinsoni, Tenison-Woods.

Schismope atkinsoni; Tenison-Woods, Proc. Roy. Soc., Tasmania, 1877 (1876), p. 149; Hedley, Austr. Assoc. Adv., Sci., 1909, p. 352; Verco, Trans. Roy. Soc., S.A., 1910, vol. xxxiv., p. 116; Hedley, Commonwealth of Australia, Fisheries, part 1, p. 92.

Dredged by me in 15 to 20 fathoms off St. Francis Island, 100 fathoms off Beachport, and by Hedley in 100 fathoms off Cape Wiles. Taken also at Bunbury, Western Australia. Hedley records it from Queensland.

Schismope pulchra, Petterd.

Schismope pulchra, Petterd, Jour. of Conch., 1884, vol. iv., p. 139, No. 17; Verco, Trans. Roy. Soc., S.A., 1910, vol. xxxiv., p. 117; Hedley, Commonwealth of Australia, Fisheries, part 1, p. 92.

Dredged off St. Francis Island in 15 to 20 fathoms, 5; and by Hedley in 100 fathoms off Cape Wiles. Taken also in Western Australia.

NOTES ON THE MARINE SHELLS OF WESTERN AUSTRALIA,
WITH DESCRIPTIONS OF NEW SPECIES.
PART II.

By JOS. C. VERCO, M.D. (Lond.), F.R.C.S. (Eng.).

[Read October 10, 1912.]

PLATES XV. AND XVI.

This paper is the second in the series, continued from p. 219 of vol. xxxv., 1911, and deals with the genera *Helcioniscus*, *Patella*, *Nacella*, *Acmaea*, *Phenacolepas*, *Haliotis*, and *Schismope*.

It embraces also a list of shells received from Geraldton.

***Helcioniscus illibratus*, Verco.**

Helcioniscus illibratus, Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 205, pl. x., figs. 6-14; Hedley, Commonwealth of Australia, Fisheries, 1911, part 1, p. 93.

King George Sound beach, 3; Ellensbrook, 9; Yallingup, 4 (from these two localities the specimens have a more decided bluish-purple tint); Bunbury beach, 2; in 15 fathoms, 2; in 22 fathoms, 1 (about half as large again as the type); Rottneest Island, 1.

***Patella neglecta*, Gray.**

Patella neglecta, Gray, Capt. King's Survey of the Inter-tropical and Western Coasts of Australia, ii., Appendix, p. 492, 1827.

P. (Scutellastra) neglecta, Gray, Pilsbry, Man. Conch., 1891, vol. xiii., pp. 95, 96, pl. xx., figs. 41, 42, pl. lviii., figs. 40, 41.

P. rustica, Linn, Menke, Moll. Nov. Holl., p. 33, 1843, and Zeitschr. F. Malac., 1844, p. 62.

Patella melanogramma, (?) Gmelin, Sowerby, Genera of Shells, vol. i., p. 140.

Patella zebra, Reeve, Conch. Icon., 1854, pl. iv., figs. 7a, 7b, "Swan River."

Locality. — Esperance beach, few; Hopetoun, few; King George Sound, Rabbit Island, many, and up to full size between water-marks; Ellensbrook and Yallingup, many; Rottneest Island, 1.

This species does not appear to come much further east than Esperance. It was not found on St. Francis Island, nor has it been taken along the coast of South Australia.

On Rabbit Island it attains the length of 100 mm. Nearly every individual exceeding 25 mm. in length carries

one or more patelliform parasites. I thought, naturally, they were young individuals of the same species, but they proved to be always examples of what I have named and described as *Acmaea patellavecta*.

Patella axiaerata, n. sp. Pl. xv., figs. 3 and 4.

Shell small, depressed, conical, elliptical, apex somewhat antemedian, lateral margins somewhat concave, so as to be lifted off a flat surface. Apex blunt, surface smooth; colour opaque-white, numerous rays (18 in the type), golden-yellow, with darker golden axial hairlines in them. Margin simple, smooth. Spatula well marked, large, with a distinct neck and large head. Interior white, through which the yellow rays are visible.

Dimensions.—Length, 4.4 mm.; breadth, 3.2 mm.; height, 1.9 mm.

Habitat.—Type, Rottneest Island, with many others; King George Sound beach, 8 small.

Variations.—Some are shorter and higher, more convex in the hinder slope, more acute at the apex. The number of golden rays may be only 12 or 10, due to the fusion of two narrower into a larger one; sometimes the ray, which is at first single, becomes later double. In some examples the golden hairlines in the rays are conspicuous and numerous. The apical region inside, for a varying extent, may be of a yellowish-brown colour.

The shape of its base suggests that its usual *habitat* is the conical surface of another shell, and as this is a very common habit with *Acmaea*, it may belong to this genus. It recalls *Patella illibrata*, Verco, by its form and apex and rays. It was not taken alive.

Type is in my cabinet.

Patella ustulata, Reeve.

Patella ustulata, Reeve, Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 206; 1907, vol. xxxi., p. 99; and 1912, vol. xxxvi., p. 182.

This was taken at Esperance Bay and King George Sound; at Ellensbrook up to 25 mm. long, by 20 mm. wide, by 7 mm. high, the largest specimen taken in the West; at Yallingup and at Bunbury, up to 18 mm. long.

They vary greatly. A common form has from 12 to 14 broad white or yellow ribs; the rest of the shell may be white or yellow or black or pinkish-brown. Some, after a moderate growth in this fashion, become wholly black.

They do not reach the size of those at Beachport, which may be 47 mm. by 40 mm.

Patella aculeata, Reeve

Patella aculeata, Reeve, Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 207, and 1912, vol. xxxvi., p. 182.

Taken on the beach, King George Sound, 10, the largest is only 23 mm. by 19 mm.; Ellensbrook, 3, up to 21 mm. long; Yallingup, up to 14 mm. It was not taken above Cape Naturaliste. The specimens seem to diminish in size and scaliness as they go west and north, and are not so large as the South Australian shells, which may attain 40 mm. in length.

Patella hepatica, Pritchard and Gatliff.

Patella hepatica, Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1903, vol. xv. (New Series), part 3, p. 194; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 207.

Esperance Bay, 3, up to 17 mm. by 13 mm.; "Albany" (Dr. Torr), 20 mm. by 15 mm. by 6.5 mm.; Yallingup, 6; Bunbury, 1. This—which is probably a variant of *P. ustulata*, Reeve—is smaller than the Victorian shell, and was not taken above Geographe Bay.

Patella stellæformis, Reeve.

Patella stellæformis, Reeve, Conch. Sys., 1842, vol. ii., p. 15, pl. cxxxvi., fig. 3; Verco, Trans. Roy. Soc., S.A., 1912, p. 182.

Taken on the beach at Esperance Bay, 1, very large, 39 mm. long, 37 mm. wide, and 12 mm. high, and 3 small specimens, scaly, with 8 ribs, the anterior splitting early into two; at Albany, many, 1 7-ribbed, the others 8-ribbed, outside speckled brown, inside white or brownish-yellow or speckled red-brown; at Ellensbrook, very many, up to 22 mm. long and 21 mm. wide and 6.5 mm. high, mostly 8-ribbed, some 7-ribbed, others 9-ribbed, rough and speckled; on Rott-nest Island, several, up to 18 mm. long and 15 mm. wide and 6.5 mm. high.

The reddish-brown specks outside may be arranged in radial series on the ribs, or scattered irregularly on the surface. Internally the spatula may be brown, but generally white. There may be a red-brown line along the groove of the ribs. No specimens of the polygonal variety, *P. chapmani*, Tenison-Woods, or of the variety *Acmaea albida*, Tenison-Woods, were found. The typical forms were much more numerous and foliaceous than on the eastern shores of South Australia.

Nacella parva, Angas.

Nacella parva, Angas, Proc. Zool. Soc., London, 1878, p. 862, pl. liv., fig. 12; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 208, 1907, vol. xxxi., p. 101, 1912, vol. xxxvi., p. 183.

Taken in King George Sound on the beach, and in 10 to 15 fathoms very many, and in 28 fathoms a few; on Bunbury beach, 3; in Geographe Bay, 15 fathoms, 2; off Fremantle, in 6 fathoms, 1. They vary greatly in width; some may be 6.75 mm. long by 2.25 mm. wide, and others 5.25 mm. long by 1.75 mm. wide, and so confirm the suggestion made in 1906 that *N. compressa*, Verco, is only a variant. They are none of them quite so wide as the South Australian examples, 5.6 mm. by 2.8 mm.; and none of them quite so narrow, 5 mm. by 1.6 mm., but are intermediate. At King George Sound they are much more common in the shallow dredging than anywhere in South Australia.

***Nacella crebrestriata*, Verco.**

Nacella crebrestriata, Verco, Trans. Roy. Soc. S.A., 1904, vol. xxviii., p. 144, pl. xxvi., figs. 20, 21; 1906, vol. xxx., p. 208; 1907, vol. xxxi., p. 101; and 1912, vol. xxxvi., p. 183.

King George Sound beach, 3; Yallingup, 5; Rott-nest Island, 2.

Var. ***roseoradiata*, var. nov.**

This is typically a broader and more elliptical shell, has about two-thirds as many radial striæ, and 15 or 16 deep-pink axial rays, gradually increasing in width.

This was taken at Guichen Bay, South Australia; but in much better condition and more abundantly at Ellensbrook and Yallingup. Some examples are oval rather than elliptical, being narrower anteriorly; they vary somewhat in width, and one has its lateral margins incurved, as though the narrow surface—*e.g.*, *Zostera*—on which it lived had shrunk, and consequently had led to the contraction of the sides of the aperture of the shell.

Type is in my cabinet.

***Nacella stowæ*, Verco.**

Nacella stowæ, Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., pl. x., figs. 4, 5; 1912, vol. xxxvi., p. 183.

King George Sound beach, 8; Bunbury beach, 4; Rott-nest Island, 2. Identical with the South Australian specimens, but in poor condition.

***Acmaea patellavecta*, n. sp.** Pl. xv., figs. 5-7;
pl. xvi., fig. 5.

Shell solid, elliptical, conical. Apex at the junction of the anterior and middle third, eroded. Margin in profile concave at the sides (due to its habit of living on a patella). Anterior slope nearly straight, posterior somewhat convex.

Outer surface with 40 radial, low, broad, round ribs, with linear interspaces, slightly crenulating the margin. Obsolete accretional growth-lines cross the ribs. The general colour is a sordid white, and the surface is mostly eroded. The interior is bordered with a narrow continuous band of a grey colour, articulated with 40 equidistant blackish-brown radially arranged spots, corresponding with the intercostal spaces. The spatula is well marked, bluish-white, with distinct muscle-scars rather wide in front, so as to give it a decided neck, beyond which it projects with a convex end.

The radula consists of 105 rows of teeth with the formula 2 (3.0.3.) 2, or more correctly 2 ($\overset{1}{1} \cdot 1 \cdot 0 \cdot 1 \cdot \overset{1}{1}$) 2. The marginals are simple, bent nearly at a right angle in the middle, with straight stems and curved cusps. The outer laterals are in line with each other, the inner of the two is only about half as wide as the other, with distinct cusps but with united bases which (though the radula may be picked to pieces) are inseparable. The inner laterals are at a higher level, and are close to each other, but their bases are quite separable. There is no central tooth. It has a triangular branchia extending from the left over the neck to the right, without any branchial cordon.

Dimensions.—Length, 31·5 mm.; breadth, 23 mm.; height, 14 mm.; height of the curve at the border, 2·5 mm.

Locality.—Type from Cape Naturaliste.

It is found also in abundance on Rabbit Island, King George Sound, and at Ellensbrook and Yallingup, south of Cape Naturaliste.

It lives on the shell of *Patella neglecta*, Gray. Nearly every example of which above 25 mm. in length carries one or more (hence its name).

Variations.—It may grow to the size of 41 mm. long by 32 mm. wide and 21·5 high. The ribs may increase to more than 50.

The outer surface is generally much eroded, so that the apex is absent. In one example, 18 mm. by 13 mm. by 5 mm., the top is a brown point without any sign of a spiral, 5 mm. by 25 mm. in size surrounded by a white area 2 mm. by 1 mm., from which project 9 primary rays. These increase rapidly by splitting and by intercalation to 23 at the margin.

The blackish markings inside the border vary with the number of ribs. They may be very distinct, but in the larger shells they fade out and may disappear altogether: sometimes in the smaller shells they may be very faint. The narrow marginal band may be so dark as to quite obscure

the spots. The colour inside varies. The inner border may be a pale heliotrope, within this an opaque white band, and then heliotrope as far as the muscle-scar. The interior may be wholly dark blotchy-brown, except the muscle-scar, which is white, and the front two-thirds of the spatula, which may be bluish-white. The brown may be more or less blotched about a whitish interior, or almost absent. In some a faint greenish-blue tint is present, deepest in the spatula.

Diagnosis.—Its *habitat*, on the back of living *Patella neglecta*, Gray, suggested that it might be the young of this mollusc: but it is not narrowed anteriorly, the ribs are low, round, and approximate: the apex is less eccentric, the spots inside—if present—are single, and not in couples. The dentition and branchiæ are not those of *Patella*, but of *Acmaea*.

Its other ally is *A. alticostata*, Angas, but its ribs are more numerous, lower, and more approximate than in Angas' species; it has not the intercostal curved concentric dark markings, and the internal marginal spots are disposed radially instead of laterally. The dentition of the radula separates them widely. *Vide* pl. xvi., figs. 3-5.

It closely resembles the figure of *Patella nigrosulcata*, Reeve, *Conch. Icon.*, 1885, Sp. 84a, *hab.* (?), and may prove to be this species; *Patella (scutellastra) stellæformis*, Reeve, *var. nigrosulcata*, Reeve, Pilsbry, *Man. Conch.*, 1891, vol. xiii., p. 100, pl. lxi., figs. 66, 67. Pilsbry gives no *habitat* for this variety, but for the species he gives "Japan to Port Jackson, South Australia," etc.

Though *P. stellæformis*, Reeve, is abundant, large, and typical in the localities where my shell is found, no intermediate forms were taken. The figures do not indicate a laterally concave base. If *P. stellæformis* has been proved by dissection to be a *Patella*, this cannot be a variety, because this is an *Acmaea*.

Type in my collection.

***Acmaea alticostata*, Angas.**

Patella alticostata, Angas, *Proc. Zool. Soc.*, London, 1865, p. 56, pl. ii., fig. 11; Verco, *Trans. Roy. Soc.*, S.A., 1912, vol. xxxvi., p. 183.

Taken at Esperance Bay, 1 measuring 26 mm. long by 22 mm. broad and 6 mm. high, in perfect condition, has only 9 very broad, round ribs with narrow intercostal spaces, but is plainly of this species; at King George Sound, abundant, and typical up to 44 mm. by 42 mm. by 12 mm.; at Ellensbrook, 3, up to 20 mm.; at Yallingup, 3, up to 23 mm.; at Bunbury, up to 14 mm.; at Rottnest, up to 25 mm.

***Acmaea flammea*, Quoy and Gaimard.**

Patelloidea flammea, Quoy and Gaimard, Voy. "Astrolabe," Zool., 1834, vol. iii., p. 354, pl. lxxi., figs. 15, 16; Verco, Trans. Roy. Soc., S.A., 1912, vol. xxxvi., p. 183.

Var. *Jacksoniensis*, Reeve (*Patella*), Conch. Icon., vol. viii., 1855, pl. xxxix., figs. 127a, 127b.

King George Sound beach, many, similar to our South Australian form, without a definite dark maltese cross, but with four white radial bands more or less irregular and indistinct. Shape mostly narrowed in front, some very much; Ellensbrook; Yallingup, many, up to 17 mm. by 13 mm. by 5·5; Bunbury; Rottnest Island, many and large, up to 25 mm. by 20 mm. by 12·5 mm.

Var. *Crucis*, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1877 (1876), p. 52.

King George Sound beach, up to 20 mm. by 16 mm.; Yallingup; Bunbury; Rottnest Island, up to 25 mm. by 20 mm. by 11·5 mm.

"Geraldton and Abrolhos Island" (Dr. Torr). They are identical with the South Australian examples in shape, size, and colouring.

***Acmaea conoidea*, Quoy and Gaimard.**

Patelloidea conoidea, Quoy and Gaimard, Voy. "Astrolabe," Zool., vol. iii., 1834, p. 355, pl. lxxi., figs. 5, 7; Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 214.

Ellensbrook, 1, half-grown. A form was found on the rocks at the south end of Rottnest Island, the largest example being 22 mm. long, 18 mm. wide, and 12·5 mm. high; it may be 18 mm. by 13·5 mm. by 8 mm., or 15 mm. by 11 mm. by 4 mm. There may be about 16 radial, thread-like ribs, with from 2 to 5 intervening threadlets. These may be absent except for obsolete primary threads. The apex is nearly central, slightly anterior and blunt. The colour is wholly black, with a black marginal band within. The rest of the interior is white, except the apical third, which is lighter or darker brown. In some the marginal black band may be broken by a linear radial extension of the white interior to the edge at one point towards the back, or at two symmetrical points or at several, and in some specimens radial black colour-bands are visible in the interior through the white. When the shell is eroded outside some four or five white radial bands may be displayed or quite a number, or the erosion may destroy all the black outer coating and leave only white; and if the rubbing and rolling affect the margin, it reveals an irregularly articulated border of white and black. This, I think, is probably the *P. conoidea* of Quoy. Though

I sought carefully on every beach examined for his species, I could not find any shell to match his unique type specimen, and I think it is probably somewhat of a monstrosity as regards its comparative height. The lateral concavity of its borders is explained by its resting on some convex surface, while erosion has removed both sculpture and colour from its upper three-fourths. Although the shells gathered by me are so distinctive in some examples by their wholly deep-black exterior, their internal black border, and elate conical shape, I feel sure they are only a further variant of the shells taken from the same rocks which I have recorded under the name of *A. flammea*, Quoy and Gaimard, *var. jacksoniensis*, Reeve.

***Acmaea calamus*, Crosse and Fischer.**

Patella calamus, Crosse and Fischer, Journ. de Conch., 1864, p. 348, and 1865, p. 42, pl. iii., figs. 7, 8; Verco, Trans. Roy. Soc., S.A., 1912, vol. xxxvi., p. 184.

Var. *polyactina*, Verco.

Taken on King George Sound beach, 6; at Yallingup, 4; on Bunbury beach, 3; in Geographe Bay, 15 fathoms 2, in 22 fathoms 3; off Fremantle, in 6 fathoms, 2; on Rott-nest Island, 3; "Cottesloe," 1; "Geraldton," 1. This variety seems to replace the typical shell in Western Australia.

***Acmaea septiformis*, Quoy and Gaimard.**

Patelloida septiformis, Quoy and Gaimard, Voy. "Astrolabe," Zool., 1834, vol. iii., p. 362, pl. lxxi., figs. 43, 44; Verco, Trans. Roy. Soc., S.A., 1912, vol. xxxvi., p. 184.

King George Sound beach, up to 15 mm. long and 12 mm. wide; Ellensbrook, 3, worn; Yallingup, 1, worn; none further north.

***Acmaea subundulata*, Angas.**

Acmaea subundulata, Angas, Proc. Zool. Soc., London, 1865, p. 155; Verco, Trans. Roy. Soc., S.A., 1912, vol. xxxvi., p. 185.

A number were taken on the beach at Esperance Bay, but none further west.

***Phenacolepas calva*, Verco.**

Scutellina calva, Verco, Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 217, pl. viii., figs. 9, 10; also *op. cit.*, 1912, vol. xxxvi., p. 185.

King George Sound beach, 1; in 14 fathoms, 1.

Phenacolepas alboradiata, Verco.

(*Scutellina*) Trans. Roy. Soc., S.A., 1906, vol. xxx., p. 217; also *op. cit.*, 1912, vol. xxxvi., p. 185.

King George Sound beach, 1.

Haliotis albicans, Quoy and Gaimard.

Haliotis albicante, Quoy and Gaimard, Voy. "Astrolabe," Zool., vol. iii., pl. lxxviii., figs. 1, 2.

H. albicans, Quoy and Gaimard, Verco, Trans. Roy. Soc., S.A., 1912, vol. xxxvi., p. 185.

Taken at King George Sound, the *type locality*.

Haliotis elegans, Koch.

Haliotis elegans, Koch, in Philippi, Abbild und Besch. Conch., 1844, vol. i., p. 119, pl. i., figs. 1, 2; Verco, Trans. Roy. Soc., S.A., 1912, vol. xxxvi., p. 186.

The *type locality* is "the western shore of New Holland, very rare." It was taken on Rottneest Island.

Haliotis conicopora, Peron.

Haliotis conicopora, Peron, Voy. Terr. Austr., vol. ii., 1816, p. 80; Verco, Trans. Roy. Soc., S.A., 1912, vol. xxxvi., p. 187. Synonyms are *H. tubifera*, Lamarck, and *H. granti*, Pritchard and Gatliff.

Taken at Esperance; in King George Sound; at Ellensbrook, measuring 17.5 cm. by 13.5 cm.; and on Rottneest Island.

Haliotis roei, Gray.

Haliotis roei, Gray, King's Voy., vol. ii., Appendix, 1827, p. 493; Verco, Trans. Roy. Soc., S.A., 1912, vol. xxxvi., p. 188.

Taken at Esperance Bay, King George Sound, Ellensbrook, Bunbury, and Rottneest Island. This is by much the most common *Haliotis* in Western Australia. It may be 10 cm. long by 8.2 cm. broad. It appears to have come round from the west along the southern coast of Australia, and reached Encounter Bay.

Haliotis tricostalis, Lamarck.

Haliotis tricostalis, Lamarck, Anim. S. Vert., 1822, p. 218; also (2nd Edition, Deshayes, etc.), 1843, vol. ix., p. 30, No. 14 "Java seas"; Deshayes, Encyc. Meth., 1830, vol. ciii., Vers, vol. ii., p. 181, No. 12; Delessert, Recueil., 1841, pl. xxxiii., figs. 8a, 8b; Menke, Moll. Nov. Holl., 1843, p. 32, No. 177, "West coast of New Holland"; H. and A. Adams, Gen. Recent Moll., 1858, vol. i., p. 443, pl. 1., fig. 7 (*Padollus*); Chenu, Man. Conch., 1859, vol. i., p. 368, figs. 2746, 2747; Weinkauff, Conch. Cab. (Ed. Küster), 1883, Band. vi., Abt. 1.B., p. 13, Sp. 10, pl. v., figs. 3, 4;

Pilsbry, Tryon, Man. Couch., 1890, vol. xii., p. 123, pl. xii., pp. 84, 85; Verco, Trans. Roy. Soc., S.A., 1912, vol. xxxvi., p. 190.

Hedley, in Proc. Linn. Soc., N.S.W., 1906 (1905), part 4, p. 521, writes:—"Pilsbry marks Montfort's name (*i.e.*, *Haliotis rubicundus*) as doubtful, but it was recognized and accepted by Dr. J. E. Gray in King's Survey Trop. Austr., Appendix ii., 1827, p. 495, and he had unusual facilities for ascertaining the facts of the case." In May, 1907, he wrote to me privately:—"I find Boltzen has a *Haliotis rubicunda*, Mus. Bolt., p. 14, No. 160, which upsets the later *H. rubicundus* of Montfort. I suppose *H. tricostalis*, Lamarck, 1822, should be called *H. scalaris*, Leach, 1814. The copy of Anim. S. Vert. in the library of the Australian Museum, Sydney, formerly belonged to Wm. Swainson. In the margin of p. 218 is a pencil note in Swainson's hand, 'This is the *Padollus scalaris* of Leach.'" Hedley's suggestion is commended to those who have the literature and material necessary to settle the question. Meanwhile I use the well-known name of Lamarck."

The species is less common than *H. roei*, Gray, but yet not rare. It was taken at Esperance, Albany, Ellensbrook, Bunbury, and Rottneest Island. The last locality provided a specimen measuring 11.5 cm. by 9.25 cm.

Schismope atkinsoni, Tenison-Woods.

Scissurella atkinsoni, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1877 (1876), p. 149; (*Schismope*) Verco, Trans. Roy. Soc., S.A., 1912, p. 191.

Taken on Bunbury beach, 1.

Schismope pulchra, Petterd.

Schismope pulchra, Petterd, Journ. of Conch., 1884, vol. iv., p. 139, No. 17; Verco, Trans. Roy. Soc., S.A., 1912, vol. xxxvi., p. 191.

Hopetoun beach, 2; King George Sound beach, 2.

A LIST OF SHELLS RECEIVED FROM GERALDTON, WESTERN AUSTRALIA.

Two or three years ago Dr. Torr brought me from Geraldton, and the Abrolhos or Houtman Islands close by, a number of shells he had collected there, and during this year Mr. Bardwell, a resident in the town, has sent me a small consignment. From this material I have prepared a list of all the species received up to the present. The two

localities are so adjacent that I have placed the species from both of them together. An asterisk has been attached to those which are found in South Australian waters, so that at a glance the proportion of species common to the two regions can be noted.

Of the 150 shells identified in this list, 108 are found in South Australia. Of the 12 shells not named, 4 are almost certainly found there, and possibly three others, or 112 probably, and 115 possibly among 162; that is, 71 per cent. These are, of course, the most common shells, and if the same ratio holds with the rare species, nearly three-fourths of the marine mollusca will be common to the two far distant localities. The proportion of 71 per cent. applies to the Pelecypods and to the Gasteropods alike.

- **Spirula spirula*, *Linne*, 1758, *Nautilus*.
- Cadulus occiduus*, *Verco*, 1912.
- Cryptoplax*, sp.
- Patella neglecta*, *Gray*, 1827.
- **Nacella parva*, *Angas*, 1878.
- **Acmæa alticostata*, *Angas*, 1865, *Patella*.
- **Acmæa septiformis*, 1834, *Patelloidea*.
- **Acmæa crucis*, *Tenison-Woods*, 1877.
- **Acmæa polyactina*, *Verco*, 1912.
- Acmæa patella-vecta*, *Verco*, 1912.
- **Haliotis roei*, *Gray*, 1827.
- **Megatebennus omicron*, *Crosse and Fischer*, 1864, *Fissurella*.
- **Macroschisma tasmaniæ*, *Sowerby*, 1866.
- **Gena nigra*, *Quoy and Gaimard*, 1834, *Stomatella*.
- **Turbo jourdani*, *Kiener*, 1839.
- **Turbo stamineus*, *Martyn*, 1784, *Limax*.
- Turbo pulcher*, *Reeve*, 1842.
- Turbo ticaonicus*, *Reeve*, 1842.
- **Astraliium fimbriatum*, *Lamarck*, 1822, *Trochus*.
- Astraliium stellare*, *Gmelin*.
- **Phasianella australis*, *Gmelin*.
- **Phasianella ventricosa*, *Quoy and Gaimard*, 1834.
- **Phasianella variegata*, *Lamarck*, 1822.
- **Phasianella rosea*, *Angas*, 1867, *Eutropia*.
- Phasianella*, sp.
- **Cyclostrema tatei*, *Angas*, 1878.
- Trochus obeliscus*, *Gmelin*.
- **Clanculus plebeius*, *Philippi*, 1846, *Trochus*.
- **Monodonta melanloma*, *Menke*, 1843.
- Monodonta (Chlorodiloma) zeus*, *Fischer*, 1874, *Trochus*.
- **Cantharidus lehmanni*, *Menke*, 1843, *Trochus*.

- **Cantharidus pulcherrimus*, Wood, 1828, Trochus.
 **Thalotia conica*, Gray, 1827, Monodonta.
 **Thalotia chlorostoma*, Menke, 1843, Trochus.
 **Thalotia neglecta*, Tate, 1893.
Thalotia indistincta, Wood, 1828, Trochus.
 **Phasianotrochus irisodontes*, Quoy and Gaimard, 1834, Trochus.
 **Leiopyrga octona*, Tate, 1891.
 **Euchelus baccatus*, Menke, 1843, Monodonta.
 **Euchelus ampullus*, Tate, 1893.
Nerita undata, Linne.
Nerita polita, Linne, var. *antiquata*, Recluz, 1841.
 **Syrnola tinctoria*, Angas, 1871.
 **Odostomia simplex*, Angas, 1871.
 **Odostomia pupæformis*, Sowerby, 1865.
 **Odostomia vincentina*, Tryon, 1886.
 **Oscilla tasmanica*, Tenison-Woods, 1877 (1876), Parthenia.
 **Turbonilla hofmani*, Angas, 1867.
 **Turbonilla fusca*, A. Adams, 1855, Chemnitzia.
 **Cingulina spina*, Crosse and Fischer, 1864, Turritella.
 **Scala aculeata*, Sowerby, 1844, Scalaria.
 **Scala jukesiana*, Forbes, 1852, Scalaria.
 **Crossea labiata*, Tenison-Woods, 1876 (1875).
 **Littorina mauritiana*, Lamarck, 1822, Phasianella.
Tectarius rugosus, Menke, 1843, Littorina.
Planaxis sulcatus, Born, 1778, Buccinum.
Modulus disculus, Philippi, 1846.
 **Risella melanostoma*, Gmelin, 1789, Trochus.
 **Diala monile*, A. Adams, 1862, Alaba.
 **Diala lauta*, A. Adams, 1864, Alaba.
 **Capulus conicus*, Schuhmacher, 1817, Amalthæa.
 **Capulus antiquatus*, Linne.
Crepidula aculeata, Gmelin, Patella.
 **Ianthina violacea*, Bolten.
 **Natica collei*, Recluz, 1843.
 **Polinices conica*, Lamarck, 1822, Natica.
 **Eunaticina papilla*, Gmelin, Sigaretus.
 **Truncatella scalarina*, Cox, 1868.
 **Truncatella marginata*, Küster.
 **Rissoa* (*Setia*) *nitens*, Frauenfeld, 1867, *Setia*.
Rissoa, sp.
Rissoa, sp.
Rissoa, sp.
Rissoa, sp.
Rissoa, sp.
Rissoa, sp.

- *Rissoa (*Epigrus*) *petterdi*, *Brazier*, 1894, *Rissoa*.
 **Rissoina flexuosa*, *Gould*, 1861.
 **Vermicularia siphon*, *Lamarck*, 1818, *Serpula*.
 **Siliquaria weldii*, *Tenison-Woods*, 1876, *Tenagodus*.
 **Bittium granarium*, *Kiener*, 1842, *Cerithium*.
 **Cerithium icarus*, *Bayle*, 1880.
Cerithium cordigerum, *Bayle*, 1880.
 **Triphora granifera*, *Brazier*, 1894.
 **Plesiotrochus monachus*, *Crosse and Fischer*, 1864,
Cerithium.
Campanile læve, *Quoy*, 1834, *Cerithium*.
Strombus floridus, *Lamarck*, 1822.
Bursa anceps, *Lamarck*, *Ranella*.
Cypræa caput-serpentis, *Linne*.
Cypræa carneola, *Linne*.
Tonna variegata, *Lamarck*, 1822, *Dolium*.
 **Cymatium exaratum*, *Reeve*, 1844, *Triton*.
 **Pyrene versicolor*, *Sowerby*, 1832, *Columbella*.
 **Pyrene semiconvexa*, *Lamarck*, 1822, *Buccinum*.
 **Pyrene austrina*, *Gaskoin*, 1851, *Columbella*.
 **Pyrene atkinsoni*, *Tenison-Woods*, 1876, *Drillia*.
Cantharus undosus, *Linne*, 1758, *Buccinum*.
 **Arcularia pauperata*, *Lamarck*, 1822, *Buccinum*.
Arcularia glans, *Linne*, 1758, *Buccinum*.
Arcularia dorsata, *Bolton*, *Buccinum*.
Thais hippocastanea, *Linne*, 1758, *Murex*.
Thais succincta, *Martyn*, 1784, *Buccinum*.
 * var. *textiliosa*, *Lamarck*, 1822.
 * var. *ægrotata*, *Reeve*.
Thais lineata (?), *Lamarck*.
Drupa chaidea (?), *Duclos*, 1832, *Purpura*.
Drupa margariticola, *Broderip*, 1832, *Murex*.
Megalatractus aruanus, *Linne*, 1758, *Murex*.
 **Marginella angasi*, *Brazier*, 1870.
Mitra.
 **Cymbium flammeum*, *Bolten*, 1798, var. *miltonis*, *Gray*,
 **Oliva australis*, *Duclos*, 1835.
 **Clathurella rufozonata*, *Angas*, 1877.
 **Cythara kingensis* (?), *Petterd*, 1879, *Daphnella*.
 **Conus anemone*, *Lamarck*, 1810.
Conus miliaris, *Hwass*.
 **Bulla australis*, *Gray*, 1825.
Hydatina physis, *Linne*, 1758, *Bulla*.
 **Tornatina fusiformis*, *A. Adams*, 1854, *Bulla*.
 **Retusa*, sp.
 **Atys exigua* (?), *A. Adams*, 1854.
 **Siphonaria baconi*, *Reeve*, 1856.

- **Siphonaria stowæ*, *Verco*, 1906.
Siphonaria, sp.
- **Nucula micans*, *Angas*, 1878.
- **Arca navicularis*, *Bruguere*, 1797.
- **Barbatia domingensis*, *Lamarck*, 1822, *Arca*.
- **Glycimeris radians*, *Lamarck*, 1819, *Pectunculus*.
- **Meleagrina fimbriata*, *Dunker*, 1852, *Avicula*.
Vulsella vulsella, *Linne*.
Septifer bilocularis, *Linne*, 1756, *Mytilus*.
- **Brachyodontes erosus*, *Lamarck*, 1819, *Mytilus*.
- **Modiolaria paulucciaë*, *Crosse*, 1863, *Crenella*.
- **Cardita crassicosta*, *Lamarck*, 1819.
Cardita incrassata, *Sowerby*, 1825.
- **Chama spinosa*, *Broderip*.
Chama fimbriata, *Reeve*, or *ruderalis*, *Lamarck*.
- **Lucina tatei*, *Angas*, 1878.
- **Loripes icterica*, *Reeve*, 1850.
- **Thyasira globosa*, *Forskäl*.
- **Lasea scalaris*, *Philippi*, 1847, *Poronia*.
Lepton, sp.
- **Rochefortia donaciformis*, *Angas*, 1877, *Mysella*.
- **Cardium elongatum*, *Bruguere*.
- **Cardium erugatum*, *Tate*, 1888.
Cardium, sp.
Codakia interrupta, *Lamarck*, 1818, *Cytherea*.
- **Sunetta excavata*, *Hanley*, 1842, *Cytherea*.
Chione marica, *Linne*, *Venus*.
- **Chione undulosa*, *Lamarck*, 1818, *Venus*.
Gafrarium australe, *Sowerby*, 1851, *Circe*.
- **Gafrarium angasi*, *E. A. Smith*, 1885, *Circe*.
- **Venerupis crenata* (?), *Lamarck*, 1818.
- **Petricola lapicida*, *Chemnitz*, *Venus*.
- **Tellina albinella*, *Lamarck*, 1818.
Tellina perna, *Spengler*.
- **Tellina decussata*, *Lamarck*, 1815.
- **Donax brazieri*, *E. A. Smith*, 1891.
Donax columbella, *Lamarck*.
Donax sulcarius, *Menke*.
- **Saxicava arctica*, *Linne*, 1767, *Mya*.
- **Pholas australasiaë*, *Sowerby*, 1849.
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SHELLS FROM THE GREAT AUSTRALIAN BIGHT.

By JOS. C. VERCO, M.D. (Lond.), F.R.C.S. (Eng.).

[Read October 10, 1912.]

PLATES X. TO XIV. AND XVI.

In March, 1912, the Federal Minister of Trade and Customs granted me permission to go on the trawler "Endeavour" during a trip of investigation in the Bight.

The area covered extended from 30 to 120 miles west of the longitude of Eucla, along the 100-fathom line, the trawl being taken across this line from 75 fathoms to 120 fathoms. The 100-fathom line followed the curve of the coast fairly uniformly at a distance of about 60 miles. The shells obtained were those brought up incidentally in the large trawl when this was gathering fish. As its mesh was comparatively large, very few small shells were taken. The fauna was consequently quite different from that I have dredged off the South Australian coast in deep water before, when either a very fine-meshed net-dredge or a conical iron bucket-dredge has been used, and only smaller forms have been obtained. Mr. Dannevig, the Director of the Fisheries investigation, very kindly gave me two hauls with my bucket-dredge in deep water, and so supplied me with material for comparison with what I have taken in a similar manner and at equal depths elsewhere.

I am pleased to take this opportunity of expressing my thanks to the Ministerial heads of the Department in the Commonwealth and in the State for the opportunity of securing much interesting material, and also to the officers and men on the trawler for their very ready and interested help.

In this paper, owing to lack of time, I am only able to deal with the larger Gasteropods. I hope to deal with the smaller forms and with the Pelecypods in the future.

Phasianella australis, Gmelin.

Buccinum australe, Gmelin, Sys. Nat., 1788, p. 3490, No. 173.

One large specimen, dead, in poor condition, dredged in 100 fathoms 90 miles west of Eucla.

Clanculus leucomphalus, Verco.

Clanculus leucomphalus, Verco, Trans. Roy. Soc., S.A., 1905, vol. xxix., p. 168, pl. xxxi., figs. 9-11.

One example was taken alive in 72 fathoms 40 miles west of Eucla, rather larger than the type, being 8.5 mm. high and 12 mm. in diameter.

Calliostoma hedleyi, Pritchard and Gatliff.

Calliostoma hedleyi, Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1902 (1901), vol. xiv. (New Series), part 2, p. 182, pl. ix., fig. 4: *Type locality*—Western Port (Gatliff); also *op. cit.*, 1906 (1905), vol. xviii. (New Series), part 2, p. 65; Hedley and May, Records Austr. Mus., 1908, vol. vii., p. 109, "100 fathoms, off Cape Pillar, Tasmania."

One example, taken in 80 fathoms 80 miles west of Eucla.

Crepidula immersa. Angas.

Crepidula immersa, Angas, Proc. Zool. Soc., London, 1865, p. 57, pl. ii., fig. 12: *Type locality*—"Port Lincoln, South Australia"; also p. 174, No. 118; Watson, 1886, "Chall.," Zool., vol. xv., p. 460, No. 4, "Bass Strait"; Tryon, Man. Conch., 1886, vol. viii., as a synonym of *C. onyx*, Sowerby, p. 128, pl. xxxviii., figs. 46, 47; J. B. Wilson, 1887, Vict. Nat., p. 116, "Port Phillip, Victoria"; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900, vol. xii., p. 201; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 377, as a synonym of *C. unguiformis*, Lamarck, Tasmania; also p. 445.

Taken in 75 fathoms 80 miles west of Eucla, up to 44.5 mm. in length, 3 quite fresh.

Caledoniella contusiformis, Basedow.

Caledoniella contusiformis, Basedow, Trans. Roy. Soc., S.A., vol. xxix., 1905, p. 183, pl. xxviii., fig. 1; *var. pulchra*, pl. xxviii., fig. 3.

Taken in 72 to 88 fathoms, 1, *C. pulchra*; in 88 to 100 fathoms, very many; in 100 fathoms, very many; in 96 to 84 fathoms, 12 specimens; and in 95 to 120 fathoms, very many. The trawling extended from 40 miles to 120 miles west of the longitude of Eucla. The examples were so numerous that we kept as many as we thought we might want and threw the rest overboard with the rubbish. They seemed to be most plentiful when large masses of green, sponge-like material were brought up. They were of varying sizes, but attained larger dimensions than the type, the shell reaching a maximum of 37 mm. long by 29 mm. wide. We did not secure a single specimen of the other varieties of this species, such as *testudinis* or *labyrinthina*, nor of the typical *contusiformis*, though variations in colour-marking were found in *C. pulchra*. Some had just the same colouration as

the example figured, the shield "of a rich yellow ground-colour, with large circular or oval lighter blotches surrounded by wreaths of black." A very large number were altogether destitute of the black wreaths, and had pale-yellow areas on the darker-yellow ground. Others had opalescent-white spots instead of the pale-yellow, and others again had yellow spots on an opalescent-white ground.

Balch, of Boston, Massachusetts, in a paper on a new Labradorian species of *Onchidiopsis*, in the Proc. U.S. Nat. Mus., vol. xxxviii., No. 1761, p. 469, places *Caledoniella* in the subfamily *Velutininae*, of the family *Lamellariidae*; but in order to locate the genus definitely in its subfamily it is necessary to determine whether the animal has the sexes separate or united, and whether it has an expiratory cleft.

Turritella runcinata, Watson.

Turritella runcinata, Watson, Jour. Linn. Soc., vol. xv., 1881, p. 217; Verco, Trans. Roy. Soc., S.A., 1910, vol. xxxiv., p. 122.

Taken in 50 fathoms west of Eucla, 2; 75 fathoms 80 miles west of Eucla, 3; 80 fathoms 80 miles west of Eucla, 4; 101 fathoms 80 miles west of Eucla, 1. It may reach 64 mm. in length by 17 mm. in width. They were all dead.

Vermicularia flava, Verco.

Vermicularia flava, Verco, Trans. Roy. Soc., S.A., 1907, vol. xxxi., p. 214, fig. 1; Gatliff and Gabriel, Proc. Roy. Soc., Victoria, 1908, vol. xxi. (New Series), part 1, p. 376, "Western Port"; Hedley and May, Records Austr. Mus., 1908, vol. vii., p. 111, "100 fathoms, off Cape Pillar, Tasmania"; Hedley, Commonwealth of Australia, Fisheries, 1911, part 1, p. 93, "100 fathoms, off Cape Wiles."

Taken in 80 fathoms 80 miles west of Eucla, alive; in 100 fathoms 90 miles west of Eucla.

Siliquaria australis, Quoy and Gaimard.

Siliquaria australis, Quoy and Gaimard, Voy. "Astrolabe," Zool., 1834, vol. iii., p. 302; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 378, recorded for Tasmania; Menke, Moll. Nov. Holl., p. 10, No. 28, recorded for Western Australia; Angas, Proc. Zool. Soc., 1865, p. 174 (*Tenagodes*), recorded for South Australia; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900, vol. xii. (New Series), part 2, p. 204, recorded for Victoria.

Dredged alive in large masses of yellow sponge in 80 fathoms 80 miles west of Eucla, and in 75 fathoms; in 100 fathoms 90 miles west of Eucla, and in 72 fathoms 40 miles west of Eucla.

Siliquaria weldii, Tenison-Woods.

Tenagodus weldii, Tenison-Woods, Proc. Roy. Soc., Tasmania, 1876 (1875), p. 144, "East coast, Tasmania"; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900, vol. xii. (New Series), part 2, p. 205 (*Tenagodes*), "Port Phillip, Western Port"; May, Proc. Roy. Soc., Tasmania, 1902, p. 110, "Type in Tas. Mus., Hobart."

Siliquaria (Pyxipoma), Tryon, Man. Conch., 1886, vol. viii., p. 191, pl. lviii., fig. 28; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 378; Hedley, Records Austr. Mus., 1905, vol. vi., part 2, p. 42, "111 fathoms, off Cape Byron, New South Wales"; Hedley and May, *op. cit.*, 1908, vol. vii., No. 2, p. 111, "100 fathoms, off Cape Pillar."

Taken in 100 fathoms 90 miles west of Eucla, in sponge.

Siliquaria anguina, Linnæus.

Tenagodus anguinus, Linnæus, Mus. Lud. Ulr., 701, No. 431, 1758.

Serpula anguina, Born, Mus. Caes. Vindobon., Test., Tome 18, fig. 15; Gmelin, Sys. Nat. Linn., 1789, vol. vi., p. 3743, "Indian Ocean."

Siliquaria anguina, Chenu, Illus. Conch., p. 1, pl. i., figs. 1, 2; Reeve, Conch. Icon., pl. iii., Sp. 7, figs. 7a, 7b, 7c, 7d, 7e; Tryon, Man. Conch., 1886, vol. viii., p. 190, pl. lviii., figs. 23-25; Sowerby, Thes. Conch., vol. v., 1887, p. 165, No. 13, pl. 481 (*Siliquaria* ii.), figs. 11-13.

Serpula muricata, Born, Mus. Caes. Vindobon., Test., Tome 18, fig. 16.

Siliquaria muricata, Lamarck, Anim. S. Vert. (2nd Edition, Deshayes, etc.), 1838, vol. vi., p. 584, "Indian seas"; Chenu, Illus. Conch., p. 2, pl. ii., figs. 13, 14, "Indian seas and New Holland."

Gmelin, Reeve, Tryon, and Sowerby give *S. muricata* as a synonym of *S. anguina*.

Taken in 100 fathoms 90 miles west of Eucla, several, in a piece of blackish-purple sponge, which stains them somewhat violet. It has the *S. muricata* form, and is easily distinguished from our other two southern Australian species *S. australis* and *S. weldii* by its squamate longitudinal ribs.

Cypræa thersites, Gaskoin.

Cypræa (Aricia) thersites, Gaskoin, Proc. Zool. Soc., 1848, p. 90: *Type locality*—"Salt Creek, Yorke Peninsula, South Australia, on clusters of *Zoophytes* at 2 to 3 fathoms."

Dredged alive in 72 fathoms 60 miles west of Eucla, 1; in 100 fathoms 90 miles west of Eucla, 1; in 75 to 120 fathoms 40 miles west of Eucla, 2. This species has hitherto appeared to be of an exceedingly limited *habitat*, being taken only in Gulf St. Vincent and Spencer Gulf. Once I dredged a large living specimen at the mouth of the American Inlet, off Hog Bay, Kangaroo Island. But it has not been recorded

from Victoria, Tasmania, or Western Australia. To meet it in about 100 fathoms in the Great Australian Bight was a surprise. The specimens obtained were all comparatively young. Their outer lip was formed and toothed, and the base was flattened. The youngest is nearly white, with a faint bluish-grey tint, and has two broad darker bands running across the shell from one lateral margin to the other. There are about 25 brown spots on the right margin and 10 on the left. The next more mature specimen has a flatter base, which projects more at both ends, which are faintly tinted with orange; the ground-colour is more bluey-grey, and numerous transverse interrupted streaks of brown cross the shell, more marked on the left side; numerous smaller spots are superadded to those on the right border. The third example is nearly mature, is of a still darker bluish-grey, with much more numerous and darker and larger blackish-purple spots on both margins, especially the left, and with darker brown dashes on the dorsum arranged antero-posteriorly. They differ from specimens found in our gulfs in their much lighter colour. The latter, even when much less mature, long before they show any sign of a formed lip, are of a yellow-orange colour, and are abundantly covered with dark-rusty-brown spots and blotches. The pallor of the deep-sea examples is very striking.

Cypræa reevei, Gray.

Cypræa reevei, Gray, Sowerby, Conch. Illus., 1832, *Cypræidæ*, p. 2, No. 15*, fig. 52: *Type locality*—Garden Island, mouth of the Swan River"; Menke, 1843, Moll. Nov. Holl., p. 29; Tryon, Man. Conch., 1885, vol. vii., p. 166, pl. iii., figs. 24, 25.

Taken in 100 fathoms 90 miles west of Eucla, 5 alive; in 105 fathoms 30 miles west of Eucla, 1 alive. This species is taken in King George Sound on rocks at low tides alive, and it is found alive in 100 fathoms. Most of the examples taken are more pallid than those in-shore, but there are the same pink tips and spire and obsolete transverse darker bands. It seems to have come round from the west, and to have reached South Australia, where it is known to extend as far as Backstairs Passage. From Victoria and Tasmania it is unrecorded.

Cypræa pulicaria, Reeve.

Cypræa pulicaria, Reeve, Proc. Zool. Soc., 1845, *hab. (?)*; Conch. Icon., 1846, Sp. 84, pl. xvii., fig. 84; Tryon, Man. Conch., 1885, vol. vii., p. 189, pl. xvi., figs. 59, 60.

Taken in 80 fathoms 80 miles west of Eucla, 1 alive; in 100 fathoms 80 miles west, 3 alive; in 100 fathoms 90 miles west, 6 alive. They vary from 17 mm. to 24 mm. in

length, are of a greyish-yellowish or yellowish-brown colour. There may be no dots whatever, or only a few brown dots about the right border, or many scattered all over the surface irregularly, or some of these may be arranged in three transverse rows, or besides other scattered sparse dots, there may be two or three obscure transverse bands of brown blotches. They are narrower and more cylindrical than the *C. piperata*, Solander, though probably only a variant.

Cypræa umbilicata, Sowerby ; var. **armeniaca**, *n. v.*

Pl. x, figs. 1-3.

1825, *Cypræa umbilicata*, Sowerby, G. B., Catalogue of Shells in collection of Earl of Tankerville, Appendix, p. xxx., No. 2260, pl. iv. and v. : *Type locality* unknown.

1826, *Cypræa umbilicata*, Sowerby, G. B., Zool. Jour., 1826, vol. ii., p. 494.

1828, Wood, Supp. Index, Test., 1828, p. 9, pl. iii., fig. 13, *hab.* unknown.

1828, *Cypræa umbilicata*, Sowerby, Gray, Zool. Jour., vol. iv., p. 77, and Sowerby, G. B., p. 221.

1837, *Cypræa pantherina*, Solander MSS., var. *umbilicata*, Sowerby, Conch. Illus. *Cypræa*, p. 2, No. 5, fig. 169.

1844, *Cypræa tigrina*, Lamarck, Deshayes, Anim. S. Vert. (2nd Edition, Deshayes, etc.), vol. x., p. 504.

1845, *Cypræa pantherina*, Lamarck, Reeve, Conch. Icon., pl. iii., Sp. 7.

1848, *Cypræovula umbilicata*, Sowerby, Gray, Proc. Zool. Soc., London, pp. 124, 125.

1867, *Cypræovula umbilicata*, Sowerby, Angas, Proc. Zool. Soc., London, p. 205.

1872, *Cypræovula umbilicata*, Sowerby, Brazier, Proc. Zool. Soc., London, 1872, p. 86.

1880, *Cypræa umbilicata*, Sowerby, Cox, Proc. Linn. Soc., N.S.W., 1879, p. 386.

1880, *Cypræa umbilicata*, Sowerby, Thes. Conch., vol. iv., p. 21, Sp. 61, pl. vii., figs. 42-44.

1883, *Luponia umbilicata*, Sowerby, Brazier, Proc. Linn. Soc., N.S.W., vol. vii., p. 117.

1885, *Cypræa umbilicata*, Sowerby, Tryon, Man. Conch., vol. vii., p. 181.

1898, *Cypræa umbilicata*, Sowerby, Beddome, Proc. Linn. Soc., N.S.W., vol. xxii., 1897, pp. 564-568, pl. xx., figs. 1, 2.

1900, *Cypræa umbilicata*, Sowerby, Pritchard and Gatliff, Proc. Roy. Soc., Victoria, vol. xii. (New Series), part 2, p. 187.

1901, *Cypræovula umbilicata*, Sowerby, Tate and May, Proc. Linn. Soc., N.S.W., vol. xxvi., 1901, p. 374.

Cypræa umbilicata, Sowerby

This species was erected upon a shell in the collection of the Earl of Tankerville, and was described and figured in

the Appendix to the Sale Catalogue of the Earl's collection by G. B. Sowerby, F.L.S., in 1825. Only two specimens were known—the type and one in the cabinet of Mr. Sowerby. The type came into the possession of the British Museum. Its *habitat* was unknown. He remarked its resemblance to *C. tigris*, but in the Zoological Journal of 1826 indicated its diagnostics.

The name *C. umbilicata* had been previously attached to a shell by Solander, which Gray thinks was *C. pyrum*; but as Solander's name was only in manuscript, and was never published, Sowerby's specific name stands.

In 1828 Dr. Gray discussed it, and suggested that as only one specimen was known it might be merely a monstrosity, a deformed *C. tigris*; but if a good species, it should be placed in his newly created genus *Cyprovula*.

G. B. Sowerby replied that two specimens were known which were quite alike; this supported the probability of its being a good species, allied rather to *C. pantherina* than to *C. tigris*.

In 1837, however, Mr. Sowerby, in his Conchological Illustrations, registered his species as a variety of *C. pantherina*, Solander MSS., having evidently accepted the suggestion that it was only a variant or a monstrosity of this variable and well-known shell.

Deshayes, in his 2nd Edition of Lamarck's Anim. S. Vert., 1844, enters it among the synonyms of *C. tigrina*, Lamarck; and Reeve, in his Conch. Icon. of 1845, under *C. pantherina*, Lamarck, says "*C. umbilicata* has been acknowledged a monstrosity."

This degradation of the species to the position of a monstrosity was doubtless due to the peculiar deformed appearance of the shell and to the fact that for more than twenty years no other specimens had been found and its *habitat* was still unknown. But in 1848 Mr. Roland Gunn wrote to Dr. Gray about a collection of cowries he had found on "the east shore of Barren Island, one of Hunter's islands, north-west of Van Diemen Land," and he sent one fine specimen to the British Museum. This Dr. Gray recognized as *C. umbilicata*, Sowerby, and placed definitely among his *Cyprovula* as "the giant of the genus," removed the reproach of monstrosity from it, and established it as a true and very remarkable species, the home of which had at last been discovered. It immediately leaped into notoriety and became valuable, for the second specimen sent to England by Mr. Gunn realized the handsome sum of £30; whereas in my Tankerville Catalogue, in which have been written the prices

paid at the sale of his shells, the sum of £3 3s. is entered against *C. umbilicata*, Sowerby.

Angas in 1867 recorded the dredging, in deep water 2 miles off the coast of New South Wales, a little south of Wollongong, of several living specimens, somewhat smaller and paler in colour than the ordinary Tasmanian examples.

Sowerby in his Thesaurus gives figures of Miss Saul's specimen, which is possibly the before-mentioned individual, offered to her by Mr. Gunn for £30, and which subsequently realized that sum: and also of one of those mentioned by Mr. Angas as being dredged by Admiral Loring off Wollongong.

Dr. Cox in 1880 created a variety, *alba*, for a shell obtained at Circular Head, Tasmania, pure white, and quite devoid of all the usual characteristic spots and colouration.

John Brazier in 1883 recorded typical examples found by Mr. Bailey at Cape Schanck and Portland, on the Victorian coast.

C. E. Beddome, in an exhaustive note, refers to an individual found by Dr. A. E. Cox at Port Stephens, New South Wales, only $2\frac{1}{2}$ in. long, lighter in colour than the Tasmanian shells, covered with light chestnut spots, base white, but not so highly enamelled as the southern forms found here (in Tasmania). He reproduces it (fig. 2, pl. xx.).

When out in the Federal trawler "Endeavour" in March, 1912, three large cowries, with a deep umbilicus, were obtained. Two of them were immature and very slightly coloured, but the third was mature, and resembled somewhat *Cypræa umbilicata*, Sowerby. I have regarded it as a variety of this species, and named it *Cypræa armeniaca* (from *armeniaca*, an apricot), because of the beautiful apricot-yellow colour of its base. Should other examples be found and establish its right to a specific distinction its name will stand, as I know of no other species so called.

***Cypræa umbilicata*, Sowerby; var. *armeniaca*, n. v.**

Shell solid, globular, very smooth and glazed. It has a well-marked umbilicus in which the volutions are plain; obsolete, narrow, flat, spiral bands occur on the right side of the dorsum. The base is convex. The aperture moderately wide, slightly dilated anteriorly, and then narrowing into a canal 8 mm. long; posteriorly very curved round the posterior part of the whorl and turning up behind and ending in a well-marked notch. The outer lip is bent in at a right angle, slightly convexly flattened, thick, with 38 rather small teeth,

almost confined to the inner edge. The teeth along the inner-margin are 29, narrow and very short, ending rather abruptly at their inner ends and rapidly becoming obsolete at their outer. The base is prolonged, thickened, and expanded on each side in front, especially on the left, and also at the back, where there is a considerable thickening round the notch, which is projected by it 8 mm. from the umbilicus, and some distance to the left of the centre of the spire.

The colour is whitish, but except along the line of union of the mantle-folds and just above the margins the white is obscured by clouds and blotches of light yellowish-brown and scattered chestnut spots, an irregular line of which bounds the upper edge of the right mantle lobe. The top of the anterior beak is painted blackish-brown, as is also the right side of the callus of the outer lip behind at its junction with the body-whorl. The whole of the base and outer lip is of a rich apricot colour, deepest outside the columellar teeth, which it tinges, and on the callus forming the anterior and posterior projections of the inner lip; it extends to both lateral margins and covers the dorsal surface of the anterior beak and the callus round the posterior notch. The left side of the body-whorl is of a delicate faint lilac tint, which fades insensibly into the yellow, white, and chestnut around. The interior is a creamy-white.

The animal is white, but the margin of its mouth is of a deep apricot colour, as is also the somewhat expanded semi-circular anterior end of the foot. The tentacles, about half an inch long, are of a paler tint, and so are their bases, which are about one-third as long and twice as stout, and bear the black eyes on their summits, outside the tentacles.

Dimensions.—Length, 3·9 in.; breadth, 2·5 in.; height, 2·2 in.

Locality.—100 fathoms, Great Australian Bight, 60 miles from shore, 80 miles west of Eucla, with 2 immature shells. The trawl worked over the sea bottom from 75 to 120 fathoms, so that they might have come from any intermediate depth.

The youngest example, taken at 80 fathoms in the Great Australian Bight 80 miles west of Eucla, is light and papery. It is 3 in. long by 2·2 in. wide and 1·9 in. high. Its outer lip is formed and bent in, and has 33 teeth, and there are 28 on the inner side of the aperture. The posterior notch touches the last whorl in the sunken spire, the anterior canal is smooth for 6 mm. beyond the teeth. There are faint axial growth-lines and numerous spiral flat bands. The ground-colour is white with a spiral disposition of brown smudges and streaks, which on the left side of the shell are united by a lighter

general brownish colouring. The base is of a faint apricot tint, which also tinges the columellar teeth. Near the base is a band of deep brown spots of varying size, which are found also on the base of the body-whorl: the anterior end and the lower third of the depressed spire and the adjacent part of the outer lip are of a dark walnut-brown.

A slightly older specimen, from 100 fathoms, is 3·5 in. long, 2·5 in. wide, and 2·2 in. high, has fewer brown spirals, with 36 outer and 26 inner and 4 intermediate teeth, the outer lip is rather more thickened, and the flat dorsal spirals are slightly more conspicuous.

I have had five examples of the Tasmanian form to compare it with, as well as the figures given by all the above-mentioned authors. Mine differs in shape, being more globular, higher, and wider, not only relatively, but absolutely. Mr. May kindly lent me two very diverse examples, which respectively measured 4·4, 2·3, 1·9 in. and 3·4, 2·1, 1·8 in. in length, breadth, and height, whereas mine is 3·9, 2·5, 2·2 in. Allowing, therefore, for the greater length of the anterior and posterior prolongations in Mr. May's large specimen, which is probably a senile change, mine is still more globular. It is interesting to notice the greater similarity between my specimen and the type, whose dimensions are: Length, 3·8 in.; and breadth, 2·3 in., which is different from that of most specimens. Sowerby does not give the height of his shell, nor a figure in profile, and it is difficult to estimate this from his figure, but it seems less elevated than mine. The concave depression on the under-surface of the forward projection is much less in mine, and the posterior curve of the aperture, its upward bending and the twist to the left are more marked. The colour is very different. The fairly uniform peppering with dark spots, the white base, the brown wide blotch over the middle third of the base of the body-whorl are wanting in mine, while the apricot base and the lilac side are absent from the typical shells.

It may be that the shape is due to its *habitat* in the quiet waters of 100 fathoms, and that though mature it is not senile, and its colouring to its having been taken alive instead of being washed up and partially bleached on the shore. But we will hope other specimens may be secured which will determine its right to be called a good species.

Type in my collection.

***Trivia australis*, Lamarck.**

Cypræa australis, Lamarck, Anim. S. Vert., 1822, vol. vii., p. 404, and 1844 (Edition Deshayes), vol. x., p. 545. "The seas of New Holland" (M. Macleay); Sowerby, Conch. Illus., 1832,

fig. 29, p. 12 (1841), No. 112, "New South Wales"; Quoy and Gaimard, 1834, Voy. "Astrolabe," Zool., vol. iii., pl. xlvi., figs. 19-26; Menke, 1843, Moll. Nov. Holl., p. 30, *Cypræa* (*Trivia*), "Western shore of Australia"; Kiener, Coq. Viv., 1845, p. 138, Sp. 125, pl. xlvi., 2 bis; Reeve, Conch. Icon., 1846, vol. iii., pl. xxiv., fig. 138; Angas, Proc. Zool. Soc., London, 1867, p. 206; also 1878, p. 867, "Fowler Bay and Cape Northumberland," South Australia; Sowerby, *Cypræa* (*Trivia*), 1870, Thes. Conch., vol. iv., p. 45, pl. 325, figs. 439, 440 (*Cypræa*, pl. xxxiv.); Brazier, Proc. Zool. Soc., London, 1872, p. 86; Weinkauff, 1881, Conch. Cab. (Ed. Küster), Band. v., Abt. iii., p. 142, pl. xlix., figs. 14, 15; Tryon (*Trivia*), 1885, Man. Conch., vol. vii., p. 206, pl. xxiii., figs. 53, 54; Brazier, Proc. Linn. Soc., N.S.W., vol. ix., p. 29; Beddome, 1898 (*Trivia*), Proc. Linn. Soc., N.S.W., vol. xxiii., pl. xxi., fig. 19; Pritchard and Gatliff (1899), 1900, vol. xii. (New Series), p. 187, Victorian coast; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 374, Tasmania; Hedley and May, Records Austr. Mus., 1908, vol. vii., p. 111, No. 2, "100 fathoms, off Cape Pillar."

Taken in 80 fathoms 80 miles west of Eucla, 2 alive, without dorsal colour-blotches.

Ovula philippinarum, Sowerby.

Ovula philippinarum, Sowerby, Proc. Zool. Soc., London, 1848, p. 136; also Thes. Conch., 1855, vol. ii., p. 481, Sp. 44, pl. c., figs. 57, 58, "Philippines"; Reeve, Conch. Icon., 1865, Sp. 46, pl. x., figs. 46a, 46b; Tryon, Man. Conch., 1885, vol. vii., p. 252, pl. iv., figs. 100-9. He gives among its synonyms *O. angasi*, A. Adams (from Port Curtis, Australia), etc.

One example, dredged in 72 fathoms 40 miles west of Eucla, 18.5 mm. in length, not quite so solid as the figures in the above plates seem to show.

Tonna variegata, Lamarck.

Dolium variegatum, Lamarck, 1822, Anim. S. Vert., vol. vii., p. 261; also 1844 (Edition Deshayes), vol. x., p. 143, No. 6, "The seas of New Holland, in the Bay of Dogs"; Angas, Proc. Zool. Soc., 1867, p. 197, recorded for New South Wales; also by Hedley, Mem. Austr. Mus., 1903, vol. iv., p. 341; Tryon, Man. Conch., 1885, vol. vii., p. 262, pl. iii., fig. 13.

Tonna variegata, Lamarck, Hedley, Austr. Assoc. Adv. Science, 1909, p. 361, recorded for Queensland.

A fresh shell, 85 mm. by 65 mm., was taken in 100 fathoms 80 miles west of Eucla. This is the easterly limit on the southern Australian coast for the species to my knowledge. Its absence from South Australian, Victorian, and Tasmanian waters makes it probable it has come from the north round Cape Leuwin.

Cassis fimbriata, Quoy and Gaimard.

Cassis fimbriata, Quoy and Gaimard, Voy. "Astrolabe," 1833, Zool., vol. ii., p. 596, pl. xliii., figs. 7, 8; Angas, Proc. Zool.

Soc., 1865, recorded for South Australia; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900, vol. xii. (New Series), part 2, p. 188, recorded for Victoria.

One individual, 83 mm. long by 52 mm. broad and 46 mm. high, with three spiral rows of tubercles on the body-whorl, was taken alive in 100 fathoms, quite typical in form and colour, and a second one dead.

Cassidea adcocki, Sowerby.

Cassis adcocki, Sowerby, Proc. Mal. Soc., 1896, vol. ii., p. 14, text figure: *Type locality*—Yankalilla Bay, South Australia; Gatliff and Gabriel, Proc. Roy. Soc., Victoria, 1912 (New Series), part 1, p. 170, recorded for Bass Straits.

One example was taken dead in 100 fathoms 90 miles west of Eucla.

Cassidea pyrum, Lamarck.

Cassis pyrum, Lamarck, Anim. S. Vert., 1844 (Edition Deshayes), vol. x., p. 33, "New Holland"; Angas, Proc. Roy. Soc., 1867, p. 197, recorded for New South Wales; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900, vol. xii. (New Series), part 2, p. 189; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 373 (*Semicassis*), recorded for Tasmania.

Cassis nivea, Brazier, Proc. Zool. Soc., 1872, p. 616, pl. xliv., fig. 1.

Cassis tumida, Petterd, Proc. Roy. Soc., Tasmania, 1886 (1885), p. 321.

Cassis thomsoni, Brazier, Proc. Linn. Soc., N.S.W., 1875, vol. i., p. 8; Hedley (*Cassidea pyrum*, Lamarck, var. *thomsoni*, Brazier), Mem. Austr. Mus., 1903, vol. iv., part 6, p. 341, pl. xxxv., figs. 2, 3.

Dredged in 100 fathoms 90 miles west of Eucla, 4; in 75 to 120 fathoms 120 miles west of Eucla, 1; in 95 fathoms 90 miles west of Eucla, 3. All were well coronated, with moderately exserted spires and with more or less marked axial plicæ on the inflation of the body-whorl, a little below the coronation. The colour when fresh was a pink-flesh tint, with a blackish-purple on the varix of the canal, and about seven blotches of black-purple on the outside of the recurved labrum, fading away towards the dorsum as vanishing spiral flames. Some have two spiral bands of orange blotches on the body-whorl.

One quite fresh shell was taken in 140 fathoms, 34 mm. 22.5 mm., without angle or tubercles or plicæ, with a thickened reflected lip, with seven purplish-black spots on it, a micromorph of the variety found to the east of Bass Straits.

Cassidea semigranosa, Lamarck.

Cassis semigranosa, Lamarck, 1822, Anim. S. Vert., vol. vii., p. 228, No. 23: *Type locality*—"The seas of New Holland";

Angas, Proc. Zool. Soc., 1865, p. 168 (*Semicassis*), recorded for South Australia; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1900, vol. xii. (New Series), part 2, p. 190, recorded for Victoria; Tate and May, 1901, Proc. Linn. Soc., N.S.W., vol. xxvi., p. 373 (*Semicassis*), "South and east coasts of Tasmania."

One dead shell, taken in 80 fathoms 80 miles west of Eucla.

Ficus tessellatus, Kobelt.

Ficula tessellata, Kobelt, Conch. Cab. (Ed. Küster), 1881, Band. iii., Abt. 3.B., p. 12, Sp. 6, Taf. ii., fig. 3: *Type locality*—Australia.

Pyrula tessellata, Kobelt, Tryon, Man. Conch., 1885, vol. vii., p. 267, pl. v., fig. 31, Rosemary Island, Australia.

One fragment, taken in 100 fathoms 90 miles west of Eucla. This is a new genus for the southern coast of Australia.

Cymatium rubicundum, Perry.

Septa rubicunda, Perry, 1811, pl. xiv., fig. 4; Gatliff, Vict. Naturalist, 1902, vol. xix., No. 5, p. 76; (*Lotorium*) Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1905, vol. xviii. (New Series), part 2, p. 41; (*Septa*) Gatliff and Gabriel, Proc. Roy. Soc., Victoria, 1908; (*Cymatum*) Hedley, 1909, Austr. Assoc. Adv. Sci., p. 360, "Queensland."

Triton australe, Lamarck, Anim. S. Vert. (Edition Deshayes), 1843, vol. ix., p. 625.

Triton nodiferus, Lamarck, Anim. S. Vert. (Edition Deshayes), 1843, vol. ix., p. 624.

Triton saulix, Reeve, Conch. Icon., 1844, pl. v., fig. 17, "Philippines."

Examples were taken along the 100-fathom line. Three were only 40 mm. and 30 mm. in length. Each of these retained the protoconch, which was conical, and consisted of four quite smooth, sloping, slightly conical whorls. The extreme tip, however, in each example was absent. Three large ones were obtained alive up to 21 cm. long by 11 cm. broad, including the everted lip. These were somewhat more elongate and narrow than those found on the shore at Albany and Wedge Island and less solid, and were less deeply coloured than those taken on the beach on the west coast of Australia.

Cymatium verrucosum, Reeve.

Triton verrucosus, Reeve, Proc. Zool. Soc., London, 1844, p. 118, *hab.* (?); Conch. Icon., 1844, vol. ii., pl. xvii., fig. 71; Kobelt, Conch. Cab. (Ed. Küster), 1878, Band. iii., Abt. 2, p. 188, pl. liii., figs. 6, 7; Tryon, Man. Conch., 1881, vol. iii., p. 24, pl. xiii., fig. 117; Pritchard and Gatliff, *Lotorium verrucosum*, Reeve, Proc. Roy. Soc., Victoria, 1898 (1897), vol. x. (New Series), p. 266, recorded for Victoria; Tate and May, *Lampusia*, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 355, for Tasmania.

Triton quoyi, Reeve, Proc. Zool. Soc., London, 1844, p. 118; Conch. Icon., 1844, vol. ii., pl. xix., fig. 93.

Taken in 75 fathoms 80 miles, and in 100 fathoms 90 miles, west of Eucla. It has the ordinary characters of the *T. quoyi* form.

Cymatium vespaceum, Lamarck.

Triton vespaceum, Lamarck, 1822, also Lamarck, Anim. S. Vert. (Edition Deshayes, etc.), 1843, vol. ix., p. 636, *hab.* (?), 14 lines long; Kiener, Spec. Coq. Viv., vol. vii., 1842, p. 18, No. 13, pl. iii., fig. 2, "Indian Ocean"; Menke, Moll. Nov. Holl., 1843, p. 25, "West coast of Australia"; Tryon, Man. Conch., 1881, vol. iii., p. 22, pl. xii., figs. 94-100; Hedley (*Cymatium*), Austr. Assoc. Adv. Sci., 1909, p. 360, "Queensland."

Two examples, taken in 100 fathoms 90 miles west of Eucla, 23.5 mm. long and 20 mm. broad.

Gyrineum ranelloides, Reeve.

Triton ranelloides, Reeve, Proc. Zool. Soc., 1844, p. 111; Conch. Icon., 1844, No. 10, pl. iii., figs. 10a, 10b, *hab.* "Matnog, Province of Albay, Island of Luzon, Philippines (found on the reefs), Cuming"; Tryon, Man. Conch., 1881, vol. iii., p. 267, gives it as a synonym of *Ranella cruentata*, Sowerby.

Gyrineum ranelloides, Reeve, Hedley, Austr. Assoc. Adv. Sci., 1909, p. 361, "Queensland."

One living specimen was dredged in 101 fathoms 80 miles west of Eucla. The operculum is shown in pl. xvi., fig. 7, and the radula in pl. xvi., fig. 6. The shell is 50 mm. long by 24 mm. at its widest part, including the varix, with a shortly conical protoconch of five whorls. The first three are very depressed, scarcely rounded; the last two are convex, and rather rapidly increasing. The first four have two erect, sharp, hair-like spiral threads, at about equal distances from the sutures and each other, and numerous though not closely crowded, oblique similar axial threads. These gradually vanish towards the beginning of the last whorl; this ends abruptly where the ordinary sculpture of the spire-whorls begins. This consists of a row of large tubercles on the median angle, three rows of tiny tubercles above these and one below. On the body-whorl the last become successively larger, and another row succeeds them further forward, and several rows of large granules are intercalated. The tubercles are deeper yellowish-brown than the ground-colour, and there are stray axial flames of darker brown and articulated spirals of broken lines or tiny spots of brown. The reflected lip just beyond the varix is very daintily spotted on its inner margin with dark-brown, which clouds also the upper part of the inner lip between its white plicæ. The lower half of the columella is white, bordered above by the yellow of the back of the pre-

ceding snout. The round gutter at the back of the aperture is very marked. The varices do not run continuously from spire to spire as in *Ranella*, but stand one-fourth of the circumference behind that in the spire below.

An identical specimen was sent to me some years ago as from Japan by Mr. Sowerby under the name *Triton ranelloides*, Reeve.

Argobuccinum australasia, Perry.

Biplex australasia, Perry, 1811, Conchology, pl. iv., figs. 2, 4, "New Holland and Van Diemen's Land."

Ranella leucostoma, Lamarck, 1822, Anim. S. Vert., vol. vii., p. 150.

Dredged in 101 fathoms 80 miles west of Eucla, 1 immature, 50 mm. by 27 mm., with a conical protoconch of four sloping convex whorls, the minute extreme apex appears to be absent; colour of shell, light bluish-grey, covered with a thin epidermis, like coarse muslin, with a minute erect hair at each intersection. Aperture quite white. Also, a mature shell 90 mm. by 43 mm., solid, and lighter in colour than those from Tasmania.

Nassaria torri, Verco. Pl. xiii., figs 3, 4.

Cominella torri, Verco, Trans. Roy. Soc., S.A., 1909, vol. xxxiii., p. 271, pl. xxi., figs. 10, 11.

The species was founded on several examples collected on St. Francis Island thrown up among the rocks, but none of them were full grown, and all of them were more or less rolled and damaged. But on May 27, 1912, the Federal trawler "Endeavour" obtained a perfect specimen from a depth varying from 77 to 105 fathoms, about 40 miles west of the meridian of Eucla. It was inhabited by a hermit crab. It has nine whorls. The protoconch, comprising one and a quarter turns, is blunt, slightly excentric and smooth. The suture ascends for about a sixth of the circumference on the last whorl, and forms with a curved callosity on the inner lip, a narrow gutter at the back of the aperture.

The aperture is obliquely axially ovate, narrowed posteriorly to a gutter and anteriorly to a short, wide, oblique canal. The outer lip is thin, simple, uniformly convex, slightly reflected, smooth within. The inner lip is an expanded glaze on the body-whorl, thickened internally into a curved callus, extending slightly above the back of the aperture at the suture; anteriorly the labium is thick, detached from the base of the whorl, and carried forward over the very valid varix of the canal to form a false, well-marked umbilicus, and to join almost at a right angle with the left margin of the

canal, which is dorsally curved to run almost vertically for about half an inch. The varix of the notch projects as a very faint oblique prominence on the columella. The columella is sigmoidally concave above and convex below.

The bent canal removes it from the genus *Cominella* and separates it from *Phos* and places it in *Nassaria*. If this location prove correct it is a gigantic member of the genus, measuring 69 mm. in length by 29 mm. in breadth. A second example, not full grown and not in very good condition, was taken in 100 fathoms 90 miles west of Eucla.

***Siphonalia dilatata*, Quoy and Gaimard**

Fusus dilatatus, Quoy and Gaimard, 1833, Voy. "Astrolabe," Zool., vol. ii., p. 498, pl. xxxiv., figs. 15, 16; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1898 (1897), vol. x. (New Series), part 2, p. 272.

Fusus tasmaniensis, Adams and Angas, 1863, Proc. Zool. Soc., London, p. 421, pl. xxxvii., fig. 1.

Siphonalia maxima, Tryon, 1881, Man. Conch., vol. iii., p. 135, pl. liv., fig. 335.

Siphonalia oligostira, Tate, Trans. Roy. Soc., S.A., 1891, vol. xiv., p. 258, pl. xi., fig. 6.

Taken in 105 fathoms 30 miles west of Eucla, with marked angulation, valid sharp transverse coronating tubercles, with numerous crowded fine deep-brown spiral cords, the colour deepest in a rather broad band revolving over the middle of the body-whorl, the interior a beautiful vivid salmon-tint or white, two examples.

Taken in 100 fathoms 90 miles west of Eucla, 2 much longer and narrower examples, one with a more rounded shoulder, with rounder and more pliciform tubercles, fewer broader spiral cords, pure white both outside and in; the second from this station comes midway between this and the first two in its colouring and sculpture. One immature, 48 mm. long, taken in 72 fathoms 40 miles west of Eucla.

***Fusus novæ hollandiæ*, Reeve.**

Fusus novæ hollandiæ, Reeve, Conch. Icon., 1847, vol. iv., p. 197, pl. xviii., fig. 70; Angas, Proc. Zool. Soc., 1877, p. 179, recorded for New South Wales; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., recorded for Tasmania; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1898, vol. x. (New Series), part 2, p. 269, recorded for Victoria; in vol. xviii., 1906, p. 43, they state that the type is in the National Museum, Victoria.

One example was dredged in 100 fathoms 90 miles west of Eucla, with the mouth somewhat broken, 67 mm. long by 22 mm. wide, spire 24 mm. long. Its shoulder is median and sharply angled, with nine pliciform axial ribs, more

marked below the angle than above, much narrower than their interspaces; the four spiral threads above the shoulder very fine, those below it very fine but slightly larger; those on the body-whorl finer than in Tasmanian specimens. A bright reddish-brown spot between the costæ at the angle.

Fasciolaria australasia, Perry.

Pyrula australasia, Perry, 1811, Conchology, pl. liv., fig. 4, "New Holland and Van Diemen's Land."

Fasciolaria coronata, Lamarck, 1822, Anim. S. Vert, vol. vii., p. 120.

One individual, dredged in 72 fathoms 60 miles west of Eucla, is rather a marked variant. It is 143 mm. long by 55 mm. at its widest part. The protoconch of two rounded smooth whorls is less eccentric and pulloid than usual. The spire is unusually long, 62 mm., of six whorls, very sharply shouldered just above the middle and markedly contracted at the sutures, with about eleven pliciform tubercles with sharp transverse summits, corded with a spiral thread. A very thin horny epidermis. Colour, first three spire-whorls brownish, all the rest quite white; interior pure white. Another individual, taken in 100 fathoms 80 miles west of Eucla, was, as to protoconch, shape, and colouration, one of the common coronated forms.

Scaphella undulata, Lamarck.

Voluta undulata, Lamarck, Ann. du Mus. Hist. Nat., vol. v. 1804, p. 157, pl. xii., figs. 1a, 1b.

Four examples, taken 80 miles and 90 miles west of Eucla from 72 to 105 fathoms, all immature and dead and quite typical.

Scaphella fulgetrum, Sowerby. Pl. xi. and xii.

Voluta fulgetrum, Sowerby, Tankerville Catalogue, 1825, p. 81, No. 2149; Appendix, p. xxviii., pl. iv., v.: *Type locality* unknown; Broderip, Zool. Jour., 1826, vol. ii., p. 35; Wood, Index. Test. Supp., 1828, p. 59, pl. iii., fig. 3; Anim. S. Vert., 1844 (2nd Edition, Deshayes, etc.), vol. x., p. 414; Sowerby, Thes. Conch., 1847, vol. i., p. 207, Sp. 35, pl. xlviii., figs. 33, 34; Reeve, Conch. Icon., 1849, pl. vi., figs. 13a, 13b; Chenu, Man. de Conch., 1859, vol. i., p. 191, fig. 973; W. F. Petterd, Journ. Conch., 1879, p. 344; Tryon, Man. Conch., 1882, vol. iv., p. 96, pl. xxviii., figs. 104, 105.

This species was described by G. B. Sowerby, sen., in the Sale Catalogue of the Earl of Tankerville's collection—the only specimen he had ever seen. It was a fine individual, and two excellent full-sized coloured figures are given of it. Its *habitat* was unknown. Broderip reproduced the description of it about a year later in the Zool. Jour., attributing

it to Sowerby. In 1849 Reeve says, "It was first described by Mr. Broderip from a specimen of rather large size in the celebrated Tankerville Collection, now in the British Museum," and places Broderip's name before Sowerby's in his references. This strange mistake evidently misled Pterid, who cites Broderip as the author of the species; but later writers correctly give Sowerby his due. Reeve is the first to give the *habitat* of the species, namely, South Australia. In my copy of the Tankerville Catalogue the price against the type specimen is £31 10s.

Variations.—It is very variable; one from Adcock's collection, not quite mature, is 7 in. long by 17.7 cm. by 8.3 cm. The type is described as 6 in. by 3 in. Mr. Mathews tells me in a letter that the largest he has seen was 8 in. by 3½ in., taken on Troubridge Island. But a mature shell, with ascending suture and fully-formed lip, may be only 3 in. by 1.55 in.

Another example is 4.3 in. by 1.7 in., so that if it were 6 in. long it would be only 2.4 wide—more than ½ in. less in diameter than the type. The shoulder, too, may be more marked than in the type, which is rather high-shouldered, and may be somewhat more concave below the suture. When senile the inner lip may have a thick axial pad of callus extending a full inch beyond the aperture. The glaze of the inner lip not only extends very far laterally over the body-whorl, but towards the spire for half an inch or more above the suture, and in shells with rusty-brown staining this covers the stain over and leaves a broad, wavy, whitish band above the suture throughout the last spire-whorl.

Tryon says, "*V. fulgetrum*, in fact, is intermediate between *V. fusiformis* and *V. papillosa*, and very probably the three are merely diverse forms of one species." I think the three species are distinct, the protoconch of *S. fulgetrum* is a sufficient diagnostic from either of the other species.

Sowerby, in the *Thes. Conch.*, refers to one variety (*S. dictua*, n. var., Verco, *Trans. Roy. Soc., S.A.*, 1909, vol. xxxiii., p. 274, pl. xxi., fig. 7) which has only a delicate reticulate lace-like colouration, and a second which has two rows of chestnut spots on the last volution. But the colour variations are quite numerous.

1. There is the typical shell with the axial zigzag brown dashes from which the shell derives its name. It will be noticed these tend to have two spiral rows of blotches, one just below the shoulder and the other over the lower part of the body-whorl. The blotches are roughly crescentic or arrow-headed, with their concavity towards the outer lip. At the suture the markings are flame-like.

2. There may be two spirals of large crescentic or arrow-headed spots, with flames at the suture; var. *lunulisligata*.

3. These may be reduced to two spirals of small spots the size of peppercorns; var. *punctisligata*.

4. There may be no spots except a few small ones on the first and second spire-whorls, the surface being more or less deeply and densely reticulated with brown; var. *dictua*, Verco.

5. The axial lightning zigzags may be crossed by two continuous deep purple-brown bands, one below the shoulder, the other over the lower part of the volution; var. *connectens*.

6. The only colour ornament may be these two bands and some small flames at the suture, all the axial markings being absent; var. *bicineta*.

7. The subsutural flames may unite to form a third spiral band; var. *tricincta*.

8. Only the lower spiral band may be present, but this quite valid; var. *unicincta*.

9. There may be no colour-markings, the shell being pure white; var. *alba*.

I have had several of these colour varieties reproduced in pl. xi. and xii.

The *habitat* of the species is very restricted. It has been taken in both Gulf St. Vincent and Spencer Gulf, and at some points is a fairly common shell. Mr. Mathews says the blacks tell him the animal lives on sandbanks nine or ten chains from the shore, which are covered by about 18 in. of water at low spring tide. He has taken them crawling ashore. It has been collected as far to the east as Kingston, in Lacepede Bay. I found none on the beaches from Sceales Bay to Point Sinclair, nor on St. Francis Island nor at Esperance, Hopetoun, King George Sound, nor on the west coast of Australia. It has not been recorded from Victoria.

Its bathymetrical distribution is interesting. Taken alive, of large size and beautifully painted, in all its varieties in the shallow water of the gulfs, and with only the lace-like reticulations, from the lobster-pots at Port Victor, and in 75 to 120 fathoms of water from 40 to 120 miles west of Eucla, 9 examples. The shells from these greater depths were all dead, mostly the home of hermit crabs, and all had the faint reticulated ornament except two, which showed the single deep band; none had the axial lightning markings.

***caphella verconis*, Tate.**

Voluta verconis, Tate, Trans. Roy. Soc., S.A., 1892, vol. xv., p. 125, pl. i., fig. 5: *Type locality*—Gulf St. Vincent (Verco).

Taken in 75 fathoms 80 miles west of Eucla, 1 dead, immature; in 80 fathoms same locality, 1 dead, mature; in 100 fathoms 90 miles west of Eucla, 3 dead, immature.

Scaphella translucida, Verco

Voluta translucida, Verco, Trans. Roy. Soc., S.A., 1896, vol. xx., p. 217, pl. vi., figs. 4, 4a.

In 100 fathoms 90 miles west of Eucla a large lump of coral was taken, and in a cavity of this when chopped open lay a perfect specimen dead, with a deciduous thin white smooth epidermis, 35 mm. long by 14 mm. broad, somewhat smaller than the type.

Scaphella dannevigii, n. sp. Pl. xiii. figs. 1, 2.

A large, thin, brown, polished, elliptical shell. Protoconch absent, the line of separation thin and jagged; the exposed pillar very oblique, thick, smooth, and rounded, concealing the projecting hemispherical apex of the shell. Whorls three, shouldered below the suture, at the upper fourth of the intersutural space. Shoulder coronated with tubercles, eleven on a whorl, none on the first whorl, the earlier tubercles pointed, the later becoming broad until about half as wide as the interspaces, shortly pliciform, but expanding, and vanishing before reaching the lower suture. Whorls sloping, concavely sub-gradate above the shoulder, sloping slightly convex below. Suture distinct, minutely channelled. Body-whorl large, oval, narrowed anteriorly. Aperture axially narrowly elliptical. Inner lip a thin extensive glaze over the whorl; outer lip immature, thin, uniformly convex, and (as the growth-lines show) curving roundly to a wide, rather shallow, anterior notch. Columella subconcave, three very oblique plaits, the lowest forming the margin of the canal.

Sculpture.—There are crowded, fine, wavy, spiral liræ, about twenty above the shoulder, less valid over this and soon becoming obsolete below it. Accremental striæ granulate these and become ruder towards the aperture. Colour, dark chestnut-brown, obscurely minutely spirally crowdedly flecked with white, with scattered darker-brown blotches, the tips of the tubercles a deep blackish-brown. A narrow creamy band, distinct on its under margin, indistinct along its upper border, starts just within the back of the aperture and winds round the body-whorl to the middle of the outer lip.

Dimensions.—Length, 16.3 cm., of the aperture 11.3 cm.; width, 8.33 cm., of the aperture 4.77 cm.; diameter of the protoconchal base, 18 mm.

Locality.—Type specimen taken in the trawl at 105 to 77 fathoms 90 miles west of the meridian of Eucla.

In 1896 off Newland Head, outside Backstairs Passage, I dredged a dilapidated broken specimen lacking the whole of its last whorl, but measuring 23·5 cm. in length, so that in life it must have been a very large shell. No others were taken by me till I secured the type and eight other examples from the material brought up by the trawl of the "Endeavour" in water ranging from 75 to 105 fathoms, and extending from 40 to 120 miles west of Eucla.

The protoconch was absent from every example. Apparently it is normally deciduous, and must be shed early, as it is absent from a well-preserved specimen 11 cm. long. It must be large, and probably resembles that of *S. mamilla*, which, however, is almost always intact. The whitish band may be centrally well marked and fade away at both margins.

The species is named after Mr. Dannevig, the Commonwealth Director of Fisheries, to whom I was indebted for much help in securing the material obtained during my short voyage on the "Endeavour."

Type in my collection.

***Scaphella roadnightæ*, McCoy. Pl. xvi., figs. 1, 2.**

Voluta roadnightæ, McCoy, Ann. Mag. Nat. Hist., 1881, vol. viii., 5th Series, p. 89, pl. vii., figs. 1, 2: *Type locality*—Ninety-mile Beach, Gippsland, Victoria; Tryon, Man. Conch., 1882, vol. iv., p. 96, pl. xxx., fig. 128; Sowerby, Thes. Conch., 1887, p. 298, Sp. 78, pl. 573 (*Voluta*, pl. xiv.), fig. 143; Pritchard and Gatliff, Proc. Roy. Soc., Victoria, 1897, vol. x. (New Series), part 2, p. 282, "Portland (Nat. Mus.);" A. Kenyon, Proc., Mal. Soc., London, 1899, p. 267; Baldwin-Spencer, Proc. Mal. Soc., London, 1901, vol. iv., p. 184; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., part 3, p. 360, Maria Island (May), east coast, near Swansea (Mrs. Irvine), Tasmania; Pritchard and Gatliff, *op. cit.*, 1906 (1905), vol. xviii., part 2, p. 45.

This species was found by Baron von Mueller when on a visit to the Gippsland Lake District at his hotel, where it was in use to prop open his bedroom window. It had been found on the Ninety-mile Beach by Mrs. Roadnight, his landlord's mother, after whom it is named. It was given by Mueller to Sir Frederick McCoy, who described it in 1881. In 1899 some seven specimens were known, two of them from the eastern coast of Tasmania. Later, several were obtained from lobster-pots on the Victorian coast, and Mr. Bastow kindly sent me one. Mr. Dannevig, the Director of Fisheries, tells me he has taken several specimens when trawling off the coasts of Victoria and Tasmania, east of Bass Strait, all dead; and occasionally off the South Australian coast, but the first living examples were brought up from about 100 fathoms

some 40 miles west of Eucla. They were of medium size, mature, and almost destitute of the zigzag colour-markings. When the trawler was in the Great Australian Bight in 1912 several examples were taken along the 100-fathom line in various stages of preservation. All were inhabited by hermit crabs but one; from this a radula was obtained. From the material thus provided the following information is supplied:—The shell when mature may measure only 4 in. long by $2\frac{1}{2}$ in. broad, or it may reach 9 in. by $4\frac{3}{4}$ in. One example is 7 in. by $4\frac{1}{2}$ in., proportionately much more ventricose, with a shorter spire, though with the same number of whorls. The protoconch is very conspicuous and is never absent, which is remarkable, since fully three-fourths of a large hemisphere projects. It is set obliquely, so that the nuclear spheroid has its flattened pole on one side. The initial point is deep blackish-brown, and this colour runs along the nuclear suture, and gradually spreads and fades out. There is no defined inner lip, except in one example, a micromorph, which has a detectible glaze spreading over the base of the body-whorl. In mature shells the outer lip ascends well and rapidly at the suture for a full inch in larger examples, and is here markedly everted, and the whole of the outer lip is somewhat curved out. There is a well-marked anterior notch $\frac{3}{4}$ in. deep by 1 in. wide, and the low wide rounded varix of the notch winding round to the upper plait on the columella forms a low furrow, which in senile shells become filled up and even convex. The plaits are normally three, and remain unchanged in senile shells; but often another plait arises between the lowest two, sometimes between the highest two, and once above all the rest. When senile the shell becomes very heavy, thickened especially on the inner side of the everted lip and along the columella. Colour: the typical tint is pale-yellowish, but it may be a rich chestnut-brown. The ornament consists typically of axial series of oblique lines in zigzag arrangement; these oblique lines may be very long, going one-third round the shell, concealing any axial disposition, or they may be short and close set and blotchy at their junction, so as to exaggerate it. Sometimes they are altogether absent, leaving only the ground-tint, almost an albino variety, as in the two examples taken alive by Mr. Dannevig in 100 fathoms west of Eucla. In some specimens a white spiral band, starting from the aperture just below the suture, winds round the shell and interrupts all the colour-markings. The radula (pl. xvi., figs. 1, 2) from a living individual of 21 cm. in length measures 21 mm. by 1 mm., and consists of a single line of seventy imbricating, tricuspidate, rachidian teeth only. The old teeth have their cusps completely worn away, and are reduced to the crescent-shaped bases.

Scaphella papillosa, Swainson. Pl. xiv., figs. 1-3.

Voluta papillosa, Swainson. Appendix, Bligh Catalogue.

Voluta papillaris (*papillosa*), Swainson, Sowerby, Genera of Shells, 1820-1825, pl. ccli., no locality. According to a note by W. J. B., "the slight alteration here given in the trivial name is only to be considered in the light of a correction of the press." Mr. Sowerby, sen., or Mr. Broderip is, therefore, responsible for the change in the specific name. Kiener, in *Coq. Viv.*, 1839, under the name of *Voluta sowerbyi nobis*, pl. 1., 2 figs., gives figures of *V. fusiformis*, Swainson, and refers to them in mistake as *V. papillaris*, Sowerby, and changes the name to *V. sowerbyi*.

Swainson, in Lardner's Cabinet Cyclopaedia, Natural History, Malacology, 1840, p. 108, calls his shell *Scaphella papillaris*, and figures it in the text 12A, and on page 318 refers to it as *Scaphella papillosa*, Sowerby, Gen., as though uncertain which name to retain. Sowerby, in *Thes. Conch.*, vol. i., 1847, p. 207, Sp. 36, pl. xlvii., fig. 30, cites its *habitat* as "Fijee Islands." Reeve, *Conch Icon.*, 1849, vol. vi., pl. iv., fig. 10, gives Port Lincoln as a *habitat*, under the name *Voluta papillaris*. He writes, "Mr. Swainson named this species *papillosa*, with the view of drawing attention to the remarkable papillary structure of the apex, but as the word signifies 'full of papillæ' it is better rendered *papillaris*. Taking it to refer to the painting, and confounding the species with *V. fusiformis*, M. Kiener has changed the name to do honour to Mr. Sowerby (calling it *V. sowerbyi*, Kiener), because the spots have so rarely the appearance of papillæ." Mr. Sowerby acknowledges the compliment in language severe but not the less true, by calling it "an absurdity." Gray, in *Proc. Zool. Soc.*, London, p. 63, calls it *Volutella papillosa*, Gray. Crosse, *Jour. de Conch.*, 1871, vol. xix., p. 297, refers to it as *Voluta (Alcithoe) papillosa*. Petterd, in *Jour. of Conch.*, 1879, p. 343, as *Voluta papillosa*, Swainson, cites it as from the north coast of Tasmania and Encounter Bay, South Australia, and off the coast of New South Wales, between Montague Island and Twofold Bay, dredged in 1,900 fathoms (Brazier). He creates and describes a variety *macquariensis*, of a uniform yellowish colour without bands or reticulate markings, from Macquarie Harbour, west coast of Tasmania. Tryon, *Man. Conch.*, 1882, vol. iv., p. 96, pl. xxviii., fig. 106, as *Voluta (Alcithoe)*. Brazier, in *Proc. Linn. Soc.*, N.S.W., 1897, vol. xxii., p. 779, describes *Voluta kenyoniana*, from Cape Everard, Victoria, a form with 19-20 axial obtuse ribs, which in *Proc. Mal. Soc.*, London, 1906-7, vol. vii., p. 6, was recognized as only a variety of *Voluta papillosa*, Swainson. Pritchard and Gatliff, *Proc. Roy. Soc.*, Victoria, 1898 (1897), vol. x. (New Series), p. 282, give "Phillip Island, Western Port, Portland." Tate and May, *Proc. Linn. Soc.*, N.S.W., 1901, vol. xxvi., p. 360.

Between 40 and 120 miles west of Eucla, about the 100-fathom line, 4 examples were taken. Two, which were mature, measured only 80 mm. in length by 32 mm. in breadth and 71 mm. by 30 mm. One nearly mature, 65 mm. by 29 mm., and one immature, 53 mm. by 22 mm. A specimen from Port Victor measures 105.2 mm. by 50 mm., and one from Victoria 124 mm. by 59 mm.; so that the deep-sea examples are much smaller and proportionately narrower. But their colour is typical, though faint (all were dead shells). They all show the typical proximity and heaping up of three plaits, with a very small plait behind these, and a distinct anterior plait close to and almost forming the border of the canal, though this last was absent from the juvenile example. One of the mature individuals showed obsolete axial costæ on the base of the body-whorl, just beyond the inner lip, so approximating to var. *kenyoniana*, Brazier. Further east the trawler "Endeavour" had taken several examples of this variety, probably to the east of Bass Straits, all dead. A mature micromorph was 65 mm. long by 32.5 mm. broad, the largest was 112 mm. long by 49 mm. broad. The costæ are more numerous than in the type of the variety described by Brazier (19 to 20), 54 being counted in the penultimate whorl. But their validity and their number vary in the examples examined. In the micromorph they are less crowded, and in another specimen they are almost absent from the body-whorl. The protoconch and ornament resemble those of the specific type. I have had one of these figured on pl. xiv., figs. 2, 3.

Since writing the above Mrs. Agnes Kenyon has kindly lent me the type specimen of Brazier's species for comparison. This can scarcely be said to have 19-20 obtuse ribs, as he describes it. On the body-whorl 44 axial costæ can be counted, and none in the last inch from the aperture. These are rather sharp at their summits, but broad at their bases, and vary very greatly in their size and proximity. In the penultimate there are about 50, but they are so irregular in size and nearness that it is difficult to count them, and they scarcely can be called ribs, but are rather irregular axial costulæ. The figs. 2 and 3 on pl. xiv. are an almost exact reproduction of the type, though taken from an "Endeavour" specimen in my collection.

Cymbium flammeum, Bolten.

Cymbium flammeum, Bolten, Mus. Boltenianum, 1798, p. 151, No. 1899, No. 3.

Voluta diadema, Lamarck, Ann. du Mus., vol. xvii., p. 57, No. 1.

Var. *Cymbium miltonis*, Gray.

Voluta miltonis, Gray, 1833, Griffith's Cuvier's Animal Kingdom, vol. xii., Mollusca, 1834, pl. xxix. (1833); Kiener, Coq. Viv., 1839, p. 10, Sp. 6, pl. x.

Cymbium miltonis, Gray, Conch. Cab. (Ed. Küster), 1841, Band. v., Abt. 2, p. 213, Taf. xlii., fig. 1.

Voluta miltoni, Gray, Deshayes, Anim. S. Vert., 1844 (2nd Edition), vol. x., p. 406, Sp. 46.

Melo miltonis, Gray, Broderip, Thes. Conch., 1847, vol. i., p. 415, Sp. 7, pl. lxxxiii., figs. 24, 25.

Cymbium miltonis, Gray, Reeve, Conch. Icon., 1861, pl. xvi.

Melo miltonis, Gray, Angas, Proc. Zool. Soc., London, 1878, p. 865.

Melo diadema, Lamarck, var. *miltonis*, Gray, Tryon, Man. Conch., 1882, vol. iv., p. 82, pl. xxiii., fig. 28.

It is well figured in Griffiths' Edition of Cuvier's Animal Kingdom, but no description is given, and its name does not appear in the letterpress. Reeve says it was named in honour of Lord Milton, afterwards Earl Fitzwilliam. Its *habitat* was unknown, and is first recorded in Thes. Conch. as from Swan River, Australia. Later Mr. Angas cited it from Fowler Bay, on the South Australian coast, and Mr. Bednall gave me a specimen labelled Streaky Bay, a little distance further east. Three specimens were taken by the Federal trawler "Endeavour," all dead, one in 95 fathoms 90 miles west of Eucla, measuring 11 cm. by 6.2 cm., with four distinct columellar plaits; a second in 88 to 100 fathoms in the same locality, of 17.3 cm. by 9.7 cm., also with four distinct plaits; and a third 19.2 cm. long, with only three plaits, corresponding with the anterior three of the other specimens. It has a much more prominent protoconch and a more elate spire than the second, but otherwise they are quite similar.

Two individuals, from Fowler Bay, obtained from Mr. W. Reed, were taken alive. They have the typical narrow elliptic form, somewhat elate spire, the incurved spines, and four columellar plaits, with abundant white triangles in the ornament. Their walls are of medium thickness. One has in the body-whorl six well-marked axial costations, corresponding with similar axial gutters within, and running down from the spines, showing that the animal curved its shell outwards as it proceeded to form the scale of the spine, and curved it in as it completed the spine.

Ancilla oblonga, Sowerby.

Ancillaria oblonga, Sowerby, Spec. Conch., 1830, part 1, p. 7, figs. 38, 39; Kiener, Coq. Viv., 1843-44, p. 15, No. 10, pl. iv., fig. 2, "The shores of New Holland"; Reeve, Conch. Icon., 1864, vol. xv., pl. viii., figs. 24a, 24b; Sowerby, Thes. Conch., 1866, vol. iii., p. 65 (*Ancillaria*, p. 9), No. 38, pl. cexiii. (*Ancillaria*, pl. iii.), figs. 57, 58; Tryon, Man. Conch., 1883, vol. v., p. 96, pl. xxxix.,

fig. 47, as a synonym of *A. marginata*, Lamarek; Watson (*Ancilla*), 1886, "Chall." Zool., vol. xv., p. 231, "38 fathoms, off Bass Strait"; Tate and May, Proc. Linn. Soc., N.S.W., 1901, vol. xxvi., p. 365, "Tasmania" = "*A. fusiformis*, Petterd"; Hedley (*Ancillaria*), Memoirs Austr. Mus., 1903, vol. iv., part 6, p. 364, "New South Wales"; Hedley (*Ancilla*), 1909, Austr. Assoc. Adv. Sci., p. 363, "Queensland."

Taken in 100 fathoms 90 miles west of Eucla. Mr. Gabriel has sent me two examples dredged in Western Port, Victoria.

***Ancilla mucronata*, Sowerby.**

Ancillaria mucronata, Sowerby, Thes. Conch., vol. iii., 1866, p. 63, No. 30, pl. 211, figs. 11, 12, "Australia"; Reeve, Conch. Icon., 1864, Sp. 10, pl. iv., figs. 10a, 10b, "Tasmania"; Kiener, Coq. Viv., 1843-44, *Ancillaria*, p. 7, Sp. 4, pl. iii., fig. 3, "The shores of New Holland." This figure is most like our shell in colouring.

Taken in 75 fathoms 80 miles west of Eucla, 1; in 80 fathoms 80 miles west of Eucla, 3; in 100 fathoms 90 miles west of Eucla, 1; in 105 fathoms, 3; in 140 fathoms, 2.

They were all dead, but several in very good condition, of a cinnamon or salmon colour, palest in the upper part of the spire and deepest between the lowest white band and the white columella, not quite so deep in the wide space between the two narrow white bands on the body-whorl. Kiener's figure is a fair representation of it. It is quite unlike *A. beachportensis*, Verco.

***Hemipleurotoma quoyi*, Desmoulins.**

Pleurotoma quoyi, Desmoulins, Actes. Soc. Linn., Bordeaux, 1842, p. 61.

Hemipleurotoma, Verco, Trans. Roy. Soc., S.A., 1909, vol. xxxiii., p. 294.

Taken in 100 fathoms 90 miles west of Eucla, 2.

EXPLANATION OF PLATES.

PLATE X.

- Fig. 1. *Cypræa armeniaca*, Verco, dorsal view.
 " 2. " " " ventral view.
 " 3. " " " side view.

PLATE XI.

- Fig. 1. *Scaphella fulgetrum*, Sowerby.
 " 2. " " " var. *lunulishigata*.
 " 3. " " " var. *connectens*.

PLATE XII.

- Fig. 1. *Scaphella fulgetrum*, Sowerby, var. *tricincta*.
 " 2. " " " var. *unicincta*.
 " 3. " " " var. *punctishigata*.

PLATE XIII.

- Fig. 1. *Scaphella dannevigii*, Verco,
 " 2. " " " " apex.
 " 3. *Nassaria torri*, Verco, side view.
 " 4. " " " " ventral view.

PLATE XIV.

- Fig. 1. *Scaphella papillosa*, Swainson, micromorph.
 " 2. " " " " var. *kenyoniana*, Brazier,
 ventral view.
 " 3. " " " " var. *kenyoniana*, Brazier,
 side view.

PLATE XV.

- Fig. 1. *Acmæa calamus*, Crosse and Fischer, var. *polyactina*, Verco.
 " 2. " " " " " " variety.
 " 3. *Patella axiaerata*, Verco, dorsal view.
 " 4. " " " " " " side view.
 " 5. *Acmæa patellavecta*, Verco, dorsal view.
 " 6. " " " " " " interior.
 " 7. " " " " " " side view.

PLATE XVI.

- Fig. 1. *Scaphella roadnightæ*, McCoy, radula.
 " 2. " " " " " " worn down.
 " 3. *Acmæa alticostata*, Angas, radula.
 " 4. " " " " " " lateral tooth.
 " 5. " " *patellavecta*, Verco, radula.
 " 6. *Gyrineum ranelloides*, Reeve, radula.
 " 7. " " " " " " operculum.





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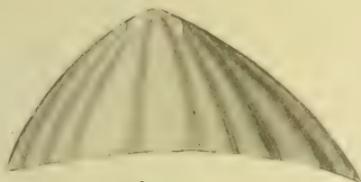




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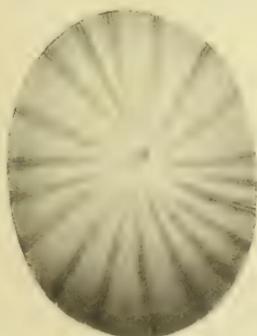
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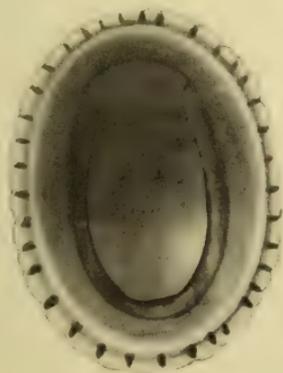
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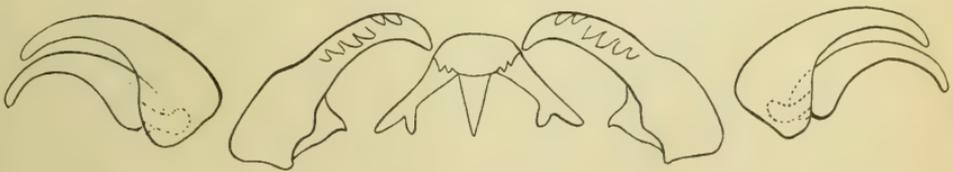
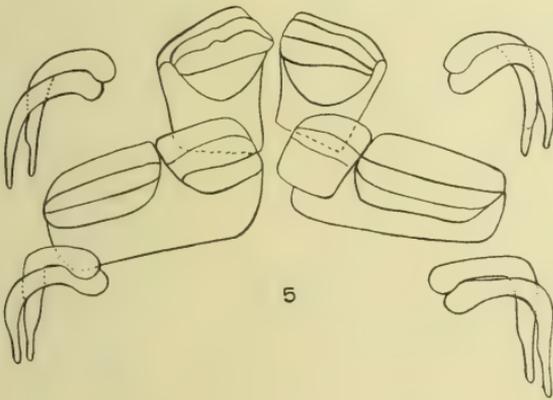
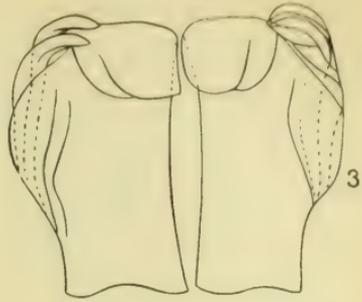
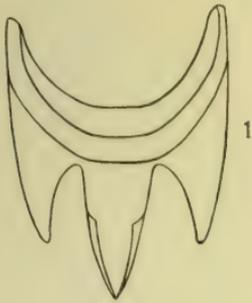
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5



NEW AUSTRALIAN DIPTERA FROM ANTS' NESTS.

By FREDERICK KNAB and J. R. MALLOCH, Bureau of Entomology, U.S. Department Agriculture, Washington, D.C.

Communicated by A. M. LEA.

[Read October 10, 1912.]

The *Diptera* described in the following are an interesting addition to the myrmecophilous fauna, particularly the two *Syrphidae* here described as species of *Microdon*. While the *Microdontinae* are believed to be generally myrmecophilous in the larva state, but very few species have been actually bred from ant nests. There has particularly been some doubt as to the habits of the more anomalous forms, such as these here described; it will thus be seen that differences in the organization of the imago bear no relation to the larval habits.

All the species of *Microdontinae* so far reported from Australia show the pedunculate wasp-like abdomen, quite unlike the typical species of *Microdon*. We were, therefore, at first inclined to put the species from Victoria (*M. daveyi*) in a separate genus, but a review of the literature and examination of material from remote parts of the world has led us to a more conservative course. It was found that the genus *Mixogaster*, to which one of the Australian species has been wrongly referred, is quite a distinct concept, and apparently confined to America; *Ceratophya* was poorly defined, and it is extremely doubtful that the Australian species should be referred to it. A last objection arose in the fact that species occur elsewhere which intergrade with the Australian ones in the shape of the abdomen.

***Microdon daveyi*, n. sp.**

♀. Dull-black, finely granulose, ornamented with golden pubescence. Frons at vertex at least one-third as wide as head, widening towards the antennæ, covered with golden pubescence except on a transverse patch at lower extremity of ocellar triangle; face projecting immediately below antennæ, flattened and nearly straight, perpendicular in profile, descending to slightly below lowest level of eyes, thickly covered with golden pubescence; postocular cilia yellow. Antennæ long, the two basal joints ferruginous, the third black, proportions 6-1-12; arista as long as basal joint (6), bare, ferruginous; third joint subcylindrical, very slightly

narrowed towards base, the apical half thickened, apex bluntly pointed. Thorax with a band of golden pubescence immediately in front of the suture, narrowed or broadly interrupted in the middle; lateral and posterior margins sparingly golden pubescent; the presutural band is carried down over the pleuræ. Scutellum transverse, rounded, unarmed, with distinct golden pubescence on disc. Abdomen petiolate, first and second segments about half as broad as thorax, the first short and thickened basally, the third to fifth segments together elongate ovate, but slightly broader than thorax; first segment with a group of yellowish white hairs at the sides; second segment shining and only granulose on apical half, ridged in the middle, broadly yellowish laterally at middle and narrowly on posterior margin, posterior margin especially laterally, with golden pubescence; third and fourth segments with scattered golden hairs and broad apical, transverse, golden fasciæ formed of thickly-placed golden hairs, but imperfectly interrupted at middle; fifth segment with golden pubescence becoming denser towards apex; ovipositor bifid, pale-ferruginous, slightly hairy. Legs pale-ferruginous tinged with brown, femora mostly black, the apices pale-ferruginous; tibiæ thickened on apical half and somewhat curved, medianly more or less darkened; tarsi broader than tibiæ, the joints very short; all the legs with dense, short, yellowish white hairs; mid femora with long pubescence on posterior surface. Wings infuscated from base to middle of first posterior cell above fourth vein, beyond this point above third vein, broad infuscations along fifth vein, cross-veins, and particularly the veins closing first posterior and discal cells; veins black; venation typical for *Microdon*, the stump of third vein projecting about half-way across first posterior cell, last section of fourth vein straight, nearly rectangular with third vein, a minute stump at angulation; anterior cross-vein but slightly more than its own length from base of discal. Halteres ferruginous. Length, 7-9 mm.

Ararat, Victoria, Australia (H. W. Davey), five specimens reared from larvæ in ants' nest.

The puparium is of the shape usual in *Microdon*, elongate-elliptical, nearly straight-sided with very slight indications of constrictions near the middle, strongly convex, the ventral surface (by which it is attached) perfectly flat; colour ferruginous-yellow, the margin slightly darker, thoracic horns ferruginous-brown, posterior respiratory horn reddish-brown, pruinose; the dorsal surface shows a median longitudinal crease extending the entire length to the posterior respiratory tubercle; on each side of this the surface is broken into reticulations, larger and forming fairly regular rows towards

the middle, somewhat smaller and more irregular towards the sides, there being about ten longitudinal rows on each half; the surface is granular and the reticulations are produced by rows of closely approximated minute, white, tuberculate spines; the surface between the reticulations is somewhat depressed; the posterior respiratory tube is somewhat thickened at the base, with a dorsal basal swelling, bluntly rounded at tip, the surface coarsely granular. Length, 8.5 mm.; width, 5 mm.; height, 3 mm.

***Microdon brachycerus*, n. sp.**

♂. Black and ferruginous, ornamented with pale-golden pubescence. Frontal stripe at vertex one-fifth as wide as head, at frons half as wide as at vertex, with long hairs which are yellow at sides; face convex, prominent, slightly retreating towards mouth, polished; frons and face with whitish-yellow pubescence. Antennæ short and stout, ferruginous, comparative lengths 3-1-16; third joint thick, hardly compressed, bluntly pointed; arista thick, shorter than third joint: the two basal joints with numerous short hairs. Thorax black, margined with golden-yellow, long pubescence, most conspicuous on posterior margin: a transverse, arcuate fascia of golden hairs before the middle; pleuræ with long yellowish-white hairs on anterior half; scutellum prominent, with two short, stout teeth, black with short black pubescence similar to that on dorsum of thorax. Abdomen longer than broad, broadest at apex of second segment, ferruginous and black; first segment black, second dark basally and along apical margin, third darkened on apical half, the very long fourth segment with two large, indistinct, dark, lateral patches; all the segments with short golden pubescence, most conspicuous on posterior margin of third segment. Legs ferruginous, the femora darker, fore and mid femora with rather noticeable white pubescence posteriorly; all the tarsi thickened; fore tarsi shorter than tibiæ, the joints decreasing in length, except the last, fourth very short, twice as broad as long; hind tarsi similar but the first joint broader than tibiæ. Wing with the outer half grey above the third vein, and broadly tinged with grey along the cross-veins and the fourth and fifth veins, the darkening produced by dense, microscopic, downy hair; stump of the third vein well developed, extending more than half-way across first posterior cell; vein closing the discal cell bent strongly inward at first but finally joining the fourth vein at nearly a right angle. Length, 8 mm.

One male. Hobart, Tasmania, from ants' nest (A. M. Lea).

The puparium is of the shape usual in this genus: elliptical, strongly convex, flattened beneath where it is attached to a stone or other surface. The colour is dull yellowish-brown, obscured by irregularly attached particles of earth; the anterior pupal respiratory horns and the posterior larval ones are ferruginous; posterior respiratory tubercle bifid at tip. The dorsal surface is nearly smooth and shows none of the usual reticulations, but instead is studded with scattered prominent brown tubercles (somewhat obscured by the attached particles of earth). Length, 7 mm.; width, 5.5 mm.; height, about 3 mm.

Microdon brachycerus appears to be related to the Tasmanian species described by Macquart as *Aphritis vittatus* and *A. pictipennis*. The figure of the wing given by Macquart for the latter species (Dipt. Exot., Suppl. 4, pl. xii., fig. 12) agrees very well with the wing of our species; however, there are too many other differences (even allowing for Macquart's notorious inaccuracies) to admit the identity of the specimen before us with *pictipennis*. Furthermore, Macquart himself had some doubt that the male he described under *pictipennis* is correctly associated, and there is nothing to indicate whether the figure of the wing was taken from the female or male. In *M. brachycerus* the antennæ are unusually short and stout.

***Limosina mrymecophila*, n. sp**

♀. Shining black. Frons brown, shining, devoid of hairs, only the strong bristles present; these consist of two upwardly divergent central rows of three each, which are slightly incurved, of almost equal strength, and equidistant serially; a pair of closely-placed, nearly equal-sized bristles at above the middle near to eye margin, one near lateral posterior angle, one post-vertical on each side and one pair on ocellar triangle; antennæ clear yellow, first joint as long as third (the apparent second), first joint with several black bristles on inner surface, third joint slightly pubescent; arista very long and thin, slightly pubescent; face yellow, darker towards antennæ, one very long and strong and 2-3 very small bristles on jowls; palpi small, yellow. Thorax shining black, bare in front, the usual pubescent hairs increasing in number and length towards posterior margin, two distinct pairs of dorso-central bristles; scutellum large and broad, regularly rounded on posterior margin. Abdomen highly polished, bare except on posterior margin of last two and lateral margins of all segments; third segment with a raised transverse ridge at close to posterior margin. Legs

black, only the trochanters, extreme bases of tibiae, and tarsi yellowish; fore femora with 2-3 strong bristles near tip on antero-ventral surface; fore tibiae pubescent; mid femora with two antero-dorsal bristles at near tip; mid tibiae with one strong dorsal bristle at slightly beyond basal third and two at about apical fourth—one each on antero—and postero-dorsal surfaces, besides these strong bristles there are several weaker hair-like ones, two of which are at basal third and one at apical third, as well as many strong hairs; hind femora and tibiae with numerous hairs but no bristles. Wings with costa spined, more numerous and weaker beyond first vein; first costal division about twice longer than second, third four times as long as second and distinctly longer than fourth; second vein twice curved, nearer to costa on basal half than on apical half, striking costa at right angles; third vein only slightly bent upward and reaching margin at close to tip; fourth vein reaching fully half-way to wing margin; fifth vein distinct to mid-way to margin; cross-veins nearly upright; first costal cell brown, second clear, third dark at base, middle, and tip; second submarginal cell brown at tip; a brown streak from front margin to near hind margin at middle, and a large rounded spot at near basal third; first posterior cell with the tip brown and a rounded spot beyond and one before middle; the entire hind margin of wing brown, with only an inverted U-shaped clear patch in second posterior cell and two clear spots near anal angle; discal cell with a rather triangular patch of brown on lower margin at middle. Halteres black. Length, 2 mm.

One female. Otford, New South Wales, Australia (A. M. Lea). With the ant *Ectotomma metallicum*.

ABSTRACT OF PROCEEDINGS
OF THE
Royal Society of South Australia
(Incorporated)
FOR 1911-12.

ORDINARY MEETING, NOVEMBER 9, 1911.

THE PRESIDENT (J. C. Verco, M.D., F.R.C.S.) in the chair.

NOMINATIONS.—T. S. Poole, B.A., LL.B., solicitor, Adelaide, as Fellow, and Miss R. Stenhouse as Associate.

EXHIBITS.—Mr. A. M. LEA, F.E.S., exhibited weevils of the genus *Mandalotus*, and also *Frenchia*, which he said was the most extraordinary insect in the world, infesting *Banksias* and *Casuarinas*. The young are viviparous, and resemble the larvæ of the ordinary scale insects, but the metamorphosis is stranger than that of many insects. Mr. J. G. O. Tepper remarked that when parrots were abundant the *Frenchia* galls were rare, and that he had seen the young issuing from the tubes. Dr VERCO exhibited *Edentellina typica*, recently described by Pritchard and Gatliff, which he had met with while dredging in South Australia. The umbo is only on one valve, and remarkable in shape, like a tiny nautilus shell.

DISCUSSION.—Mr. S. DIXON initiated a discussion on "The Influence of Metallic Minerals on Vegetation." Mr. A. M. Lea thought that the Agricultural Department was the right body to take up this subject. Professor Rennie said that it was a complex matter, requiring prolonged biological and chemical investigation. Messrs. Edquist and Tepper also joined in the discussion.

ORDINARY MEETING, APRIL 11, 1912.

THE PRESIDENT (J. C. Verco, M.D., F.R.C.S.) in the chair.

ELECTION.—T. S. Poole, B.A., LL.B., solicitor, Adelaide, was elected a Fellow.

NOMINATIONS.—F. R. Zietz, ornithologist, South Australian Museum; L. K. Ward, B.A., B.E., Government Geologist, Adelaide; and R. L. Jack, B.E., Assistant Government Geologist, Adelaide, were nominated as Fellows.

EXHIBITS.—Mr. W. HOWCHIN, for Mr. C. E. Broughton, exhibited specimens of turquoise discovered by Mr. Greenwood, jun., at Mount Painter, South Australia. Turquoise is a hydrous phosphate of alumina. The determination was made at the Technological College, Sydney. This is its first recorded appearance in South Australia, and Mr. Howchin, in view of the value of the mineral, recommended that the locality be searched for better specimens. Mr. Dixon said that he had found turquoise on the Murchison goldfield, Western Australia. Mr. E. ASHBY exhibited birds of the Swift family, including *Salangana esculenta*, from New Guinea, which has also been recorded from South Australia, and which constructs the so-called edible birds' nests; the Australian spine-tailed swift (*Chaetura caudacuta*); and the Javanese swallow (*Hirundo javanica*), also recorded from Australia. THE PRESIDENT exhibited a series of eight perfect adult specimens of "*Scaphella roadnightia*." This remarkable mollusc was first obtained on the Ninety-mile Beach, Victoria, by Baron von Mueller, who discovered the first specimen propping up a hotel window, and gave it to Mr. McCoy, who described it in 1881. None had been obtained alive until two were taken by the "Endeavour" off Eucla in 100 fathoms. This shell varies extremely in size, the micromorphs and macromorphs being respectively smaller and larger than the type. The apex or protoconch is always present and exceedingly adherent, while in many other species of *Voluta* it is invariably absent in adult specimens.

PAPERS.—"The Ionization produced by the Impact of Solid Bodies in Air," by Professor KERR GRANT, M.Sc. He described the experiments carried out by himself and Mr. G. E. M. Jauncey, B.Sc. "The occurrence of an Outlier of Lower Cainozoic Rocks, in the River Light, near Mallala," by WALTER HOWCHIN, F.G.S.

ORDINARY MEETING, MAY 9, 1912.

THE PRESIDENT (J. C. Verco, M.D., F.R.C.S.) in the chair.

ELECTIONS.—F. R. Zietz, ornithologist, South Australian Museum; L. K. Ward, B.A., B.E., Government Geologist, Adelaide; and R. L. Jack, B.E., Assistant Government Geologist, Adelaide, were elected Fellows.

NOMINATIONS.—J. G. O. Tepper, F.L.S., Norwood, as an Honorary Member, and A. C. Broughton, undergraduate, Adelaide University, as a Fellow.

EXHIBITS.—Mr. W. HOWCHIN exhibited a fine example of geological ripple marks on a face of Lower Cambrian

quartzite, obtained near Laura by Mr. M. H. Thiele, head teacher of Laura Public School, who had forwarded it to the University. Mr. A. M. LEA exhibited an insect-catching grass (*Cenchrus australis*) gathered by him near Cairns, Queensland. The outer glumes of the spikelets were armed with barbed hairs or bristles, on which numerous insects were impaled. The plant does not appear to draw nourishment from these. Mr. F. R. ZIETZ exhibited anchovies brought by Mr. W. B. Poole from the Glenelg River, where they appear to be the prey of bream. Others from Port Willunga had been secured by Mr. A. H. C. Zietz. He also exhibited an *Aplysia* brought from Port Lincoln by Mr. Randell. THE PRESIDENT exhibited a large new volute found off Newland Head, and more recently in the Australian Bight, in 100 fathoms; also a beautifully perfect specimen of *Cominella torri*, fragments of which he had previously found on St. Francis Island. This specimen was trawled in 100 fathoms. It locates the species in the genus *Nassaria*.

PAPER.—“Additions to the Flora of South Australia,” by J. M. BLACK.

ORDINARY MEETING, JUNE 13, 1912.

THE PRESIDENT (J. C. Verco, M.D., F.R.C.S.) in the chair.

DEATH OF CANON BLACKBURN.—THE PRESIDENT said:—“As President I have this evening with sincere regret to formally notify the Society of the death of our esteemed Fellow, the Rev. Thos. Blackburn, B.A. This furnishes an opportunity not to be missed of publicly expressing our high appreciation of him and our sense of the great loss we have sustained. He graduated Bachelor of Arts at the London University in 1868, and leaving England about eight years later, was in Honolulu for some six years, then in Port Lincoln for about four years, and finally he settled at Woodville, where he was Rector of St. Margaret’s Church. This was in 1886, the same year that his name first appears on our list of Fellows. He must, therefore, have come into touch with our Society directly after his arrival, and this immediate alliance with a scientific body is evidence of the keenness and energy of his scientific instincts. He has consequently been associated with us for rather more than a quarter of a century. He was no nominal member. In our Transactions for 1886-1887 are to be found five papers written by him, totalling together no fewer than 184 pages of printed matter; and as the whole volume contained only 303 pages,

the Society must have felt it had struck a rich lode when it discovered Mr. Blackburn. That was in the first year of his membership, and from then until he died not a volume of our Transactions has been issued which does not contain one or more of his valuable contributions. A sort of statistical curiosity prompted me to find out the extent to which he has enriched our Proceedings, and I have counted at least forty-one papers, extending over nearly 1,700 pages; so that his scientific contributions would equal four volumes of closely printed material of more than 400 pages each. One paper during his first year covered 110 pages, and another in 1902, 114 pages. I think it probable he established a record in our Society as to abundance of material supplied. The quality of his work equalled the quantity. All his specific definitions and descriptions are given in Latin, and to one like myself, who is unacquainted with entomology, the particular department of natural history he studied, the whole substance of his papers appears to be exact, clear, and detailed, and written in cultured language, making his productions equally classical and scientific. His contributions can, as a rule, be picked out at a glance, because he frequently employed a peculiar tabulated arrangement of his numerous species in groups, which suggests the quaint poetic composition of some aberrant genius, a strangely exaggerated instance of versification after the style of the "Samson Agonistes" of Milton, or "Alexander's Feast," by Dryden. One marked example of this occurs in his paper of 1910, where he discusses more than seventy species and gives their specific diagnostics, spreading them over seven closely printed pages, in lines which begin at different distances from the left-hand margin, with a sinuous or a step-like outline, each initialled by a single or double capital letter, each distance and letter having its characteristic significance, so as to indicate to the eye the several alliances and distinctions between all the species in the group. This tabular arrangement, so ingenious and effective, shows the thoroughness and clearness of his knowledge of the subject, and must have aided investigators who referred to it as much as, if not more so, than it tried the capabilities of his linotype printer. Mr. Mayo, who was for many years our Honorary Secretary, informs me that to Mr. Blackburn probably more than any other contributor to our Proceedings is due the wide exchange our Transactions enjoy, for Entomological Societies, especially, sought to effect arrangements by which they might regularly receive our annual volumes and obtain our back numbers. This is a practical testimony to his efficiency from ex-

perts in his own department. He had not that pleasurable incentive to scientific labour which some of us have, from our association with the Royal Society, in the opportunity of publicly showing fellow-members novel or unusual exhibits in illustration of our papers, and of enlarging in a familiar way upon their points of interest. His contributions were regarded by him as too technical and abstruse to permit this; and so he worked, as it were, alone, without this encouragement and happy extraneous aid, and hence deserved the greater commendation. Not only as an author, however, has he aided our Society; but also as a member of its Executive. In October, 1887, he became a member of the Council, and served upon it without intermission until his death. In 1889 he was elected Vice-President, a position which he filled for twelve years; and in 1890 he was elected to the Presidency, and filled the chair for two years. As a member of Council he was of great assistance. Being an expert in entomology he was our referee in this department of natural history on all questions of exchange and the acceptance and printing of papers presented to the Society in this subject; while his shrewdness, trueness, kindness, and general knowledge made him very helpful in the ordinary business of the Council. When President, in 1890, he delivered an excellent address at the annual meeting, in which he strove to show the ultimate aim of the study of natural history and the urgent necessity and great advantage of collecting and recording all available facts and describing all recognized novelties in our Australian continent, and to do this as quickly, accurately, and fully as possible while the opportunity is afforded, and before commerce, agriculture, and extending civilization shall prevent the possibility of such work. He certainly practised what he preached, and is one of the best examples of such industry, accuracy, and promptitude. And now that his work is done we trust others will take the subject up where he has left it, so realize his ideals, suffer his word of exhortation, and follow in his steps. We shall miss his well-known, delicate, almost ascetic, form, as though 'much study had made him very lean'; we shall miss his keen face, his dark, bright, intelligent eyes, his gentle and courteous manner, his quiet modesty and reserve; but we shall recall with pleasure and pride the many excellent qualities of our late Fellow; while our Transactions will ever remain a monument to his interest and delight in the scientific study and his wonderful knowledge of those humbler members of the animal kingdom—the creeping things of the earth." Mr. A. M. Lea added some reminiscences of Canon Blackburn,

ELECTIONS.—J. G. O. Tepper, F.L.S., Norwood, was elected an Honorary Fellow; A. C. Broughton, undergraduate, Adelaide University, was elected a Fellow; and Professor Kerr Grant, Adelaide University, was elected a member of Council to fill the vacancy caused by the death of Rev. Canon Blackburn, B.A.

EXHIBITS.—Mr. ASHBY exhibited some pigeons, robins, kingfishers, and rifle-birds. Mr. EDQUIST exhibited an abscess formation in the fat of a shoulder of mutton. Dr. E. A. JOHNSON exhibited a section of the aorta of one of the Pharaohs, received from the Curator of the Royal College of Surgeons of England.

PAPER.—“The Giant Monitor of Central Australia (*Varanus giganteus*), with a Note on the ‘Fat Bodies’ of this Species,” by Professor E. C. STIRLING, C.M.G., F.R.S., etc. The paper was illustrated by the exhibition of a large stuffed specimen of the species, and also the claws and vertebræ of a fossil species, immensely larger, for comparison.

SPECIAL MEETING, JULY 11, 1912.

THE PRESIDENT (J. C. Verco, M.D., F.R.C.S.) in the chair.

ALTERATION OF RULE 17.—On the motion of Mr. S. DIXON, seconded by Mr. W. B. POOLE, it was resolved—“That in Rule 17 the words ‘with the prescribed subscription (if any)’ be struck out.”

PROPOSED ALTERATION TO BY-LAW 1 OF SECTION I.—Mr. W. B. POOLE moved and Mr. S. DIXON seconded—“That this by-law be altered by the addition of the words ‘but if elected after June 1 the subscription shall be 10s. 6d. for the remainder of the year.’” After discussion the motion was lost.

ORDINARY MEETING, JULY 11, 1912.

THE PRESIDENT (J. C. Verco, M.D., F.R.C.S.) in the chair.

NOMINATION.—Captain S. A. White, “Weetunga,” Fulham, as a Fellow.

EXHIBITS.—Mr. A. M. LEA exhibited wasps’ nests from Queensland. The largest kind was built on the bark of a eucalypt, which in course of time shelled off and fell to the ground, carrying the nest with it. The specimen came from Mount Tambourine, Logan River district, and was estimated to contain 80,000 cells, made of a wood-paste prepared by the wasps, and then built up into the papery walled compartments. The nests of the two smaller species came from Townsville. Mr. HOWCHIN referred to the architecture of a British species observed by him in England. Mr. LEA also

exhibited *Anobium paniceum*, the so-called bread or biscuit beetle, recently found eating the poisonous seeds of *Strychnos nux-vomica* in a suburban pharmacy. Mr. JACK exhibited a strange fungus from Gawler Ranges for identification. He was advised to hand it to Professor Ewart in Melbourne or to the Victorian Mycological Society. THE PRESIDENT exhibited two species of Gasteropoda:—(1) *Cypraea umbilicata*, Sowerby, in Tankerville's Catalogue. Later this was regarded as a monstrosity of *C. tigris*, Linn., and then of *C. pantherina*, Linn. Afterwards a number were found at Barren Island by Gunn, a Tasmanian, and proved it to be a valid species. He also exhibited specimens taken by the Commonwealth trawler in the Great Australian Bight, which were more globular than the type, and lacked the peculiar projection of the anterior part of the aperture found in the more eastern examples, and had a rich uniform apricot colour on the base. He proposed to call the western examples exhibited (*C. umbilicata*, var. *armeniaca*, Verco. (2) *Scaphella fulgetrum*, Gray. The exhibited series of this beautiful shell contained specimens from as far east as Kingston, and others dredged as far west as the longitude of Eucla. It showed remarkable variations, some shells being unicolored and some having spot-bands or lightning marks, or spiral-bands, either alone or in conjunction. It also included both macromorphic and micromorphic forms.

PAPER.—“Notes on Recurrent Transgressions of the Sea near Dry Creek,” by WALTER HOWCHIN, F.G.S.

ORDINARY MEETING, AUGUST 8, 1912.

THE VICE-PRESIDENT (Walter Rutt, C.E.) in the chair.

ELECTION.—Captain S. A. White, “Weetunga,” Fulham, was elected a Fellow.

NOMINATIONS. — Hugh Corbin, B.Sc., Lecturer in Forestry, Adelaide University, and J. Desmond, veterinary surgeon, Adelaide, as Fellows.

EXHIBITS.—Mr. A. M. LEA exhibited ant commensals, including species of *Saragus*, *Trox*, *Histerida*, *Staphylinida*, and *Chlamydopsis*; also a hippoboscid fly from a wallaby. Mr. F. R. ZIETZ exhibited a large sub-fossil, *Turbo stamineus*, Martyn, from the travertine limestone at Brentwood, Yorke Peninsula.

PAPER.—“Further Notes on Australian Coleoptera, with Descriptions of New Genera and Species,” by the late CANON BLACKBURN, B.A. Communicated by Mr. A. M. LEA.

ORDINARY MEETING, SEPTEMBER 12, 1912.

THE PRESIDENT (J. C. Verco, M.D., F.R.C.S.) in the chair.

EXHIBITS.—Mr. J. G. O. TEPPER exhibited a photograph of a species of *Podargus*, taken on the nest; also pictures of icebergs painted in 1858 by the late Mr. F. S. Crawford on his voyage from England in the ship "Istamboul." Mr. A. M. LEA exhibited fine specimens of the very dissimilar sexes of *Ornithoptera priamus* or *Proides*. THE PRESIDENT exhibited a fine series of *Voluta papillosa*, Swains, from Tasmania, Victoria, and South Australia, including the rare ribbed variety and macromorphic and micromorphic forms. This series showed the necessity of having many specimens from different localities to prove the continuity of form and prevent the multiplication of species; the ribbed form having been described by Brazier as a separate species, *Voluta kenyoniana*.

PAPERS.—"The Polyplacophora of South Australia," by W. G. TORR, LL.D., M.A., B.C.L., illustrated by the exhibition of Chitons. "The Curculionidæ of Australia, Part x., *Cryptorhynchidæ*," by A. M. LEA, F.E.S., illustrated by exhibits of many of the species described.

ANNUAL MEETING, OCTOBER 10, 1912.

THE VICE-PRESIDENT (Professor E. H. Rennie, M.A., D.Sc., F.C.S.) in the chair.

An apology on account of illness was received from the President.

A letter was received from Dr. Pulleine resigning the office of Secretary on account of pressure of business.

The Annual Report was taken as read and adopted.

The Balance-sheet was read by the Hon. Treasurer and adopted.

ELECTION OF OFFICERS.—*President*, J. C. Verco, M.D., F.R.C.S.; *Vice-Presidents*, Professor E. H. Rennie, M.A., D.Sc., F.C.S., and R. H. Pulleine, M.B.; *Hon. Treasurer*, W. B. Poole; *Members of Council*, Samuel Dixon and G. G. Mayo, C.E.; *Hon. Secretary*, Walter Rutt, C.E.; *Hon. Auditors*, W. L. Ware and H. Whitbread.

It was resolved—"That a letter be forwarded to Mr. J. S. Lloyd, F.I.A., S.A., who is relinquishing the position of Auditor on account of age, expressing regret and appreciation of his long-continued past services."

EXHIBITS.—Mr. A. M. LEA exhibited a case of contents of birds' stomachs; also a case of insects collected by Captain White during his rambles in the Gawler Ranges.

PAPERS.—"The late Rev. T. Blackburn, B.A., and his Entomological Work," by A. M. LEA, F.E.S. "Notes on the Marine Mollusca of South Australia, with Descriptions of

New Species, Part XV.," "Notes on the Marine Mollusca of Western Australia, with Descriptions of New Species, Part II.," and "Mollusca from the Great Australian Bight," by J. C. VERCO, M.D., F.R.C.S. "Notes on the Occurrences of Silica near Mount Painter, Flinders Range," by A. C. BROUGHTON. "Description of Wild Hybrids of Australian Ducks," by F. R. ZIETZ. "New Australian Diptera from Ants' Nests," by FREDERICK KNAB and J. R. MALLOCK, communicated by A. M. LEA. "Additions to the Flora of South Australia," by J. M. BLACK.

ANNUAL REPORT, 1911-12.

The Council has the pleasure to report that the contributions to the Society's proceedings during the year were of great scientific value and of considerable local interest, while the exhibits at its meetings have been of a varied and interesting character.

The annual volume of Transactions will include, amongst other papers, one by Professor E. C. Stirling, C.M.G., F.R.S., on "The Giant *Veranus* of Central Australia," which contains much unpublished information. Dr. W. G. Torr, in his paper on "The Polyplacophora of South Australia," has brought our knowledge of this interesting family of Mollusca up to date and described several new forms. Professor Kerr Grant, in his paper on "The Ionization Produced by the Impact of Solid Bodies in Air," has again introduced physical subjects into our Transactions, and the Council hopes in future to receive many of his valuable contributions.

Several series of papers which have been running through the Transactions for some years have been continued during the present session. Dr. J. C. Verco deals again with the South Australian Marine Mollusca and with the Marine Shells of Western Australia; Mr. A. M. Lea, F.E.S., with Australian Curculionidæ; Mr. J. M. Black with South Australian Introduced and Indigenous Plants; and Mr. W. Howchin, F.G.S., with the Geology of South Australia.

The Society has suffered a great loss by the death of the Rev. Canon Blackburn, B.A., F.E.S., who, since his election as a Fellow in 1887, has been the most voluminous contributor to the Society's Transactions. Part xlii. of his "Notes on Australian Coleoptera," which was almost ready for

publication at the time of his death, was prepared for publication and communicated by Mr. A. M. Lea, who has also contributed an able paper upon the late Canon's life and entomological work.

One of our Fellows, Dr. Mawson, has again been engaged throughout the whole of this year in scientific exploration in the Antarctic.

A great advance has been made towards securing the western portion of Kangaroo Island as a reserve (which it is proposed to name Flinders Chase), the Commissioner of Crown Lands having asked for and received from your Council an outlined scheme for the formation and working of the Reserve and an estimate of the cost of initiating and maintaining the same, with a view to the preparation of a Bill to be laid before Parliament. The Fauna and Flora Protection Committee of our Field Naturalists' Section is to be congratulated upon having progressed so far in this matter.

Great progress has been made, under Mr. Clucas and his assistant, towards placing the Society's valuable library in a satisfactory condition. More shelving has been provided, the books have been reshelved, and the indicator will soon be affixed. A considerable number of volumes has been bound, and many more are in the binder's hands. Arrangements have been made for the Assistant Librarian to be present prior to each meeting of the Society for the purpose of lending books to the Fellows.

The demand for the Society's publications still continues, and several important exchanges of whole sets have been arranged with other learned Societies.

During the year seven new Fellows have been elected, and Mr. J. G. O. Tepper, in recognition of his past scientific services, has been transferred to the class of Honorary Fellows. The membership now comprises 10 Honorary Fellows, 5 Corresponding Members, 75 Fellows, and 1 Associate.

JOS. C. VERCO, *President.*

ROBERT PULLEINE, *Hon. Secretary.*

ROYAL SOCIETY OF SOUTH AUSTRALIA (INCORPORATED).

REVENUE AND EXPENDITURE FOR 1911-1912.

	£	s.	d.	£	s.	d.
To Balance, October 1, 1911	533	3	1
By Transactions—						
Subscriptions—						
Royal Society	72	13	6
Field Naturalists' Section	59	14	0
Malacological Section	0	13	6
Microscopical Section			
Grants from Government—						
On Subscriptions	77	10	0
For Printing Reports on Scientific Investigations in South Australia	0	13	6
Sale of Transactions			
Donations and Interest—						
Donation	20	0	0
Interest on S.A. Government Stock	4	5	0
Savings Bank Interest	3	0	0
Library—						
New Shelving and Binding Books	41	0	0
Cataloguing	10	18	9
Purchase of Microscope			
Caretaking and Lighting	11	12	2
Printing, Stationery, and Postage	14	1	2
Advertising	0	10	0
Bank Account Charges	0	10	0
Transfer to Endowment Fund	26	13	4
Balance, September 30, 1912	120	10	10
Balance, September 30, 1911	537	4	0
				£996	16	1

Examined and found correct—

J. S. LLOYD, F.I.A.S.A.,
 HOWARD WHITEHEAD, } *Hon. Auditors.*

W. B. POOLE, *Hon. Treasurer.*
 September 30, 1912.

(1) Printing of Memoir, part 4, vol. ii., is not quite completed. Liability for printing about £65.

DONATIONS TO THE LIBRARY

FOR THE YEAR 1911-12.

TRANSACTIONS, JOURNALS, REPORTS, ETC.,

presented by the respective editors, societies, and
governments.

AUSTRALIA.

- AUSTRALIA. *Bureau of Census and Statistics*. Official year book, no. 5, 1901-11. Melb. 1912.
- Shipping and oversea migration, 1910. Melb.
- Social insurance. Melb. 1910.
- *Bureau of Meteorology*. Average rainfall map of Western Australia. Melb. 1912.
- Climate of the Yass-Canberra district. Melb. 1912.
- Monthly report, vol. 1, no. 12-13. Melb. 1912.
- Report on observations during official visit to Europe. Melb. 1911.
- Results of rainfall observations in Victoria, 1840-1910. Melb. 1912.
- *Dep't of Trade and Customs*. Zoological results of the fishing experiments carried out by F.T.S. *Endeavour*, pt. 1-3. Melb. 1912.
- ROYAL ANTHROPOLOGICAL SOCIETY OF AUSTRALIA. *Journal: Science of man*, vol. 13, no. 1-10. Syd. 1911-12.

NEW SOUTH WALES.

- AGRICULTURAL GAZETTE OF NEW SOUTH WALES, vol. 22, pt. 10-12; vol. 23, pt. 1-10. Syd. 1911-12.
- AUSTRALIAN MUSEUM. *Memoir* 4, pt. 16. Syd. 1911.
- *Miscellaneous ser.* 7. Syd. 1912.
- *Records*, vol. 8, no. 3; vol. 9, no. 1-2. Syd. 1912.
- *Report of the trustees*, to June, 1911. Syd. 1911.
- *Special catalogue*, vol. 3, pt. 4. Syd. 1912.
- LINNEAN SOCIETY OF NEW SOUTH WALES. *Abstract of proceedings*, no. 296-304. Syd. 1911-12.
- *Proceedings*, vol. 35, pt. 4; vol. 36, pt. 1-4; vol. 37, pt. 1. Syd. 1911-12.
- MAIDEN, J. H. *Critical revision of the genus eucalyptus*, pt. 14-16. Syd. 1912.
- *Forest flora of New South Wales*, vol. 5, pt. 6-9. Syd. 1912.

- NEW SOUTH WALES. *Board of Fisheries*. Future of commercial marine fishing in New South Wales; by D. G. Stead. Syd. 1911.
- On the need for more uniformity in the vernacular names of Australian edible fishes; by D. G. Stead. Syd. 1911.
- *Botanic Gardens and Government Domains*. Report of the director, 1910. Syd. 1911.
- *Dep't of Agriculture*. Science bulletin, no. 1-4. Syd. 1912.
- *Dep't of Mines*. Annual report, 1911. Syd. 1912.
- *Geological Survey*. Mineral resources, no. 13-16. Syd. 1912.
- NEW SOUTH WALES NATURALISTS' CLUB. *Journal: The Australian naturalist*, vol. 2, pt. 9-12. Syd. 1912.
- ROYAL SOCIETY OF NEW SOUTH WALES. *Journal and proceedings*, vol. 44, pt. 4; vol. 45, pt. 1, pt. 3.
- UNIVERSITY OF SYDNEY. *Calendar*, 1912. Syd. 1912.

QUEENSLAND.

- QUEENSLAND. *Dep't of Mines*. Geological Survey publications, no. 235, 237. Brisb. 1912.
- ROYAL SOCIETY OF QUEENSLAND. *Proceedings*, vol. 23, pt. 2. Brisb. 1912.

SOUTH AUSTRALIA.

- PUBLIC LIBRARY, MUSEUM, AND ART GALLERY OF SOUTH AUSTRALIA. *Report of the Board of Governors*, 1910-11. Adel. 1912.
- SOUTH AUSTRALIA. *Dep't of Mines*. *Review of mining operations*, no. 14-16. Adel. 1911-12.
- *Government Geologist's report on the uranium ores of South Australia*. Adel. 1911.
- *Woods and Forests Dep't*. *Annual progress report*, 1910-11. Adel. 1911.
- SOUTH AUSTRALIAN SCHOOL OF MINES AND INDUSTRIES. *Annual report*, 1910-11. Adel. 1911-12.

TASMANIA.

- ROYAL SOCIETY OF TASMANIA. *Papers and proceedings*, 1911. Hobart. 1911.
- TASMANIA. *Dep't of Mines*. *Progress of the mineral industry of Tasmania*, Sept., 1911; Dec., 1911; March, 1912; June, 1912. Hobart. 1911-12.
- *Geological Survey*. *Bulletin*, 10-12. Hobart. 1912.

VICTORIA.

- NATIONAL MUSEUM. Memoirs, no. 4. Melb. 1912.
- ROYAL SOCIETY OF VICTORIA. Proceedings, n.s., vol. 24, no. 1-2; vol. 25, no. 1. Melb. 1911-12.
- VICTORIA. *Dep't of Agriculture*. Journal, vol. 9, pt. 12; vol. 10, pt. 1-10. Melb. 1912.
- *Dep't of Mines*. Annual report of the Secretary for Mines, 1911. Melb. 1912.
- Bulletin of the Geological Survey, no. 24, 26. Melb. 1912.
- Memoirs of the Geological Survey, no. 10-11. Melb. 1912.
- Records of the Geological Survey, vol. 3, no. 2. Melb. 1912.
- VICTORIAN GEOGRAPHICAL JOURNAL, vol. 28. Melb. 1912.
- VICTORIAN NATURALIST, vol. 28, no. 8, 10-12; vol. 29, no. 1-6. Melb. 1912.
- VICTORIAN YEAR BOOK, vol. 31, 1910-11. Melb. 1912.

WESTERN AUSTRALIA.

- WESTERN AUSTRALIA. Meteorological observations made at Perth Observatory, *etc.*, 1907. Perth. 1910.
- WEST AUSTRALIAN NATURAL HISTORY SOCIETY. Journal, vol. 3, pt. 1-2. Perth. 1910-11.

ENGLAND.

- BRITISH ANTARCTIC EXPEDITION, 1907-9. Reports on the scientific investigations, vol. 1, pt. 7. Lond. 1911.
- BRITISH MUSEUM. Guide to W. Smith's drawings of field and cultivated mushrooms, *etc.* Lond. 1910.
- Guide to the exhibition of animals, plants, and minerals mentioned in the Bible. Lond. 1911.
- Synonymic catalogue of orthoptera, vol. 1-3. Lond. 1912.
- CAMBRIDGE PHILOSOPHICAL SOCIETY. Proceedings, vol. 16, pt. 3-7. Camb. 1911-12.
- CAMBRIDGE UNIVERSITY LIBRARY. Report of the Library Syndicate, 1911. Camb. 1912.
- CONCHOLOGICAL SOCIETY. Journal of conchology, vol. 13, pt. 9-10, 12. Lond. 1912.
- ENTOMOLOGICAL SOCIETY OF LONDON. Transactions, 1911. Lond. 1912.
- IMPERIAL INSTITUTE. Bulletin, vol. 9, no. 3-4; vol. 10, no. 1-2. Lond. 1911-12.
- LINNEAN SOCIETY. List, 1911-12. Lond. 1912.
- Proceedings, Nov., 1910; June, 1911. Lond. 1910-11.

- LIVERPOOL BIOLOGICAL SOCIETY. Proceedings and transactions, vol. 25. L'pool. 1911.
- MANCHESTER FIELD NATURALISTS' AND ARCHAEOLOGISTS' SOCIETY. Report and proceedings, vol. 51. Manch. 1911.
- MANCHESTER LITERARY AND PHILOSOPHICAL SOCIETY. Memoirs and proceedings, vol. 55, pt. 3: vol. 56, pt. 1-2. Manch. 1912.
- NATIONAL PHYSICAL LABORATORY. Collected researches, vol. 8. Teddington. 1912.
- Report, 1911. Teddington. 1912.
- ROYAL BOTANIC GARDENS, KEW. Bulletin, 1911. Lond. 1912.
- ROYAL COLONIAL INSTITUTE. Yearbook, 1912. Lond. 1912.
- ROYAL MICROSCOPICAL SOCIETY OF LONDON. Journal, 1911, pt. 4-6; 1912, pt. 1. Lond. 1911-12.
- ROYAL SOCIETY OF LONDON. Proceedings, ser. A, no. 582-584, 586-596. Lond. 1912.
- Proceedings, ser. B, no. 572-581. Lond. 1912.
- Year book, 1912. Lond. 1912.
- UNITED EMPIRE, new ser., vol. 2, no. 11-12; vol. 3, no. 1-9. Lond. 1912.

IRELAND.

- BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY. Report and proceedings, session 1910-11. Belfast. 1911.
- ROYAL DUBLIN SOCIETY. Economic proceedings, vol. 2, no. 3-4. Dublin. 1911.
- Scientific proceedings, new ser., vol. 13, no. 11-13. Dublin. 1911-12.
- ROYAL IRISH ACADEMY. List of members, etc., 1911. Dublin. 1911.
- Proceedings: Clare Island survey, vol. 31, no. 2, 4-6, 10-12, 14, 16-19, 22, 24, 26-31, 35, 37-41, 43-4, 51-2, 56-8, 60, 63, 65. Dublin. 1911-12.
- ——— section A, vol. 29, no. 5-6; vol. 30, no. 1-4. Dublin. 1912.
- ——— section B, vol. 29, no. 7-8; vol. 30, no. 2. Dublin. 1912.
- ——— section C, vol. 29, no. 5-9; vol. 30, no. 1-11. Dublin. 1912.

SCOTLAND.

- GLASGOW GEOLOGICAL SOCIETY. Transactions, vol. 14, pt. 2. Glasg. 1912.
- ROYAL SOCIETY OF EDINBURGH. Proceedings, vol. 31, pt. 5; vol. 32, pt. 1-2. Edin. 1911-12.

AUSTRIA.

- KAISERLICHE AKADEMIE DER WISSENSCHAFTEN. Anzeiger, Jahrg. 48, 1911. Wien. 1912.
- K.K. GEOLOGISCHE REICHANSTALT. Verhandlungen, Jahrg. 1911, Nr. 12-18; Jahrg. 1912, Nr. 1-5. Wien. 1911-12.
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1910-12.

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1911-12.

MEXICO.

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1911-12.

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1912.

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LIST OF FELLOWS, MEMBERS, Etc.,

OCTOBER, 1912.

Those marked with an asterisk have contributed papers published in the Society's Transactions.

Any change in address should be notified to the Secretary.

NOTE.—The publications of the Society will not be sent to those whose subscriptions are in arrears.

Date of
Election.

HONORARY FELLOWS.

1910. *BRAGG, W. H., M.A., F.R.S., Professor of Physics, University of Leeds, England (Fellow 1886).
 1893. *COSSMAN, M., Rue de Maubeuge, 95, Paris.
 1897. *DAVID, T. W. EDGEWORTH, C.M.G., B.A., D.Sc., F.R.S., F.G.S., Professor of Geology, University of Sydney.
 1890. *ETHERIDGE, ROBERT, Director of the Australian Museum of New South Wales, Sydney.
 1905. GILL, THOMAS, I.S.O., Under-Treasurer, Adelaide.
 1905. *HEDLEY, CHAS. H., Naturalist, Australian Museum, Sydney.
 1892. *MAIDEN, J. H., F.L.S., F.C.S., Director Botanic Gardens, Sydney, New South Wales.
 1898. *MEYRICK, E. T., B.A., F.R.S., F.Z.S., Tothrnanger, Marlborough, Wilts, England.
 1894. *WILSON, J. T., M.D., Professor of Anatomy, University of Sydney, New South Wales.
 1912. *TEPPER, J. G. O., F.L.S., Elizabeth Street, Norwood (Corresponding Member 1878, Fellow 1886).

CORRESPONDING MEMBERS.

1881. BAILEY, F. M., F.L.S., Colonial Botanist, Brisbane, Queensland.
 1880. *FOELSCHE, PAUL, Palmerston, Northern Territory.
 1893. STRETTON, W. G., Palmerston, Northern Territory.
 1905. THOMSON, G. M., F.L.S., F.C.S., Dunedin, New Zealand.
 1908. *WOOLNOUGH, WALTER GEORGE, D.Sc., F.G.S., Lecturer in Geology, University of Sydney (Fellow 1902).

FELLOWS.

1895. *ASHBY, EDWIN, 111, King William Street, Adelaide.
 1902. *BAKER, W. H., F.L.S., Glen Osmond Road, Parkside.
 1908. *BENSON, W. NOEL, B.Sc., c/o W. Benson, 63, Pitt Street, Sydney.
 1907. *BLACK, J. MCCONNELL, Alfred Street, Norwood.
 1909. *BRADLEY, EDGAR J., C.E., Hydraulic Engineer's Department, Adelaide.
 1912. BROUGHTON, A. C., University of Adelaide.
 1911. BROWN, EDGAR J., M.B., D.Ph., 3, North Terrace.
 1883. BROWN, H. Y. L., F.G.S.
 1893. BRUMMITT, ROBERT, M.R.C.S., Medindie
 1904. BRUNSKILL, GEORGE, Semaphore, South Australia

1906. BUNDEY, Miss ELLEN MILNE, 148, Molesworth Street, North Adelaide.
1907. *CHAPMAN, R. W., M.A., B.C.E., Professor of Mathematics and Mechanics, University of Adelaide.
1904. CHRISTIE, W., Rundle Street, Adelaide.
1910. *CLARK, E. V., B.Sc., Lecturer in Electrical Engineering, University of Adelaide.
1867. CLARK, M. SYMONDS, Knightsbridge.
1879. *CLELAND, W. L., M.B., Ch.M., J.P., Colonial Surgeon, Resident Medical Officer, Parkside Lunatic Asylum.
1895. CLELAND, JOHN B., M.D., Government Bureau of Microbiology, Sydney, New South Wales.
1907. *COOKE, T. W., D.Sc., Lecturer, University of Adelaide.
1912. CORBIN, H., B.Sc., Forest Department, Adelaide.
1907. DARLING, JOHN, Kent Terrace, Norwood.
1912. DESMOND, J., Currie Street, Adelaide.
1887. *DIXON, SAMUEL, Bath Street, New Glenelg.
1911. DUTTON, H. H., Anlaby.
1902. EDQUIST, A. G., Tate Terrace, Croydon.
1911. GILLESPIE, H. R., 51, Angas Street.
1904. GORDON, DAVID, Gawler Place, Adelaide.
1880. *GOYDER, GEORGE, A.M., F.C.S., Analyst and Assayer, Adelaide.
1910. *GRANT, KERR, M.Sc., Professor of Physics, University of Adelaide.
1904. GRIFFITH, H., Henley Beach.
1896. HAWKER, E. W., F.C.S., East Bungaree, Clare.
1891. *HOLTZE, MAURICE, F.L.S., Director Botanic Gardens, Adelaide.
1883. *HOWCHIN, WALTER, F.G.S., Lecturer in Geology and Palaeontology, University of Adelaide.
1911. HUGHES, W. H., Booyoolie, Gladstone.
1912. JACK, R. L., B.E., Assistant Government Geologist, Adelaide.
1893. JAMES, THOMAS, M.R.C.S., Moonta.
1910. *JOHNSON, E. A., M.D., M.R.C.S., Pirie Street, Adelaide.
1897. *LEA, A. M., F.E.S., South Australian Museum, Adelaide.
1884. LENDON, A. A., M.D. (Lond.), M.R.C.S., Lecturer in Obstetrics, University of Adelaide, and Hon. Physician, Children's Hospital, North Adelaide.
1856. LLOYD, J. S., Alma Chambers, Adelaide.
1888. *LOWER, OSWALD B., F.E.S. (Lond.), Broken Hill, New South Wales.
1905. *MAWSON, DOUGLAS, D.Sc., B.E., Lecturer in Mineralogy and Petrology, University of Adelaide.
1874. MAYO, GEO. G., C.E., 116, Franklin Street, Adelaide.
1907. MELROSE, ROBERT THOMSON, Mount Pleasant.
1897. *MORGAN, A. M., M.B., Ch.B., Angas Street, Adelaide.
1907. MUECKE, HUGO, C.E., Grenfell Street, Adelaide.
1884. MUNTON, H. S., North Terrace, Adelaide.
1886. POOLE, W. B., Savings Bank, Adelaide.
1911. POOLE, T. S., B.A., LL.B., Solicitor, Adelaide.
1908. POPE, WILLIAM, Solicitor, Adelaide.
1907. PULLEINE, R. H., M.B., North Terrace, Adelaide.
1907. PURDUE, R. F., Mining Agent, St. Helen's, Tasmania.
1885. *RENNIE, EDWARD H., M.A., D.Sc. (Lond.), F.C.S., Professor of Chemistry, University of Adelaide.

1911. ROACH, B. S., Education Department, Flinders Street, Adelaide.
1905. *ROGERS, R. S., M.A., M.D., Flinders Street, Adelaide.
1869. *RUTT, WALTER, C.E., College Park, Adelaide.
1891. SELWAY, W. H., Treasury, Adelaide.
1893. SIMSON, AUGUSTUS, Launceston, Tasmania.
1871. SMITH, ROBERT BARR, Adelaide.
1906. SNOW, FRANCIS H., Adelaide.
1910. *STANLEY E. R., Government Geologist, Port Moresby, Papua.
1881. *STIRLING, EDWARD C., C.M.G., M.A., M.D., F.R.S., F.R.C.S., Professor of Physiology, University of Adelaide, Director of South Australian Museum.
1907. SWEETAPPLE, H. A., M.D., Park Terrace, Parkside.
1904. TAYLOR, WILLIAM, St. Andrew's, North Adelaide.
1897. *TORR, W. G., LL.D., M.A., B.C.L., Brighton, South Australia.
1894. *TURNER, A. JEFFERIS, M.D., Wickham Terrace, Brisbane, Queensland.
1889. VARDON, SENATOR JOSEPH, Gresham Street, Adelaide.
1878. *VERCO, JOSEPH C., M.D. (Lond.), F.R.C.S., Lecturer on the Principles and Practice of Medicine, University of Adelaide, and Consulting Physician Adelaide Hospital and Children's Hospital.
1883. WAINWRIGHT, E. H., B.Sc. (Lond.), McLaren Vale.
1912. WARD, LEONARD KEITH, B.A., B.E., Government Geologist, Adelaide.
1878. WARE, W. L., Adelaide.
1859. WAY, RIGHT HON. SIR SAMUEL JAMES, Bart., P.C., D.C.L., Chief Justice and Lieutenant-Governor of South Australia, Adelaide.
1907. WEBB, NOEL A., Barrister, Waymouth Street, Adelaide.
1904. WHITBREAD, HOWARD, Currie Street, Adelaide.
1912. WHITE, CAPTAIN S. A., "Weetunga," Fulham, South Australia.
1912. *ZIETZ, F. R., South Australian Museum.

ASSOCIATE.

1904. ROBINSON, MRS. H. R., "Las Conchas," Largs Bay, South Australia.

APPENDICES.

FIELD NATURALISTS' SECTION

OF THE

Royal Society of South Australia (Incorporated).

TWENTY-NINTH ANNUAL REPORT OF THE
COMMITTEE

FOR THE YEAR ENDED SEPTEMBER 17, 1912.

MONTHLY MEETINGS, LECTURES, AND ADDRESSES.

September 19, 1911.—The Annual Meeting of this Section was held on this date, when the formal business of receiving the Committee's Report and the Hon. Treasurer's Statement of Accounts was transacted. The Report of the Fauna and Flora Protection Committee was read, and the election of officers took place for the ensuing year as follows:—

FIELD NATURALISTS' COMMITTEE—*Chairman*, Dr. R. H. Pulleine; *Vice-Chairmen*, Messrs. A. G. Edquist and J. M. Black; *Hon. Secretary*, Mr. E. H. Lock; *Hon. Treasurer*, Mr. S. S. Stokes; *Hon. Minute Secretary*, Miss E. Hocking; *Committee*, Messrs. M. S. Clark, J. Willmott, J. G. O. Tepper, and J. W. Mellor, Dr. R. S. Rogers, Mr. W. H. Selway, and Mesdames J. F. Mellor and R. S. Rogers; *Auditors*, Messrs. J. S. Lloyd and Walter D. Reed.

FAUNA AND FLORA PROTECTION COMMITTEE—Messrs. M. S. Clark and S. Dixon, Drs. R. S. Rogers and W. Ramsay Smith, Messrs. E. Ashby, E. H. Lock, J. W. Mellor, A. Zietz, W. H. Selway, J. M. Black, and A. G. Edquist, and the Chairman and Secretary of the Section *ex officio*.

Mr. S. Dixon read a farewell address as Chairman of the Fauna and Flora Protection Committee. Mr. Dixon regretted having to resign the position of Chairman after an occupation of the position for twenty-three successive years. He wished now to make way for a younger man. He referred to the first resolution made by the late Mr. A. F. Robin that was passed by the committee twenty-three years ago as follows—"That in furtherance of the proposed objects, this Sec-

tion desires to recommend that the Government Farm (now National Park, Belair) be declared a 'public park' and handed over to Trustees to manage." Mr. Dixon mentioned what had been done in securing more adequate protective game laws, in urging Nature studies in the State schools, and in protests against the alienation of forest reserves. After further reference to the fact that Mr. James Page, of Mitcham, was practically the founder of the National Park at Belair, and that the idea had been warmly taken up by the Field Naturalists' Section, Mr. Dixon referred at length to the work that had been done to secure what is to be known as the "Flinders Chase," on Kangaroo Island, for the preservation of native fauna and flora, and put in a special plea that the Natural History scientific bodies should be the preponderating influence on the new governing body of the Chase. He referred to the necessity for a strong Society of sympathetic observers to watch over the conservation interests and for the publication of literature dealing with our Natural History. Such a Society should use its influence in the propagation and planting our own native flora in the parks, as it was unfortunate that in the landscape gardening the distinctive beauties peculiarly Australian should be sacrificed to uniform imitations of European gardens. Mr. Dixon also pleaded for about 700 acres, instead of 40, which had been set apart in the National Park for the preservation of native fauna. The address was listened to with keen attention and loudly applauded.

November 21.—The Chairman of the Section (Dr. Robert Pulleine) delivered the Annual Address, and took as his subject "Prehistoric Man." The lecturer showed a fine collection of implements, and in explaining them stated that the evolution of ideas of civilization among all races in all lands was the same. He pointed out that most people were not aware of the vastly interesting subjects they had around them in Australia, and urged a study of ethnological and anthropological works as subjects for investigation by members of the Section.

April 16, 1912.—The second course of monthly meetings for the year was begun on this date, and was devoted to the description of exhibits by members. Mr. Stokes showed flowers and ferns taken on a holiday trip to New South Wales, in the district of Ourimbah. Botanical exhibits were forwarded by Mr. Hosking from the Northern Territory. Miss Hunt tabled exhibits from New Zealand and Australia. Dr. Watson sent a specimen of a hawk-moth obtained on board a steamer at sea a day and a half distant from Booby Island. Dr. Pulleine described a ceremonial staff-sign used

by the natives of Woodlark Island, New Guinea. Mr. Stokes brought greetings from the Sydney Field Naturalists' Club, with which he had spent a pleasant excursion during his holiday.

May 21.—Captain S. A. White gave an interesting address on a visit to Kangaroo Island, especially dealing with lantern illustrations of the proposed reserve for native fauna and flora. The lecturer read some extracts of the early history of the island, and remarked that it was the only land left on the Australian coast which could be made a national sanctuary for the native birds and animals of South Australia. The land was unfit for pastoral or agricultural purposes, and the fauna was being rapidly exterminated by trappers, who even encroached on the land already reserved. He entered a strong plea for their preservation.

June 18.—Mr. A. G. Edquist (Vice-Chairman) delivered a lecture with experiments and exhibits illustrative of the life of plants. By interesting demonstrations he showed how life was maintained and plants grew on land and in water, the breathing process and food absorption receiving particular attention.

July 16.—Mr. J. W. Mellor gave an account of a journey he had taken through the north-west country from Port Augusta as far as the Tarcoola and Wilgena districts. The study of the native in this country was full of interest. A number of ornithological, botanical, and mineral specimens were tabled and explained, and photographs of the country, taken by Mr. J. W. Mellor, exhibited.

August 20.—The Chairman (Dr. Robert Pulleine) gave an address on Spiders. The lecturer dealt briefly with the classification of spiders, their anatomy and development. He spoke of their economic value to producers, and showed how they kept in check the ravages of destructive enemies to various kinds of crops. The common trapdoor spider was particularly serviceable in this respect, as it was the producers' best friend in keeping down the growth of land vermin. The means of offence and defence in poison fangs were illustrated. The methods of obtaining food and migration by webs were also shown. Hunting spiders were interesting in their habits and in their methods of securing their natural food. The lecture was illustrated by a large collection of photographs thrown upon the lantern screen.

EXHIBITS.

A feature of the monthly meetings was the number of exhibits tabled by members for general observation and explanation.

On June 18 Mr. A. M. Lea exhibited a case of rare butterflies and moths. Mr. Kimber showed a shell which was regarded as new to science, which he had obtained on a dredging excursion carried out by the Section in St. Vincent Gulf. Mr. J. W. Mellor exhibited specimens from the Flinders Ranges; Mr. H. H. D. Griffith, the tsetse fly, of evil repute in sleeping sickness, also fibre of *Posidonia*, which is of commercial value; Mr. J. G. O. Tepper, the base of a grass-tree from Kangaroo Island; Mr. M. S. Clark, a pearl-shell chain, 3 ft. long, without joins in the links—the chain had probably been carved out of one shell, and was 100 years old.

On July 16 Mr. J. F. Mellor showed specimens of snail shells found at Robe and recorded for the first time on the mainland of Australia. They are a European species, and were probably transported by shipping. He also showed galls formed on a sheoak log by *Coccidæ*. Miss Kruger tabled a beautiful bloom of a Western Australian plant which had been grown here. Mr. A. M. Lea showed and described a case of dragon flies taken during a journey to Queensland. Mr. J. G. O. Tepper exhibited a collection of photographs of the early days of Lyndoch and views of Kintore Avenue before the old trees had been removed. A large acorn barnacle from a jetty pile was shown by Mr. M. S. Clark.

Exhibits were also shown at all the meetings to demonstrate the subjects taken by the lecturers. This feature of the Section's work is exceedingly instructive and interesting, and the committee hopes that the members will continue to bring exhibits of such interest to the meetings.

The evening set apart for exhibits alone was a success, and the committee will probably make further arrangements of a like character.

EXCURSIONS.

The following excursions were held during the year:—October 11, 1911, Hallett's Cove; October 28, Sturt River; November 11, Montacute; November 25, Scott's Creek; March 2, 1912, Dredging Excursion in Gulf St. Vincent; May 4, Mount Lofty; June 29, Aldgate; July 20, Brighton; August 3, Norton Summit; August 17, Black Hill; August 31, Upper Sturt.

The above excursions have been well attended, except the last, which was on Wattle Day, and a number of members were engaged at the functions arranged to celebrate that occasion.

Mr. Kimber was the fortunate member this year to report a new find in excursion work, but many members have added in their own line of study valued collections and many

specimens of interest. It should be noted that a number of the members have been working, as opportunity offered, far afield in our own State and in the other States. Wherever they have travelled their collections have been carefully noted, and those who have not had the good fortune to get far away from the usual fields for work have shared in the benefit of observations and collections by others on their return at the evening meetings.

The membership of the Section has been largely added to during the year, and the evening meetings well attended.

The committee looks back upon the year's work with considerable satisfaction from scientific, collecting, and social points of view.

R. PULLEINE, *Chairman.*

E. H. LOCK, *Hon. Secretary.*

TWENTY-FOURTH ANNUAL REPORT OF THE
NATIVE FAUNA AND FLORA PROTECTION
COMMITTEE OF THE FIELD NATURALISTS'
SECTION OF THE ROYAL SOCIETY OF SOUTH
AUSTRALIA FOR THE YEAR ENDED SEPTEMBER,
1912.

NEW CHAIRMAN.

Your committee has to report that Mr. Samuel Dixon, after acting as Chairman for twenty-three years, had at the last Annual Meeting of this Section resigned the position and retired from the committee. Mr. Edwin Ashby was appointed Chairman in his place.

FLINDERS CHASE, KANGAROO ISLAND.

The committee is pleased to report that, though no longer one of its number, Mr. Dixon has continued to take an active interest in the work, and recently, with the President of the Royal Society (Dr. Verco), Mr. Ashby, and Captain White, waited upon the Commissioner of Crown Lands (the Hon. F. W. Young) to again urge upon the Government the desirability of further extending the area of the Reserve, the fencing off with a vermin-proof fence, the appointment of a ranger to protect the fauna and flora, and the vesting of the land in Trustees. The committee understands that the suggestions were favourably received by the Commissioner, who said he would introduce into Parliament a Bill for the purpose of carrying them out.

THE WILD ANIMALS' PROTECTION BILL.

The committee understands that this Bill, embodying many amendments suggested by them, will shortly be laid before Parliament. When carried into law the long-desired protection for opossums can be given effect to, and it is hoped that protection may be extended to several other of our native animals. Under the Bill the only introduced animals which it is proposed to protect are deer. If at any time it should be decided to protect any others, their names can be proclaimed to be added to the schedule of wholly protected or to that of partially protected animals. Under the existing legislation many species of vermin might be introduced which would automatically come into the list of partially protected animals.

EDWIN ASHBY, *Chairman.*

M. SYMONDS CLARK, *Hon. Secretary.*

September 17, 1912.

BALANCE-SHEET OF FIELD NATURALISTS' SECTION OF THE
ROYAL SOCIETY.

DR.		£	s.	d.
To Postages	... ..	4	7	0
„ Printing and Advertising	... ..	5	14	6
„ Subscriptions paid to Royal Society	... ..	18	0	0
„ Balance in Bank	... ..	1	6	5
		<hr/>		
		£29	7	11
CR.		£	s.	d.
By Balance brought forward	... ..	1	5	0
„ Grant from Royal Society	... ..	10	0	0
„ Subscriptions received	... ..	18	0	0
„ Bank Interest	... ..	0	2	11
		<hr/>		
		£29	7	11

Audited and found correct,

(Signed) W. D. REED, }
J. S. LLOYD. } *Auditors.*

MALACOLOGICAL SECTION

OF THE

Royal Society of South Australia (Incorporated).

ANNUAL REPORT FOR THE YEAR 1911-12.

Eleven meetings were held during the year. There are thirteen members on the roll and there has been an average attendance of six. The members are:—Dr. Verco, Dr. Pulleine, Mrs. Robinson, Messrs. W. Howchin, F. R. Zeitz, W. D. Reed, W. J. Kimber, and F. S. Saunders, Miss Stenhouse, and Dr. Torr. The following new members have been elected this year:—Miss Robinson, Messrs. E. G. Saunders and Errol Hanley.

During the year about 140 species of shells have been identified and classified, consisting, among others, of *Haliotidæ*, *Cocculinidæ*, *Fissurellidæ*, *Stomatellidæ*, *Turbinidæ*, *Delphinulidæ*, *Cyclostrematidæ*, and *Trochidæ*. Dr. Verco is elected President for 1912-13 and Dr. Torr Hon. Secretary and Treasurer.

RECEIPTS AND EXPENDITURE FOR THE YEAR 1911-12.

Receipts.

	£	s.	d.
To Credit Balance	1	4	5
„ Subscriptions	1	15	0
„ Debit Balance	1	12	7
	<hr/>		
	£4	12	0

Expenditure.

	£	s.	d.
By Post Cards printed and Postages ...	1	17	6
„ Deed Box	0	19	6
„ Subscription to Royal Society ...	1	15	0
	<hr/>		
	£4	12	0

WILLIAM G. TORR,

Hon. Secretary and Treasurer.

MICROSCOPICAL SECTION

OF THE

Royal Society of South Australia (Incorporated).

ANNUAL REPORT, 1910-11.

[This Report was omitted from the Volume of last year's Transactions, as the manuscript was not supplied in time.—ED.]

OFFICERS.—*Chairman*, Mr. E. J. Bradley; *Vice-Chairman*, Mr. W. Fuller; *Committee*, Messrs. D. Gordon, B. S. Roach, and E. H. Matthews; *Auditors*, Messrs. A. G. Rendall and H. Whitbread; *Hon. Secretary*, Mr. H. W. H. Hale.

Your committee has to report that the conclusion of the eighth session of this Section since its reinstatement shows that it continues to make progress. A considerable number of new members have been enrolled, the exhibits have been numerous and varied, and some interesting papers contributed.

The following meetings were held during the year:—

September 27, 1910.—General Annual Meeting, when an address was given by Dr. Ray upon "Progress in Modern Methods in Medicine," dealing specially with microscopic research by means of dark-ground illumination and differential staining, the enquiry by means of the microscope into anti-toxins, immunizations, and hæmatological analysis.

October 25.—Meeting held at the laboratory of Veterinary Surgeon Desmond, who demonstrated his newly received Zeiss, dark-ground illuminating apparatus.

February 28, 1911.—Diatoms and Algæ, exhibited by Mr. Edquist; specimens of Anthropods, exhibited by Mr. Baker, who also showed the hydroid *Aglaophemia*. Address by the Chairman upon various Polyzoa, illustrated by mounts and specimens.

March 28.—Address by Mr. W. Fuller upon "Blood Relationships and Modern Discoveries in Hæmatology."

April 24.—Specimens of various Pulices exhibited by Mr. Bradley; mounts of *Demodex folliculorum*, taken from a case of red mange in the dog, by Mr. Desmond, who also exhibited balsam mounts of human blood, showing enormous macrophages. Mr. Fuller showed mounts of the blood of the

Murray turtle containing Hæmatozoa; and Mr. Showell exhibited specimens of larva and imago of midge.

May 23.—Mr. Baker showed mounts of *Astracella*, an isopod exhibiting protective mimicry.

June 27.—A committee was appointed to deal with the question of a laboratory.

August 22.—A discussion as to the future arrangements of the meetings was held, and it was decided that a less formal method of procedure should be adopted. Mr. Bradley exhibited mounts of the feather mite of the magpie and of the feathers of the humming bird, and demonstrated an electric-motor turntable, designed and made by Mr. Rendall.

EDGAR J. BRADLEY, *Chairman*.

BALANCE-SHEET, SESSION 1910-11.

Receipts.				£	s.	d.
To Subscriptions, 1910-11	...	...	...	6	2	6
„ Grant from Royal Society, 1910-11	...	...	...	5	17	6
				£12	0	0
Expenditure.				£	s.	d.
By Subscription, 1910-11, paid to Royal Society				5	17	6
„ Stationery, Printing, etc., 1910-11	...	...	...	2	17	6
„ Cash in Hand	...	...	...	3	5	0
				£12	0	0

EDGAR J. BRADLEY, *Chairman*.

Audited and found correct with Vouchers produced—

ALEXR. G. RENDALL, {
HOWARD WHITBREAD, } *Auditors*.

September 25, 1911.

ANNUAL REPORT, 1911-12.

OFFICERS.—*Chairman*, Mr. W. B. Poole; *Vice-Chairman*, Mr. W. Fuller; *Committee*, Messrs. B. S. Roach, D. Gordon, and W. H. Baker; *Auditors*, Messrs. A. G. Rendall and H. Whitbread; *Hon. Secretary*, Mr. E. J. Bradley.

Your committee has to report that the ninth session, now concluded, has shown continued progress of the Society. A number of new members have been enrolled. A feature of this session has been the abandonment of the more formal method of having papers and the adoption of the system of

"Conversation Meetings," so that the evenings during the session with two exceptions have been devoted to exhibits of objects of interest, etc., and discussions by the members thereon. The innovation has proved successful.

June 25 was devoted to a public lecture on the poultry tick (*Argus persicus*) by Mr. D. C. F. Laurie, Government Poultry Expert, the appreciation of the public being shown by an attendance of about 300 members and visitors.

At the Section's suggestion the Royal Society has purchased a microscope for the use of the affiliated sections. The instrument is a Watson's Circuit No. 1 Van Heurck microscope stand with substage, and fittings for polariscope and holographic eyepiece.

The following meetings have been held during the year:—

September 26, 1911.—Annual General Meeting. Election of officers and a paper by Mr. W. H. Baker on "Some Crustacean Parasites"; also exhibit of pond-life specimens from Blackwood by Mr. E. J. Bradley.

October 24.—Conversation Meeting. Mr. Desmond exhibited "Culpepper-Scarlett" microscope, dated 1740. Mr. W. B. Poole exhibited rotifers, *Philodenia* (sp. ?). Rev. T. Ward exhibited "commercial" microscopic slides sent out by dealers in London. Amazement was expressed that such unsatisfactory slides should be sent out by reputable dealers.

November 28.—Mr. W. H. Baker exhibited mounts of small insects cleared with chloral and phenol (equal parts). Mr. Bradley exhibited parasites on the aphid of orange-trees. Mr. W. B. Poole exhibited mounts of Diatoms, and initiated a discussion on mountings in media of high refractive indices.

March 26, 1912.—Mr. Desmond exhibited Botriocephalous worms, *Ligula replans* (*sparganium*), from the subcutaneous tissues of a fox and cow. Mr. Fuller exhibited Bausch & Lomb's 1912 model student's microscope. Mr. Bradley exhibited specimens illustrating the life history of the *Anopheles* mosquito from the River Torrens.

April 23.—Mr. Poole exhibited mounts of "Thrip," and slides of Diatoms from Pomonky, U.S.A., mounted by Mr. Showell, of Renmark. Mr. Bradley exhibited insect preparations and gave particulars for making preparations with the caustic potash method of maceration. Mr. Broughton exhibited petrological preparations. Mr. Desmond exhibited specimens of the red-tailed larva of the botfly of the horse, and also specimens of a new parasite of the fox (*Dibotriocephalus latus*).

May 28.—Mr. Poole exhibited *Gamasus coleopratorum*, a parasite on the dung beetle. Mr. Bradley exhibited four species of Gamasids obtained as parasites on the dung beetle

(*Onthophagus muinzechi*); also mounts of the ferment fly (*Drosophilus*, sp. ?), found hovering over decaying fruit, and of the larva of the red-tailed botfly of the horse.

June 25.—The Section adjourned the ordinary business for this evening and invited the general public to a lecture on the "Poultry Tick" by Mr. D. C. F. Laurie.

July 23.—Mr. Poole exhibited "arranged" mounts of Diatoms by Mr. Showell, of Renmark. Mr. Fuller exhibited section of the aorta of King Pharoah (Menephtah, the Pharoah of the Exodus), presented to the Adelaide University by Dr. Angas Johnson, and received by him from Dr. Arthur Keith, Curator of the Museum of the Royal College of Surgeons. Mr. Desmond exhibited specimens of *Hæmatopinus*, sp.—a species of louse from the sheep, considered by him to be new.

August 27.—The new microscope for the use of the Royal Society and the Sections, a Watson's Circuit No. 1 Van Heurck, was exhibited, and its use explained by Mr. Bradley. Mr. Huston exhibited a grand model Bausch and Lomb's microscope. Mr. Baker exhibited slides of *Cumacea* (sp. ?), and also mounted mites. Mr. Bradley exhibited various specimens of gamasids and dipterous insects from Broken Hill; also "natural" dissection of lingual ribbon of a species of limpet from Bass Straits.

W. B. POOLE, *Chairman*.

BALANCE-SHEET, SESSION 1911-12.

Receipts.		£	s.	d.
To Cash handed over by outgoing Hon. Secretary		3	5	0
„ Subscriptions, 1911-12	... ..	4	5	0
„ Grant from Royal Society, 1911-12	... ..	4	5	0
		<hr/>		
		£11	15	0
Expenditure.		£	s.	d.
By Stationery, Postage, and Printing, 1911-12		3	12	3
„ Subscriptions paid to Royal Society	... ..	4	5	0
„ Cash in Hand	... ..	3	17	9
		<hr/>		
		£11	15	0

EDGAR J. BRADLEY, *Hon. Secretary*.

Audited and found correct with Vouchers produced—

ALEXR. G. RENDALL, } *Auditors*.
HOWARD WHITBREAD, }

September 24, 1912.

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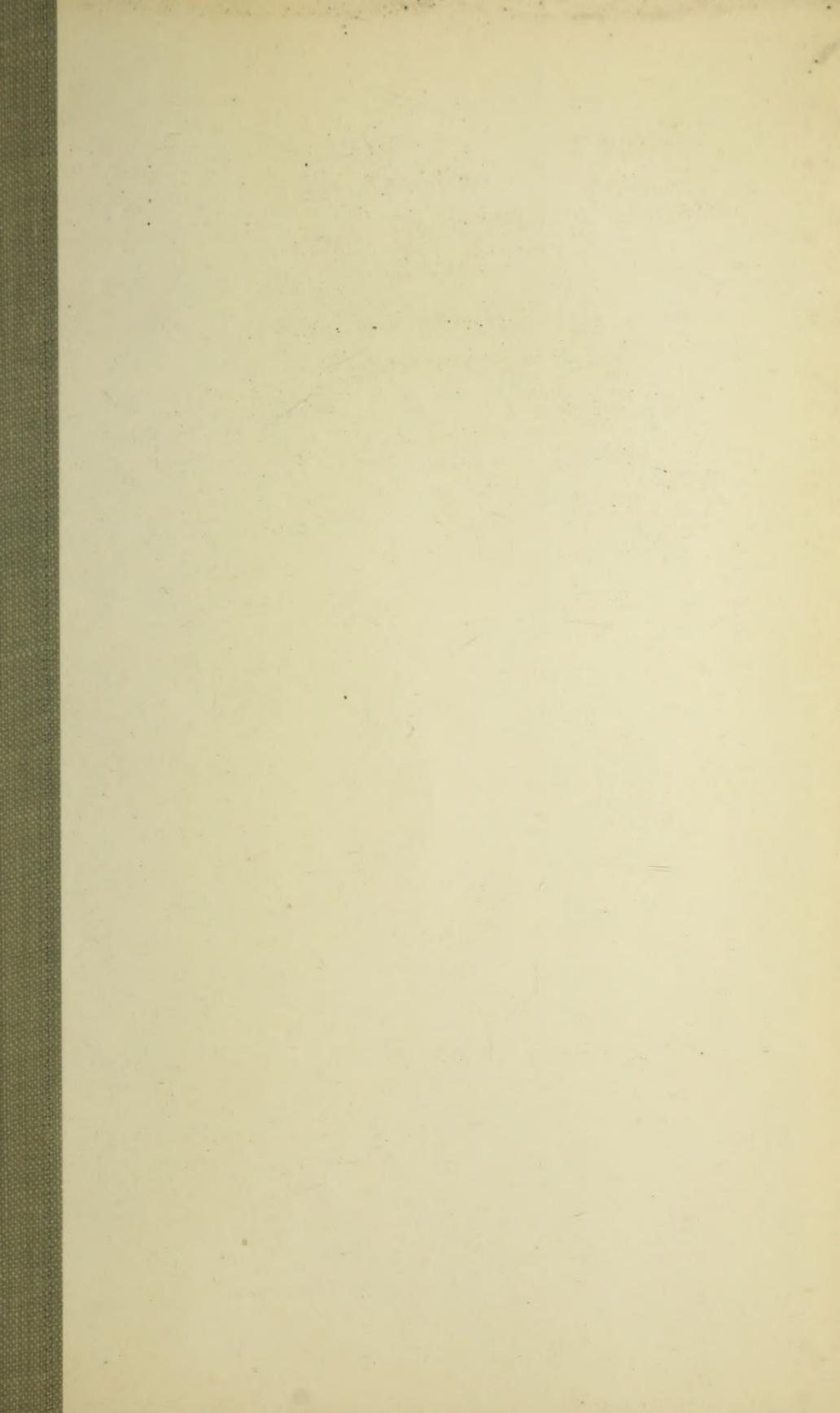
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