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

PRICE, TEN SHILLINGS AND SIXPENCE.

Adelaide:
RIGBY, LIMITED, 74, KING WILLIAM STREET.
DECEMBER, 1911.

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APPENDICES.

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.—*Pultenæa 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.

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 3½ 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.

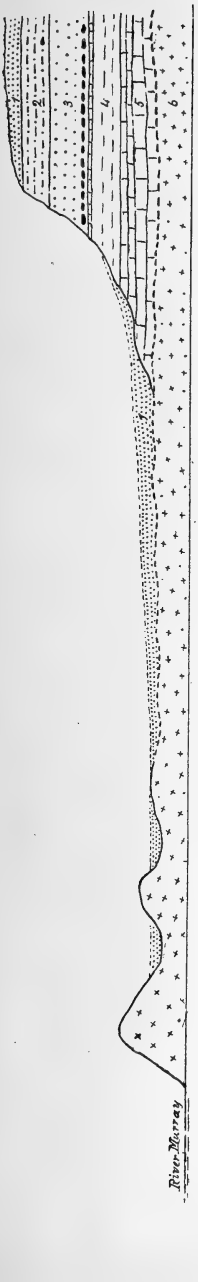
On reaching Swanport he found that a large number of bones had already been exposed, most of them having been promiscuously thrown into a hole, while others had been shovelled with the soil into the trucks and tipped on to the embankment. Mr. Zietz, who was present on the spot during a part of April 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 superjacent 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 numerously 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-

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(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,(3) 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.

(3) 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.

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(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. Bott, 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 1½ 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 Kongorong (**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**, I., 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 Köntinyeri (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

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(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 *(Unio)* 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.

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(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 Finniss. 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 command. 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 smallpox, 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

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(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**, I., 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**, I., 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 Curringài, 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, Oiē or Boiē, 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**, I., 148) gives Dr. Mair's own synopsis, which may be advantageously quoted here as summarizing his conclusions:—

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(12) Spencer and Gillen have pointed out (**29**, 20) that the line of transmission, as represented by the handing on of corroborees 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 bindness, 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 communciation with the affected blacks.

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

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(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**, I., 2, 16), Eyre (**18**, II., 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

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(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 Finniss, 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.

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(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 Poltalloch, 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. Redman, superintendent of the Point Macleay Mission Station—as, indeed, does another correspondent, Mr. G. G. Hacket—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

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[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 Northen 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 provision 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.

Description of a Disturbed Area of Cainozoic Rocks in South Australia, with Remarks on its Geological Significance.

By Walter Howchin, F.G.S., Lecturer in Geology and Palæontology in the University of Adelaide.

[Read April 4, 1911.]

Plates X. to XIX.

Contents.

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."

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(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 monoclinal 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.

Palæontological 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.
Lovenia 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.

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 Catchfly.) 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. *Kennedya 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 Æthiopis*, 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.—**Polypogon maritimus*, 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 *Curculionidæ* 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, 3-4¾ 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 inter-ocular 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. Hardcastle).

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 carinæ fairly distinct before abrasion; scrobes near apex suddenly and strongly encroaching on upper-surface. Antennæ 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 striæ; 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 setæ 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 setæ 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 setæ, longer on elytra than elsewhere; under-surface and legs with shorter, paler, and depressed setæ.

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 costæ marking margins of depression; scrobes foveiform. Antennæ 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 prothorax, 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 ($2\frac{1}{3}$ 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 LEPTOPSIDES.

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 obtuse 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, 6¼ 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 trisinuate; 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, 4-4½ 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 trisinuate; 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 bisinuate on lower surface, the apex acutely produced. Length, 4½-5½ 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, 3½ 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 *inusitatus*, 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 *fuligineus* 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 *fuligineus* 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. *(Pantopœus)*.

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.

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(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. Rostrum 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 tibiæ, with a faint longitudinal impression between insertion of antennæ; 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. *Tibiæ* 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 tibiæ; 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 *hispida*.

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 infuscate. 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 *amplicollis* 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 ∩-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 trisinuate.

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 numerously 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, *Ochrophœbe* (9) and *Orichora* (10) are wrongly placed there.

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

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(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) *Ochrophœbe* 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 *Erirhinides*, 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) ... ... *Elleschodes*
Femora edentate.
  Eyes finely faceted ... ... *Hibberticola*
  Eyes coarsely faceted.
    Tibiæ distorted in male ... ... *Sellechus*
    Tibiæ not distorted in male ... ... *Elleschus*

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 *Erirhinides*.

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

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(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 *Platybranchiatæ*, 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 litle 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 accuminate; 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.

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.

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. smaraydinus*, and other *Ischnochitonidæ*, 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 *Ischnochitonidæ* 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 Rottnest 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.

Cryptoplax (noloplax) 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. Liolophura 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 articulamentum 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 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 pustolose 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.

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 girdle 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 xlv.

(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 Finniss 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

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(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 Finniss 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]

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(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 monoclinal folds, or to die out. The doubt as to the scarp nature of the southern coast is explained in the text.

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(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 *phœnicops*, Watson, by the presence of costal fold of ♂. The genus extends to the Indo-Malayan Archipelago.

1. C. CARISTUS, Hew.

Chætnocneme 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. PHŒNICOPS, 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; *Phœnicops 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, Queensland, 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. 2*ab*, 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. Underside 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. Mabille's 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 *œluropis*, 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., Wyst. 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 cyclospila, 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 Rottnest 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 donnysa*, 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 *donnysa*, 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. *Donnysa* 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 *donnysa*, 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 Längsstrich. 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 violetbraun 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 saumwart 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 *donnysa* 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; *Telesto idothea*, M. and L.; T.R.S., p. 68. ♂, *Telesto 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.

♂, *Telesto flammeata*, Butl., Ann. Mag., N.H., 1882, p. 85; Vict., Butt. ii., p. 124, 1894; M. and L., T.R.S., p. 69. ♀, *Telesto 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 4e 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 cèrcles 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 *atrax*, 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 $\frac{2}{3}$ 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 the neuration 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 saxula*, 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'intermédiare plus petit, en outre on en voit encore un dans le 4e intervalle. Frange large, concolore et luisante. Inférieures d'un noir foncé. Dessous semblable; intervalle 1, aux premières et une partie du 2e, 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 mediane de taches semblables séparée en deux groupes, l'un de deux taches près de l'angle anterieur, et l'outre commençant au dessus de la cellule et s'arrêtant a l'espace abdominal."

In 1904 Mabille, in his Monograph of the Hesperiadæ in Wystman'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, costa gently 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 doclea*, 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 *Hesperiadæ* 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 Mabille, 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, immediately 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 underside 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.

Telesto 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.

Telesto 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 underside 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, termen gently 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. 9-9*a*; 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 *megalopis*, 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 iachus; alsi ecaudatis, flavo maculatis postis punctus 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 ⅔ 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 *phlœa* (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., xliv., 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 tibiæ 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 *mœvius*, Fabr.

Antennæ short, club forming a flattened disk, conspicuously hollowed, tip abruptly pointed; palpi ascending, terminal 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 subapical 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. papyria, Bdv.

Hesperia papyria, Bdv., Voy., "Astrolabe," Lep., p. 166, 1832. *Taractrocera cœleno*, 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 Mabille's 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. *Ancyloxypha 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 $\frac{3}{5}$ 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 *mæsa*, 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. mccccxciv. (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. 3*a*, 3*b*. *Apaustus sunias*, M. and L. (*nec* Feld.), T.R.S., p. 101.

Type in Coll. British Museum. Taken at Port Darwin, also at Dammar 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 Mabille, 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., xliv., p. 230 (1883), pl. dcxcv. *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. Underside 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 *mœsa*, 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 Mabille, 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., xliv., 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 Krefftii*, 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., xliv., 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.*, *i.l.*, 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 similar 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 redescribe 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. mccccclx. *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. Hindwings 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. 3*a*, 3*b*, 1881. *Hesperia urejus*, Plötz, Berl., Ent. Zeit., xxix., p. 226, 1885, pl. mccccxv. *H. saruna*, *ib.*, *l.c.*, xlviii., p. 90, 1886, pl. mccccxxix.

♂ ♀, 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. mccccxv. there is only one; in pl. mccccxxix. 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 Mabille 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 1*a*, 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 *agna*, 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 ♀. Mabille 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 diffèrent 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 "Jén 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. lxviii., fig. 3 ♂, 3*a* ♀, 3*b* 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. 2*a*, 2*b*, 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 *Doleschalli*, 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. lxv., 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 $\frac{3}{5}$ 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 $\frac{3}{5}$ to vein 1*b*; a large patch of black on dorsum at anal angle; an obscure whitish streak along vein 1*a* 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 1*b* 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 *underside* 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 waved, 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 1*c*, becoming undecided toward the margin; at vein 1*b* 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 *"olivaceus,"* 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 *Xylonchus* used for this genus by Lacordaire and other authors (also in Masters' Catalogue) is a synonym of *Stethaspis*.

Burmeister mentioned *lætus* 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 *lætus* is probably, as Burmeister conjectures, identical) has head, prothorax, scutellum, and legs testaceo-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 *lætus*, 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 *lætus)*. 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 hm "*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 punctuation. 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. lætus, 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 *lætus* 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 *lætus* 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 pedisbusque 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° intus spiniformi.

Feminæ antennarum flabello quam maris, et illius articulo basali quam ceteris, multo brevioribus; antennarum articulo 4° haud spinifero. Long., 9-10 l.; lat., 5½-5¾ 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*, *Rhopœa*, *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 *Rhopœa* 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 *Melonthides*" 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 tibiæ, 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 *Rhopæa* (*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 aggregates 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 *Rhopæa* 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 cylindric 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 *Rhopæa*, 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 *Rhopæa* 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 *Rhopæa* 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*, Macl. (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 laminæ (7 of about equal length) ...	magnicornis, *Blackb.*
AA. Antennal flabellum consists of 7 laminæ (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, *Blackb.*
EE. Prothorax not strongly narrowed in front, and with sides (viewed from above) lightly arched	heterodactyla, *Germ.*
DD. Elytra and whole surface of pronotum sparsely set with erect comparatively long hairs	hirtuosa, *Blackb.*
CC. Joint 3 of antennæ much more than twice as long as wide ...	assimilis, *Blackb.*

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 ... ... australis *(Holophylla)*, [*Blackb.*
DD. Disc of pronotum closely (though by no means confluently) punctulate ... ... pilosa, *Blackb.*
CC. Width of prothorax fully twice the length of same ... ... laticollis, *Blackb.*
AAA. Antennal flabellum consists of 6 laminæ (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 antennæ very short, scarcely longer than wide ... Mussoni, *Blackb.*
DD. Joint 3 of antennæ considerably longer than wide.
E. Joint 3 of antennæ abruptly rounded on inner side just before apex; body long and parallel ... ... consanguinea, *Blackb.*
EE. Joint 3 of antennæ cylindric; body much wider and less parallel ... ... rugulosa, *Blackb.*
AAAA. Antennal club consists of 5 laminæ (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-dilatate 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 *Rhopæa* known to me:—

A. Puncturation of pronotum very close and fine (as in their males).
B. Antennal flabellum with 6 long and subequal laminæ ... ... soror, *Blackb.*

BB. Antennal flabellum with only 5 long and subequal laminæ	Verreauxi, *Blanch.*
AA. Punctures of pronotum much larger and less close (as in their males).	
B. Antennal flabellum with 5 subequal laminæ, each equal to joints 1-5 of the antennæ together	Mussoni, *Blackb.*
BB. Antennal flabellum with only 3 of its laminæ 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 l.; 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° triangulari (intus quam articuli 1us 2us 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., $4\frac{4}{5}$ 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 *Rhopœa* 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. laticollis, sp. nov., Mas. Minus elongata; subtiliter pubescens, capite pronoto elytrisque pilis erectis fulvis sat elongatis vestitis, sternis pedibusque longe fulvo-pilosis; 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.*

pilosæ) formatis; prothorace quam longiori duplo latiori, antice parum angustato, supra crebre (in disco nullo modo confluenter) 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 *Rhophææ*. 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° 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 subangulatim) 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., $4\frac{4}{5}$ 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 subgrosse vix crebre punctulatis; pygidio coriaceo, leviter minus confertim subtilius punctulato.

Maris antennarum articulo 3° quam latiori multo longiori sat cylindrico, flabello quam articuli ceteri conjuncti sat longiori 6-articulato (illius articulo primo quam ceteri tribus partibus breviori).

Feminæ antennarum flabello quam articuli ceteri conjuncti multo breviori, 6-articulato (illius articulis primo perbrevi, 2° 3° 4° gradatim longioribus, 5° 6° que 4° æqualibus); tarsis quam maris multo brevioribus. Long., 11 l.; lat., $5\frac{1}{5}$ 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. rugulosæ*) affinis; multo magis angusta; antennarum articulo 3° breviori, quam latiori haud multo longiori, ad apicem quam ad basin multo latiori, ante apicem intus manifeste anguliformi; antennarum flabelli articulo 1° paullo longiori; prothorace antice magis angustata, ad basin manifeste lobato; elytrorum costulis multo minus obsoletis.

Fem. latet. Long., $10\frac{1}{2}$ 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° sat brevi quam latiori parum longiori 5° brevi intus breviter spiniformi, flabello 5-articulato (articulis 1° quam 2us dimidio, 2° quam 3us fere dimidio, brevioribus) quam articuli ceteri conjuncti sat longiori; prothorace quam longiori ut 10 ad $6\frac{1}{2}$ 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 subtillisime creberrime punctulato.

Fem. latet. Long., $11\frac{1}{2}$ l.; lat., $5\frac{1}{2}$ 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 *costulæ* 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° sat cylindrico quam latiori sat multo longiori 5° brevi intus breviter spiniformi, flabello 5-articulato (articulis 1° quam 3us dimidio breviori, 2° quam 1us 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., $4\frac{4}{5}$ 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 tibiarum posticarum spina interna ad mediam partem quam ad basin multo latiori, ét 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 verarum*, Lac.).

Rhopææ 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 laminæ 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 tibiæ 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 antennæ, and the antennæ 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 antennæ distinctly longer than joint 4	Burmeisteri, *Blackb.*
AA. Joint 3 of antennæ not longer than joint 4.	
B. Antennæ red	tasmanicus, *Burm.*
BB. Antennæ black	nigricornis, *Blackb.*

A. nigricornis, sp. nov., Mas. Subnitidus; nigropiceus, antennis nigris, pedibus et segmentis apicalibus 2 nonnihil 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° piriformi, 2° brevi subgloboso, 3° quam 2us parum longiori, 4° 3° sat æquali, 5° quam 4us paullo breviori intus dentiformi, 6° 7° que perbrevibus (intus spiniformibus), 8°-10° 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° piriformi, 2° brevi transversim globoso, 3° quam 2us sat longiori, 4° quam 3us sat breviori, 5° quam 4us parum breviori intus dentiformi, 6° 7° que brevibus intus spiniformibus, 8°-10° 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., 5½ 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 *quinquesulcatus*, 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 *Cebrionidæ*, is easily distinguished from the true *Elateridæ* 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° quam 2^us multo longiori, 11° 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° quam 2^{us} multo longiori, 11° 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.

A. 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.); Pilsbry, 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. octagonum*, 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 1*a*.

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 internal 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 4*a*.

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 ½ 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. 4*a*. 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, 5*a*, 5*b*.

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 6*a*.

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 9½ 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. 2*a*, 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. 3*a*. 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 Gruneri.

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

Pisaniinæ, 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 3*a*.

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.

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*, *Peizorhynchus nitidus*, *Rhiphidura 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 *Hysteridæ* and *Pselaphidæ* from the nests of ants; also a new genus and species of *Leucanidæ* 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 *Neolamprima 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 "Calcined 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.

ELECTICN 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*.

ROYAL SOCIETY OF SOUTH AUSTRALIA (INCORPORATED).

Revenue and Expenditure for 1910-11.

Cr.	£	s.	d.	£	s.	d.
To Balance, October 1, 1910 ...				535	2	7
,, Subscriptions—						
Royal Society	71	13	0			
Field Naturalists' Section ...	17	12	6			
Malacological Section	1	7	6			
Microscopical Section	5	17	6			
				96	10	6
,, Grants from Government—						
On Subscriptions	76	6	3			
For Printing Reports on Scientific Investigations in South Australia	150	0	0			
				226	6	3
,, Sale of Transactions				1	4	8
,, Donations and Interest—						
Donations	75	0	0			
Interest on S.A. Government Stock	75	0	0			
Interest at Savings Bank ...	10	19	9			
				160	19	9
				£1,020	3	9

Dr.	£	s.	d.	£	s.	d.
By Transactions—						
Printing	106	19	11			
Illustrating	81	7	6			
Publishing	0	15	6			
				189	2	11
,, Memoirs—						
Printing	18	15	0			
Illustrating	54	10	6			
Publishing	1	12	11			
				74	18	5
,, Grants—						
Field Naturalists' Section ...	7	0	0			
Field Naturalists' Section—Special Grant on account Fauna and Flora Protection Committee	7	13	6			
Microscopical Section	5	17	6			
				20	11	0
,, Library—						
New Shelving and Binding Books	20	3	0			
Carriage of Books	0	6	0			
Cataloguing	8	3	6			
				28	12	6
,, Caretaking and Lighting ...	15	1	6			
,, Printing, Stationery, and Postage	6	15	2			
,, Advertising	1	9	2			
,, Bank Account Charge	0	10	0			
				23	15	10
,, Transfer to Endowment Fund ...				150	0	0
,, Balance, September 30, 1911 ...				533	3	1
				£1,020	3	9

Examined and found correct—

J. S. Lloyd,
Howard Whitbread, } Hon. Auditors.

W. B. Poole, Hon. Treasurer.

September 30, 1911.

ENDOWMENT FUND.

	£	s.	d.		£	s.	d.
To Amount of Fund, October 1, 1910	2,006	0	0	By £2,000 S.A. $3\frac{3}{4}$ per cent. Inscribed Stock	1,997	10	0
,, Amount transferred from Revenue and Expenditure Account	150	0	0	,, Deposit in Savings Bank	158	10	0
	£2,156	0	0		£2,156	0	0

Examined and found correct—
J. S. Lloyd, } Hon. Auditors.
Howard Whitbread, }
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.	£	s.	d.	Expenditure.	£	s.	d.
To Credit Balance	0	13	10	By Postages	0	6	5
,, Subscriptions	1	7	6	,, Unbehaun & Johnstone, Limited	0	3	0
				,, Subscriptions to Royal Society	1	7	6
				,, Balance in hand	0	4	5
	£2	1	4		£2	1	4

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.

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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.

VICTORIAN YEAR BOOK. vol. 30, 1909-10. Melb. n.d.

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.

IMPERIAL INSTITUTE. Bulletin, vol. 8, no. 4; vol. 9, no. 1-2. Lond. 1910-11.

LINNEAN SOCIETY. List, 1910-11. Lond. 1911.

——— 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. 1910-11.

Royal Irish Academy. Proceedings: Section A, vol. 28, no. 3; t.p. and index to vol. 28; vol. 29, no. 1-4. 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.

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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; vol. 31, pt. 1-4. Edin. 1910-11.

AUSTRIA.

Kaiserliche Akademie der Wissenschaften. Anzeiger, Jahrg. 47. Wien. 1911.

K.k. Geologische Reichanstalt. Verhandlungen, Jahrg. 1910, Nr. 2-18; Jahrg. 1911, Nr. 1-11. Wien. 1910-11.

K.k. Naturhistorisches Hofmuseum. Annalen, Bd. 23, Nr. 3-4; Bd. 24, Nr. 1-2. Wien. 1910.

K.k. Zoologische-Botanische Gesellschaft. Verhandlungen, Bd. 60, H. 4-8; Bd. 61, H. 1-5. Wien. 1910-11.

BELGIUM.

Belgique, Musee Royal D'Histoire Naturelle. Extrait des Mémoires, année, 1907, tom. 4-5; année, 1908, tom. 4-5. Brux. 1910-11.

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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.
SOCIETE ENTOMOLOGIQUE DE BELGIQUE. Annales, tom. 53. Brux. 1909.
SOCIETE ROYALE DES SCIENCES DE LIEGE. Mémoires, sér. 3, tom. 8. Liège. 1909.

BRAZIL.

BRAZILIANISCHE RUNDSCHAU, Jahrg. 1, Heft 1. Rio de Janeiro. 1910.
RIO DE JANEIRO. Annuario Observatorio, annos 25-7. Rio de Janeiro. 1909-11.
RIO DE JANEIRO INSTITUTO OSWALDO CRUZ. Memorias, tom. 2, fasc. 1-2. Rio de Janeiro. 1910.
RIO DE JANEIRO, OBSERVATORIO DE. Boletin mensal, Jan.-Dec., 1908. Rio de Janeiro. 1909.
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CANADA. *Department of Mines. Geological Survey Branch.* Memoirs, no. 1-6, 8, 10, 11-T, 12, 14. Ottawa.
——— ——— ——— Report, 1064, 1066. Ottawa. 1911.
——— ——— ——— Summary report, 1910. Ottawa. 1911.
——— ——— *Mines Branch.* Bulletin, no. 3-5. Ottawa. 1911.
——— ——— ——— Report, 59, 69, 88. Ottawa. 1910-11.
CANADIAN INSTITUTE. Transactions, vol. 9, pt. 1. Toronto. 1911.

CAPE COLONY.

ALBANY MUSEUM. Records, vol. 2, pt. 3. Grahamstown. 1911.
ROYAL SOCIETY OF SOUTH AFRICA. Transactions, vol. 2, pt. 1-2. Cape Town. 1910-11.
SOUTH AFRICAN JOURNAL OF SCIENCE, vol. 6, pt. 11-12; vol. 7, pt. 1-7. Cape Town. 1910-11.
SOUTH AFRICAN MUSEUM. Annals, vol. 5, pt. 8-9; vol. 6, pt. 4; vol. 7, pt. 4; vol. 8, pt. 1; vol. 9, pt. 1; vol. 10, pt. 1; vol. 11, pt. 1. Cape Town.

FRANCE.

FEUILLE DES JEUNES NATURALISTES, nos. 479-92. Par. 1910-11.
NANTES. SOCIETE DES SCIENCES NATURELLES DE L'OUEST DE LA FRANCE. Bulletin, tom. 9, trimestre 2-4; tom. 10, trimestre 1-2. Nantes. 1910-11.

SOCIETE ENTOMOLOGIQUE DE FRANCE. Annales, vol. 79, trimestre, 2-3. Par. 1910-11.

——— Bulletin, 1910, nos. 15-21; 1911, nos. 1-14. Par. 1910-11.

SOCIETE LINNEENNE DE NORMANDIE. Bulletin, 6e sér., vol. 2. Caen. 1910.

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BERLINER GESELLSCHAFT FUR ANTHROPOLOGIE, ETHNOLOGIE, UND URGESCHICHTE. Zeitschrift für Ethnologie, Jahrg. 42, H. 5-6; Jahrg. 43, H. 2. Berl. 1910-11.

DEUTSCHE ENTOMOLOGISCHE GESELLSCHAFT. Deutsche Entomologische Zeitschrift, Jahrg. 1910, H. 5-6; 1911, H. 1-4. Berl. 1910-11.

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HAMBURG. NATURWISSENSCHAFTLICHER VEREIN. Verhandlungen, 1909, dritte Folge 17. Hamburg. 1910.

HAMBURG. NATURHISTORISCHES MUSEUM. Mitteilungen, Jahrg. 26-27. Hamburg. 1909-10.

K. BAYERISCHE AKADEMIE DER WISSENSCHAFTEN ZU MUNCHEN. *Mathematisch-physikalische Klasse.* Sitzungsberichte. Jahrg. 1910, Abh. 5-9. Münch. 1910-11.

——— ——— Abhandlungen. Bd. 24. Abh. 3; Bd. 25, Abh. 4; Sup. Bd. 1, Abh. 9-10; Sup. Bd. 2, Abh. 2; Sup. Bd. 4, Abh. 1-2. Münch. 1910-11.

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——— ——— Mathematish - Physikalische Klasse, 1910, H. 2-6; 1911, H. 1-3. Berl. 1910-11.

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PHYSIKALISCH-MEDICINISCHE GESELLSCHAFT ZU WURZBURG. Sitzungsberichte, 1909, Nr. 1-5; 1910, Nr. 1-5. Würzburg. 1910-11.

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INDIA. *Department of Agriculture.* Report of the progress of agriculture in India, 1909-10. Calcutta. 1910.

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PUSA AGRICULTURAL RESEARCH INSTITUTE. Report, 1909-10. Calcutta. 1910.

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SOCIETA ITALIANA DI SCIENZE NATURALI. Atti, vol. 49, fasc. 2-4; vol. 50, fasc. 1. Pavia. 1909-10.

——— Memorie, vol. 7, fasc. 1. Pavia. 1910.

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IMPERIAL EARTHQUAKE INVESTIGATION COMMITTEE. Bulletin, vol. 4, no. 2; vol. 5, no 1. Tokyo. 1910-11.

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CANTERBURY MUSEUM. Records, vol. 1, no. 3. Christchurch. 1911.

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——— Mémoires, nouv. sér., livr. 56-7, 59. St. Petersb. 1910-11.

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Societe Vaudois des Sciences Naturelles. Bulletin, no. 170-3. Lausanne. 1910-11.

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SMITHSONIAN INSTITUTION. Annual report, 1909. Wash. 1910.

——— *Bureau of American Ethnology.* Bulletin, no. 30, pt. 2; 37, 40 pt. 1; 43-5, 50-1. Wash. 1910-11.

——— *U.S. National Museum.* Bulletin, no. 71, 73-5. Wash. 1910-11.

——— ——— Contributions from the U.S. National Herbarium, vol. 13, pt. 6-11; vol. 14, pt. 1-5, vol. 15, pt. 1-2. Wash. 1910-11.

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——— Report ser., vol. 4, no. 1. Chic. 1911.

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AMERICAN ACADEMY OF ARTS AND SCIENCES. Proceedings, vol. 45, no. 8-21; vol. 46, no. 1-24; vol. 47, no. 1-7. Bost. 1910-11.

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BERNICE PAUAHI BISHOP MUSEUM. Fauna Hawaiiensis, vol. 2, pt. 6; vol. 3, pt. 6. Univ. Pr. Camb. 1910.

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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, Univer- 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. *FOELSCHE, 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. 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, 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 Palæontology, 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. MUNTON, 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.

APPENDICES.

FIELD NATURALISTS' SECTION

OF THE

Royal Society of South Australia (Incorporated).

TWENTY-EIGHTH ANNUAL REPORT OF THE COMMITTEE

For 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 variableness 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.

FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY OF SOUTH AUSTRALIA (INCORPORATED).

Statement of Receipts and Expenditure for the Year Ended September 30, 1911.

Dr.	£	s.	d.	Cr.	£	s.	d.
To Balance brought forward	7	3	8	By Postages	5	12	8
,, Grant from the Royal Society	14	13	6	,, Printing	2	13	0
,, Subscriptions	17	12	6	,, Advertising	0	17	5
,, Bank Interest	0	8	1	,, Lecture-room and Lantern	3	1	8
				,, Sundries	1	2	0
				,, Fauna and Flora Committee (printing) ...	7	13	6
					21	0	3
				,, Subscriptions paid to Royal Society ...	17	12	6
				,, Balance in Savings Bank	0	16	6
				,, Cash in hand	0	8	6
	£39	17	9		£39	17	9

	£	s.	d.
September 30, 1911—Balance in General Funds ...	1	5	0
Balance in Excursion Account	3	18	1
	£5	3	1

Stanley S. Stokes, Hon. Treasurer.

Audited and found correct,

J. S. Lloyd,
Walter D. Reed, } Auditors.

Adelaide, September 15, 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 workingmen'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 workingmen'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 *Exocarpos*, 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. podalyriæfolia*. 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 Mitchelli*, with thick dense masses of leaves and large whitish-yellow blooms, the brilliant flowered *Hibiscus Hugelli* or the yellow *H. lakœafolia* 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 *Exocarpos*, 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.

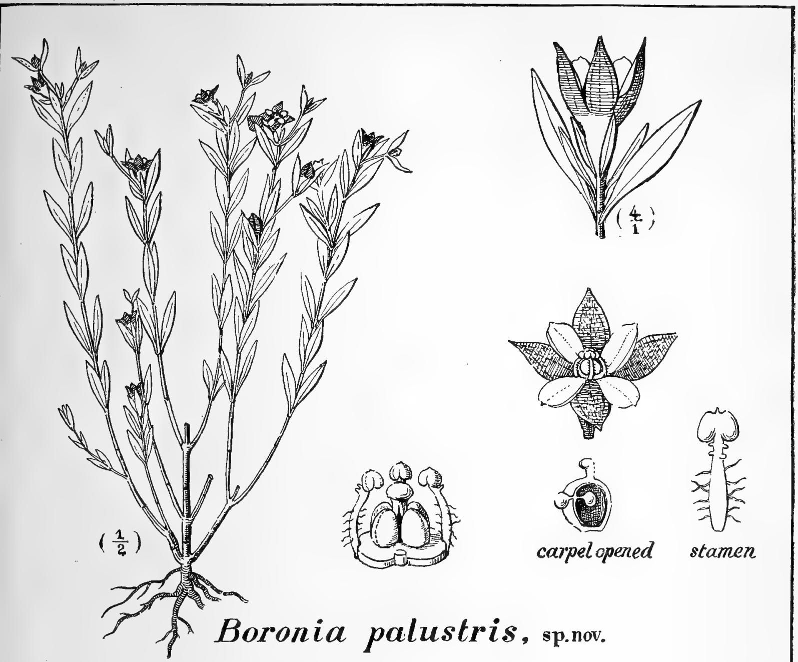
One large section of natural history is now splendidly cared for by the Ornithological Society, the members of which are to be heartily congratulated on the successful transportation of the mallee hen (Leipoa) to Flinders Chase. I feel sure of their cordial help and assistance if the proposed Society 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.

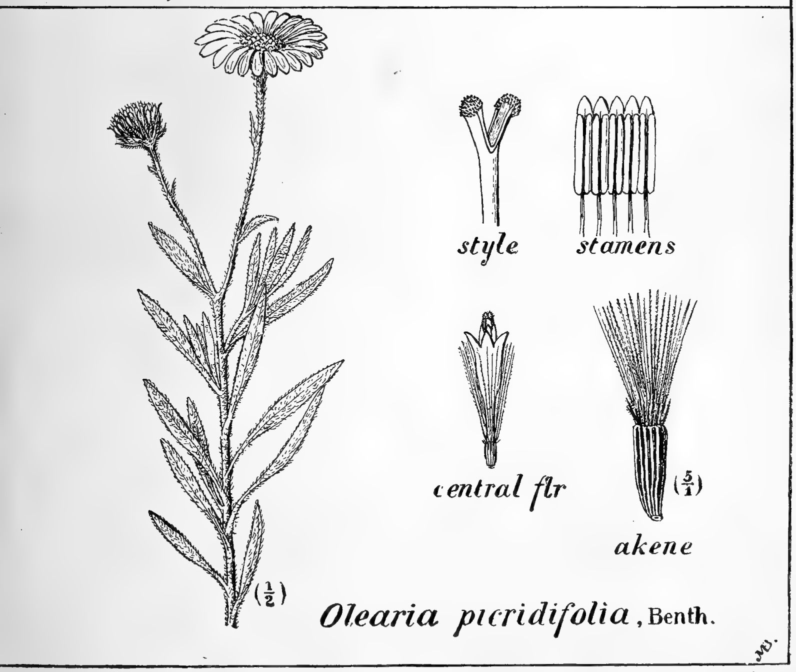
GENERAL INDEX.

[Generic and specific names printed in italics indicate that the forms described are new.]

PLATES I. TO XXVII.



Boronia palustris, sp. nov.



Olearia picridifolia, Benth.

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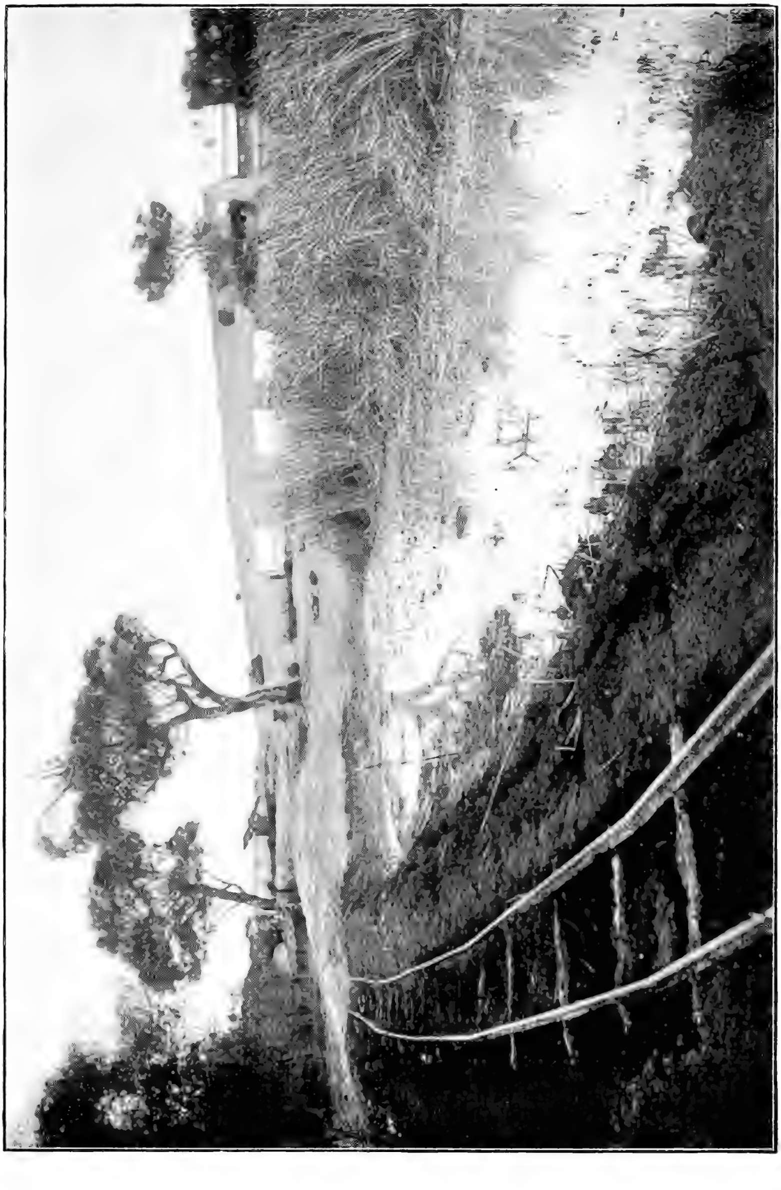

View of Swanport, looking South from the southern end of the Swamp, which is seen in the foreground.

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

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Exposed face of the Cutting from a near point.

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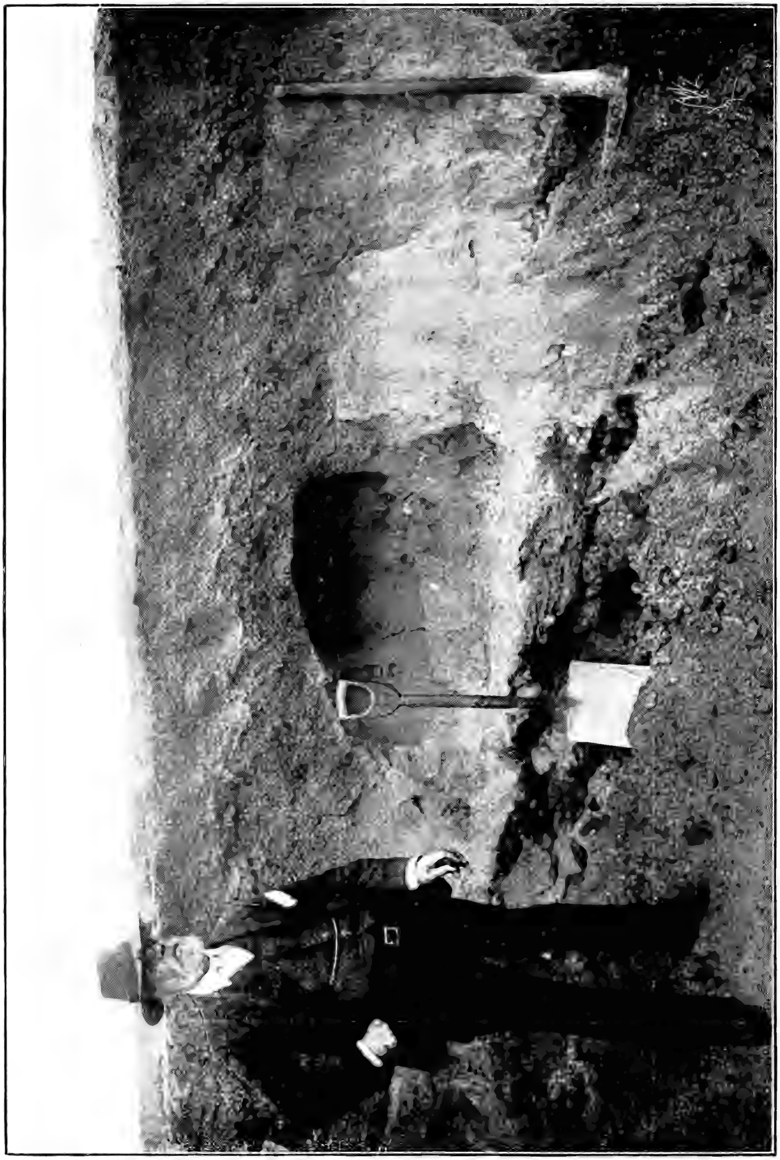

Another view of face of Section, showing line of demarcation between kitchen-midden deposit and subjacent layer of red sand.

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Mrs. Karpeny.

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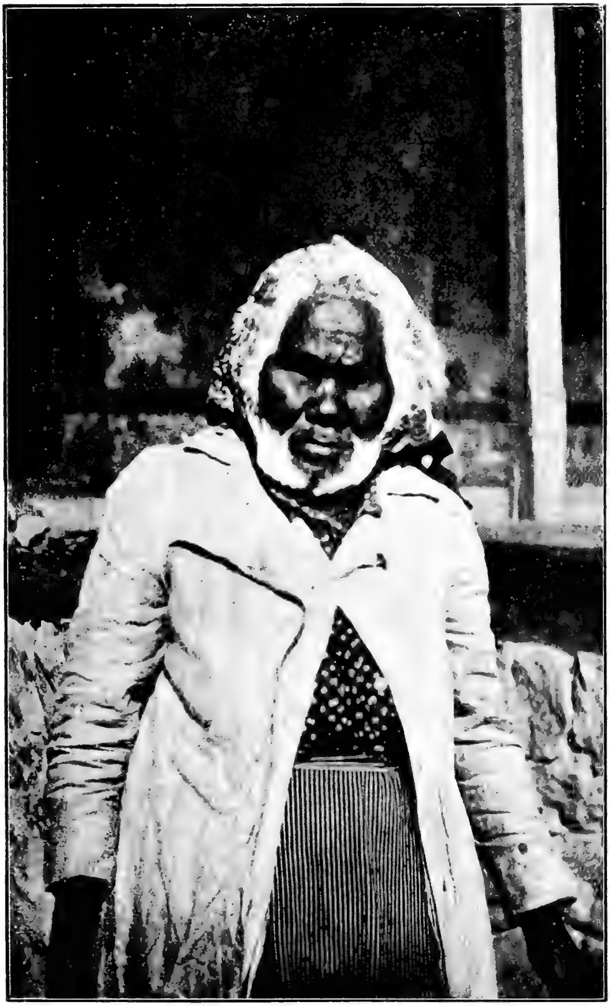

Mrs. Karpeny.

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Mrs. Karpeny.

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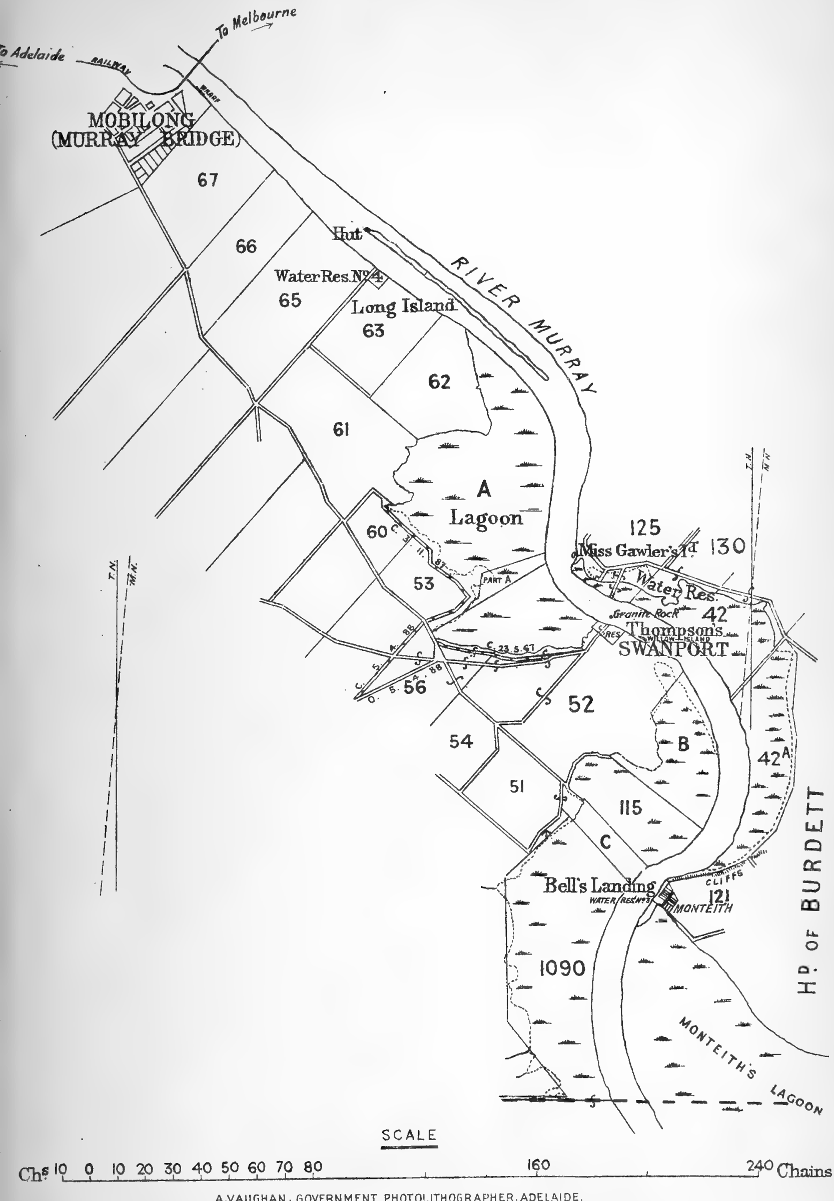
Hd. OF MOBILONG



A. VAUGHAN, GOVERNMENT PHOTOLITHOGRAPHER, ADELAIDE.

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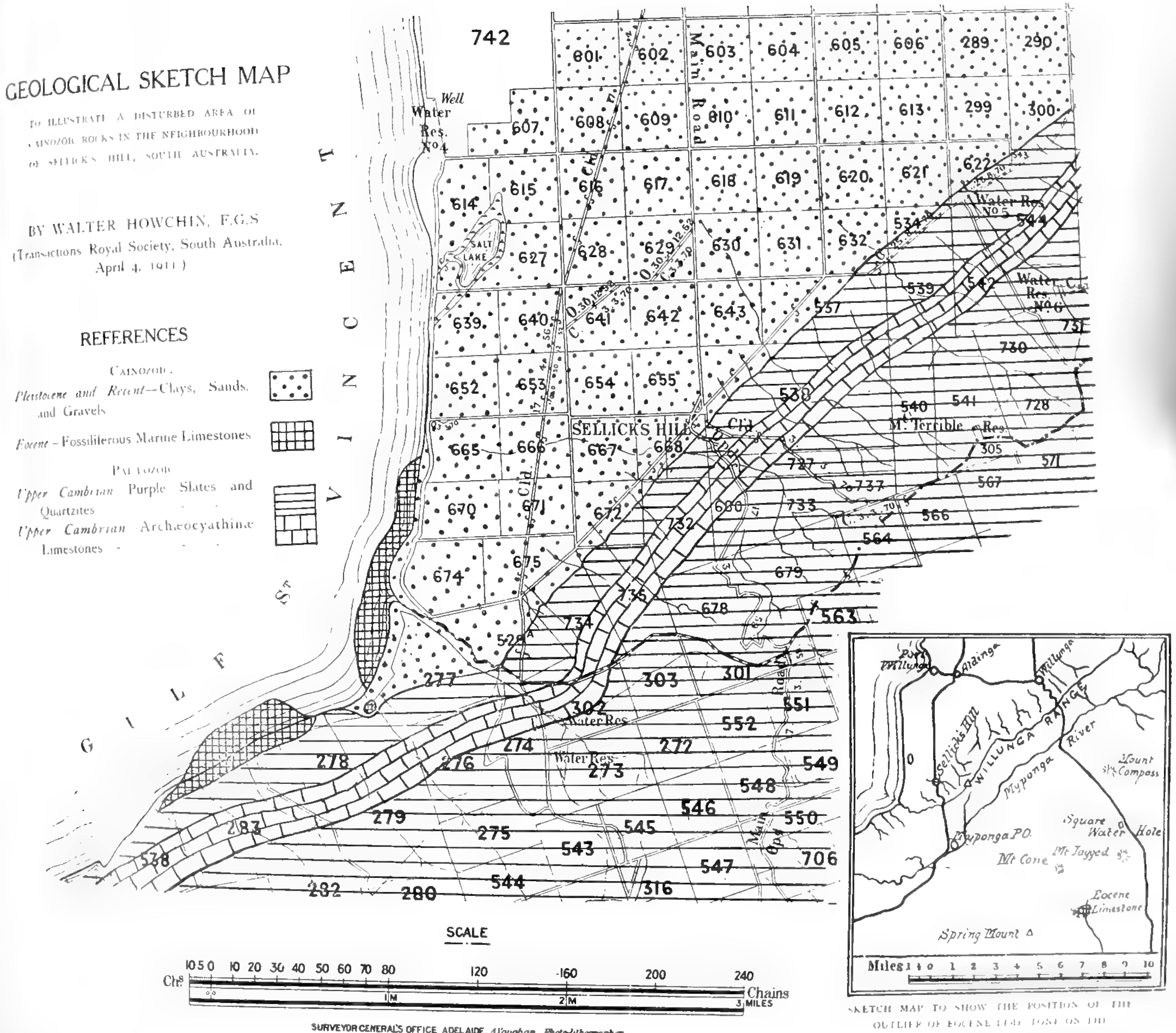

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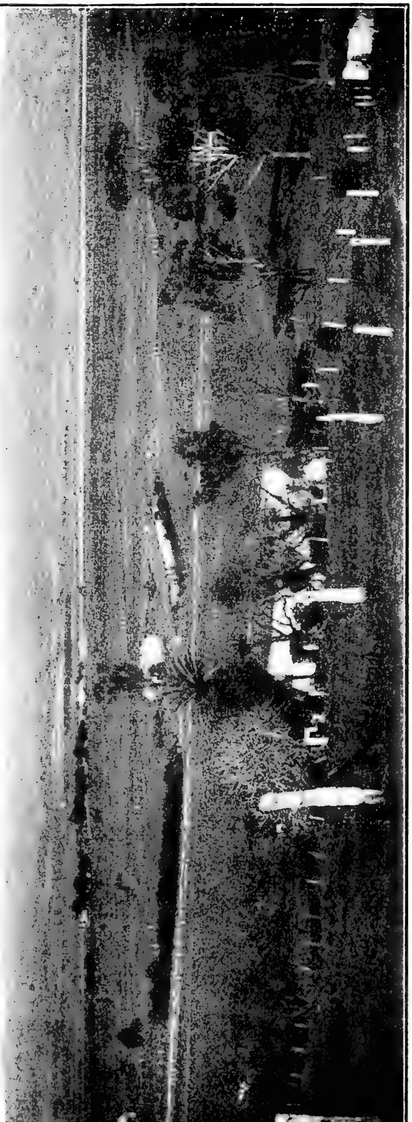

Photo. by W. Howchin.

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

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Photo. by W. Howchin.

Tilted Lower Cainozoic Rocks resting unconformably on Cambrian Slates.

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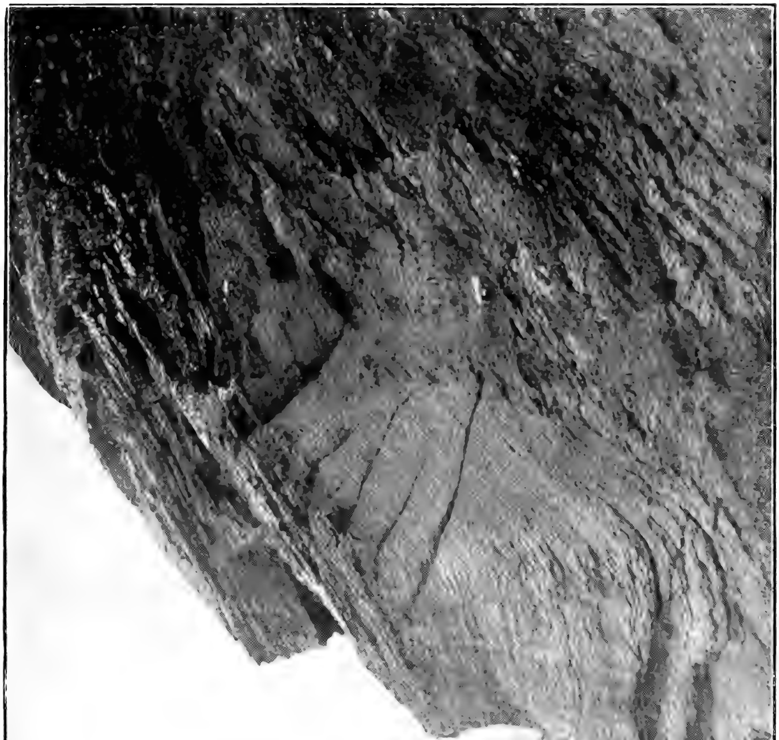

Photo. by W. Howchin.

Folded Lower Cainozoic Rocks in Sea Cliffs, looking north.

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Photo. by W. Howchin

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

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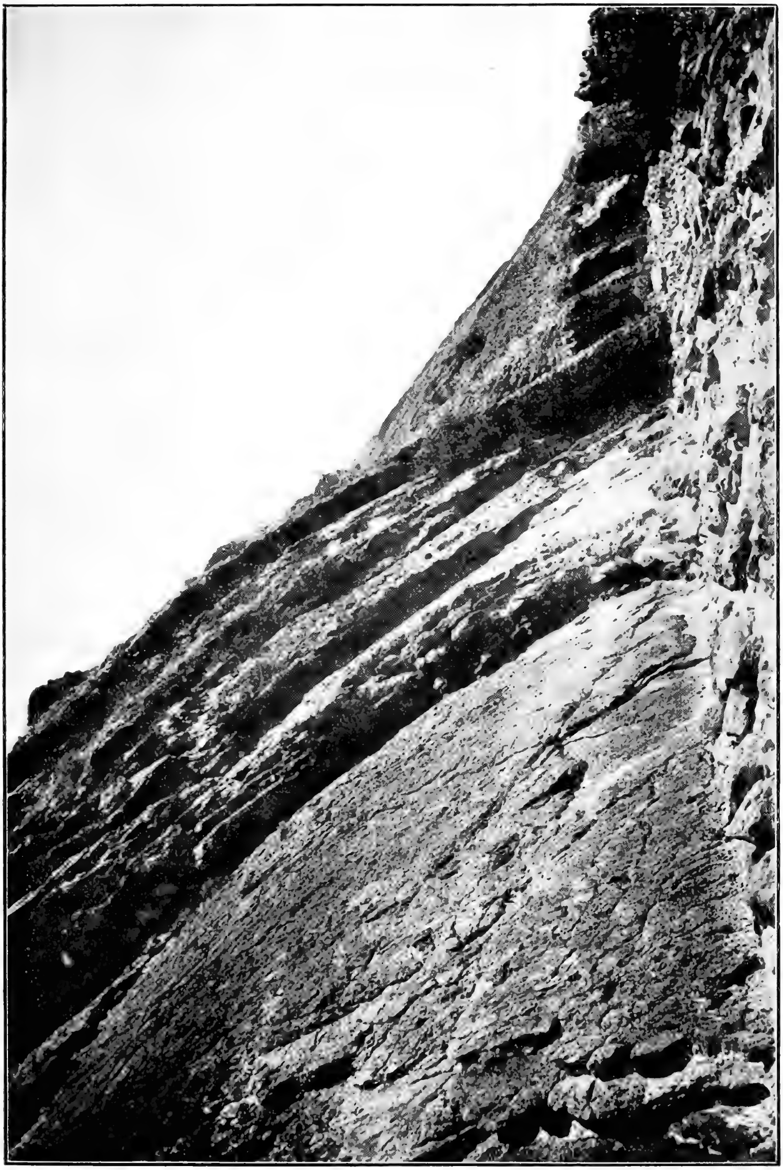

Near view of Cliffs shown in Plate XIV.

Photo. by W. Howchin.

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Photo. by W. Howchin

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

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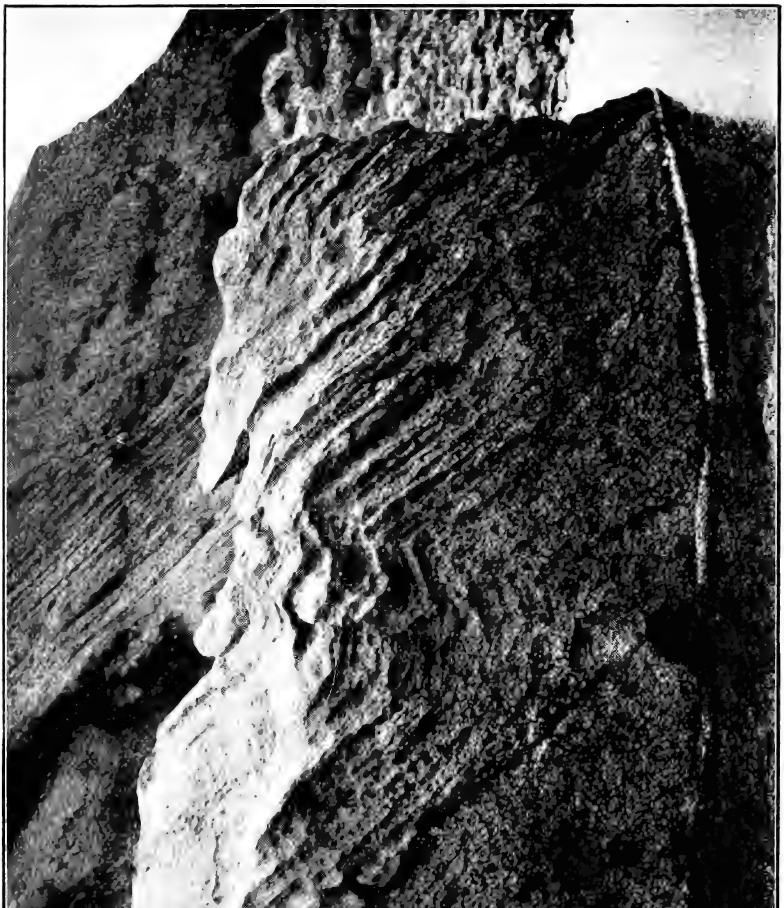

Photo. by W. Howchin.

Contorted Lower Cainozoic Rocks forming isolated Pedestal on Beach.

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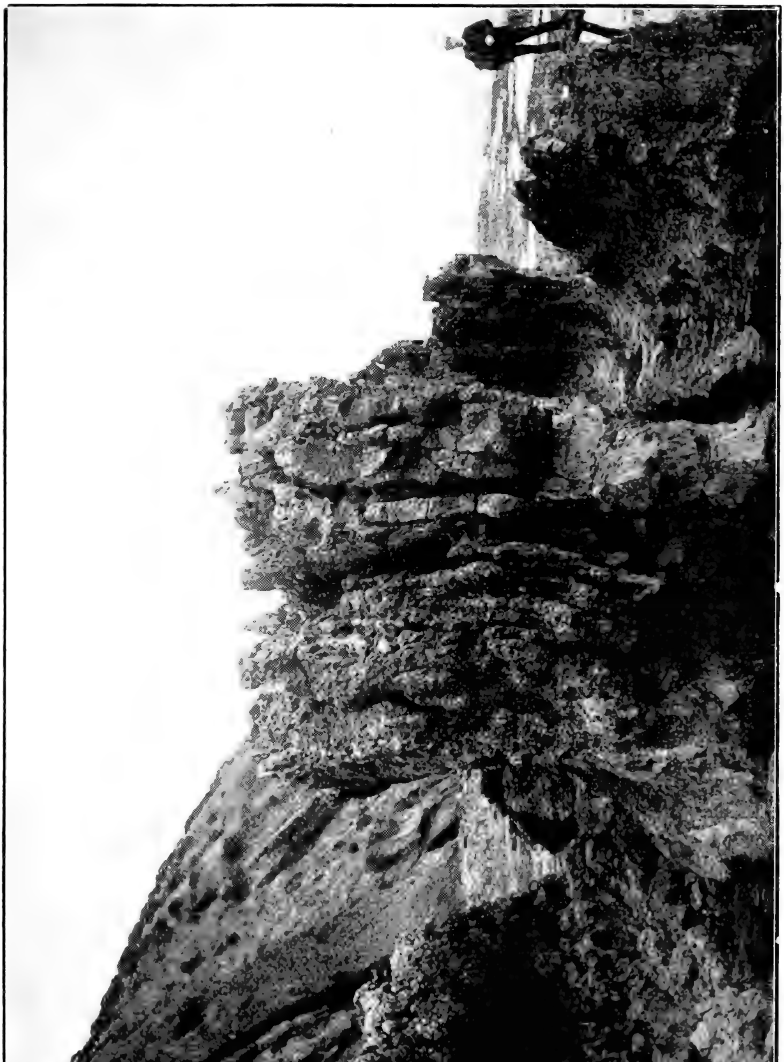

Photo. by W. Howchin.

Vertical and Reversed Folds of Lower Cainozoic Rocks on Beach.

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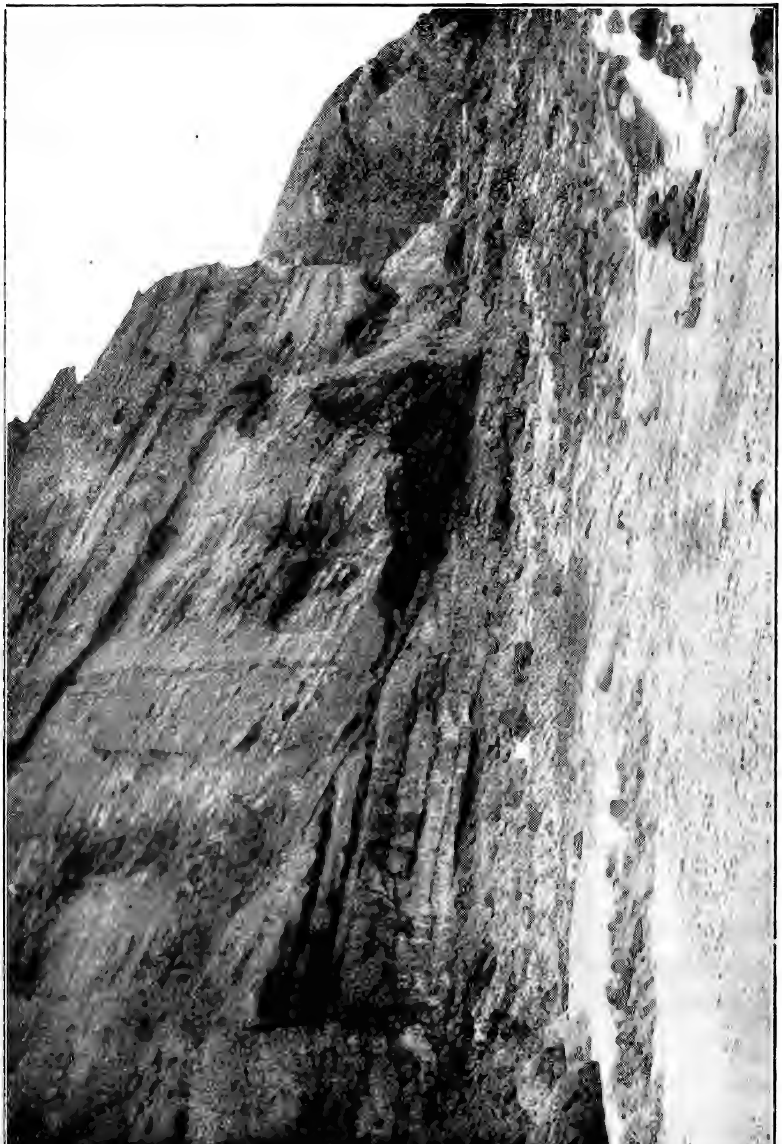

Thrust-Plane in Lower Cainozoic Rocks, looking south.

Photo. by W. Howchin.

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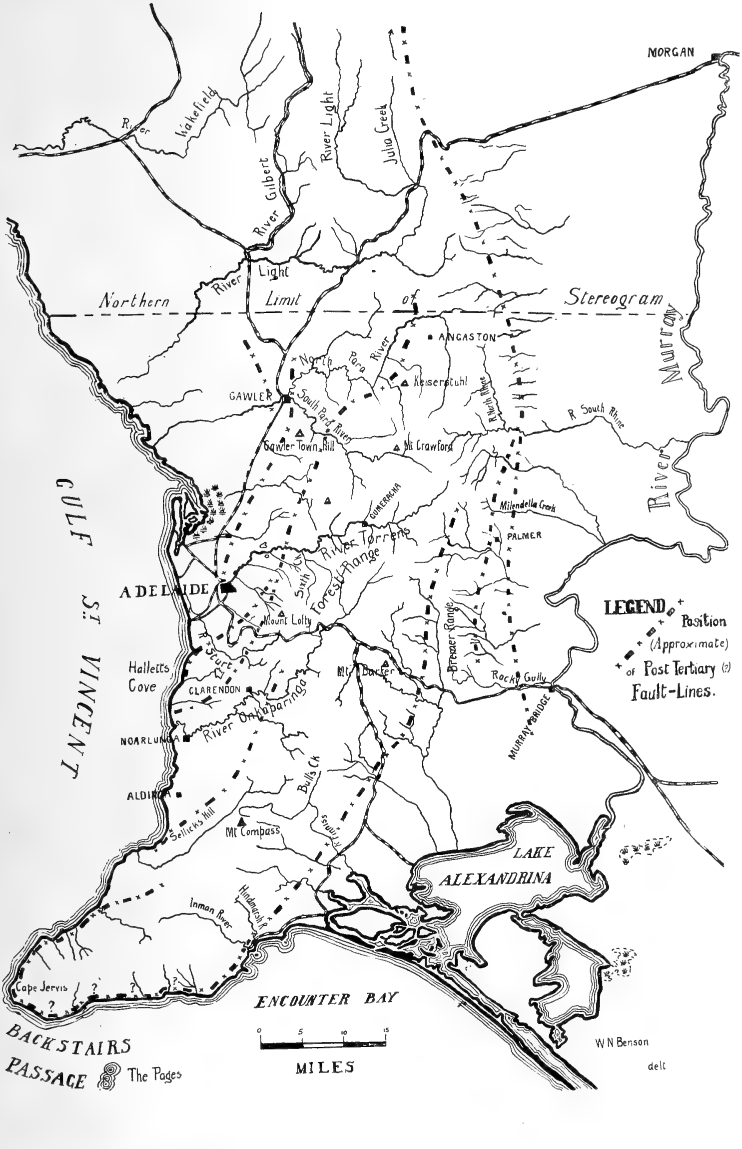

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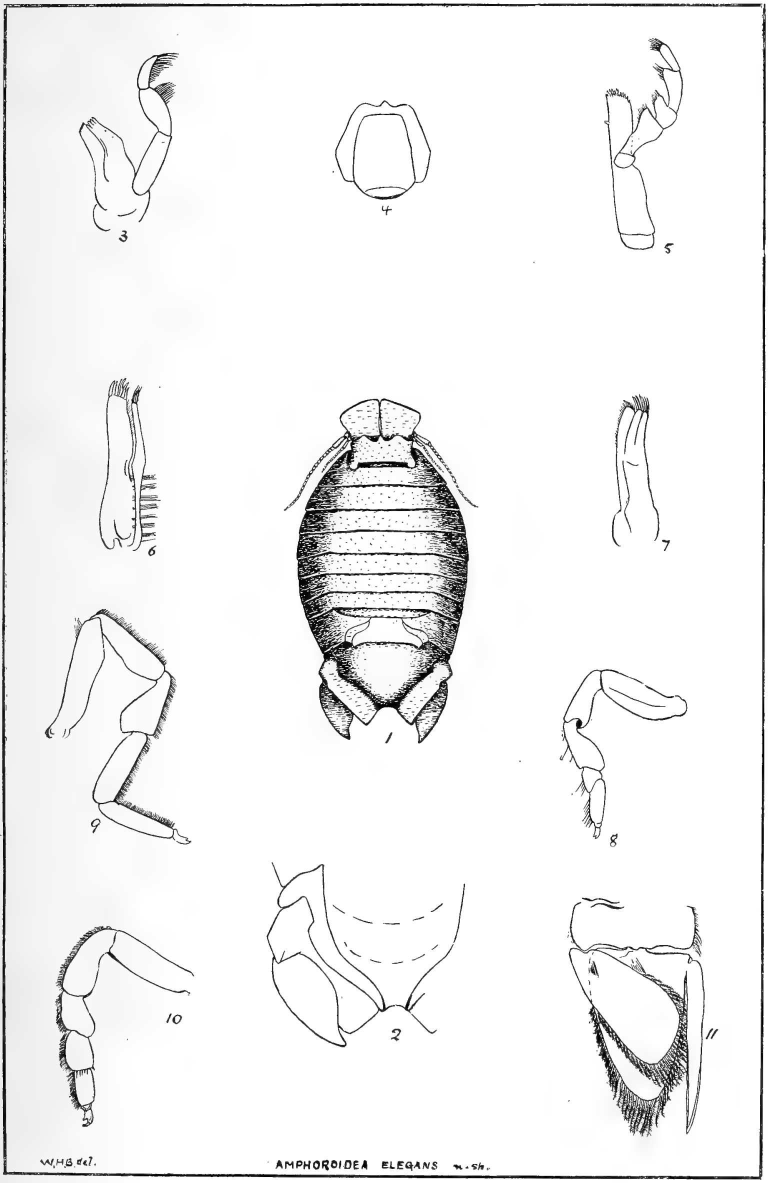
Gawler
Sth Rhine R
R Torrens
ADELAIDE
R Murray
R Sturt
R Onkaparinga
Murray Bridge
Noarlunga
Bremer R
Sellick's Hill
Yankalilla
R Inman
Victor Harbour
Cape Jervis
2000 F.
16 Miles



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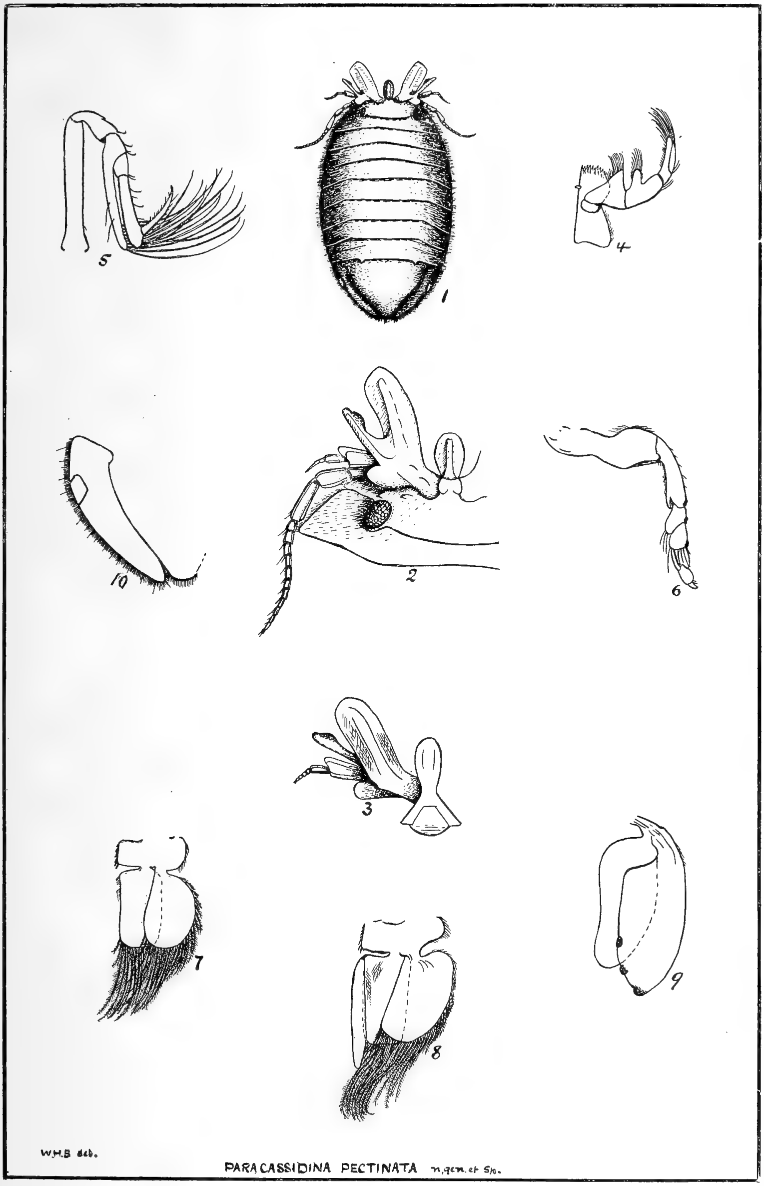

PARACASSIDINA PECTINATA n. gen. et sp.

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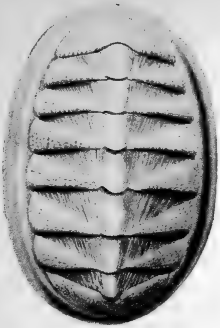

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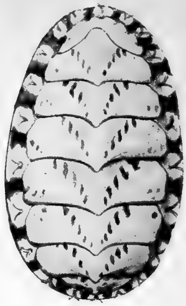

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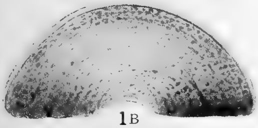

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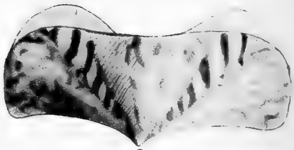

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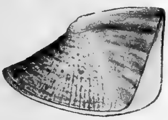

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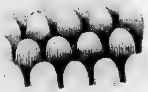

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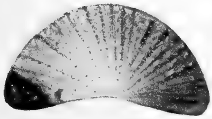
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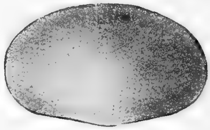
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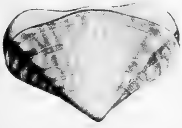
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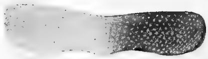
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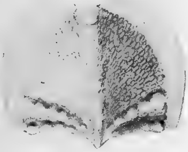
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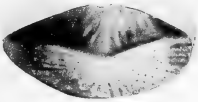
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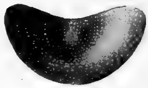
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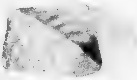
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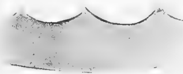
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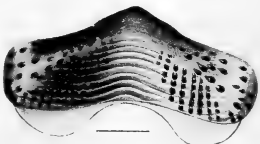
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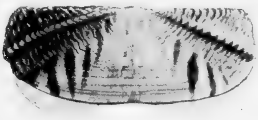
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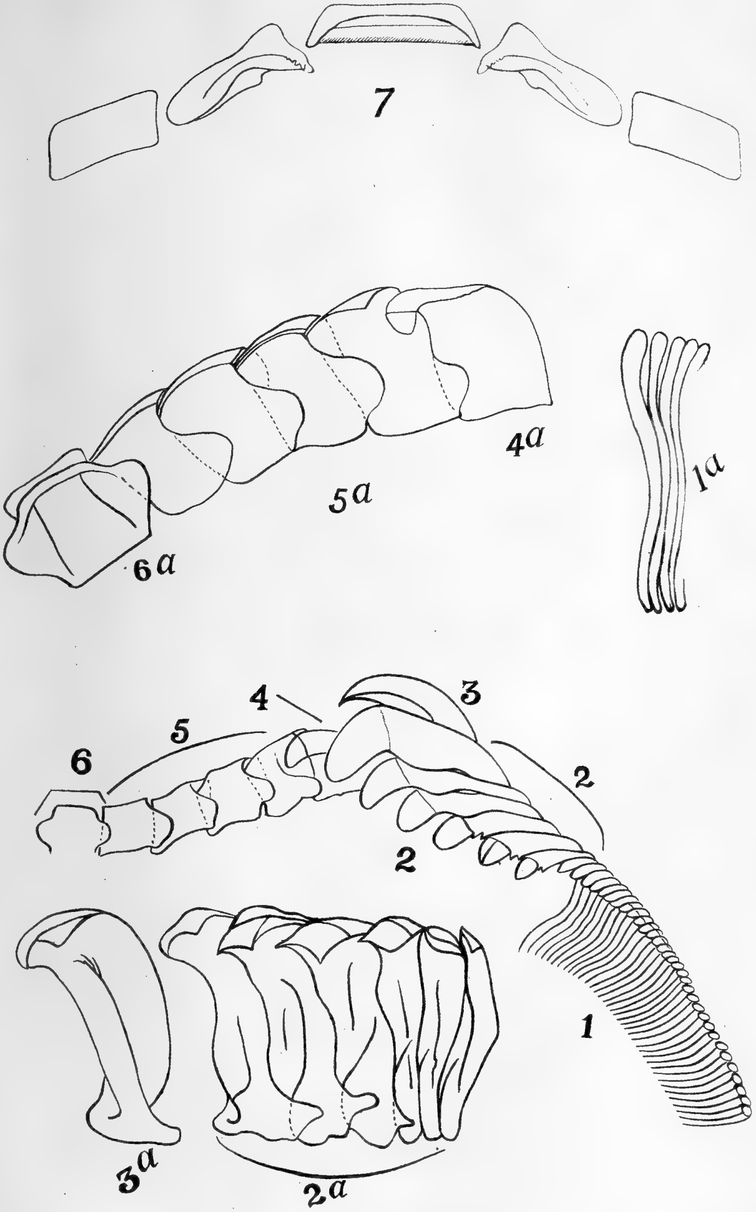
Drawings and Printing by
Donald Taylor Collotype Co., North Adelaide.



Drawings and Printing by
Donald Taylor Collotype Co., North Adelaide.

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