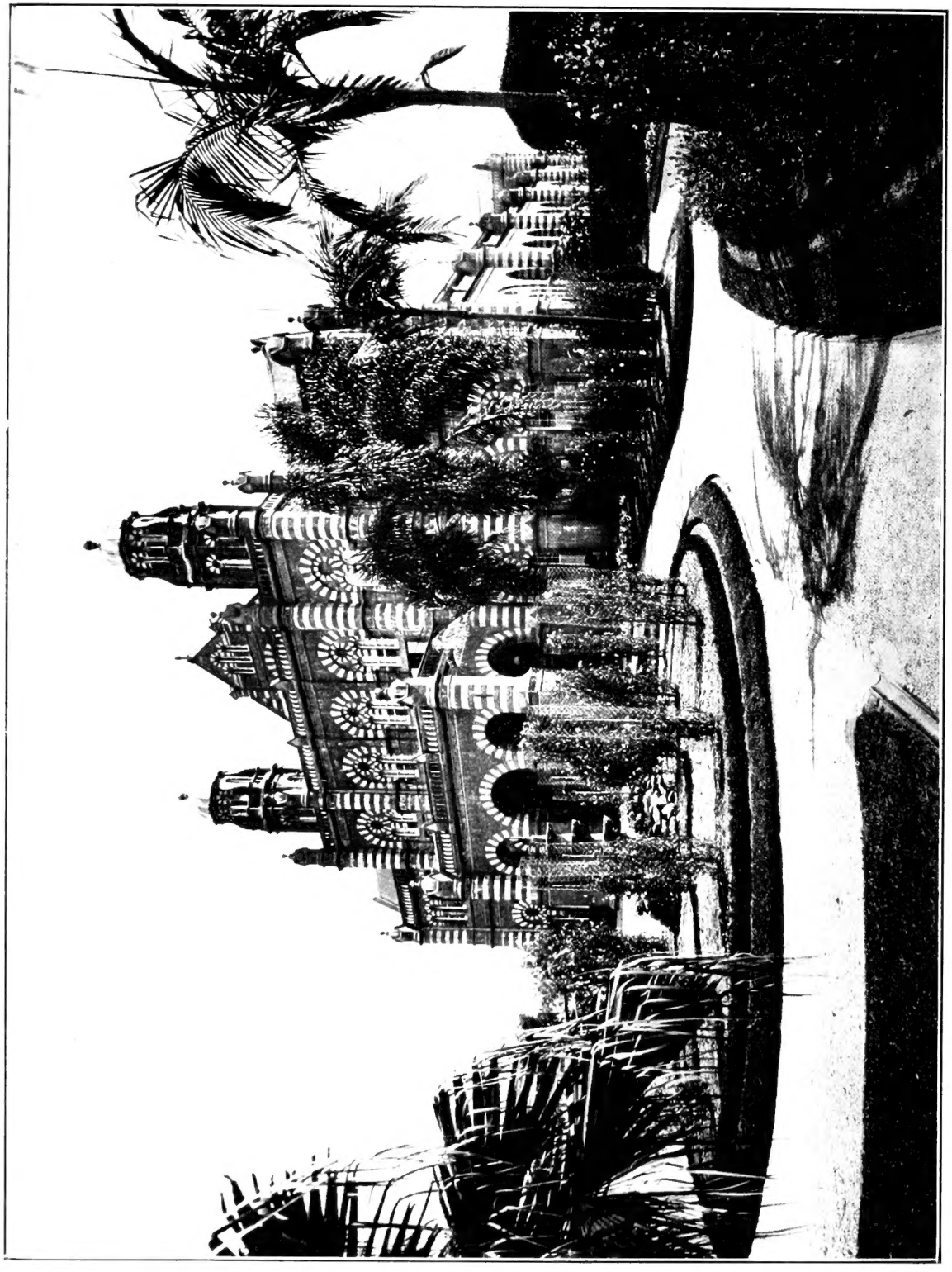

The Queensland Museum, Brisbane (Gregory Terrace Frontage).

MEMOIRS

OF THE

QUEENSLAND MUSEUM

VOL. VI.

WITH PLATES AND FIGURES IN THE TEXT.

EDITED BY THE DIRECTOR,

HEBER A. LONGMAN, F.L.S.

ISSUED DECEMBER 19, 1918.

EDITORIAL NOTE.—*Owing to the exigencies of war time, the publication of these Memoirs has been in abeyance. Several of the articles here printed were received early in* 1917.

BY AUTHORITY:
ANTHONY JAMES CUMMING, GOVERNMENT PRINTER,
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The specimen is tilted slightly from the basal plane.

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NOTES ON CERTAIN HUMAN CRANIA IN THE QUEENSLAND MUSEUM.

By Heber A. Longman, F.L.S., Director.

(Plates I to V.)

Although no special attention has been given in the past to the collection of aboriginal and other crania in the Queensland Museum, a considerable number of specimens have been acquired. No opportunity of securing additional material is now being lost, and it is hoped that the collection will be largely augmented as time goes on.

During the re-registration of our crania, each has been carefully examined for unusual features, and certain measurements, mainly those involving cephalic and vertical indices and the cubic capacities, have been tabulated. Some of the specimens are of such interest that it is desirable to record a few notes regarding them with the illustrations now published. Later on, perhaps with the assistance of other workers, it is hoped that our series will be dealt with in the adequate way that Professor R. J. A. Berry and Dr. A. W. D. Robertson have treated Australian and Tasmanian aboriginal skulls, descriptions being supplemented by dioptrographic tracings in various normæ.

A male aboriginal cranium (Q.E. 16/1157), from an unknown locality—unfortunately—illustrates a palate with approximately parallel sides, recalling those of the anthropoid apes (Plate I). This characteristic has, of course, been previously noted for certain Australian and Tasmanian crania, but in this specimen it is present to a surprising degree. The palato-maxillary region is dolichuranic; the incisors are in the one straight line, and the molar series are almost parallel. The length from the anterior alveolar border between the median incisors to the extremity of the posterior nasal spine (which is decidedly long) is 70 mm. On each side the maxilla extends 11 mm. beyond the alveolus of the third molar. The breadth of the palate is 37 mm. between the second premolars, and this only increases to 40·5 mm. between the third molars. The combined length of the molars and premolars is 49·5 mm. on the right and 48 on the left. The masticatory area is thus above the average. The palate is unusually deep anteriorly, the sides near the first molar being 20 mm. The external pterygoid plate is considerably extended, and on each side there are traces of ossifications between it and processes from the border of the foramen spinosum. For an aboriginal the mastoid processes are well developed.

Although the dental arcade is of unusual size, the area in front of the third molars lies within the dimensions of the cast of the Talgai cranium, described by Dr. S. A. Smith.

The cranium has a maximum length of 191 mm., a parietal breadth of 128, and the basi-bregmatic height is 137. The specimen is markedly prognathous. The basion-nasion diameter is 102 and the basion-prosthion 107, giving a gnathic index of 104·9. The distance from the bregma to the prosthion is no less than 216 mm. There is a fronto-squamosal articulation on the right side.

Plates II and III illustrate a male skull (Q.E. 16/858) discovered in the sand-dunes at Pialba, Queensland, the outstanding features of which are the asymmetrical condition of the foramen magnum and the breadth of the first upper molars. Klaatsch states: "The original power of natural regeneration, not yet disturbed by the fortunes of civilisation, renders intelligible the otherwise almost incredible, recuperative powers of cranial traumatisms."[1] He also quotes an example of an aboriginal at the Yarrabah Station with a scar in the region of the vertex so deep that a finger could be inserted in it, and yet he lived with no disturbance of health or of mental processes. Although we have no knowledge of the condition in life of the aboriginal represented by the skull illustrated, yet it is evident that he lived for years with the foramen magnum in this abnormal condition, probably with associated partial degeneration of the spinal column—apparently the result of osteo-arthritis.

The right condyle is enlarged posteriorly and is produced laterally almost to the sagittal plane. The articular surface is somewhat irregular and is slightly cancellous. Anteriorly it somewhat overhangs the hypoglossal canal, which in comparison with its fellow is restricted. The lateral portions of the occipital bone are unusually rugose, and the condyloid canal has three external openings.

The labio-lingual surface of the upper dental arch is remarkably oblique, the outer or labial facies being much more worn than the inner. Unfortunately, the incisors and the right canine have been lost *post mortem*. Evidently the mandible had a transverse movement through a wide arc. The crowns of all the teeth have been worn away by mutual attrition. The excess in width of the upper dental arcade over the lower in the molar region of Australian aborigines was noted by Turner,[2] who found a maximum difference of 8 mm. and a mean of 4 mm. in his series. In the abnormal specimen under present consideration, the width of the upper arcade at the first molar is no less than 64 mm. The roots of the molars appear externally on each side of the maxillæ, and the width here reaches 71 mm. These roots are plainly visible on Plate III. The occlusal surface of these remarkable first molars is 16 mm. wide on the left and 15 on the right. The width of the lower arcade at the first molars is 55 mm.

This skull has a maximum length of 185 mm.; the parietal breadth is 128, and the basi-bregmatic height is 132.

A microcephalic cranium (Q.E. 16/999), bisected in the sagittal plane, is the subject of Plate IV, fig. 1. The cubic capacity is only 980, as ascertained

[1] Klaatsch, Rep. Path. Lab. Lun. Dep. N.S.W., i, pt. 3, p. 152, 1908.
[2] Turner, Journ. Anat. & Phys., xxv, 1891, p. 461.

Aboriginal Cranium, Q. E. 858.

Face page 2.

Aboriginal Cranium, Q. E. 853.

Face page 3.

Fig. 1.—Aboriginal Cranium, Q. E. 9.99.

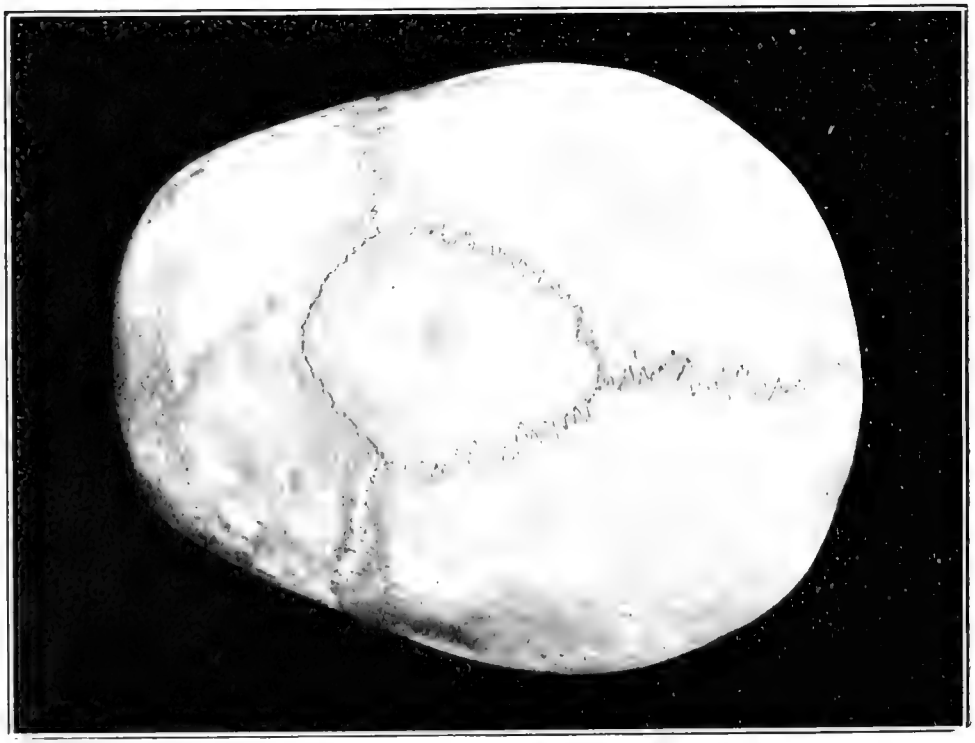


Fig. 2. Papuan Cranium with Bregmatic Bone.

Face page 3.

prior to dissection by using No. 8 shot. This specimen is one of a series of microcephalic crania from Wright's Creek, North Queensland, collected by Mr. J. Campbell. Several of the teeth have been lost *post mortem*, and those remaining in the moiety not illustrated are greatly decayed. In Plate IV the third molar is in place but unworn. The cranium has a fronto-squamous articulation on each side. The average thickness of the cranial wall is 7 mm. The maximum length is 173; the parietal breadth is 117; and the basi-bregmatic height 125·5. Although superciliary ridges are slightly developed and muscular prominences are present to a degree unusual in a female skull, it has been registered as such because the male crania from the same district are very strongly marked in their sexual characteristics.

Two crania (E. 800 and N.G.E. 170) from the Fly River district, Papua, have been selected to illustrate in our galleries typical dolichocephalic and brachycephalic skulls, the respective indices being 74·6 and 86. As long ago as 1882, Miklouho-Maclay recorded the wide range of a well-marked brachycephalic population in Melanesia.[3] Turner actually quotes the Fly River district as a locality where many races or varieties have come into contact.[4] Seligmann has also recorded brachycephalic crania ("average 82, min. 79, max. 84") from Orangerie Bay.[5] We have four skulls from the Fly River district with a cephalic index of over 80. Three (and a fourth which is also credited to the Fly River but was not clearly labelled) come within the dolichocephalic range, whilst four are mesaticephalic. The broad skulls are markedly postero-brachycephalic, the maximum breadth being found across the parietal eminences, whilst in the frontal region they are comparatively narrow. In the dolichocephalic specimens the great length of the parietals is the outstanding feature.

These divergent crania are probably associated with marked other differences, and it is interesting to note that His Excellency the Hon. J. W. P. Murray, Lieutenant-Governor of Papua, has recorded the existence on the Fly River of individuals "who, if they may be taken as a fair type of their tribe, might possibly be classified as pygmies, or, more probably, as a mixed race descended from pygmies and people of ordinary stature." ("Man," March, 1918, p. 43.)

Opportunity is taken to illustrate (Plate IV, fig. 2) an immature cranium (N.G.E. 17/179) from the Fly River, Papua, which has a large oval bregmatic bone, or os fronto-parietale, 58 mm. in length and 46 mm. wide. This evidently was formed from a separate ossification in the frontal fontanelle in embryonic life. The same specimen has also several large wormian bones in the lambdoid region. The basilar suture is open, and the third molars are just appearing through the alveolar margins. On each side a frontal process from the temporal

[3] Proc. Linn. Soc. N.S.W., vi, p. 172.

[4] Challenger Reports, x, p. 90.

[5] Melanesians of British New Guinea, 1910, p. 24.

bone forms a fronto-squamous articulation. Maximum length 160, maximum breadth 128; basi-bregmatic height 129. The cranium is probably that of a female.

G. G. MacCurdy has stated that the Papuans are noted for the relatively large number of irregularities in the pterionic region.[6] This is fully borne out by our Papuan crania. In our series no instance has been found of such antero-posterior parietal sutures as those figured by Hrdlicka in his elaborate study of the parietal bone.[7]

An incomplete cranium (Q.E. 14/561) found at Wynnum, Queensland, is of interest because it represents the longest specimen in the collection. This is badly damaged in the region of the foramen magnum, and the basilar portion is missing together with most of the bones below the orbital plates of the frontal. The maximum length is 202 mm., which is identical with No. 2101 in Duckworth's list.[8] The ophryo-occipital length is 200 mm. The supraciliary ridges are not so pronounced as in many of our crania, but there is an unusually large torus occipitalis transversus, and the thickness of the cranial wall at this part, as ascertained by sliding callipers, is no less than 15 mm. The maximum breadth (parietal) of the cranium is 140 mm., and as the basi-bregmatic height must have been at least 130 mm. (calculated from the position of the jugular processes), it has dimensions which are considerably above the average. The cranium is evidently that of an aged male.

A mandible from an unknown locality has on each side a deep alveolus for the accommodation of a fourth molar. (Plate V, figs. 1 and 2.) Klaatsch considers the presence of this molar, "even if all other proofs are cast aside, as constituting an extraordinarily primitive type of mankind." This mandible is remarkably robust, and in profile it greatly resembles the one figured by Keith for divergent comparison with the Heidelberg jaw.[9] The ramus is almost at right angles with the body, and its width in line with the molar series is no less than 40 mm. The sigmoid notch is very shallow, especially on the right side. The anterior surface of the mandible forms a right angle with the alveolar border. The dental arcade is almost rectangular, and the incisors and canines are practically in the one straight line. The distance between the second premolars is 30 mm., and this only increases to 39 mm. opposite the third molars. The combined length of the premolars and molars is 50 mm. on the left and 51 mm. on the right, this being well within the range of Duckworth's figures (*loc. cit.*). The right canine and left inner incisor have been lost *post mortem*.

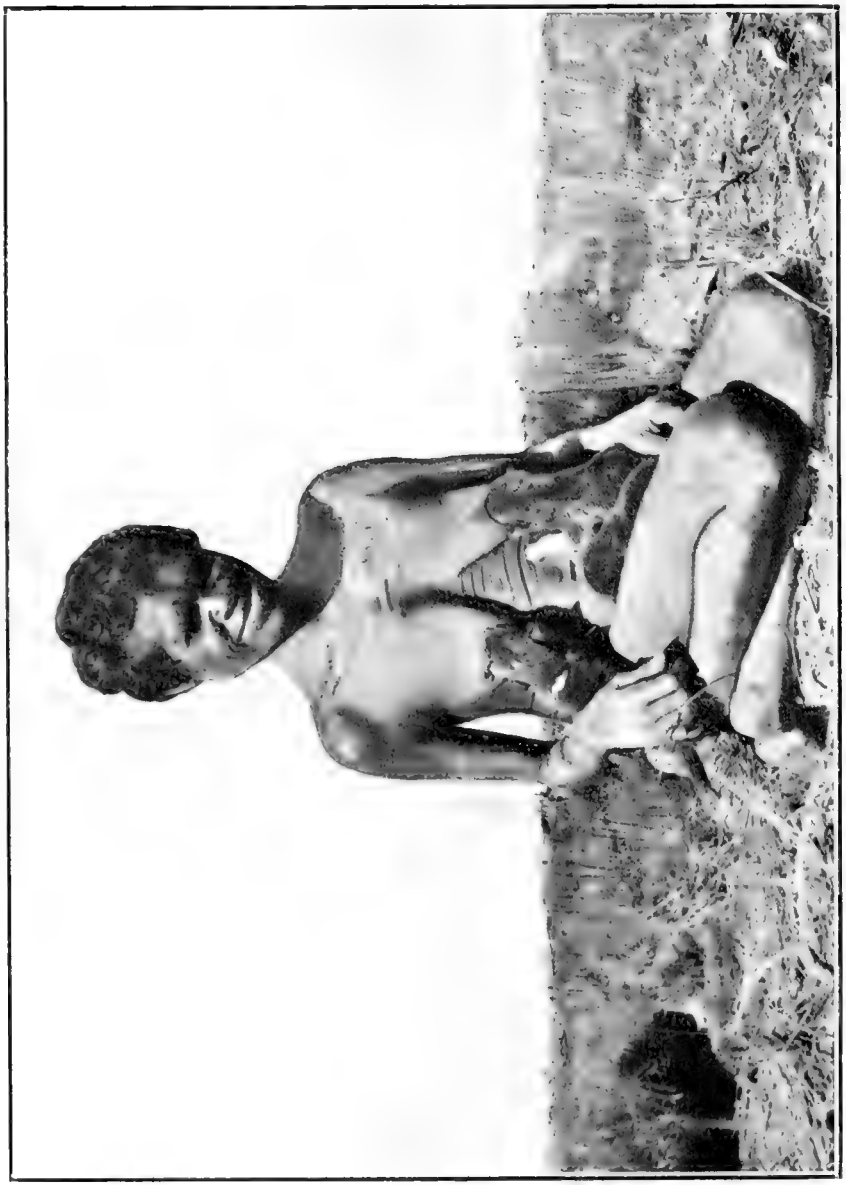
Duckworth states that accessory molar teeth occur in nearly 50 per cent. of male orang-utans.

[6] MacCurdy, Univ. Penn. Anth. Pub., xi, No.1, 1914, p. 6.
[7] Hrdlicka, Bull. Amer. Mus. Nat. Hist., xix, 1903, p. 231.
[8] Duckworth, Studies from the Anth. Lab., Camb., 1904, p. 122.
[9] The Antiquity of Man, 1915, fig. 84, p. 240.

Fig. 1.—Mandible E944 with Alveoli for Accessory Molars.

Fig. 2.—Profile of Mandible E944.

Face page 4.



J. W. Bleakley, photo. Mornington Island Native Suckling Young Dingo Pups.

QUEENSLAND ETHNOLOGICAL NOTES (2).

By Ronald Hamlyn-Harris, D.Sc., F.R.A.I., F.L.S., &c.

(Plates VI to X and Three Text-figures.)

NATIVE DOGS.

Primitive people in many parts of the world have been known to specially prize their dogs, and to bestow on them attention and caresses reserved by less benighted folks for children. It has been observed that young girls are more often than others disposed to go beyond the recognised limits of familiarity with such pets. On account of its utility for hunting, the native dog is a possession of considerable value, and though it may be lean and mangy and have a downcast air and be repulsive generally, it beds with the best of the camp though deprived of its due share of the fruits of the chase. It has been quite a common practice for the blacks of North Queensland, not only to admit dogs to the freedom of their beds, but for the women to suckle pups,[1] and I am fortunate in being able to illustrate a concrete instance of an act which may almost seem incredible unless supported by well-authenticated and graphic testimony.* During the recent visit of the Chief Protector of Aborigines (Mr. J. W. Bleakley) to Mornington Island (Gulf of Carpentaria) he was fortunate enough to surprise a woman in the act, but as soon as Mr. Bleakley was observed the inbred shyness of the race manifested itself and the woman tried to hide the puppies—which were about a week old—under her legs, and it was only with great persuasion that she was induced to allow the animals to continue their feeding undisturbed.[2] This enabled Mr. Bleakley to obtain the accompanying photograph (Plate VI), to whom I am indebted for its loan.

[1] In making this statement, however, there is nevertheless just a vague possibility that the native may be aware that by prolonging the period of lactation the possibility of pregnancy is correspondingly reduced.

* [Mitchell recorded this practice in 1838 (Three Exped. Int. Eastern Australia, II., p. 341), whilst Gerard Krefft noted it in his article on the Aborigines of the Lower Murray and Darling in 1865 (Trans. Phil. Soc. N.S.W., 1866, p. 372).—Editor.]

[2] I have confirmation of this practice from Captain Malcolm Smith of the "Melbidir," E. J. Banfield, Northern Queensland, and M. J. Colclough, Northern Territory, as well as Northern and Southern Queensland.

Dogs are mainly responsible for the prevalence of hydatids. These animals sleep under the blankets with the blacks and lick their mouths and sores ; frequently they also use the same drinking and food utensils.

FOLKLORE.

Blacks in their primitive state were fond of their children and allowed them to take great liberties with them without rebuff or angry word, and in shifting camp the men would hoist the youngsters on their shoulders, who would secure themselves with a good grip of the hair and would thus sit comfortably and be safe.

On one of these outings, an old man who was very fond of his grandson took him into the scrub. The day was very hot and by and by a storm arose, and the thunder and lightning became terrifying and rain fell in torrents. The old man, who had hastened a long distance, had to cross a creek which he feared would block him as he was handicapped with the boy, so he stripped some bark for a temporary shelter for the night. All night long the rain poured down, and the man, who realised that he could not swim the flooded creek and carry the boy, made up his mind to leave him in the humpy and return to the old camp for food. Having told the little chap to wait until he returned he enclosed him in the temporary shelter with bark, and put sticks against the bark to prevent it from being blown down. Having thus made all secure, the old man started off at as quick a rate as the weather permitted, and on reaching the camp had some food and, with some for the boy, set out with a mate on his second journey. But to their astonishment they could find no trace of the little humpy or the sticks or the boy. Everything had disappeared, search as they would, and though they cooeed and shouted they got no reply. At last they found dangling from the limb of a tree a large chrysalis,[3] and so came to the conclusion that the boy had been changed into a grub securely housed in what represented the humpy and its protective sticks.[4]

THE ORIGIN OF THE MUMGOOBURRAS.

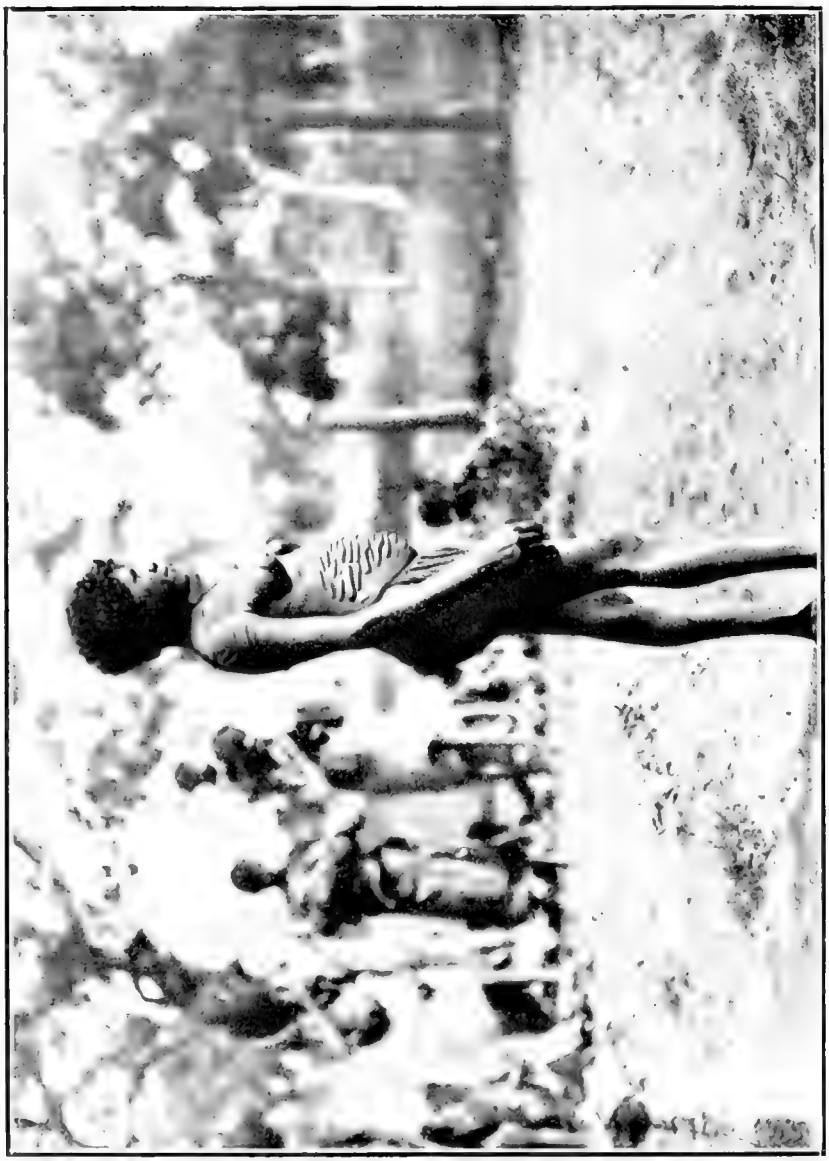
A long time ago, one hot day, one of the yellow seed-pods[5] growing on Prairie Creek opened and out of it came a young gin, plump of body and clear of eye. She looked around and found things pleasing to her ; the season was good, the lagoons

[3] The chrysalis is that of the case-moth (similar to the so-called "Faggot case-moth"), *Entometa clongata* Saunders.

I believe that the Singalese call the same kind of chrysalis by a name which means "billet of wood," and believe that the insects were once human beings who stole firewood on earth and are forced to undergo appropriate punishment in the insect world.

[4] On the authority of T. Illidge (St. Lawrence, 30 years ago).

[5] The yellow seed-pods above referred to are those of the "Cattle bush," *Pittosporum phillyraeoides* Benth.



J. W. *Bleakley, photo.*

A Young Mornington Islander.

Showing a somewhat abnormal growth of the breasts, apparently shared by most of the young gins on this island. The areola is so pronounced that a definite sulcus is formed separating the breast superficially into two well-defined portions.

full, and the herbage green. She took up her residence just above where the Plains homestead now stands, and finding food in plenty lived there alone. One day as she was walking along the creek she passed another kind of shrub with big seed-pods, and lo, as she passed, one of these seed-pods opened and out of it came a fine young blackfellow, whom she greeted gleefully and invited to her camp on the lagoon, and there he remained with her and they lived happily as man and wife. In due time she bore a piccaninny, and that was the beginning of the aboriginal race, or at any rate of the Mumgooburras.[6]

SUPERSTITION AND MAGIC (illustrated by specimens in the Queensland Museum collections).

Women in the upper part of the Cape York Peninsula (Pennefather River district) wear string necklaces ornamented with interwoven bird feathers and down in sign of mourning, while the old women regard them as charms and firmly believe that they are able to prevent evil spirits and sickness from approaching them (Plate VIII, fig. C). The ornamentation of the necklaces is not restricted to any particular kind of feather. We have several in which feathers from other birds, such as the mountain parrot for instance, have been used.

Similar charms are to be found in various parts of Queensland, particularly in the North and Western districts, in the shape of human hair cord,[7] but these are mostly used to dispel pain or sickness. Such instances as have come under my notice are—(1) Human-hair twine worn by both males and females for tying round the affected parts (Q. E. 14/283, Western Queensland); (2) Similar example from Palmer River employed for all kinds of pain and sickness (Q. E. 11/279); (3) As a charm against headache on the Mitchell River[8] (Q. E. 15/732).

In our collections we have quite a number of mourning string ornaments which have been prepared as a circlet, and represent a chain and overcast variety of stringwork. Samples were procured from the following localities:—Bentinck Island (Roth), Maytown (Roth), Bathurst Head (Roth), Butcher Hill (Roth), Cardwell (1879, collector unknown); also a plain mourning string, looped and worn by women only, comes from Maytown (Roth).

[6] I am indebted to Mr. J. R. Chisholm, Prairie Tableland, for this version of the origin of the native race, his informant being an old man who died some 35 years ago.

[7] It is also interesting to record that similar specimens are worn by initiated men to show their social standing.

[8] In referring to these medicinal charms, reference should here be briefly made to the emu feather charm referred to by Dr. Roth, a similar specimen of which is in our collections and was collected by him at Carandotta, and is marked as "a roll of emu feathers placed on parts affected for aches and pains." *See* paragraph 154, Roth, W. E., N. Q. Ethnography, No. 5, 1903.

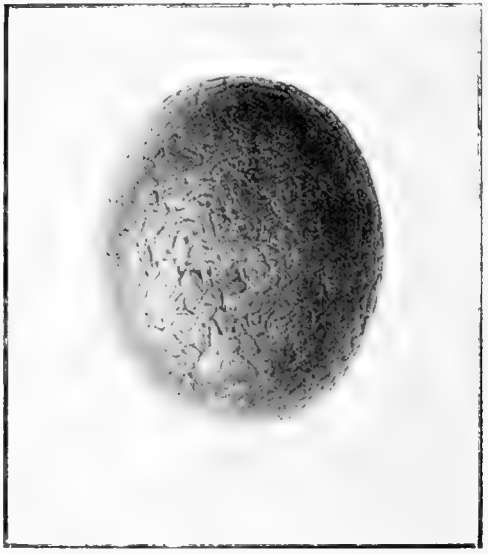
Text-figure 1.—A Wooden (Spatulate) Charm.

Text-figure 1.

A wooden (spatulate) charm.

Evidently connected with revenge. Q. E. 15/786. Marlborough District. Collector, T. Illidge.

The flat stick worked down to almost a thin slab has stretched along a portion of its surface pieces of human skin, which are kept in position by strips of a species of pliable cane, the whole having been daubed with white ochre, which has with use become more or less obliterated.

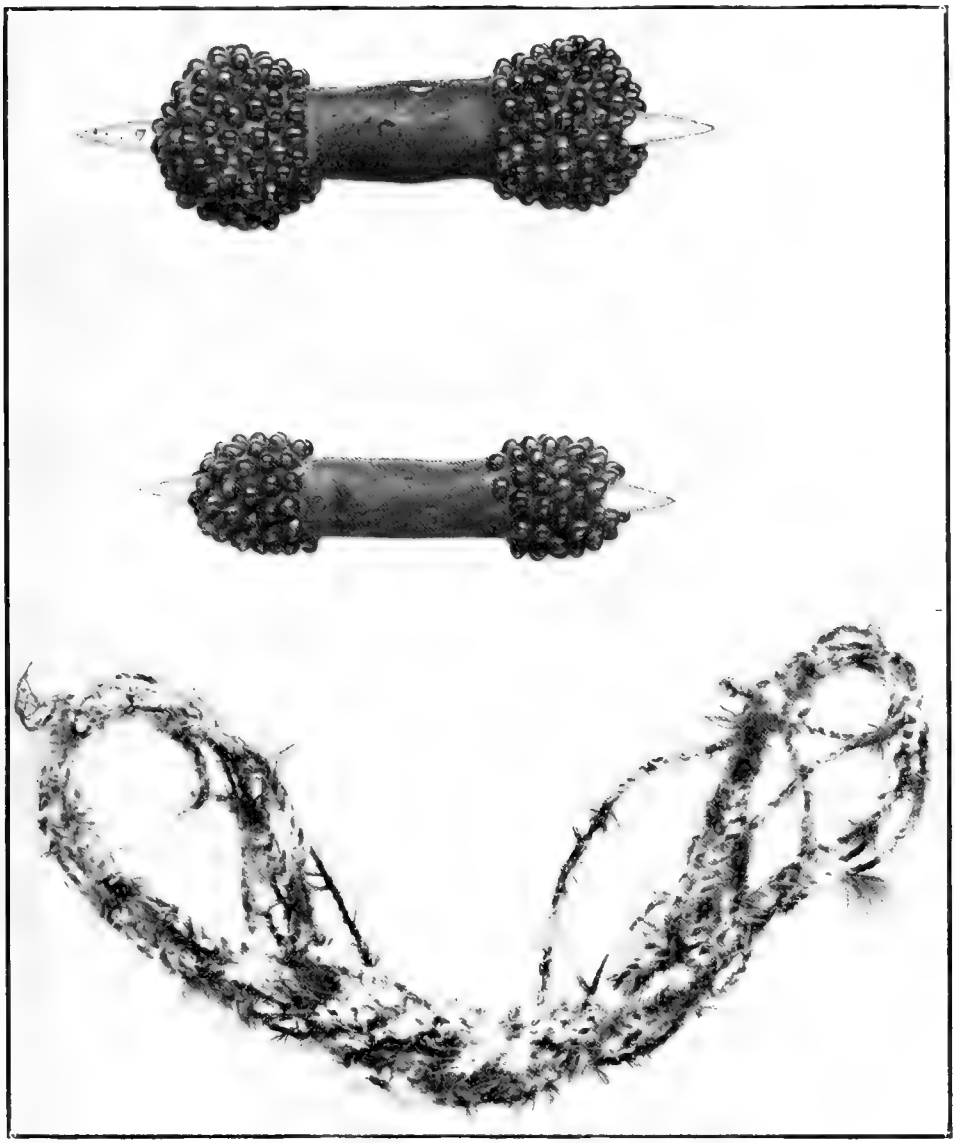


Text-figure 2.

"A Bora Stone"

Found in a grave near camping-ground, Bundaberg district (Q. E. 15/787).

The whole surface of this stone is pitted with marks which were evidently made when the clay was soft. Its circumference is 6½ inches and its length about 3 inches.

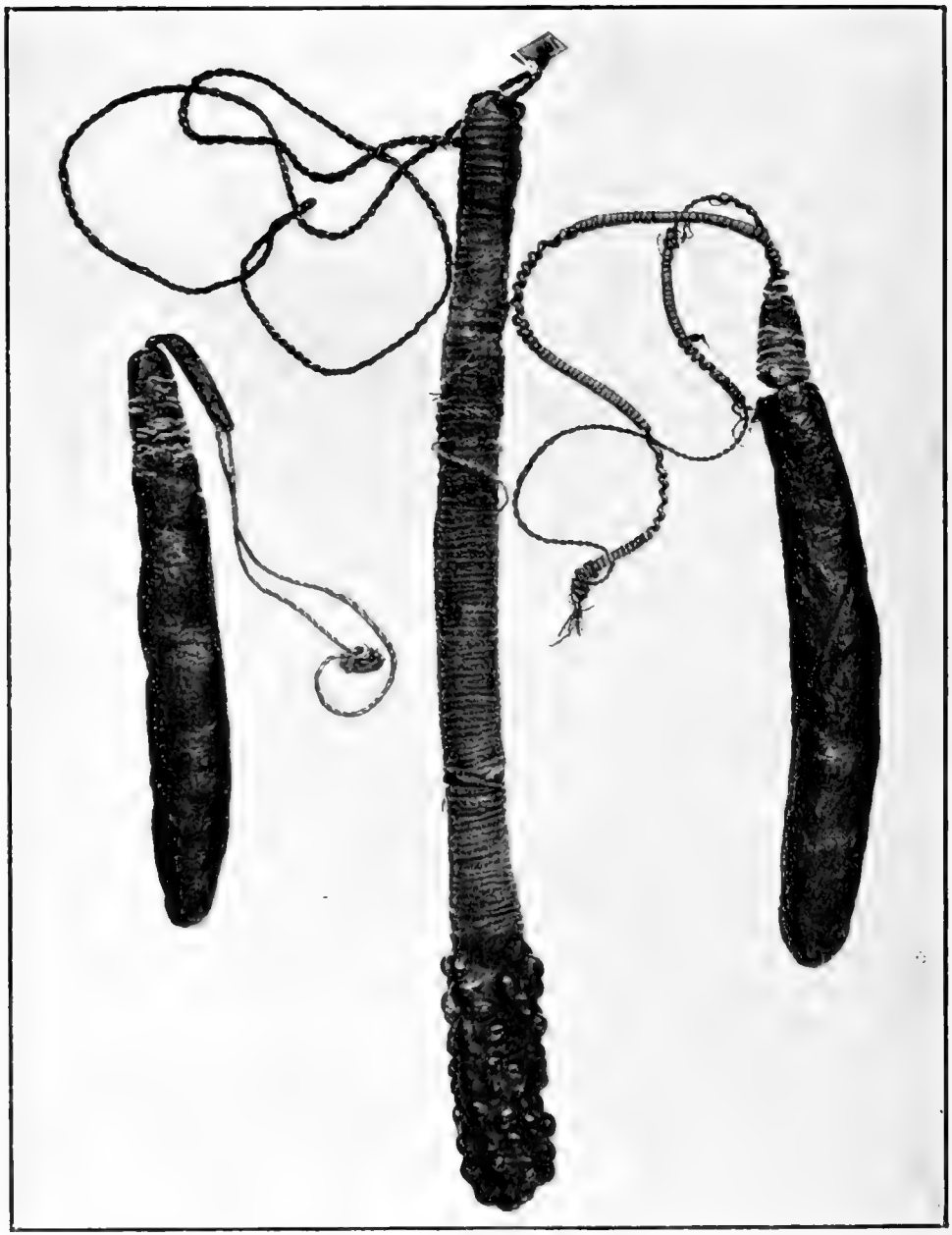


Figs. A and B.—Two ear-ornaments worn by the dead. Fig. C.—A necklace charm.

The dumb-bell shaped ornaments with which the dead are decorated in the Cape York Peninsula are made of gum cement and provided with wallaby incisors at each end, which in their turn are surrounded at the base with the gay seeds of *Abrus precatorius* (Q.E 16/941A, and Q.E 16/972B).

The love for the necklace charm is very deep-rooted (*see* text).

Face page 8.



Three Pendant Charms from the Northern Portion of Cape York Peninsula

Face page 9.

PENDANT CHARMS.

It seems to have been a somewhat popular practice in the Cape York Peninsula to make pendant charms principally with gum cement, and in those regions which have been under Papuan influence it is customary to find them ornamented with the seeds of *Abrus precatorius*. Several of these are in the Queensland Museum collections which require to be noted. One specimen consists of a long rope of human hair

Text-figure 3.

A number of CHARMS made of the branchiostegal rays of the eel mounted in gum cement. Atherton District. (Q. F. 15/715-718.)

It would appear that these were in use by young boys when being initiated into manhood. They are worn hanging on the chest, and the opposing tribe is supposed to throw spears at them during the ceremonies. The native name is " Wak-kee."

wound round with cord, ending in a fusiform mass of gum cement in which Abrus seeds are embedded. The whole is worn suspended by a brown cord around the neck (Q. E. 14/582). This specimen was obtained at Normanton and measures 265 mm. (Plate IX, fig. C.)

Two further interesting examples are recorded from Cape York (exact locality unknown). These are completely enveloped in gum cement suspended by cords. The presence of one Abrus seed in one of these suggests the abandonment of further decoration to have been an afterthought (Q. E. 16/909—Plate IX, figs. A and B. A measures 140 mm., B measures 168 mm. in length).

In this respect it is interesting to record that on the Pennefather River the navel-string (Nggerikudi, " Anombite") is covered with beeswax into which the *Abrus precatorius* seeds are stuck, the article (under the same name) being fixed at one extremity to a loop : the grandfather carried this slung from over the forehead so as to hang between the shoulders, until the child from whom it has been taken is able to walk, when it is buried. So long as it is thus carried about the child grows quickly and healthy, but should death befall it it is burnt.[9]

[9] On the authority of W. E. Roth. Consult N. Q. Ethnography, Bull. No. 5, para. 151.

MEDICINE.

I am indebted to Mr. J. R. Chisholm, The Prairie, for the following information :—

"I doubt if blacks of my acquaintance ever 'took medicine,' but they are always alert to the need of a change of diet. Honey was their aperient, or perhaps they might at times eat a quantity of yam locally known as 'Kaalgoolly.' It is, I believe, allied to jalap, at any rate it has a purgative effect. They always diluted honey with water, and sucked it out of a sponge or currajong bark or beaten grass. A black is always keen on a bit of green vegetable, and as they walked through the forest were alert to pick a mouthful here and there. I have acquaintance with the desert country tribes from Peak Downs up to this district. On the coasts and well-watered districts they get lots of greenstuff, submerged mostly. When I was a lad I used to go with the blacks a good deal about the Dawson (lower). They ate large quantities of the pink lily seed roasted, and various tubers. About Peak Downs district in the scrubs (brigalow) I've gone with myall blacks for days; study of them was always congenial to me. I have known Western blacks on the Georgina living on that nardoo rubbish. I think great numbers must have died from impaction. There was no honey or other aperient that I knew of in that country. Nardoo is totally indigestible to a white man; so also are many of their other seed-cakes. The nutriment value must be very meagre, and in dry seasons the Western blacks became frequently constipated as a result of their frugal diet."

Most natives know the value of greenstuff for keeping themselves fit. Young pigweed is particularly prized for its blood-purifying properties.[10]

Probably the use of many herbs may depend on their efficacy for the same principle, as for example the following instance recorded from St. Lawrence :— The blacks used to gather a sort of herb like pennyroyal, and make a tea of it and drink some of it. Mr. T. Illidge tells me that he tasted it once and that it was slightly bitter. They used it in cases of fever. The gum of certain trees, which when powdered was very red and astringent, was a common remedy for diarrhœa. A little of the powder was mixed with honey and taken several times a day. The bulbs of an orchid which favours the ironbark tree would be roasted in the fire, cooled off, opened, and swallowed with water for bowel complaint.[11]

DRESSING OF WOUNDS.

I have it on the excellent authority of J. R. Chisholm that the awful retributive cuts on the muscles of the legs, arms, or back healed very quickly by the application of ashes or clay, and he has often seen common mud from lagoons, which contained much decomposing weed or leaves, used for the same purpose. An instance is recalled on Peak Downs when one man inflicted a dreadful gash on another from

[10] Hamlyn-Harris, R., Anthropological Considerations of Queensland, &c., Proc. R. S. Q. Presidential Address, vol. 29, No. 1, 1917, 7, 27.

[11] On the authority of T. Illidge.

A Native Pillow made entirely of Emu Feathers.

Native name "Hoorbarra" (Q.E. 15/728, Mitchell River).

The habit of sleeping with only the flat ground beneath the head being universal throughout Queen-land, makes this novel pillow the more interesting, and there can be, I think, little doubt that its make is due to the effects of civilisation. The feathers are securely fastened together with a kind of white ochre which must have been applied originally in a moist condition, the feathers becoming fastened as the white earth dried.

Face page 11.

the knee to the hip parallel with the muscles; the bone was visible and the freed muscles protruded. The wound was tied up in clay and ashes, and it was but a short time afterwards that the boy was about again almost without a limp.

Mr. Watson gives the following interesting information *re* a celebrated black ruffian, Paddy Maloney by name, who chopped his gin's both legs off about six inches below the knee. The gin survived the operation and lived in the Currawilla Station Camp for years afterwards. It is a pity, however, that no information is forthcoming with reference to the method of cure adopted.[12]

COUNTER-IRRITANTS.

The use of counter-irritants for pains is by no means uncommon. An instance was recently brought under my notice by Dr. Kesteven, when a full-blooded black was admitted into the Gin Gin Hospital suffering from abdominal pains and pains in his left shoulder which he had for over two days. Previous to admittance he had scored the abdomen on each side of the mid-line with eight or nine skin-deep incisions from 1 to 1½ inches in length, and on the shoulder three long shallow incisions 4 to 5 inches long which extended over the scapulæ.

BORA RING, NERANG.

I am indebted to Prof. S. B. J. Skertchly (Nerang) for the following notes :—

"*Situation.*—One mile south of Nerang Bridge, a quarter of a mile south of Nerang Railway Station, on the road to Gilston. The road traverses and has nearly destroyed the ring.

"*Age.*—The Nerang blacks are now extinct. The ring was last used in 1865 for a celebrated corrobboree which Mr. E. Cooper (my informant) attended.

"*Position.*—The Bora-ground was a noted one because (*a*) it was situated at what is called 'The Falls' on Nerang River, a bar of sandstone where fish were and are easily obtained; (*b*) it was the last crossing place or ford; (*c*) though in 'forest' it was near 'scrub.''

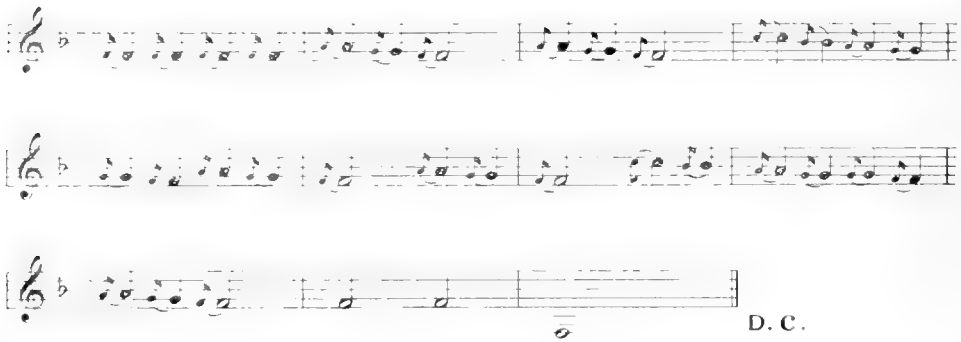
"The flat upon which the Bora-ground is situated is covered with alluvium. There are absolutely *no* stones in it.

"*Usage.*—The sandstone in the neighbourhood (Palæozoic, probably Carboniferous) weathers into very peculiar boulder-like masses, which at first deceived me as being waterworn. The river grinds these into still more implement-like forms. The blacks, finding such ready-made stones ready to hand in hundreds, took them to the Bora-ground for temporary use. *Every* stone on the flat is of this quasi-implement form, and has been brought up and at the close of a meeting left as not worth carrying away.

"Mr. Cooper and I found twenty in half an hour, and these I have given to the Queensland Museum. Some of them have been more or less worked. The cruder series form what may be called the Eoliths of the Australian cultus, and should be sought for elsewhere as illustrating a phase of native life.''

[12] The blacks eventually executed Paddy Maloney in their own way (W. H. Watson).

TUNE SUNG IN AN ABORIGINAL CAMP AT ST. LAWRENCE ABOUT THE YEAR 1870.



This is sung mostly on moonlight nights, accompanying a sort of "walk-round" dance. These blacks were from the Downs country about the Isaacs and Lotus Creeks. Number of performers varies from ten to twenty. The singing is in unison; some natives beating small waddies together; time, that of a smart "quick march." Step is similar to a "galopade." The same foot is kept in front. Final drop to lower key-note is as much of a grunt as a note, but at the same time clear and distinct, and accompanied by a vigorous stamp of the foot.

An eclipse of the moon occurred during one of these performances. Directly the shadow was observed both song and dance stopped suddenly, and a cry went up similar to the wailing for the dead, and continued until the eclipse was over.

(HORACE BURKITT, Corinda, 31 Dec. 97, D. 9542)

ON MESSAGES AND "MESSAGE STICKS" EMPLOYED AMONG THE QUEENSLAND ABORIGINES.

Illustrated by Specimens in the Queensland Museum Collections.

By R. Hamlyn-Harris, D.Sc., F.R.A.I., F.L.S., Etc.

Nothing appears more natural than that primitive people such as the Queensland aborigines, having an individual or tribal message to deliver, should convey such by means of a definite token, as a guarantee of good faith, both of the message and the sender; and that such a token should be marked to assist the messenger in the delivery of his message.

On account of the distance which such messengers would on occasions have to travel, "memory sticks" would become almost a necessity, and there is, I think, little doubt that certain marks are undoubtedly known and recognised by tribal customs, so that, however many meaningless marks such a token might contain, there are nevertheless certain signs which would always be readily understood. Such tokens or so-called "message sticks," however, would not be used merely as "memory sticks" but for other definite purposes, such as, for instance, a summons to an individual or group of individuals (for either private or public reasons) to attend an initiation ceremony or to settle a dispute, or for general purposes of corroboree. Sometimes a "message stick" is purely an introduction, and at other times may serve as a passport through hostile country.

The same token has on occasions a totemic significance, especially when carried in conjunction with the bull-roarer. The fact that a "message stick" is often retained until the arrival of the sender almost suggests a possibility of its being regarded as a temporary "keepsake."

It is necessary at the outset to realise one important fact, and that is that these "sticks" must not be interpreted as a white man's letter would be, nor must it be supposed that the "sticks" could "talk" in a white man's language. A native boy would emphasize this by saying that the black boys "were notha kind," and that the boys make them to send "alonga notha man." To suppose that a "message stick" could be interpreted from the white man's standpoint is ridiculed even by the blacks themselves, any one of whom might

be induced to exclaim " that fella humbug, ear'nt mak'em talk all a same white man"; and this is, I think, one of the most important points in the consideration of our Queensland " message sticks."

Nothing is more natural, either, than even among primitive folk a love message should be delivered by means of a love token, and when such is the case it is noticeable that such a symbol is not accompanied as a rule by any particular set of marks; the " beautiful nonsense" which every lover so highly appreciates is left undoubtedly to the imagination, unless it might be that we can discern in certain " flash" marks, sometimes so noticeable, something of the sender's emotion. It must be exceedingly difficult for the white man to understand the proper significance of the "message stick" from the black man's standpoint, and it is because an endeavour to explain the "message stick" from our own has so often been made, that we have been at a loss to understand the subject properly.

Most authors are agreed that the marked " message sticks" tell no particular story nor indeed have any specific meaning, hence the opinion on this subject of a man like R. J. Cooper, of Melville Island (who was also Baldwin Spencer's informant), is of the greatest possible value. Cooper in this connection says:—

" There are very few used on Melville Island. Some people say that the blacks on receiving them can read or understand the marks on the stick, but that is not my experience. Anyone entrusted with a ' message stick' is told the message and the different meaning of the marks. Sometimes sticks are sent and no message is told to the bearer, that is in the case of sweethearts, &c. I have heard them read them; one mark may mean ' him want 'em,' and then another one, a growl, and another mark ' him want 'em me go bush'; and then another person may get a stick differently marked altogether and the same meaning applied, and *vice versâ*. I have received ' message sticks' personally, but always the bearer has told me what is wanted, and the stick explains itself, each notch denoting some definite article required; and the stick is simply sent to prove that the message is true, and is kept to refer to later when the sender is met with."

It is, however, hardly likely that such marked sticks would have originally come into existence if there had not been some definite intention of their conveying some precise meaning, and viewed in this light they are undoubtedly the first primitive step towards a written language. The idea of an aid to memory is nothing new. Deniker in his "Races of Man" (**6**) gives a number of very interesting instances of the use of symbolic objects and mnemonic marks, such as for instance the little horn tablets bearing notches which have been found in the sepulchral caverns of the Quaternary period, at Aurignæ (Dordogne).

Of great importance to our subject is the record of Harmand (**11**) discovered in a Laotian village in the shape of a notched tablet, each notch of which had a definite significance.

But one of the most important uses to which "message sticks" would be put would be that for the purpose of obtaining barter, when there would be a tendency for the stick to become marked in the same way and in the same definite positions on each occasion, and hence such would be purely "memory sticks," and it would be easy to imagine that some definite meaning might be attributable to each notch, not that such a notch would be capable of being characterised by an exact interpretation, but merely that such a mark would tend to remind the messenger of the definite object of his mission, and if he was sent on a similar mission again, it is not outside the bounds of possibility that there would be a tendency to mark the stick in exactly the same way: hence the message stick is not an attempt at writing but a crude representation of ideas. Doubtless the brand of individuality would also be noticeable in the shape of some "flash" marks irrespective of meaning.

The idea that "message sticks" are really primarily "memory sticks" and guarantees of good faith is, I think, shown by the fact that when carried they are never wrapped up, as it is evidently the intention that same should be available at a moment's notice. In Queensland they are carried by men only, and whilst hunting they are usually twisted into the hair and concealed therein; unless the messenger happens to have a belt, in which case the stick might be placed there for a time.

"Message sticks" seem to have been in use almost universally throughout Australia with the exception of the Arunta tribe of Central Australia (**7, 24**), and though never regarded as sacred it was nevertheless considered to be a matter of honour to see that they safely reached their destination, and the faithfulness with which such a mission was carried out shows clearly how (prior to the advent of civilisation) the native regarded the sanctity of his obligations.

There is an instance known to me personally where the messenger died *en route* at some distance from his destination. After some short lapse of time the stick was passed on from one to the other most religiously, until it finally reached its proper channel. It is presumed that no verbal message could have accompanied the stick, since the message died with him, and yet I have evidence that the receiver was able to decipher the message in some sort of way, since he immediately became troubled and soon after "went bush," returning to the tribe and place from whence the message was originally sent.

Tasmania.—The primitive Tasmanians did not possess "message sticks"; their only method of intercommunication was by means of smoke signals made in prearranged places and principally used to give warning.

New Zealand.—Nor do we find "message sticks" in use among the Maoris. J. F. Cheeseman, the Director of the Auckland Museum, sends me the following note:—

"The nearest approach that has come under my notice is a little article in this Museum, which is the lower valve of an oyster shell, through which a circular hole has been neatly drilled. I was informed that such articles were sometimes sent as a proof of the honesty and reliability of anyone sent with an important message, but I have been unable to find sufficient support for the statement in other districts to allow me to fully accept it at present. With respect to credentials sent with a message, I believe one plan was to send a well-known Mere (fighting club of nephrite) or other weapon or ornament as a token of th bona-fides of the messenger."

Southern Africa.—The present Governor of Queensland, Sir Hamilton Goold-Adams, who has spent a considerable time in parts of South Africa, has kindly given me the following information bearing on this subject, which I find far too interesting to omit. He says:—

"The tribes and kingdoms of Southern Africa are very much more important organizations than anything of the kind in Australia appears to be, and when a message is to be sent from one chief or king to another it is conveyed by ambassadors with due ceremonial. When written messages are carried by the natives in the ordinary course of trade, business, &c., the procedure is as follows:—As soon as the message is handed to the carrier he immediately goes to the nearest bush and cuts therefrom a small twig, in the cleft end of which he inserts the note, and there ties it securely with bark. He then sets out, carrying the stick in front of him so that it may be apparent to all that he is the bearer of a message. Should he find it impossible for him to complete the journey, he proceeds to the nearest chief, informs him of his mission, and the message is invariably sent on by another bearer. Very often, of course, there is delay in securing another messenger, but it is a recognised thing amongst native tribes that the message must be forwarded, and it eventually does reach its destination."

With reference to messages and messengers of Torres Strait, I have the following information:—

Yorke Island.—Kindly supplied by Ed. B. Connolly—

"1. When a native went to the bush in his own island, or to an adjacent island, he left a pointed stick at his house with the point in the direction he had taken.

"2. If he was sending a message to someone on another island that he intended paying him a visit in, say, five days' time, he would send five sticks pointed at one end.

"3. If he wanted a person on another island to visit him he would send sticks pointed at both ends.

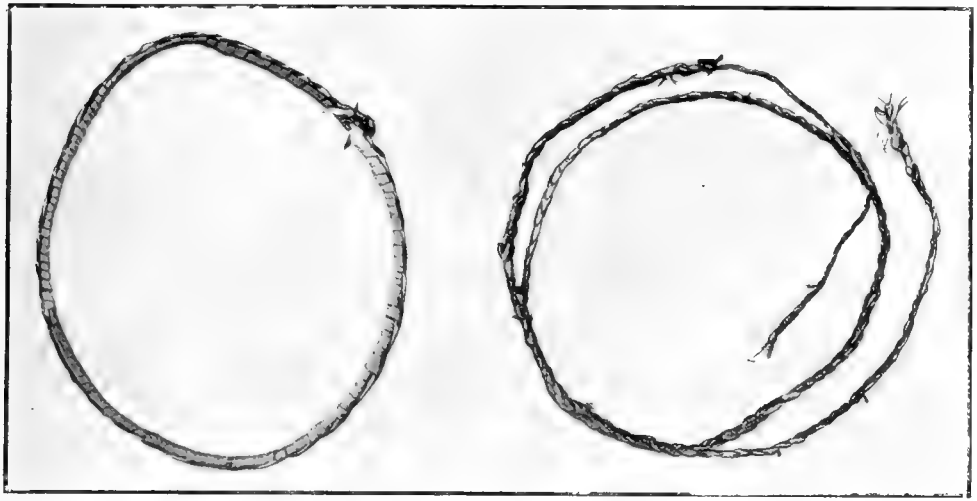
"4. If natives of one island intended to make war on another island in, say, ten days' time, they sent ten sticks burned at one end.

"5. If natives were approaching another island with peaceful intentions, they would wave a green branch, but if with warlike ones, a firestick."

Badu.—E. M. Zahel kindly writes as follows:—

"In sending messages to another island a relative was chosen if possible, and in the case of love messages a female relative. If it were a message asking the friend or people to come over to the island a piece of plaited cabbage-tree was sent; if there were need for haste a very short piece, and if not, a piece longer, according to the urgency of the case.

"In the case of a young man wishing to take a girl from another island he would send a female relative, when possible, and would give her his anklet and armlet. If the girl were willing she would wear these; if not, they would be returned by the messenger. Sometimes the girl, when willing, would send her anklet and armlet in exchange. The man would also send a message as to when to expect him to come and fetch the girl. The days were numbered by the fingers up to two hands and then the numbering repeated."



Text-figure 1.

Fig. A, Anklet. Fig. B, Armlet. "Tiapuru."

"The anklet and armlet are called 'Tiapuru' (also recorded by A. C. Haddon (10)), and when sent as a love message 'Musura.' The piece of cabbage-tree used to denote time is called 'Buruwa.'

"In sending the news of a death to another island the man who has been the master of ceremonies at the funeral was chosen. He was called a 'Marget,' he would take a stick, which was evidently a special stick and only used on these occasions—the only way they seemed to have used a stick for messages—and when the people of the island were assembled and sitting down, he would go next to the chief friend of the deceased and push the stick into the ground, at the same time asking if so-and-so (mentioning the name of the deceased) were there. The people would immediately know he was dead and start to wail. This custom was practised at Badu last month. A girl had died very unexpectedly in Thursday Island, and her brother brought the news over to the father. The boy went to the father and asked him if the girl was with him. The father knew at once that she was dead."

The Murray Group.—I am indebted to J. S. Bruce for the following information:—

"The Murray Group, Darnley, and Stephens Island people speak the same language and their native customs are similar. They had a kind of message stick which they used among themselves. It was named 'Tom,' and was arrow-pointed but had no barb fixed on its point.

"A messenger coming from Murray to either of the above islands or *vice versâ*, with a verbal message was given a 'Tom' by the sender to present as his credential. There was no distinguishing mark on the 'Tom' to show who the sender was, but on presentation it was accepted in good faith as genuine. The bearer of the message would address the receiver, 'Your friend so-and-so sends his "Tom" to you.' It was not returned, neither was a 'Tom' sent with the return message. Messages accompanied by a 'Tom' were used principally by the sender in giving notice of his intention to pay a friendly visit to his friends, stating about the time they might expect him, or inviting a friend to come on a visit to him. The 'Tom' was also used in sending a challenge to fight, with the warning as to the time when the attack was likely to be made. The last occasion on which it was used for this purpose was about forty years ago, when a messenger from Murray with a 'Tom' was sent to Stephens Island warning the people there that they were to be attacked at a certain time. The trouble arose through the Stephens Islanders having forced a young Murray woman (whilst she and her father were visitors there) to marry one of their men. The father got a message sent to Murray telling what had been done, and his friends arranged to punish the Stephens Islanders and sent a message to them accompanied with a 'Tom.' Formerly the people of the above islands traded with the people of the Fly River, Papua. The old people tell me that they received the 'Tom' with a verbal message from Papua just in the same way as they themselves used it—*i.e.*, in giving notice of an intended visit.

"No message or 'Tom' was used between the peoples of the Eastern and Western Islands, as they had no intercourse with each other until recent times, but they had a form of 'Tom' in use amongst themselves."

South Australia, bordering S. W. Queensland.—In this connection I cannot refrain from making some reference to the Thdoas in use among the Diari tribe of Cooper's Creek:—

"When members of this tribe (and, I believe, the Wonkangura adjoining them on the north) intended to strike camp in order to find a better hunting-ground or more water, &c., they made a Thdoa, which was usually of wood (frequently *Acacia ancura*) on which they painted a design. To this they added a few leaves or twigs at the top, or they moulded a shape of clay or gypsum, and so on, on to the wood, and sticking the pointed end into the ground, usually inside one of their huts, left it there, for any relation or friend who might chance to come after they had left. The finder knew how to read the signs. Thus, for instance, a waterhole called Kapitakutu (or Kudu) was shown roughly representing a kapita or bandicoot, by which their friends knew that they had gone to the particular waterhole bearing that name.

"Or take another instance. A Thdoa decorated with a tuft of emu feathers on a white knob represented the place Warukatipitipalu. 'Warukati' is the Diari for the emu; 'piti' means the hinder parts, and 'palu' white. Or, again, Kirrakirrani. 'Kirra' is the name for a boomerang and the diminutive is usually formed by duplication, the 'ni' at the end denoting 'to' or 'in the direction of.' On the top of this Thdoa two or three fishbones are fixed, to tell their friends that they have gone to this particular waterhole for the purpose of fishing, and that usually implies only a temporary absence from camp."[1]

[1] On the authority of H. J. Hillier.

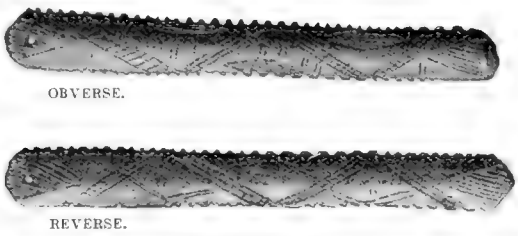
TECHNIQUE.

The kind of wood used is not of any particular significance, since it would probably be selected for its accommodating size. It is interesting to note that amongst the Queensland Museum specimens the following woods have been used:—Leichhardt pine, white pine, cypress pine, gums of various kinds, blackwood, ironbark, &c.[2] *Hibiscus brachysiphonius* or some other soft wood is used in the Gulf district (Hey); whereas Roth informs us that some such wood as gidyea or tea-tree is frequently used in North-West Central Queensland, and that the name for the message stick among the Kalkadoon simply means "a piece of wood." In the neighbourhood of Dunk Island, so Banfield tells me, "the natives used no particular wood, though they had a preference for wattle, especially that which was reddish in colour." As a rule the sticks remain plain, the use of ochre seeming to be a modern invention, at least so it would appear from the study of the Queensland Museum specimens; the older variety were rarely if ever ochred, but the more recent the stick, the more ochre has been daubed on it. This, it seems, is also E. J. Banfield's opinion, who says—"I have no information as to ochres on message sticks, except during current times when it is sought to catch the eyes of collectors; in such cases a white clay, a soft red rock, and a yellowish earth are used with water. I thought that perhaps coral lime might be employed, but I am told not."

In pre-white days the wood was cut with a stone implement used somewhat as a saw. The process would of course be slow, but, as we know, time with the native was of no object. The piece of wood once secured was scraped down with shell or stone scrapers. For polishing and obtaining fine edges the sticks were rubbed together until the desired end was obtained.

In some cases Banfield tells me that the leaves of *Ficus opposita* were used for polishing, but ordinarily the shells made the stick smooth enough.

QUEENSLAND MESSAGE STICKS.



Text-figure 2.

The obverse and reverse sides of a message stick from the Burdekin River, Queensland. (No. 970; 140 mm. x 17 mm.)

[2] No specific names of these can be given.

This stick is made of ironbark and has 37 notches on each side. Both surfaces are marked with extreme care, the small hole having been made with either shell or stone drills.

On the obverse side three club shields are well defined, with a varying number of short double marks over each shield.

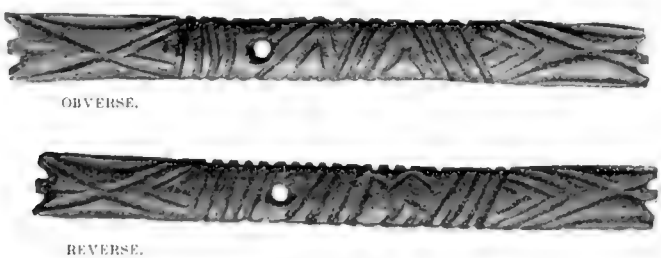
On the reverse, there are three boomerangs with one double mark inside each boomerang.

Message unknown.

Text-figure 3.

Obverse and reverse sides of Queensland message stick.
(No. Q.E. 16/871; 115 mm. x 6 mm. x 8 mm.; exact locality unknown.)

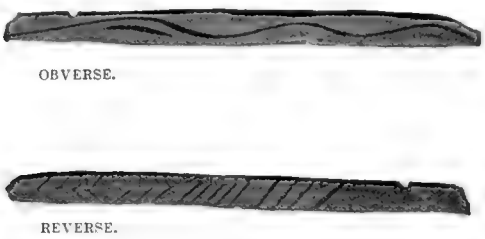
This stick, made of ironbark, has zigzag lines on the side of top corner, but not one line completely encircles it; there is an isolated diamond-shaped figure in centre of the obverse side. Message unknown.



Text-figure 4.

The obverse and reverse sides of a message stick from the Bareoo.
(No. 261 (1808); 174 mm. x 19 mm. x 7 mm.)

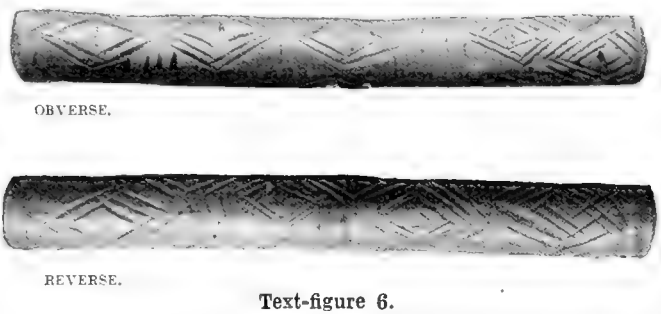
This stick, which is made of ironbark, suggests totemic designs similar to those used on the bodies of initiates, in cave-drawings (as well as the markings associated with burial in New South Wales). The lines and notches are moderately deep, and the hole has been drilled with a firestick. The notches are in sets of 3, 4, and 7, and 2, 1, and 5 on sides respectively. Message unknown.



Text-figure 5.

The obverse and reverse sides of a Queensland message stick.
(No. Q.E. 16/870; 131 mm. x 10 mm.; locality unknown.)

A roughly fashioned and untrimmed stick made of ironbark, containing a message with reference to a long journey. The flat obverse side only contains a long sinuous line and a very short one, together with one notch on the side of the same. On the reverse there are a number of irregularly placed lines producing in the manner of their arrangement a roughly carved diamond-shaped figure, so characteristic of message sticks.



Text-figure 6.

Two sides of a Southern Queensland message stick.
(No. 972; 119 mm. x 14 mm.)

This stick is an exceptionally interesting one, and is made of the white gum which grows along watercourses, but is not actually round; it is distinctly marked, and the peculiar diamond-shaped figures with a centre cut (one with two) have undoubted phallic significance, and is the only stick of this kind which has come into our possession.

There are altogether 10 representations of the vulva indicating the number of females to be operated upon at the ceremony, and about 35 straight lines denoting the men, the isolated grouping indicating the number of eligibles from each locality.

Text-figure 7.

Two views of a bean-shaped Queensland message stick made of pine.
(No. 2811; 55 mm. x 15 to 21 mm.)

Further information unobtainable.

Text-figure 8.

Obverse and reverse sides of a typical message stick from Roseburth, Birdsville.
(No. Q.E. 14/356; 162 mm. x 14 mm.)

This stick is very roughly fashioned of pine wood, possesses no notches but only transverse lines cut on each side. Another specimen from the same locality is very similar, except that here and there there is a greater distance between each cut.

Text-figure 9.

A rare form of message stick from the Gregory River district. (A. Meston.)
(190 mm. x 15 mm.; native name "Muranda.")

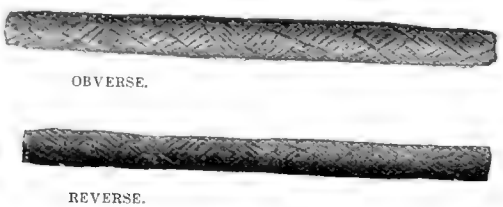
This interesting stick is made of the wood of the bean-tree, and its whole surface is marked with a faintly incised pattern heterogeneous to a great extent.

The work has been accomplished with a marsupial incisor, and is extremely faint in places. The obverse side shows two notches at that portion of the stick,

where the message is reputed to commence. At the other extreme end there is a small ring in the centre of a blank, and a distinct "track" is visible extending over half the length of the stick; diamond-shaped or irregular triangular figures predominate.

Its message is reputed to be somewhat as follows:—The bearer of the message is sent with another man for two gins (two notches: first notch, single virgin; second notch, widow would suffice), and intimates a big fight which is to take place as a display of dexterity (not tribal fight). Nine womineras represented by diamonds, and six spears by lines, are sent together with relatives of girls in payment for the two gins.

The track indicates the distance to be traversed.

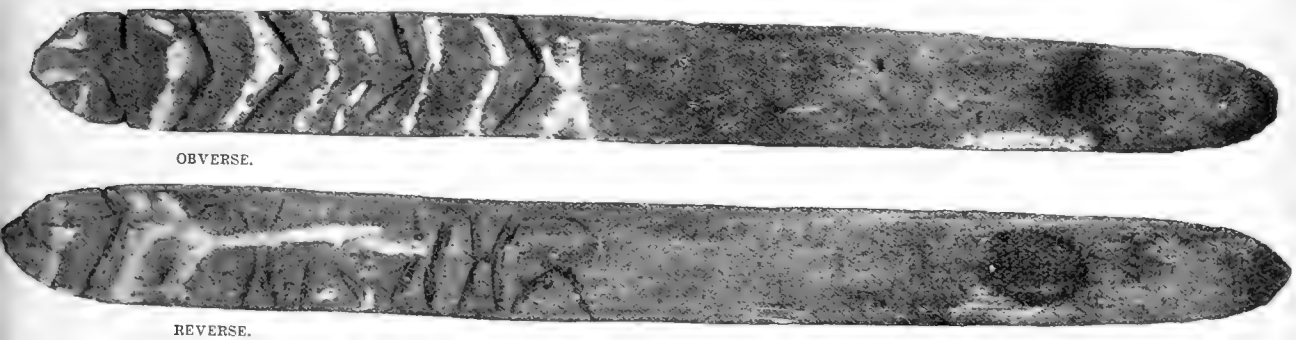


Text-figure 10.

A message stick from Normanton, North Queensland.

(No. 971; 131 mm. x 11 mm.)

This stick is encompassed by winding lines, the interstices being filled with short cross-bars, the cuts of which are now and then broad. The surface has been charcoaled.



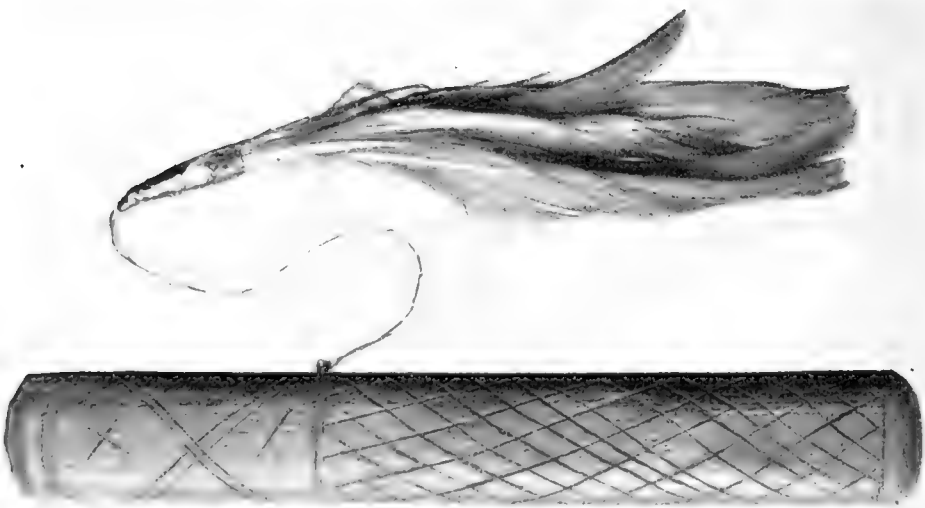
Text-figure 11.

A rather long message stick from Bourke River.

(No. 2123; 317 mm. x 33 mm. in widest part.)

The wood used for this stick is extremely soft, and white clay has been smeared over a portion of the surface only. Crude boomerangs are marked upon the reverse side.

OBVERSE.



REVERSE.

Text-figure 12.

A message stick ornamented with feathers, from Turn-off Lagoon, *via* Burketown, North Queensland.

(No. Q.E. 11/36; 196 mm. x 24 mm.)

This stick, which was donated by a Protector of Aboriginals, Mr. E. P. Smith, N.E. inland of Burketown, is provided with a plume of yellow-crested cockatoo feathers mounted in gum cement. A stick of this kind, almost a rarity, would only be used by the headman of a tribe in communicating with the headman of another, and as soon as received the plumes would be taken off the stick and worn in the hair, pending the arrival of the ceremony to which he had been summoned.

The lines, half-circles, and crosses (of which there are six altogether) are but lightly carved on a piece of white gum, and the whole is raddled in dark ochre. Such a message stick might on occasions be wrapped up in a piece of bark.

OBVERSE.

REVERSE.

Text-figure 13.

A message stick from Turn-off Lagoon, *viâ* Burketown.
(No. Q.E. 11/35; 125 mm. x 20 mm.)

This pine stick has an unusual design and is highly suggestive of white influence. The three figures on the obverse side almost suggest a flag design with six dots, but this must not be taken too seriously, since the writer is totally unaware of the motive in design. Mr. E. P. Smith informs me that the stick was sent from a brother to his sister telling her that he had found the police.

Although the arrow here is undoubtedly intended to portray the "arm of the law," it should not be entirely overlooked that there was a time when a similar mark resembling the arrow was in use and had other significance (probably phallic from what I have been told).

OBVERSE.

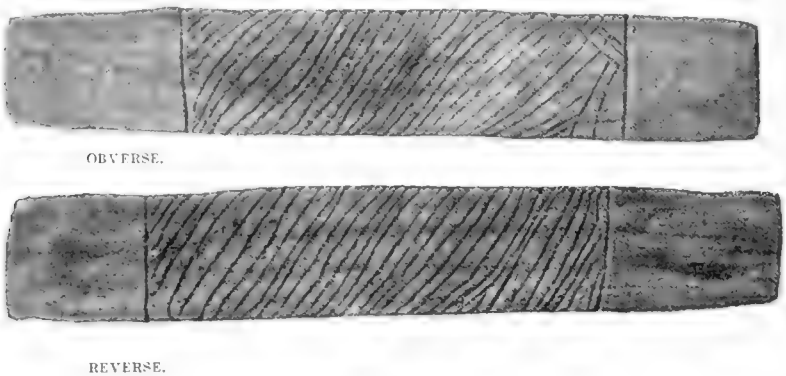
REVERSE.

Text-figure 14.

A four-sided pine message stick from Turn-off Lagoon, *viâ* Burketown.
(No. Q.E. 11/36/2; 92 mm. x 11 mm. x 8 mm.)

This ochred stick contains irregularly inclined zigzag lines on the reverse, and the period of six moons is shown by six straight lines on the side, unfortunately not visible in the illustration.

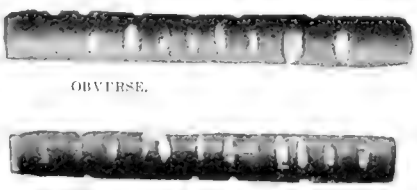
The stick, which is of recent make, is an invitation from one clan to another to visit a corroboree in six months' (moons) time.



Text-figure 15.

A flat (white gum) message stick from Turn-off Lagoon.
(No. Q.E. 11/34; 182 mm. x 32 mm.)

A stick at one time the property of the "King of the Muholoon." The close sinuous lines completely encircle the confined area. The cross-markings shown on the obverse side are produced where these taper off. Message unknown.



Text-figure 16.

Message stick from the Cape York Peninsula.
(No. Q.E. 14/530; 109 mm. x 14 mm.)

This message stick was sent by a native of Aurukun to a native of Weipa, consenting to his sister marrying the latter when he had built his humpy, and asking for payment in the form of a cloth from the woman and a pair of trousers and a singlet from the man.

The wood used is possibly a variety of Hibiscus, and is crudely prepared, showing haste in the making. There are altogether three rows of notches cut

at irregular intervals. Although the natives who used this stick have been under the influence of civilisation, it is nevertheless a concrete instance of a definite message.

Text-figure 17.

A message stick, as seen on the two marked surfaces, from the Cape York Peninsula.
(No. Q.E. 14/532; 242 mm. x 19 mm.)

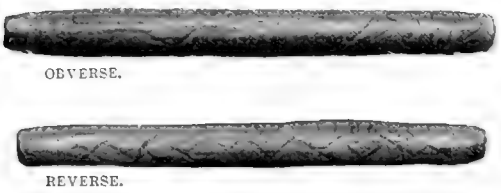
It is not an easy matter to determine the kind of wood from which this stick has been made. It is not at all unlikely that it may be a piece of *Hibiscus brachysiphonius*, which is recorded by Hey as being used in the Gulf districts for this purpose. Being, however, desirous of procuring an expert opinion, I consulted Mr. C. T. White, the Colonial Botanist, who says—"It seems like one of the Euphorbiaceæ or Urticaceæ. The medullary rays are pronounced, close together, and sub-equidistant, and under a lens the pores are prominent and distinct; the soft pith occupying the centre is a marked feature. No distinct rings of growth could be observed. Though a light wood in cross section it shows little or no soft tissue."

The stick has a number of " square cuts" and a few " back" cuts which are distinct and are evidently intended to convey a meaning of their own. The two surfaces between the rows of marks are ochred in red. Message unknown.

Text-figure 18.

A "Cypress" pine message stick from Herbert River.
(No. 390 (8426); 129 mm. x 16 mm.; donor, J. Gaggin.)

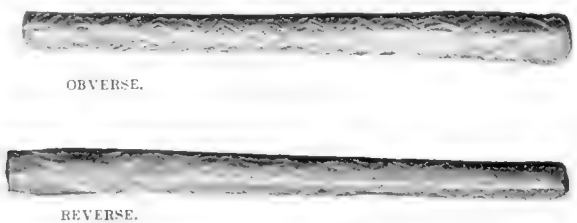
This round stick is covered with zigzag lines (in groups) irregularly placed. Message unknown.



Text-figure 19.

A pine message stick from the Herbert River, Queensland.
(No. 391; 89 mm. x 9 mm.; donor, J. Gaggin.)

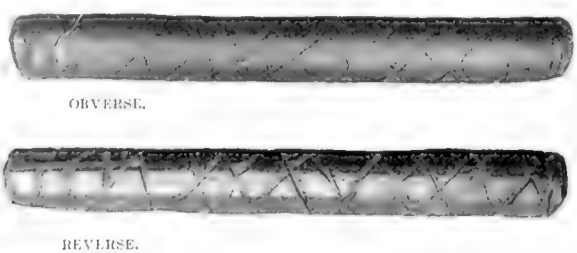
This stick, though in the main round, has practically four sides and is raddled with a dark-red ochre. The two rows of notches number 24 and 25 respectively, and a groove (track) runs along one of these rows; for the rest zigzag lines and crosses are typical. Message unknown.



Text-figure 20.

A Central Queensland message stick.
(No. 969; 154 mm. x 12 to 15 mm.)

A stick of so-called "grey" gum with zigzag lines, lightly engraved, producing on account of their position a rather confused picture; the diamond-shaped figures have consequently too uncertain contours. Message unknown.

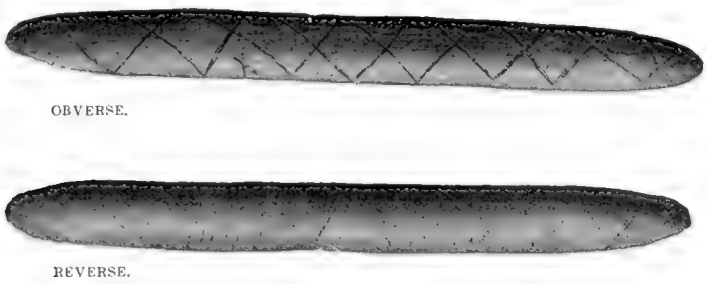


Text-figure 21.

Message stick from Camboon.
(No. 311 (x); 157 mm. x 19 mm.)

This stick, made of ironbark, is cylindrical in shape, is provided with winding decussating grooves. Both on the obverse and reverse sides a distinct

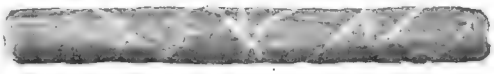
double track is noticeable—which could hardly be interpreted as flash marks. The message is unknown.



Text-figure 22.

Two sides of a message stick from Camboon.
(No. 312; 193 mm. x 21 mm.)

This stick is made of an ironbark, and its surfaces are engraved with faint lines, more pronounced on the obverse side. Message unknown.



Text-figure 23.

A North Queensland message stick.
(No. Q.E. 16/895; 114 mm. x 13 mm.)

This stick, made of a species of pine wood, had actually been used four years ago by a native in sending the following message to his brother-in-law from Cooktown to Cairns, when the donor, Mr. J. J. Bramford (Oaklands), procured it.

"You tell 'em, come three moon. I been see 'em. White fella steala me my country, shoot 'em brother alonga boat. Tell 'em Samson; which way Charlie? Tell 'em come. Mother alonga me die. Mother first time, die. Bye-bye me tell 'em. Toby alonga me."[3]

Altogether there is apparently no special technical design from the study of which we could classify the various Queensland sticks and determine with any degree of certainty the localities from which they came. It is nevertheless

[3] Interpreted into intelligent English this would read somewhat as follows:—

"My brother-in-law, I want you to leave home in three months. I would like you to come and see me here. A white man stole me from home and shot my brother in a boat. Tell old Samson I'm here. Where is Charlie? If you see him tell him to come too. My mother and old granny have both died. Cannot tell you more now. Toby is with me."

an acknowledged fact that the native can generally tell whether a stick belongs to "his country" or not, and is, I fancy, an indication that there was a time, probably not so very remote, when there was a greater persistency of type in definite districts.

We have a number of other message sticks in our collections, but these being of quite modern manufacture are not of much importance; they are made mostly of a very light wood and are ochred in red. They contain a whole host of marks evidently worked in according to the fertile imagination of the maker, and I should say were only made for trade purposes or in some cases by special request, and can therefore not be said to have any real ethnological value. The markings consist mostly of a series of narrow lines encircling the stick, and in some instances crossing and re-crossing one another; in one specimen, Q.E. 16/931, a crescent-shaped figure is evidently intended to represent the sun, with lines radiating from it. This stick measures 191 mm. x 17 mm., and comes from Burketown (donor, J. N. MacIntyre).

Two sticks referred to and figured by Banfield (**1**) (Q.E. 16/897 and Q.E. 16/898), are also in our collection.

Northern Territory—

Text-figure 24.

A message stick from the Northern Territory.

(No. Q.E. 15/493; 112 mm. x 13 mm. x 10 mm.)

This stick was obtained by Bishop White (when Bishop of Carpentaria) on the Daly waters, and donated by him to the Queensland Museum. Its interest lies in the fact that, just as the Bishop was leaving Darwin by coach, an aboriginal boy brought this stick to the driver and asked him to deliver it to another blackboy at Daly waters with this message:

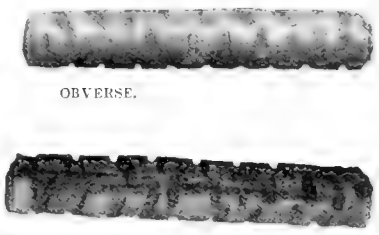
"Want 'em pretty fellow alonga head, boomerang."

Bishop White was so interested in the matter that he undertook to deliver the stick, but withheld the verbal message until he had satisfied himself that the receiver of the message had some knowledge of what the stick was

supposed to convey. Bishop White said he was no little surprised to find that the boy interpreted the request for head-bands and boomerangs correctly.

Since the accuracy of this instance is vouched for by the integrity of such a well-known cleric, we may also presume that the stick probably contained some mention of an exchange and the name of the boy by whom it had been sent.

The stick is made of pine and has 22 and 23 notches respectively on each side; for the rest, crosses and a few bars complete the writing.



Text-figure 25.

A small pine message stick from the Northern Territory.
(No. Q.E. 11/16/1; 70 mm. x 13 mm.)

Evidently a hastily prepared and crudely fashioned stick from the Roper River, collected by Mr. M. J. Colclough in 1909. It was sent in connection with the death of a child, notifying the father of its death.

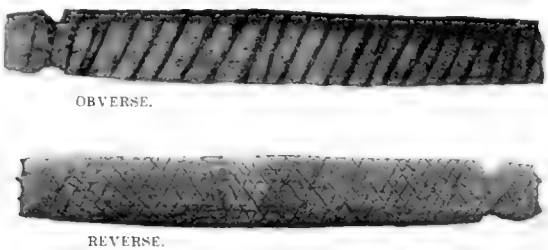
There is a custom in this part of the country of passing children temporarily on from one tribe to another, in good seasons, with a view to educating them and teaching them local dialects. Such a child had died, and hence the message.

Text-figure 26.

Message stick from the MacArthur River, Northern Territory.
(No. Q.E. 11/16/2; 167 mm. x varying from 14 to 21 mm.; ochred.)

This contains an invitation to the Boroloola to a ceremony, "Jundee," and records the number of boys to be initiated. This stick is made of Leichhardt

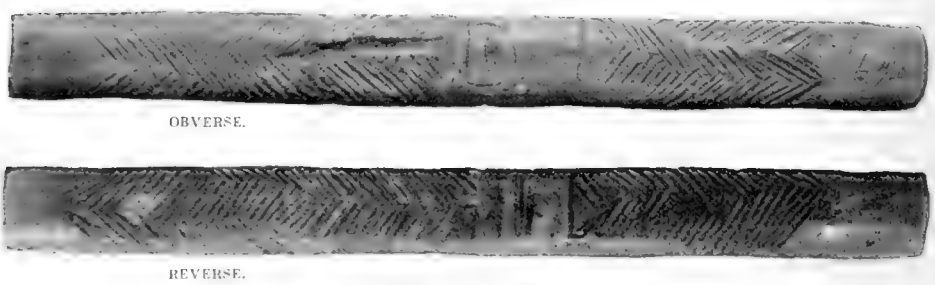
pine; the lines are cut deeply and irregularly. The obverse surface is convex, and has a number of zigzag with four deeply cut lines in the centre, and on the side fifteen notches. The reverse surface is flat.



Text-figure 27.

A very roughly made pine message stick from Mountain Creek, Northern Territory. (No. E. 11/16/4; 115 mm. x 14 mm. Collected by Mr. M. J. Colelough.)

Message unknown.



Text-figure 28.

A message stick from the Northern Territory (Roper River). (No. E. 11/16/3; 181 mm. x 17 mm. Collected by Mr. M. J. Colelough.)

A definite message accompanied this stick, together with three war-spears, specially made and very straight. The message was something to this effect:— A brother sends warning to his brother (by a third person) about a coming foe, who had set out to spear him owing to a fight over a lubra, and who was approaching by a given route. Owing to the wet season and the fact that the whole country was in flood ("big fella wata") it would take four moons to cover the journey.

The stick, which is made of Leichhardt pine, is covered with significant marks. On the obverse side the flood-waters are indicated by a deep gash, whilst the four moons are enclosed in a circle by themselves. On the reverse three lines evidently refer to the three spears which accompanied the messenger. For the remainder, the zigzags with their number and variety cover the surface of the stick with the exception of the two ends, which are unmarked.

Text-figure 29.—A West Australian message stick from the Flora Valley district, 20 miles from Hall's Creek, Kimberley Division. (No. E. 16/703; 274 mm. x 12 mm. maximum.)

This stick was obtained by Mr. W. A. Chambers, who was stationed at Wyndham. It was said to be tabu to women. I am, however, inclined to dispute this statement, and beyond placing the remark on record I should hesitate to accept it until such a statement has been definitely confirmed.

There are three sinuous (unbroken) lines winding from end to end, reaching to within about one inch of each end. These are interspersed by animal tracks heading in opposite directions. Message unknown.

Western Australia.—I am greatly indebted to Mr. L. Glauert, of the Perth Museum, for his notes on Western Australian message sticks, and as they are of value to the student I reproduce the greater part of them here.

"The distribution, as illustrated in the Perth Museum collections, is from Kimberley to Shark's Bay and inland to the Upper Gascoyne, Wilma, and the country around Menzies and Davyhurst.

"In the National Museum, Melbourne, are specimens from Northampton near Geraldton, York and Esperance Bay on the South-east Coast.

"In shape the object is usually cylindrical, with pointed, rounded, or truncated ends. The length varies from $4\frac{1}{4}$ to $27\frac{3}{4}$ inches, and the thickness from $\frac{5}{16}$ to $2\frac{1}{8}$ inches.

"Three specimens, oval in section, connect these message sticks with the 'marben' or passports figured by Clement[4] and the 'eugina' or 'gilliana' or invitation stick of the same writer.[4] These churinga-like objects, used by men and women of the North-west and Kimberley as charms and head ornaments, are usually termed 'Lara' by the blacks of the neighbourhood of Broome. At the same time it must be noted that a police constable, recently returned from Peuder Bay, Dampier Land, near Broome, informed me that these 'cobba-cobba sticks' were used to summon aboriginals to attend cobba-cobbas or corrobborees. In connection with this matter I have no further particulars except the statement by Dr. H. Klaatsch to the effect that message sticks were unknown in the Broome country, so far as he was able to ascertain (4).

"*The Technique.*—A suitable piece of wood having been obtained, the surface was smoothed and the design executed in scratches produced by a sharp object such as a chip of stone, piece of shell, broken bone. As a rule the markings are fine and hairlike, but a type from the Gascoyne, Ashburton, and Kimberley (2?) (C. 263, 364, 694, 697, 710) is ornamented with grooves which are both wide and deep. Often the design is accentuated by a 'shading' of dots or transverse cuts and by the rubbing in of some black material, probably black earth or a mixture of charcoal and fat, which fills the scratches.

"On several specimens from the Kookynn district, the pattern has been burned in by applying heated iron wire, a method which has superseded the original practice of using glowing twigs or embers.

[4] Austral. Assoc. Adv. Sc., vol. xi, Adelaide Meeting 1907, p. 580.

" The *design* traced upon the message stick is varied in the extreme. It may follow some definite plan or consist of a number of figures of irregular outline with little or no trace of any recognisable plan. As is usually the case with Western Australian aboriginal art, representations of natural objects such as trees, plants, animals, birds, and man are absent; the only exceptions are message sticks of the type figured in the British Museum Handbook, to the ethnographical collections upon which human beings, plants, and snakes (?) are depicted.

" Practically all the designs may be classed as geometrical, closely allied to the conventional patterns met with on certain types of shields, spear-throwers, bull-roarers, and churingas of Western Australia.

" In describing and classifying the patterns I have commenced with those designs that most closely resemble a conventional type, and have endeavoured to show how the various schemes adopted are related to this and to one another.

" The regular pattern, a duplicated longitudinal zigzag, is not uncommon on objects made by Western Australian aborigines;[5] it is present on several message sticks, C. 345 West Kimberley, 3829 from the Isdell Ranges, West Kimberley, &c.; by the rounding of the angles the line may become sinuous as in C. 709 from the Gascoyne River and C. 346 from West Kimberley. Subsidiary markings in the form of groups of short transverse scratches similar to the ornamentation on certain types of wooden spears are present on some of these message sticks from the Kookyrui district, the Upper Gascoyne River 5454, the Ashburton River 4028 and Walima, Lake Way 2537.

" By altering the relative position of the two lines they are in some instances made to enclose lozenge-shaped areas which are brought into greater prominence through being covered with numerous short transverse cuts or scratches. This variety is not uncommon in the Kookyrui district, where some specimens have been collected having the pattern burnt in, not incised.

" Another variety may be termed the ' Banksia-leaf ' pattern. This is a modification of the regular zigzag, produced by the introduction of a long individual band between the zigzags. The distribution of this pattern appears to be confined to the north-west of Western Australia (Pilbara district, &c.), the eight specimens in the collection having been obtained at Welma and Bermier Island. Those from the latter locality were made by the natives from the Ashburton and Lyons River. There are also message sticks with the ' Banksia-leaf ' pattern arranged transversely on the stick instead of longitudinally.

" The transitional forms between these more or less regular designs and those in which no order can be recognised are naturally very varied. They are well illustrated by a series from Kookynie.

" Specimens without any trace of regular arrangement have been obtained from the Gascoyne, Ashburton, and various unknown localities. Included among these are designs similar to those figured in the British Museum Handbook. Four examples of these are present in the collection; one came from the Gascoyne, the others are without data.

" A type which may have evolved from the above main group of duplicated zigzags is represented by specimens from the Gascoyne, Ashburton, and Kimberley (?). Here the zigzags have been modified to form a number of adjacent angular figures. The outlines and shading consist of deeply incised grooves into which black earth or charcoal has been rubbed. The six specimens ornamented in this manner were collected more than twenty years ago and are undoubtedly genuine.

[5] Brit. Mus. Handbk. Ethnog. collections (1910), fig 92A, page 110.

"Finally there is a small series of three examples from Wilima and the Upper Gascoyne, quite distinct from the varieties described above. The sticks are longitudinally grooved like a throwing-stick ('dowark' or 'coondie'). All three are ornamented with bands or fine scratches passing transversely round the stick at each tapering end; the one has no other markings, but the other (4019), from the Upper Gascoyne, is covered with thin scratches throughout its whole length. The third specimen, from Wilima, is similar, but with the longitudinal grooves, which in this case are much shallower, almost obliterated by a superimposed design or zigzag lines extending from end to end. Numbers of short transverse scratches less than ½ inch in length, in groups of from two to seven, are present wherever the principal design permits.

"The number of specimens in Western Australian Museum collections totals 68."

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(4.) *Ibid.* .. .. .. Pl. iv, figs. 2, 3, xi, Nos. 190-193, p. 29.

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(13.) *Ibid.* .. .. .. The Jeraeil or Initiation Ceremonies of the Kurnai Tribe. J.A.I., vol. 14, 1885, p. 301 (*see also* footnote 6).

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(15.) *Ibid.* .. .. .. The Native Tribes of South-East Australia, 1904. Chapter 11, Messenger and Message Sticks, p. 678.

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(18.) *Ibid.* .. .. .. Two Representative Tribes of Queensland, 1910, p. 124.

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(25.) Spencer, Baldwin .. Native Tribes of the Northern Territory of Australia (1914), p. 35 and p. 329. Message sticks announcing birth.

(26.) *Ibid.* .. .. .. Guide to the Australian Ethnological Collection exhibited in the National Museum of Victoria, 1915, pp. 65-66.

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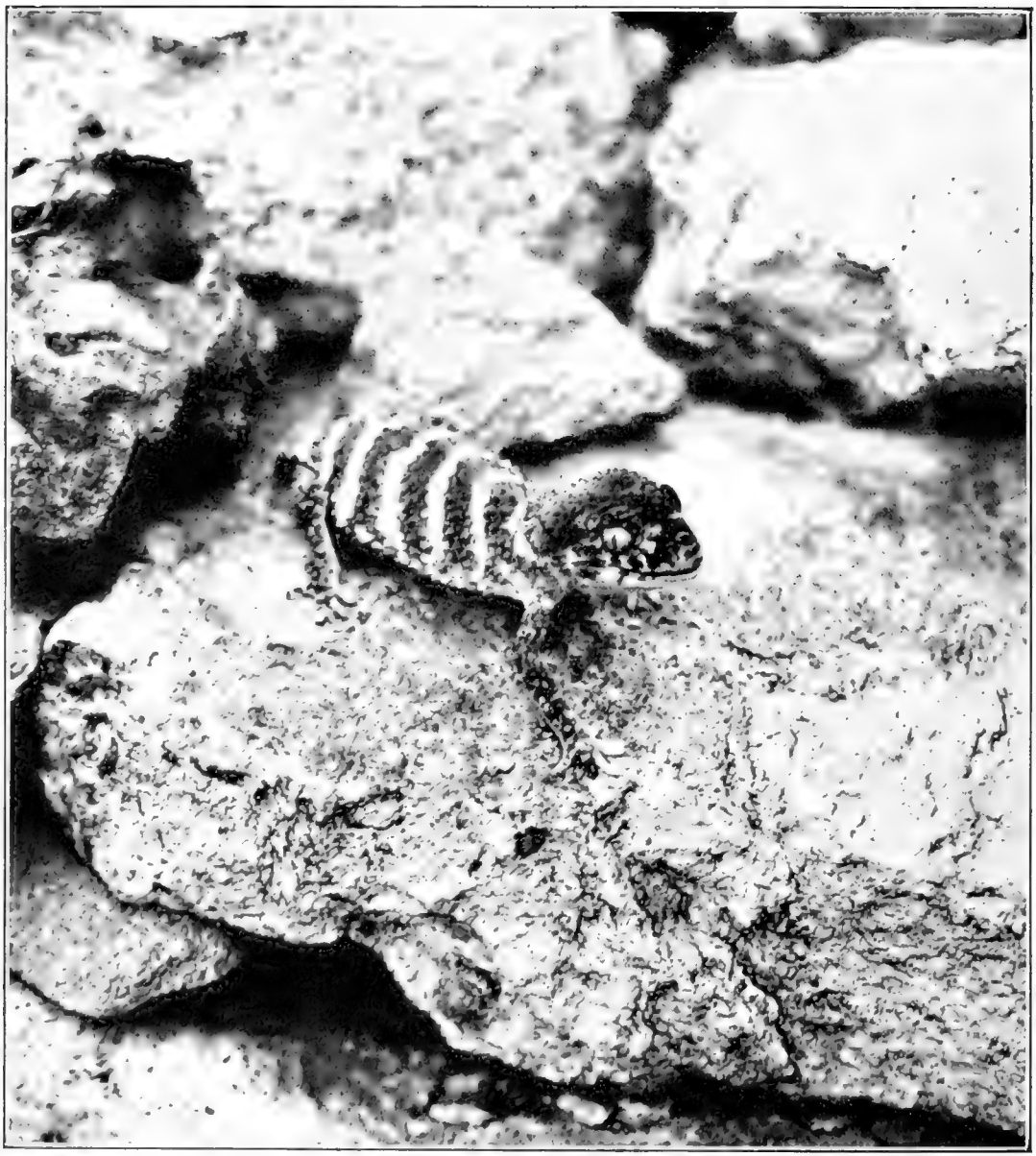
(28.) Wheeler, G. C. .. .. The Tribe, 1910, chap. 7.



From life. NEPHRURUS ASPER, *Günther.*

NOTES ON SOME QUEENSLAND AND PAPUAN REPTILES.

By Heber A. Longman, F.L.S., Director.

(Plates XI to XV.)

LACERTILIA.

NEPHRURUS ASPER, Günther.

(Plate XI.)

A live specimen of this grotesque little gecko was recently sent to Brisbane from North Queensland, being subsequently donated to the Museum. Its appearance in life is shown in Plate XI., but a short cinematograph film would be needed to demonstrate the range of its curious movements. When disturbed, it has the habit of raising itself to the full extent of the long thin legs and then lowering its body nearly to the ground; this being done repeatedly. Occasionally, when teased, it gives a short side-spring and emits a cough-like bark, which has gained for it the name of "Barking Lizard." It bites so determinedly that when gripping a finger it may be lifted in that way from the ground. The jaws are too weak, however, for it to inflict much damage. Broom notes a specimen of a more docile temperament.[1] Our lizard lived in captivity for a few weeks, being fed on grasshoppers. The white transverse bands were very noticeable in this specimen; but this feature is somewhat variable. The appearance of the skin brings to mind the test of a sea-urchin. In addition to specimens from several localities in North and Western Queensland, we have an example from Pine Creek, Northern Territory (received through Mr. G. F. Hill). The Horn Expedition secured this lizard at Alice Springs, and Lonnberg and Andersson have recorded it from Kimberley, N. W. Australia.

LIALIS BURTONII, Gray.

(Plate XII.)

The two specimens here illustrated had been in captivity for several months. They represent varieties A and C as noted by Boulenger in the British Museum Catalogue. Both these snake-like lizards were captured by the writer in Brisbane.

EGERNIA BUNGANA, De Vis.

(Plate XIII.)

In 1887 De Vis described this species,[2] but the type has unfortunately disappeared. The Queensland Museum now contains two specimens, one of which was recently secured alive by the writer at Tambourine Mountain. This lizard

[1] Broom, Proc. Linn. Soc. N.S.W., xxii, 1897, p. 640.
[2] De Vis, Proc. Linn. Soc. N.S.W. (2), ii, 1887, p. 814.

is the giant of Australian skinks and grows to over 2 feet in length. It is quite common at Tambourine, and may be frequently seen in or near other mountainous rain-forests in South-Eastern Queensland. As it seldom ventures far from its haunts in the hollows of large logs on the ground, specimens are not easy to obtain. It is structurally allied to *Egernia major*, as pointed out by De Vis, and in the number, proportions, and dispositions of the head shields and body scales it is difficult to find distinctions. An azygous nuchal shield, in contact with the interparietal, is present in both our specimens of *E. bungana* and is absent in our series of *E. major*, but shields in this region are often variable. *E. bungana*, however, is strikingly distinct because of its colouration, its habitat, and the larger size of adults. The entire dorsal and dorsal-lateral surface is a uniform shining black; near to the ventral region this merges to a brownish tint, and the ventral surface is yellow, with the exception of the throat which is salmon colour. The eyelids are yellowish white, and the tongue is bluish. Several young specimens seen were also of a shining black colour above. Because of its large black scales this lizard has received at Tambourine the curious name of "Land Mullet." It has the habit of lying out on logs in the sunlight, especially after wet weather. A specimen, 22 inches in length, was chopped out of a hollow log by the writer. In captivity it thrives well on raw meat. When handled or approached it gives out vigorous blasts of breath, the bellow-like movement of the body being somewhat remarkable. The specific term is derived from its aboriginal name.

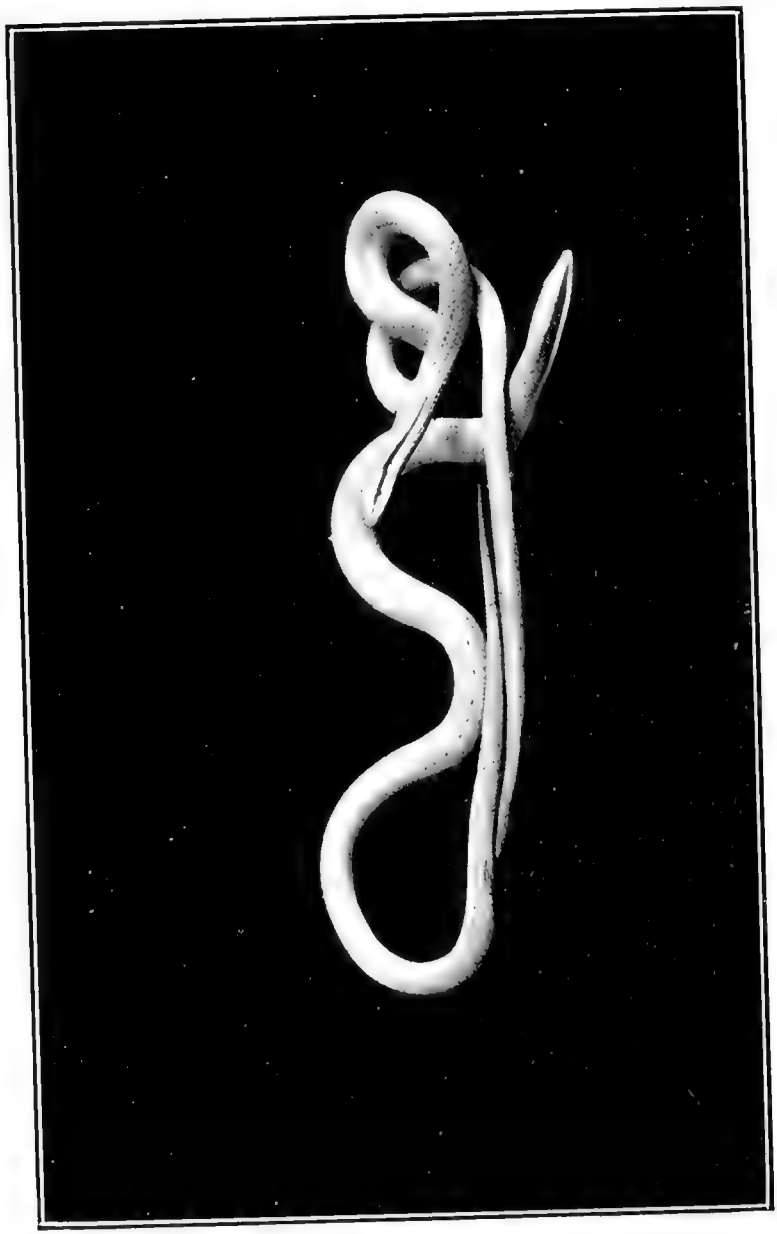
LYGOSOMA (LIOLEPISMA) SPECTABILE (De Vis).[3]

Six specimens which agree well with this species were collected by the writer at Tambourine Mountain in April 1917. In regard to the proportions of the tail the original description needs amending, as it is more than half as long again as the head and body, both in the type and in our later specimens. *L. spectabile* may be distinguished from *L. mustelinum*, apart from certain differences in colouration, by the greater number of lamellæ under the fourth toe.

LYGOSOMA (HINULIA) TRYONI, sp. nov.

Habit lacertiform: limbs pentadactyle; the distance between the end of the snout and the fore limb is contained one and one-half times in the distance between axilla and groin. Snout short, obtuse; lower eyelid scaly; nostril in a single nasal, followed by a series of loreals, which are not superposed; no supranasal; frontonasal broader than long, forming a wide suture with the rostral and a narrower one with the frontal; latter a little shorter than the frontoparietal and interparietal together, in contact with the first two supraoculars; four supraoculars, second largest, and in addition there is a small shield not serially aligned with either the supraoculars or the supraciliaries; eight supraciliaries; frontoparietals and interparietals distinct; the parietals form a suture behind; two pairs of enlarged nuchals; parietal bordered laterally by a large shield;

[3] Loc. cit., p. 819.



Lialis burtonii, *Gray.*

From life.

Face page 39.

Egernia bungana, *De Vis.*

From life.

Face page 39.

two anterior temporals; six upper labials, the fourth being below the centre of the eye; ear-opening subcircular, a little smaller than the eye-opening; no lobules. Forty smooth scales around middle of body, laterals smallest; preanal scales enlarged. The toes of the adpressed limbs overlap; digits laterally compressed; 16-19 smooth, undivided lamellæ under the fourth toe. Tail longer than head and body.

In colouration this skink somewhat resembles *L. tenue*, being brownish above, mottled with black; along the sides the dark markings are almost continuous, but do not form a regular band; the sides of both head and body are marked with light spots; throat marbled with black, otherwise the ventral surface is whitish.

Total length 223 millim.; tail 122; fore limb 25; hind limb 35; head 22, width of head 14.

Described from two specimens collected by Mr. Henry Tryon in the Macpherson Ranges, 3,000 ft., South Queensland. Reg. Nos. J. 17/3023 (type), 3024 (co-type).

Lygosoma tryoni resembles *L. quoyi* in the number of its body scales, but is readily distinguished by its more obtuse snout, shorter tail, lesser number of lamellæ under the fourth toe (which are undivided), the absence of a prefrontal suture, and the disposition of the upper labials in relation to the eye.

OPHIDIA.

DIPSADOMORPHUS IRREGULARIS (Merr.).

Through the courtesy of Mr. D. Le Souef, Director of the Zoological Gardens, Melbourne, we recently received a snake captured at Dunk Island, which he noticed was quite distinct from the common Brown Tree Snake. This specimen is olive brown above, being darker in the vertebral region and lighter on the sides. There are no transverse markings. The ventrals are yellowish and more or less clouded with darker markings which are still more pronounced on the subcaudals. The anterior palatine and mandibular teeth are enlarged. Scales in 21 rows, 15 near the anus; ventrals 261; anal entire; subcaudals 87 (incomplete). This is the first record of the widely spread and variable *D. irregularis* so far south, though it has been noted from Torres Strait Islands. Possibly Macleay's *D. boydii*, from Ingham, North Queensland, should be more correctly placed in its synonymy than with *D. fuscus*. Mr. E. J. Banfield, Dunk Island, has since forwarded a second specimen. He records "Wat-tam" as the aboriginal name, and gives an interesting account of its habits in "Tropic Days" (Fisher Unwin, 1918), p. 240. Like its congener, *D. fuscus*, it feeds on birds, and Mr. Banfield states that the blacks regard its bite as fatal. Although its fangs are situated at the back of the mouth, there may be some basis for this view. The Boomslangs of South Africa were once regarded as harmless, but F. W. Fitzsimons has shown that the bite is occasionally attended with fatal results to man. It is obvious that certain species of Opisthoglypha need to be handled with caution.

TOXICOCALAMUS LONGISSIMUS, Boulenger.

In 1905 De Vis described a snake from Vanapa Valley, Papua, as *Vanapina lineata*,[4] both genus and species being recorded as new. His description concludes with the query—"Is this *Apistocalamus loriæ*, Blgr.?" Unfortunately the type has disappeared, but there is no doubt that the genus *Vanapina* should be included in Boulenger's *Toxicocalamus*,[5] which De Vis had overlooked. It seems probable that the actual species is also identical with *T. longissimus*. The differences to be noted from the descriptions are very slight, but as Boulenger's specimens came from Woodlark Island it may be that the mainland form is separable as a variety. *Apistocalamus loriæ* is, of course, quite distinct. The characteristics of the six Papuan snakes in this group have been tabulated by Boulenger,[6] who states that the later genera *Apistocalamus* and *Pseudapistocalamus* are doubtfully distinct from *Toxicocalamus*.

PSEUDELAPS HARRIETTÆ (Krefft).

(Plate XIV.)

On 3rd August, 1917, the writer secured from under a heap of rubbish in a Brisbane garden five young specimens of the White-crowned Snake—*Pseudelaps harriettæ* (Krefft). These were each about 160 mm. in length and had evidently just emerged from the eggs, as seven empty egg-cases were found close by. These little snakes were lead-coloured above; the white circlet on the head was very sharply defined and enclosed a shining black patch on the frontal and parietal regions. The light longitudinal lines on the dorsal and lateral scales of the body were prominent, and anteriorly these were continued on the lateral scales until they terminated in the white markings of the lower labials. In life the pupil is almost circular. In three specimens the nasal shield was not in contact with the preocular. In all five the scales were in 15 rows, and the anal was divided. The ventrals varied from 172 to 180 and the paired subcaudals from 28 to 38 in addition to single terminal scale.

Pseudelaps harriettæ often shows great agility when disturbed, and throws its body from side to side with quick convulsive movements. Adult specimens have the power of flattening themselves to a surprising extent. This snake will sometimes raise the anterior fourth of the body almost vertically, whilst the head is sharply bent at a right angle, the attitude bringing to mind some of the illustrations of the Indian cobra.

In life the general colour of adults is a dark slate, the light longitudinal lines being barely noticeable. The white markings on the head encircle a patch of shining black. On the ventral surface the prevailing colour is a lighter slate than that of the dorsum. *Pseudelaps harriettæ* is quite a common snake in the Brisbane district.

[4] De Vis, Ann. Qld. Mus., No. 6, 1905, p. 48.
[5] Boulenger, Ann. Mag. Nat. Hist. 1896, xviii, p. 152.
[6] Boulenger, Ann. Mag. Nat. Hist. 1908, i, p. 249.

Pseudelaps harriettæ (*Krefft*).

From life.

Face page 11.

LATICAUDA COLUBRINUS (Schneid.).

In his diagnosis of four species of Platurus in the British Museum Catalogue of Snakes, Boulenger sectioned them according to the presence or absence of a keel on the posterior ventrals. This characteristic does not appear to be of quite unexceptional value, and the matter has a direct relation to the status of *Platurus frontalis*, De Vis.[7] Captain F. Wall states[8] that he has found a median ventral keel "in at least three specimens of what I consider undoubted *P. laticaudatus*," and he thinks that *muelleri* should be included with this species. Stejneger[9] somewhat ambiguously refers to *L. muelleri* as "a *L. laticaudatus* with a ventral keel." Out of fourteen specimens of *colubrinus* in the Queensland Museum, one has a distinct keel and another has a trace. The type of "*Platurus frontalis*" agrees in detail with *L. colubrinus*, but a median ventral keel is present on the posterior ventrals. In view of the variability noted, there are insufficient grounds for separating *frontalis* from *colubrinus*. Barbour[10] prefers to consider *L. colubrinus* itself as a subspecies of *laticaudata*. As pointed out by Ogilby,[11] the generic term *Laticauda* has better claims than *Platurus* for these snakes.

HYDRELAPS DARWINIENSIS, Boulenger.

Whilst examining specimens of juvenile *Laticauda colubrinus* in the Queensland Museum collections, a solitary example of the apparently rare sea snake *Hydrelaps darwiniensis* was found by the writer. The superficial resemblance between the two accounts for their being mixed in the old collection. Our specimen agrees well with Boulenger's description,[13] but the tail is relatively longer. The scale formula is as follows:—Body rows 27; ventrals 168; anal 2; subcaudals 36 (single). Total length 380 mm.; tail 48. Unfortunately no locality is available. Lonnberg and Andersson have recorded a specimen from Broome.

LAPEMIS HARDWICKII, Gray.

The Queensland Museum has a specimen of this short sea snake, which was captured at Townsville. The ventral surface was roughly opened up for purpose of preservation, and it is thus impossible to give a complete scale data. This is the first example to be noted in our register, but Werner has recorded it from Shark's Bay, Western Australia.[14] We have followed Stejneger in using *Lapemis* in preference to *Enhydris*.

[7] De Vis, Annals Qld. Museum, vi, 1905, p. 48.

[8] Wall, P.Z.S. 1903, p. 96.

[9] Stejneger, Herp. of Jap., Bull. 58, U.S. Nat. Mus. 1907, p. 402.

[10] Barbour, Mem. Mus. Comp. Zoolog. Harv., xliv, 1912, p. 131.

[11] Ogilby, Proc. Linn. Soc. N.S.W., xxiii, 1898, p. 363.

[13] Boulenger, British Museum Catalogue, iii, p. 270, pl. xii, fig. 1.

[14] Werner, Fauna Sudwest-Aus., ii, p. 263, 1909.

FURINA ANNULATA (Gray).

(Plate XV.)

The larger forms of *Furina annulata* (Gray) have a remarkable habit of raising one or more loops of the body and holding them almost vertically aloft. This attitude is well illustrated in Plate XV, and they maintain this position with surprising rigidity. This is probably an instance of an aposematic condition.

Although this snake has been catalogued under the name of *Furina occipitalis*, Gray's name, given with a description in the appendix to Grey's Journals of Two Expeditions of Discovery in North-west and Western Australia, vol. ii, p. 443, published in 1841, has priority.

DISTEIRA MAJOR (Shaw).

Examination of the type of *Disteira nasalis*, De Vis,[15] shows that this cannot be separated from *D. major*. It was described from a young specimen only 400 mm. long. De Vis attached importance to the division of the nasal by a line to the prefrontal, but this condition is present only on the left side. Cope described a similar feature in his note on *D. dumerilii*,[16] which is included by Boulenger in the synonymy of *D. major*.[17] The posterior angle of the left nasal is produced between the median prefrontal suture and thus reduces its length. There are two superimposed anterior temporals, the lower being somewhat in advance, and below this there is a very small labial which was evidently not considered by De Vis. There are thus seven, and not six, upper labials. On the right side there is a small shield between the two postoculars and the anterior temporals. The posterior pair of chin-shields are so small that they can only just be differentiated from the surrounding scales. With these necessary emendations it is scarcely possible to separate *D. nasalis* from *D. major*.

DISTEIRA ELEGANS (Gray).

Variation in a Sea Snake and its Young.—On 13th March, 1917, the Queensland Museum received a sea snake which had been captured in the Pine River, Mr. Cross being the donor. This proved to be the common Elegant Sea Snake, *Disteira elegans*, Gray, which is the species most frequently secured on our coast. Examination of this snake showed that it contained eight young, which were evidently near the period of birth, the lepidosis being well developed. As the range of variation in these snakes has been the subject of no little controversy, the writer thought it would be an excellent opportunity to place on record some of the chief features of the mother and young.

Seven of the eight embryos were removed from the associated membranes and closely examined. The prevailing colour on the ventral and lateral surface was a beautiful French gray. This was continued on the back in a series of from forty-five to fifty-two bands, which alternated with wider dark patches. The light bands were themselves regularly dark-spotted on the dorsum, whilst

[15] De Vis, Ann. Qld. Mus. No. 6, p. 48, 1905.

[16] Cope, Proc. Ac. Philad. 1859, p. 347.

[17] Boulenger, Brit. Mus. Cat. Sn. iii, p. 289, 1896.

FURINA ANNULATA (*Gray*).

From life.

For page 1.

the sides were marked with smaller spots, the whole forming a very handsome pattern. The head was dark above and on the sides, and on the median ventral surface the dark markings were almost continuous.

These specimens varied but little in length, all being about 360 mm. The diameter of the circular fore part of the body was considerably more than half of the vertical diameter of the compressed posterior part. The chin-shields showed but little variation, although the degree of contact of the posterior pair varied. A large terminal caudal shield was present in each specimen. Some of the variations noted are set forth in the following table, 2878 being the registered number of the mother:—

—	No. of bands.	Preoc.	Postoc.	Up. labials.	Ant. Temps.	Sc. Neck.	Sc. Body.	Ventrals.
2878	48	1	2	7	1	27	44	380
1	49	1	1	7–2 last small	1	28	46	367
2	45	1	1	7–2 ,,	1	28	44	362
3	45	1	1	7–3 ,,	2	28	42	351
4	48	1	2	right 7–3 ,, / left 7–2 ,,	2 right / 1 left	28	40	350
5	47	1	2	right 7–3 / left 7–2 ,,	2	26	40	363
6	45	1	2	right 8* / left 7–2 ,,	1	25	40	353
7	51	1	1 or 2	right 7 ,, / left 7–3 ,,	1 right / 2 left	28	41	377

* Small additional labial between 4th and 5th.

The exserted hemipenes show that numbers 4, 5, 6, and 7 are males.

The shields on the upper surface of the head presented no special divergencies. In each the prefrontals were in contact with the second labial. There was some little variation in the lengths of the median sutures between the pairs of prefrontals and nasals. The variation in the number of ventrals was from 350 to 380 (the mother), and this suggests that the male parent had a considerably lower range than that of the female. Boettger[18] has pointed out that the males have fewer ventrals, but our figures do not give much support to his conclusions. The counting of the ventral series in the young presented some difficulties owing to the irregularities, especially in the umbilical region, but although the figures may not be absolutely correct they are substantially so. The scale series around the body appear to be fairly constant in number.

The presence of one or two temporals is of considerable importance. The fifth labial may become laterally divided and its upper portion will then form a lower and second anterior temporal. This is somewhat in advance of the upper, but the snake would probably be described as possessing two superposed anterior temporals. Stejneger has noted a variation of this type in his study of *Disteira melanocephala*.[19]

A full description of the parent snake follows. It will be noted that the difference between the slender fore part of the body and the compressed posterior is very much greater in the adult.

[18] Boettger, Zool. Anz., 1888, p. 395.

[19] Stejneger, Herpet. of Japan, Bull. 58, U.S. Nat. Mus., p. 425, 1907.

Fore part of the body small and circular, about 16 mm. in diam.; posterior part flattened, its vertical diameter being fully three times that of the neck. Rostral slightly broader than deep; nasals a little shorter than the frontal, nearly three times as long as the suture between the prefrontals; frontal subhexagonal, shorter than parietals, longer than broad, a little longer than its distance from the rostral; one pre- and two postoculars; one large anterior temporal, followed by a second. Seven upper labials, second largest, third and fourth entering eye. Two pairs of subequal chin-shields, the second being only in contact anteriorly; 27 scales round the neck, 44 round the body; scales slightly imbricate. They are prominently keeled on the posterior part of the body where the ventral scales are also feebly marked with two keels, but the carination entirely disappears on the neck. Ventrals 380, distinct throughout, though a little irregular in places. There are two pairs and 46 single subcaudal scales between the anal region and the large terminal shield.

The head, body, and tail are of a dirty whitish colour, with yellowish tinges. On the dorsal surface there are 48 large rhomboidal spots, pale slate on the body but somewhat greenish near the head; these alternate with a series of smaller lateral spots, which are less distinct anteriorly. There are no special colour patterns on the head. A series of black spots on the ventral scales forms a well-marked interrupted black line on the anterior half of the body.

Total length 1,490 mm.; tail 120. Reg. No. Q.M.J. 17/2878.

The writer believes that the variations here noted in the mother and offspring, although of considerable interest, are but an indication to the far greater variation within the entourage of a Hydrid species.

Following other workers, we have examined the teeth of certain specimens of *Hydrophis*, and these show under magnification traces of the grooves which were once thought to be distinctive of *Disteira* and which are certainly much more obvious in some species than in others. J. Van Denburgh and J. C. Thompson have set out the evidence on this point.[20] As the distinction between these genera seems to break down, we have preferred to call the snakes actually under review *Disteira elegans*. In the larger number of the body scales, these specimens agree with Boulenger's *Disteira grandis*.[21] In his monograph of the Sea Snakes, Wall[22] has interpreted the range of Shaw's *spiralis* so as to include some half-a-dozen others since described. Should this attitude be adopted, and there are many reasons for so doing, certain of the Queensland Museum specimens now named as *Disteira elegans* should be designated as *spiralis*. Lonnberg and Andersson's *Disteira mjöbergi*[23] would also come near to *spiralis* in the broader sense. Probably many of the difficulties in this group would be best solved by using trinomials.

[20] Proc. California Acad. Sci., iii, p. 41, 1908.
[21] Brit. Mus. Catalogue, iii, p. 293.
[22] Mem. Asiatic Soc. Bengal, vol. 2, No. 8, 1909.
[23] Vet. Ak. Handl., Stockholm, 52, No. 3, p. 13, 1913.

EDIBLE FISHES OF QUEENSLAND.

By J. Douglas Ogilby (Ichthyologist).

(Plates XVI to XXVI.)

Part X.—PLESIOPIDÆ (No. 1).

PARAPLESIOPS Bleeker.

Ruppelia Castelnau, Proc. Zool. & Acel. Soc. Vic., ii, 1873, p. 51 (*prolongata* = *bleekeri*). Not *Ruepelia* Schinz.

Paraplesiops Bleeker, Verh. Akad. Amst., xv, 1875, Pseudochrom., p. 3 (*bleekeri*).

Body ovate or subovate, more or less compressed. Scales large or moderate, adherent, ciliated. Two lateral lines, the upper close to the dorsal profile and terminating below or a little behind the last dorsal rays, the lower along the middle of the tail; tubes simple and straight. Head large; cheeks partly, opercles wholly scaly, the scales cycloid. Mouth terminal and protractile, with rather wide, oblique cleft, the jaws equal; maxillary exposed and distally dilated, with supplemental bone. Jaws, vomer, palatines, and tongue armed with bands of villiform teeth, the outer and inner rows in the former somewhat enlarged and conical. Angle of preopercle entire or with several short coarse spines concealed beneath a membranous border.[1] One dorsal fin with xi or xii 9 to 11 rays, the interspinous membrane deeply cleft and penicillate; soft portion of fin much shorter than the spinous and acutely angulated behind; base of fin scaly. Caudal rounded, with 17 principal rays, the upper and lower simple. Anal short, with iii 10 to 12 rays, the soft portion similar to that of the dorsal. Pectorals more or less broadly rounded, with 18 or 19 rays. Ventral inserted below the pectoral-base, with i 4 rays, the outer soft ray thickened and produced, cleft nearly to the base. Gill-openings wide; gill-membranes separate, free from the isthmus; branchiostegals six; pseudobranchiæ present; gills four, a slit behind the fourth; gill-rakers short stout and spinulose. (*παρά*, near; *Plesiops*, an allied genus.)

A small genus, containing five species from the shores of Temperate Australia. Though small, good panfishes.

The following key to the species of *Paraplesiops* at present recognized having been sent to me by Mr. McCulloch, I gladly avail myself of his permission to publish it, more especially as in drawing it up he had the advantage of having before him good examples of all five species. Among other things he writes to me as follows:—"These fishes are very variable as regards their fin and scale counts,

[1] These spines are not present in the three extralimital species, and it may, therefore, be advisable to segregate the Queensland species under the subgeneric name *Acanthogonia*, characterized by their presence and the larger scales.

but you may rely upon the characters in the key." I may add that he is of opinion that *P. poweri* and *P. jolliffei* are "colour varieties of one and the same species"; a conclusion with which I can not agree for the reasons given previously.[2] In dealing, therefore, with the two last species I have added certain other characters to McCulloch's key, believing that with two fishes of almost identical size so great differences, as, for instance, are shown in the interorbital width and the width of the body, could not possibly exist in a single species; moreover, my second example of *P. jolliffei* fully supports my contention.

Key to the Species of Paraplesiops.

a^1. Preopercle entire; 34 or more scales on the upper branch of the lateral line and usually 6 between it and the lower branch.

b^1. Cheek-scales in about ten series; body light, with darker cross-bands .. 1. *bleekeri.*

b^2. Cheek-scales in two or three series; body darker, without cross-bands.

c^1. Eleven dorsal spines .. .. 2. *gigas.*

c^2. Twelve dorsal spines .. .. 3. *meleagris.*

a^2. Preopercle spinose above the angle; about 30 scales on the upper branch of the lateral line and five between it and the lower branch.

d^1. Body little compressed; interorbital region narrow; cleft of mouth subhorizontal; body dark purplish black, with darker cross-bands .. .. 4. *jolliffei.*

d^2. Body strongly compressed; interorbital region wider; cleft of mouth oblique; body lighter, without darker cross-bands .. .. 5. *poweri.*

PARAPLESIOPS BLEEKERI (Günther).

(Plate XVI.)

Plesiops bleekeri Günther, Brit. Mus. Catal. Fish., iii, 1861, p. 364; id., Fisch. d. Südsee, pt. 2, 1874, p. 87, pl. lviii, fig. A; Macleay, Proc. Linn. Soc. N. S. Wales, v, 1881, p. 400; Ogilby, Catal. Fish. N. S. Wales, 1886, p. 22.

Ruppelia prolongata Castelnau, Proc. Zool. & Acel. Soc. Vic., ii, 1873, p. 51; id., Proc. Linn. Soc. N. S. Wales, iii, 1879, pp. 353, 359.

Paraplesiops bleekeri Bleeker, Verh. Akad. Amst., xv, 1875, Pseudochrom., p. 3; Boulenger, Catal. Percif. Fish., i, 1895, p. 338; Waite, Synops. Fish. N. S. Wales, 1904, p. 28; Stead, Edib. Fish. N. S. Wales, 1908, p. 60.

Rueppellia prolongata Ogilby, ibid.

? *Ruppelia prolongata* Zietz, Trans. Roy. Soc. S. Austr., xxxiii, 1909, p. 268.

ROUNDHEAD.

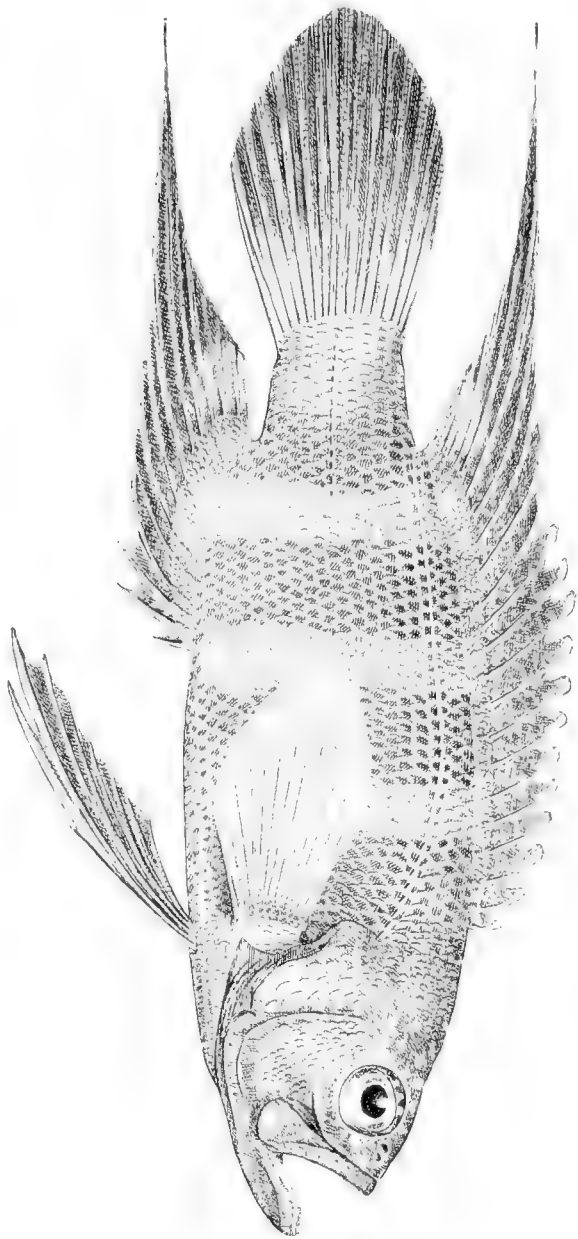
Devil Fish (Victoria, *fide* Castelnau).

Type localities:—?, Günther; Port Jackson, Macleay (*P. bleekeri*). Hobson's Bay (*R. prolongata*).

Body subovate and compressed, the ventral contour rather more arched than the dorsal, its width at the shoulders about half its depth, which is 2·7 to 2·83 in its length and a little more than the length of the head. Caudal peduncle about

[2] Proc. Roy. Soc. Queensl., xxviii, 1916, p. 113.

QUEENSLAND FISHES.



Edgar R. Waite, del.

Parapleuops fleekeri (Günther). ½ Nat. Size.

Face page 46.

two fifths deeper than long, its least depth 5·67 to 6 in the body-length. Head about four ninths deeper than wide, the fronto-occipital profile sublinear and but little acclivous, that of the nape feebly rounded and somewhat raised above the level of the occiput, its width 1·83 to 2 in its length, which is 2·83 to 3 in that of the body. Snout with rounded profile, its length about one-eighth less than the eye-diameter, which is 3·5 to 3·67 in the length of the head. Interorbital region feebly convex, its width 1·2 to 1·5 in the eye-diameter. Jaws equal; cleft of mouth very oblique; maxillary extending to beyond the vertical from the posterior border of the pupil, its length half or rather more than half that of the head, the width of its gently rounded distal extremity 1·75 to 1·83 in the eye-diameter.

Premaxillaries with a band of villiform teeth, broad in front, gradually narrowing laterally, and an outer row of short, stout, curved, and somewhat distant teeth; a few slender, depressible teeth on each side of the symphysis posteriorly. Mandibular band similar anteriorly, but narrower and without depressible teeth; laterally the teeth are of equal size, in three to two series, the inner ones as strong as those of the outer row. An angular band of small teeth on the head of the vomer, each successive series decreasing in size from the outer row. Palatine teeth in a narrow, anteriorly claviform, band; pterygoids toothless. An elongate-ovate patch of small teeth on the tongue.

Scales in 36 series between the opercular flap and the root of the caudal fin, in 5 or 6/1/18 or 19 between the first dorsal spine and the ventral edge, those below the upper lateral line and on the opercles large and feebly ctenoid, above that line small and cycloid, as also are those of the nape, parietal region, and cheek; rest of head naked. Lateral lines with 39/12 simple pores.

Dorsal fin with xii 9 or 10 rays, originating above the pectoral base; spines moderately strong, the membranes of those in front deeply notched and penicillate; they increase gradually in length to the last, which is 1·75 to 2 in the length of the head and 2·33 to 2·5 in the sixth or seventh ray; these are subequal in length, 2·2 to 2·5 in the body-length. Caudal subcuneiform, 2·55 to 2·67 in the body-length. Anal fin with iii 10 rays, originating below the eleventh dorsal spine; spines strong, the third the longest, 1·87 to 2·17 in the length of the head and 2·6 in the sixth and longest ray, which is as long as or a little longer than that of the dorsal. Pectoral obtusely pointed, with 16 to 19 rays,[3] as long as the head; seventh and eighth rays longest, extending to below the last dorsal spine. Ventral fin elongate and pointed, inserted slightly in advance of the pectoral-base, the length of the spine 1·5 in that of the head; outer ray bifid and inspissate, extending to or beyond the last anal spine, its length 2·25 in that of the body.

Gill-rakers 7 + 14, mostly reduced to mere spinulose pads, the last on the lower branch of the anterior arch broad and triangular, its length 2·67 in the eye-diameter. Pharyngeal bones mostly armed with small, closely set, globular teeth.

[3] The larger of my examples has 19 rays on each side, the smaller 16 on one side, 18 on the other.

Ochraceous, with four broad, transverse, purple bands. Head with scattered blue spots. All the fins, except the pectorals, which are uniform lemon-yellow, broadly tipped with violet; dorsal and anal sometimes with a few blue spots basally. (Named after Dr. Pieter Bleeker, the celebrated Dutch ichthyologist.)

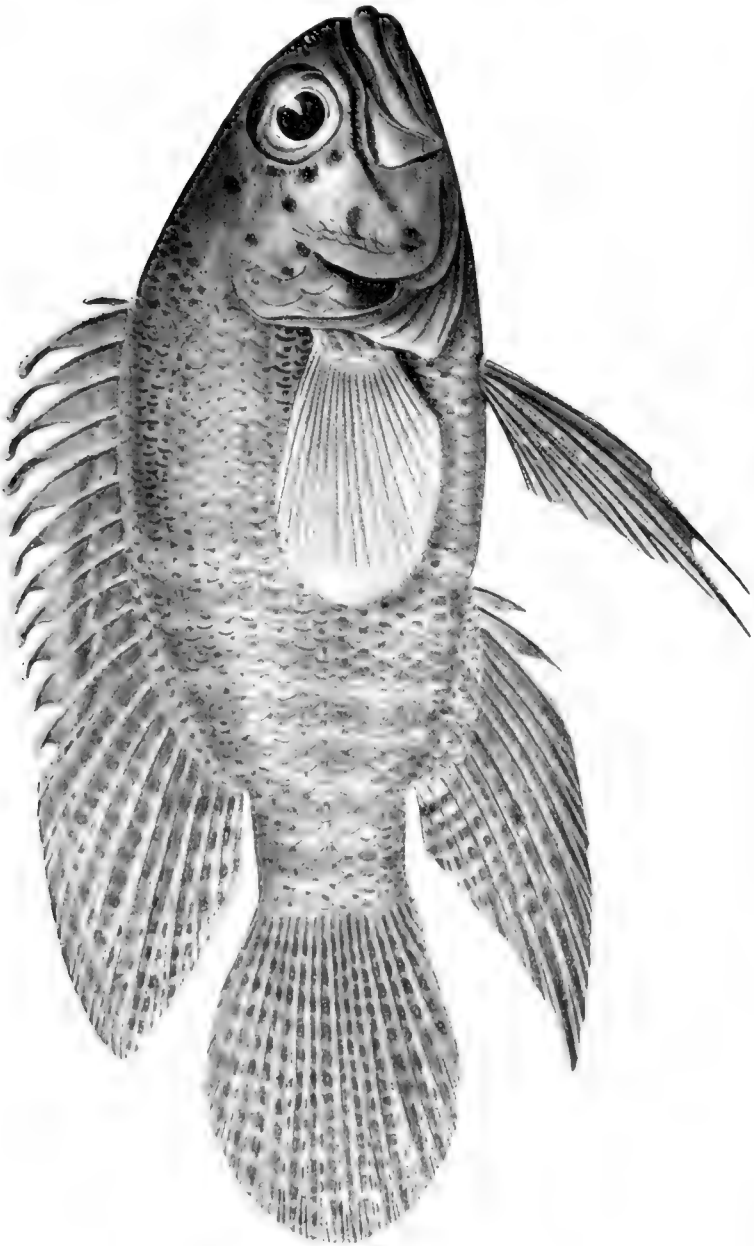
Described from two Port Jackson examples, measuring respectively 182 and 233 mm., acquired by exchange from the Australian Museum, Sydney. Reg. No. I. 2858, 3116.

Distribution:—The unquestionable recorded range of this species is small, being restricted to the south-eastern corner of the mainland between Hobson's Bay and Port Jackson. The earliest notice of its occurrence was made by Dr. Günther who, after describing it, remarked that—"The locality in which this splendid species is found is unknown; I conclude, however, from its general appearance that it belonged originally to a collection made at the Norfolk Islands." Subsequently he figured it among the fishes of the South Seas, but with the statement that it had not come under the notice of Garrett. Nothing, however, has further transpired to give warrant for any such assumption. To Castelnau belongs the honor of first providing this species with "a local habitation and a name" (vernacular), he having recorded, under the title *Rüppelia prolongata,* a large example obtained presumably in the Melbourne Market, where it was sufficiently well known to have earned for itself the local name of "devil fish," though it is difficult to understand why so harmless and handsome a fish should be weighted with so opprobious a title.[4] Subsequently the same author noted the occurrence of the species in Port Jackson, and a few years later the writer was fortunate enough to catch a fine specimen in Port Hacking, as noted in his New South Wales Catalogue. So far as I can ascertain these three are the only localities from which the species has been directly recorded. Stead's remark, that "it is not uncommon in the vicinity of reefs and rocky localities generally along our (*i.e.* New South Wales) coastline," induces the belief that its range is not so restricted as would appear from the foregoing. Castelnau further published[5] under *R. prolongata* a notice of a fish forwarded to him from

[4] In his various notices of this fish Castelnau has got himself into a somewhat hopeless tangle by confusing under the same name two totally distinct species. Early in 1873 he wrote —"It forms a new genus (*Bleeckeria*), characterised by the soft part of its dorsal and of the anal being considerably prolongated, and its ventrales formed of one spine and only three rays. This species (*catafracta*) is over a foot long and is covered with rather large scales." Later in the same year he again wrote—"In my paper on the Edible Fishes of Victoria, in the Exhibition Essays, 1873, I stated by a *lapsus calami* that this fish was my *Bleeckeria catafracta* (*Lacepedia*)." This latter assignment of the name was not published until some months after the issue of the earlier paper, so that it would seem that, if *Bleeckeria catafracta* was, as a name, of any scientific value, it would have to be listed as a synonym of *Paraplesiops bleekeri*, not of *Lacepedia catafracta,* which is possibly a latrididid fish. Fortunately, however, *Bleeckeria* is antedated by *Bleekeria* Günther, an ammodytidoid fish from the East Indian Seas. (See Brit. Mus. Catal. Fish., iv, 1862, p. 387.)

[5] Res. Fish. Austr., 1875, p. 29.

QUEENSLAND FISHES.



Paraplesiops jolliffei Ogilby; holotype. 1½ Nat. Size.

Phyllis F. Clarke, del.

Face page 49.

Fremantle, W. A., by Mr. Bostock, but I have no hesitation in saying that this record appertains to some quite distinct plesiopid, possibly *P. meleagris*,[6] a fact which tends to discredit Zietz's Gulf of St. Vincent record, that author having failed to detect Castelnau's error. Nothing is known of the breeding of this fish.

Uses:—Stead writes—"Although of edible value is not important enough to be regarded as a market fish, either present or prospective."

Dimensions:—Attains a length of 330 mm.

Our figure, which is taken from an Australian Museum example, has been placed at my disposal by the authorities of that institution.

PARAPLESIOPS JOLLIFFEI Ogilby.

(Plate XVII.)

Paraplesiops jolliffei Ogilby, Proc. Roy. Soc. Queensl., xxviii, 1916, p. 112.

BLUE-TIP LONGFIN.

Type locality:—Green Island, Moreton Bay.

Body ovate, the dorsal profile much more arched than the ventral, its width anteriorly about three fourths of its depth, which is 2·37 to 2·55 of its length and from a little to one seventh more than the length of the head. Caudal about one half deeper than long, its least depth 5·6 to 6 in the body-length. Head about one sixth deeper than wide, its upper profile and that of the nape linear and strongly acclivous, its width 1·33 in its length, which is 2·67 to 2·75 in that of the body. Snout short and blunt, with linear, subvertical profile, its length 1.33 to 1·4 in the eye-diameter, which is 3 to 3·25 in the length of the head; interorbital region feebly convex, its width 8·25 in the length of the head. Jaws equal; cleft of mouth subhorizontal; maxillary extending to below the hinder border of the eye, its length about half of that of the head.

Jaws with bands of villiform teeth, broadest anteriorly, where the outer and inner rows are composed of short, stout, widely set, conical teeth; a rectangular band of villiform teeth on the vomer and a short, straight, narrow band on the palatines; lingual teeth in a broader band.

Scales in 32 or 33 series along the middle of the side; in 4/1/14 to 16 from the base of the first dorsal spine obliquely backwards; tubes of lateral lines 28 to 30/12; opercles, except the preopercle, scaly, the rest of the head naked, except a biserial band of smaller scales on the cheek posteriorly; naked parts with numerous small open pores.

Dorsal with xii 10 rays, originating above the opercular flap; first and second dorsal spines short; the others gradually increasing in length to the last, which is 1·67 to 1·83 in the length of the head; outer border of soft dorsal acutely angulated, the 7th ray the longest, as long as or longer than the head, and

[6] McCulloch has given us an excellent figure of this species in Rec. W. Austr. Mus., i, pt. 2, 1912, pl. ix.

reaching to or beyond the middle of the caudal. Caudal rounded, 2·33 to 2·44 in the body-length. Anal with iii 11 rays, originating below the 11th dorsal spine; third spine longest, a little shorter than the last dorsal spine, and 2·11 to 2·37 in the seventh and longest ray, which is considerably longer and reaches further back than that of the dorsal. Pectoral rounded, with 18 (17 to 19) rays, a little shorter than the head. Ventral two fifths longer than the pectoral, the second ray the longest, extending to the sixth to eighth anal ray; ventral spine 1·6 in the length of the head without the opercular flap.

Gill-rakers 11 on the lower branch of the anterior arch, the first 4 tubercular, the longest one fourth of the eye-diameter.

Body purplish black, the last third of the trunk and the tail with six obscure grayish cross-bands, which do not reach the dorsal surface. A blue band from the nostril to the angle of the preopercle, cheeks and opercles sparsely blue-spotted. Dorsal, caudal, anal, and ventral fins purple, the first two and the posterior rays of the third crossed by a network of grayish lines; pectorals greenish yellow. (Named after its collector, Mr. Edwin Alfred Jolliffe.)

Through the fortunate capture by its discoverer of a second example of this beautiful longfin, I am now in a position to give a fuller and more correct description than was heretofore possible, the head of the original specimen being much distorted. The present description, which supersedes the first, is, therefore, taken from two examples, measuring respectively 151 and 125 mm. over all, taken at Green Island, Moreton Bay, by Mr. Edwin Alfred Jolliffe, who generously presented them to the Queensland Museum, and after whom I have had much pleasure in naming it, in slight recognition of his keen interest in all matters relating to marine zoology.

Our illustration is taken from the smaller example mentioned above. Reg. No. I. 2669.

PARAPLESIOPS POWERI Ogilby.

(Plate XVIII.)

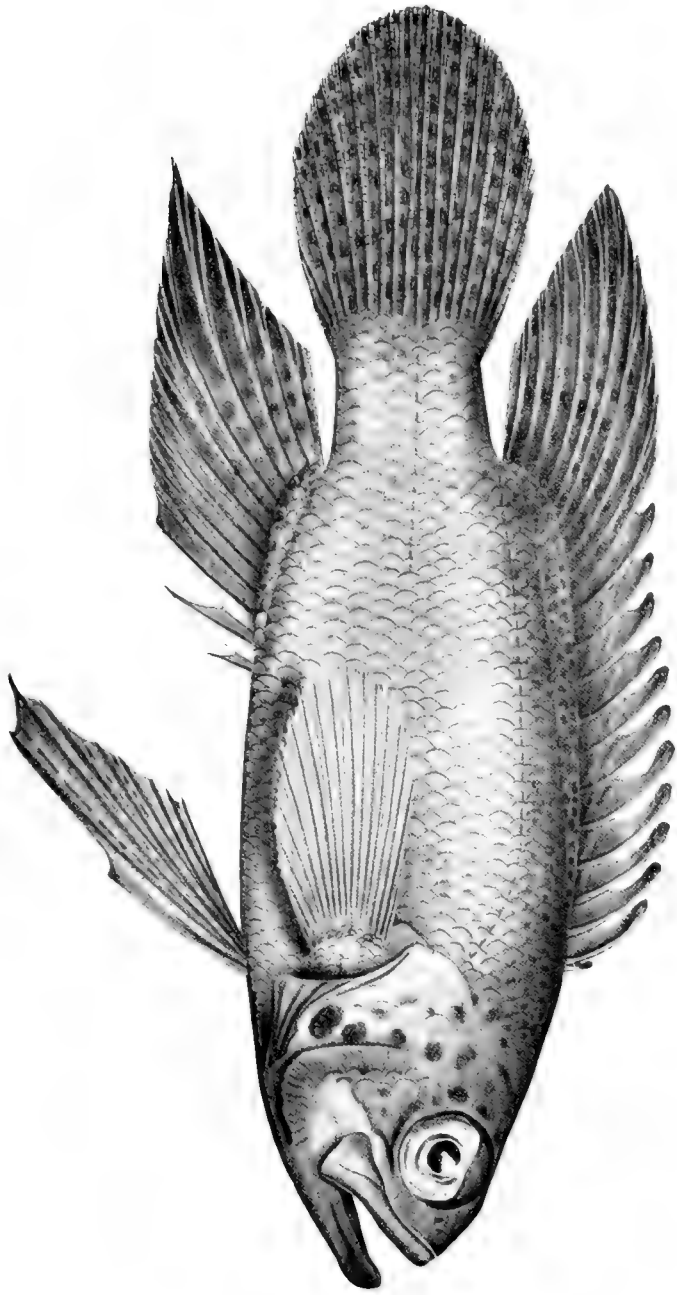
Paraplesiops poweri Ogilby, Proc. Roy. Soc. Queensl., xxi, 1907, p. 17.

BROWN LONGFIN.

Type locality:—Mud Island, Moreton Bay.

Body subovate, the dorsal and anal contours subsymmetrical, its width anteriorly about four sevenths of its depth, which is 2·83 in its length and equal to the length of the head. Caudal peduncle about one half deeper than long, its least depth 6·2 in the body-length. Head one third deeper than wide, its upper profile and that of the nape linear and gently acclivous, its width 1·67 in its length. Snout short and blunt, with rounded, subvertical profile, its length 1·33 in the eye-diameter, which is one third of the length of the head; interorbital region feebly convex, its width 5·6 in the length of the head. Jaws equal; cleft of mouth rather strongly oblique; maxillary extending to below the last quarter of the eye, its length about half of that of the head.

QUEENSLAND FISHES.



Phyllis F. Clarke, del.

Parapriacanthus powerii Ogilby; holotype. Nat. Size.

Face page 50.

Dentition as in *P. jolliffei*.

Scales in 33 series along the middle of the side; in 4/1/15 from the base of the first dorsal spine obliquely backwards; tubes of lateral lines 30/12. Otherwise as in *P. jolliffei*.

Dorsal with xii 10 rays, originating above the opercle; first spine short, the succeeding spines gradually increasing in length to the eighth and ninth, which are equal, longer than the tenth and eleventh, but shorter than the last, which is 1·83 in the length of the head; outer border of soft dorsal acutely angulated, the sixth ray the longest, rather longer than the head, and reaching to well beyond the middle of the caudal. Caudal rounded, 2·62 in the body-length. Anal with iii 10 rays, originating below the last dorsal spine; third spine longest, a little shorter than the last dorsal spine, and 2·37 in the sixth and longest ray, which is longer than and reaches somewhat further back than that of the dorsal. Pectoral obtusely pointed, with 18 rays, a little shorter than the head. Ventral one third longer than the pectoral, the second ray the longest, extending to the second anal ray; ventral spine 1·6 in the length of the head without the opercular flap.

Gill-rakers 12 on the lower branch of the anterior arch, all but the first 3 tubercular, the longest about one sixth of the eye-diameter.

Uniform greenish brown, the upper surface and the sides of the head with a purplish gloss. Sides of head with scattered blue spots, which only become prominent after death. All the fins blackish, except the pectorals and the basal third of the ventrals, which are pale yellowish brown. (Named after its collector Mr. Percy Power.)

Described from the type specimen, the only one so far obtained. It measures 172 mm. in total length, and was taken at Mud Island, Moreton Bay, by Mr. Percy Power, by whom it was presented to the Amateur Fishermen's Association of Queensland. It is now deposited in the type collection of the Queensland Museum, through the favor of the Association. Reg. No. I. 1548.

PART XI.—LUTIANIDÆ (No. 1).

APRION Cuvier & Valenciennes.

Aprion Cuvier & Valenciennes, Hist. Nat. Poiss., vi, 1830, p. 543 (*virescens*); Günther, Brit. Mus. Catal. Fish., i, 1859. p, 81; Bleeker, Atlas Ichth., viii, 1877, p. 76.

Sparopsis Kner, Sitz. Akad. Wien, lviii. 1868, p. 27 (*latifrons*).

Body elliptical, compressed. Scales moderate or rather small, adherent, finely ciliated. Lateral line complete, not extending on the caudal fin, the tube short and simple. Head scaly, except the interorbital region, snout, preorbital, suborbital ring, preopercle, and mandible. Snout moderate; preorbital wide.

Cleft of mouth moderate and oblique, the lower jaw slightly the longer. Canine teeth in both jaws, succeeded by a villiform band; vomer and palatines with villiform teeth; tongue toothless. Eye large. Nostrils contiguous, the anterior valvular. Preopercle entire or finely serrulate posteriorly; opercle with a blunt point; suprascapula serrated. Dorsal fin with x 11 rays, the spines slender and flexible, naked as also are the soft rays, the last of which is more or less produced. Caudal forked. Anal fin with iii 8 rays, similar to the soft dorsal. Pectoral long and pointed, with 15 to 18 rays. Ventral inserted below or behind the pectoral-base, the outer ray usually produced, without accessory scale. Gill-rakers in moderate number, well developed. (*a*, priv.; *πρίων*, a saw.)

Perciform fishes from the Indian and Western Pacific Oceans. Species 4 or 5.

APRION MICROLEPIS (Bleeker).

Chætopterus microlepis Bleeker, Versl. Akad. Amst. (2) iii, 1869, p. 80.

Aprion (*Aprion*) *microlepis* Bleeker, Verh. Akad. Amst. xiii, 1873, Révis. Lutjanus etc. p. 96; id., in Pollen & Van Dam. Faun. Madagascar, pt. 4. 1875, Poiss., pp. 26, 96; id., Atlas Ichth., viii, 1877, p. 78, pl. ccexxxv, fig. 6.

Aphareus roseus Castelnau, Proc. Linn. Soc. N. S. Wales, iii, pt. 4, 1879, p. 373; Macleay, Proc. Linn. Soc. N. S. Wales, v, 1881, p. 386; Woods, Fish & Fisher. N. S. Wales, 1882, p. 15; Ogilby, Catal. Fish. N. S. Wales, 1886, p. 13; Waite, Synop. Fish. N. S. Wales, 1904, p. 33.

Aprion roseus McCulloch, Rec. Austr. Mus., xi, 1917, p. 173, pl. xxx.

ROSEATE SEA-BREAM.

Type localities:—Amboina (*Apr. microlepis*).
Port Jackson (*Aph. roseus*).

Body elliptical and somewhat compressed, the dorsal profile rather more arched than the ventral, its width 1·63 in its depth, which is 3·57 in its length and subequal to the length of the head. Caudal peduncle two and three fourths times as long as deep, its least depth 3·14 in the depth of the body. Head about two fifths longer than deep, the upper profile level and gently acclivous from above the nostrils to the occiput, which with the nape is feebly rounded, its width 1·8 in its length, which is 3·44 in that of the body. Snout rather long, with gently convex profile, its length 2·9 in that of the head. Eye moderate, its diameter 1·3 in the length of the snout, 3·75 in that of the head, and twice its distance from the angle of the maxillary groove; interorbital region convex, its width one fifth more than the eye-diameter and 3·14 in the length of the head. Lower jaw prominent, the maxillary extending to somewhat beyond the anterior border of the eye, its length 2·6, that of the mandible 2, in the length of the head. Preopercle feebly serrated, some of the teeth on the rounded angle enlarged; opercle with a pair of small spines.

Scales in 63 or 64 transverse series above the lateral line; 7/1/16 scales between the spinous dorsal and the vent; cheek scales in 7 series.

Dorsal fin with x 11 rays, the soft portion 1·44 in the length of the spinous; sixth spine longest, but scarcely longer than the fourth, fifth, seventh, and eighth, its length 2·44 in that of the head; soft dorsal a little lower than the spinous, one fourth longer than high, the posterior branch of the last ray produced, two sevenths more than the longest spine, but not reaching to the base of the caudal. Caudal deeply emarginate, with the lobes acute, the middle rays one third of the upper lobe, which is 3·33 in the body-length. Anal fin with iii 8 rays, originating below the second dorsal ray, the spines slender and flexible, the third the longest, 3·75 in the length of the head and a little shorter than the first ray; soft anal one sixth longer than high, the last ray similar to that of the dorsal, and seven ninths more than the second spine. Pectoral with 16 rays, its length 3·55 in that of the body, the fifth ray longest, not reaching to the vertical from the vent; below the fifth the rays rapidly decrease in length, so that the seventh is only three fifths of the length of the longest. Ventral long and pointed, with the outer ray slightly produced, extending as far back as and 1·25 in the length of the pectoral, which is about as long as the head.

Gill-rakers of moderate length and strength, 16 on the lower branch of the anterior arch, the longest 1·86 in the eye-diameter.

Upper surface and sides roseate, shading into pearly white below, the upper surface of the head and the snout washed with violet. Fins pinkish, the dorsal with a median saffron band, and with a basal saffron or pearly spot between each pair of spines and rays; anal with a pearly basal and saffron marginal band; tips of caudal, pectoral, and ventral rays grayish. (*μικρός*, small; *λεπίς*, scale.)

Described from a specimen, 395 millim. long, taken in Moreton Bay by Mr. A. E. Wood, and presented by him to the Queensland Museum; Reg. No. I. 2509. I have also had the opportunity of examining a larger example (482 millim.), caught by Mr. John Colclough on the Snapper Banks off Moreton Bay, and now the property of the Amateur Fishermen's Association.

Historical:—But little is known of this rare and beautiful fish, which was originally described from two small examples obtained at Amboina; some years subsequently its describer included it in the catalogue of fishes, published by Pollen & van Dam in their "Faune Madagascar," on the strength of an example received from Réunion. As *Apharcus roseus* Castelnau described it two years later from Port Jackson, and his type not being available for re-examination, the error was perpetuated in all subsequent lists of New South Wales fishes. It was, therefore, with especial pleasure that I discovered, in the collection of the Queensland Museum, the specimen from which the above description was drawn up, and am thus enabled to fix the position of Castelnau's fish.

Uses:—Nothing appears to have been recorded as to the edible qualities of this species or its congeners, but as it is a fairly large and robust fish, it is doubtless of equally good quality for the table as its lutianoid allies.

Range:—East Coast of Australia, Amboina, and Réunion.

Dimensions:—Attains a length of fully 600 millim. (Castelnau).

Remarks:—Since writing the above McCulloch has described and figured this fish as *Aprion roseus* Castelnau; nevertheless I still hold to the opinion that our fish cannot be separated from that of Bleeker.

Part XII.—NEMIPTERIDÆ (No. 1).

NEMIPTERUS Swainson.

Nemipterus Swainson, Classif. Fish., ii, 1839, pp. 172, 223 (*filamentosus* = *nematophorus*); Jordan & Thompson, Proc. U. S. Nat. Mus., xli, 1912, p. 563.

Synagris Günther, Brit. Mus. Catal. Fish., i, 1859, p. 373 (*furcosus*); Day, Fish. India, pt. 1, 1875, p. 90; Jordan & Thompson, ibid. Subgenus.

Dentex Bleeker, Atlas Ichth., viii, 1877, p. 80 (*tæniopterus*). Not of Cuvier.

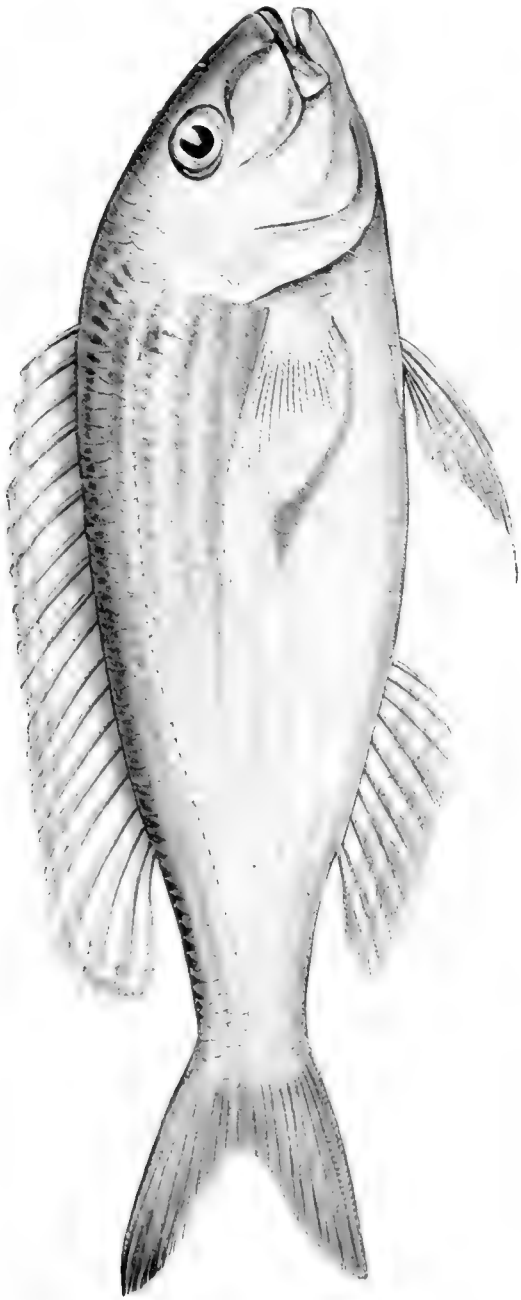
Anemura Fowler, Proc. Acad. Nat. Sci. Phila., 1904, p. 527 (*notatus* = *tæniopterus*) = Synagris.

Odontoglyphis Fowler, ibid. (*tolu*); Jordan & Thompson, ibid. Subgenus.

Euthyopteroma Fowler, ibid. (*blochii*); Jordan & Thompson, ibid. Subgenus.

Body elliptical and compressed. Scales moderate, adherent, ciliated. Lateral line complete, not extending on the caudal fin, the tubes simple. Head moderate, with wide smooth preorbital, the occiput, opercles (except the preopercle), and cheeks scaly, those of the latter arranged in three series; scales of head cycloid and smooth, except those of the parietal region, and a row between the occiput and nape, the scales of which are modified so as to form mucigerous organs. Mouth terminal and protractile, with moderate slightly oblique cleft, the jaws equal; maxillary mostly exposed, without supplemental bone. Jaws with a band of villiform teeth, the outer row conical and somewhat enlarged; upper jaw with three or four pairs of moderately strong canines; canines of lower jaw, if present, weak. Preopercle entire or feebly serrulate; opercular spine weak or absent. Dorsal fin scaleless, with x 9 rays, the spines feeble and sometimes filamentous. Caudal deeply forked, the upper ray sometimes filamentous. Anal with iii 7 rays, similar to the soft dorsal. Pectoral pointed, with 15 to 18 rays. Ventral inserted below or behind the pectoral-base, with i 5 rays, the outer sometimes produced; accessory ventral scale present. Six branchiostegals. Air-bladder notched posteriorly. Pylorie appendages in small number. (*νῆμα*, a thread; *πτερόν*, a fin.)

Perciform fishes of moderate size, inhabiting the warmer zones of the Indian and Western Pacific Oceans, ranging from the Red Sea and East Coast of Africa through the Indian Seas northwards to China and Japan, and eastwards through Malaysia to New Guinea, the Louisiade Archipelago, and the East Coast of Australia. They are panfishes of excellent flavor, and as they are found in



Nemipterus theodorei Ogilby; holotype. ⅓ Nat. Size.

Phyllis F. Clarke, del.

large numbers off our shores in moderately deep water where the sea-bed is smooth, they should at no distant date form a cheap and pleasant addition to the breakfast tables of Brisbane. Five species belong to the Queensland fauna and may be recognized by the following key—

a^1. Both jaws with distinct canines ; dorsal spines low, the membranes not notched, none of the spines or rays filamentous (*Synagris*).

b^1. Scales in transverse series 4/1/14 ; spinous dorsal higher than the soft ; coloration uniform .. .. 1. *guntheri.*

b^2. Scales in transverse series 4/1/11 ; spinous dorsal lower than the soft ; body with yellow bands .. .. 2. *tæniopterus.*

a^2. Lower jaw without distinct canines ; dorsal spines all low, the membranes not notched, the spines scarcely exserted (*Euthynpteroma*).

c^1. Median dorsal spines longest.

d^1. Scales in transverse series 3/1/12 ; upper caudal ray not produced ; coloration uniform .. .. 3. *upencoides.*[7]

d^2. Scales in transverse series 3/1/10 ; upper caudal ray filiform ; body with yellow bands .. .. 4. *aurifilum.*

c^2. Posterior dorsal spines longest.

e^1. Scales in transverse series 3/1/9 ; upper caudal ray not produced ; body with yellow bands .. .. 5. *theodorei.*

NEMIPTERUS THEODOREI Ogilby.

(Plate XIX.)

Nemipterus theodorei Ogilby, Proc. Roy. Soc. Queensl., xxviii, 1916, p. 113.

BUTTERFLY BREAM.

Type locality:—Caloundra Bank, S.Q.

Body elliptical, the ventral contour as much or a little more arched than the dorsal, which is linear and feebly declivous behind the origin of the dorsal, its width 1·8 to 2·1 in its depth, which is 3 to 3·2 in its length and as much as to one tenth less than the length of the head. Caudal peduncle slender, its least depth 1·8 to 2 in its length and 2·8 to 3 in the depth of the body. Head one sixth to two ninths longer than deep, its upper profile evenly and gently convex, its width somewhat less than half its length, which is 3·1 to 3·25 in that of the body. Snout with moderately declivous profile, its length 2·37 to 2·5 in that of the head. Diameter of eye 1·5 to 1·67 in the length of the snout, 3·67 to 4 in that of the head, and subequal to the width of the preorbital. Interorbital region gently convex, its width 1·22 to 1·33 in the eye-diameter and 4·5 to 5 in the length of the head. Jaws equal ; maxillary not extending to the level of the eye, its length 2·63 to 2·83, that of the mandible 2·4, in the length of the head. Opercle with a small spine.

[7] Bleeker (Atlas Ichth., pl. cccxxviii, fig. 2) figures this species with a large oval blackish shoulder-spot, but no mention is made of it in his original description (Nat. Tijds. Nederl. Ind., iii, 1852, p. 725).

Upper jaw with four pair of small canines, the outer pair the longest; lower jaw without true canines, which are replaced by an outer series of enlarged conical teeth, which is continued backward along the side of the jaw, the largest teeth being on the middle of the side.

Scales in 48 series above the lateral line; 3/1/9 in the series between the spinous dorsal and the vent. Accessory ventral scale slenderly lanceolate, as long as or a little longer than the eye-diameter.

Dorsal fin originating above the opercular spine; spinous portion low, the tips of the spines scarcely projecting beyond the interspinous membrane, the spines gently graded to the last, which is 2·4 to 2·5 in the length of the head and 1·3 to 1·4 in the penultimate and longest ray; soft dorsal one third to two fifths longer than high, posteriorly angulate, its length 1·3 to 1·4 in that of the head. Caudal forked, with pointed lobes, the middle rays 2·55 to 2·67 in the upper and somewhat longer lobe, which is 3·5 to 3·67 in the body-length. Anal fin originating below the second dorsal ray, the third spine the longest, 2·88 to 3 in the length of the head; soft portion as long as to one tenth longer than high, the rays increasing very gradually to the sixth, which equals the last and is three tenths to four ninths more than the third spine. Pectoral pointed, with 17 rays, its length 3 to 3·5 in that of the body, the sixth ray the longest, extending to above the vent. Ventral inserted below the pectoral-base, the spine moderate and slender, 1·67 to 2 in the outer ray, which is produced, is a little shorter than the pectoral, and extends to the second anal spine.

Gill-rakers 5 + 7 on the anterior arch, short, stout, and strongly spinulose, the longest 5·5 in the eye-diameter.

Roseate above, shading imperceptibly through the iridescent pink of the sides to the pearly white of the lower surface; sides below the lateral line with five greenish yellow horizontal bands, each of which occupies the middle of a series of scales, the upper and lower bands shorter and less conspicuous than the intervening bands; a brilliant crimson shoulder-spot, covering the upper half of two consecutive scales, which vary from the second and third to the fourth and fifth below the lateral line. Upper surface and sides of head with a tinge of lavender overlying the pink; a curved light blue bar from the front of the eye, passing along the upper edge of the preorbital, and anteriorly changing gradually to a deep violet; a similar but less conspicuous bar along its lower edge; upper lip yellow; cheeks and opercles pink with golden reflections, the lower series of cheek-scales with a shimmering violet iridescence; a distinct greenish blue spot, preceded by a purplish spot, behind the upper angle of the preopercle. Lower two thirds of iris vivid scarlet, upper third green, the line of demarcation sharply defined. Dorsal fin pink, bordered by a broad gold-edged puce band; caudal pinkish yellow, broadly tipped with rose, its upper ray edged with gold, its lower with rose; anal with the basal half yellow, the distal half lilaceous silvery, the former traversed by a basal and two median pale blue bands; pectorals and ventrals colorless. (Named after the Hon. Edward Granville Theodore, in recognition of the fact that to him is attributable the formation of a Department

of Fisheries, by means of which it is hoped that both the public and the professional fishermen will materially benefit; and by which it may be expected that the vast importance of our fishing industries, so shamefully neglected in the past, may be brought into adequate prominence.)

Described from three examples, measuring 248 to 267 mm., taken by hook on the Caloundra Bank, and presented respectively to the Amateur Fishermen's Association by its President, Mr. Thomas Welsby, and to the Queensland Museum by Mr. T. C. Troedson and myself, the largest of the three being selected as the type; Reg. No. I. 2648. In elegance of form and beauty of coloration this species equals, if indeed it does not surpass, any other fish of our seas, even the wonderful rainbow-fishes and butterfly-fishes of our coral reefs paling to insignificance before its delicate loveliness.

Our illustration is taken from the holotype, and should be studied along with the color-pattern of recent specimens given above for, as with all fishes of similar delicacy, the various tints are extremely evanescent, and disappear almost immediately in preservatives.

Note on Synagris furcosus Günther.

After carefully examining the literature of this fish from both points of view, I am unable to satisfy myself as to its identity with the *Dentex furcosus* of Cuvier and Valenciennes, because, in the first place, while that fish is said to have been obtained by Raynaud "in the roadstead of Trincomalee," it has not since been found in Indian waters, and Day has omitted it from his great work on the "Fishes of India, Burma, and Ceylon";[8] and, in the second place, because the description of its form, as given by the French authors, does not agree well with that of Günther. This author, who had before him seven specimens from various eastern localities on which to form an opinion, made the species the type of his new genus *Synagris*, but kept the eastern fish united to the western and somewhat hypothetical *Dentex furcosus*, a conclusion which has not been borne out by subsequent research. Bleeker, it may be observed, was also dissatisfied with Günther's identification, for he writes—"*M. Gunther rapporte cette espèce au Dentex furcosus dont cependant la justesse me semble avoir besoin d'être prouvée.*"[9] Since, therefore, the name *furcosus* was undeniably given in the first place to a western—Ceylonese—species it becomes impossible to retain it for the eastern fish, it seems, therefore, necessary to give a distinctive title to the latter. In 1870 Day described from Andaman specimens a fish which he named *Dentex (Synagris) notatus*.[10] Five years later he records the same fish from the "Seas of India," holding it to be "a slight variety of *S. furcosus* Gunther," which name he places with some hesitation in the synonymy of *S. notatus*, being evidently of opinion that Günther's name had no *locus standi*, since it was doubtful whether

[8] True, Day has doubtfully included Valenciennes' fish in the synonymy of his *S. notatus*, but Bleeker has indisputably shown that that suppositious species was identical with *S. tæniopterus*.

[9] Atlas Ichth., viii, 1877, p. 85.

[10] Proc. Zool. Soc. London, 1870, p. 684.

it were identical with the *Dentex furcosus* of the Histoire Naturelle. Bleeker, however, two years later, as mentioned above, showed that Day's fish was inseparable from *Nemipterus taniopterus*,[11] which identification was subsequently admitted to be correct by Day himself. In view, therefore, of the failure of Indian naturalists to rediscover the true *D. furcosus*, the question arises as to whether *D. taniopterus* was not founded on a more carefully preserved specimen of the former fish. The eastern form has been recorded from Amboina, the Louisiade Archipelago, Damlay (? Darnley) Island, and Australia (*Günther*); Palm Islands, Cape Grenville, North and North-East Australia (*Macleay*). There is, therefore, a wide and unbridged gulf between the reputed ranges of the two forms; nor should it be forgotten that Bleeker, with the illimitable resources at his command, never got either species.

I, therefore, propose to separate the eastern fish as *Nemipterus güntheri*, with the following synonymy, leaving to my Indian confreres the task of clearing up the mystery of *D. furcosus*.

NEMIPTERUS GUNTHERI nom. nov.

Synagris furcosus Günther, Brit. Mus. Catal. Fish., i, 1859, p. 373; Alleyne & Macleay, Proc. Linn. Soc. N. S. Wales, i, 1877, p. 271; Macleay, Proc. Linn. Soc. N. S. Wales, v, 1881, p. 383; id., ibid., viii, 1863, p. 262. Not *Dentex furcosus* Cuvier & Valenciennes.

Dentex furcosus Bleeker, Verh. Akad. Amst. xiii, 1873, Rev. Espèc. Dentex, etc., p. 12; id. Atlas Ichth., viii, 1877, p. 85. After *Synagris furcosus* Günther.

I append here the description of a unique specimen of *Nemipterus* in the collection of the Queensland Museum, in order to call the attention of northern observers to this extraordinarily deep form, and perchance obtain further examples. McCulloch suggests that the example has suffered an injury to the spine, which might account for the depth of the body, but the specimen is in good condition and well nourished, and shows no external sign of injury. Should McCulloch's suggestion be correct the fish would be classed as *N. güntheri*

NEMIPTERUS sp.

Lutianus rubicaudus de Vis; *nom. mus.*

Gengorage rubicauda Kent, Great Barrier Reef, 1893, p. 369; *nom. nud.*

This fish was caught at Somerset, N.Q., by Mr. Kendal Broadbent and measures 218 mm. Reg. No. I. 2580.

Body subovate, the dorsal contour much more arched than the ventral, its profile evenly rounded from the nape to the caudal fin, the highest point being above the base of the pectoral fin; width of body 2·17 in its depth, which is 2·6 in its length and a little more than the length of the head. Caudal peduncle moderately stout, its least depth 1·44 in its length and 3·17 in the length of the head. Head three tenths longer than deep, the upper profile feebly convex, its width about half its length, which is 2·8 in that of the body. Snout with strongly declivous profile, its length 2·5 in that of the head. Diameter of eye 1·43 in the

[11] *Dentex taniopterus* Cuvier & Valenciennes, Hist. Nat. Poiss., vi, 1830, p. 246.

length of the snout, 3·55 in that of the head, and one eighth more than the least width of the preorbital; interorbital region feebly convex, its width a trifle less than the eye-diameter and 3·75 in the length of the head. Jaws equal; maxillary extending to the vertical from the anterior border of the eye, its length 2·77, that of the mandible 2·3, in the length of the head. Opercle with a small spine.

Each jaw with 3 pair of moderate canines, the outer the longer.

Scales in 50 series above the lateral line, in 4/1/14 between the spinous dorsal and the vent. Accessory ventral scale slenderly lanceolate, rather less than the eye-diameter.

Dorsal fin originating above the angle of the preopercle, the spinous portion high, the spines scarcely projecting beyond the interspinous membrane, the 5th and 6th the longest, 2·22 in the length of the head, and two ninths more than the four anterior rays, which are equal, those succeeding them gradually decreasing in length; soft dorsal three fourths longer than high, posteriorly rounded, its length two thirds of that of the head. Caudal deeply forked, with pointed lobes, the middle rays 3·25 in the upper lobe, which is rather the longer and is one third of the body-length. Anal fin originating below the 1st dorsal ray, the 3rd spine the longest, 3·75 in the length of the head; soft anal two fifths longer than high, the three anterior rays subequal and longest, one fourth more than the 3rd spine; last ray slightly produced, nearly as long as the anterior rays. Pectoral pointed, with 17 rays, its length 3·75 in that of the body; 5th ray longest, extending to above the origin of the anal. Ventral inserted below the inferior axil of the pectoral, the spine moderate and slender, 1·56 in the 2nd and longest ray, which is 1·45 in the length of the head and extends to a little beyond the vent.

The colors of our specimen have faded to a rusty yellow, but we learn from Günther that it is "uniform," while we may infer from de Vis' manuscript name that its general tint is reddish.

PART XIII.—SCIÆNIDÆ (No. 1).

Sciænoides part. Cuvier, Règne Anim.; Cuvier & Valenciennes, Hist. Nat. Poiss., v, 1830, p. 1; Müller, Abh. Akad. Berlin, 1844, p. 201.

Sciænidæ part. Owen, Lect. Comp. Anat. Vert., Fish., 1846, p. 49.

Sciænidæ Richardson, Ichth. China & Japan, 1846, p. 223; Günther, Brit. Mus. Catal. Fish., ii, 1860, p. 265; Day, Fish. India, pt. 2, 1876, p. 181; Jordan & Evermann, Fish. North & Mid. Amer., pt. 2, 1898, p. 1392.

Sciænoidæ Cantor, Catal. Malay. Fish., 1850, p. 56.

Sciænoidei Bleeker, Arch. Néerl. Sci. Nat., xi, 1876, p. 323.

THE JEWFISHES.

Body elliptical or subovate, compressed, covered with adherent ctenoid or cycloid scales. Lateral line complete, mostly following the curvature of the back, and extending on the caudal fin. Head large, with moderate, more or less obtuse

snout, almost wholly scaly, the mucigerous system strongly developed. Mouth terminal and somewhat protractile; maxillary wholly or partly concealed beneath the preorbital, without supplemental bone; chin usually porigerous, sometimes with a barbel. Teeth in the jaws usually in villiform bands, with or without an outer enlarged row, sometimes uniserial; canines present or absent; roof of mouth and tongue toothless. Two approximate nostrils on each side. Preopercle usually with a feeble serrature; opercle with two flat points. Dorsal fin divided into two portions by a deep notch, the soft portion the longer, the spinous depressible in a more or less complete groove. Caudal usually rounded or cuneate. Anal with one or two spines, much shorter than the soft dorsal.[12] Ventrals inserted below or behind the pectoral-base, close together, each with i 5 rays, and with or without an axillary scale. Gill-openings wide; gill-membranes separate, free from the isthmus; seven branchiostegals; pseudobranchiæ usually present; gills four, a slit behind the fourth. Air-bladder, when present, mostly large with many lateral appendages; otoliths of large size. Stomach cæcal; intestinal canal with two convolutions; pyloric appendages usually in small number and weak. Subocular shelf, when present, consisting of a small and usually slender process of the second suborbital. Vertebræ 24 to 30; anterior precaudals without parapophyses and with sessile ribs, the posterior ribs on parapophyses.

A large and important family of perciform percoids, inhabiting the sandy shores of all warm seas, except those of the Pacific Islands, from which, though abundant on both shores of that ocean, they are unaccountably absent. They freely enter estuaries, through which they make their way upwards, eventually ascending the rivers to far beyond the influence of the tide. These excursions are not, however, undertaken for the purpose of depositing their spawn, as in the case of the salmon and shad, but primarily as predatory raids on the schools of small mullets, herrings, and prawns, which swarm at certain seasons in the extratidal reaches. Some species are, however, wholly confined to fresh water, and it is possible that the ancestral sciænids were purely fluviatile, in which case the excursions above referred to may be the outcome of an instinctive desire to get back for a time at least to their original environment. Dr. Günther takes a converse view of the case to that which I have here advanced; he writes—"The fishes of the 'Meagre' family are chiefly coast-fishes of the tropical and subtropical Atlantic and Indian Oceans, preferring the neighbourhood of the mouths of large rivers, into which they freely enter, *some of the species having become so completely naturalised in fresh water that they are never found now-a-days in the sea.*"[13] I think, however, that to those who have practical experience of these fishes, the theory put forward by me above will appeal more strongly. Some of the species, such as the Eastern Atlantic "maigre" (*Sciæna hololepidota*),[14] our

[12] Except in *Scriphus* Ayres (Proc. Cal. Acad. Sci., ii, 1861, p. 80), in which the anal fin is at least as long as the soft dorsal.

[13] Study of Fishes, 1880, p. 427.

[14] *Labrus hololepidotus* Lacépède, Hist. Nat. Poiss., iii, 1802, p. 517. This name has a year's preference over *Cheilodipterus aquila* of the same author—ibid., v, 1803, p. 685.

own "jewfish" (*S. antarctica*), the Californian "white sea-bass" (*Cynoscion nobilis*),[15] etc., attain a very large size, specimens exceeding one hundred pounds having been recorded, but the majority of the species do not exceed a foot or eighteen inches in length; most of them, however, are valuable as food-fishes. All the jewfishes are carnivorous, and as they bite greedily and struggle hard for freedom when hooked, they are alike favorites with the angler and the epicure. The large and complicated air-bladder, common to most of these fishes, is used extensively in the manufacture of an inferior brand of isinglass,[16] and so adds materially to the value of the fish; so much so, indeed, that Day, writing of the Indian species, states—"The air-vessels of many of these fishes are extensively collected along the coast of India as they afford isinglass, which is exported to China and elsewhere. As food, however, their flesh is rather tasteless when young and coarse when large, consequently in many localities, as Kurrachee or in Beloochistan, the sounds or air-vessels are as valuable as the whole of the remainder of the fish." The otoliths or ear-bones of these fishes are very large and are often beautifully sculptured, pitted, or papillated, differing so much *inter se* that the various Australian species may be readily distinguished from an examination of these bones alone. Many of these fishes are capable of producing sounds so plainly, while still at some distance below the surface, that these are readily perceptible by the occupants of a boat passing above them; the method by which the sound is produced has not been definitely decided, though several theories have been propounded; some authorities suggest that it is caused by the clashing together of the pharyngeal teeth, but I am more inclined to believe in the theory advanced by Jordan and Evermann [17] that it is "caused by forcing the air from the air-bladder into one of the lateral horns." This theory is supported by the fact that in the two species most widely credited with this accomplishment, the "maigre" and the "drum" (*Pogonias chromis*)[18] of the Eastern United States, the air-bladder is exceptionally large and complicated. The same authors also assert—"None occurs in deep water and none among rocks."[17] While the former statement is irrefutable, the latter, though in the main correct, needs some modification. I have personally seen fine jewfish taken close in to Wolf Rock, an outlier of Double Island Point and a noted haunt of the jew; also at "Jewfish Shoal" some miles further south, where, according to Mr. J. Hirst Stevens, Inspector of Fisheries for the State of Queensland, the bottom is "mixed rock and coarse shingle, the rock predominating." The same gentleman also informs me that jewfish may be taken on rocky ground in many parts of the South Queensland Coast. As regards the breeding of these fishes I must confess myself to be quite in the dark. The young of all our other edible estuarine fishes—whiting, flathead, bream, etc.—are well known from their earliest stages, but

[15] Ayres, Proc. Cal. Acad. Sci., 1860, p. 78.

[16] The most highly prized isinglass is that which is procured from the air-bladders of the "tassel-fishes" (*Polynemidæ*).

[17] Fish. North and Mid. Amer., pt. 2, 1898, p. 1392.

[18] *Labrus chromis* Linnæus, Syst. Nat., ed. 12, 1766, p. 479.

I am unable to find anyone who has ever seen a baby jewfish; when they make their first appearance in our estuaries they are about a foot long, but where they came from is a question to which I can find no answer.

About thirty genera and one hundred and fifty species of sciænoid fishes are recognized by Jordan and Evermann[17] and Boulenger,[19] the majority of which belong to the typical genus *Sciæna*.

Key to the Australian Genera.

a^1. Precaudal vertebræ more numerous than those of the caudal (*Otolithinæ*).
  b^1. Canine teeth present in both jaws .. .. 1. *Otolithus*.
  b^2. No true canine teeth in either jaw .. .. 2. *Atractoscion*.
a^2. Precaudal vertebræ fewer than those of the caudal (*Sciænina*).
  c^1. No true canine teeth in either jaw .. .. 3. *Sciæna*.

OTOLITHUS Cuvier.

Otolithus part. Cuvier, Règne Anim. (*rubber*); Cuvier & Valenciennes, Hist. Nat. Poiss., v. 1830, p. 59; Cantor, Catal. Malay. Fish., 1850, p. 56; Günther, Brit. Mus. Catal. Fish., ii, 1860, p. 305; Day, Fish. India, pt. 2, 1876, p. 195.

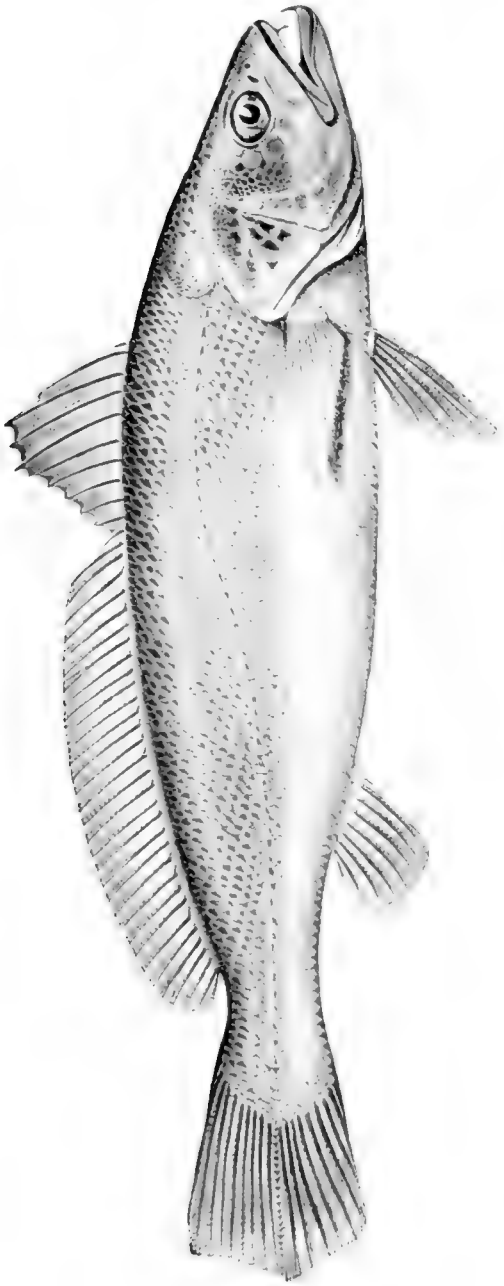
Body elliptical or elongate-elliptical, compressed. Scales moderate or small, adherent, cycloid. Lateral line gently curved to below the middle of the soft dorsal, thence straight along the middle of the tail, and extending to the tip of the caudal fin; tubes profusely ramose, not quite reaching to the border of the scale. Head moderate, with pointed snout and rather narrow preorbital, almost wholly scaly, the mucigerous system well developed. Mouth terminal, with wide oblique cleft, the lower jaw projecting. Premaxillaries with a narrow band of villiform teeth, an outer enlarged row of subulate teeth, and a strong curved canine on either side of and some distance from the symphysis; mandibles somewhat similarly armed, but the villiform band, if present, is reduced to a small anterior patch, while there may be only a single median canine, or if a pair inserted close together, so as to fit between the premaxillary pair and enter a groove or even a socket in the upper lip when the mouth is closed; roof of mouth and tongue smooth. Nostrils approximate, close in front of the eye, the posterior the larger. Eyes rather small and anterior. Preopercle feebly denticulate in the young, smooth or crenulate in the adult; opercle with two weak points. Two dorsal fins, united at their bases, with x (rarely ix or xi) i 25 to 31 rays, the spines weak and flexible; second dorsal lower but much longer than the first. Caudal emarginate. Anal short, with ii 7 to 11 rays, the spines weak. Pectoral obtusely pointed, with 16 to 18 rays. Ventrals thoracic, close together, each with a feeble spine and five soft rays, the outer the longer; a small accessory ventral scale. Gill-rakers in rather small number, short and slender. Pyloric appendages few.

Shore fishes of moderate or rather large size, inhabiting the warmer parts of the Indian and Western Pacific Oceans, freely ascending rivers for predatory

[17] Fish. North and Mid. Amer., pt. 2, 1898, p. 1392.

[19] Cambr. Nat. Hist., vii, 1904, p. 663.

QUEENSLAND FISHES.



Otolithus argenteus Cuvier and Valenciennes. ⅔ Nat. Size.

Phyllis F. Clarke, del.

purposes. These fishes are of considerable value for the table, and the isinglass obtained from their air-bladders or "sounds" is of good quality. I recognize only the following species as belonging to the restricted genus *Otolithus*.

1. *argenteus*. v. supra.

2. *latcoides* Bleeker, Nat. Tijds. Nederl. Ind., i, 1851, p. 98; id., Atlas Ichth., viii, 1876, pl. cccIxxxiv, fig. 1.

3. *maculatus* (Kuhl & van Hasselt) Cuvier & Valenciennes, Hist. Nat. Poiss., v, 1830, p. 64; Bleeker, ibid., fig. 3.

4. *ruber* Schneider, in Bloch, Syst. Ichth., 1801, p. 75, pl. xvii.

Note:—Otolithus leuciscus Gunther,[20] from Manila, is referred to this genus by Jordan and Richardson,[21] but since its describer expressly writes "the lower jaw without canines in front" I can not admit the correctness of their identification. Also Seale describes two Bornean species as *O. dolorosus*[22] and *O. orientalis*[22]; unfortunately the paper in which they are described is missing both from our library and that of the Australian Museum, Sydney, and I am, therefore, perforce, obliged to omit them, owing to the loose way in which the generic name has been applied in the past.

OTOLITHUS ARGENTEUS Kuhl & van Hasselt.

(Plate XX.)

Otolithus argenteus (Kuhl & van Hasselt) Cuvier & Valenciennes, Hist. Nat. Poiss., v, 1830, p. 62; Richardson, Ichth. China & Japan, 1846, p. 225; Bleeker, Verh. Batav. Gen., xxiii, 1850, Sciæn. p. 15; Cantor, Catal. Malay. Fish. 1850, p. 61; Günther, Brit. Mus. Catal. Fish., ii, 1860, p. 310; id., Proc. Zool. Soc. London, 1861, p. 222; Day, Fish. Malabar, 1865, p. 58; Kner, Zool. Novara, i, Fisch., pt. 2, 1865, p. 135, pl. vi, fig. 4 (air-bladder); Playfair, Fish. Zanz., 1866, p. 53; id., Proc. Zool. Soc. London, 1868, p. 9; Bleeker, Verh. Akad. Amst., xiv, 1874, Sciæn., p. 9; id., Atlas Ichth., viii, 1876, pl. cccIxxxv, fig. 5; Day, Fish. India, pt. 2, 1876, p. 197, pl. xlv, fig. 3.

SILVER TERAGLIN.

Type locality:—Java.

Body slenderly elliptical and compressed, the dorsal contour considerably more arched than the ventral, which is gently rounded between the isthmus and the anal fin, its width 1·75 in its depth, which is 3·8 in its length and 1·16 in the length of the head. Abdomen long, its length from ventral-base to vent 2·75 in that of the body and as long as the space between the vent and the root of the caudal. Caudal peduncle one third longer than deep, its least depth 3·38 in the length of the head. Head about one fourth deeper than wide, the fronto-occipital profile linear and but little acclivous, passing imperceptibly into the gentle occipito-nuchal convexity, its width one half of its length, which is 3·33 in that of the body. Snout pointed, with convex profile, its length one fourth of

[20] Ann & Mag. Nat. Hist. (4) x, 1872, p. 398.

[21] Check-List Fish. Philipp. Arch., 1910, p. 33.

[22] Philipp. Journ. Sci., 1911, pp. 280, 281, pls. iii, iv.

that of the head. Diameter of eye 1/25 in the length of the snout and 4·67 in that of the head. Preorbital narrow, its width 2·17 in the eye-diameter. Interorbital region moderate and convex, its width equal to or a little more than the eye-diameter. Nostrils approximate, the posterior somewhat the larger and situated directly in front of the eye, the anterior on a higher level. Lower jaw slightly projecting; cleft of mouth oblique, rising to the level of the middle of the eye. Maxillary extending to below the middle of the eye, its length 2·5 in that of the head, the width of its obliquely truncated distal extremity about four sevenths of the eye-diameter. Vertical limb and angle of preopercle with a few weak and widely separated denticles, that on the angle being the largest; hinder limb subvertical; opercle with two feeble points.

Both jaws with a row of short stout subulate teeth, behind which in the premaxillaries is a narrow band of villiform teeth; these are not present in the mandible; a long curved canine on each side of the symphysis in the upper jaw, and a single median and somewhat stronger one in front of the lower.

Scales cycloid, in 72 to 75 series above the lateral line, in 8/1/19 below the spinous dorsal; head almost entirely scaly, the scales varying greatly in size, the largest being on the middle anterior area of the opercles and along the infero-posterior borders of the eye. One or two series of minute scales along the bases of the soft dorsal and anal, the interradial membranes naked; basal half of caudal fin scaly. Lateral line forming a gentle curve to above the origin of the anal, thence straight and extending to the end of the caudal fin, the tube-bearing body-scales 50 to 52, the tubes profusely arborescent along the posterior two thirds of the body. Snout with a pair of inconspicuous pores, situated above the bases of the canine teeth; chin apparently poreless.

Dorsal fins with x or xi, i 29 rays, the first originating above the ventral-base, the last spine united to but barely half so long as that of the soft dorsal; spines slender and flexible, the first short, the fourth the longest, 2·16 in the length of the head and 1·38 in its base, which is 2·14 in that of the second dorsal, the rays of which increase slightly in length to about the eighteenth, which is 1·37 in the fourth spine and one third of the length of the head; length of its base 2·5 in that of the body; last ray divided nearly to the base. Caudal fin cuneiform, the lower median rays the longest, 5·44 in the body-length. Anal with ii 7 rays, originating below the thirteenth dorsal ray; spines weak, the first excessively small, the second about half the length of the second ray, which is the longest, 2·57 in the length of the head; base of anal 5·43 in that of the second dorsal. Pectoral pointed, with 16 rays, the sixth the longest, 1·44 in the length of the head, and extending to below the tenth dorsal spine. Ventral inserted a little behind the pectoral-base, and about one eighth shorter than that fin, the first ray the longest, not extending midway to the vent.

Gill-rakers 3 + 10, the longest two fifths of the eye-diameter and five sevenths of the longest fringes. Air-bladder rather small, with 25 to 32 fringed appendages on either side. Six pyloric cæca.

Silvery, washed with blue above the lateral line.

Described from two specimens, measuring respectively 260 and 275 mm., trawled by the Endeavour in Edgecumbe Bay at a depth of fourteen fathoms on sand and mud.

Variation:—Although after an exhaustive comparison of our fish with Day's description and Bleeker's figure I have no hesitation in identifying it as *O. argenteus,* it is interesting to note that in both my examples there is an eleventh spine interpolated between the spinous and the soft dorsals, with both of which it is united, its length being subequal to the tenth spine of the first dorsal and rather less than half the spine of the second. Mr. McNeill, however, tells me that the other specimens, eight in number, have the ordinary number of ten spines in the first dorsal.

Historical:—The Silver Teraglin is yet another of the fishes, which were first brought to the notice of European scientists through the indefatigable labors of those industrious Dutch naturalists Messrs. Kuhl and van Hasselt, who sent home a painting of a specimen taken at Batavia; this drawing subsequently came into the hands of Valenciennes and formed the basis of his description of the species, the name inscribed upon the painting being retained by him. From the same source we gather that Dussumier found the fish upon the Malabar Coast of India, and further that Major Farquhar figured it from an example captured in the Straits of Malacca, and which forms one of the collection of drawings of Indian animals made by him and deposited in the library of the India House, London. From Canton it was recorded by Richardson, while Cantor writes—"at Pinang this species is taken in numbers from June till August." Günther next listed a British Museum example from Ceylon, and during the following year reported the occurrence of "this marine species" in the far-off rivers of Nepal, whence the skin of a large specimen was brought by Mr. B. H. Hodgson and presented to the same institution. Col. Playfair a few years later announced its capture at Aden and off the "mouth of the Pangani River," an East African stream, which enters the ocean opposite to the northern extremity of the Island of Zanzibar, and the same observer subsequently collected it in the sea at Cape Saint Mary, Madagascar. Bleeker received examples from Celebes, Madura, Borneo, Java, Banca, Singapore, Nias, Sumatra, Pinang, Siam, China, Bengal, and Madagascar. Tenison Woods recorded its presence in Lake Bombon, Luzon, and finally Evermann and Seale reported it from Bacon in the Philippine Archipelago. The present record adds a long stretch of coast-line to its range, the most easterly locality previously reported having been Bleeker's Celebesian one; incidentally it is also the first notification of the presence of a true *Otolithus* in Australian waters. The southern fish, described respectively by Günther and Macleay as *Otolithus atelodus* and *O. teraglin,* having proved to belong to the allied genus *Atractoscion,* now takes its place in our system as *A. atelodus.*[23]

[23] My friend Mr. J. H. Hamson, whose knowledge of our edible fishes is extensive and reliable, assures me that the southern teraglin occasionally occurs in Moreton Bay, but in the absence of a specimen it is impossible to admit it to our faunal list.

Uses:—Cantor, alluding to Pinang, states that—"it is valued by the natives as an article of food," and goes on to say that "owing to the small size of the air-vessel it yields but a small quantity of isinglass, the quality of which, however, is considered very good."

Food:—From an examination of the stomachs of Pinang examples the same author concludes that its principal food supply was drawn from smaller fishes and crustaceans.

Range:—From the East Coast of Africa, Madagascar, and South-Western Arabia, through all the Seas of India to those of Siam, Southern China, the Malay Archipelago, and the East Coast of Queensland.

Dimensions:—Attains a length of 800 mm.

Illustration:—Taken from one of the specimens described above.

ATRACTOSCION Gill.

Atractoscion Gill, Proc. Acad. Nat. Sci. Phila., 1862, p. 18 (*æquidens*).

Body elongate-elliptical, compressed. Scales small and adherent. Lateral line forming a long gentle curve to the caudal peduncle. Head conical, with rather long pointed snout and narrow preorbital, almost wholly scaly. Mouth terminal, with very wide oblique cleft, the lower jaw projecting. Teeth in the jaws in cardiform bands, without canines, the lateral mandibular teeth the strongest. Eyes small and anterior. Preopercle feebly denticulated in small, entire in large, examples; opercle with two weak spines. Two dorsal fins with x, i 27 to 31 rays, the spines slender and flexible, the soft dorsal lower but much longer than the spinous. Caudal fin lunate. Anal short, with ii 8 or 9 rays, the spines feeble. Pectoral pointed. Ventral inserted below the pectoral-base. Pseudobranchiæ present. Pyloric appendages in small number. (ἄτρακτος, a spindle; *Sciæna*, an allied genus.)

Shore-fishes of large size from the Coasts of South-Eastern Australia and South Africa. Like their relatives, the Jewfishes, which they closely resemble in appearance and habits, they are noted for their voracity, but unlike them they confine their depredations to the more open waters of bay and beach. Both species are held in high estimation for the table.

I am not altogether satisfied as to the generic position of the Australian fish. Waite very rightly removed it from the genus *Otolithus*, with which it has only an external affinity, but in referring it to *Cynoscion*[24] he has, I conceive, made an equally grave mistake. That genus, according to its author and all those who follow Gill's splendid constructional work, invariably possesses a pair of canines in the upper jaw, though they may be small as in *C. nobilis*[15] and its allies. In our fish there are no canine teeth in either jaw at any stage of existence. Being, however, reluctant to establish a new genus for our Australian fish, in a family already overweighted with small genera, I propose to resuscitate

[24] Gill, Proc. Acad. Nat. Sci. Phila., 1862, p. 18. Type *Johnius regalis* Schneider.

Gill's genus *Atractoscion*, thus associating in a natural group our fish with the *Otolithus æquidens*[25] of the Cape Seas, and removing from that genus all the species of *Cynoscion* included by Jordan and Evermann under the subgeneric title *Atractoscion*,[26] which, having canine teeth in the upper jaw, manifestly can not be associated with fishes which have the "teeth cardiform and pluriserial" without canines in either jaw.

ATRACTOSCION ATELODUS (Günther).

Otolithus atelodus Günther, Ann. & Mag. Nat. Hist. (3) xx, 1867, p. 60; Woods, Fish. & Fisher. N. S. Wales, 1882, p. 54, pl. xvii; Ogilby, Catal. Fish. N. S. Wales, 1886, p. 24; id., Edib. Fish. N. S. Wales, 1893, p. 75, pl. xxiii.

Otolithus teraglin Macleay, Proc. Linn. Soc. N. S. Wales, v. 1880, p. 48.

Cynoscion atelodus Waite, Synops. Fish. N. S. Wales, 1904, p. 31; Stead, Fish. Austr., 1906, p. 113; id., Edib. Fish N. S. Wales, 1908, p. 67, pl. xxxviii; Roughley, Fish Austr., 1916, p. 115, pl. xxxvi.

TERAGLIN.

Type localities:—Australia (*O. atelodus*).
Sydney Market (*O. teraglin*).

Body slenderly elliptical and compressed, the ventral contour much more arched than the dorsal, which is but gently rounded from the occiput to the peduncle, its depth about one fourth of its length and a little less than the length of the head. Abdomen long, its length from ventral-base to vent 2·25 in that of the body and four fifths more than the space between the vent and the root of the caudal. Caudal peduncle about one third longer than deep, its least depth 3·6 in the length of the head. Head with the upper profile linear or feebly emarginate, its length 3·5 to 3·67 in that of the body. Snout slightly blunt anteriorly, its length 3·67 in that of the head. Eye small, its diameter 1·5 to 1·67 in that of the snout, and 5·8 to 6·25 in that of the head. Preorbital narrow, its width about one half of the eye-diameter. Interorbital region rather wide and convex, its width from one third to one half more than the eye-diameter and 4·12 to 4·38 in the length of the head. Nostrils moderately approximate, pierced in a naked groove directly in front of the eye, the anterior small and circular, the posterior elongate-oval and vertical. Lower jaw projecting; cleft of mouth wide and but little oblique, rising to the level of the middle of the eye. Maxillary extending to below or a little beyond the hinder border of the eye, its length 2 to 2·25 in that of the head, the width of its rounded distal extremity nearly equal to the eye-diameter. Preopercle rounded, the vertical limb and angle with a few small slender distant teeth, which usually disappear with advancing age; opercle with two feeble spines.

Premaxillary teeth in a villiform band, broadest in front, and a symphysial patch of much stronger recurved cardiform teeth, and with one or two rows of stout teeth along each side; mandible with a large anterior patch of teeth

[25] Cuvier & Valenciennes, Hist. Nat. Poiss., v, 1830, p. 66.
[26] Fish. North & Mid. Amer., pt. 2, 1898, pp. 1413 to 1415 incl.

similar to that of the premaxillaries, and two lateral series, the inner of which contains the strongest teeth in either jaw.

Scales small and cycloid, in 74 to 77 series above the lateral line, in 16/1/33 below the first dorsal.

Dorsal fins with x, i 29 to 31 rays, the first originating slightly behind the opercular flap, the last spine united to and not much shorter than that of the soft dorsal; spines slender and flexible, the first very small, the fourth the longest, 2·5 to 2·75 in the length of the head, and 2 to 2·2 in its base, which is 1·5 to 1·67 in that of the second dorsal, the rays of which increase very gradually in length to about the seventeenth, which is 1·33 in the fourth spine and 3·67 in the length of the head; length of base 2·67 in that of the body. Caudal fin lunate, the lobes equal and pointed, the upper 4·33 to 4·67 in the body-length. Anal inserted posteriorly, with ii 9 rays, originating below the nineteenth or twentieth dorsal ray, the spines short and weak, the second rather more than half the length of the first ray, which is the longest and somewhat less than the length of the head; base of anal about two ninths of that of the second dorsal. Pectoral short and pointed, with 19 rays, its length 1·6 to 1·9 in the length of the head, and extending to below the eighth dorsal spine. Ventral inserted below the pectoral-base and a little shorter than that fin, the outer ray the longest, 1·86 to 2 in the length of the head, and reaching about one third of the distance between its origin and the vent.

Upper surface and sides silvery, the former with bluish reflections; throat and abdomen white. Cheeks washed with gold; inside of mouth and inner edge of opercle orange; irides golden. Dorsals yellowish gray, with darker spots at the base; caudal greenish yellow, with the outer edges and the tips darker; anal silvery, the anterior rays clouded; pectorals gray, with a black spot in and behind the axilla; ventrals pink.

Described from several specimens obtained in the Sydney Market. The above is a rearrangement of my original description (Ogilby 2), with which are embodied a number of fugitive notes taken at various times.

Remarks:—The Teraglin is universally admitted to be one of the most delicious of the food-fishes of New South Wales, in this respect far outrivaling its relative the jewfish at any stage of the latter's existence. In connection with this Stead remarks—"It is looked upon as a fine edible fish, and when more is learnt in regard to its movements it will probably be numbered among our most important food-fishes." Roughley tells us that "the supply of this fish to the markets is considerably less constant than that of the Jewfish owing to its habit of dwelling in water too deep for the fishermen's nets. Still in spite of this there is a fairly big supply, the catches of the line fishermen being often forwarded for sale." It is a most voracious fish, and will greedily snatch at almost any ordinary fish bait, such as mullet or shark, while squid seems to be irresistible; but among its good qualities must be placed that it does not ascend rivers to the same extent that the jewfish does, and is not, therefore, so great a pest to the estuarine and fluviatile nursery grounds.

Reproduction:—As regards this important phase of its life-history nothing seems to have been learnt since I wrote the following twenty-five years ago—"The difficulty of formulating any general rule as to the breeding season of our marine fishes, and especially of those which, like the present species and the jewfish, are confirmed wanderers, is well exemplified by the examination of several specimens recently obtained in the market, which led to the following results:—During the earlier part of September examples, forwarded for sale to the Sydney Market from Lake Macquarie, were found to be in an advanced stage of spawning, the ova being almost fully developed, whilst in others, taken in Port Jackson during the following November, the contents of the ovaries were not more than half developed." As with the jewfish the spawning grounds are quite unknown, but it is probable that the ova are pelagic and are shed in the open sea. "The whereabouts and manner of life of the young fishes are equally unknown, all we can be certain of being that they appear from seaward in large shoals during the late winter and the spring months, varying at this time from one to three feet in length, the smaller fishes usually preceding their more mature brethren."

Range:—So far as is known the Teraglin is confined to the coast of New South Wales.

Dimensions:—Attains a length of 900 mm., but the ordinary market size is 600 mm. and under.

SCIÆNA Artedi.

Sciæna (Artedi) Linnæus, Syst. Nat. ed. 10, 1758, p. 289 (*umbra*); Day, Fish. India, pt. 2, 1876, p. 184; Ogilby, Edib. Fish. N. S. Wales, 1893, p. 72; Jordan & Thompson, Proc. U. S. Nat. Mus., xxxix, 1911, p. 244.

Johnius Bloch, Ichthyol., x, 1793, p. 107 (*carutta*); Cantor, Catal. Malay. Fish., 1850, p. 64.

Bola Buchanan, Fish. Ganges, 1822, p. 78 (*coitor*).

Corvina Cuvier, Règne Anim., ed. 2, ii, 1829, p. 173 (*nigra*); Boulenger, Catal. Fr. Wat. Fish. Afr., iii, 1915, p. 115.

Argyrosomus de la Peglaie, Compt. Rend., 1835, p. 534 (*aquila*).

Cheilotrema Tschudi, Faun. Peru., Fisch., 1845, p. 13 (*fasciatum*).

Rhinoscion Gill, Proc. Acad. Nat. Sci. Phila., 1861, p. 85 (*saturnus*).

Pseudosciæna Bleeker, Nederl. Tijds. Dierk., i, 1863 (*aquila*); fide Jordan & Thompson, ibid.; id., Arch. Néerl. Sci. Nat., xi, 1876, p. 329.

Pseudotolithus Bleeker, Nat. Verh. Holl. Maatsch. Wet (2) xviii, p. 59 (*typus*).

Callaus Jordan, Rep. U. S. Fish. Comm., 1889, p. 395 (*deliciosus*).

Nibea Jordan & Thompson, ibid., p. 246, subgenus (*mitsukurii*).

Othonias Jordan & Thompson, ibid., subgenus (*manchurica*).

Pseudomycterus Ogilby, Proc. Roy. Soc. Queensl., xxi, 1908, p. 84[27] (*maccullochi*).

Body elongate-elliptical to subovate, more or less strongly compressed. Scales moderate or small, usually adherent. Snout variously formed, with conspicuous slits and pores; chin usually porigerous. Cleft of mouth moderate or rather small, low and usually oblique, rarely rising to the level of the eye.

[27] For notes on the synonymy see Jordan and Thompson, *ut supra.*

Jaws with bands of villiform teeth, the outer and inner rows more or less enlarged. Dorsal fins separated by a notch, the first of nine or ten flexible spines, the second with i 22 to 33 rays. Caudal fin varying with age. Anal short, with ii 6 to 9 rays, the second spine varying from weak to very strong. Pectoral pointed, with 16 to 19 rays. Gill-rakers in small number, short and stout. (*σκίαινα*, the Greek name for a Mediterranean species.)

A large genus, composed of fishes very variable in size and appearance, inhabiting nearly all warm seas, and of considerable economic importance.

Key to the Australian Species.

a^1. Second anal spine short and weak.
  b^1. Snout more or less pointed.
    c^1. Preorbital and interorbital region narrow, the former about 2·5 in the eye-diameter, the latter about 5·25 in the length of the head .. .. .. 1. *antarctica.*
    c^2. Preorbital and interorbital region wider, the former about 1·5 in the eye-diameter, the latter about 3·75 in the length of the head .. .. .. 2. *australis.*
a^2. Second anal spine strong.
  d^1. Snout swollen; second anal spine rather short, about one-third of the length of the head .. .. 3. *novæ-hollandiæ.*
  d^2. Snout not swollen; second anal spine long, about half the length of the head.
    e^1. Body subovate, its depth more than one third of its length .. .. 4. *soldado.*
    e^2. Body elliptical, its depth less than one third of its length.
      f^1. Soft rays of dorsal 24 or 25 .. .. 5. *albida.*
      f^2. Soft rays of dorsal 31 .. .. 6. *leptolepis.*

SCIÆNA HOLOLEPIDOTA ANTARCTICA Castlenau.

(Plate XXI.)

Sciæna aquila McCoy, Rep. Melb. Intern. Exhib., 1866, p. 317; Ogilby, Edib. Fish. N. S. Wales, 1893, p. 72, pl. xxii; Zietz, Trans. Roy. Soc. S. Austr., xxvi, 1901, p. 266.

Sciæna antarctica Castelnau, Proc. Zool. & Acel. Soc. Vic., i, 1872, p. 100; Macleay, Proc. Linn. Soc. N. S. Wales, v, 1881, p. 520; Woods, Fish & Fisher. N. S. Wales, 1882, p. 53, pl. xvi; Stead, Fish. Austr., 1906, p. 113, fig. 42; id., Edib. Fish. N. S. Wales, 1908, p. 66, pl. xxxvii; Ogilby, Commer. Fish. & Fisher. Queensl., 1916, p. 23; Roughley, Fish. Austr., 1916, p. 112, pl. xxxv.

Sciæna aquila? Castelnau, Proc. Linn. Soc. N. S. Wales, ii, 1878, p. 232; id., ibid., iii, 1879, p. 381.

Corvina axillaris de Vis, Proc. Linn. Soc. N. S. Wales, ix, 1884, p. 538.

Sciæna neglecta Ramsay & Ogilby, Proc. Linn. Soc. N. S. Wales, xi, 1886, p. 941.

JEWFISH.

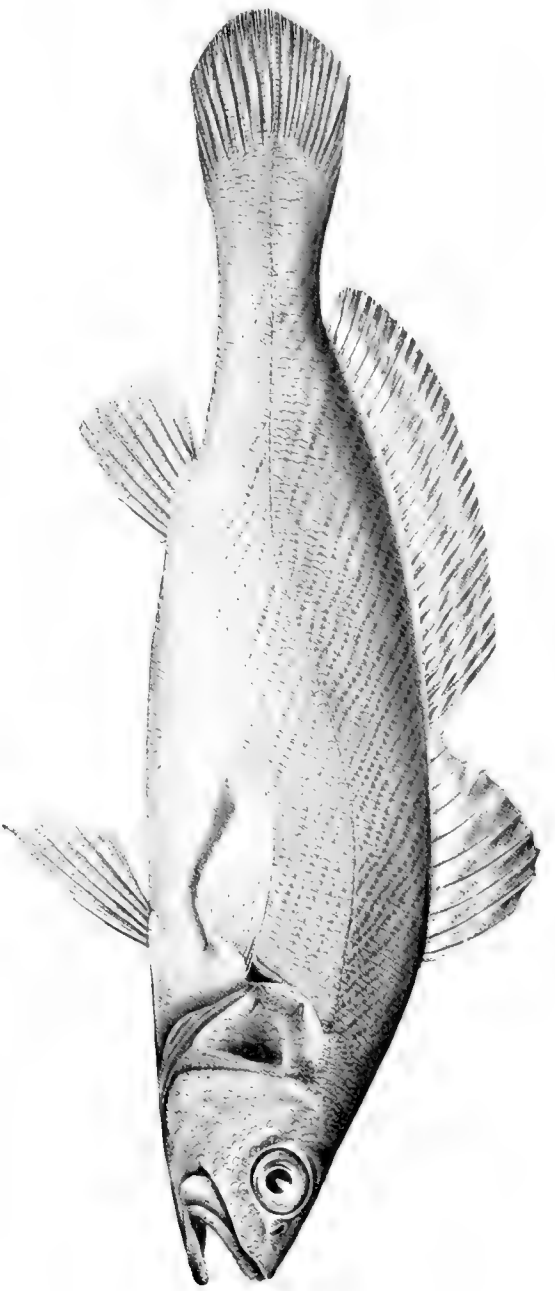
Kingfish (Melbourne and Adelaide); Jewfish (Sydney and Brisbane)[28]; Silver Jew (young at Sydney); Mulloway (Aborigines of the Lower Murray).

Type localities:—Bass Strait (*S. antarctica*).
Brisbane River (*C. axillaris*).
Broken Bay (*S. neglecta*).

Body elliptical and compressed, moderately robust, the dorsal contour much more arched than the ventral, which is nearly linear from the isthmus to the anal fin, its width rather more than half its depth, which is 3·4 to 3·9 in its

[28] Sometimes erroneously written "dewfish."

QUEENSLAND FISHES.



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SCIÆNA ANTARCTICA Castelnau.

length and equal to or somewhat less than the length of the head. Abdomen moderate, its length from ventral base to vent 3·28 to 3·37 in that of the body and 1·25 to 1·33 in the space between the vent and the root of the caudal. Caudal peduncle a little longer than deep, its least depth 2·8 to 3 in the length of the head. Head about one half deeper than wide, its upper profile linear or feebly concave, that of the nape gently rounded, its width 2 to 2·25 in its length, which is 3·25 to 3·4 in that of the body. Snout pointed, with scarcely a trace of anterior gibbosity, its profile moderately acclivous, its length 3·5 to 3·63 in that of the head. Diameter of eye one fourth to three fifths less than the length of the snout and 4·44 to 5·5 in that of the head. Preorbital narrow, its least width 2·5 to 2·75 in the eye-diameter. Interorbital region of moderate width and convex, equal to or a little less than the eye-diameter, and 5 to 5·33 in the length of the head. Nostrils approximate, the posterior much the larger and situated directly in front of the inferior moiety of the upper half of the eye. Upper jaw slightly overhanging; cleft of mouth oblique, rising to well above the lower border of the eye; maxillary smooth, extending to below or a little beyond the hinder border of the pupil, its length 2·4 to 2·5 in that of the head, the width of its undulous hinder border about half of the eye-diameter. Preopercle with the angle and hinder limbs sparsely serrated, the serræ disappearing with age; opercle with two flexible points; posttemporal feebly crenulate.

Upper jaw with a band of small teeth, triserial in front, narrowing to uniserial behind, and an outer row of strong, hooked, widely set, subulate teeth, of which the second anterior tooth on each side is the largest; lower jaw with a similar band, but the outer is enlarged anteriorly only, while laterally the inner row is similarly enlarged and subulate.

Scales of body small and finely ctenoid, in 85 to 90 series above the lateral line, in 11 or 12/1/19 to 21 below the spinous dorsal; scales of head, except those of the opercle and occiput cycloid; only the tip of the snout, preorbitals, and chin naked; on the body they are arranged in oblique rows both above and below the lateral line, except on the breast. A single series of scales forms a sheath at the base of the soft dorsal, and another series of smaller scales covers fully one half of the membrane between the rays; small scales cover the basal two thirds of the caudal, and the bases of the anal and pectoral fins are sparsely scaly. Lateral line forming a long gentle curve to below the middle of the soft dorsal, thence horizontal and extending to the tip of the caudal fin, the tube-bearing scales 51 to 54, the tubes, which do not quite reach to the border of the scale, each provided with several ascending and descending tubules of varying length. Tip of snout with a pair of median pores arranged longitudinally, and two lateral pores on each side; mandibular pores arranged in three pair, the anterior pair being the smallest and round, the others increasingly apart and slit-like.

Dorsal fins with x, i 27 or 28 rays, the first originating above the pectoral-base, the last spine partly united to but much shorter than that of the soft

dorsal; spines weak and flexible, the third or fourth the longest, 2 to 2·4 in the length of the head and 1·33 to 1·5 in the length of the base, which is 1·9 to 2·1 in that of the second dorsal, the rays of which, except the last two or three, are nearly equal in length, one ninth to one fourth lower than the longest spine, and 2·4 to 2·57 in the length of the head; length of its base 2·37 to 2·6 in that of the body; last ray, like that of the anal, divided nearly to its base. Caudal fin varying with age from obtusely cuneiform to truncate, its length 4·4 to 5·25 in that of the body. Anal with ii 7 rays, originating below the tenth dorsal ray, the spines short and weak, the second 3·5 to 4 in the length of the head and 1·67 to 1·9 in the first ray; base of anal 5 to 5·25 in that of the second dorsal. Pectoral pointed, with 17 rays, the fifth and sixth the longest, 1·4 to 1·55 in the length of the head, and extending to below the tenth dorsal spine. Ventral inserted a little behind the pectoral-base, its length a little more in the young to a little less in the adult than that fin, the first ray longest and terminating in a short filament, which disappears with age.

Gill-rakers short and moderately stout, 4 + 9 and some rudiments on the anterior arch, the longest about two fifths of the eye-diameter. Air-bladder with numerous fringed processes on either side. Eight pyloric cæca.

Steel-blue above in the young, becoming dark gray-blue or grayish brown in large examples, shading through the silver-gray of the sides to the pure white of the throat and abdomen; the young usually with narrow oblique bars directed obliquely upwards and backwards, and following the borders of each row of scales above the lateral line, and sometimes with a few horizontal series of obscure spots below it; a large blackish axillary blotch. Head rather less brilliantly tinted than the back, the sides suffused with gold; inside of mouth and inner border of opercles orange. Fins grayish or grayish brown, except the ventrals, which are white. (*Antarctica*, belonging to the south.)

Described from seven examples, measuring between 277 and 525 mm. in total length, all obtained in Moreton Bay and the Brisbane River.

Historical.—Our jewfish is the Australian representative of the European "maigre" (*Sciæna hololepidota*), an important food-fish of the Eastern Atlantic, which ranges northward to the southern shores of the British Isles and southward to the Cape of Good Hope, round which it passes, ascending the East African Coast to Natal, and branching off thence to Mauritius, from which Commerçon obtained the specimen, the description and figure of which were afterwards reproduced by Lacépède under the name of *Labrus hololepidotus*. With this species our fish is so closely allied that it does not seem advisable to consider it as of higher than subspecific rank, if even it be entitled to so much consideration. The first intimation, which I can find, of the presence of this noble fish in Australian waters comes, strangely enough, from Victoria, where it is only a rare and occasional visitor, Prof. McCoy having, under the name of *S. aquila*, placed on record the capture of an example in those seas in his "Notes on the Zoology of Victoria," published in the Reports of the Melbourne International Exhibition, 1866. Castelnau, however, six years later separated the

Australian from the Atlantic fish giving to the former the name of *S. antarctica*, by which it is generally known at the present time, but it must be confessed that he does not give any very convincing reasons for his action. His decision was based on a single large specimen, fifty-seven inches long, captured in Bass Strait, where, he says, it seems to be an accidental visitor, appears exclusively in the colder months, and only of a very large size. Subsequently, influenced by McCoy, he reverts to the name *S. aquila*, and states that, during a six years' residence in Melbourne, he had only seen two examples, "both of enormous size, weighing about eighty pounds" apiece. And just here we come upon the first of the fascinating mysteries, which enshroud the history of the jewfishes in these waters; the others will disclose themselves in due course. In his paper last referred to Castelnau, writing in 1878 of a recent visit to Brisbane, states that he "was astonished to find that a *Sciæna* was amongst the most common fishes of Moreton Bay, and is considered the best edible fish of the country. It is called Dewfish, because of its beautiful silvery gray colour"; and further on he writes "It attains the weight of fifty pounds. During my stay in the months of June and July, numerous specimens of all sizes were caught every day; the great majority were of a foot long or even less." My first impression, on reading these lines, was that Castelnau, like so many others after him, had confounded the little Brisbane River "perch" (*S. australis*) with the young of the true jewfish, but after intimate conversations with several old Brisbane anglers with thirty to forty years' experience of the river, I am convinced that by so doing I would have made a serious mistake and that the small fishes, to which Castelnau refers, were in very truth the young of the large jewfish. Regarding this Mr. J. Trevethan, who is supported by all the older angling identities, kindly writes to me as follows:—"On the first appearance of these fishes in the upper reaches[29] they were of from one pound to six pounds in weight, and were to be caught in such large numbers that one could hardly get rid of them, even as gifts to friends, so common were they. I have known as many as sixty or seventy of these fishes to be creeled by a single angler in a very short space of time, by which you may judge what jewfishing was like in those days. Later on a second run of these fishes commenced, those composing it being of a much larger size, varying in weight from ten to over fifty lb." The largest jewfish Mr. Trevethan was at the catching of weighed fifty-seven lb. after it had been cleaned. As a further instance of their abundance before the great flood of 1893 he states that "even the prawners used to catch them in their nets up to thirty lb. weight, and were glad to get rid of them for a couple of shillings after carrying them from one restaurant to another before they could get a purchaser."

Uses:—As a foodfish this species is of considerable importance, although there is at present no regular fishery for it, most of those which appear in our shops being taken by hook. Up to 25 lb. weight it is an excellent table fish, but beyond that it becomes coarse and somewhat rank. However, as it

[29] Mr. Trevethan is alluding to the river reaches from the Dry Dock in Brisbane to above the railway bridge at Indooroopilly.

takes salt well, the larger examples might be preserved by that process, and if the fishery were developed on more business-like lines, they would in time take the place of the vastly inferior imported article, more especially because, as remarked by Mr. Welsby, they do "not become rancid and strong by long keeping as other varieties do."[30] An accessory product of the jewfish, which is totally neglected by our fishermen, is the large, fringed air-bladder; though these require but little care, beyond drying, in their preparation for the market, and are of considerable importance in the manufacture of isinglass, they are invariably thrown away as worthless in these States.

Food:—Nothing that it can master comes amiss to this cunning, powerful, and voracious prowler, for though the bulk of its food consists of other fishes, it also consumes large quantities of cephalopods, crustaceans, and the like. Being gregarious it is very destructive to spawning fishes, and especially to the sea mullet, rounding them up in shallow water, and when they are thus huddled together making savage and concerted assaults on the massed shoals, killing and maiming many more than they are able to consume, carried away apparently by the lust of slaughter for slaughter's sake. It follows its prey into the estuaries, and even ascends rivers far beyond the influence of the tide. Mr. Welsby records the occurrence of specimens from the basin at Ipswich.

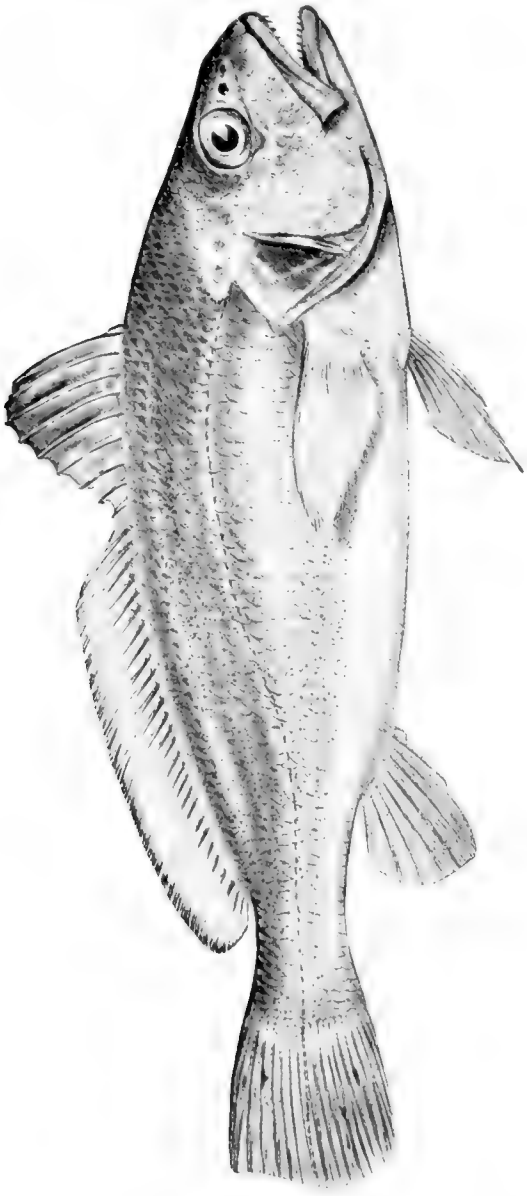
Range:—Shores and estuaries of Temperate Australia. On the Queensland Coast I do not know certainly of its occurrence further north than the Mary River, while during the six weeks' researches carried out by the Endeavour in our waters it only occurred on one occasion, when two large examples were taken by hook and line at the Wolf Rock. As we proceed further south it rapidly becomes more abundant and is, as has been shown, a common fish in the Moreton district. Regarding this Mr. Welsby writes—"Jewfish of large size come in from sea in attendance upon the schools of whiting in the months of September and October, and are caught both by the line and in nets up to 60 or 70 lb. in weight, but these extra large ones do not appear to go very far up the Bay." It is abundant everywhere along the coastline of New South Wales where, according to Stead (2) it "is, at present, one of our most important food-fishes, and it is likely in the future to be of still greater value, as the demand for it is constantly increasing, while our resources, as far as its supply is concerned, are but just tapped." Further south it is reported to be rare on the coasts of Tasmania and Victoria; possibly this may be due to the absence of large rivers, the estuaries of which it loves to frequent, for passing westward we learn from Zietz that it "is sometimes found in great numbers" in the Lower Murray, where it goes by the native name "mulloway." Fraser includes it in his list of West Australian Fishes, but nothing is known as to its distribution or abundance in that State.

Dimensions:—Attains a weight of 125 lb. with a length of over 6 ft., but the usual run of market fish is under 30 lb.

Illustration:—Taken from a young specimen, 275 mm. long, in the collection of the Queensland Museum; Reg. No. I. 2893.

[30] Schnappering, p. 80.

QUEENSLAND FISHES.



Sciæna australis (Günther). ⅓ Nat. Size.

Phyllis F. Clarke, del.

Face page 75.

SCIÆNA AUSTRALIS Günther.

(Plate XXII.)

Corvina australis Günther, Zool. Challenger, i, 1880, Shore Fish., p. 33.

Corvina canina de Vis, Proc. Linn. Soc. N. S. Wales, ix, 1884, p. 538.

LESSER JEWFISH.

The "Perch" of the Brisbane fishermen; Little Jew-Perch.

Type localities:—Mary River at Tiaro (*C. australis*).
Brisbane River (*C. canina*).

Body elliptical and compressed, somewhat robust, the dorsal contour rather more arched than the ventral, which is nearly linear from the isthmus to the anal fin, its width 1·62 to 1·77 in its depth, which is 3·25 to 3·5 in its length and equal to or a little less than the length of the head. Abdomen short, its length from ventral-base to vent one third of that of the body and a little less than the space between the vent and the root of the caudal. Caudal peduncle one third longer than deep, its least depth 3·22 to 3·43 in the length of the head. Head about one third deeper than wide, its fronto-occipital profile feebly concave, that of the nape as feebly convex, its width 1·7 to 1·88 in its length, which is 3·17 to 3·33 in that of the body. Snout pointed, its profile linear and moderately acclivous, forming with the frontal region a slight protuberance in front of the upper border of the eye, its length 3 to 3·25 in that of the head. Diameter of eye about two fifths less than the length of the snout and 4 to 4·67 in that of the head. Preorbital deep, its least width 1·33 to 1·55 in the eye-diameter. Interorbital region wide and convex, its width about one fifth more than the eye-diameter and 3·6 to 3·86 in the length of the head. Nostrils approximate, the posterior much the larger and situated directly in front of the middle of the eye. Upper jaw slightly projecting; cleft of mouth oblique, but not quite rising to the level of the eye; maxillary extending to below the middle of the eye, its length 2·33 to 2·44 in that of the head, the width of its obliquely truncate distal extremity five ninths of the eye-diameter. Preopercle armed with well-developed but slender spines; opercle with two short blunt points; posttemporal bordered with membranous crenulæ.

Premaxillaries with a triserial band of minute teeth, and an outer row of about thirteen much larger subulate teeth, which decrease in size from the front; mandible with an outer row of small curved teeth and an inner row of about ten enlarged teeth, which are longest mesially and gradually decrease thence to the front and rear, but are nowhere so long or strong as the anterior premaxillary teeth; roof of mouth and tongue smooth.

Scales of body moderate and finely ctenoid, in 54 to 56 series above the lateral line, in 9/1/16 to 18 below the spinous dorsal; scales of head cycloid; only the tip of the snout and the chin naked; on the body they are arranged in regular oblique rows both above and below the lateral line, except on the breast and

caudal peduncle. Two or three series of small elongate scales form a sheath at the base of the soft dorsal, the interradial membrane of which is almost completely covered by more or less acuminate minute scales directed outwards; base of caudal scaly, smaller scales extending between the rays to about two thirds of the length of the fin; basal half of anal, pectorals, and ventrals scaly. Lateral line following the curvature of the back to about the middle of the soft dorsal, beyond which it runs straight to the extremity of the caudal fin; tube-bearing scales 48 to 50, the tubes, which do not extend to the border of the scale, each with an ascending and a descending tubule. An arcuate band of three open pores on the snout anteriorly; seven pores across the chin forming two transversely crescentic series, the three anterior small and rounded, the outer pair of the hinder series much the largest and round, the inner pair small and slit-like.

Dorsal fins with x, i 29 to 31 rays, the first originating above the tip of the bony opercle, the last spine basally united to and but little shorter than that of the soft dorsal; spines weak and flexible, the third the longest, scarcely longer than the fourth, 2·1 to 2·28 in the length of the head and 1·2 to 1·37 in the length of its base, which is about 2·2 in that of the second dorsal, the rays of which, except the last three, are of nearly even length, the postero-median ones somewhat the longest, about one third less than the third spine, and 2·8 to 3·1 in the length of the head, the last ray, like that of the anal, divided nearly to its base; base of soft dorsal 2·37 to 2·55 in the body-length. Caudal fin obtusely cuneate or rounded, its length 4·84 to 5·28 in that of the body. Anal with ii 7 rays, originating below the thirteenth dorsal ray, the spines short and weak, the second 3·67 to 4·1 in the length of the head and 1·6 to 1·8 in the first ray; base of anal 5 to 5·38 in that of the second dorsal. Pectoral pointed, with 17 rays, the sixth the longest, 1·33 to 1·5 in the length of the head, and extending to below the anterior dorsal ray. Ventral inserted below and behind the lower angle of the pectoral-base and about one ninth shorter than that fin, the first ray the longest and terminating in a short filament.

Gill-rakers short and slender, 6 or 7 + 12 or 13 with some rudiments on the anterior arch, the longest about three tenths of the eye-diameter. Lower pharyngeals separate, each with three very strong subulate teeth on its inner anterior angle. Air-bladder pointed posteriorly, with a few simple papilliform appendages on each side.

Silver-gray above, shading through the pure silver of the sides to the pearly white of the breast and belly; all the upper and lateral scales are densely powdered with dusky dots, which are so crowded in places as to form four broad longitudinal darker gray bands, two above and two below the lateral line; most of the scales of the breast and belly with a marginal series of from three to five copper-colored dots; nape purplish brown, forming a triangular blotch on each side. Upper surface of head dark brown, separated from the nuchal collar by a silvery band; sides and lower surface silvery; inside of mouth golden. Dorsal, caudal, and pectoral fins gray, the spinous dorsal so closely dotted as to obscure

the ground-color, becoming gradually darker from the base upwards, so that the outer third appears blackish; soft dorsal with the dots much less crowded, only a narrow marginal and a suprabasal band appearing blackish; tips of caudal rays blackish; a small dark spot in and behind the pectoral-axil; anal and ventrals white.

Described from twelve examples, measuring 188 to 276 mm., taken in the upper reaches of the estuary of the Brisbane River by Mr. J. H. Hamson, and kindly given by him to me for the purposes of this paper.

Historical:—Our earliest description of this species comes from Dr. Günther who, in his Report on the Shore Fishes of the Challenger Expedition, shortly described two specimens taken in the neighborhood of Tiaro, a settlement on the upper reaches of the Mary River Estuary. Subsequently de Vis redescribed the fish as *Corvina canina*, the description, like that of Dr. Günther, being of little value as a means of identification. The life history of this little Jewfish is interesting in that it is surrounded by a cloud of mystery. None of the specimens which I have examined showed milt or ova in anything but the earliest stage of development, nor has inquiry from many of our local anglers, who have been catching the fish for years, elicited evidence contrary to my own experience; where and how the spawn is deposited or shed is, therefore, a matter of conjecture, some of our best known experts holding that the "perch," like the salmon, makes its way into the upper reaches of the river for the purpose of depositing its spawn, and this having been accomplished retires to recuperate in the deeper waters of the bay. A few even assert that having left the estuary, and gained the shallower fresh waters of the river sources, they remain there and spawn during the summer months, only dropping down into brackish water on the advent of autumn. I can not, however, find the slightest evidence in support of this view, even its advocates acknowledging that there is no reliable record of its capture under such conditions. The majority of our anglers, however, believe that, like its congener, *S. antarctica*, it merely resorts to the estuaries during the winter and spring months in search of the food which it finds there plentifully, and that, having gained by the latter part of its sojourn therein the highest condition, it then retires to the deeper parts of Moreton Bay or even to the open sea for the purpose of spawning. With this view I am inclined to agree.[31] Again in some years it is exceedingly abundant in all the rivers flowing into Moreton Bay, while in others, where the circumstances are to all appearances equally favorable, it only appears in limited numbers, or even in rare cases puts in no appearance. As to the causes which induce this remarkable variation from year to year no one has as yet given any adequate explanation. The following notes, referring to the Brisbane River, condensed from a letter kindly written for

[31] Since writing the above I have received, through the kindness of Mr. R. Illidge, a young example, measuring 67 mm., taken at Bulimba; this goes far to prove that, like the majority of our edible fishes, this species spawns near the mouths of rivers, and the young, as with mullet, whiting, bream, etc., seek the shallow water at the edges of the estuaries for protection from their enemies.

me by Mr. J. H. Hamson, and fully endorsed by Mr. J. Trevethan, both perch-fishers of many years' experience, give practically all the definite information that is known about this species. Mr. Hamson writes:—

"With regard to the fish commonly called 'perch,' there appears to be some difference of opinion amongst anglers as to whether they make their first appearance for the season from the bay or from the upper reaches of the river. For the last two seasons I have caught the first examples early in March (this year on the 4th, in the Hamilton Reach), and the first good catches are usually made in the Newstead and Mowbray Park Reaches of the river, and gradually the fish travels higher up. On the 20th of last March, while fishing in the reach near the South Brisbane Cemetery, I was told by two old residents of the district that 'the perch had not *got up* that far yet.' They, of course, arrived later on, and are even now (Sept. 18) fairly plentiful in the upper reaches, for no later than yesterday a friend and I caught 86. It would be interesting to know where they go during the summer months; do they go out to sea again? or do they remain in the upper reaches? They evidently travel at times in large schools, and at times bite very freely, 'doubles' being a common occurrence. It is nothing unusual for a party of three or four anglers to return after a night's fishing with a catch of about 200. One can never be quite sure at what time they will bite freely; sometimes they are at their best just before and after slack water; at other times the running tide seems to suit them best; while generally they feed more freely during the night."

Finally there is another remarkable circumstance connected with these fishes which, were it not vouched for by numbers of our most reliable anglers, appears well-nigh incredible. It is that prior to the great flood of March, 1893, which overflowed all the low-lying lands along the banks of the Brisbane River, and caused great destruction of life and property, this little jewfish was unknown in the river, its place being taken by the "golden jew," a fish of a bright yellow color, which now occurs only singly and at long intervals. Following the subsidence of the waters after the 1893 flood, the present species appeared.

Uses:—Opinions differ as to its value as a foodfish; personally I consider it as a well-flavored and pleasant addition to the menu of the breakfast table.

Food:—By common consent prawns are acknowledged to be the most favored bait for the perch, but they will also take a fish or fowl-gut bait.

Range:—This is one of those species of jewfishes which have a very limited range. I have notes of its capture at Nerang Creek, Southport Pier, Coomera and Logan Rivers, Cleveland Jetty, Brisbane River, Doughboy Creek, Sandgate Pier, Pine River, and Bribie Island, all in the Moreton Bay District and, as before mentioned, in the Mary River at Tiaro.

Dimensions:—Never or very rarely exceeds 300 mm.

Our illustration is taken from a specimen in the Queensland Museum. Reg. No. I. 2890.

QUEENSLAND FISHES.

SCIÆNA NOVÆ-HOLLANDIÆ Steindachner. ⅓ Nat. Size.

Phyllis F. Clarke, del.

Face page 79.

SCIÆNA NOVÆ-HOLLANDIÆ Steindachner.

(Plate XXIII.)

Sciæna (Corvina) novæ-hollandiæ Steindachner, Sitz. Akad. Wien, liii, 1866, i, p. 445, pl. v, fig. 2.

? *Johnnius novæ-hollandiæ* Bleeker, Verh. Akad. Amst., xiv, 1874, Sciæn., p. 44; id., Atlas Ichth., viii, 1876, pl. ccclxxxvii, fig. 2.

Corvina comes de Vis, Proc. Linn. Soc. N. S. Wales, ix, 1884, p. 538.

Pseudomyctcrus macculloclii Ogilby, Proc. Roy. Soc. Queensl., xxi, 1908, p. 96.

BOTTLENOSE JEWFISH.

Type localities:—Port Jackson, N.S.W. (*S. novæ-hollandiæ*).
Brisbane River, S.Q. (*C. comes*).
Logan River, S.Q. (*P. macculloclii*).

Body elliptical and robust, the dorsal contour much more arched than the ventral, its width 1·7 in its depth, which is 3·28 in its length and a little more than the length of the head. Abdomen moderate, its length from ventral-base to vent 3·25 to 3·4 in that of the body and 1·28 in the space between the vent and the root of the caudal. Caudal peduncle a little longer than deep, its least depth 2·75 in the length of the head. Head two ninths deeper than wide, its upper profile and that of the nape linear and moderately acclivous, its width 1·6 to 1·75 in its length, which is 3·25 to 3·5 in that of the body. Snout obtusely rounded and conspicuously gibbous in front, projecting far beyond the jaws, its length 3·14 in that of the head. Diameter of eye two sevenths to two fifths less than the length of the snout and 4·33 in that of the head. Preorbital deep, its least width 1·1 to 1·28 in the eye-diameter. Interorbital region wide and convex, its width one fifth more than the eye-diameter and 3·60 in the length of the head. Upper jaw the longer; cleft of mouth but little oblique, not nearly reaching to the level of the eye; maxillary extending to below the middle of the eye, its length rather less than a third of the head. Preopercle and posttemporal entire, the former with a narrow crenulated membranous border; opercle with a single spinous point.

Jaws with narrow bands of villiform teeth, the outer premaxillary row enlarged.

Scales in 55 to 58 series above the lateral line, in 7/1/14 or 15 between the origin of the spinous dorsal and the vent; scales of head, except those of the snout, preorbitals, and mandible, ctenoid; vertical fins scaly almost to their tips. Lateral line with 46 to 48 tube-bearing body-scales, forming a long gentle curve to below the middle of the soft dorsal, the tube straight and not reaching to the border of the scale, each with an ascending and a descending tubule. Antero-inferior margin of snout bearing four broad papilliform processes, which separate and conceal a series of five pores; a single large open pore on the chin, followed on each side by a slit-like pore.

Dorsal fins with x, i 28 or 29 rays, the first originating above the pectoral-base; last spine of first dorsal basally united to and nearly as long as the spine of the second dorsal; second spine slightly longer than the third, 1·4 in the length of the head and 1·12 in its basal length, which is 2·14 in that of the second dorsal,

the rays of which, except the last two, are of nearly equal length, about two thirds of the second spine and 2·37 in the length of the head; length of base 2·3 in that of the body. Caudal fin cuneate, 3·8 in the body-length. Anal fin with ii 7 rays, originating below the thirteenth dorsal ray; spines strong, the second 2·9 in the length of the head and 1·44 in the first ray; length of anal 3·88 in that of the second dorsal. Pectoral pointed, with 18 rays, its length 1·25 in that of the head; fourth ray longest, extending to below the ninth dorsal spine. Ventral fin inserted behind the pectoral, shorter than the pectoral, the outer ray terminating in a short filament, which extends to midway between its origin and the base of the fourth anal ray.

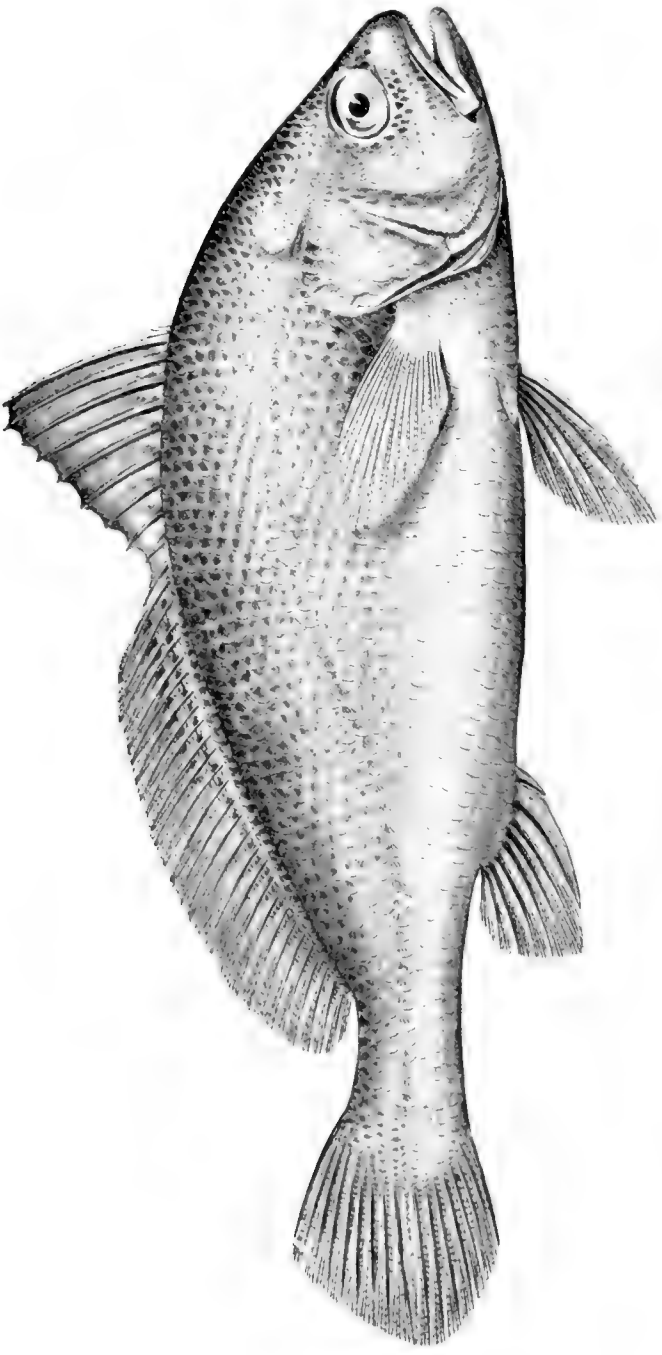
Gill-rakers short and spinulose, 5 + 10 on the anterior arch, the longest about one sixth of the eye-diameter.

Silvery, everywhere so clouded with brown dots as to quite obscure the ground color. Vertical fins darker than the body, except the base of the spinous dorsal, which is dull blue.

Described from two examples, the type of *Corvina comes* de Vis, a stuffed specimen in fair condition, measuring 200 mm., not 150 as stated by its describer, and the type of *Pseudomycterus macculloch*i, 285 mm. long, caught by Mr. C. E. Harris in September 1906, and presented by him to the Amateur Fishermen's Association, through the courtesy of which it is now deposited in the type collection of the Queensland Museum. Reg. Nos. I. 949 and I. 1535. With regard to the latter supposititious genus and species McCulloch informs me (*in lit.*) that "there is an outer row of enlarged teeth between the fleshy lip and the villiform band in the upper jaw; it is so well hidden, however, that it may have escaped your notice." This is in fact what actually occurred, and as the supposed want of these teeth constituted the chief reason for the formation of the genus *Pseudomycterus*, it follows that the establishment of their presence obviates the necessity for the genus, and automatically refers the species to *Sciana* proper. Nor could the matter rest there, for this necessitated an inquiry into the status of the species, and a careful comparison with the other Queensland sciænids quickly made it evident that *Pseudomycterus macculloch*i could not be specifically separated from *Corvina comes*. As I had already associated that species with *Sciana nova-hollandiæ*, I am now in a position, through the kindness of Mr. McCulloch, to clear up the somewhat tangled synonymy of Steindachner's species. In dealing with that species I have been severely handicapped by my inability to consult Steindachner's description, but in consideration of the locality whence his holotype came, and the more or less accurate resemblance of Bleeker's figure to the Brisbane fish, I think it may safely be concluded that the above identifications are substantially correct. There are, however, some conflicting characters which may properly be pointed out here. Günther,[32] for instance, gives the number of soft dorsal rays in Steindachner's fish as 25 only, whereas Bleeker (figure), de Vis, and I show respectively 29, 28, and 29. Again our fish differs markedly in some respects from Bleeker's figure, which portrays a much more slender species, having a depth of body 3·75 in its length, and a shorter snout, its length being

[32] Zool. Rec., iii, 1866, p. 143.

QUEENSLAND FISHES.



SCIÆNA SOLDADO (Lacépède); lectotype of *C. argentea* Macleay. ½ Nat. Size.

Phyllis F. Clarke, del.

but one fourth of that of the head. The Australian Museum is fortunate in possessing a second specimen of this interesting and evidently scarce sciænid, of which McCulloch writes as follows:—"A nice little specimen, registered as having been collected by yourself in the Brisbane River in 1886, is *Pseudomycterus macculloch*i. I had almost identified it with *Corvina comes* de Vis." This example was taken by hook at the rocks below Thorn street, Kangaroo Point. Many old Brisbane anglers consider that this is, to the best of their belief, the species which was known to them many years ago as the "golden perch," and which disappeared so mysteriously after the great flood of 1893. McCulloch's identification of my 1886 fish with *P. macculloch*i lends color to this suggestion.

Our illustration is drawn from the holotype of *P. macculloch*i.

SCIÆNA SOLDADO (Lacépède).

(Plate XXIV.)

Holocentrus soldado Lacépède, Hist. Nat. Poiss., iv, 1802, pp. 344, 390.

Tella Katchelee Russell, Fish. Vizag., ii, 1803, p. 13, pl. cxvii.

Corvina[33] *miles* Cuvier & Valenciennes, Hist. Nat. Poiss., v, 1830, p. 94; idd., ibid., ix, 1833, p. 479; Bleeker, Verh. Batav. Gen., xxiii, 1850, Sciæn., p. 17; Jerdon, Madras Journ. Lit. & Sci., 1851, p. 131; Günther, Brit. Mus. Catal. Fish., ii, 1860, p. 300; Macleay, Proc. Linn. Soc. N. S. Wales, ix, 1884, p. 23.

Sciæna argentea (Kuhl & van Hasselt) Cuvier & Valenciennes, ibid., p. 95.

Corvina soldado Cantor, Catal. Malay. Fish., 1850, p. 70.

Corvina wolffii Bleeker, Nat. Tijds. Nederl. Ind., ii, 1851, p. 66.

Corvina sampitensis Bleeker, ibid., iii., 1852, p. 421.

Corvina celebica Bleeker, ibid., vii, 1854, p. 244.

Corvina dorsalis Peters, Arch. f. Nat., 1855, i, p. 242.

Johnius miles Bleeker, ibid., xviii, 1859, p. 364.

Johnius celebicus Bleeker, Act. Soc. Sci. Indo-Neerl., viii, 1860, Borneo, p. 12.

Pseudosciæna miles Bleeker, Verh. Akad. Amst., xiv, 1874, Sciæn., p. 23; Atlas Ichth., viii, 1876, pl. ccclxxxv, fig. 3.

Sciæna miles Day, Fish. India, pt. 2, 1876, p. 185, pl. xliii, fig. 5; Klunzinger, Sitz. Akad. Wien, lxxx, 1880, i, p. 372.

Sciæna mülleri Steindachner, Denk. Akad. Wien, xli, 1879, i, p. 1; Klunzinger, ibid.

Corvina argentea Macleay, ibid., viii, 1883, p. 204.

SILVER JEWFISH.

Type localities:—Pondicherry (*C. miles*).
Java (*S. argentea* K. & v. H.).
Banjermassin, Borneo (*C. wolffii*).
Sampit, Borneo (*C. sampitensis*).
Macassar, Celebes (*C. celebicus*).
Quilimane (*C. dorsalis*).
South Australia (*C. mülleri*).
Lower Burdekin (*C. argentea* Mcl.).

Body deep and strongly compressed, the dorsal contour much more arched than the ventral, which is nearly linear from the isthmus to the anal fin, its width

[33] *Sciæna miles* in letterpress by *lapsus calami*.

2·75 in its depth, which is 2·88 to 3 in its length and a little more than the length of the head. Abdomen moderate, its length from ventral base to vent 3·37 in that of the body and 1·28 in the space between the vent and the root of the caudal. Caudal peduncle scarcely longer than deep, its least depth 3 to 3·22 in the length of the head. Head about one half deeper than wide, its fronto-occipital profile linear and rather strongly acclivous, that of the nape evenly rounded, its width a little less than half its length, which is 3·25 to 3·5 in that of the body. Snout but little gibbous in front, its upper profile feebly concave, its length 4 to 4·3 in that of the head. Diameter of eye equal to or a little less than the length of the snout and 4·5 to 4·67 in that of the head. Preorbital moderate, its least width 1·63 in the eye-diameter. Interorbital region narrow and slightly convex, its width five sixths of the eye-diameter and 5·6 in the length of the head. Nostrils approximate, the posterior the larger and situated directly in front of the eye. Jaws equal; cleft of mouth slightly curved and but little oblique, not nearly rising to the level of the eye. Maxillary extending to below the posterior fourth of the eye, its length 2·33 in that of the head, the width of its obliquely truncate hinder border about three fourths of the eye-diameter. Angle and vertical limb of preopercle with a few small remote denticles, the latter directed forwards and upwards; opercle with two spinous points.

Premaxillaries with an outer row of strong, curved teeth, which decrease in size from the symphysis backwards, and a narrow band of villiform teeth, broadest posteriorly; mandibular teeth in two series, the inner row somewhat enlarged, but smaller than those of the outer premaxillary row; roof of mouth and tongue toothless.

Scales of body ctenoid, in 62 to 65 series above the lateral line, in 8/1/16 below the spinous dorsal; scales of head, except those of the occiput, cycloid; they are very unequal in size, minute ones being intermingled with the others on the cheeks, occiput and opercular lobes; head almost entirely scaly, only the tip of the snout and the chin naked; on the body they are arranged in oblique rows both above and below the lateral line, except on the caudal peduncle and the breast, and are largest on the middle of the sides. A single row of scales forms a sheath at the base of the soft dorsal and several series of small scales cover about a third of the membrane between the rays; scales cover the membrane of the caudal fin and are present between the rays at the bases of the anal and pectoral fins. Lateral line almost concurrent with the back from the shoulder to above the anal fin, thence horizontal and extending to the tip of the tail, the tube-bearing body-scales 49 to 51. Tip of snout with a round median pore, on each side of which is a partly concealed slit-like pore; chin with a transversely oval pore, at some distance behind which is a median circular pore.

Dorsal fins with x, i 28 to 32 rays, the first originating above the pectoral-base, its last spine united to but not so long as that of the soft dorsal; third spine longest, 1·7 to 1·87 in the length of the head, and 1·17 in that of its base, which is 2 to 2·22 in that of the second dorsal, the rays of which increase slightly in length to about the twentieth, which is 1·5 in the third spine and 2·3 in the

length of the head; length of its base 2·1 to 2·25 in that of the body. Caudal fin bluntly cuneate, the eighth lowest ray the longest, 4·8 to 4·9 in the body-length. Anal with ii 7 rays, originating below the fourteenth or fifteenth dorsal ray, the spines strong and finely striated, the second 2·1 to 2·2 in the length of the head and 1·25 in the first ray; length of anal 3·7 in that of the second dorsal. Pectoral obtusely pointed, with 16 rays, the fifth and sixth the longest, 1·55 in the length of the head, and extending to below the last dorsal spine. Ventral inserted a little behind the pectoral-base, and somewhat longer than that fin, the first ray longest, with or without a short filamentary appendage.

Gill-rakers 6 + 8 with some rudiments on the lower branch, the longest two fifths of the eye-diameter.

Coloration, after long immersion in preservatives, almost uniformly silvery, with gray stripes extending obliquely upwards and backwards along the middle of each series of scales on the upper anterior portion of the body. Anterior dorsal dusky, with microscopic brown dots; soft dorsal somewhat lighter, with a dark spot before each ray, forming a horizontal row just above the scaly sheath, above which is a second but less definite row. (*Soldado*, the Spanish term for a soldier.)

Described from two specimens, one measuring 320 mm. taken at Dunk Island by Mr. Kendal Broadbent, and acquired from him by the Trustees of the Queensland Museum; Reg. No. I. 2901. The second from a 338 mm. example captured in the Lower Burdekin, which belongs to the Australian Museum, and has been chosen as the lectotype from seven specimens, which are cotypes of *Corvina argentea* Macleay.

Variation:—The six other cotypes, measuring 188 to 310 mm. in length, exhibit some slight variation, the depth being a little less in the smaller specimens than in the larger ones.

Synonymy:—Mr. McCulloch, who has kindly compared the specimens, obtained from various sources, in the collection of the Australian Museum, writes to me as follows—"*Corvina argentea* Macleay is evidently synonymous with *Sciæna soldado* (Lacépède); a comparison of one of the smaller specimens of Macleay's cotypes with an Indian example of *S. miles* (= *S. soldado*) of about the same size, from Dr. Francis Day's collection, reveals no appreciable difference between them. *S. mülleri* Steindachner is said to differ from *S. soldado* principally in having the second anal spine somewhat shorter in relation to the following rays, in the relative lengths of the dorsal spines, and in having the tip of the first ventral ray filiform. All these differences are trivial and are not consistently maintained either in our specimens or in the descriptions and figures of *S. soldado*. It seems probable that *S. mülleri* is not distinct from Lacépède's species, though it should be noted that Klunzinger, with both forms before him, maintained them as distinct." With Mr. McCulloch's conclusions I am thoroughly in accord.

Historical:—Our first acquaintance with this fine species comes through Lacépède, who tells us that the specimen from which his description was taken was a part of the collection, which he euphemistically describes as having been given by the Stadholder of Holland to France, and which undoubtedly came from somewhere in the Dutch East Indies. He also mentions a second specimen as having come from Cayenne, the capital of French Guiana; this is of course a mistake. Russell and Sonnerat obtained it on the Coromandel Coast of India, at Vizagapatam and Pondicherry respectively, while Valenciennes reports that Messrs. Kuhl and van Hasselt sent a Javanese example to the Museum of the Low Countries, and that Dussumier found it abundant at Bombay. Cantor states that "small individuals occur at Pinang at all seasons; larger ones but rarely." Bleeker received specimens from Celebes, Bali, Borneo, Java, Banca, Pinang, and Bengal, and records that, like many of its congeners, it freely enters rivers. Peters added the width of the Indian Ocean to its range by obtaining specimens at Quilimane, an important centre on the western shore of the Mozambique Channel. Günther added Ceylon and Tenasserim to the list of recorded localities. Its first occurrence in Australia is contained in Steindachner's description of a South Australian sciænid by the name of *S. mülleri,* which form was subsequently reported from the Queensland Coast by Klunzinger. Macleay next redescribed it, under the untenable name of *Corvina argentea,* from examples collected by Morton in the estuary of the Burdekin River, where, he states, "it is an abundant and valuable fish." Finally the Queensland Museum possesses a specimen collected many years ago by Mr. Kendal Broadbent at Dunk Island, and a second, which probably belongs here, is labeled "Moreton Bay (*v. infra*)."

Uses:—Dussumier reported that at Bombay it was considered "a good fish," while in regard to Pinang Cantor repeats his usual formula "eaten by the natives," but adds that "the few air-vessels procurable are valued as good isinglass."

Range:—From the East Coast of Africa through the Seas of India and Malaysia to South Australia and the Coast of Queensland.

Dimensions:—Attains a length of at least 600 mm.

Illustration:—Taken from the lectotype above referred to.

The following differences, some at least of which can hardly be called trivial, occur between the Moreton Bay example above mentioned and my description of *Sciæna soldado.* Nevertheless, although it is a slightly smaller (300 mm.) and much deeper fish than either of the two utilized in preparing that description, I look upon it as merely a somewhat abnormal example of the same species.

Depth of body 2·7 in its length and one fourth more than the length of the head. Abdomen short, its length from ventral-base to vent 3·8 in the length of the body and 1·5 in the space between the vent and the root of the caudal. Caudal peduncle a little deeper than long, its least depth 2·77 in the length of the head.

Fronto-occipital profile much more strongly acclivous. Snout 3·75 in the length of the head. Diameter of eye one fourth less than the length of the snout. Interorbital region somewhat wider, seven eighths of the eye-diameter and 5·33 in the length of the head. Maxillary extending to a little beyond the posterior border of the eye. Dorsal fin originating in advance of the pectoral-base; second spine longest, 1·6 in the length of the head. Second anal spine 1·87 in the length of the head and subequal to the first ray; base of anal 4·44 in that of the soft dorsal. Pectoral longer, 1·28 in the length of the head, extending to below the first dorsal ray. Outer ventral ray with filiform tip.

Locality:—Moreton Bay.

SCIÆNA ALBIDA (Cuvier & Valenciennes).

? *Bola coibor* Buchanan, Fish. Ganges, 1822, pp. 78, 368.

Corvina albida Cuvier & Valenciennes, Hist. Nat. Poiss., v, 1830, p. 93; Bélanger, Voy. Ind.-Orient., Zool., 1834, p. 355; Günther, Brit. Mus. Catal. Fish., ii, 1860, p. 304; Day, Fish. Malab., 1865, p. 54; Castelnau, Proc. Linn. Soc. N. S. Wales, iii, 1878, p. 47; Macleay, Proc. Linn. Soc. N. S. Wales, v, 1881, p. 521.

Johnius anci Blyth, Proc. Asiat. Soc. Bengal, 1860, p. 141. Not of Bloch.

Pseudosciæna albida Bleeker, Nederl. Tijds. Dierk., i, 1863, p. 145.

Corvina neilli Day, ibid., p. 55; id., Proc. Zool. Soc. London, 1869, p. 300.

Sciæna albida Day, Fish. India, pt. 2, 1876, p. 188, pl. xliv, figs. 4 & 6.

INDIAN JEWFISH.

Type localities:—Estuary of the Ganges (*B. coibor*).
Pondicherry (*C. albida*).
Cochin, Malabar Coast (*C. neilli*).

Body slenderly subovate and compressed, the dorsal contour much more arched than the ventral, which is almost level from the isthmus to the anal fin, its depth rather less than one third of its length and subequal to or rather more than the length of the head. Abdomen moderate, its length from ventral-base to vent 3·4 in that of the body and 1·33 in the space between the vent and the root of the caudal. Caudal peduncle about as deep as long, its least depth one third of the head. Head about one half deeper than wide, its upper profile linear or feebly emarginate, that of the nape gently rounded, its width one half its length, which is 3 to 3·5 in that of the body. Snout slightly gibbous in front, its profile moderately acclivous. Diameter of eye as much as to one fourth less than the length of the snout and from one fourth in the immature to one seventh in the adult in the length of the head. Preorbital narrow, its width about three sevenths of the eye-diameter. Interorbital region very slightly convex. Nostrils approximate, the posterior much the larger, and situated directly in front of the eye. Jaws equal or the upper slightly the longer; cleft of mouth but little oblique, not nearly rising to the level of the eye; maxillary extending to below the last third

or even the hinder border of the eye; a bluntish knob below the symphysis of the lower jaw. Preopercle with some serrations in the young, becoming indistinct in the adult; opercular spines feeble.

Jaws with a band of villiform teeth, the outer row in the premaxillaries and the inner row in the mandibles enlarged.

Scales of body moderate and ctenoid, in 55 to 60 series above the lateral line, in 7/1/18 behind the spinous dorsal; scales of head cycloid. Fine scales cover the bases of the soft dorsal and anal fins; caudal fin wholly scaly in the adult. Lateral line forming a long gentle curve to above the anal fin, the tube-bearing scales about 52, the tubes arborescent posteriorly. Three pores across the front of the snout; the free edge of the skin of the snout with five orifices and a slight lateral lobe; chin with a large open median pore, and two more on the side of either ramus. A short barbel between the median pore and the anterior lateral one and a very minute one at the posterior pore.

Dorsal fins with ix or x, i 24 or 25 rays, the first originating above the pectoral-base, its last spine united to but not so long as that of the soft dorsal; spines weak and flexible, the third the longest, 1·75 to 2 in the length of the head, and 1·33 in that of its base, which is 1·67 in that of the second dorsal, the rays of which increase in length to about the fifteenth, which is 1·25 in the third spine and 2·4 in the length of the head; length of its base 2·67 in that of the body. Caudal fin cuneate in the young, rounded in the adult, one sixth to one seventh in the body-length. Anal with ii 7 rays, originating below the eighth or ninth dorsal ray, the spines strong, the second about half the length of the head and nearly as long as the first ray; length of anal 3·25 in that of the second dorsal. Pectoral pointed, with 18 rays, the fifth the longest, 1·38 in the length of the head, and extending to below the origin of the soft dorsal. Ventral inserted below the pectoral-base, and a little shorter than that fin, the outer ray the longest, terminating in a short filament, which disappears with age.

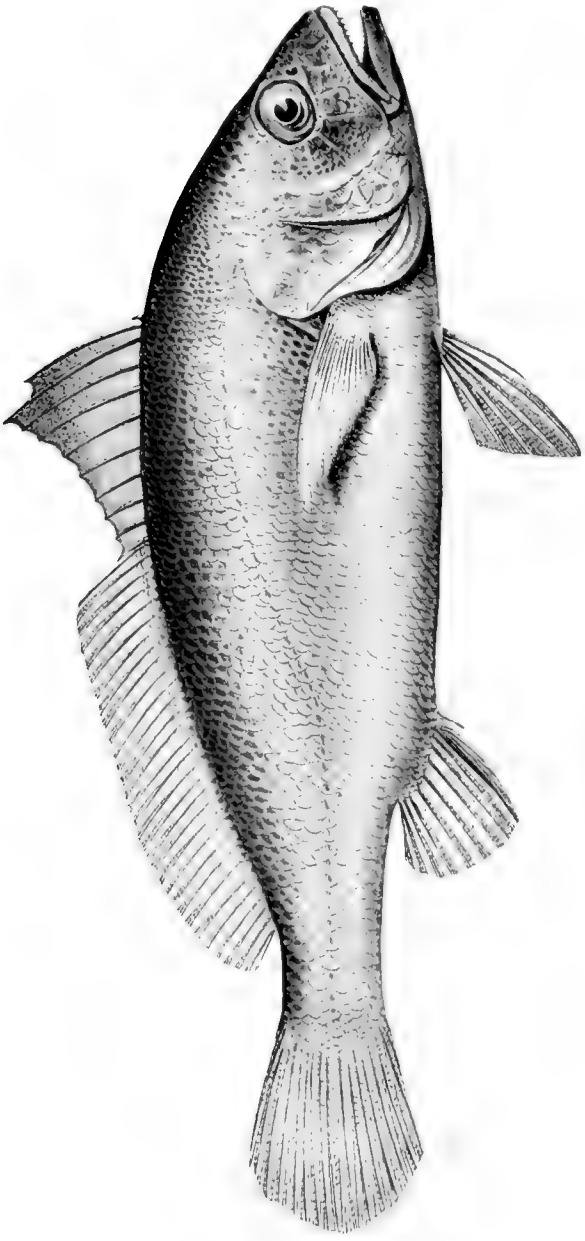
Pyloric appendages five.

Silvery, with a light streak along each row of scales. A dark bluish spot on the opercles, most distinct in the young. First dorsal with a black inter-spinous membrane in the young, which is gradually reduced to a dark outer border in the adult; outer third of the second dorsal stained with gray; caudal, anal, and ventral fins yellowish. (*Albida*, white.)

The above description is mostly a rearrangement, extracted from Day's description and figures, but should suffice to identify the species, should it be rediscovered by our northern observers.

Historical:—Large and abundant as it is on the coasts of Hindoostan the life history of this fish is pitiably meagre. If Day be correct as to the identity of *Bola coibor* with *Sciæna albida* the earliest notice of this fine species came from the pen of Dr. Francis Buchanan in his history of the fishes found in the Ganges and its tributory streams, and it was not until eight years later that it received from Valenciennes the name by which it has since been generally known.

QUEENSLAND FISHES.



Sciæna Leptolepis Ogilby; holotype. ½ Nat. Size.

Phyllis F. Clarke, del.

Face page 87.

His specimens were sent to the Paris Museum by Leschenault from Pondicherry and Bélanger from Malabar, and it is from the former that we learn that the fishery is continuous throughout the year in the roadstead of Pondicherry. Günther later added China to its range and thereafter nothing is heard of it until Castelnau claimed to have obtained a twenty-inch example from the Norman River through the agency of his friend, Mr. Gulliver. Day, in the "Fishes of Malabar," redescribed it as *Corvina neilli*, but subsequently satisfied himself that his fish was inseparable from *S. albida*.

Uses:—According to Leschenault the inhabitants of Pondicherry considered this fish to be "good to eat"; Day, however, says that it is "not in much esteem for the table." Possibly French cookery may bridge the gulf.

Range:—Seas of India and China; North Coast of Queensland.

Dimensions:—Attains a length of at least 900 mm.

Remarks:—If it were not for the difference in the number of dorsal rays I would be inclined to think that the Norman River fish was *S. soldado* not *S. albida*.

SCIÆNA LEPTOLEPIS sp. nov.

(Plate XXV.)

SHARP-NOSED JEWFISH.

Type locality:—Croker Island, N.T.

Body elliptical and strongly compressed, moderately robust, the dorsal contour much more arched than the anal, which is nearly linear from the isthmus to the anal fin, its width rather more than half its depth, which is 3·3 in its length and slightly more than the length of the head. Abdomen short, its length from ventral-base to vent 3·5 in the length of the body and 1·33 in the space between the vent and the root of the caudal. Caudal peduncle about as long as deep, its least depth 3·2 in the length of the head. Head one half deeper than wide, its upper profile linear with a feeble emargination in front of the upper border of the eye, that of the nape gently rounded, its width 2·12 in its length, which is 3·2 in that of the body. Snout with scarcely a trace of anterior gibbosity, its profile moderately acclivous, its length 3·6 in that of the head. Diameter of eye one fifth less than the length of the snout and 4·33 in that of the head. Preorbital moderate, its least width 1·77 in the eye-diameter. Interorbital region narrow and convex, its width three eighths less than the eye-diameter and one sixth of the length of the head. Nostrils approximate, the posterior the larger, situated directly in front of the eye. Jaws equal; cleft of mouth oblique, but not rising to the level of the eye; maxillary extending to below the middle of the eye, its length 2·37 in that of the head, the width of its obliquely truncated hinder border five eighths of the eye-diameter. Preopercle finely crenulated, with a few small and widely separated spines at the angle; operele with two flexible points.

Upper jaw with a single series of conical teeth on each ramus, leaving a wide naked interspace in front, the second front tooth on either side being the

largest, behind which the others are symmetrically graded; lower jaw with a similar series of conical teeth, but the largest are on the middle of the side, from which they gradually decrease in size before and behind; outside of this row is a second series, posteriorly very small, but evenly increasing towards the front, so that at the symphysis they are fully as long and strong as those of the inner series; roof of mouth and tongue smooth.

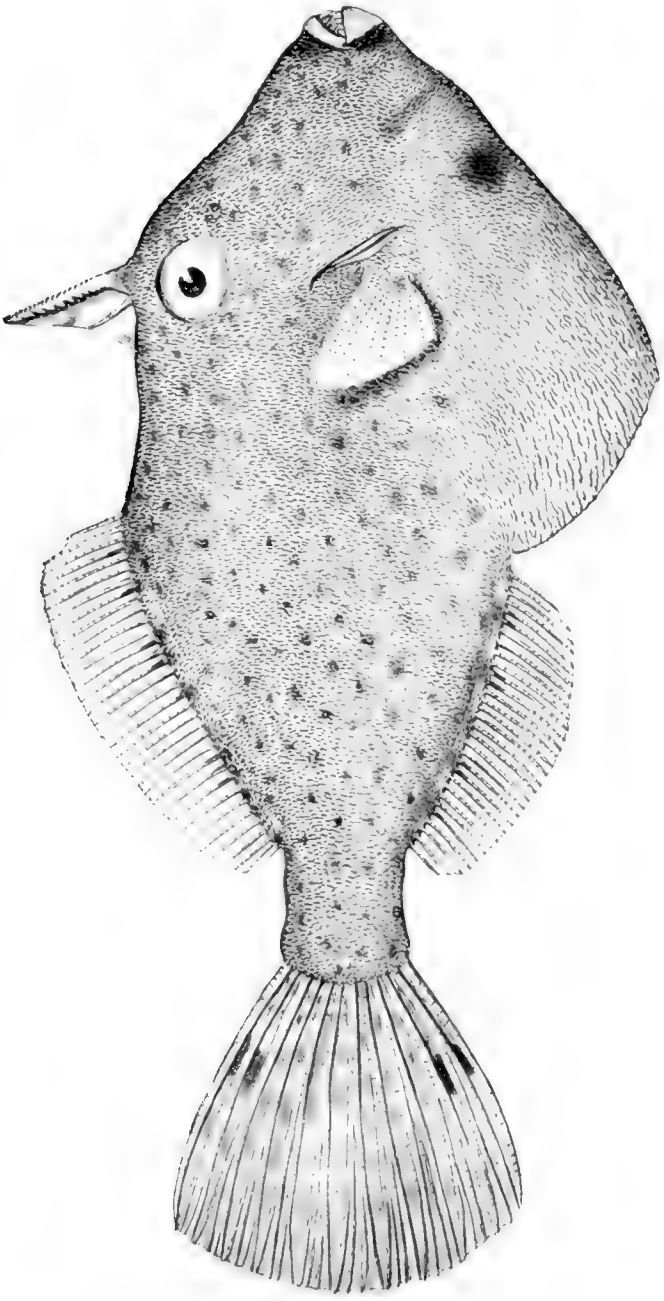
Scales small, thin, and delicate, feebly ctenoid, in 82 series above the lateral line, in 11/1/19 below the spinous dorsal; scales of head, except those of the opercle and occiput, cycloid, only the tip of the snout and the chin naked; on the body they are arranged in oblique rows, except on the caudal peduncle and breast. Ctenoid scales in two series form a basal sheath for the soft dorsal, the interradial membrane of which is scaly on its lower moiety; proximal two thirds of caudal scaly; anal, pectorals, and ventrals with scaly bases. Lateral line forming a long gentle curve to below the middle of the soft dorsal, the tube-bearing scales 49, the tubes, which do not reach the border of the scale, each being provided with an ascending and a descending tubule. Tip of snout pierced by eight pores; a large median one in front followed by a crescentic series of three smaller ones, the inferior edge having on either side a pair of slit-like pores, each overhung by a narrow flap; mandibular pores five; a median transversely oblong one, followed by two paired longitudinal slits.

Dorsal fins with x, i 31 rays, the first originating above the pectoral-base, the last spine partly united to but considerably shorter than that of the soft dorsal; spines weak and flexible, the third the longest, conspicuously longer than the fourth, 1·83 in the length of the head, and 1·22 in that of its base, which is 1·9 in that of the second dorsal, the rays of which increase gradually to about the fifteenth, which is 1·5 in the length of the third spine and 2·77 in the length of the head; last ray, like that of the anal, divided nearly to its base; length of soft dorsal 2·5 in that of the body. Caudal fin cuneate, 4·55 in the body-length. Anal with ii 7 rays, originating below the twelfth dorsal ray; spines strong and pungent, the second long and fluted, half as long as the head, and scarcely shorter than the first ray; length of anal 4·3 in that of the second dorsal. Pectoral pointed, with 17 rays, the fifth and sixth the longest, 1·6 in the length of the head, and extending to below the anterior dorsal ray. Ventral originating below the lower angle of the pectoral-base and as long as that fin, the outer ray the longest and terminating in a short filament.

Gill-rakers short and slender, 6 + 10 with some rudiments on the anterior arch, the longest two fifths of the eye-diameter.

Silvery, darkest above, the sides and belly deeply washed with gold, as also is the base of the ventrals, the edge of the preopercle, and the exposed portion of the maxillary. Spinous dorsal dark-edged, the interspinous membrane profusely powdered with rufous brown; the powdering of the soft dorsal and caudal confined to a strip along each ray. (λεπτός, thin; λεπίς, a scale.)

QUEENSLAND FISHES.



CANTHERINES MAYNARDI Ogilby.

F. A. McNeill, del.

Described from a specimen, measuring 211 mm., netted at Croker Island, N.T., by Mr. John Colclough. Reg. No. I. 1534.

Note:—Although this species has not as yet been recorded from Queensland waters I consider it advisable to introduce it here, so as to make this review comprise all the known Australian species.

Part XIV.—BALISTIDÆ (No. 1).

CANTHERINES MAYNARDI Ogilby.

(Plate XXVI.)

Cantherines maynardi Ogilby, Proc. Roy. Soc. Queensl., xxviii, 1916, p. 114.

BROWN-SPOTTED LEATHERJACKET.

Body ovate, with the interdorsal profile emarginate, its depth above the pelvic spine 2, between the origins of the dorsal and anal fins 2·4, in its length; caudal peduncle rather slender, its least depth less than the width of the gill-opening. Head bluntly triangular, its length 3·6 in that of the body. Snout with an anterior protuberance, behind which it is feebly concave to above the nostrils. Eye midway between the tip of the snout and the 4th dorsal ray, and one and a half time nearer to the dorsal spine than to the gill-opening, its diameter 3·8 in the length of the snout and equal to the convex interorbital width. Gill-opening exceptionally oblique, commencing slightly in advance of the nostrils and before the middle of the pectoral-base, and terminating below the middle of the eye, its width three fourths more than the eye-diameter, the inner flap but little protruding.

Skin covered with soft granules, which appear velvety to the touch, but contain a retrorse spinule; caudal peduncle without differentiated spines (♀?); sides with a few short thread-like cirri, arranged in more or less regular longitudinal series.

Dorsal spine inserted above the last quarter of the eye, armed anteriorly with two rows of close-set blunt tubercles, posteriorly with two more remote rows of short blunt spines, its length 1·6 in that of the head;[34] 2nd dorsal spine weak. Soft dorsal with 35 rays, its outline feebly rounded, its height 4·3 in its length, which equals the distance between its origin and that of the anal. Caudal rounded and greatly developed, its length slightly more than that of the head. Anal fin with 32 rays, originating below the ninth dorsal ray and terminating a little behind the soft dorsal, than which it is one fourth shorter and a trifle higher. Pectoral fin inserted below the anterior half of the eye,

[34] The spine appears to have been injured at some time as, in addition to the bifurcation of the tip, there is a prominent tumor near the base.

rounded, with 12 rays, the second the longest, a little more than the width of the gill-opening. Ventral spine small and rough, not projecting beyond the ventral flap, which is moderately developed.

Stone-gray, the head and body, except the throat and ventral flap, with numerous small round brown spots; outer edge of throat, in advance of the gill-opening, with a much larger blackish spot, which is connected with its fellow by a brown band; above the spot are two concentric semicircles of pale blue. Soft dorsal and anal gray, each ray with an inconspicuous darker intra-basal spot; caudal profusely brown-spotted. (I have much pleasure in naming this species after my friend Mr. Lewis Holden Maynard, of Bundaberg, in recognition of his keen interest in the biology of our State.)

Described from a fine specimen, measuring 317 millim. in total length (244 to root of caudal), captured at Cowan-Cowan, Moreton Bay, by Mr. James Palmer, and presented by him to the Queensland Museum. Reg. No. I. 2643.

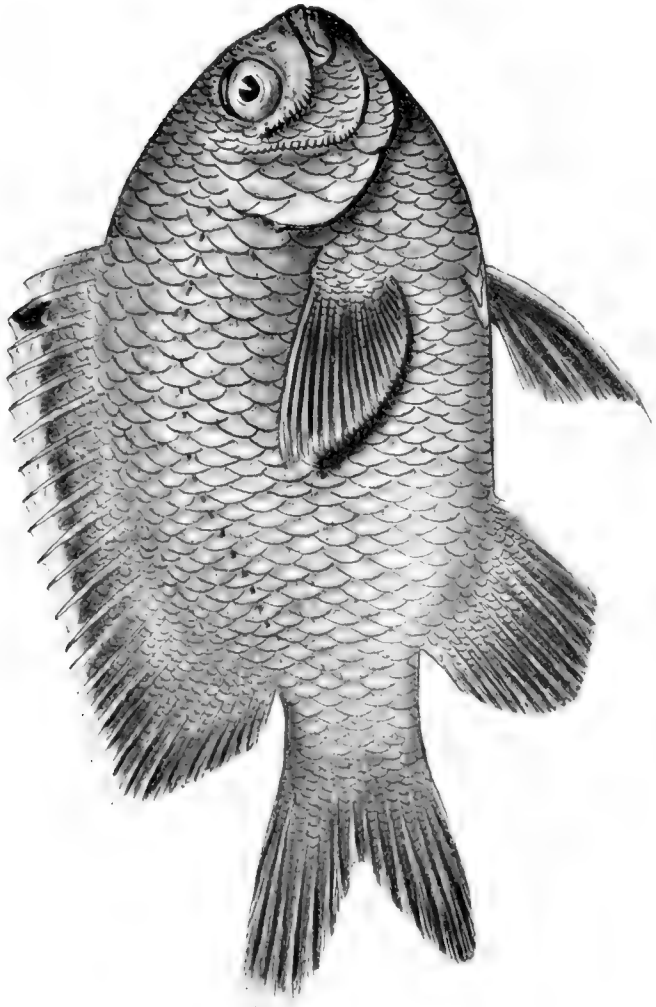
The nearest ally of this species is Bleeker's *Cantherines macrurus*,[35] from which, however, it differs in numerous minor characters.

In my notes on the fishes trawled on the Queensland Coast by the Endeavour, I find the following entry:—"Leatherjacket. *Cantherines sp.* (spotted)." Possibly this refers to the species under consideration. Seven examples were trawled at three stations, namely—Off Jenny Lind Buoy, Port Curtis, one; outside fairway buoy, Hervey Bay, five; off Hummocky Island, one.

On drawing Mr. McCulloch's attention to these examples, he kindly compared them with my original description, and decided that they were identical. It is from one of these Endeavour fishes that Mr. McNeill's excellent drawing was made.

[35] *Monacanthus macrurus* Bleeker, Nat. Tijds. Nederl. Ind., xii, 1856, p. 226; Nias; *Pseudomonacanthus macrurus* Atlas Ichth., v, p. 134, pl. ccxxviii, fig. 2.

QUEENSLAND FISHES.



POMACENTRUS APICALIS, De Vis.

F. A. McNeill, del.

Face page 91.

FOUR QUEENSLAND FISHES.

By Allan R. McCulloch, Zoologist, Australian Museum.

(Contributions from the Australian Museum.)

(Plates XXVII to XXX.)

The four species here described and figured have hitherto been only very briefly characterised, and their recognition has been a matter of some little difficulty. *Pomacentrus apicalis*, De Vis, and *Cantherines brunneus*, Castelnau, have not been recognised since they were originally described over thirty years ago.

Family POMACENTRIDÆ.

Genus POMACENTRUS, Lacépède.

POMACENTRUS APICALIS, de Vis.

(Plate XXVII.)

Pomacentrus apicalis, De Vis, Proc. Linn. Soc. N. S. Wales, ix, 1885, p. 874.

D. xiii/16; A. ii/13; P. 20; V. i/5; C. 15; L. lat. 20; 27 rows of scales between the operculum and the hypural joint; L. tr. $3\frac{1}{2}/11$. Depth before the ventrals 2 into the length of the hypural joint; head 3·3 in the same. Eye slightly narrower than the interorbital width, as long as the snout, and 3·5 in the head.

Body short and deep. Head slightly longer than deep. Snout obtusely pointed, the maxilla reaching slightly beyond the anterior margin of the eye. Suborbital strongly denticulate on its postero-inferior margin. Preoperculum denticulate on its hinder limb, the angle rounded. Operculum with a small flat spine. Head, body, and vertical fins closely covered with scales, the edges of which are minutely ciliated; they extend forward to between the nostrils and cover the greater part of the suborbital bone, leaving only the end of the snout naked. Nostril a little nearer the eye than the end of the snout. Dorsal originating above the end of the operculum; the spines increase gradually in length backwards, and there is no indentation between the spinous and soft dorsals; the soft dorsal angular, its median rays longest. Second anal spine as long as the distance between the preoperculum and the snout, and longer than the dorsal spines; soft portion of fin rounded. Caudal bifurcate, the upper lobe longer than the lower. First ventral ray filamentous, reaching the second anal spine.

Colour.—After preservation in weak alcohol, the general colour is dark coffee brown, with indistinct darker bases to the scales. Most of the scales of the back, side, and soft dorsal with a minute pale spot; the scales on the lower portion of the operculum and the base of the pectoral each with larger pale bluish spots. A row of light infraorbital spots. Dorsal fins with a broad orange margin which is most intense on the soft portion; two irregular blue streaks between each of the third to last spines; a large black blotch between the upper portion of the second and third spines. Tip of the upper caudal lobe bright orange. Soft dorsal, caudal, anal, pectorals and ventrals blackish, the spines of the anal and ventrals light blue.

Described from a specimen 115 mm. long from the snout to the end of the middle caudal rays. It agrees better with the second specimen referred to by de Vis than with that upon which he bases his description.

Loc.—Holborn Is., off Port Denison, Queensland; collected by Mr. E. H. Rainford.

Family TEUTHIDIDÆ.

Genus TEUTHIS, Linné.

Hepatus, Gronow, Zoophyl., 1763, p. 113—nonbinomial. See Jordan, Genera Fishes, 1917, p. 20.

Teuthis, Linné, Syst. Nat., 12th ed., 1766, p. 23 (*T. hepatus*, Linné). *Id.*, Jordan, *loc. cit.*, p. 23.

TEUTHIS GRAMMOPTILUS, Richardson.

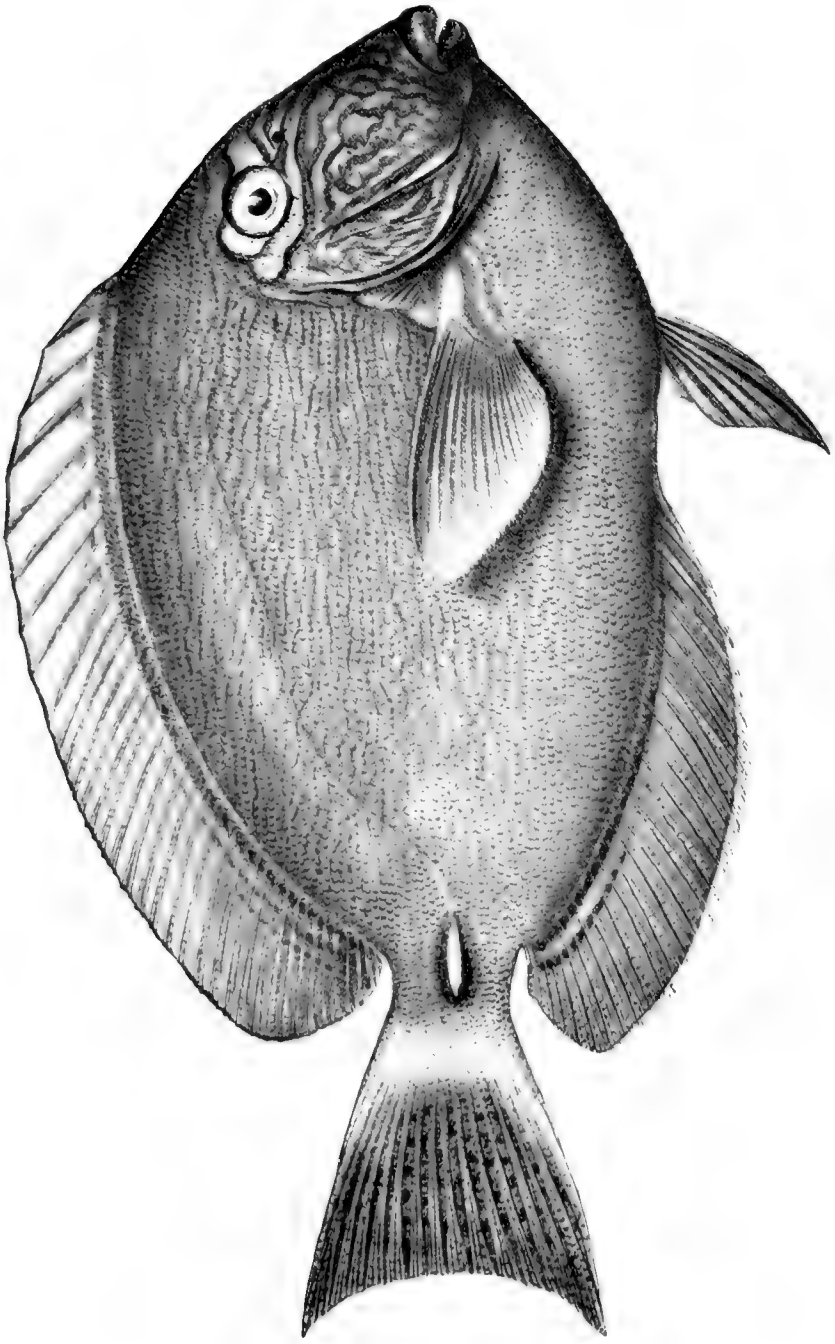
(Plate XXVIII.)

Acanthurus grammoptilus, Richardson, Ann. Mag. Nat. Hist., xi, 1842, p. 176. *Id.*, Günther, Brit. Mus. Cat. Fish., iii, 1861, p. 335. *Id.*, Macleay, Proc. Linn. Soc. N. S. Wales, ii, 1878, p. 354, and v, 1881, p. 528. *Id.*, Klunzinger, Sitzb. Akad. Wiss. Wien, lxxx, i, 1879, p. 393.

D. ix/27; A. iii/25; P. 17; V. i/5; C. 16. Depth before the ventrals 1·9 in the length to the hypural joint; head 3·5 in the same. Eye 2·3 in its distance from the upper lip, and 3·9 in the head; interorbital space wider than the eye, 3 in the head. Last dorsal spine 1·5, eighteenth dorsal ray 1·9 in the head. Pectoral 1·04, ventral 1·2 in the head.

The profile from the snout to the dorsal fin is obliquely convex, the forehead before the eyes forming an obtuse angle between the contours of the snout and the nape. Opercles oblique; preopercular border and the whole of the operculum striated. Nostrils approximate, the anterior much larger than the

QUEENSLAND FISHES.



TETTHIS GRAMMOPTILUS, Richardson.

A. R. McCulloch, del.

posterior, which is close to the border of the eye. Teeth depressed, their margins rounded and uniformly lobulate; sixteen in the upper jaw. The exposed surfaces of the clavicle and supraclavicle are striated.

The greater part of the body is covered with small, strongly ctenoid scales, which become cycloid on the breast and abdomen; head-scales deeply embedded and cycloid. Lateral line arched anteriorly, thence oblique to below the hinder third of the soft dorsal, whence it descends to the middle of the caudal peduncle. Caudal spine strong, its anterior free portion longer than the posterior.

Dorsal commencing above the middle of the operculum, the spines increasing evenly in length to the last. The margin of the fin is evenly rounded, and the rays decrease evenly backwards to the eighteenth, after which they become rapidly shorter. Anal commencing below the posterior dorsal spines, and terminating a trifle behind the last ray; its margin rounded. Ventrals acutely pointed, and reaching the base of the first anal ray. Caudal damaged, emarginate (the lobes probably produced).

Colour.—Body brown before preservation, tinged with yellow. The greater part of the sides covered with narrow dark-brown lines, which are largely horizontal, irregular and anastomosing. Ventral surface uniform brown. Some broad blue bands around the eye enclose light areas. Cheeks, opercles, shoulder, and base of pectoral brown, closely covered with reticulating darker brown stripes. Dorsal orange yellow, becoming darker posteriorly; a broad blue band along the entire base and a second darker one above it posteriorly; a narrow black margin. Anal dark greenish brown, with a pale blue border, with indications of two blue stripes near the base posteriorly. Ventrals dark brown; pectorals yellowish, darker between the rays. Caudal dark, with many round darker spots between the rays; the base near the caudal peduncle light in colour; a blackish area round the caudal spine.

Described and figured from a specimen 218 mm. long, from the Clarence River, New South Wales.

Variation.—Two smaller examples from Masthead Island, 150 and 159 mm. long, are very similar, though their markings are not so distinct as in the larger example; in one, the vermiform markings on the body are much broader and less numerous than in the other. The dorsal and anal fins are marked with about six longitudinal dark stripes, and are darker anteriorly than in the specimen figured. The white area around the caudal peduncle is more sharply defined anteriorly, and the extreme margin of the fin is white.

Locs.—Clarence River, New South Wales; presented to the Australian Museum by the Fisheries Department of New South Wales. Masthead Island, off Port Curtis, Queensland; coll. A. R. McCulloch. Specimens are in the Macleay Museum from Port Darwin, Northern Territory.

Family BLENNIIDÆ.

Genus NOTOGRAPTUS, Günther.

NOTOGRAPTUS GUTTATUS, Günther.

(Plate XXIX.)

Notograptus guttatus, Günther, Ann. Mag. Nat. Hist. (3), xx, 1867, p. 64. *Id.*, Macleay, Proc. Linn. Soc. N. S. Wales, ii, 1878, p. 359, and vi, 1881, p. 30. *Id.*, Klunzinger, Sitzb. Akad. Wiss. Wien, lxxx, i, 1879, p. 393.

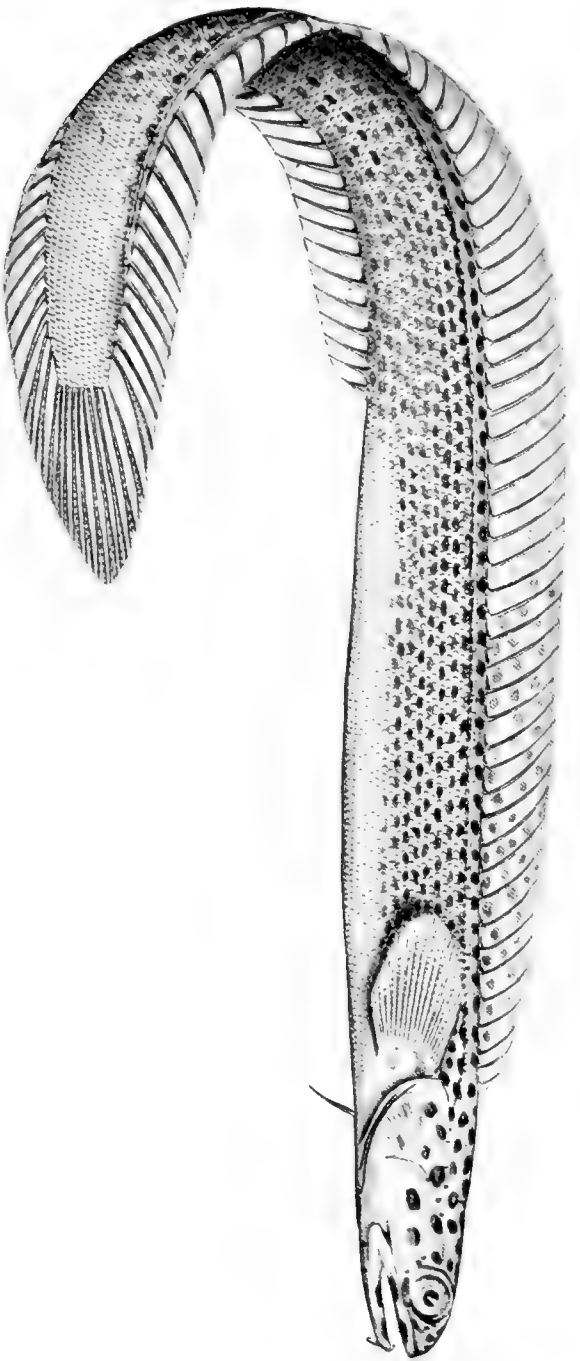
Blanchardia maculata, Castelnau, Res. Fish. Austr. (Vict. Offic. Rec. Philad. Exhib.), 1875, p. 47. *Id.*, Macleay, Proc. Linn. Soc. N. S. Wales, vi, 1881, p. 272. *Id.*, Ogilby, Mem. Qld. Mus., i, 1912, p. 216.

D. lxii/1; A. xxxvii/2; V. 1; P. 19; C. 10. The length from the snout to the vent is 1·1 in the distance between the vent and the hypural joint. The head is 2·5 in its distance from the vent. Depth at the vent about 2·1 in the head; orbit 5 in the same. Snout 1·5 in the orbit and greater than the interorbital width, which is 2·7 in the orbit. Pectoral 2·2, caudal 1·5 in the head. Ventral ray almost equal to the orbit in length. Posterior dorsal spine 3·2, and posterior anal spine nearly 4 in the head.

Body anguilliform, somewhat compressed, and covered with minute imbricate scales which extend forward to behind the pectorals and ventrals; the breast and the back above the lateral line are naked. Head subcylindrical, naked, with series of pores surrounding the eye, above the opercles, across the nape, and on the mandibles. Snout obtuse; anterior nostril in a short tube. Mouth nearly horizontal, the maxilla produced backward well beyond the eye; its posterior portion is rather narrow, rounded, and exposed; mandible shorter than the upper jaw, with a small mental barbel. A broad band of granular teeth on each ramus of the jaws, which becomes narrower as it extends backward; the symphyses are naked; a broad band of similar teeth on each palatine, vomer toothless. Tongue slender, largely free. Eye large, its anterior margin free from the orbital membranes. Opercles unarmed, the preopercular margin hidden beneath the skin; subopercular with oblique ridges. Gill-opening wide, lateral, the membranes broadly attached to the isthmus. Lateral line extending obliquely upward from the operculum to near the back, whence it runs backward to the base of the fourth last dorsal spine; it is formed of a continuous series of enlarged tubules.

Dorsal fin originating above the end of the head; the spines of the greater portion are slender with flexible tips, but they become thicker posteriorly and are acutely pointed; they increase gradually in length to the last; the single ray is branched and longer than the spines, and is united with the caudal. Anal similar in form to the dorsal, commencing below the twenty-eighth spine of that fin; its spines are all strong and acute, and increase in length to the last;

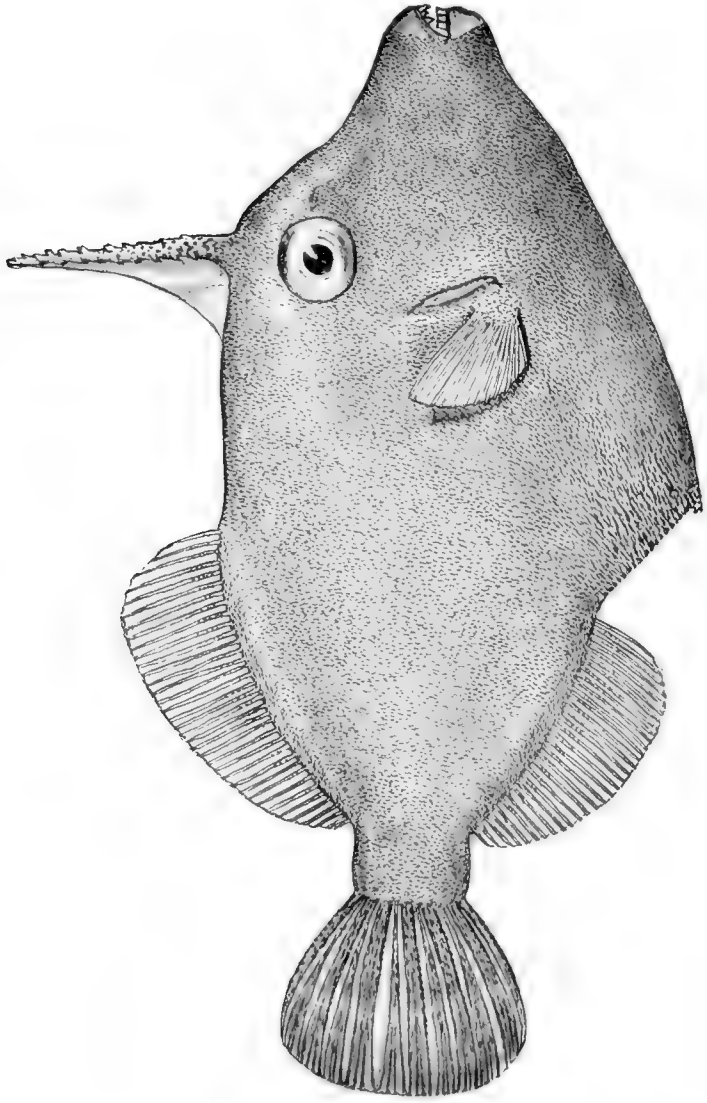
QUEENSLAND FISHES.



A. R. McCulloch, del.

Notographus guttatus, Günther.

QUEENSLAND FISHES.



CANTHERINES BRUNNEUS, Castelnau.

F. A. McNeill, del.

Face page 95.

the rays are branched and united with the caudal. Pectoral obtusely pointed, the median rays longest; most of the rays appear to be bifurcate. Ventrals each of a single ray which is situated before the vertical of the anterior dorsal spine. Caudal obtusely pointed, the median rays longest and branched.

Colour-marking.—Pale brown in alcohol, the lower portion of the head and abdomen white. Large brown ocelli cover the upper and lateral surfaces of the head and nape, and the lips. The back and sides are closely covered with smaller brown spots which are darkest and most numerous anteriorly, and become fainter and more scattered posteriorly; they disappear on the posterior half of the tail. Dorsal fin with less distinct spots.

Described and figured from a specimen 108 mm. long, which was presented to the Australian Museum by Mr. E. H. Rainford.

Loc.—Port Denison, Queensland.

Family MONACANTHIDÆ.

CANTHERINES, Swainson.

CANTHERINES BRUNNEUS, Castelnau.

(Plate XXX.)

Monacanthus brunneus, Castelnau, Proc. Zool. Soc. Viet., ii, 1873, p. 108. *Id.,* Macleay, Proc. Linn. Soc. N. S. Wales, vi, 1881, p. 327.

D. ii/36; A. 31; P. 13; C. 12. Depth between the anterior dorsal and anal rays 2·3 in the distance between the snout and the base of the caudal rays; head, to the middle of the gill-opening, 3·1 in the same. Eye 3·1 in the head, and equal to the interorbital space. Dorsal spine 1·2 in the head.

Profile of the snout very concave. Ventral spine immovable and covered with sharp projecting spinules; the membrane forms a straight line between the spine and the vent. Skin finely spinate, each spine with a fleshy swelling near its tip; on the ventral membrane the spines are arranged in oblique rows; no enlarged spines on the caudal peduncle. Gill-opening situated below the hinder half of the eye. Two or three pointed, flattened teeth on each side of the upper jaw, and a large plate-like one near the angle; two teeth on each side of the mandible, those of the symphysis being much larger than any of the others. Dorsal spine above the anterior half of the eye; its upper half bears two rows of flattened spinules projecting forwards, some of which are bi- or tridentate; these decrease in size as they approach the base of the spine; posterior margins of the spine with enlarged spinules on the basal half. Dorsal and anal fins rounded, the rays longest in the anterior fourths of their lengths, and spinate near their bases. Caudal rounded, the rays alternately thick and thin, branched and largely spinate. Second ray of the pectoral longest, a little longer than the eye; the rays are spinate basally.

Colour.—Uniform brownish green, the caudal fin with curved series of darker cross-bands.

Described and figured from a specimen 72 mm. long, which differs in several details from Castelnau's description. His example was said to have only twenty-seven anal rays, whereas mine has thirty-two; he counted only seven caudal rays, but doubtless overlooked the five narrow rays which are intermediate between the seven thick ones.

Loc.—St. Crispin reef, off Port Douglas, on the outer edge of the Great Barrier, Queensland; in a tidal rock-pool; coll. A. R. McCulloch, June, 1918.

The holotype of the species, which is the only other specimen known, was secured at Knob Island, North Australia.[1]

[1] Knob Island is probably a misprint for Nob Island, which is one of the Home Group off Cape Grenville, North Queensland.

ICHTHYOLOGICAL NOTES (No. 4).

By J. Douglas Ogilby.

ORECTOLOBIDÆ.

ORECTOLOBUS TENTACULATUS Peters.[1]

In my "Check-List of Queensland Selachians"[2] I expressed a doubt as to whether the Port Adelaide and Cape York sharks recorded by Günther[3] under this name were identical, pointing out that the species had never been taken at any intermediate station. This doubt was, however, dispelled by the reception of a fine example forwarded from Port Darwin to this Museum by Mr. G. F. Hill.

STEGOSTOMA TYGRINUM (Bonnateire).[4]

During Christmas week one of these sharks was captured at Southport, and forwarded to the Queensland University.

MOBULIDÆ.

MOBULA Rafinesque.

MOBULA EREGOODOO (Cantor).[5]

Through the kindness of Mr. J. Hirst Stevens, Inspector of Fisheries, the Museum became possessed of two fine examples, a male and a female, of this "horned ray," which had been exhibited in the Fisheries Court of the 1917 Agricultural Show. Since that time I know of a third specimen having been caught in Moreton Bay, but this was unfortunately lost to science, its captors, having brought it up the river as far as Pinkenba, deciding to jettison it. Though from the infrequency of its capture the species is but little known to our fishermen, whether professional or amateur, it is possibly by no means so rare as is generally supposed.

ARGENTINIDÆ.

RETROPINNA SEMONI (Weber).[6]

During the last week of April 1917 I had the good fortune to be asked to accompany Messrs. Aird (Waterworks) and Stevens (Inspector of Fisheries)

[1] *Crossorhinus tentaculatus* Peters, Mon. Akad. Berlin, 1864, p. 123.
[2] Mem. Queensl. Mus., v, 1916, p. 76, footnote 15.
[3] Brit. Mus. Catal. Fish., viii, 1870, p. 414.
[4] *Squalus tygrinus* Bonnaterre, Encycl. Méth. Ichth., 1788, p. 8.
[5] *Dicerobatis eregoodoo* Cantor, Catal. Malay. Fish., 1850, p. 438.
[6] *Prototroctes semoni* Weber, Zool. Forsch., 1895, p. 274.

on a trip to the head waters of the Noosa River. The aim of the expedition was to test the possibilities of procuring from this source a sufficient quantity of Golden Perch (*Plectroplites ambiguus*)[7] to stock the new Gold Creek Reservoir. I may here remark parenthetically that, though we were successful in catching quite a number of these excellent fishes by trolling with a spoon-bait, we failed to bring any of them alive to Brisbane, a heavy thunderstorm which broke over the camp on the last night of our stay being doubtless a potent cause of their untimely decease. These and a single Long-finned Eel (*Anguilla reinhardtii*)[8] constituted the entire produce of our hook and line fishing. On arrival at the forks of the Upper Noosa, beyond which navigation is impossible, we noticed that the launch was quickly surrounded by numbers of small, high-swimming fishes. A few, a very few, of these, for they were lightning-quick in their movements, we managed to catch through the agency of some bread-crumbs and a small landing-net. They proved to be Crimson-spotted Sunfishes (*Melanotænia fitzroyensis*)[9] and Queensland Smelts (*Retropinna semoni*)[6] in the proportion of about three to one, thus adding another locality to the range of the latter interesting anadrom. On our way homewards we noticed a violent commotion in the water under an overhanging bank, and on investigating with a paddle we had the good luck to pick up four large and healthy River Jew-fishes (*Tandanus tandanus*),[10] the marriage ceremonies of which we had thus cruelly and wantonly interrupted. The trip through the water systems of the Lower and Upper Noosa and across Lakes Cooroiba and Cootharaba is most enjoyable, the scenery everywhere beautiful and romantic, wild and solitary; it can be earnestly recommended to anyone in search of health or pleasure. The clearness of the water in the upper reaches was responsible for a most exquisite and faithful reproduction of each leaf and bough of the overhanging trees, even the delicate fronds of the fragile "climbing maidenhair"[11] being photographed reversedly with a vivid intensity almost unbelievable, bringing back to one's mind Wordsworth's well-nigh forgotten duplicate swan.

MONOPTERIDÆ.

MONOPTERUS ? ALBUS (Zuiew)[12]

During last June I received from my good friend Mr. James Palmer of Cowan Cowan, Moreton Bay, a small but most interesting collection of fishes obtained by him at that place. It consisted of a very large *Nomeus gronovii*

[7] *Dules ambiguus* Richardson, Zool. Erebus & Terror, ii, 1844, Fish., p. 26, pl. xix.

[8] Steindachner, Sitz. Akad. Wien, lv, 1867, p. 15.

[9] *Aristeus fitzroyensis* Castelnau, Proc. Linn. Soc. N. S. Wales, iii, 1878, p. 141.

[10] *Plotosus* (*Tandanus*) *tandanus* Mitchell, Exp. Int. East. Austr., ed. 2, i, 1838, p. 95, pl. v, fig. 2.

[11] *Lygodium scandens* (Swartz) Bailey, Queensl. Flora, vi, 1902, p. 1934.

[12] *Muræna alba* Zuiew, Nov. Act. Acad. Sci. Petropol., vii, 1797, p. 299, pl. vii, fig. 2.

(Gmelin),[13] measuring 128 mm., a *Psenes whiteleggii* Waite,[14] two of the beautiful *Rhadinocentrus ornatus* Regan,[15] which appears to be confined to Moreton Island, and two of the above symbranchs. Though certain differences between these specimens and the descriptions of *M. albus* were perceptible, I considered it advisable, owing to the absence in this Museum of examples for comparison and the very small size (135 and 120 mm.) of this pair, to send them to Mr. McCulloch for further examination, and I give here the very interesting notes which he has kindly forwarded to me on the subject:—"An examination of your two small *Monopterus* does not enable me to identify them as *M. albus*, with three of which I have compared them. They appear generally similar, but the gill-opening is much farther back in your specimens; in *albus* it is in advance of the origin of the lateral line, and in yours well behind that point. I can think of no more satisfactory way of expressing the character. Again your specimens have distinct caudal rays, whereas the others have none, but this is perhaps due to their very small size. The teeth in your specimens are villiform, in a band in each jaw which is fairly wide anteriorly, but becomes very narrow laterally; they form a small forward projection at the premaxillary symphysis. They appear to be biserial on each palatine anteriorly, becoming uniserial posteriorly. They are evidently quite similar to those of *M. albus*."

The following table of comparative measurements is drawn up from the measurements of the five specimens kindly taken by Mr. McCulloch—following Day:—

	Batavia, 653 mm.	Malaysia, 512 mm.	Burma, 267 mm.	Moreton Bay, 135 mm. I. 17/2835.	Moreton Bay, 120 mm. I. 17/2836.
Head to head and trunk	9·5	9·25	8·83	6·5	6·5
Tail to total length	3·5	4·13	4·16	3·3	2·75
Eye to head	12·25	12·6	11·5	11·6	11·5
Eye to snout	2·25	2·4	2·25	2·13	2

This is the first record of the occurrence of this genus in Australian waters.

SILURIDÆ.

HEXANEMATICHTHYS AUSTRALIS (Günther).[16]

Some time ago the Museum received the head of a very large catfish belonging to this species, which had been caught in the Burnett River. In an MS. description of the "Estuary Catfish," drawn up from an examination of

[13] *Gobius gronovii* Gmelin, Syst. Nat., i, 1788, p. 128. I scarcely think it advisable to substitute the generic name *Gobiomorus* for that used here; v. Jordan, Guide to the Study of Fishes, ii, p. 285.

[14] Proc. Linn. Soc. N. S. Wales, xix, 1894, p. 218, pl. xvii, fig. 1.

[15] Trans. Zool. Soc. London, xx, 1914, p. 280, pl. xxxi, fig. 1.

[16] *Arius australis* Günther, Proc. Zool. Soc., 1867, p. 103, c. text-fig. of upper surface of head.

nine examples, measuring between 154 and 427 mm., I find that the proportional length of the body averages 1 to 3·4. On this basis the example in question would have measured fully 700 mm. to the end of the hypural bone and 925 to the tip of the caudal fin. Previous to this record the largest specimen of which I have a note was only 520 mm. long over all.

BELONIDÆ.

TYLOSURUS MACLEAYANUS (Ogilby).[17]

Through the generosity of Mr. J. Trevethan the Museum, during last October, became the recipient of the largest example of this needle-fish which I have as yet seen, its total length from the tip of the snout to the end of the lower caudal lobe being 1,013 mm. Following are some of the more important measurements taken from the fresh specimen:—Tip of snout to vent 686, width of body 70, depth of body 72, length of head 255, of postorbital head 73, of snout 172, diameter of eye 27, width of interorbit 46, lower caudal lobe 123 mm. I do not think *Tylosurus impotens*[18] can be separated from this species, notwithstanding that the maxillary is partly visible when the mouth is closed.

SERRANIDÆ.

CROMILEPTES ALTIVELIS (Cuvier & Valenciennes).[19]

A fine example of this northern species was taken recently by an angler at the "yellow patch," Moreton Bay, and presented to the Amateur Fishermen's Association, in whose collection it now is. The most southerly point from which it has previously been recorded is "Cairns Reef,"[20] which is located some miles south of Cooktown, the other known Australian stations being Darnley Island[21] and Port Essington.[22] This lucky capture, therefore, not only adds another interesting species to the fauna of our wonderful Bay, but extends the fish's southerly range by about 1,000 miles.

POMADASIDÆ.

PLECTORHYNCHUS RETICULATUS (Günther).[23]

In the last issued part of the Endeavour Fishes McCulloch described and figured this species from an unspecified New South Wales locality. About the same time a specimen, caught in Moreton Bay, came into my hands, and is now in the State Museum. There are now, therefore, four recorded Australian localities for this fish, namely—Cape York (Günther), Little Island, W. A. and New South Wales Coast (McCulloch), and Moreton Bay.

[17] *Belone macleayana* Ogilby, Catal. N. S. Wales Fish., 1886, p. 53.
[18] Ogilby, Proc. Roy. Soc. Queensl., xxi, 1908, p. 89.
[19] *Serranus altivelis* Cuvier & Valenciennes, Hist. Nat. Poiss., ii, 1828, p. 324, pl. xxxv.
[20] McCulloch, *in lit.*
[21] Ogilby, Mem. Queensl. Mus., ii, 1913, p. 90.
[22] Boulenger, Brit. Mus. Catal. Fish., ed. 2, i, 1895, p. 272.
[23] *Diagramma reticulatum* Günther, Brit. Mus. Catal. Fish, i, 1859, p. 334.

SCOMBRIDÆ.

GRAMMATORYCNUS BICARINATUS (Quoy & Gaimard).[24]

In September, 1915, McCulloch described and figured a specimen of this fish which had been taken by trolling a few miles south of the Tweed Heads in June, 1914, this being the first record of its occurrence on the Coast of Eastern Australia. It was, therefore, with much pleasure that I recognised a fine specimen among the fishes exhibited in the Fisheries Court at the last Agricultural Show. This specimen was captured off Cape Moreton and, though presented to the Museum by the Inspector of Fisheries, was surreptitiously taken away and consumed by some uncredited individual. Since then I have been shown by Mr. C. Dahl a drawing of a fish, taken off Moreton Bay by two Maitland sportsmen, using a trolling rod and line. In this figure not only is the double lateral line correctly shown, but the position of the vertical fins and the number of finlets are accurately given. It would, therefore, appear that this fish annually visits our offshore waters during the winter months, and that our failure hitherto to realise the presence of this and allied species is merely due to the lack of proper appliances for their capture.

TEUTHIDIDÆ.

TEUTHIS MATOIDES (Cuvier & Valenciennes).[25]

During the latter end of November 1917 the Museum received through the courtesy of Mr. A. A. Gilmour, manager of the State Fish Market, an exceptionally fine example of this fish, measuring no less than 444 mm. To one who only knows the species from preserved specimens the colours of the fresh fish were a revelation. The head and body were of the deepest imperial purple, shading to lilac on the breast and throat, while the outer fourth of the pectoral was brilliantly golden. The vertical fins, however, were without blue lines.

SCORPÆNIDÆ.

PTEROIS Cuvier.

Key to the Queensland species.

a^1. Pectoral fins extending beyond the base of the caudal (PTEROIS).

b^1. Interorbital region deep.

c^1. Genal ridge narrow and feebly spinose.

d^1. Supraorbital filament long ; nape naked .. .. 1. *volitans*[26]

d^2. Supraorbital filament short ; nape scaly .. .. 2. *lunulata*[27]

c^2. Genal ridge broad and densely spinulose.

e^1. Interorbital region deep; supraorbital filament moderate .. .. 3. *kodipungi*[28]

[24] *Thynnus bicarinatus* Quoy & Gaimard, Voy. Uranie, Zool., 1824, p. 357, pl. lxi, fig. 1.

[25] *Acanthurus matoides* Cuvier & Valenciennes, Hist. Nat. Poiss., x, 1835, p. 204.

[26] *Gasterosteus volitans* Linnæus, Syst. Nat., ed. 10, i, 1758, p. 296 : Amboina.

[27] Schlegel, Faun. Japon., Pisc., 1842, p. 45, pl. xix : Nagasaki, Japan.

[28] Bleeker, Nat. Tijds. Nederl. Ind., iii, 1852, p. 450 : Banca.

a^2. Pectoral fins not extending to the caudal (DENDROCHIRUS).

f^1. Interorbital region broad and shallow; genal ridge broad and densely spinulose; supraorbital filament short .. .. 4. *miles*[29]

f^2. Interorbital region narrow and deep; genal ridge narrow and feebly spinose; supraorbital filament long .. .. 5. *zebra*[30]

CARACANTHIDÆ.

CARACANTHUS UNIPINNA (Gray).[31]

The reputed scleroderm from the Banks Islands described by De Vis[32] as *Trachycephalus*[33] *bankiensis* proves on examination to be identical with the above fish. I am indebted for this determination to my friend and colleague Mr. Allan R. McCulloch, to whom I forwarded three examples under the impression that they were an aberrant *Gobiodon*. We do not consider the trivial character of the continuity of the dorsal fin sufficient justification for the removal of this fish to the special genus *Amphiprionichthys*.

Mr. McCulloch kindly sends me the synonymy of our genus and species, which may be advantageously inserted here:—

GENUS CARACANTHUS, Kroyer.

Micropus Gray, Zool. Misc., 1831, p. 20. (*M. maculatus* Gray). Not *Micropus* Wolf, 1810.

Caracanthus Kroyer, Naturhist. Tidsskr., i, 1844, p. 267. (*C. typicus* Kroyer); Jordan & Evermann, Bull. U. S. Fish. Comm., xxiii, i, 1905, p. 453.

Amphiprionichthys Bleeker, Nat. Tijds. Nederl. Ind., viii, 1855, p. 170 (*A. apistus* Bleeker).

Centropus Kner, Sitz. Akad. Wien, xxxix, 1860, p. 531 (*C. staurophorus* Kner). Not *Centropus* Illiger, 1811.

Crossoderma Guichenot, Nouv. Arch. Mus. Hist. Nat., v, 1870, p. 194. (*C. madagascariense* Guichenot).

Trachycephalus De Vis, Proc. Linn. Soc. N. S. Wales, viii, 1884, p. 455. (*T. bankiensis* de Vis) Not *Trachycephalus* Tschudi, 1838, *nec alio*.

Trachycephalus De Vis proves to be synonymous with *Caracanthus* Kroyer, and agrees with the subgenus *Amphiprionichthys* Bleeker in having the dorsal fins united.

[29] *Scorpæna miles* J. W. Bennett, Fish. Ceylon, 1851, pl. ix: Ceylon.

[30] Cuvier & Valenciennes, Hist. Nat. Poiss., iv, 1829, p. 367: Mauritius.

[31] *Micropus unipinna* Gray, Zool. Misc., 1831, p. 20.

[32] Proc. Linn. Soc. N. S. Wales, viii, 1884, pp. 455, 456.

[33] De Vis was unfortunate in his choice of a generic name, *Trachycephalus* having been used thrice previously—by Tschudi in Batrachians 1838, by Swainson in Fishes 1839, and by Gray in Reptiles 1845.

CARACANTHUS UNIPINNA (Gray).

Micropus unipinna Gray, Zool. Misc., 1831, p. 20.
Amphiprionichthys apistus Bleeker, Nat. Tijds. Nederl. Ind., 1855, p. 170.
Centropus staurophorus Kner, Sitz. Akad. Wien, xxxix., 1860, p. 531.
Caracanthus apistus Bleeker, Atlas Ichth., ix, 1878, pl. cccexvi, fig. 5; Jordan & Evermann, Bull. U. S. Fish. Comm., xxiii, i, 1905, p. 454.
Trachycephalus bankiensis De Vis, Proc. Linn. Soc. N. S. Wales, viii, 1884, p. 456.

The three cotypes of *T. bankiensis* De Vis agree in all details with Bleeker's figure of *C. apistus*, which is apparently synonymous with *C. unipinna*.

Loc.:—Banks Islands, northern New Hebrides. The species ranges from Zanzibar to Hawaii.

PLATYCEPHALIDÆ.

PLATYCEPHALUS MARMORATUS Stead.[34]

While snappering in the winter of 1917 I was fortunate enough to obtain a fine specimen of this handsome flathead, this being the first record of its occurrence in Queensland waters. It was captured on the outer bank off Caloundra.

TETRAODONTIDÆ.

SPHEROIDES MULTISTRIATUS (Richardson).[35]

In a previous number of these "Memoirs"[36] I described a specimen of this rare toadfish, which had been forwarded from Townsville to the Queensland Museum. Last winter, when on a snapper trip to the Caloundra Banks, I was both surprised and pleased, on making my usual tour of inspection at the termination of a drift, to find a large example of this species lying discarded on the deck, having evidently been thrown aside as worthless; it was incontinently commandeered.

CERATODONTIDÆ.

The Queensland Museum has lately received, through Mr. A. A. Gilmour, Manager of the State Fish Market, a specimen of *Neoceratodus*[37] *forsteri* from the Coomera River, which measures only 495 mm., and thus definitely proves that the fishes introduced by the late Mr. D. O'Connor on Aug. 29, 1896, are breeding in that river; these fishes ranged from 33 to 45 in. in length. This gives us some hope that they are similarly reproducing their species in the other waters in which they were placed about the same time. The history of these liberations may profitably be given here in Mr. O'Connor's own words[38]:—"On May 7, 1895, eight were put in the North Pine River about a mile above tidal influence. The next, a lot of five, were on the 17th of November placed in a lagune near the Albert River, on the property of Messrs. Collins and Sons. On the 15th December I took eight to Mr. D. C. McConnel and Sons, Cressbrook; these were

[34] New Fishes from New South Wales, 1908, p. 9, pls. iii to v.
[35] *Anchisomus multistriatus* Richardson, Voy. Herald, 1854, p. 160, pl. xxix.
[36] Vol. iii, p. 128.
[37] *Epiceratodus* Teller, Abh. Geol. Reich., xv, 1891, Heft. 3 is antedated fifteen years by *Neoceratodus* Castelnau.
[38] Proc. Roy. Soc. Queensland, xii, 1897, p. 101-2.

liberated in a dam, which communicates with the Brisbane River. On returning from a visit to New Zealand I recommenced the work, and on the 28th of May liberated eighteen in the Enoggera Reservoir. Twenty-one were taken to Warwick on the 31st of July and put in the Condamine. On the 29th of August sixteen were liberated in the waters of the Upper Coomera. Two were on the same day placed in a pond at the Botanical Gardens."[39] I have records of several specimens from the Pine and Coomera Rivers, of one from the Enoggera Dam, and of one from the Condamine having been killed. It is much to be regretted that, after all the trouble and expense which has been incurred to transplant these unique fishes to new homes, they are relentlessly destroyed when opportunity offers. It may be useful here to remind my readers that these fishes are now protected by law, and that their destruction is, therefore, a punishable offence. Such as are caught should at once be returned to the water. In this case, however, Mr. Whalley, its captor, informs me that the fish was taken in salt water at the mouth of the river; when first seen it was lying outside the net, and appeared to be sick and unable to help itself, so that he lifted the net and pushed it under with an oar; evidently its condition was due to the salinity of the water.

ADDENDA.

TORPEDINIDÆ.

HYPNOS SUBNIGER Duméril.[40]

Through the courtesy of Mr. J. Hirst Stevens, Inspector of Fisheries, the Queensland Museum has acquired a very fine female example of this electric ray, which formed one of the exhibits in the Fisheries Court of the National Show, 1918, and was an object of much curiosity and no little scepticism—as regards its shock-giving proclivities—to thousands of interested sight-seers. It was captured by seine net at Cape Moreton by Mr. George Crouch and party, and measures 572 mm. from the tip of the snout to that of the tail. This is the fourth recorded Queensland occurrence, the others being[41] *a*, a young female, labeled Moreton Bay, belonging to the Old Collection of the Queensland Museum; *b* and *c*, an immature pair, male and female, trawled by the Endeavour in 13 fathoms on fine dark sand off South Hill.

CARANGIDÆ.

APOLECTUS NIGER (Bloch).[42]

During August the Queensland Museum received a fine specimen of this fish, measuring 380 mm. in total length and weighing slightly over five pounds. For this noble addition to our marine fauna I have again to thank the acumen of the officers of the State Fish Market who, recognizing that it was a novelty, at

[39] See also — Bancroft, Proc. Roy. Soc. Queensl., xxiii, 1912, p. 251 & ibid., xxx, 1918, p. 91.

[40] Rev. & Mag. Zool., 1852, p. 279.

[41] See Ogilby, Mem. Queensl. Mus., v, 1916, p. 83.

[42] *Stromateus niger* Bloch, Ausl. Fisch., xii, p. 93, pl. cccexxii.

once put it aside for my inspection. The fish was taken in the Coomera River by Messrs. Brady Bros. on the 14th inst., and is the first recorded instance of its occurrence in Australian waters.

SPARIDÆ.

SPARUS BERDA Forskål.[43]

On the 24th inst., when paying my weekly visit to the Fish Market, I was shown a small bream, which had been taken along with the ordinary species at Caloundra, and was surprised and delighted to recognize in it a representative of the northern "pikey bream," of which the most southerly previous record was that of Macleay from the Lower Burdekin. Possibly the species may not be so rare as is supposed, but has been confounded with the common bream (*S. australis*).[44] From this and the tarwhine (*S. sarba*)[45] it is at once distinguishable by the great size and strength of the second anal spine, which has suggested the vernacular name here employed.

SCOMBRIDÆ.

GRAMMATORYCNUS BICARINATUS (Quoy & Gaimard).[46]

During the first week of August, when paying a visit to the State Fish Market, I was shown a specimen of this fish, weighing 30 lb., which was caught in the Bay in company with School Mackerel (*Scomberomorus* spp.)

URANOSCOPIDÆ.

ICHTHYSCOPUS LEBECK (Schneider).[47]

To Mr. J. Tait, of Tewantin, the Museum is indebted for an exceptionally large example of this "stargazer," measuring 542 mm. in total length. On opening it the stomach was found to be filled to repletion with the remains of other fishes, some of which, on the evidence of the bones, must have been of considerable size. The specimen was a female, and the ovaries contained eggs in an advanced stage of maturity. These are exceedingly small for the size of the fish, so much so that I considered it worth while attempting to compute the number of ova about to be shed by this specimen. The mass of eggs weighed exactly 7 oz., and by carefully removing a portion weighing one sixty-fourth of an ounce (3 grs.), and washing this out until each ovum became separated from its fellows, I arrived by careful counting at 1,160 eggs for the 3 grs., which when multiplied by 448 gives the astonishing total of 519,680. Mr. Longman, who made his calculations by a somewhat different method to that employed by me, arrived at a total of slightly under half a million, a difference quite inappreciable when dealing with figures of such magnitude.

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[43] Descr. Anim., 1775, p. 32. See also remarks under *S. latus* by Jordan & Thompson, Proc. U.S. Nat. Mus., xli, 1912, p. 585-6.

[44] *Chrysophrys australis* Günther, Brit. Mus. Catal. Fish., i, 1859, p. 494.

[45] Forskål, ibid., p. 31. See remarks under *S. aries* by Jordan & Thompson, ibid., p. 483.

[46] See p. 101 antea.

[47] *Uranoscopus lebeck* Schneider, in Bloch, Syst. Ichth., 1801, p. 47.

ENTOMOLOGICAL CONTRIBUTIONS.

By Henry Hacker, F.E.S.

(Plates XXXI, XXXII.)

NOTES ON COLLECTING HYMENOPTERA.

While some of our wasps and bees have a wide range, many of them are very local; consequently the number to be obtained in any one locality is usually not large and is greatly influenced by the climate, soil, and flora. In Queensland the richest localities are contained within the coastal strip of country between the sea and the Main Range. One might think that the Northern scrubs or rain forests, with their dense tropical vegetation and a hot steamy atmosphere, would be an ideal place for Hymenoptera, but it is not so. As the majority of the wasps and bees make burrows and nests in the ground, it is essential that both they and their food supplies be kept dry and free from conditions favourable to the growth of fungi and moulds. Consequently a comparatively dry climate, together with a light sandy soil in which the fossorial species can easily burrow, will be found the most favourable habitat. The flora also is an important factor; districts with a varied flora, the flowering periods of which extend over the whole summer, will obviously support a much larger population of bees than a locality where the plant population is limited and the flowering period lasts only a few weeks. This applies to the domesticated as well as the wild bees.

The best collecting grounds for Hymenoptera in the Brisbane district are on the South Coast line at Sunnybank, Birkdale, and Cleveland, and on the North Coast line at Caloundra. Stradbroke Island, which consists mostly of pure sand, is very rich in Hymenoptera. It is also remarkable in possessing several species of Thynnidæ which, while occurring commonly about Sydney, have not yet been recorded from the Queensland coast.

In most localities in South Queensland, bees and wasps make their appearance in early spring, simultaneously with the flowering of *Leptospermum*, which generally commences about the last week in August and continues throughout September. After this spring burst of insect life there is a constant succession of fresh forms until the hot midsummer, when a lull takes place. Although the species are more numerous at this time, the specimens are less plentiful, and require to be specially searched for in favourite localities. After the summer rains,

when the weather is settled, there is an autumn burst of life which consists chiefly of the second brood of the same species which appeared in the spring, although generally speaking they are not so numerous as the first brood.

When the *Leptospermum* flowers are beginning to open one can pick off any desired insect with the net without any difficulty; later on it is not so easy, as it is impossible to catch one without getting a dozen other insects at the same time, and sometimes the desired specimen escapes in the confusion. The plan which I adopt is to pass quickly among the flowering bushes, sweeping the insects off with the net before they have time to become alarmed. When the mass of insects, petals, leaves, &c., at the bottom of the net have accumulated into a good-sized ball, I put it together with part of the net into a wide-mouthed killing bottle for a few minutes; it can then be safely turned out into the killing bottle and another "sweep" made. By this means numbers of minute bees and wasps are captured which would otherwise be overlooked.

Another good method of collecting Hymenoptera, and one which proves very successful when the conditions are favourable, is to take note of all the dams and waterholes in the district to be collected over, and then visit them in November or December. About that time they will be nearly dry and the mud around the edges will be visited by many fine wasps and bees. Some of the wasps go to obtain mud for cell-making; some predatory species go to capture other insects; while the bees go to satisfy their thirst and also to obtain water for their larvæ. Every beekeeper knows what a large quantity of water the bees require in the spring when brood-rearing is going on. The wild bees under similar circumstances also consume a quantity of water.

An unusual method is the following, which is copied verbatim from my note-book:—"On November 18th I happened to be collecting in the neighbourhood of Sunnybank. It was one of the hottest days experienced this season, and in addition a hot wind was blowing. No insects were to be seen on the wing, and my prospect of obtaining anything on such a day seemed small. While passing a large eucalypt which was in flower I noticed a few large Diptera on the side which was sheltered from the hot wind, and on closer examination found scores of insects belonging to nearly all the orders, the Hymenoptera and Diptera predominating. There were also a fair number of Hemiptera, while Coleoptera were in great numbers under pieces of loose bark and in every crack and cranny. The remainder of the day was spent in examining similar tree-trunks, the result being a record for one day's collecting. In Hymenoptera alone fifteen species of bees and forty-seven species of wasps were taken on the sheltered sides of these trees." Evidently the insects had been attracted to the flowers earlier in the day; but the intense heat, together with the hot wind, drove them to the trunks for shelter.

A final word of advice is to collect flower-frequenting species in the morning. The flowers yield their nectar freely in the forenoon. In the heat of

the day this nectar dries up and the flowers consequently lose most of their attractive power. My experience is that one hour's collecting in the early part of the day is more productive than that of two hours in the afternoon.

NOTES ON NESTS OF MONEREBIA EPHIPPIUM, Fabr.[1]

A fine nest of this wasp was found at Sunnybank on July 13th, attached to the inside of a hollow log lying on the ground. It was about seven inches long, four inches wide, and contained ten cells. The cells were made of sand mixed with clay, and were arranged alternately in two rows. The walls of the cells were very thick, and the entire nest had such a massive appearance that it was hard to believe it to be the work of a single wasp. In this particular nest the usual funnel-shaped entrance had been broken, only a small portion being left attached to the nest. On two previous occasions I have found nests of this wasp, and each was furnished with a funnel-shaped entrance.

Six of the cells contained full-grown living larvæ. The interior of these cells was beautifully smooth, and was lined with a thin silken membrane resembling tissue paper. The outer side of the nest was of clay which had been plastered smooth, so that it had a shiny or greasy appearance. The clean, smooth appearance of the interior of these cells made one wonder what had become of the excreta and débris of food. On further examination it was found that at the end of each cell, outside the silk lining, between that lining and the wall of the cell, there was a cavity into which the larvæ had closely packed all excreta and débris.

Two of the cells were found to be full of dead caterpillars (all consisting of the same species, *Clania ignobilis*, Wlk., belonging to the family Psychidæ), empty puparia of Tachinid flies, dead Tachinid flies, and some excreta.

The contents of the first cell were fourteen dead larvæ of *Clania ignobilis*, nine empty puparia of Tachinid flies, six dead Tachinid flies, three dead Tachinid flies still contained in puparia. The second of the two cells contained fifteen dead larvæ of *Clania ignobilis*, eleven dead Tachinid flies, eleven empty puparia of Tachinid flies.

Judging by the contents of these two cells, it would appear that the caterpillars were parasitised by Tachinid flies before being placed in the cells by the *Monerebia*. The young *Monerebia* larvæ had starved owing to the Tachinid larvæ having consumed the most nutritious portion of the caterpillars. The adult Tachinid flies had died after successfully emerging from the pupal state, because of their inability to leave the sealed-up cells.

Two other *Monerebia* cells were found to be occupied by living larvæ of a smaller species of wasp, *Pison aurocericeum*, Rohw. Both cells had been divided

[1] I have used the name *Monerebia* instead of the better-known *Abispa* on the authority of Meade-Waldo (Ann. & Mag. Nat. His., p. 461, 1914).

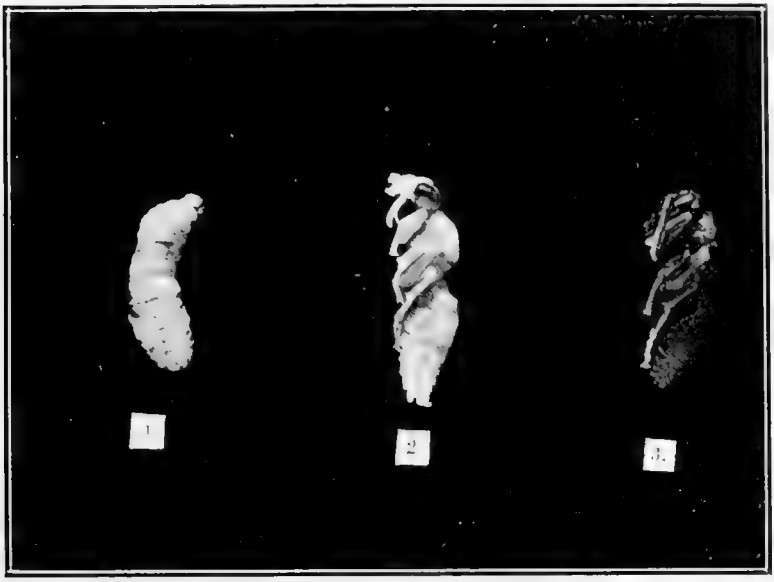

Fig. 1.—MONEREBIA EPHIPPIUM Fabr.
1, Larva; 2, pupa (early stage); 3, pupa (later stage).

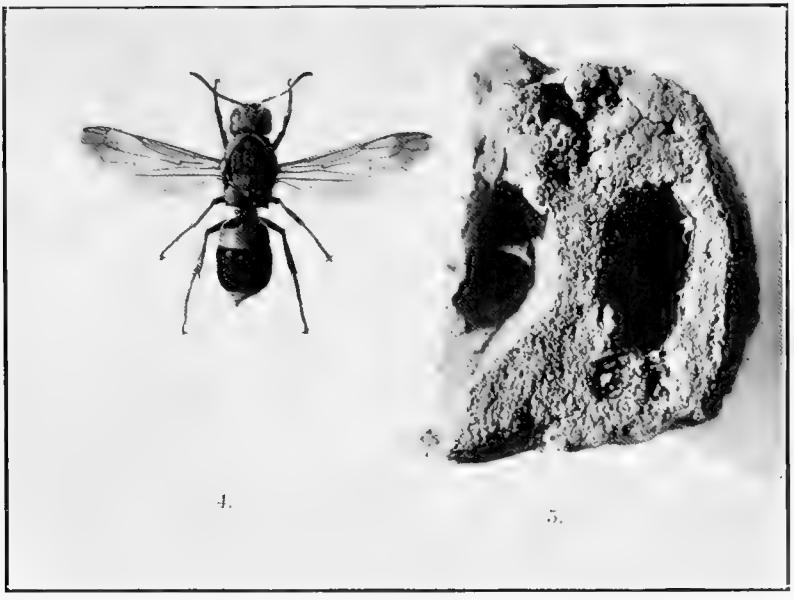

Fig. 2.—MONEREBIA EPHIPPIUM Fabr.
4, Adult wasp (female); 5, part of nest showing excreta packed in end of cell.
All Natural Size.

Photographs by H. Hacker.

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into three smaller cells by means of two transverse walls of clay; each of these smaller cells was occupied by a larva of *Pison aureosericeum* enclosed in a yellow semi-transparent skin. They were all lying transversely to the longitudinal axis of the *Monerebia* cell.

These seem to be instances of "appropriation." The cells had been left empty for some reason, and had been taken possession of by *Pison aureosericeum*, but finding them too large for its purpose it had divided each cell into three smaller cells. Two of the *Pison* larvæ were parasitised by a dipterous insect belonging to the genus *Anthrax*. These parasites emerged on September 25th, and left their empty pupal cases protruding half through the wall of the cells.

The *Monerebia* larvæ remained in a dormant or sleeping condition within their cells throughout the winter; most of them changed into pupæ during the last week in September. The pupa is not enclosed in a skin or cocoon, but lies quite nakedly within the cell; when newly changed it is pale yellow, with the exception of the abbreviated wings, which are deep amber. The outline of the future wasp is very distinct; the antennæ lie straight down in front along the outer side of the mandibles; the legs are packed close to the sides; even the segments of the abdomen are quite plain, and can easily be counted. When the pupa is a week old the eyes become dark-brown, the other parts remaining the same colour as before. During the third week the black and orange colours of the adult begin to show; the black second segment of the abdomen and the mesothorax showing very distinctly. The adult wasps emerged about a month from the time they pupated.

With regard to the funnel-shaped entrances to the nests made by *Monerebia* and a number of other Eumenid wasps, I am of opinion that they are constructed as a precaution against ants and other marauding insects. In one or two instances which came under my notice they were made quite early in the construction of the nest, and were used for entrance and exit by the female wasp while storing the newly made cells with food. As the cells would necessarily remain open and exposed until they had received their full complement of provisions, it can be easily seen what a protection a funnel would be. All the nests found by me were in dark corners and crevices, and the mouths of the funnels were in all cases pointing downward. It would be a bold insect that would venture far up a smooth and slippery funnel in almost total darkness. After the work of provisioning and ovipositing inside the nest is finished, the female wasp closes the hole at the base of the funnel with a plug of clay. The funnel is then of no further use, as it is not needed for the emergence of the young wasps, each of which issues from a hole cut through the end of its cell.

The industry of *Monerebia ephippium* can be best realised by the fact that this nest weighed eight ounces. In addition to this, and taking fourteen larvæ as the average contents of each cell, the wasp must have caught at least 140 larvæ of *Clania ignobilis* to furnish food for its progeny.

NOTES ON WASPS FREQUENTING ASCLEPIAS CURASSAVICA.

Asclepias curassavica is not indigenous to Australia, having been introduced into this country from America within comparatively recent years. At the present time the plant exists throughout the eastern coast lands of the continent. It is a well-known and interesting fact that the introduction of the plant marked also the introduction of the butterfly *Danaida archippus*, Fabr.,[2] the existence of which in this country is co-extensive with the existence of the plant.

While collecting insects last season, I captured a wasp having the curious winged pollen of the above plant attached to its tarsi. By looking specially for wasps similarly affected, I obtained quite a number belonging to the following species:—*Chlorion vestitus*, Sm.; *Odynerus bicolor*, Sauss.; *Odynerus nigrocinctus*, Sauss.; *Ecthromorpha insidiator*, Sm. All these species had the paddle-shaped pollen of *Asclepias* attached to their tarsi, tarsal claws, and occasionally to their mouth parts.

All the above-mentioned wasps are endemic, and have a wide range in Australia; and three of them possess strong powers of flight. There is little doubt that their assistance in fertilising the flowers of *Asclepias* has tended to spread the plant over areas on which it was not previously found.

NOTES ON BEES.

Lestes bombylans, Sm.—A number of nests belonging to these bees were collected at various places near Brisbane, and it was noticed that they made use of several different kinds of wood in which to build their cells. At Caloundra the nests were plentiful in the early summer inside the dry flower-stems of Grass-trees, *Xanthorrhaa*. The nests were also found on the edge of a swamp inside dead *Leptospermum* stems. At Stradbroke Island they were numerous, and were all found inside the stems of young Shea-oaks (*Casuarina*) which had been killed by grass fires. None of the Stradbroke Island specimens were found occupying *Xanthorrhaa* flower-stems, although that plant occurred plentifully in the neighbourhood.

While the nest is under construction, the female bee spends the night just inside the entrance-hole. If disturbed, or if danger threatens, she rushes to the hole, which she blocks up with her head, at the same time making a loud buzzing noise.

Trichocolletes venusta, Sm.—During a period of four years of observation this species has been found to be the first to appear in the spring. There are a few bees which may be taken singly on fine days throughout the winter months,

[2] First recorded by Miskin as occurring in considerable numbers at Brisbane in 1870 (Ent. Mo. Mag., vol. viii, p. 17).

Fig. 1.—Lestis bombylans at flowers of *Leptospermum flavescens*. Natural Size.

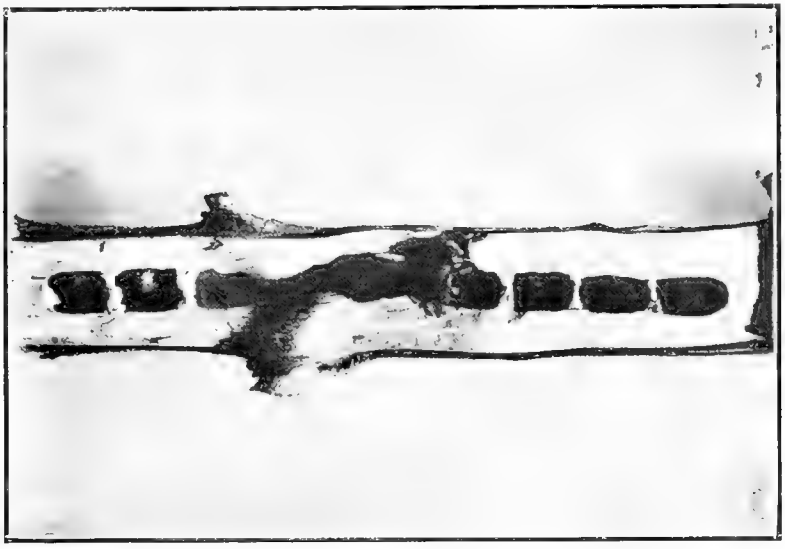

Fig. 2.—Section of Shea-oak (Casuarina) showing nest of *Lestis bombylans*. Half Natural Size.

Photographs by H. Hacker.

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mostly belonging to *Prosopis*; but the above insect is always the first to come out in numbers. They invariably appear during the first week in August, visiting flowers of *Hovea longifolia* and *Daviesia ulicina*. Most of the males were taken on the former plant, while all the females were taken on the latter.

Megachile rhodogastra, Ckll.—There is a native tree, *Mallotus philippinensis*, in my garden which was so frequented by large numbers of *M. rhodogastra* that some of the branches presented quite a ragged appearance, many leaves having portions cut away. Last season I planted a number of rose-bushes about fifty feet from the *Mallotus*. Since that time the bees have discarded the native tree, and obtain all their nesting material from the rose-bushes. There were no rose-bushes in the vicinity previous to my planting. From these facts it would appear that *M. rhodogastra* prefers rose-leaves for nest-building; but, in their absence, will utilise other kinds of leaves possessing a somewhat similar texture.

Euryglossa hæmatura, Ckll.—This species was found on the 16th December nesting in the perpendicular bank of a creek. The exit-holes were about a quarter of an inch in diameter, and were scattered in patches along the bank, one patch consisting of over fifty holes. On digging away part of the bank the tunnels were seen to extend for five or six inches. They were not straight, but bent and twisted in all directions. At the extreme end of each tunnel was a cell lined with a very thin and delicate membrane. A number of these cells were dug out, and all contained larvæ of different sizes, from newly hatched to nearly full-grown. The cells which contained the smaller larvæ were full of a thin semi-liquid substance the colour of gamboge. The bees were busy entering and leaving their cells; they do not hesitate at the entrance of their holes like some species of *Halictus*, but enter the instant they reach it. The bank was full of medium-sized pebbles, and it may be possible that the tunnels were twisted and turned to avoid the stones; but I cannot be certain of this, as I have not seen nests elsewhere.

SOME BEES COLLECTED IN QUEENSLAND.

By T. D. A. Cockerell.

The present paper is a report on a collection of bees recently sent from the Queensland Museum. All were collected by Mr. H. Hacker in Queensland, with the exception of a single *Halictus* from New South Wales. Mr. Hacker's industry is revealing a remarkable bee-fauna in the region about Brisbane. A rather surprising number of the Mackay species, known from the collections of Rowland and Gilbert Turner, go south to Brisbane; while several of the New South Wales species also occur, no doubt near the northern limit of this range. There are, in addition, many species discovered by Mr. Hacker, and not at present known from other parts of the country. The numbers cited in the list are those of the Queensland Museum.

COLLETIDÆ.

Paracolletes hackeri n. sp. Brisbane, Sept. 20, 1916. (209.)

♀. Length 10 mm.; head, thorax, and legs black; abdomen with first three segments dark steel blue, the others black; pubescence greyish white, mixed with black on mesothorax, black on scutellum, and caudal fimbria black; under side of thorax, abdomen, and bases of legs with pure white hair; clypeus shining, distinctly punctured; lower part of supraclypeal area smooth and polished; antennæ dark, the flagellum reddened apically; mesothorax and scutellum shining, sparsely punctured; basal part of area of metathorax dull and granular, no transverse carina on metathorax; tegulæ black; wings slightly dusky, stigma and nervures black; first r.n. joining middle of second s.m., b.n. meeting t.m.; hind tibial scopa white; abdomen smooth, with weak punctures.

Closely allied to *P. providus* Smith, but differing in the sculpture of the abdomen. All my specimens of *P. providus* are from Victoria, where it seems to be common.

Paracolletes helichrysi n. sp. Tambourine Mtn., at flowers of *Helichrysum bracteatum*, Oct. 27, 1912. (205.)

♀. Length 7 mm.; robust, black, the hind margins of abdominal segments broadly fusco-testaceous; pubescence greyish white, on dorsum of thorax pale ochreous, with some dark fuscous hair on disc of scutellum and mesothorax; clypeus shining, with large, irregular punctures; face broad; tongue as in *Colletes*; flagellum short, dull ferruginous beneath, except basally; mesothorax and scutellum shiny, feebly punctured; area of metathorax triangular, smooth and shining; tegulæ black; wings hyaline, faintly dusky at apex, stigma and nervures dark fuscous; b.n. arched, meeting t.m., second s.m. narrow, receiving r.n. about middle; legs with greyish-white

hair, orange on inner side of tarsi; hind tibial scopa loose and strongly plumose; abdomen dull, appearing finely granular under a lens; apical fimbria more or less brownish.

Rather like *P. halictiformis* Ckll. and *P. sigillatus* Ckll., but quite distinct.

PROSOPIDIDÆ.

Prosopis constricta Ckll. Brisbane, Aug. 2, 1916. (171, 188.)

The mark between the antennæ is present in one specimen, absent in the other.

Prosopis cyaneomicans Ckll. var. **nigrescens** n. var. Bribie Island, Jan. 1917. (172.)

Flagellum black, obscurely brown beneath; stigma and nervures brownish black.

Prosopis disjuncta Ckll. Caloundra, Jan. 20, 1916. (174.)

Prosopis chromatica Ckll. Brisbane, Sept. 10 and 16, 1914 and 1915, the Sept. 16 one at flowers of *Melaleuca preissiana*. (175, 173.)

Prosopis nubilosella susbp. **mediosticta** Ckll. Stradbroke Island, at flowers of grey gum, Dec. 3, 1912. (179.)

Prosopis eugeniella Ckll. Brisbane, Sept. 10, 1915. (184.)

Prosopis eburniella Ckll. Brisbane, Oct. 3 and Feb. 8, 1916. (181, 185.)

Prosopis amiculiformis Ckll. Brisbane, Sept. 12, 1916. (180.)

Prosopis amicula Smith. Brisbane, Feb. 8, 1916. (187.)

Prosopis serotinella Ckll. Brisbane, Oct. 3, 1916, ♀ (177), Sept. 26, 1916, ♂ (176).

The male is new; it differs from the female by the bright lemon-yellow face, labrum, and mandibles, the supraclypeal mark semicircular, the lateral marks broadly truncate just below antennæ; flagellum long, obscure brown beneath; anterior and middle knees, tibiæ (except a dark spot) and tarsi yellow; hind tibiæ pale yellow at base; hind basitarsi white at extreme base; marginal cell only feebly infuscated, darkest just beyond stigma, and cloud below marginal cell also faint. The abdomen is flattish, venter not modified.

Prosopis aurifera n. sp. Stradbroke Island, Sept. 17, 1915. (178.)

♀. Length about 8 mm., with rather short abdomen; black, with chrome-yellow markings, as follows: Clypeus (except lower margin, and a narrow band down each side), broad supraclypeal mark (truncate above and with oblique sides), broad lateral marks extending a short distance above antennæ, stripe on cheeks (only the lower end touching orbit), upper border of prothorax (not reaching tubercles), tubercles, and basal two-fifths of hind tibiæ. Mandibles ordinary; face broad; flagellum dull ferruginous beneath except basally; anterior tibiæ red in front except apically; front and mesothorax dull, but punctures more distinct on front than on thorax; area of metathorax dullish; tegulæ dark fuscous; wings slightly dusky; nervures and stigma piceous black, first r.m. meeting first t.c.; abdomen dorsally shiny, without evident hair; venter not modified.

A very distinct species, superficially resembling *Gnathoprosopis bituberculata* Sm.

The following key will be convenient for the separation of the above species. I include also two other forms, described below.

	Abdomen with some red	1.
	Abdomen without red	2.
1.	The red a band on apex of first segment and base of second	*Euryglossa hypoleuca.*
	The red including more than a segment	*Prosopis constricta.*
2.	Abdomen at least partly brilliant blue	3.
	Abdomen black	5.
3.	Thorax and face black	*P. cyaneomicans nigrescens.*
	Thorax blue	4.
4.	Male ; tubercles light yellow, not continuous with yellow of prothorax	*P. disjuncta.*
	Female ; tubercles bright chrome, continuous with yellow margin of prothorax, which however is very broadly interrupted in middle	*P. chromatica.*
5.	Marginal cell deep fuscous	*P. serotinella* ♀.
	Marginal cell not thus fuscous	6.
6.	Scutellum and postscutellum bright chrome yellow	*P. nubilosella mediosticta.*
	Scutellum and postscutellum black	7.
7.	Axillæ yellow	*Palæorhiza melliceps.*
	Axillæ black	8.
8.	Clypeus black ; lateral marks cream colour ; very small	*Prosopis eugeniella.*
	Clypeus not black	9.
9.	A black stripe between clypeus and lateral marks ; larger species	*P. aurifera.*
	No such black stripes ; smaller species	10.
10.	Tubercles white	*P. eburniella.*
	Tubercles yellow	11.
11.	Yellow of prothorax interrupted in middle	*P. amiculiformis.*
	Yellow of prothorax not interrupted	12.
12.	Face narrow ; legs nearly all yellow	*P. amicula.*
	Face broad ; legs with less yellow	*P. serotinella* ♂.

Prosopis bidentata Smith.

This species was described by F. Smith in 1853 (Cat. Hym. B.M., Pt. i, p. 28) from a male in the J. S. Baly collection, the locality being given as "New Holland." It is not represented in the British Museum, and I do not know the present location of the type. Mr. Hacker has collected on Stradbroke Island, September 17th, 1915, a male which he considered to belong to *P. aurifera* Ckll. It is, however, too large for *aurifera*, and is, I am sure, a distinct species. The front is not distinctly punctate as in *aurifera*, the mesothorax is duller, and the tegulæ are mainly reddish. It is, I am sure, the long-lost *P. bidentata*, with the description of which it agrees very well. The first recurrent nervure joins the second submarginal cell near its base, as it should not do in *bidentata*; but this discrepancy may be due to variation, or even to an error in the original account. The species is a very striking one; the long ventral abdominal teeth or spines are at the end of a long convex ridge, and both ridge and teeth are polished and shining. The mandibles do not accord with those of *Gnathoprosopis*; the orange face is dull, not oily and polished, and the scape is not dilated. In other respects, however, the species seems close to *Gnathoprosopis*, and it is perhaps doubtful whether that genus should be maintained.

Palæorhiza melliceps n. sp. Brisbane, June 13, 1912. (182.)

♀. Length somewhat over 8 mm.; slender, with unusually long and narrow abdomen; black; head mainly chrome yellow, but base beneath, vertex, and front except sides black; the long clypeus and supraclypeal area are stained with red, and the clypeus has a broad dusky shade on each side; head oblong, the face relatively long and narrow; antennæ ferruginous, the flagellum blackish above; mesothorax and scutellum dullish, but area of metathorax polished; upper border of prothorax (not reaching tubercles), tubercles, large patch behind them, broad bands along posterior halves of sides of mesothorax, and axillæ, all bright chrome yellow; tegulæ dark reddish; wings dusky, stigma and nervures black; second submarginal cell broad, receiving recurrent nervures about equally far from base and apex; b.n. falling short of t.m.; legs black, anterior knees and tibiæ in front red, anterior femora and tibiæ mainly yellow behind; abdomen strongly constricted at apex of first segment.

A very distinct species, which may I think be safely referred to *Palæorhiza*, though the male is unknown. The colour and markings are unique.

Euryglossa hypoleuca n. sp. Brisbane, Feb. 15, 1916. (186.)

♂. Length about 5 mm.; robust, black, the hind margins of abdominal segments broadly testaceous, the first segment ferruginous apically; head and thorax dull, the sculpture excessively fine, the sides of the front striate; face broad, ivory colour below antennæ, the lateral marks with linear extension halfway up sides of front, clypeus with a small pale-fuscous spot on each side; labrum and mandibles white, the latter with cutting edge red; a small white spot behind eyes at base; scape pale yellowish in front, flagellum clear ferruginous beneath; postscutellum with conspicuous white hair; upper border of prothorax and tubercles white, the band slightly interrupted in middle, and also failing to reach tubercles; tegulæ ferruginous; wings hyaline, the veins fuscous, first r.n. joining base of second s.m.; knees, and anterior tibiæ except a small spot, pale reddish; mid and hind tibiæ white, suffused with reddish basally; basitarsi white; abdomen dullish, very finely pruinose.

Very close to *Euryglossa albocuneata* Ckll., of which only the female is known. In *E. albocuneata* the second r.n. joins second s.m. well before the end, so it seems probable that *hypoleuca* is not the male of *albocuneata*, since it differs in this feature of the venation. There is a possibility, however, that the venation varies, and the two are sexes of a single species. These insects are intermediate between *Prosopis* and *Euryglossa* and should perhaps be separated generically from both.

Euryglossa semicastanea n. sp. Brisbane, Feb. 15, 1916. (183.)

♀. Length about 6 mm.; robust, head and thorax black, abdomen chestnut red; labrum, mandibles (except apex), lower part of clypeus suffusedly, and narrow lateral stripes extending along orbits to a little above antennæ, deep red; antennæ chestnut red above and below; mesothorax dull, extremely finely punctured; scutellum with larger, more distinct punctures; area of metathorax large, entirely dull; tegulæ black; wings slightly dusky; stigma large but rather short, amber colour; b.n. meeting t.m., second s.m. broad; knees, tibiæ, and tarsi deep red; abdomen without bands.

Quite distinct from *E. semirufa* Ckll., *E. edwardsii*, Ckll., &c.

Euryglossa neglectula Ckll. var. **mica** n.v. Brisbane, Oct. 10, 1916. (208.)

♂. Length nearly 4·5 mm.; shining black; the abdomen slightly brownish black; face broad, entirely black; flagellum obscurely reddish beneath; head and thorax moderately hairy; area of metathorax polished; tegulæ piceous; wings slightly dusky, nervures and stigma sepia colour; second s.m. broad; b.n. falling a considerable distance short of t.m.; legs black, anterior tibiæ obscurely reddish in front, tarsi reddish; abdomen broad, not banded.

I formerly called this form var. **a**. It differs from true *neglectula* by the narrow face, slightly dusky wings, and abdomen not at all purplish. It is easily known from *E. inconspicua* Ckll. by the dark tibiæ. It is quite possibly a distinct species.

Pachyprosopis indicans n. sp. Brisbane, Feb. 8, 1916. (189.)

♂. Length about 5 mm.; robust, with a broad face; black, with face below antennæ bright chrome yellow, the lateral marks extending a short distance upward with the outline of a closed hand with index finger pointed; labrum, broad base of mandibles, and mark below eyes also yellow; scape rather broad, yellow in front and behind, slightly suffused with reddish; flagellum black, ferruginous beneath, except at base and apex; front dullish, extremely finely punctured; thorax without yellow markings, extremely finely punctured; tegulæ black; wings hyaline, stigma and nervures black; first r.n. joining extreme apex of first s.m.; legs reddish yellow, anterior femora with a large black patch behind; abdomen broad, with dullish surface.

Closely related to *P. angophoræ* Ckll., but easily distinguished by the yellow face. By the yellow legs it resembles *P. aurantipes* Ckll., but it is otherwise quite different.

Euryglossella globuliceps n. sp. Brisbane, Feb. 8, 1916. (213.)

♀. Length less than 4 mm., shining black, the abdomen very faintly purplish; flagellum short, obscurely reddish beneath; anterior tibiæ very obscurely reddish in front; wings hyaline; stigma long, dusky amber; an incomplete second submarginal cell present; head large, with broad cheeks, front polished.

The venation is like that of *E. atomaria* Ckll., which is easily separated from *E. globuliceps* by the yellow femora, &c.

ANDRENIDÆ.

Nomia halictella Ckll. Brisbane, Feb. 8, 1916. ♂. (191.)

Halictus semipolitus Ckll. Brisbane, Sept. 20, 1916. (192.)

Halictus urbanus Smith. Brisbane, Sept. 10, 1915. (203.)

Halictus oxoniellus Ckll. Bribie Island, Nov. 2, 1913. (194.)

A variety or race with green mesothorax.

Halictus eyrei Ckll. Brisbane, Feb. 15, 1916. (200.)

Halictus vitripennis Smith. Brisbane, Sept. 10, 1915, and Feb. 8, 1916. (196, 198.)

Halictus erythrurus Ckll. Oxley, Brisbane, Sept. 17, 1914. (204.)

Halictus erythrurus var. **atrocyaneus** n.v. Brisbane, Feb. 8, 1916. (199.)

♀. Very small, about 4 mm. long; mesothorax very dark blue. Very distinct in appearance, but I believe only a variety. The thorax, excepting the mesothorax, is black; abdomen chestnut red, the first segment black except apically; mandibles red; clypeus shining, with scattered large punctures; flagellum dark red beneath; mesothorax dullish, extremely finely punctured; area of metathorax rugose, with a broad shining rim; tegulæ dark reddish; wings hyaline, stigma testaceous, nervures pallid; legs black, anterior tibiæ obscurely reddish in front; abdomen shining.

Halictus clarigaster n. sp. Caloundra, Jan. 20, 1916. (197.)

♀. Length about 6·5 mm.; head and thorax black, abdomen clear bright ferruginous, slightly dusky apically; labrum and mandibles dark red; head broad, clypeus shining and sparsely punctured; front dull, except at extreme sides; supraclypeal area convex, prominent; flagellum clear ferruginous beneath, except first joint and extreme apex; hair of head and thorax dull white; mesothorax dullish, very finely and closely punctured; area of metathorax semilunar, glistening, with fine mainly longitudinal rugæ; tegulæ light ferruginous; wings moderately dusky; stigma and nervures dusky reddish, outer r.n. and t.c. weakened; legs black with all the knees, anterior tibiæ in front, and the other tibiæ on inner side, ferruginous; hind spur with a few strong spines; abdomen without bands or patches of hair, but delicately white-pruinose from fine hair. Quite distinct from the similar *H. ewarti* Ckll.

Halictus eboracensis n. sp. Ebor, N.S.W., Dec. 30, 1915. (A. J. Turner.) (201.)

♀. Length about 10 mm.; black, the bases of abdominal segments 3 and 4 with very broad bands of pale greyish tomentum, and the base of second segment with a cuneiform patch of the same on each side; hind spur with a stout tooth toward base. Closely allied to *H. seductus* Ckll., for which it would be taken on casual examination, but the mesothorax is not dull anteriorly, and the plications at base of metathorax are not so fine. The metathoracic plications resemble those of *H. circumdatus* Ckll., but otherwise the species is quite distinct.

Halictus speculellus n. sp. Brisbane, Feb. 15, 1916. (193.)

♀. Length about 5 mm.; black, with the labrum and mandibles (except base) dull red; flagellum ferruginous beneath; tegulæ clear rufo-testaceous; tarsi rather obscure ferruginous; wings dusky, stigma dark reddish brown; clypeus shining, sparsely punctured; front dull, except at sides; area of metathorax with very fine plicæ, the broad rim dullish; abdomen broad, thinly hairy, hind margins of segments brownish. Mesothorax polished, the disc without punctures, except a few along the middle line. Very like *H. repertulus* Ckll. (male), but not its female, as *repertulus* has a distinctly punctured mesothorax. Also allied to *H. Sturti* Ckll., but smaller, with more dusky wings, and different metathorax.

Halictus brisbanensis n. sp. Brisbane, Sept. 17, 1914. (195.)

♀. Length 5 mm. or a little over; head and thorax black, with the mesothorax dull blue-green; abdomen shining chestnut red, the hind margins of first three segments

with broad black bands, not reaching extreme sides ; labrum black ; mandibles clear red, with the apex dark ; scape with a red spot at extreme base ; flagellum obscure reddish beneath, except at base ; mesothorax appearing granular, median groove distinct ; area of metathorax with very fine plicæ ; tegulæ bright rufo-testaceous ; wings slightly dusky. Stigma large and dark ; anterior knees, tibiæ, and tarsi light ferruginous ; middle and hind knees, middle tibiæ in front, hind tibiæ at base and apex, and middle and hind tarsi, rather red ; sides of apical part of abdomen with long hairs.

♀. var. **a.** Brisbane, Sept. 10, 1915. (202.)

Abdomen reddish black, the broad base and sides of second segment, extreme sides of third, and fourth except middle, red.

♀. var. **b.** Brisbane, Sept. 1, 1914, at flowers of *Leptospermum*. (206.)

Mesothorax yellowish green, the median sulcus scarcely developed ; abdomen even darker than in var. **a.**

Related to *H. sphecodoides* Smith, of which it may be a race ; but it differs by the darker abdomen and tarsi.

Parasphecodes bribiensis Ckll. Stradbroke Island, Oct. 20, 1911. (207.)

The specimen has the abdomen contracted, and so looks quite different from the type at first glance. A characteristic feature of the species is the pair of elevated bosses on each of the first two abdominal segments.

Parasphecodes insculptus n. sp. Tambourine Mtn., Dec. 28, 1911. (190.)

♀. Length 8 mm. or a little more ; black, with dusky wings ; anterior tibiæ reddish in front, tarsi reddened apically ; mandibles red subapically ; clypeus polished and shining, with sparse small punctures ; supraclypeal area large and triangular, smooth but glaucous, with scattered minute punctures ; flagellum obscure reddish beneath ; mesothorax smooth and very feebly and remotely punctured, but glaucous ; scutellum like mesothorax ; area of metathorax dull and without sculpture ; tegulæ bright ferruginous, with a large dusky cloud ; stigma and nervures dark reddish fuscous ; abdomen with extremely minute punctures ; a narrow band of white tomentum at extreme base of second and third segments.

Related to *P. plorator* Ckll., but readily distinguished by the dullish abdomen, with closely and very minutely punctured second segment. From *P. atronitens* Ckll. it is known by the dull second abdominal segment, not polished between the punctures, the sculpture of the mesothorax, &c.

The above species of *Halictus* and *Parasphecodes* may be separated by the following table :—

	Mesothorax black	1.
	Mesothorax green or blue	6.
1.	Abdomen red or reddish	2.
	Abdomen black	3.
2.	Abdomen clear red, rather narrow	*H. clarigaster.*
	Abdomen dusky reddish, very broad	*P. bribiensis.*

3. Large species, at least 8 mm. long .. .. 4.
   Small species .. .. 5.
4. Area of metathorax strongly ridged or plicate .. .. *H. eboracensis.*
   Area of metathorax not ridged .. .. *P. insculptus.*
5. Mesothorax very shiny ; hind tarsi ferruginous .. .. *H. speculellus.*
   Mesothorax dullish ; hind tarsi not red .. .. *H. semipolitus.*
6. Abdomen entirely shining black .. .. *H. urbanus.*
   Abdomen with more or less red, or all red .. .. 7.
7. Stigma dark .. .. 8.
   Stigma pallid .. .. 9.
8. Legs black ; area of metathorax shorter .. .. *H. oxoniellus.*
   Legs more or less reddish .. .. *H. brisbanensis.*
9. Mesothorax obscurely metallic .. .. 10.
   Mesothorax light green .. .. 11.
10. Larger, mesothorax green .. .. *H. erythrurus.*
    Smaller, mesothorax blue .. .. *H. erythrurus* v. *atrocyaneus.*
11. Base of abdomen red .. .. *H. eyrei.*
    Base of abdomen green .. .. *H. vitripennis.*

MEGACHILIDÆ.

Lithurgus atratiformis Ckll. Brisbane, Oct. 5, 1915. (210.)

Megachile simpliciformis n. sp. Stradbroke Island, Sept. 15, 1915. (211.)

♀. Length about 11 mm. ; like *M. simplex* Smith, but clypeus very densely and finely punctured ; vertex more depressed, the head little elevated above the eyes, which are brown ; clypeus emarginate in middle of lower edge, with a tuft of orange hair showing in the emargination. Ventral scopa all white.

CERATINIDÆ.

Exoneura ploratula Ckll. Brisbane, Sept. 12, 1916. (215.)

Exoneura aterrima Ckll. Brisbane, Feb. 15, 1916. (219.)

This was described as a variety of *E. botanica* Ckll., but I now think it must be a distinct species. The specimen (219) is a male, and differs from the female by the clypeus (except a very small mark on each lateral margin) and labrum entirely white, the anterior tibiæ and the basitarsi black or dark fuscous.

Exoneura melæna n. sp. Caloundra, Jan. 20, 1916. (214.)

♀. Length about 5 mm. ; black, similar to *E. aterrima* but differing thus : Face entirely black ; wings dilute reddish ; a bright ferruginous patch at each side of base of first abdominal segment ; tibiæ largely red, but basitarsi dark.

Exoneura gracilis n. sp. Brisbane, Feb. 8, 1916. (212.)

♀. Length about 4·5 mm. ; slender, black, shining ; face wholly black, labrum clear ferruginous ; scape in front and flagellum beneath dull ferruginous ; tubercles white ; tegulæ hyaline with a white spot ; wings hyaline ; stigma large, pale reddish,

nervures pallid; anterior tibiæ and tarsi ferruginous; middle and hind tibiæ red (more or less) at base and apex, and their tarsi pale reddish; abdomen long. Allied to *E. ploratula* Ckll., differing in the colour of the femora.

Exoneura hackeri Ckll. Brisbane, Feb. 8, 1916, ♀ (220), ♂ (216).

The female represents a variety without the dark abdominal bands. The male has the bands; its face markings resemble those of *E. clarissima* Ckll., but that species has the scape white in front, while in *hackeri* it is entirely black. *E. hackeri* was described as a variety of *E. angophoræ*, but I think it is a distinct species.

Exoneura hackeri var. **incerta** n.v. Brisbane, Sept. 12, 1916. (218.)

♀. Lateral face-marks reduced to small spots; stigma clear ferruginous; scape red at base; tegulæ dusky ferruginous; abdominal bands represented by faint dusky clouds. Possibly a distinct species.

Exoneura hamulata Ckll. Stradbroke Island, Sept. 17, 1915. (217.) ♀.

The male, from the same locality, is described in Proc. Acad. Nat. Sci., Phila., 1913, p. 30.

The above species of *Exoneura* are separable thus :—

Abdomen red		1.
Abdomen black		4.
1. With a light spot or mark on each side of face		2.
Without light spots at sides of face		3.
2. Tegulæ dark rufo-fuscous; spots on face triangular, quite large; stigma fuscous		*E. hackeri.*
Tegulæ ferruginous; spots on sides of face very small, obscure; stigma ferruginous		*E. hackeri* v. *incerta.*
3. Male; face without lateral projections from light area above		*E. hackeri.*
Female; face with anchor-mark		*E. hamulata.*
4. Male; face-marks ivory white		*E. aterrima.*
Females; face black		5.
5. Size of *E. aterrima*		*E. melæna.*
Small *Euryglossina*-like species		6.
6. Middle and hind femora clear red		*E. ploratula.*
Middle and hind femora black		*E. gracilis.*

NEW GENERA AND SPECIES OF AUSTRALIAN THYSANOPTERA.[1]

By Captain J. Douglas Hood, M.A.

(Of the United States Biological Survey, Washington).

In this paper descriptions are given of four new genera and twenty-four new species of thrips collected by Mr. Alexandre A. Girault in the coastal region of North Queensland. As the specimens were all taken by sweeping, little data appears on life habits or food plants.

The author wishes to announce the intention of continuing his studies on Australian Thysanoptera with the object of working gradually toward the preparation of a monographic work, and to state that he will be pleased to receive specimens for determination. Thrips should be collected directly into numbered tubes of 70 per cent. ethyl alcohol by means of a small camel's-hair brush; and full data, giving locality, date, collector, and any possible notes on ecology, should always be entered under a corresponding number in a note-book carried for the purpose, or, in the case of flower-inhabiting species, on an envelope containing a specimen of the plant from which the insect was taken. Care should be taken to use a sufficient quantity of alcohol, and particularly to force down into the liquid a tightly fitting wad of cotton, so that no air bubble will remain to flow about and break the specimens during shipment.

One set of types has been retained by the author for reference in further work, while another set has been deposited in the Queensland Museum.

RHIPIDOTHRIPS CINCTUS sp. nov.

Female (*macropterous*).—Length about 1·6 mm. Colour light brown, with head, abdominal segments 6-10, and middle and hind tibiæ darker; abdominal segments 4 and 5, and antennal segments 3 and 4, almost white; fore wings white with apex brown and with a transverse brown band in apical third.

Head almost smooth behind eyes, vertex transversely striate; occiput and cheeks with about 30 short, distinct bristles. Eyes longer than their distance from back of head and slightly narrower than their interval. Ocelli about equidistant. Antennæ with segments 7-9 somewhat more compactly joined than the others; segments 1, 2, and 6-9 brown, 2 paler than 1; 3 and 4 nearly white, 4 infuscate laterally. Maxillary palpi three-segmented.

[1] With a catalogue of the North American species of *Haplothrips* and *Liothrips*.

Pronotum without sculpture, but with numerous short bristles. Mesoscutum very closely transversely striate ; metascutum longitudinally striate at sides, reticulate at middle. Wings and legs of normal structure.

Abdomen of normal structure, very faintly sculptured at sides near base.

Measurements of holotype :—Length 1·57 mm. ; head, length 0·156 mm., width 0·173 mm. ; prothorax, length 0·138 mm., width 0·228 mm. ; pterothorax, width 0·276 mm. ; fore wing, length 0·828 mm., width near base 0·096 mm., at middle 0·108 mm. ; abdomen, width 0·456 mm.

Antennal segments :	1	2	3	4	5	6	7	8	9
Length (μ)	30	48	83	72	45	31	33	20	15
Width (μ)	36	28	22	22	21	21	20	14	7

Total length of antenna, 0·377 mm.

Described from two females taken by sweeping in fields at Cooktown, North Queensland, February 4 and 24, 1912, by Mr. A. A. Girault.

This is the only species of the genus known from outside Europe, and may be known by the banded wings and abdomen.

PHYSOTHRIPS MACULICOLLIS sp. nov.

Female (*macropterous*).—Length about 1·4 mm. General colour brownish yellow, abdomen (especially posteriorly) and pterothorax infuscate ; head with a dark vitta behind eyes along cheeks ; prothorax with several obscure dark spots and a larger subbasal blotch ; antennæ blackish brown, with the two basal segments paler and segment 3 almost clear yellow ; fore wings light gray in basal third, much darker beyond ; legs brownish yellow, with mid and hind femora brown.

Head only slightly wider than long, subangulate and widest just behind eyes, sides converging to base ; occiput with a number of slightly anastomosing transverse lines ; frontal costa narrow, with a shallow notch ; interocellar bristles half as long as eyes, situated outside the ocellar triangle ; all other cephalic bristles minute. Eyes longer than cheeks and narrower than their interval. Ocelli nearly equidistant, pigment red. Antennæ about 2·25 times as long as head, of normal structure.

Prothorax about 1·15 times the length of head, evenly striate with anastomosing lines visible only under high magnification ; posterior angular bristles half the length of pronotum ; other bristles minute, brown, distinct. Wings of fore pair with about seven dark bristles in basal third of anterior vein and three widely separated ones beyond ; posterior vein with a series of about seventeen bristles.

Abdomen of normal form, almost without sculpture ; segment 8 with a dorsal posterior comb which is broadly interrupted at middle ; segment 10 divided above in apical three-fifths.

Measurements of holotype :—Length 1·37 mm. ; head, length 0·156 mm., width 0·175 mm. ; prothorax, length 0·180 mm., width 0·235 mm. ; pterothorax, width 0·308 mm. ; fore wing, length 0·936 mm., width near base 0·094 mm., at middle 0·060 mm. ; abdomen, width 0·362 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	30	47	72	70	51	62	8	11
Width (μ)	33	28	24	20	17	18	7	6

Total length of antenna, 0·351 mm.

Described from two females taken by sweeping in forest at Nelson, N.Q., April 28 and May 21, 1914, by Mr. A. A. Girault.

Structurally very close to *Ph. pictus*, but easily known by the obscurely maculate prothorax and the dark postocular vitta.

HELIOTHRIPS SCULPTILIS sp. nov.

Female (*macropterous*).—Length about 1 mm. Colour blackish brown, thorax paler, head yellow in front of ocelli; knees, tarsi, ends of tibiæ, and basal half of antennal segments 3-5, nearly white; fore wings light brown, with a narrow white band beyond scale and one in eighth tenth, the apex pale.

Head closely and finely reticulate, occiput with exceedingly fine rugæ between the lines of reticulation; frontal costa nearly as wide as first antennal segment. Eyes not protruding, about twice as long as their distance from posterior margin of head. Ocelli equidistant. Antennæ almost exactly as in *H. phaseoli* (*see* Psyche, vol. xix, 1912, Pl. 8, fig. *b*). Maxillary palpi two-segmented.

Prothorax reticulated and roughened like occiput. Mesoscutum paler than other pterothoracic plates, with sides and posterior portion closely striate, the remainder sculptured like occiput. Fore wings with veins and bristles as in *H. phaseoli* (l.c., fig. *a*).

Abdomen of normal structure; tergites 1-8 closely striate at sides, the striæ transverse toward middle of segment and longitudinal at sides, as in *H. phaseoli* (l.c., fig. *c*). Tergite 10 divided in apical half.

Measurements of holotype:—Length 0·984 mm.; head, length 0·120 mm., width 0·157 mm.; prothorax, length 0·096 mm., width 0·178 mm.; pterothorax, width 0·240 mm.; fore wing, length 0·698 mm., width near base 0·075 mm., at middle 0·048 mm.; abdomen, width 0·294 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	18	38	46	41	32	24	12	30
Width (μ)	24	29	21	21	19	17	8	5

Total length of antenna, 0·241 mm.

Described from one female taken by "sweeping in an old Chinese garden, overgrown partly with weeds," Proserpine, N.Q., November 3, 1912, by Mr. A. A. Girault.

The striate abdomen and the colour of the wings are the most distinctive characters.

PTEROTHRIPS gen. nov.

(πτερον, wing; θριψ, a wood-worm.)

Body deeply reticulate. Head large, subquadrangular, much broader than long, strongly constricted at base; vertex transverse, slightly elevated between eyes but not surpassing them anteriorly. Ocelli approximate, elevated, the anterior

ocellus directed forward, scarcely overhanging; posterior ocelli directed laterally. Antennæ short, eight-segmented, slender beyond segment 2, which is broad and goblet-shaped; sense-cones simple; style short. Maxillary palpi two-segmented. Prothorax short, without strong bristles, lateral margin explanate, particularly in anterior half. Wings of fore pair pubescent only at margins, with a prominent "ring vein," one longitudinal vein, and a cross-vein near base; anterior margin bare, without fringe or spines; median vein without bristles. Legs short. Abdomen of normal structure in male, without expanded, fan-shaped bristles on segment 10.

Genotype :—*Pterothrips quadratus* sp. nov.

Close to *Rhipiphorothrips*, which it closely resembles in the venation of the fore wings and the complete absence of bristles and hairs from the costal margin, but certainly distinct by the transverse vertex and the armature of the tenth abdominal segment.

PTEROTHRIPS QUADRATUS sp. nov.

Male (*macropterous*).—Length about 0·9 mm. Body thickly chitinized. Colour almost testaceous, with head, mesoscutum, part of metascutum, and sides of pterothorax, blackish brown; tip of abdomen pale brown; antennæ uniform pale yellow, with apical half of segment 6 and all of 7 and 8, blackish brown; legs yellow, femora very slightly darker at sides; fore wings with scale, basal portion and veins, brownish yellow, remainder clear.

Head very prominently and heavily reticulate, blunt in front, broadest across eyes, cheeks sinuately converging to neck, which is sharply delimited by an anteriorly arcuate, raised line. Eyes about twice as long as their distance from posterior margin of head, less than half as wide as their interval. Ocelli nearly equidistant, ocellar area elevated. Antennæ about twice the length of head; segments 4 and 5 with short, abrupt pedicels; 3 and 4 each with single, stout sense-cone arising from pit on lower outer apical surface.

Prothorax quadrangular, obscurely reticulate; lateral margin thin and broad anteriorly. Mesoscutum and triangular middle portion of mesonotum deeply reticulate like head. Legs roughened.

Abdomen reticulate, especially at sides, segments 1-8 with a more or less scalloped, transverse, sub-basal line; tergite 9 with two pairs of long bristles whose bases form a semicircle.

Measurements of holotype :—Length 0·924 mm.; head, length 0·108 mm., width 0·180 mm.; prothorax, length 0·120 mm., width 0·198 mm.; pterothorax, width 0·234 mm.; fore wing, length 0·624 mm., width near base 0·066 mm., at middle 0·044 mm.; abdomen, width 0·247 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	(18)	(42)	49	31	27	26	11	15
Width (μ)	(24)	36	19	19	20	18	9	5

Total length of antenna, 0·219 mm.

Described from one male taken by sweeping at Pentland, N.Q., January 6, 1913, by Mr. A. A. Girault.

The quadrangular head and prothorax have suggested the specific name.

PHIBALOTHRIPS gen. nov.

(*φίβαλος*,[2] slender ; *θριψ*, a wood-worm).

Body deeply reticulate. Head longer than broad, abruptly and strongly constricted at base ; vertex elevated between eyes and produced. Eyes strongly protruding in front, not longer than cheeks. Ocelli approximate, the anterior ocellus overhanging and directed forward, the posterior ocelli directed laterally. Antennæ seven-segmented, very slender beyond segment 2, which is broad and goblet-shaped ; 5-7 compactly united in a fusiform mass, 7 needle-like ; sense-cones simple. Maxillary palpi two-segmented. Prothorax slightly transverse, without strong bristles ; lateral margin explanate. Wings very slender ; fore wings with complete marginal vein, only ; costal margin with neither fringe nor bristles. Legs short and stout. Abdomen unusually long and slender, apical segments more heavily chitinized ; segments 2 and 9 longest ; 9 distinctly longer than 10 and with three pairs of strong, dorso-lateral bristles, of which the middle pair is slightly longer than segment 10, and twice the length of the lateral pairs ; terminal segment conical, rounded at tip, divided in its entire length.

Genotype :—*Phibalothrips exilis* sp. nov.

Phibalothrips is a member of the *Heliothrips* group, and is closely related to *Retithrips*, *Rhipiphorothrips*, and *Pterothrips*. With all of them it agrees in lacking the anterior fringe of the fore wings. The antennal structure is distinctive, as is also the slender body and the absence of longitudinal wing-veins.

PHIBALOTHRIPS EXILIS sp. nov.

Female (*macropterous*).—Length about 1·1 mm. Head, prothorax, mesothorax, scutellum, and antennal segments 6 and 7, dark brown ; remainder lemon yellow, with sides of metathorax and of abdominal segments 9 and 10, tinged with orange.

Head longer than wide, sides almost perfectly straight to the rectangular neck-like constriction ; deeply reticulate above, with two smoother chevron-shaped areas extending from side to side ; frontal costa narrow, notched. Eyes anteriorly acutely produced and protruding, considerably surpassing the vertex and the base of the first antennal segment.

Prothorax only 1·25 times as wide as long, almost smooth, with a narrow band of reticulation near anterior margin and with a few minute bristles ; lateral flange smooth. Mesothorax sculptured both above and below. Metathorax smooth, except the very acute, reticulate scutellum. Legs yellow, reticulate. Wings almost colourless, washed with yellow along the veins.

Abdomen slender and elongate, reticulate except along median line ; segments 3-8 with a serrate, subbasal line ; posterior margins of tergites 1-8 serrate at sides with short, blunt teeth ; tergites 2-7 with two median, posteriorly converging lines of sculpture.

[2] This word, though not commonly given in lexicons, is to be found in that of Constantine (1592).

Measurements of holotype :—Length 1·14 mm. ; head, length 0·162 mm., width 0·140 mm. ; prothorax, length 0·144 mm., width 0·180 mm. ; pterothorax, width 0·180 mm. ; fore wing, length 0·828 mm. width near base 0·060 mm., at middle 0·033 mm. ; abdomen, width 0·264 mm.

Antennal segments :	1	2	3	4	5	6	7
Length (μ)	(24)	(45)	62	51	53	27	38
Width (μ)	24	33	17	15	18	13	4

Total length of antenna, 0·300 mm.

Described from one female taken by sweeping in forest at Nelson, N.Q., August 7, 1913, by Mr. A. A. Girault.

HAPLOTHRIPS Amyot and Serville, 1843.

1843. *Haplothrips* Amyot and Serville, Hist. Nat. Ins. Hém., p. 640. [Type *Phlœothrips albipennis* Burmeister (= *Thrips aculeata* Fabricius teste Haliday), by monotypy.]

1895. *Anthothrips* Uzel, Mon. d. Ordn. Thys., p. 237.

1899. *Anthothrips* Reuter, Acta Soc. Fauna Flora Fennica, vol. xvii, No. 2, pp. 17, 27.

1902. *Anthothrips* Hinds, Proc. U. S. Nat. Mus., vol. xxvi, p. 188.

1910. *Anthothrips* Trybom, Schultze : Zool. u. anthr. Ergebn. Forsch.-Reise westl. u. zentr. Südafr., bd. iv, lief. i, p. 172.

1912. *Haplothrips* Karny, Zool. Ann., vol. iv, p. 324.

1913. *Haplothrips* Schmutz, Sitzungsb. K. Akad. Wiss. Wien, Mathem.-naturw. Klasse, bd. cxxii, abt. i, pp. 1025, 1033.

1916. *Anthothrips* Watson, Ent. News, vol. xxvii, p. 129.

This genus now contains about fifty apparently valid species recorded from all portions of the world. They are very closely related among themselves and their separation is correspondingly difficult. One of the most satisfactory characters, in the writer's experience, for the differentiation of closely allied forms is the presence or absence of the sense-cone on the inner surface of the apex of the third antennal segment. In the critical examination of several thousand specimens of this genus, this character has been found absolutely constant, and in the following key it is used for the primary division of the genus.

Before proceeding with the synopsis and discussion of the Australian species of *Haplothrips*, it may be well to comment briefly on one of the papers cited above, namely, Mr. Watson's recent contribution to "Entomological News." On examination of this paper, it will be seen that the author has failed to employ the proper generic term for this genus, and has used instead a name which for four years had reposed in synonymy. In addition he adopts, in his key to six North American species, four synonymous names, while five additional North American species are completely overlooked. The new species described is a synonym of one characterised four years previously by the present writer. The corrected list of North American species, after adding one published since the appearance of Watson's paper, is as follows :—

1. *? bellus* Hood and Williams, Journ. N. Y. Ent. Soc., vol. xxiii, 1915, p. 125, pl. viii, figs. 2-5.

2. *faurei* Hood, Proc. Biol. Soc. Wash., vol. xxvii, 1914, p. 157, pl. 3, figs. 5, 6.

3. *flavipes* (Jones) Tech. Ser. 23, pt. i, Bur. Ent., U. S. Dept. Agr., 1912, p. 18, pl. v, figs. 5-7 (*Anthothrips*).

4. *gowdeyi* (Franklin), Proc. U. S. Nat. Mus., vol. xxxiii, 1908, p. 724, pl. lxiii, fig. 8, pl. lxiv, figs. 15, 16, pl. lxv, fig. 23 (*Anthothrips*).
   Anthothrips variabilis Crawford, Pomona Coll. Journ. Ent., vol. ii, 1910, p. 166, fig. 69, *a-e*.

5. *graminis* Hood, Proc. Biol. Soc. Wash., vol. xxv, 1912, p. 69, fig. 3.
   Anthothrips floridensis Watson, Ent. News, vol. xxvii, 1916, p. 128, pl. vi, figs. 10-12.

6. *halophilus* Hood, Ins. Insc. Menstr., vol. iii, 1915, p. 29.

7. *jonesii* Karny, Zool. Ann., vol. iv, 1912, p. 344.
   Anthothrips nigricornis Jones, Tech. Ser. 23, pt. i, Bur. Ent., U. S. Dept. Agr., 1912, p. 17, pl. v, figs. 1-4 (nec *A. nigricornis* Bagnall, 1910).

8. *malifloris* Hood, Proc. Biol. Soc. Wash., vol. xxix, 1916, p. 121.

9. *nubilipennis* Hood, Proc. Biol. Soc. Wash., vol. xxvii, 1914, p. 156, pl. 3, figs. 3, 4.

10. *ruber* (Moulton), Tech, Ser. 21, Bur. Ent., U. S. Dept. Agr., 1911, p. 48, pl. v, fig. 39, pl. vi, fig. 40 (*Trichothrips*).

11. *statices* (Haliday), Ent. Mag., vol. iii, 1836, p. 442 (*Phlœothrips*).
    Phlœothrips nigra Osborn, Can. Ent., vol. xv, 1883, p. 154.
    Phlœothrips armata Lindeman, Bull. Soc. Imp. Nat. Moscou, 1887, p. 335.

12. *verbasci* (Osborn), Proc. Iowa Acad. Sci., vol. iii, 1896, p. 228 (*Phlœothrips*).
    Trichothrips femoralis Moulton, Tech. Ser. 12, pt. iii, Bur. Ent., U. S. Dept. Agr., 1907, p. 61, pl. v, fig. 44, pl. vi, figs. 45, 46.

Key to Australian Species.

a. Segment 3 of antenna with sense-cone on inner surface of apex.

  b. Segments 3-6 of antenna lemon yellow, slightly infuscate apically ; wings of fore pair slender, slightly broadened at base and somewhat narrowed at middle, the bases of the three subbasal bristles forming a nearly straight line ; about 6 (4-9) accessory hairs on posterior margin of fore wings .. .. *gowdeyi* (Franklin).

  bb. Segments 3-6 of antenna blackish brown, 3 slightly paler at base and along outer surface ; wings of fore pair broad at base and at apex, very much narrowed at middle, the bases of the three subbasal bristles forming an equilateral triangle ; no accessory hairs on posterior margin of fore wings .. .. *varius* Hood.

aa. Segment 3 of antenna without sense-cone on inner surface of apex.

  c. Segments 3-5 of antenna yellow, 4 and 5 very slightly infuscate ; segment 3 slender and about 1·9 times as long as greatest width, outline of outer surface nearly straight .. *anceps* Hood.

  cc. Segments 3-5 of antenna blackish brown, 3 slightly paler at base and along outer surface ; segment 3 moderately stout and about 1·5 times as long as greatest width, outline of outer surface strongly arcuate .. .. *froggatti* Hood.

HAPLOTHRIPS GOWDEYI (Franklin).

1908. *Anthothrips gowdeyi* Franklin, Proc. U. S. Nat. Mus., vol. xxxiii, p. 724, pl. lxiii, fig. 8, pl. lxiv, figs. 15, 16, pl. lxv, fig. 23.

1910. *Anthothrips variabilis* Crawford, Pomona Coll. Journ. Ent., vol. ii, No. 1, p. 166, fig. 69, *a-e*.

1912. *Haplothrips gowdeyi* Hood, Proc. Biol. Soc. Wash., vol. xxv, p. 62 (Apr. 13).

1912. *Haplothrips variabilis* Karny, Zool. Ann., vol. iv, p. 326 (Apr. 15).

1912. *Haplothrips gowdeyi* idem, ibidem, p. 327.

1913. *Haplothrips gowdeyi* Hood, Ins. Insc. Menstr., vol. i, p. 152.

1916. *Anthothrips variabilis*, Watson, Ent. News, vol. xxvii, p. 129.

Originally described from Barbados and subsequently recorded from Cuba, Nicaragua, and Mexico by Crawford and from Porto Rico by the author, this species is represented in the Australian material by a series of seven females taken by Mr. Girault in North Queensland. These specimens, which were collected at Aloomba, July 7, 1912, at Halifax, February 28, 1913, and at Nelson, April 2 and 4, 1913, have been found indistinguishable from Neotropical and Nearctic specimens even after a careful study of a large series of specimens cleared in potassium hydroxide. In colour, form, and the multitudinous details of chitinous structure there is very little variation indeed, and I have no hesitation in declaring that we are here concerned with but a single species which, through the medium of commerce, has been distributed to many parts of the world; or which has persisted without modification in spite of complete geographic isolation.

The insect frequents flowers of many species, and the student is referred to the papers by Franklin and Crawford for their enumeration.

HAPLOTHRIPS VARIUS sp. nov.

Female (*macropterous*).—Length about 1·6 mm. Colour dark blackish brown with fore tarsi yellow and fore tibiæ yellow apically; antennæ brown, segments 1, 2, and 5-8 darkest; 3 slightly paler, particularly along outer surface and at base.

Head slightly longer than wide, sides nearly straight; vertex produced, the anterior ocellus overhanging and slightly surpassing frontal costa; postocular bristles blunt, two-thirds as long as eyes. Eyes one-third as long as head, slightly wider than their interval. Antennæ of normal structure, segment 3 small, almost exactly as in *H. humilis* (*see* Proc. Biol. Soc. Wash., vol. xxvii, 1914, pl. iv, fig. 2), but with a sense-cone on inner surface; segment 4 large; 7 and 8 rather closely united.

Prothorax smooth; all usual bristles present, blunt, the two pairs at posterior angles longest, others subequal in length to postoculars. Wings of fore pair broad, very much narrowed at middle, the scale and the region of the three subbasal bristles brown, remainder colourless; subbasal bristles approximate, equally blunt, forming an almost equilateral triangle; no accessory hairs. Fore tarsus with a minute tooth.

Abdominal bristles mostly blunt: terminal bristles about 1·2 times the length of tube.

Measurements of holotype:—Length 1·63 mm.; head, length 0·209 mm., width 0·194 mm.; prothorax, length 0·156 mm., width (inclusive of coxæ) 0·360 mm.; pterothorax, width 0·384 mm.; abdomen, width 0·408 mm.; tube, length 0·132 mm., width at base 0·068 mm., at apex 0·039 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	36	51	45	51	50	45	44	32
Width (μ)	32	30	30	33	31	26	22	14

Total length of antenna, 0·354 mm.

Described from one female taken by sweeping, Proserpine, N.Q., November 2, 1912, by Mr. A. A. Girault.

The broad wings, abruptly narrowed at middle, without accessory hairs, and with the subbasal bristles approximate and disposed to form a nearly equilateral triangle, together with the darkly coloured antennæ and the presence of a sense-cone on the inner surface of the third antennal segment, make this species readily distinguishable.

HAPLOTHRIPS ANCEPS sp. nov.

Female (*macropterous*).—Length about 1·4 mm. Colour blackish brown, with most of fore tibiæ, and all tarsi, lemon yellow; antennal segments 3-5 yellow, 4 and 5 very slightly infuscate.

Head about 1·1 times as long as wide, cheeks very slightly arched; vertex slightly produced, the anterior ocellus overhanging, not attaining frontal costa; postocular bristles slightly more than half as long as eyes, blunt. Eyes about 0·4 as long as head, narrower than their interval. Antennæ of normal structure; segment 3 slender and elongate, without sense-cone on inner surface; segments 7 and 8 rather closely united. Mouth-cone normal to genus.

Prothorax smooth, all usual bristles present, blunt, the two pairs at the posterior angles longest and about equal in length to postoculars, the others shorter; anterior marginals half the length of postoculars. Wings of fore pair narrow, sparsely fringed, only slightly narrowed at middle, with about four accessory hairs; scale and the region of the three subbasal bristles slightly browned: subbasal bristles knobbed, disposed on a nearly straight line, the outer bristle much the longest. Fore tarsus with a minute tooth.

Abdomen of normal structure; most bristles knobbed; terminal bristles distinctly longer than tube.

Measurements of holotype:—Length 1·42 mm.; head, length 0·192 mm., width 0·175 mm.; prothorax, length 0·144 mm., width (inclusive of coxæ) 0·260 mm.; pterothorax, width 0·312 mm.; abdomen, width 0·324 mm.; tube, length 0·115 mm., width at base 0·058 mm., at apex 0·032 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	35	46	45	46	45	39	38	27
Width (μ)	33	28	24	30	25	24	20	12

Total length of antenna, 0·321 mm.

Male (*macropterous*).—Length about 1·2 mm. Colour and structure essentially as in female; fore tarsus with a stout, triangular tooth.

Measurements of allotype:—Length 1·18 mm.; head, length 0·185 mm., width 0·160 mm.; prothorax, length 0·132 mm., width (inclusive of coxæ) 0·257 mm.; pterothorax, width 0·258 mm.; abdomen, width 0·241 mm.; tube, length 0·115 mm., width at base 0·057 mm., at apex 0·029 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	30	41	42	46	44	40	37	25
Width (μ)	29	24	20	26	22	21	18	11

Total length of antenna, 0·305 mm.

Described from six females and nine males, taken by sweeping, at Nelson, N.Q. (type locality), April 2, 4, and 27, 1913 ; at Proserpine, N.Q., November 2 and 3, 1912 ; at Quingilli, N.Q., September 13, 1912 ; and at Hinchinbrook Island, N.Q., July 19, 1912.

The principal diagnostic characters are the colour of the legs and antennæ, the long third antennal segment without a sense-cone on its inner surface, and the well-developed anterior marginal bristles.

HAPLOTHRIPS FROGGATTI sp. nov.

Female (*macropterous*).—Length about 1·4 mm. Colour dark blackish brown, with fore tarsi yellow and fore tibiæ yellow apically ; antennæ brown, segments 1, 2, and 6-8 darkest ; 3 paler, particularly along outer surface and at base.

Head as broad as long, with sides very slightly arched ; vertex slightly produced, the anterior ocellus overhanging and usually just attaining frontal costa ; postocular bristles blunt, a little more than half as long as eyes. Eyes nearly 0·4 as long as head, narrower than their interval. Antennæ of normal structure ; segment 3 small, almost exactly as in *H. humilis* (*see* Proc. Biol. Soc. Wash., vol. xxvii, 1914, pl. iv, fig. 2), without sense-cone on inner surface ; segment 4 large ; 7 and 8 rather closely united.

Prothorax smooth ; all usual bristles present, blunt, the two pairs at posterior angles slightly the longest, others equal in length to postoculars. Wings of fore pair broadened at base and distinctly narrowed at middle ; the scale and the region of the three subbasal bristles brown, remainder colourless ; subbasal bristles equidistant, arranged nearly on a straight line, the outer longest and less blunt ; about 10 accessory hairs. Fore tarsus unarmed.

Abdominal bristles mostly blunt ; terminal bristles about 1·3 times as long as tube.

Measurements of holotype :—Length 1·43 mm. ; head, length 0·181 mm., width 0·181 mm. ; prothorax, length 0·132 mm., width (inclusive of coxæ) 0·269 mm. ; pterothorax, width 0·312 mm. ; abdomen, width 0·318 mm. ; tube, length 0·115 mm., width at base 0·061 mm., at apex 0·033 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	34	45	38	48	42	40	37	25
Width (μ)	30	27	26	31	27	24	19	12

Total length of antenna, 0·310 mm.

Male (*macropterous*).—Length about 1·2 mm. Almost identical with female in colour and structure ; fore tarsus with a stout, triangular tooth.

Measurements of allotype : Length 1·23 mm. ; head, length 0·179 mm., width 0·168 mm. ; prothorax, length 0·128 mm., width (inclusive of coxæ) 0·242 mm. ; pterothorax, width 0·288 mm. ; abdomen, width 0·270 mm. ; tube, length 0·115 mm., width at base 0·054 mm., at apex 0·030 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	31	42	38	47	42	40	35	25
Width (μ)	29	24	24	29	24	20	18	12

Total length of antenna, 0·300 mm.

Described from ten females and two males, taken by sweeping grass, at Hughenden, N.Q., July 13 and 14, 1912, and at Pentland, N.Q., December 24 and 26, 1912, and January 6, 1913, by Mr. A. A. Girault.

Named after Walter W. Froggatt, Esq., Government Entomologist, N.S.W., in recognition of his work on Australian Thysanoptera.

LIOTHRIPS Uzel, 1895.

1895. *Liothrips* Uzel, Mon. d. Ordn. Thys., p. 261. (Type not designated ; two species included, *L. hradacensis* nov. sp., and *Phlœothrips setinodis* Reuter. Type by present designation, *Phlœothrips setinodis* Reuter.)

1899. *Liothrips* Reuter, Acta Soc. Fauna Flora Fennica, vol. xvii, No. 2, p. 64.

1908. *Phyllothrips* Hood, Can. Ent., vol. xl, No. 9, p. 305. (Type *P. citricornis* sp. nov., by designation and monotypy.)

1909. *Phyllothrips* Hood, Ent. News, vol. xx, No. 1, pp. 30, 31.

1912. *Liothrips* Karny, Trans. Ent. Soc. Lond., 1912, pt. 2, p. 471.

1916. *Liothrips* Watson, Ent. News, vol. xxvii, p. 132.

This genus is evidently one of the dominant types of Thysanoptera in Queensland, and its species will no doubt be found to inhabit the under surface of the leaves of woody plants. The forms which the writer has assigned here are not all typical members of the genus, and it may be necessary in time to remove to another genus those placed under the category "*aa*" in the key below. Further collecting and much additional material will be required, however, before this and other doubtful points can be settled.

It may not be inopportune to remark that in the key to the North American species of this genus, given in the last paper cited above, its author includes *maconnelli* (a mis-spelling of *mcconnelli*) and *fasciculatus*, both of which were transferred to the genus *Leptothrips* in 1912 ; that six North American species (*leucogonis*, *castaneæ*, *brevicornis*, *sambuci*, *montanus*, and *varicornis*), originally described in this genus, as well as four others properly referable to it, are omitted entirely ; that the new species *flavoantennis* is apparently identical with *citricornis* Hood, described in 1908 ; and that the description and figure of the new subspecies of *caryæ* Fitch are not sufficient to distinguish it from the typical form, having unfortunately been based merely on teneral material. The described North American species of this genus, as interpreted by the writer, may be listed in alphabetical order as follows :—

1. *brevicornis* Hood, Proc. Biol. Soc. Wash., vol. xxvi, 1913, p. 164.

2. *caryæ* (Fitch), Third Rept. Nox. Ins. State N. Y., in Ann. Rept. N. Y. State Agr. Soc., vol. xvi, 1856, p. 445 (*Phlœothrips*) ; Hood, Proc. Biol. Soc. Wash., vol. xxvii, 1914, p. 160, pl. 4, fig. 6.

L. caryæ floridensis Watson, Ent. News, vol. xxvii, 1916, p. 130, pl. v, figs. 4-6.

3. *castaneæ* Hood, Bull. Brook. Ent. Soc., vol. x, 1915, p. 76.

4. *citricornis* (Hood), Can. Ent., vol. xl, 1908, p. 305, fig. 15 (*Phyllothrips*).
L. flavoantennis Watson, Ent. News, vol. xxvii, 1916, p. 129, pl. vi, figs. 7-9.

5. *dumosa* (Moulton), Tech. Ser. 12, pt. iii, Bur. Ent., U. S. Dept. Agr., 1907, p. 63 (*Trichothrips ilex* var. *dumosa*).

6. *floridensis* (Watson), Ent. News, vol. xxiv, 1913, p. 145, pl. vi, figs. 1-4 (*Cryptothrips*).

7. *fuscus* (Morgan), Proc. U. S. Nat. Mus., vol. 46, 1914, p. 30, figs. 55-57 (*Trichothrips*).

8. *ilex* (Moulton), Tech. Ser. 12, pt. iii, Bur. Ent. U. S. Dept. Agr., 1907, p. 62, pl. vi, figs. 47-49 (*Trichothrips*).

9. *leucogonis* Hood, Bull. Brook. Ent. Soc., vol. x, 1915, p. 78.

10. *mexicanus* (Crawford), Pomona Coll. Journ. Ent., vol. 2, 1910, p. 161 (*Liothrips umbripennis* var. *mexicana*).

11. *montanus* Hood, Proc. Biol. Soc. Wash., vol. xxvi, 1913, p. 163.

12. *ocellatus* Hood, Bull. Ill. State Lab. Nat. Hist., vol. viii, 1908, p. 375.

13. *sambuci* Hood, Proc. Biol. Soc. Wash., vol. xxvi, 1913, p. 163.

14. *umbripennis* (Hood), Ent. News, vol. xx, 1909, p. 30, fig. 3 (*Phyllothrips*).

15. *varicornis* Hood, Proc. Biol. Soc. Wash., vol. xxv, 1912, p. 74, fig. 6.

Key to Australian Species.

a. Fore tarsus of female not toothed ; wings darkly infuscate throughout.
b. Head about 1·3 times as long as wide, not longer than tube .. .. *umbratus* Hood.
bb. Head about 1·8 times as long as wide and 1·6 times as long as tube *tenuis* Hood.

aa. Fore tarsus of female with a stout tooth ; wings clear, or at most slightly infuscate at base.
c. Head about 1·2 times as long as wide.
d. Antennal segments 7 and 8 not compactly united to form a single mass, 8 more than twice as long as greatest width .. .. *disjunctus* Hood.
dd. Antennal segments 7 and 8 compactly united, forming a single mass, 8 less than twice as long as greatest width .. .. *connatus* Hood.
cc. Head very slightly, if at all, longer than wide.
e. Head slightly longer than wide ; antennæ slender, segment 5 about 2·4 times as long as wide ; prothorax 0·73 as long as head, bristles long and pale, those at the anterior and posterior angles equal in length to eyes .. .. .. *gracilior* Hood.
ee. Head slightly wider than long ; antennæ rather stout, segment 5 about 1·7 times as long as wide ; prothorax 0·64 as long as head, bristles short, dark, subequal, and about half as long as eyes .. .. *brevidens* Hood.

LIOTHRIPS UMBRATUS sp. nov.

Female (*macropterous*).—Length about 2·3 mm. Colour dark blackish brown, with articulations of legs, tarsi, most of fore tibiæ, and antennal segments 3-6, yellow ; fore wings darkly infuscate, particularly at base and along median line.

Head 1·28 times as long as wide, nearly smooth ; cheeks rounded, converging to the slightly constricted base ; vertex broadly rounded, slightly produced in front of eyes ; postocular bristles pointed, equal in length to eyes. Eyes slightly more than one-third as long as head, not protruding, slightly narrower than their interval. Anterior ocellus overhanging, directed forward. Antennæ of normal structure, about 1·8 times the length of head ; segments 7 and 8 rather more closely united than the others, but not compactly joined ; sense-cones arranged as usual in the genus ;

segments 1 and 2 about concolourous with head, 2 yellow at apex; 3-6 lemon yellow, 6 infuscate in apical half; 7 and 8 blackish brown. Mouth-cone broadly rounded, attaining apical fourth of prosternum.

Prothorax about 0·54 as long as head and (inclusive of coxæ) about 2·7 times as wide as median dorsal length; surface smooth, with short median thickening; all usual bristles present, pointed, the outer posterior pair longer than postoculars, the inner posterior pair about equal in length to postoculars, other bristles less than half as long. Wings long, broad, fore pair with about seventeen accessory hairs on posterior margin and with the three subbasal bristles of the same size as postoculars; hind wings clouded along margins and with a dark median line. Fore tarsus unarmed.

Abdomen of normal form and structure. Tube about equal in length to head. Abdominal bristles long, pointed, dark brown in colour, those on segment 9 longer than tube.

Measurements of holotype:—Length 2·29 mm.; head, length 0·307 mm., width 0·240 mm.; prothorax, length 0·164 mm., width (inclusive of coxæ) 0·444 mm.; pterothorax, width 0·480 mm.; abdomen, width 0·480 mm.; tube, length 0·312 mm., width at base 0·112 mm., at apex 0·054 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	60	66	84	81	84	74	69	39
Width (μ)	51	41	41	47	42	41	33	16

Total length of antenna, 0.557 mm.

Described from three females taken by sweeping in jungle at Nelson, N.Q., May 25, 1913, by Mr. A. A. Girault.

A true *Liothrips*, easily known by the long tube and the colouration of the wings and antennæ.

LIOTHRIPS TENUIS sp. nov.

Female (*macropterous*).—Length about 2·7 mm. Colour dark blackish brown (almost black), with tarsi, apex and inner surface of fore tibiæ, and most of antennal segments 3-6, lemon yellow; fore wings darkly infuscate, particularly at base and along median line.

Head 1·8 times as long as wide, nearly smooth; cheeks nearly parallel, constricted near base; vertex not produced; postocular bristles slightly longer than eyes, nearly pointed. Eyes about one-third as long as head, flattened at sides, protruding at posterior angles, slightly narrower than their interval. Ocelli equal in size and equidistant, the anterior ocellus directed upward and not overhanging. Antennæ of normal structure, nearly 1·5 times as long as head; segments 7 and 8 more closely united than the others but not compactly joined; sense-cones arranged as usual in the genus; segments 1, 2, 7, and 8 concolourous with head, 2 slightly paler at apex; 3-6 lemon yellow, 4 and 5 lightly infuscate at apex, 6 dark brown in apical two-fifths. Mouth-cone broadly rounded, reaching about half across prosternum.

Prothorax about 0·4 as long as head; surface roughened, and with short median thickening; all usual bristles present, nearly pointed, dark brown in colour, the two posterior pairs longest but decidedly shorter than postoculars, the others

about one-third as long. Wings long and broad, fore pair with about thirteen accessory hairs on posterior margin; subbasal bristles nearly pointed, the outer equal in size to posterior angulars, the other two successively shorter; hind wings clouded and with dark median line. Fore tarsus unarmed.

Abdomen slender, of normal structure. Tube about 0·6 as long as head. Abdominal bristles long, nearly pointed, dark brown in colour, those on segment 9 shorter than tube; terminal bristles about 0·8 as long as tube.

Measurements of holotype :—Length 2·69 mm.; head, length 0·384 mm., width 0·210 mm.; prothorax, length 0·158 mm., width (inclusive of coxæ) 0·420 mm.; pterothorax, width 0·480 mm.; abdomen, width 0·498 mm.; tube, length 0·240 mm., width at base 0·104 mm., at apex 0·049 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	60	65	85	86	84	78	66	37
Width (μ)	47	38	36	40	37	33	27	15

Total length of antenna, 0·561 mm.

Described from one female taken by sweeping in jungle at Nelson, N.Q., April 12, 1914, by Mr. A. A. Girault.

Easily known by the long head and dark wings.

LIOTHRIPS DISJUNCTUS sp. nov.

Female (*macropterous*).—Length about 1·9 mm. Colour dark blackish brown, with tarsi, most of fore tibiæ, distal ends of middle and hind tibiæ, and antennal segments 3-6, lemon yellow; wings almost clear, lightly infuscate at base.

Head about 1·2 times as long as wide, entire dorsal surface rather deeply and distinctly reticulate with anastomosing lines, cheeks evenly rounded to eyes and to base; vertex slightly produced; postocular bristles capitate, a little more than half as long as eyes. Eyes about 0·4 as long as head, not protruding, slightly narrower than their interval. Anterior ocellus overhanging, directed forward. Antennæ of normal structure, fully 1·8 times as long as head; segments 7 and 8 more closely united than the others, but not compactly joined; sense-cones arranged as usual in the genus; segments 1, 2, 7, and 8 concolourous with head, 2 paler at apex; 3-6 lemon yellow, the last infuscate apically. Mouth-cones broadly rounded, attaining middle of prosternum.

Prothorax about three-fourths as long as head and (inclusive of coxæ) slightly more than twice as wide as long; surface distinctly reticulate with anastomosing lines, and with short median thickening; all usual bristles present, capitate, the pair at posterior angles much the longest and about equal to postoculars. Wings long, broad; fore pair with eight accessory hairs on posterior margin and with the three subbasal bristles capitate, equal, and about the size of anterior laterals. Fore tarsus with a stout, slightly hooked tooth.

Abdomen of normal form and structure. Tube about 0·92 as long as head, sides straight, slightly constricted at apex; abdominal bristles long, pale, capitate, those on segment 9 about three-fourths as long as tube; terminal bristles nearly as long as tube.

Measurements of holotype :—Length 1·85 mm.; head, length 0·253 mm., width 0·208 mm.; prothorax, length 0·192 mm., width (inclusive of coxæ) 0·414 mm.; pterothorax, width 0·450 mm.; abdomen, width 0·480 mm.; tube, length 0·234 mm., width at base 0·095 mm., at apex 0·041 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	52	63	70	69	65	64	55	35
Width (μ)	41	37	33	38	37	33	26	13

Total length of antenna, 0·473 mm.

Described from one female taken on Thursday Island, Torres Strait, Q., March 31, 1912, by Mr. A. A. Girault.

Readily known by the characters given in the key.

LIOTHRIPS CONNATUS sp. nov.

Female (*macropterous*).—Length about 1·6 mm. Colour dark blackish brown, with tarsi, distal ends of all tibiæ, and at least the basal portion of antennal segments 3-6, lemon yellow; wings almost clear, lightly infuscate at base.

Head about 1·2 times as long as wide, entire dorsal surface rather deeply and distinctly reticulate with anastomosing lines; cheeks evenly rounded to eyes and to base; vertex slightly produced; postocular bristles blunt, slightly longer than eyes. Eyes slightly more than one-third as long as head, slightly if at all protruding, distinctly narrower than their interval. Anterior ocellus overhanging and directed forward. Antennæ of nearly normal structure, about one and three-fourths times as long as head, segments 7 and 8 compactly united to form a single mass, 8 short, about 1·4 times as long as wide; sense-cones disposed as usual in the genus; segments 1, 2, 7, and 8 concolourous with head, 2 paler at apex; 3-6 lemon yellow, 4 infuscate in distal third, 5 in distal half, and 6 in distal three-fifths. Mouth-cone broadly rounded, attaining middle of prosternum.

Prothorax two-thirds as long as head and (inclusive of coxæ) about 2·1 times as wide as long; pronotum lightly reticulate with anastomosing lines, except at middle, and with short median thickening; all usual bristles present, capitate, the two posterior pairs longest and about equal to postoculars; mid-laterals slightly shorter; the two anterior pairs about half the length of postoculars. Wings long, broad; fore pair with seven accessory hairs on posterior margin and with the three subbasal bristles capitate, equal, and about the size of anterior laterals. Fore tarsus with a long, stout, slightly hooked tooth.

Abdomen of normal form and structure. Tube about 0·73 as long as head, sides straight, slightly constricted at apex; abdominal bristles long, pale, capitate, those on segment 9 nearly as long as tube.

Measurements of holotype :—Length 1·63 mm. ; head, length 0·240 mm., width 0·199 mm. ; prothorax, length 0·161 mm., width (inclusive of coxæ) 0·341 mm. ; pterothorax, width 0·390 mm. ; abdomen, width 0·444 mm. ; tube, length 0·175 mm., width at base 0·083 mm., at apex 0·036 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	48	60	65	62	61	56	47	24
Width (μ)	41	33	29	34	31	33	27	17

Total length of antenna, 0·423 mm.

Described from one female taken by sweeping in forest at Pentland, N.Q., December 24, 1912, by Mr. A. A. Girault.

LIOTHRIPS GRACILIOR sp. nov.

Female (*macropterous*).—Length about 1·9 mm. Colour dark blackish brown, with tarsi, proximal and distal ends of all tibiæ, and basal portions of antennal segments 3-6, yellow ; wings clear.

Head very nearly as wide as long, entire dorsal surface rather deeply and distinctly reticulate with anastomosing lines ; cheeks strongly converging to eyes, nearly parallel posteriorly except for a slight subbasal constriction ; vertex not produced, anterior margin straight and nearly vertical ; postocular bristles long, pale in colour, capitate, equal in length to eyes. Eyes slightly more than one-third as long as head, not at all protruding, equal in width to their interval ; ventral length five-sevenths of dorsal, ventral interval nearly twice the ventral width. Anterior ocellus slightly overhanging, directed forward. Antennæ of nearly normal structure, twice as long as head, segments 7 and 8 compactly united to form a single mass, 8 about 1·67 times as long as wide ; sense-cones disposed as usual in the genus ; segments 1, 2, 7, and 8 concolourous with head ; 2 paler at apex, 3-6 yellow, slightly infuscate distally, 4 and 5 irregularly brown in apical half, 6 brown except base. Mouth-cone rounded, nearly attaining base of prosternum.

Prothorax about 0·73 as long as head and (inclusive of coxæ) about 2·3 times as wide as long ; pronotum smooth at middle, margins with faint, anastomosing lines ; median thickening distinct ; all usual bristles present, capitate, the anterior marginals and posterior marginals shorter than the others, which are subequal and nearly as long as postoculars. Wings broad, colourless, fore pair with about fourteen accessory hairs on posterior margin, and with the three subbasal bristles capitate. Fore tarsus with a long, stout, slightly hooked tooth.

Abdomen of normal form and structure. Tube about 0·77 as long as head, sides straight, Abdominal bristles long, pale, capitate, those on segment 9 three-fourths as long as tube.

Measurements of holotype :—Length 1·86 mm. ; head, length 0·250 mm., width 0·245 mm. ; prothorax, length 0·181 mm., width (inclusive of coxæ) 0·415 mm. ; pterothorax, width 0·420 mm. ; abdomen, width 0·522 mm. ; tube, length 0·192 mm., width at base 0·090 mm., at apex 0·042 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	54	72	84	76	69	61	54	30
Width (μ)	45	33	31	33	29	32	28	18

Total length of antenna, 0·500 mm.

Described from one female taken by sweeping in forest at Pentland, N.Q., December 26, 1912, by Mr. A. A. Girault.

LIOTHRIPS BREVIDENS sp. nov.

Female (*macropterous*).—Length about 1·4 mm. Colour dark blackish brown, with tarsi, distal ends of fore tibiæ, and basal portions of antennal segments 3-5, yellow ; wings clear.

Head very slightly wider than long, entire dorsal surface deeply and distinctly reticulate with anastomosing lines ; cheeks strongly converging to eyes, nearly parallel posteriorly ; vertex not or only very slightly produced, anterior margin nearly straight and vertical ; postocular bristles short, dark in colour, capitate, half as long as eyes. Eyes nearly 0·4 as long as head, not at all protruding, slightly narrower than their interval ; ventral length about five-sevenths of dorsal, ventral width a little less than half of ventral interval. Anterior ocellus slightly overhanging, directed forward. Antennæ of nearly normal structure, nearly twice as long as head, segments 7 and 8 compactly united to form a single mass, 8 short, about 1·7 times as long as wide ; sense-cones disposed as usual in the genus ; segments 1, 2, 7, and 8 concolourous with head, 2 paler at apex ; 3 yellow, lightly infuscate distally ; 4 and 5 brown, yellow in basal third, 6-8 blackish brown. Mouth-cone pointed, with sides straight, attaining base of prosternum.

Prothorax about 0·64 as long as head and (inclusive of coxæ) about 2·5 times as wide as long ; pronotum smooth at middle, margins with strong anastomosing lines ; median thickening short and indistinct ; all usual bristles present, short, stout, capitate, dark in colour, subequal in length, and half as long as eye. Wings broad, colourless, except at extreme base ; fore pair with about nine accessory hairs on posterior margin and with the three subbasal bristles capitate. Fore tarsus with slightly hooked tooth about one-third as long as width of tarsus.

Abdomen of normal form and structure. Tube about three-fourths as long as head, sides straight. Abdominal bristles rather short, brownish, capitate, those on segment 9 half as long as tube ; terminal bristles about 0·8 as long as tube.

Measurements of holotype :—Length 1·42 mm. ; head, length 0·198 mm., width 0·211 mm. ; prothorax, length 0·126 mm., width (inclusive of coxæ) 0·316 mm. ; pterothorax, width 0·336 mm. ; abdomen, width 0·408 mm. ; tube, length 0·150 mm., width at base 0·075 mm., at apex 0·034 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	48	54	60	58	51	48	45	27
Width (μ)	36	31	27	31	30	32	29	16

Total length of antenna, 0·391 mm.

Male (*macropterous*).—Length about 1·3 mm. Colour and structure essentially as in female, but with the longest bristles on segment 9 of the abdomen about 0·8 the length of tube.

Measurements of allotype :—Length 1·25 mm. ; head, length 0·186 mm., width 0·198 mm. ; prothorax, length 0·128 mm., width (inclusive of coxae) 0·322 mm. ; pterothorax, width 0·326 mm. ; abdomen, width 0·341 mm. ; tube, length 0·139 mm., width at base 0·066 mm., at apex 0·032 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	40	49	54	54	53	48	45	24
Width (μ)	34	28	25	28	28	27	25	15

Total length of antenna, 0·367 mm.

Described from three females and four males taken by sweeping foliage and grass in forest at Pentland, N.Q., December 26, 1912, and January 6, 1913, by Mr. A. A. Girault.

RHYNCHOTHRIPS SOROR sp. nov.

Female (*macropterous*).—Length about 1·4 mm. Colour dark blackish brown, with tarsi, both ends of middle and hind tibiæ, distal portion and inner surface of fore tibiæ, and third antennal segment, yellow or ochreus.

Head 1·04 times as long as wide ; cheeks slightly arched, nearly parallel ; lateral portions of occiput reticulate with fine anastomosing lines ; vertex not produced, nearly vertical, its front margin straight ; postocular bristles broadly capitate, two-thirds as long as eyes. Eyes nearly 0·4 as long as head, slightly wider than their interval, rounded and not protruding ; ventral extent much less than dorsal, the length and width equal and about 0·6 of the ventral interval, the inner posterior angle about 90°. Anterior ocellus overhanging and directed forward. Antennæ 2·25 times as long as head, almost as in *Rh. dentifer* (*see* Proc. Ent. Soc. Wash., vol. xiv, 1912, pl. vi, fig. 3), segments 7 and 8 compactly united ; sense-cones short ; formula : 3, 0-1 ; 4, 1-1+1 ; 5, 1-1+1 ; 6, 1-1+1 ; 7 with one on dorsum near apex ; segments 1 and 2, and 4-8 concolourous with head, 2 paler at apex ; 3 ochreus, infuscate apically. Mouth-cone very long, slender, equal in length to dorsum of head, surpassing base of prosternum.

Prothorax along median dorsal line nearly equal in length to head and (inclusive of coxæ) 2·1 times as wide as long ; pronotum with short median thickening ; all usual bristles present, pale, similar to postoculars and of about the same length. Pterothorax with sides rather strongly converging posteriorly. Legs moderately short and stout, fore femora longer than head ; fore tarsus with a long, hooked tooth. Wings clear.

Abdomen broad and of normal structure ; tube about 0·83 as long as head, less than twice as long as basal width, and 2·25 times as wide at base as at apex, slightly narrowed to middle and again at apex ; abdominal bristles pale, capitate, those at apex of segment 9 about half as long as tube ; terminal bristles longer than tube.

Measurements of holotype :—Length 1·44 mm. ; head, length 0·187 mm., width 0·180 mm. ; prothorax, length 0·180 mm., width (inclusive of coxæ) 0·378 mm. ; pterothorax, width 0·396 mm. ; abdomen, width 0·414 mm. ; tube, length 0·150 mm., width at base 0·081 mm., at apex 0·036 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	45	57	59	63	57	56	50	34
Width (μ)	34	34	30	33	30	30	24	15

Total length of antenna, 0·421 mm.

Described from one female taken by sweeping in forest and jungle at Nelson, N.Q., April 27, 1913, by Mr. A. A. Girault.

MESOTHRIPS AUSTRALIÆ sp. nov.

Female (*macropterous*).—Length about 2·9 mm. Colour dark blackish brown, with fore tibiæ, all tarsi, and basal portions of antennal segments 3-7, yellow ; wings pale fuliginous, with dark median streak extending to middle of fore wings and to near apex of hind wings.

Head 1·68 times as long as wide, broadest across eyes, cheeks nearly straight, slightly converging posteriorly and strongly constricted at base, which is 0·69 of the width across eyes ; dorsal and lateral surfaces nearly smooth, the transverse anastomosing lines faint, with a few rather strong bristles ; vertex conically produced ; postocular bristles slender, pointed, nearly as long as eyes. Eyes large and prominent, one-third as long as head and decidedly narrower than their interval. Ocelli equidistant, the anterior ocellus overhanging and on a line with the base of the first antennal segment. Antennæ of normal structure, about 1·5 times as long as head, formed almost exactly as in *M. jordani* ; sense-cone formula : 3, 1-2 ; 4, 2-2 ; 5, 1-1^{+1} ; 6, 1-1^{+1} ; 7 with one on dorsum near apex ; segments 1 and 2 concolourous with head, 2 slightly paler at apex ; 3 lemon yellow, with a small, infuscate area near apex ; 4-6 lemon yellow, darkly infuscate in distal half ; 7 and 8 brown, the former yellow in basal two-fifths. Mouth-cone short and broadly rounded.

Prothorax large, heavy, and three-fourths as long as head, the breadth across coxæ 1·66 times the length and 2·6 times the apical breadth ; pronotum smooth, with short, median thickening ; all usual bristles present, pointed ; the two anterior pairs short, others about as long as postoculars. Fore legs greatly enlarged, the fore femora longer than and nearly as broad as head, the fore tibiæ about as stout as the middle femora, the fore tarsi with a very large hooked tooth. Fore wings slightly narrowed at middle, with about sixteen accessory hairs on posterior margin, and with the three subbasal bristles very long and pointed ; wings of both pairs pale fuliginous, with dark median streak extending to middle of fore wings and to near apex of hind wings.

Abdomen slender, much narrower than pterothorax, broadest across segment 2. Tube about 0·8 as long as head. All bristles long, pointed, yellow, those at apex of segment 9 fully as long as tube ; terminal bristles brown, about equal in length to tube.

Measurements of holotype :—Length 2·88 mm. ; head, length 0·396 mm., width across eyes 0·235 mm., at base 0·162 mm.; prothorax, length 0·300 mm., width (inclusive of coxæ) 0·499 mm. ; pterothorax, width 0·540 mm. ; abdomen, width 0·462 mm. ; tube, length 0·313 mm., width at base 0·109 mm., at apex 0·057 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	60	68	106	105	81	69	61	38
Width (μ)	50	36	50	48	38	31	25	13

Total length of antenna, 0·588 mm.

Male (*macropterous*).—Length about 2·2 mm. Colour and structure essentially as in female.

Measurements of allotype :—Length 2·24 mm. ; head, length 0·342 mm., width across eyes 0·216 mm., at base 0·150 mm. ; prothorax, length 0·222 mm., width (inclusive of coxæ) 0·384 mm.; pterothorax, width 0·408 mm. ; abdomen, width 0·414 mm. ; tube, length 0·264 mm., width at base 0·091 mm., at apex 0·049 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	51	58	93	93	75	60	47	33
Width (μ)	45	33	41	44	34	29	24	13

Total length of antenna, 0·510 mm.

Described from one female and two males taken by sweeping in jungle at Nelson, N.Q., June 2, 1914, and August 31, 1913, by Mr. A. A. Girault.

Very close indeed to *M. jordani*, and perhaps merely a race of that species. The only differences observed lie in colouration of the wings and antennæ, and the longer postocular bristles of *australiæ*.

EUOPLOTHRIPS gen. nov.

(*ευοπλος*, well-armed ; *θριψ*, a wood-worm.)

Head much longer than wide and much longer than prothorax, widest across eyes and strongly constricted at base ; vertex conically produced, bearing the anterior ocellus at its extremity ; cheeks with a few minute bristles. Eyes rather large, rounded, finely faceted, prominent, narrower than their interval. Ocelli anterior in position. Antennæ eight-segmented, formed as in *Mesothrips*. Mouth-cone shorter than its basal width, broadly rounded. Prothorax much shorter than head, strongly widened posteriorly and fully twice as wide across coxæ as at anterior margin, bristles rather short. Fore femora slightly enlarged, with a long tooth near middle of inner surface ; fore tibiæ with a finger-like projection near middle of inner surface ; fore tarsi with a long hooked tooth. Wings of fore pair wide near base, narrower apically, slightly constricted at middle. Abdomen slender, narrower than pterothorax. Tube normal, shorter than head.

Genotype : *Euoplothrips bagnalli* sp. nov.

Related to *Mesothrips*, *Gynaikothrips*, and *Androthrips*, but differing from them and from all other known genera of Thysanoptera in the armature of the fore legs. It is without doubt a gall-making genus.

EUOPLOTHRIPS BAGNALLI sp. nov.

Female (*macropterous*).—Length about 2·2 mm. Colour dark blackish brown (nearly black), with fore tibiæ and tarsi and bases of intermediate antennal segments yellowish; wings fuliginous, darker at base, and with a dark median line.

Head 1·64 times as long as wide, broadest across eyes, cheeks nearly straight, slightly converging posteriorly and strongly constricted at base, which is 0·73 of the width across eyes; dorsal and lateral surfaces nearly smooth, the transverse anastomosing lines faint, three or four minute bristles visible in profile; vertex conically produced; postocular bristles blunt, about half as long as eye. Eyes large and prominent, about 0·36 as long as head and about three-fourths as wide as their interval. Ocelli equidistant, the anterior ocellus overhanging and on a line with the base of the first antennal segment. Antennæ of normal structure, formed as in *Mesothrips*, 1·6 times as long as head; sense-cone formula: 3, 1-2; 4, 2-2; 5, $1\text{-}1^{+1}$; 6, $1\text{-}1^{+1}$; 7 with one on dorsum near apex; segments 1, 2, 7, and 8 concolourous with head, 2 paler at apex; 3 and 4 with pedicels yellow, the remainder of these segments dark fuliginous, paler at apex; 5 yellow in basal third, fuliginous beyond; 6 fuliginous, pedicel paler. Mouth-cone shorter than its basal width, broadly rounded.

Prothorax large, heavy, and 0·61 as long as head, the breadth across coxæ 1·84 times the length and about 2·3 times the apical breadth; pronotum smooth, with short median thickening; all usual bristles present, anterior marginals greatly reduced, the others blunt and about as long as postoculars. Fore legs slightly if at all enlarged, the fore femora with a long, straight acute tooth near middle of inner surface; fore tibiæ, near middle of inner surface, with a finger-like projection two-fifths as long as femoral tooth bearing a minute bristle at its tip; fore tarsi with a long, hooked tooth. Fore wings slightly narrowed at middle, with about ten accessory hairs on posterior margin, and with the three subbasal bristles blunt and equal in length to postoculars; wings of both pairs pale fuliginous, darker at base and in apical half, and with dark median streak extending to near apex of both pairs.

Abdomen slender, much narrower than pterothorax, broadest across segment 2. Tube about 0·62 as long as head. All bristles long, pointed, yellowish, those at apex of segment 9 nearly as long as tube; terminal bristles brown, about equal in length to tube.

Measurements of holotype:—Length 2·16 mm.; head, length 0·336 mm., width across eyes 0·204 mm., at base 0·148 mm.; prothorax, length 0·206 mm., width (inclusive of coxæ) 0·380 mm.; pterothorax, width 0·372 mm.; abdomen, width 0·332 mm.; tube, length 0·208 mm., width at base 0·082 mm., at apex 0·039 mm.

Antennal segments:	1	2	3	4	5	6	7	8
Length (μ)	60	63	83	89	81	69	57	40
Width (μ)	46	35	46	45	36	27	22	12

Total length of antenna, 0·542 mm.

Described from one female taken by sweeping in jungle at Nelson, N.Q., May, 30, 1912, by Mr. A. A. Girault.

Named after Richard S. Bagnall, Esq., of Penshaw, England, in recognition of his work on the Thysanoptera and in appreciation of his many courtesies to the author.

CRYPTOTHRIPS Uzel, 1895.

1895. *Cryptothrips* Uzel, Mon. d. Ordn. Thys., p. 228. (Type not designated ; 6 species included *nigripes* Reut., *lata* nov. sp., *angusta* nov. sp., *Icarus* nov. sp., *dentipes* Reut., and *bicolor* Heeger.)

1899. *Cryptothrips* Reuter, Acta Soc. Fauna Flora Fennica, vol. xvii, No. 2, pp. 16, 21.

1912. *Cryptothrips* Trybon, Arkiv f. Zool., bd. 7, No. 33, p. 9.

1912. *Cryptothrips* Karny, Marcellia, vol. xi, p. 138.

1914. *Cryptothrips* Karny, Zeitschr. f. wiss. Ins.-Biol., bd. x, p. 294.

1916. *Cryptothrips* Hood, Bull. Brook. Ent. Soc., vol. xi, p. 64. (Type designated as *C. lata* Uzel.)

The four Australian species which the writer has assigned to this genus are closely allied to the forms found in Europe, and have not been assigned here simply through lack of a more appropriate place to put them. The first species is related to *C. latus* Uzel, the second and third to *C. icarus* Uzel, and the fourth to *C. bicolor* (Heeger).

Key to Australian Species.

a. Head longer than wide.

b. Head less than twice as long as wide.

c. Head nearly as wide as long, broadest across eyes ; cheeks straight, strongly converging posteriorly ; eyes directed more nearly forward than laterally, not at all protruding ; median dorsal length of prothorax less than half the length of head *laticeps* Hood.

cc. Head about 1·6 times as long as wide, as broad in basal third as across eyes ; cheeks sinuate, constricted just behind eyes and again at base ; eyes directed more nearly laterally than forward, rather strongly protruding ; median dorsal length of prothorax more than half the length of head .. .. *badius* Hood.

bb. Head very elongate, fully twice as long as wide .. .. *dolichos* Hood.

aa. Head wider than long ; abdomen nearly black, remainder of body and all appendages yellow *dimidiatus* Hood.

CRYPTOTHRIPS LATICEPS sp. nov.

Female (macropterous).—Length about 1·8 mm. Colour dark blackish brown, with tarsi, apex of segment 2 of antennæ and base of segments 3, paler ; fore wings brown, darkest at base and becoming quite pale toward apex.

Head smooth, slightly longer than wide, broadest across eyes, cheeks straight and converging to base, which is only 0·8 of the greatest width ; vertex not at all produced ; postocular bristles pointed, about 1·5 times as long as eyes ; all other bristles minute. Eyes small, not protruding, situated on the front, rather than the lateral, part of the head, broader on dorsal than on ventral surface, and, as seen from above, quadrangular in form. Ocelli of posterior pair widely separated. Antennæ of normal structure, almost exactly as in *C. longiceps* (*see* Proc. Ent. Soc. Wash., vol. xiv, No. 3, 1912, pl. viii, fig. 5). Mouth-cone broadly rounded, nearly attaining posterior margin of prothorax.

Prothorax along median dorsal line less than half the length of head, with slight median thickening ; all usual bristles present, pointed, the outer posterior pair longest, anterior marginals shortest and weakest. Fore tarsus unarmed. Fore wings rather broad and of equal width throughout, with about 12 accessory hairs.

Abdomen rather stout and heavy. Tube about 0·7 as long as head, sides straight. Bristles long, dark, and prominent, those at apex of segments 7 and 9 equal in length to tube and to terminal bristles.

Measurements of holotype :—Length 1·82 mm. ; head, length 0·290 mm., width 0·262 mm. ; prothorax, length (along median dorsal line) 0·122 mm., width (inclusive of coxæ) 0·354 mm. ; pterothorax, width 0·414 mm. ; abdomen, width 0·462 mm. ; tube, length 0·210 mm., width at base 0·090 mm., at apex 0·048 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	45	63	84	75	66	60	41	39
Width (μ)	44	34	30	35	33	33	25	17

Total length of antenna, 0·473 mm.

Male (*macropterous*).—Length about 1·9 mm. Almost identical with female in colour and structure, but with segments 3 and 4 of antennæ, and apex of segment 2, yellowish ; fore tibiæ yellow toward apex, and fore tarsi yellow, armed with a stout triangular tooth ; pterothorax and fore femora enlarged, the former with strong median thickening ; scale at base of tube prominent.

Measurements of allotype :—Length 1·86 mm. ; head, length 0·283 mm., width 0·236 mm. ; prothorax, length 0·163 mm., width (inclusive of coxæ) 0·384 mm. ; pterothorax, width 0·420 mm. ; abdomen, width 0·510 mm. ; tube, length 0·224 mm., width at base 0·114 mm., at apex 0·047 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	45	63	91	80	78	69	43	42
Width (μ)	44	33	30	34	32	30	22	16

Total length of antenna, 0·511 mm.

Described from one female and one male, taken by " sweeping top of Pyramid Mt., 3,000 ft., Casuarina and bushes," Nelson, N.Q., August 7, 1912, by Mr. A. A. Girault.

Strictly congeneric with *C. latus* and its allies, but remarkable for the anteriorly broadened head.

CRYPTOTHRIPS BADIUS sp. nov.

Female (*apterous*).—Length about 2·1 mm. Colour uniform dark blackish brown, with tarsi, articulations of legs, apex of segment 2 of antennæ and base of segment 3, yellow or yellowish.

Head about 1·65 times as long as wide, sides and occiput with anastomosing lines, sides sinuate, narrowed equally behind eyes and at base, and as wide in intermediate portion as across eyes ; postocular bristles pointed, longer than eyes, and situated close to their inner posterior margins ; other bristles minute. Eyes prominent and protruding, about one-fifth as long as head and a little more than half as wide as their interval. Anterior ocellus minute, posterior ocelli wanting. Antennæ long and slender, about 1·8 times as long as head, structure normal to genus ; segment 3 with one sense-cone on inner and one on outer surface. Mouth-cone short and broadly rounded.

Prothorax with anastomosing lines along posterior margin and with a long, distinct, median thickening; all bristles pointed and moderate in size, the two posterior pairs longest and strongest, the anterior marginals greatly reduced. Pterothorax reduced. Fore tarsus unarmed.

Abdomen stout, heavy, much broader than pterothorax. Tube about three-fourths as long as head and about 2·6 times as wide at base as at apex, sides concave; all bristles yellowish, pointed, the terminal bristles shorter than tube.

Measurements of holotype :—Length 2·08 mm.; head, length 0·348 mm., width 0·211 mm.; pterothorax, length 0·192 mm., width (inclusive of coxæ) 0·372 mm.; pterothorax, width 0·360 mm.; abdomen, width 0·552 mm.; tube, length 0·264 mm., width at base 0·118 mm., at apex 0·044 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	63	69	104	104	96	72	68	48
Width (μ)	51	39	35	37	33	29	27	15

Total length of antenna, 0·624 mm.

Male (*apterous*).—Very similar to female in colour and structure, but with the fore tarsus armed with a stout triangular tooth and the tube with a prominent "scale" at base.

Measurements of allotype :—Length 1·75 mm.; head, length 0·305 mm., width 0·200 mm.; prothorax, length 0·169 mm., width (inclusive of coxæ) 0·236 mm.; pterothorax, width 0·324 mm.; abdomen, width 0·468 mm.; tube, length 0·220 mm., width at base 0·099 mm., at apex 0·045 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	57	63	94	94	90	69	61	42
Width (μ)	47	36	35	34	32	28	25	13

Total length of antenna, 0·570 mm.

Described from two females and three males, taken by sweeping in forest, Nelson, N.Q., January 29, August 27-28, October 9, and November 2, 1912, by Mr. A. A. Girault.

Very close to *C. icarus*, but easily known by the longer head and the different coloration.

CRYPTOTHRIPS DOLICHOS sp. nov.

Male (*apterous*).—Length about 2·1 mm. Colour light yellowish brown, with last four segments of abdomen nearly black.

Head very long and slender, 2·1 times as long as wide, sides sinuate, narrowest a little behind eyes and narrowed again at base, smooth above, cheeks with several rather strong bristles; vertex not produced; postocular bristles long, pointed; another pair of strong bristles between and near eyes. Eyes small but prominent and strongly protruding, only about one-sixth the length of head and less than half as wide as their interval. Ocelli wanting. Antennal segment 1 elongate, equal in length to 2; remaining segments wanting in the unique type.

Prothorax along median dorsal line about 0·4 the length of head, without median thickening; anterior marginal bristles wanting, all others present, pointed, the posterior pairs much the longest. Fore tarsus with a stout, slightly curved tooth. Wings wanting.

Abdomen stout and heavy. Tube about 0·7 as long as head, sides straight. Abdominal bristles long, pointed, yellowish, those at apex of segment 9 about 0·6 the length of tube.

Measurements of holotype :—Length 2·52 mm.; head, length 0·456 mm., width 0·216 mm.; prothorax, length 0·181 mm., width (inclusive of coxæ) 0·427 mm.; pterothorax, width 0·396 mm.; abdomen, width 0·540 mm.; tube, length 0·312 mm., width at base 0·114 mm., at apex 0·051 mm.

Antennal segments: 1, length 69μ, width 48μ; 2, length 72μ, width 39μ; remainder of antenna wanting.

Described from one male taken by "sweeping floor of forest, Double Island (mainland)," Queensland, December 24, 1911, by Mr. A. A. Girault.

The decidedly anomalous character of this species seems to warrant its description at the present time, even from a specimen as poorly preserved as the type. While the unusual colouration may not perhaps be normal, the very long, slender head and the small, protruding eyes mark it at once as very distinct. It is a true *Cryptothrips*, as that genus is at present interpreted, and is allied to Uzel's *icarus*.

CRYPTOTHRIPS DIMIDIATUS sp. nov.

Female (*apterous*).—Length about 1·4 mm. Head and thorax yellow, the former darker and the latter washed at sides with brown; legs and antennæ lemon yellow, the latter with segments 7 and 8 (rarely 5-8) infuscate; abdomen black.

Head nearly smooth, about 1·16 times as wide as long, narrowed posteriorly; vertex flat and evenly declivous; postocular bristles about as long as dorsal length of eyes, pointed; another pair of pointed bristles about half as long between and near eyes. Eyes scarcely protruding, small and very widely separated, produced posteriorly on ventral surface of head. Ocelli wanting, or only minute anterior ocellus present. Antennæ of the same general structure as in *C. gilvipes* (*see* Proc. Biol. Soc. Wash., vol. xxvii, 1914, pl. v, fig. 4), but stouter and with the intermediate segments more rounded; segment 3 with one sense-cone on inner and one on outer surface. Mouth-cone short and broadly rounded.

Prothorax with all usual bristles present, pointed, the two posterior pairs about equal in length to postoculars; midlaterals, anterior laterals, and anterior marginals successively shorter. Pterothorax small and narrow. Fore tarsus unarmed.

Abdomen stout, heavy, much broader than pterothorax. Tube about three-fourths as long as head, twice as wide at base as at apex, sides parallel in basal fifth, thence converging to apex; all bristles brown, pointed, the terminal bristles shorter than tube.

Measurements of holotype :—Length 1·38 mm. ; head, length 0·190 mm., width 0·221 mm. ; prothorax, length 0·144 mm., width (inclusive of coxæ) 0·290 mm. ; pterothorax, width 0·312 mm. ; abdomen, width 0·468 mm. ; tube, length 0·145 mm., width at base 0·084 mm., at apex 0·042 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	45	54	69	66	63	57	44	31
Width (μ)	44	37	30	32	31	30	24	14

Total length of antenna, 0·429 mm.

Male (*apterous*).—Very similar to female in colour and structure, but with the fore tarsus strongly toothed and the pronotum with a short, dark, median thickening.

Measurements of allotype :—Length 1·03 mm. ; head, length 0·150 mm., width 0·181 mm. ; prothorax, length 0·130 mm., width (inclusive of coxæ) 0·240 mm. ; pterothorax, width 0·228 mm. ; abdomen, width 0·312 mm. ; tube, length 0·108 mm., width at base 0·069 mm., at apex 0·034 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	36	45	51	50	49	45	33	26
Width (μ)	36	31	27	28	29	27	22	13

Total length of antenna, 0·335 mm.

Described from six females and one male, all taken by Mr. A. A. Girault by sweeping in forest, at Proserpine, N.Q. (type locality), November 2 and 3, 1912 ; at Nelson, N.Q., May 29, 1913, and at Pentland, N.Q., January 8, 1913.

Easily known from *dentipes*, *gilvipes*, and *bicolor*, its closest allies, by its small size, short head, and colour.

PHAULOTHRIPS gen. nov.

(φαῦλος, good-for-nothing ; θριψ, a wood-worm).

Head elongate, rectangular, much longer than wide, and fully twice as long as median dorsal length of pronotum, slightly elevated along posterior portion of median line ; vertex not produced, though overhanging, with a pair of prominent forwardly directed bristles lateral of median ocellus ; cheeks straight and parallel, with a pair of long lateral bristles behind eyes ; postocular bristles long. Antennæ slender, eight-segmented, segments 4-7 (particularly 5 and 6) prolonged on ventral surface at apex ; segment 3 longest ; 7 and 8 not closely united. Eyes small, less than one-fourth as long as head. Anterior ocellus directed forward and upward. Mouth-cone not as long as width at base, semicircular at apex, about attaining middle of prosternum. Prothorax more than two and one-half times as wide across coxæ as median length of dorsum ; anterior margin of pronotum deeply, roundly emarginate and somewhat thickened ; the two pairs of bristles at posterior angles long, others minute. Fore tarsi (at least in the male) strongly armed. Wings long, broad, not narrowed at middle. Abdomen broad and heavy. Tube much shorter than head, constricted at apex.

Genotype : *Phaulothrips vuilleti* sp. nov.

Suggestive in many ways of *Diceratothrips*, from which it may be known by the longer head and the broad, deeply emarginate prothorax. The thickening of the anterior margin of the pronotum is an interesting character which occurs also in the Neotropical genus *Dichætothrips*.

PHAULOTHRIPS VUILLETI sp. nov.

Male (*macropterous*).—Length about 3·3 mm. Colour dark blackish brown or black, with third antennal segment, fore tarsi, and apex of fore tibiæ, yellowish.

Head slightly more than twice as long as wide, sides perfectly straight and parallel ; dorsal and lateral surfaces faintly reticulate with anastomosing lines, especially at base ; vertex not produced, front broadly emarginate, overhanging insertion of antennæ and with a pair of long, strong, forwardly directed bristles each side of emargination and a pair of minute bristles between and below these ; postocular bristles much longer than eyes, pointed ; cheeks with a pair of lateral bristles (half the length of postoculars) behind eyes. Eyes about one-fifth as long as head and above about as wide as their interval ; beneath, half as wide as their interval and with the inner posterior angle acute. Ocelli nearly equidistant, the anterior ocellus directed forward and upward. Antennæ slender, 1·72 times as long as head, intermediate segments elongate, sense-cones very short, stout ; formula : 3, 1-1 ; 4, 1-1 ; 5, $1\text{-}1^{+1}$; 6, $1\text{-}0^{+1}$; 7 with one on dorsum near apex ; segments 1, 2, and 4-8 dark blackish brown, the apex of 2 yellowish ; 3 yellow, infuscate at apex. Mouth-cone not as long as width at base, semicircular at apex, about attaining middle of prosternum.

Prothorax along median dorsal line about 0·43 as long as head and (inclusive of coxæ) about 2·7 times as wide as long ; pronotum smooth, with heavy median thickening, and with the deeply emarginate anterior margin somewhat thickened ; the two pairs of bristles at posterior angles long, pointed, equal in length to postoculars, other bristles minute. Pterothorax rectangular about equal in width to prothorax. Wings long, broad, not narrowed at middle, lightly washed with brownish. Fore femora enlarged, about as long as head and 0·7 as broad ; fore tarsi with a long, stout tooth.

Abdomen broad and heavy. Tube 0·68 as long as head and 2·5 times as long as width at base, which is about 2·4 times the apical. Sides sinuate, the apex constricted. All bristles long and pointed, yellow, those at apex of segment 9 longer than tube ; terminal bristles half as long as tube.

Measurements of holotype :—Length 3·29 mm. ; head, length 0·588 mm., width 0·284 mm. ; prothorax, length along median dorsal line 0·252 mm., width (inclusive of coxæ) 0·678 mm. ; pterothorax, width 0·672 mm. ; abdomen, width 0·732 mm. ; tube, length 0·400 mm., width at base 0·160 mm., at apex 0·068 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	96	111	225	174	150	108	72	70
Width (μ)	64	50	48	48	47	42	35	23

Total length of antenna, 1·01 mm.

Described from two males taken by sweeping in forest at Nelson, N.Q., August 7 and November 5-6, 1913, by Mr. A. A. Girault.

Named after the late M. André Vuillet, formerly of the Entomological Station at Paris, France, who was one of the most promising students of the Thysanoptera.

ADIAPHOROTHRIPS GIRAULTI sp. nov.

Male (macropterous).—Length about 3·5 mm. Colour dark blackish brown, with tarsi, knees, part of fore tibiæ, and at least the basal portions of antennal segments 3-5 (sometimes 3-6), yellow ; wings clear, or yellowish toward base.

Head 1·6 times as long as wide, depressed, broadest across eyes ; cheeks narrowed a little behind eyes, roundly broadened at basal third, and with a distinct constriction near base, behind which they are again broadened, surface set with about eight strong parallel lateral bristles, dorsal and lateral surfaces with fine close striæ which become reticulate on posterior portion of occiput ; vertex not produced ; postocular bristles pointed, longer than eyes. Eyes about one-fourth as long as head and two-thirds as wide as their interval, ventral extent slightly less than dorsal. Ocelli widely separated, the anterior ocellus on a line with the posterior margin of first antennal segment ; posterior ocelli contiguous to inner margins of eyes. Antennæ slender, about 1·85 times the length of head ; segments 3 and 4 subequal in length, 5 slightly shorter ; sense-cones short and inconspicuous ; formula : 3, 1-1 ; 4, 2-2 ; 5, 1-1+1 ; 6, 1-0+1 ; 7 with one on dorsum near apex ; segments 1, 2, 7, and 8 dark blackish brown ; 3 and 4 (sometimes only 3) yellow ; 5 yellow at base, dark brown beyond ; 6 dark brown or with pedicel yellow. Mouth-cone shorter than width at base, semicircularly rounded at apex.

Prothorax about 0·57 as long as head and (inclusive of coxae) about 2·4 times as wide as long ; pronotum smooth, with strong median thickening, and with the anterior border emarginate and thickened ; all usual bristles present, pointed, the two posterior pairs about as long as postoculars, others small. Fore legs enlarged ; fore femora with a few stout spines on inner surface and on outer basal margin ; fore tarsi with a very large hooked tooth which is nearly as long as tarsus. Wings long, broad, of equal width throughout, and with about 42 accessory hairs on posterior margin.

Abdomen large, broad ; tube nearly as long as head and about three times as long as its basal width, sides straight. Abdominal bristles long, pointed, pale, those at apex of segment 9 about as long as tube ; terminal bristles brown, three-fourths the length of tube.

Measurements of holotype :—Length 3·47 mm. ; head, length 0·526 mm., width 0·328 mm. ; prothorax, length 0·300 mm., width (inclusive of coxæ) 0·732 mm. ; pterothorax, width 0·792 mm. ; abdomen, width 0·876 mm. ; tube, length 0·480 mm., width at base 0·162 mm., at apex 0·075 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	90	102	165	171	153	126	89	78
Width (μ)	69	51	50	51	44	33	27	21

Total length of antenna, 0·974 mm.

Described from three males taken by sweeping in forest at Nelson, N.Q., February 16, 1911, June 13, 1912, and August 12, 1912, by Mr. A. A. Girault.

A large and conspicuous species, very different from the Bornean *A. simplex*, and one which I take pleasure in naming for Mr. Alexandre A. Girault.

Mr. Bagnall, who described the genus *Adiaphorothrips*, has kindly examined one of the types of *girault*i and concurs in my assignment of the species to this genus. The shorter tube, the position of the posterior ocelli, and the different proportionate lengths of the third, fourth, and fifth antennal segments make *girault*i easily recognisable.

LEEUWENIA CONVERGENS sp. nov.

Female (*macropterous*).—Length about 3·8 mm. Colour dark brown, with antennæ, tarsi, fore tibiæ, and distal three-fifths of middle and hind tibiæ, clear pale yellow.

Head about 1·8 times as long as wide, broadest at extreme base, the cheeks straight and converging anteriorly, constricted behind eyes ; vertex convex, not produced ; postocular bristles very short, pointed ; surface with asperate, anastomosing lines. Eyes 0·7 as long as their distance from posterior margin of head and 1·6 times as wide as their interval, inner margins straight and converging posteriorly. Ocelli placed far forward, opposite anterior portion of eyes, the anterior ocellus slightly more distant from the posterior pair than these from each other ; pigment red. Antennæ slender, one and three-fourths times as long as head ; segments 1 and 2 concolourous with head, the apex of 2 paler ; remainder clear pale yellow with apical portions of 6 and 7 and all of 8, lightly infuscate ; sense-cones very long and slender, fully half the length of the intermediate segments. Mouth-cone very broadly rounded, reaching to posterior third of prosternum.

Prothorax half as long as head, indistinctly and irregularly subreticulate, much smoother than head ; one short capitate bristle at anterior angle and a long, stout, capitate one at posterior angle, borne at the apex of a tubercle ; midlateral very short, stout ; other bristles wanting. Pterothorax broad, sides of metathorax swollen. Wings colourless, slightly narrowing apically, without accessory hairs on posterior margin. Legs moderatly short ; fore tarsus unarmed.

Abdomen moderately slender, distinctly reticulate at sides and on last three segments ; tube exceedingly long and slender, more than three times as long as head and about seventeen times as long as greatest width, surface sparsely and inconspicuously pubescent ; posterior margins of tergites 2-8 with two pairs of long, stout, capitate bristles, the lateral pair borne on distinct tubercles ; tergite 9 with blunt bristles which are not as long as basal width of tube ; terminal bristles moderately long.

Measurements of holotype :—Length 3·82 mm. ; head, length 0·428 mm., width 0·242 mm. ; prothorax, length 0·212 mm., width (inclusive of coxæ) 0·456 mm. ; mesothorax, width 0·516 mm. ; metathorax, width 0·576 mm. ; abdomen, width 0·540 mm.; tube, length 1·39 mm., width at base 0·083 mm., at apex 0·046 mm.

Antennal segments :	1	2	3	4	5	6	7	8
Length (μ)	54	66	141	121	128	120	75	47
Width (μ)	44	36	28	32	33	34	26	15

Total length of antenna, 0·752 mm.

Described from two females, taken by sweeping in jungle at Nelson, N.Q., May 25 and August 31, 1913, by Mr. A. A. Girault.

Very different from the Javanese *L. gladiatrix* and perhaps generically distinct. The anteriorly converging sides of the head, the long antennæ, and the inconspicuously pubescent tube are the most important differentia. It is without doubt a gall-making species.

AUSTRALIAN BLATTIDÆ.

WITH DESCRIPTIONS OF ELEVEN NEW SPECIES.

By Eland Shaw, M.R.C.S., F.E.S., &c.

(Seventeen original Text-figures.)

In the following paper sixteen species of Blattidæ are dealt with, eleven o which are new to science ; nine of these are from Queensland, one from Victoria, and one from Western Australia ; and two cosmopolitan species are noted, which have not previously been recorded from Australia.

A revision of the genus *Cutilia* Stål will soon be advisable. The tegminal vestiges may be entirely absent, as in *Cutilia tepperi* mihi, and the diagnosis of the genus as given by Shelford in Wytsman's Genera Insectorum, Fasc. 109 (1910), should be enlarged to include this, a fact not to be wondered at when the close alliance between *Cutilia* and *Platyzosteria* is considered. Shelford includes six species in the genus *Cutilia*, and in the present paper five new species are added to these.

The following definitions of the words "Type" and "Cotype" are thought desirable, in view of the misuse of these terms which now commonly prevails :—

"Type"—The actual specimen from which a description is written, when only one specimen has been so used ; and the use of the word prohibits the use of the word *Cotype* in respect of the same species. *Note.*—There may be separate types of ♂ and ♀.

"Cotype"—One of a series of two or more actual specimens from which a description is written ; and the use of the word prohibits the use of the word *Type* in respect of the same species. *Note.*—There may be separate cotypes of ♂ and ♀.

ON THE ABBREVIATION OF THE ORGANS OF FLIGHT IN CERTAIN BLATTIDÆ.

The organs of flight of many Blattidæ display an abbreviated condition usually known amongst Blattidists as "rudimentary" ; but it appears evident, from a consideration of the numerous apterous and semi-apterous Blattid forms, that these abbreviated tegmina and wings should be regarded as vestiges of lost organs, rather than as rudiments of organs to come. Sometimes as in *Escala*—an Ectobine genus—the males have the tegmina and wings fully explicate, whilst in the females

these are represented by squamiform lobes ; and I have previously shown[1] that the female of *Escala circumducta* Walk. was erroneously described as a species of the genus *Loboptera* Brunner. In this instance the females, having come to spend their entire existence under the bark of trees, have almost discarded their organs of flight ; whilst the males, only associated with them during a brief pairing season, have retained theirs. A similar sexual dimorphism obtains in the Panchlorine genus *Oniscosoma* Brunner, the females of which are wholly apterous, whilst the males are fully winged. Here both sexes may be found together under bark all the year round, and I have never taken the male on the wing ; and both sexes are typically depressed insects. The same occurs commonly in the Epilamprinæ ; whilst in the *Polyzosteria* group of the Blattinæ may be found every condition of the flying organs, from the fully spread tegmina and wings of both sexes of *Methana* Stål, through the quadrate tegmina and squamiform wings of *Scabina* Shelf., the quadrate tegmina and absent wings of *Temnelytra* Tepper, the squamiform tegmina and absent wings of most species of *Platyzosteria* Brunner and *Cutilia* Stål, up to the completely apterous condition of the whole of *Polyzosteria* Burmeister, and many species of *Platyzosteria* and *Cutilia* ; some apterous species still showing in a faint crumpling of the lateral parts of the mesonotum and metanotum a vestige of the unrequired and discarded organs of flight. My experience of the *Polyzosteria* group (with the exception of the genus *Polyzosteria* itself, of whose habits I am at present in ignorance), and of the other semi-apterous and apterous forms alluded to above, leads me to the conclusion that all the known species are cryptic in their habits, being found under fallen wood, under loose bark of standing trees, and in crevices ; very seldom seen until their habitat is disturbed ; and that there is a definite correlation between a depression of form and an absence of flying organs.

In *Panesthia* there are in the one genus examples of the various stages in this advance, from species with fully explicate tegmina and wings, to completely apterous forms, with the addition of what appears to be an intermediate stage. I refer to the condition which Brunner v. Wattenwyl[2] writes of as an accidental mutilation found in several species of *Panesthia*. It has been previously suggested by me[3] that this was a purposeful rather than an accidental abbreviation of the flying organs, and I look upon it as one of the early steps towards the discarding of organs of flight in species whose modified habits no longer demand their retention. The squamiform tegmina and wings would be a further step, and a condition to be properly described as vestigial rather than rudimentary. Dr. R. J. Tillyard informs me that no adult fossil cockroaches are known with abbreviated organs of flight ; and it seems probable that Mr. Shelford[4] was right when he suggested, though on other grounds, that our *Polyzosteria* group of cockroaches, instead of being primitive forms, are on the contrary very highly evolved.

[1] Shaw : Victorian Naturalist, xxxi, 7, 1914, p. 104.

[2] Brunner : Nouv. Syst. Blatt. 1865, p. 391 *et seq.*

[3] Shaw : Vict. Nat., xxxi, 7, 1914, p. 107.

[4] Shelford : Trans. Ent. Soc. Lond. 1909, p. 254.

Subfamily BLATTINÆ.

Genus PLATYZOSTERIA Brunner v. Wattenwyl.

PLATYZOSTERIA INCURVA sp. nov.

Dark castaneous to black, except portions of the distal abdominal somites, nitid. Visible margins of all the tergites and abdominal sternites ciliate. Head reddish brown, margin of the clypeus and labrum paler, antennæ concolorous. Thoracic tergites with a few shallow punctures, and furnished with a sparse erect pubescence. No vestiges of tegmina or wings. Posterior angles of the 5th abdominal tergite backwardly produced ; of 6th more strongly produced, and the posterior third of this tergite is occupied in about its outer fourth by an orange yellow macula, broadest externally, and not reaching to the extreme margin which is dark ; 7th abdominal tergite with the posterior angles strongly produced backwards, posterior third orange yellow, but the lateral margins of the tergite and the apices of the spines are dark ; 9th abdominal tergite orange yellow except the angles which are black, and which are produced into sharp spines. Supra-anal lamina of ♂ (Text-figure 1) black, trigonal, apex truncate, widely and deeply emarginate with 1 to 3 spines about the posterior external angles. Cerci large, depressed, black, with the tips reddish brown, exceeding the supra-anal lamina in length. Supra-anal lamina of ♀ (Text-fig. 3), trigonal, apex truncate, with a wide shallow emargination, angles denticulate. Subgenital lamina of ♂ (Text-fig. 2) subquadrate with rounded angles, terminating in two large, strongly incurved, acuminate processes or spines. Styles long, acuminate, black, with tips reddish brown, and inserted externally to the base of the large incurved spines. Subgenital lamina of ♀ black, lateral margins yellow, valves black. Coxæ margined with yellow. Legs reddish brown. Posterior metatarsus nearly as long as the remaining joints, not spined, with its pulvillus occupying nearly the whole length of the joint. Arolia large.

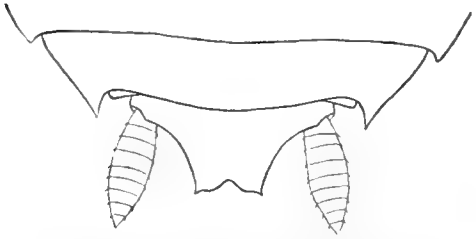
Length.—♂ 16 mm. ; ♀ 16 mm. Pronotum 3 × 6 mm.

Types.—♂ and ♀, Coll. Auct. (Spms. No. 7 ♂ and No. 8 ♀.)

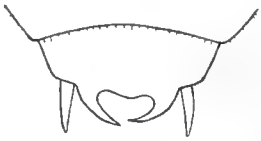
Habitat.—Queensland : Green Island—Moreton Bay, Cleveland, Wynnum (Auct.) ; Mt. Coot-tha near Brisbane (H. Tryon) ; Brisbane (J. C. Bridwell) ; "Near Brisbane" (Q. Mus. : H. Hacker).

Notes.—The form of the subgenital lamina of the ♂ and the yellow colouring of the distal abdominal tergites, unlike anything else in the genus *Platyzosteria*. make this species quite distinctive. There is considerable variation, from castaneous to black, in the general colour. The orange-yellow portions of the distal tergites are also variable ; the base of the supra-anal lamina of the ♂ being orange in some specimens, as are also the angles of the 9th tergite.

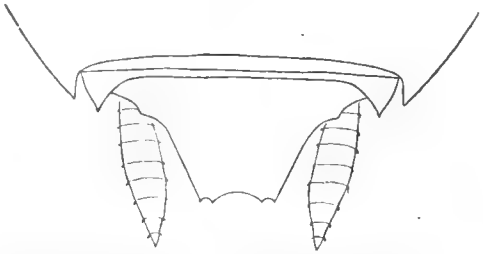
The subgenital lamina of the larval ♂ is similar to that of the adult, and that of the larval ♀ is of the usual Blattine form.



Text-fig. 1.—*Platyzosteria incurva.* Supra-anal lamina of ♂, much enlarged. (Drawn from Spm. No. 9, Coll. Auct.)



Text-fig. 2.—*Platyzosteria incurva.* Subgenital lamina of ♂, much enlarged. (Drawn from the type, Spm. No. 7, Coll. Auct.



Text-fig. 3.—*Platyzosteria incurva.* Supra-anal lamina of ♀, much enlarged. (Drawn from the type, Spm. No. 8, Coll. Auct.)

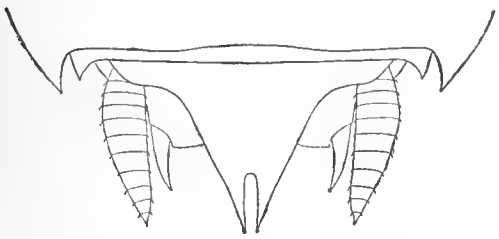
PLATYZOSTERIA SUBARMATA sp. nov.

Nigro-castaneous, nitid, a few scattered impressed dots on the thoracic tergites, lateral and posterior margins of all the tergites ciliate, not scabrous. Head nigro-castaneous ocelliform spots yellow, antennæ rufo-castaneous, with about the proximal $\frac{1}{6}$ of their length darker. Thoracic tergites somewhat rufous laterally, darker on the disc. No vestiges of tegmina or wings. Abdominal tergites with a darker band occupying the posterior half ; margins more rufous, especially towards the apex of the abdomen, where the posterior lateral angles of the tergites and the distal portions of the appendages are rufo-castaneous. Angles of abdominal tergites 5, 6, and 7 backwardly produced ; lateral margins of tergites 6 and 7 not denticulate. Supra-anal lamina of ♂ (Text-fig. 4) triangular, produced into two long spines, with or without a spine on the lateral margin, extending beyond the cerci which are very long. Subgenital lamina of ♂ (Text-fig. 5) quadrate, emarginate, styles long, acuminate, slightly incurved, inserted laterally, and without a spine at the base. Coxæ margined with yellow, legs castaneous, anterior and middle femora paler than posterior femora. Distal tarsal joints paler than the metatarsus, which is rather long, not spined beneath, and with its pulvillus occupying almost the whole of its length. Arolia large.

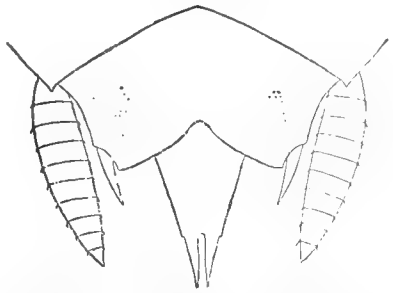
Length.—♂ 29-33 mm. Pronotum 7-9·5 mm. × 11·5-14 mm. Abdomen 13-15 mm. wide.

Type.—♂ Coll. Auct. (Spm. No. 4.)

Habitat.—Laidley, Queensland, 1 ♂ (Auct.); Brewarrina, N.S.W., 2 ♂ (W. W. Froggatt).



Text-fig. 4.—*Platyzosteria subarmata.* Supra-anal lamina of ♂, much enlarged. (Drawn from the type, Spm. No. 4, Coll. Auct.)



Text-fig. 5.—*Platyzosteria subarmata.* Subgenital lamina of ♂, much enlarged. (Drawn from Spm. No. 23, Coll. Auct.)

NOTES.—This species is nearly related to *P. armata* Tepper, from the Fraser Range, West Australia, described in Trans. Roy. Soc. S. Aust. 1893, p. 84, and redescribed and figured by Shelford in Trans. Ent. Soc. Lond. 1909, p. 273, Pl. vii, figs. 8 and 9. It differs however from *armata* Tepp. in its smaller and narrower proportions, darker colouring, and in several structural details, viz. :—The body is not scabrous ; the lateral margins of the 6th and 7th tergites are not denticulate ; and in the absence of a spine on the subgenital lamina at the base of the styles. Also the coxæ are bordered with yellow, whilst those of *armata* are concolorous. In *armata* the apices of the cerci, the styles, and the spines of the supra-anal lamina are about level, the spines extending but slightly further backwards ; whilst in *subarmata* the long cerci and spines extend considerably beyond the styles.

I have not yet seen the ♀ of this species, and of the three ♂ known the supra-anal lamina of one is abortive.

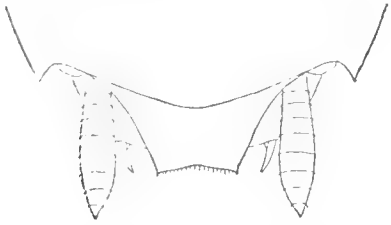
The type was taken under the bark of a *Eucalyptus* sp. near Laidley, Q.

GENUS CUTILIA Stål.

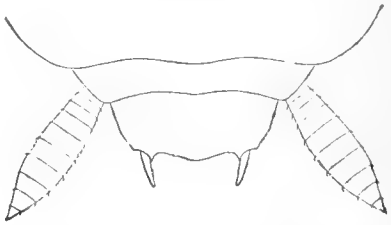
CUTILIA NITIDELLA sp. nov.

Dark castaneous to black, nitid, tergites finely punctate, with a sparse erect pubescence. Margins ciliate. Head with the vertex and frons furnished with a few erect hairs, castaneous, clypeus and labrum paler, ocelliform spots yellow, antennæ reddish brown with the second joint blackish. Tegmina vestigial, lateral margins somewhat thickened and everted, apex obliquely truncate, densely punctate. The tegminal punctures are much coarser than those of the tergites, and are coarser in the ♀ than in the ♂. In colour the tegminal vestiges are paler than the mesonotum,

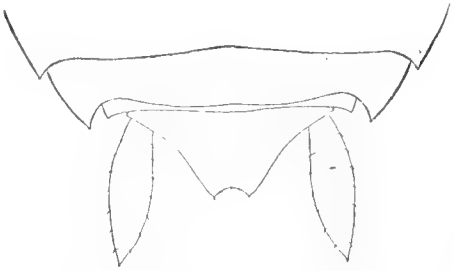
and are usually rufo-castaneous. Wings absent. Abdominal tergites with their posterior angles backwardly produced, lateral margins, which are slightly thickened and paler, entire. Posterior margin of the 7th abdominal tergite sinuate. Supra-anal lamina of ♂ (Text-fig. 6) quadrate, angles obtuse, lateral margins everted, finely punctate, posterior margin ciliate, with a wide, shallow, angular emargination. Cerci extending considerably beyond the lamina in both sexes, tips fuscous. Supra-anal lamina of ♀ (Text-fig. 8) triangular, apex truncate, concavely emarginate, not densely ciliate, and with each external angle terminating in a definite spine, lateral margins ciliate. Subgenital lamina of ♂ (Text-fig. 7) subquadrate, posterior margin convex, with a stout spine at the base of the styles. Styles inserted on the posterior border within the angles, acuminate, slightly incurved. When viewed dorsally the styles partly conceal the laminal spines, thereby assuming a broad-based appearance. The two laminæ are of about equal length. Coxæ bordered with yellowish on the upper surface (next the sternites) and are, with the femora, dark castaneous. Trochanters and tibiæ considerably lighter in colour, the tibiæ usually rufo-castaneous. Posterior metatarsus long, biseriately spined beneath, its pulvillus apical, remaining joints unspined, their pulvilli occupying their whole length. The two proximal joints of the tarsi are very dark castaneous; and the three distal joints much paler. Arolia present.



Text-fig. 6.—*Cutilia nitidella.*
Supra-anal lamina of ♂, much enlarged.
(Drawn from Spm. No. 24, Coll. Auct.)



Text-fig. 7.—*Cutilia nitidella.*
Subgenital lamina of ♂, much enlarged.
(Drawn from cotype, Spm. No. 12, Coll. Auct.)



Text-fig. 8.—Supra-anal lamina of ♀, much enlarged. (Drawn from Spm. No. 25, Coll. Auct.)

Length.— ♂ 15-16 mm.; ♀ 17-18 mm. Pronotum 5·5 × 9 mm.

Cotypes.—2 ♂ and 2 ♀, Coll. Auct. (Spms. Nos. 11 and 12 ♂; Nos. 13 and 14 ♀.)

Habitat.—Queensland: Brisbane, Wynnum, Capalaba, Ormiston, Wellington Point, Tingalpa, Cleveland, Laidley (Auct.), Sunnybank (H. Tryon), Brisbane (Q. Mus.: H. Hacker), (J. C. Bridwell).

Ootheca.—Chitinous, longitudinally fluted, the length about twice the depth, carried with the suture uppermost, suture serrate. The ootheca of *C. nitidella* differs greatly from that of *C. nitida* Brun., which is very long and smooth. Comparative measurements are given below. One of the ♀ cotypes (Spm. No. 14, Coll. Auct.) has the ootheca still attached.

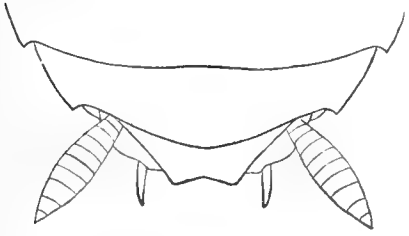
	C. nitidella mihi.	*C. nitida* Brun.
Length	8 mm. ..	17 mm.
Depth	4 mm. ..	5 mm.
No. of serrations	20 ..	30
Longitudinal keels	Numerous, on sides and base. ..	One on each side, below suture.

Notes.—This species is very common around Brisbane. At first sight it appears to be black but most of the specimens taken are nigro-castaneous. The colour of the legs with its alternating shades of dark coxæ, paler trochanters, dark femora, paler tibiæ, dark proximal and pale distal portions of tarsi, is distinctive; and this appearance is especially noticeable in the larvæ.

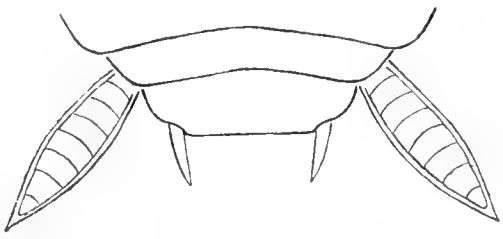
CUTILIA TEPPERI sp. nov.

Drymaplaneta (*Periplaneta*) *circumcincta* Tepper, MS.

Rufo-castaneous with a broad flavo-testaceous border all round. Discal colour darker towards the lateral borders and on the distal tergites, also considerably darker in the ♂ than in the ♀. The flavo-testaceous border is, on the margins of the tergites, outlined with reddish brown. Head with the vertex rufo-castaneous; frons yellow, the disc being occupied by a broad longitudinal reddish-brown macula; labrum fulvous, eyes black, antennæ testaceous. Lateral margins of the tergites slightly thickened. No vestiges of tegmina or wings. Posterior margins of abdominal tergites 1 and 2 slightly convex, of tergite 3 nearly straight, of tergites 4 and 5 slightly concave, and of tergites 6 and 7 sinuate. Posterior angles of tergites 5, 6, and 7 backwardly produced, that of 7th tergite more produced in the ♀ than in the ♂. Posterior margin of 7th abdominal tergite broadly flavo-testaceous. Supra-anal



Text-fig. 9.—*Cutilia tepperi.*
Supra-anal lamina of ♂, much enlarged.
(Drawn from Spm. No. 26, Coll. Auct.)



Text-fig. 10.—*Cutilia tepperi.*
Subgenital lamina of ♂, much enlarged.
(Drawn from Spm. No. 26, Coll. Auct.)

lamina of ♂ (Text-fig. 9) triangular, apex truncate, widely and angularly emarginate, lateral margins entire, a little everted, exceeding the subgenital lamina in length. Basal portion nigro-castaneous, apical portion flavo-testaceous. Cerci much exceeding the lamina in length, blackish, tipped pale. Supra-anal lamina of ♀ similar to that of ♂, but the emargination is concave rather than angular. Subgenital lamina of ♂ (Text-fig. 10) quadrate, angles obtuse, castaneous, no spines. Styles inserted externally to the angles, acuminate, slightly incurved, reddish-brown. Abdominal sternites fusco-castaneous ; lateral and posterior margins paler in ♀. Legs testaceous, spines reddish brown, a castaneous macula at the base of the coxæ. Posterior metatarsus long, biseriately spined beneath, its pulvillus apical ; remaining joints unspined beneath, their pulvilli occupying their whole length. Arolia present.

Length.—♂ 12-13 mm. ; ♀ 13-15 mm.

Cotypes.—2 ♂ and 2 ♀, Coll. Auct. (Spms. Nos. 18 and 19 ♂, Nos. 20 and 21 ♀.)

Habitat.—Victoria : Wimmera district, 1911 (L. Kelly), Dookie, 1913 (L. Kelly).

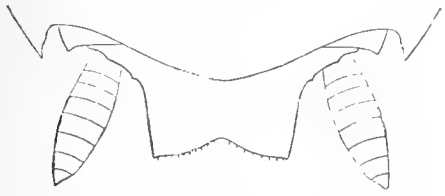
Notes.—My friend Mr. Leslie Kelly first sent me this species from the Wimmera district of Victoria, and later in abundance from Dookie ; and it appeared to be identical with specimens in the Nat. Mus. Melb., labelled "*Drymaplaneta circumcincta* Tepper." Two of these specimens were amongst the Victorian Blattidæ sent to Mr. Tepper for determination in 1895, and were returned by him named "*Drymaplaneta* (*Periplaneta*) *circumcincta* n. sp." No mention, however, is made of the species in his paper dealing with this collection (Trans. Roy. Soc. S. Austr. 1895, pp. 146-166), nor could any published name or description be found. Mr. Tepper, writing to me in May, 1916, in reply to inquiries, says he cannot find any published record of the species, and that he "must have entirely missed it" ; adding, "It is therefore quite at your disposition both as to genus and species name."

As Shelford points out (Trans. Ent. Soc. Lond. 1909, p. 265 *et seq.*), Tepper founded his genus *Drymaplaneta* on an immature condition of the subgenital lamina of ♀. The genus cannot stand, and the species placed therein by Tepper will probably go into *Platyzosteria* or *Cutilia*. The posterior metatarsus of the present species being typically that of *Cutilia* I have placed it in that genus, and have added as specific name that of Mr. Tepper, the discoverer of the species, and one to whom we owe so much for his work on Australian Blattidæ.

CUTILIA UNCINATA sp. nov.

Nigro-castaneous with a broad reddish-yellow border. Head with the vertex rufo-castaneous, frons nigro-castaneous with a rufo-castaneous spot between the antennal sockets ; ocelliform spots large, rhomboidal, yellow ; margins of the clypeus and labrum rufo-fuscous, the latter deeply emarginate with rounded lobes ; palpi long ; antennæ fuscous. Pronotum smooth nitid, anteriorly parabolic ; margins deflexed anteriorly, with a few scattered impressed punctures, and some sparse erect hairs ; posterior margin nearly straight, nigro-castaneous ; with a broad yellow lateral

border, widely separated anteriorly, extending to the posterior angles. Mesonotum and metanotum similar in colouring, but disc rufo-castaneous, and the yellow border of the metanotum narrower, and in the ♂ interrupted. Tegmina vestigial, apices not separated from the posterior angles of the tergite; no vestiges of wings. Abdominal tergites nigro-castaneous with the basal portion rufo-castaneous; the yellow border of the thoracic tergites continued as a series of blotches and spots, basally situated within the narrow rufo-castaneous margin, and diminishing in size from before backwards; no yellow spot on the 7th tergite, the lateral margins of which are entire. All the angles backwardly produced. Supra-anal lamina of ♂ (Text-fig. 11) subquadrate, widely and rather deeply emarginate, ciliate; cerci longer than the lamina, rufous at the tips. Supra-anal lamina of ♀ (Text-fig. 12) triangular, apex truncate, subtectiform,



Text-fig. 11.—*Cutilia uncinata.*
Supra-anal lamina of ♂, much enlarged.
(Drawn from the type, Spm. No. 78, Coll. Auct.)

Text-fig. 12.—*Cutilia uncinata.*
Supra-anal lamina of ♀, much enlarged.
(Drawn from the type, Spm. No. 77, Coll. Auct.)

Text-fig. 13.—*Cutilia uncinata.*
Subgenital lamina of ♂, much enlarged. (Drawn from the type, Spm. No. 78, Coll. Auct.)

with a wide concave emargination. Subgenital lamina of ♂ (Text-fig. 13) asymmetrical, triangularly produced, and terminating in a single stout hook, strongly curving towards the left; styles long, stout, incurved, the left style being longer than the right, and situated nearer to the middle line; a short blunt process internal to the right style. Subgenital lamina of the ♀ of the usual valvular form. Beneath, the yellow margins of the thoracic tergites are reproduced, and similar yellow spots obtain on the abdominal sternites, which are nigro-castaneous with the disc rufo-castaneous. Legs rufo-fuscous; coxæ narrowly bordered with yellow; trochanters paler; posterior metatarsi longer than the remaining joints, biseriately spined beneath, pulvillus apical; 2nd joint unspined, pulvillus occupying its whole length; arolia large.

Length.—♂ 19 mm. ; ♀ 15 mm.

Types.—♂ and ♀, Coll. Auct. (No. 78 ♂ ; No. 77 ♀).

Habitat.—Queensland : Lizard Id., Eagle Id. (W. J. Young, July 1916).

Notes.—Three specimens were taken by Mr. Young, a ♂ on Lizard Island, and ♂ and ♀ on Eagle Island, N.Q. These were sent to me for determination by Mr. F. H. Taylor, F.E.S., of Townsville, who has kindly presented me with the types, and the third specimen is in his collection. The form of the vestigial tegmina and the extraordinary asymmetrical subgenital lamina of the ♂ are, as far as I know, unique amongst the Blattinæ. The Lizard Island ♂ is larger than that from Eagle Island, which is of the same dimensions as the ♀ ; but both have the tegmina and subgenital laminæ identical in form.

CUTILIA MELANESIÆ Shelf.

Shelford : Trans. Ent. Soc. Lond. 1909, p. 291.

Shelford described the ♂ from Torres Strait, and the type is in the British Museum. The single ♀ in my collection from N. Queensland is, I think, to be referred to this species in spite of the fact that the posterior tarsi are unfortunately broken off. In *Cutilia* the anterior and middle metatarsi also are longer than in *Platyzosteria*, and this obtains in the ♀ under consideration. To Shelford's description may be added :—

♀. Head with a broad transverse castaneous stripe occupying the vertex between the eyes ; labrum rufo-castaneous. Mesonotum and metanotum finely impressed punctate laterally, also the abdominal tergites, the punctures encroaching further on the disc in the distal tergites ; 7th abdominal tergite with the posterior margin sinuate. Supra-anal lamina triangular, apex truncate, widely concavely emarginate. Subgenital lamina of the usual Blattine form. Tegmina vestigial, more thickly and coarsely punctate than the mesonotum ; wings none. Posterior coxæ with the dorsal surface margined very pale. Anterior and middle metatarsi with a few basal spines beneath.

Length.—♀ 20 mm. Pronotum, 6 mm. × 5·5 mm.

Type.—♂, British Mus. ; of ♀, Coll. Auct. (Spm. No. 68).

Habitat.—N. Queensland : Lower Burdekin District (L. Kelly, 1915).

CUTILIA NIGROFASCIATA sp. nov.

Testaceous banded with black. Head with the vertex exposed, testaceous ; vertex of a blackish-brown colour, which is continued down the frons in a broad longitudinal stripe with irregular edges, the colour gradually diminishing in intensity to the margin of the clypeus and the labrum which are brownish testaceous ; eyes black ; antennæ missing except the first segment which is brownish testaceous ; palpi pale. Pronotum with the lateral margin a little thickened, and slightly deflexed anteriorly ; fore margin truncate ; the anterior portion of the disc occupied by a black macula, which fades through brown into the testaceous ground colour. The

same obtains in the dark bands of all the tergites. Extreme lateral margin of all the tergites narrowly brown ; posterior border of the pronotum banded black extending to the angles. Mesonotum testaceous with a black band anteriorly and posteriorly, the former not reaching the lateral margins. Tegmina vestigial, only partly separated from the mesonotum, testaceous with the tips blackish brown. Metanotum similar in colouring, the posterior angles slightly produced ; no vestiges of wings. Abdominal tergites testaceous, with a broad blackish-brown band occupying the posterior border, but narrowing laterally ; angles of the 5th, 6th, and 7th tergites backwardly produced ; posterior margin of the 7th tergite sinuate, lateral margins entire. Supra-anal lamina of ♂ subquadrate, short, widely emarginate, ciliate, lateral margins entire, medially longitudinally sulcate, the sulcus broad at the base and occupied by a pointed brown streak, the point not reaching the apex of the emargination. Cerci about twice the length of the lamina, testaceous.

Supra-anal lamina of ♀ longer, triangular, apex truncate, emarginate, lateral margins entire, not concealing the tips of the subgenital valves, testaceous, with a broad-based triangular blackish macula basally situate. Subgenital lamina of ♂ subquadrate, about equalling the supra-anal lamina in length, angles obtuse, concavely emarginate, of a bright pale brown. Styles stout, long, and acuminate, placed externally to the angles. Beneath : thoracic sternites testaceous ; abdominal sternites bright pale brown on the disc with a broad testaceous lateral border. Legs testaceous, spines brownish ; posterior metatarsus longer than the remaining joints together, biseriately spined beneath ; pulvillus apical ; remaining joints with their pulvilli occupying their whole length, unspined ; arolia large ; anterior and middle metatarsi long, the latter biseriately spined beneath in the basal third, pulvillus apical.

Length.—♂ 16 mm. ; ♀ 17·5 mm.

Types.—♂ and ♀, Coll. Auct. (No. 93 ♂, No. 94 ♀).

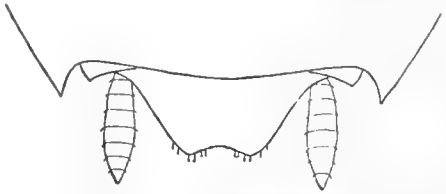
Habitat.—Waddouring, W. Australia, Oct. 1915. (Presented by the West Australian Museum.)

Notes.—The species in colouring bears a great resemblance to *C. triangulata* Brunner (*Leptozosteria secunda* Tepper), but is smaller, not so depressed, and the form of the supra-anal lamina of ♂ is different. The pronotal marking of *triangulata* is quite distinctive.

CUTILIA KELLYI sp. nov.

♂ nigro-castaneous, of small size, convex species. Head rufo-castaneous, with the ocelliform spots, and margin of the clypeus pale ; eyes black ; antennæ rufo-castaneous, longer than the body. Pronotum parabolic, forming in transverse section an arch almost semicircular, posterior margin straight, smooth, nitid, with a few erect hairs, and scattered punctures, dark castaneous. Mesonotum and metanotum similar ; tegminal vestiges completely separated, more thickly punctate, sharply pointed, and extending slightly beyond the tergite ; postero-lateral angles of the metanotum somewhat backwardly produced. Abdominal tergites darker than the thoracic, almost piceous posteriorly ; lateral margins rufo-castaneous ; postero-lateral angles backwardly produced ; 2nd to 5th tergites slightly scabrous laterally.

6th more scabrous, and 7th with the posterior half and sides scabrous. Supra-anal lamina (Text-fig. 14) triangular, apex truncate, faintly emarginate, ciliate, lateral margins somewhat everted, entire, scabrous; cerci considerably longer than the lamina.



Text-fig. 14.—*Cutilia kellyi*.
Supra-anal lamina of ♂, much enlarged. (Drawn from the type, Spm. No. 79, Coll. Auct.)

Subgenital lamina subquadrate, posterior margin convex; styles long, slightly incurved, with a large stout spine within the base of each. Beneath castaneous; legs rufo-castaneous; posterior metatarsus exceeding the remaining joints in length, biseriately spined beneath, its pulvillus apical; middle metatarsus long, pulvillus occupying about half its length, and a few basal spines beneath.

Length.—13 mm.

Type.—♂, Coll. Auct. (Spm. No. 79).

Habitat.—N. Queensland: Lower Burdekin District, ♂ (Mr. L. Kelly).

Notes.—I wish to record in the name of this species my appreciation of a keen naturalist, my friend Mr. Leslie Kelly, of Healesville, Victoria, one with whom I spent many pleasant days cockroach hunting, who has sent me many specimens, and who, at the time ot writing, is in France fighting for his country.

Genus COSMOZOSTERIA Stål.

COSMOZOSTERIA SUBZONATA Tepper.

Platyzosteria subzonata Tepp., Trans. Roy. Soc. S. Austr. 1894, p. 181.

Cosmozosteria subzonata Kirby, Syn. Cat. Orth. B.M., vol. I., p. 133 (1904).

This species was described from specimens presented to Mr. Tepper by Mr. C. French. The locality is given as "Victoria," but possibly this is an error, as with the exception of *C. bicolor* Sauss. (which also occurs in Queensland) recorded from the Darling and the Hunter Rivers, N.S.W., all the known species of the genus come from Queensland, and nearly all of them from the northern parts of that State; and Tepper himself queries[5] the accuracy of the locality "Victoria (French)" for the Cooktown species *C. picta* Tepper. I have taken *C. subzonata* Tepper not uncommonly in the Brisbane district, and some of these specimens sent to the S. A. Museum have been compared with Tepper's types, and are stated by the Museum

[5] Tepper: Trans. Roy. Soc. S. Aust. 1894, p. 182.

to be in agreement with them. An examination of a good series indicates that Shelford's[6] opinion that Tepper's species is but a colour-variety of *C. bicolor* Sauss. cannot be supported, for, in addition to the differences in colour, the pronotum of *C. subzonata* Tepper is considerably wider in proportion to its length, there is no spine at the posterior-lateral angles of the supra-anal lamina of the ♂, and the rugosity of its abdominal tergites is much finer, in fact only a shagreening. The average pronotal measurements of 10 adult specimens of each species was found to be—*C. bicolor* Sauss., 10·3×7·1 mm.; *C. subzonata* Tepper, 10·3×6·1 mm. I think Tepper's species is a good one, and should stand. My specimens of *C. bicolor* Sauss. are from the Burdekin district, N.Q.; and I have not found it in the Brisbane district.

Types.—♂ and ♀, S. Aust. Mus.

Habitat.—Brisbane District, Q., in the following localities:—Birkdale, Ormiston, Tingalpa, Wynnum (Auct.); Taringa (H. W. May). ? Victoria (*teste* Tepper).

Genus SCABINA Shelford.

SCABINA ANTIPODA Kirby.

Pelmatosilpha (?) antipoda Kirby, Ann. Mag. Nat. Hist., ser. 7, xii, p. 376 (1903).

Scabina antipoda Shelf., Trans. Ent. Soc. Lond. 1909, p. 306.

Kirby does not state the sex of the type which is in the British Museum, but the addition to Kirby's description by Shelford in Trans. Ent. Soc. Lond. 1909, p. 306, indicates that it is a ♂. As I have examined several specimens of the ♂, and recently captured examples of both sexes at Tambourine Mountain, S. Queensland, a few descriptive notes of the ♀ may be added. The sinuation of the outer margin of the tegmen of the ♂ is more apparent than real, the appearance being produced by a sharp deflection of the marginal area.

♀ with the tegmina castaneous, marginal area but slightly deflexed, the sinuation when viewed dorsally being scarcely apparent; wings squamiform, supra-anal lamina trigonal, subtectiform, castaneous towards the margins, apex truncate, sinuately emarginate, lateral margins not serrate, everted, terminating in a spine; cerci of about the same length as the lamina. Subgenital lamina valvular. Subgenital lamina of the larval ♀ of the usual Blattine form.

Length.—30 mm. Tegmen 7·5 mm.; pronotum 9·25 mm.×12 mm.

Types.—Spm. No. 95 (Coll. Auct.), from which the above descriptive note was taken, may be regarded as the type of ♀. Shelford (loc. cit.) writing of ♂ says—"British Mus., type; Oxford Mus., cotype"; but this seems to be a misuse of the word "cotype," for no species can have both type and cotypes.

Localities.—S. Queensland: Tambourine Mountain (Auct., H. Hacker); National Park, Lamington Plateau (H. Tryon).

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[6] Shelford: Trans. Ent. Soc. Lond. 1909, p. 297.

Subfamily PANCHLORINÆ.

Genus LEUCOPHÆA Brunner v. Wattenwyl.

LEUCOPHÆA SURINAMENSIS, Linné.

Blatta surinamensis Linn., Syst. Nat. (ed. x), i, p. 424, n. 3 (1758).

This cosmopolitan species has not been previously recorded from Australia; but it is widely distributed in Queensland, and further observation will probably reveal its presence in many localities other than those here enumerated. Cleveland, where in 1915 I found it under loose stones near the lighthouse, was in early days expected to develop into an important port; but it is more than half a century since any overseas shipping came in there, and it is probable that this species has occupied its isolated position at the point of the Cleveland peninsula for many years.

Localities.—Queensland: Cleveland, Brisbane (Auct.); Townsville, Lizard Island (F. H. Taylor); Ayr (L. Kelly); Cairns, Gordonvale (J. F. Illingworth).

Genus NAUPHŒTA Burmeister.

NAUPHŒTA CINEREA Olivier.

Blatta cinerea Oliv. Enc. Méth. Ins., iv., p. 314, n. 3 (1789).
Nauphœta bivittata Burm. Handb. Ent., ii, p. 508, n. 3 (1838).

Another cosmopolitan species hitherto unrecorded from Australia.

Localities.—Ayr (L. Kelly, 1915); Brisbane (Q. Mus.: H. Hacker); Townsville (J. F. Illingworth, F. H. Taylor); Cairns, Gordonvale (J. F. Illingworth).

Subfamily PANESTHIINÆ.

Genus PANESTHIA Serville.

The four Queensland species of which brief descriptions are given below appear to be new. Two of them, *parva* and *obtusa*, are fully winged, although the tegmina and wings may be broken off short in the line of fracture usual to the genus. The other two, *sloanei* and *tryoni*, are quite apterous.

PANESTHIA PARVA sp. nov.

Small, black, nitid, all visible tergites and sternites thickly punctate, the punctures becoming coarser on the abdominal tergites 5, 6, and 7. Head: vertex of ♂ with a very large foveola; margin of the clypeus, ocelliform spots, terminal five segments of the antennæ, and tarsi pale. Pronotum transverse, anteriorly widely emarginate in ♂, the emargination almost as wide as the interocular space, and bounded laterally by large, prominent, rounded, and somewhat everted tubercles; faintly emarginate in ♀, not tuberculate; disc in ♂ excavated in its anterior ⅔, the excavation showing a prominent median, longitudinal carina, and being bounded posteriorly by 4 or 5 small diverticula. Tegmina and wings either fully explicate, and deeply infuscate, with dark-brown veins, or broken across in the manner common to the genus. Anterior femora unspined, but for a single apical spine in the posterior border, no genicular spine. Abdominal tergites with none of the posterior angles sharply produced; 7th with the lateral margins entire, the posterior margin straight and the postero-lateral angles roundly produced. Supra-anal lamina with the posterior margin gently arcuate, entire.

Length.—♂ 18 mm., ♀ 17-18 mm.

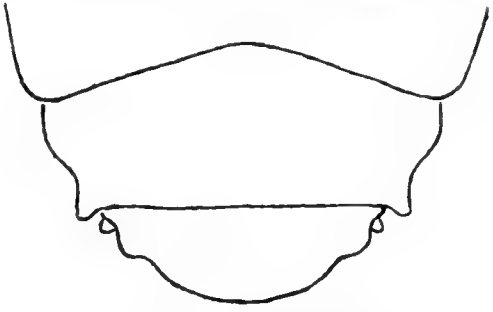
Cotypes.—2 ♂ and 2 ♀ (Coll. Auct., Nos. 64 and 82 ♂; Nos. 83 and 84 ♀).

Habitat.—Queensland: Laidley (Auct. 1915), Mount Gravatt near Brisbane (H. Tryon).

Notes.—In July, 1915, I took 2 ♂ and numerous ♀ and larval specimens at Laidley from firewood obtained in the neighbourhood. More recently I found some specimens from Mount Gravatt near Brisbane, in the collection of Mr. H. Tryon, Govt. Entomologist, one of which (cotype of ♂, No. 64, Coll. Auct.) he kindly gave me. The remaining cotypes are from Laidley. This is the only Australian species whose ♂ has de Saussure's "depression en fossette" on the vertex, and the foveola is relatively much larger than in any of the other species possessing it, which I have examined.

PANESTHIA OBTUSA sp. nov.

Nigro-castaneous, nitid. Head with the vertex and frons finely punctate; vertex of ♂ not foveolate; ocelliform spots, margins of the clypeus, and of the labrum, and distal segments of the antennæ brownish yellow, also the tips of the palpi in ♂. Pronotum transverse, finely punctate, disc of ♂ excavated in its anterior $\frac{3}{4}$, the excavation ending posteriorly in three diverticula, the large median diverticulum having a longitudinal carina, and being bounded by a blunt tubercle on each side; anterior margin roundly emarginate, a rounded tubercle on each side; disc of ♀ similar, but less pronounced, excavation not extending so far backwards, with the anterior portion of its floor tumefied, and the emargination of the anterior border obsolescent. Mesonotum and metanotum with a few scattered punctures, the middle of the posterior border of each obtusely backwardly produced. Tegmina and wings darkly infumate, veins black; fully explicate, or fractured in the usual line. Abdominal tergites punctate, the 1st tergite with only a few scattered punctures, which become more numerous, and coarser towards the distal tergites, until in the ♂ the 6th and 7th tergites are densely and coarsely punctate; 7th tergite with the posterior margin straight, the lateral margins deeply sinuate, backwardly produced into a bluntly rounded process (Text-fig. No. 15). Supra-anal lamina of ♂ densely and coarsely punctate, posterior margin gently arcuate, not crenulate, lateral processes bluntly rounded; cerci fulvous in the distal half. Abdominal sternites punctate, more



Text-fig. 15.—*Panesthia obtusa* ♀.
Distal tergites × 6. (Drawn from Spm. No. 96, Coll. Auct.)

coarsely so in ♂. Legs castaneous, trochanters and tarsi paler. Anterior femora 1 or 2 spinose.

Length.—♂ 25 mm., ♀ 26 mm.

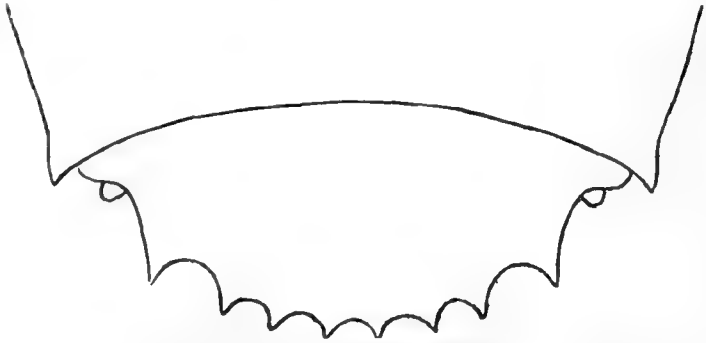
Types.—♂ and ♀, Coll. Auct. (♂ No. 87, ♀ No. 88).

Habitat.—Queensland: Spring Bluff (W. G. Jones), Manly, Brisbane District; Tambourine Mountain (Auct.). N. S. Wales: Armidale (F. W. Carr).

Notes.—This species is near *P. australis* Brunner but is smaller, the postero-lateral angles of the 7th tergite, which in *australis* are dentiform, are in *obtusa* roundly and bluntly produced, and the markedly sinuate lateral margin of the same tergite is distinctive. In both species the posterior margin of the supra-anal lamina is entire; but in *obtusa* it is less arcuate, and the lateral processes though relatively larger are more bluntly rounded. These structural peculiarities are more marked in the ♂. Two ♀ from Tambourine Mountain, S.Q., are smaller than the type, one of them measuring only 23·5 mm.

PANESTHIA SLOANEI sp. nov.

♂ large, apterous, of a rich chestnut brown, darkening towards the margins. Head impunctate, castaneous, margin of the clypeus, margin of the labrum, and distal half of the antennæ pale; no foveola of the vertex; no pale ocelliform spots. Pronotum deeply excavated in its anterior $\frac{1}{3}$; the excavation with its floor scabrous, and presenting tumefactions, extending posteriorly into a large, wide diverticulum, and bounded laterally by two tubercles, the posterior tubercle being much the more prominent; anterior margin roundly emarginate, the emargination bounded on each side by a strong, recurved tubercle, the tips of which extend backwardly; a shallow transverse furrow on the disc posterior to the excavation, divided into two portions by a median ridge. Mesonotum and metanotum smooth, impunctate; with a lateral crumpling. Abdominal tergites 1, 2, 3, and 4 with a few punctures laterally, the 4th with some minute punctures in the disc also; 5th, 6th, and 7th tergites coarsely punctate, the surface between the punctures smooth; 7th tergite with the postero-lateral angles sharply backwardly produced, lateral margins entire. Supra-anal lamina (Text-fig. 16) densely and coarsely punctate, posterior margin prominently denticulate. Beneath concolorous. Legs with the femora and trochanters rather paler; anterior femora bi-spinose.



Text-fig. 16.—*Panesthia sloanei* ♂.
Supra-anal lamina × 6. (Drawn from Spm. No. 90, Coll. Auct.)

Length.—45 mm.

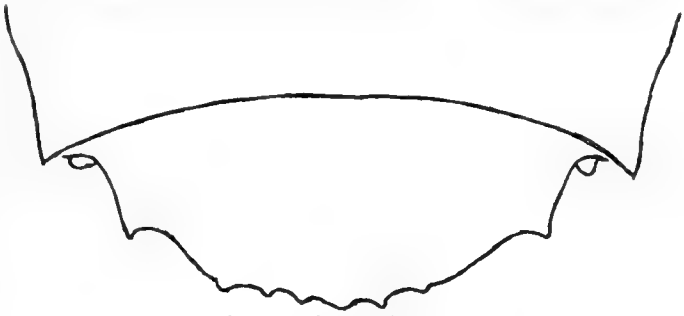
Type.—Coll. Auct. (No. 89).

Habitat.—Queensland: "The Tableland" behind Cooktown, elevation 1,600 ft., 2 ♂, 1 larval ♂, 3 larval ♀, July 1916 (Mr. T. G. Sloane).

NOTES.—I have named this fine species after Mr. T. G. Sloane, its discoverer, who kindly presented me with the six specimens captured by him "in damp scrub, feeding on the decaying trunks of large softwood trees." The specimen from which Fig. 16 was drawn has one more denticulation of the supra-anal lamina than the type. There is a single ♂ in the Queensland Museum without a locality label.

PANESTHIA TRYONI sp. nov.

Large, apterous, piceous, differs from the preceding species in the following structural details:—The emargination of the anterior border of the pronotum is narrow and angular; the excavation of the disc is less pronounced, and the large posterior diverticulum is narrower, and connected with the transverse furrow behind by a shallow depression; the transverse furrow is much more pronounced. The pronotum of the ♀ is similar in form to that of the ♂. Supra-anal lamina (Text-fig. 17)



Text-fig. 17.—*Panesthia tryoni* ♂.
Supra-anal lamina × 6. (Drawn from Spm. No. 121, Coll. Auct.)

with its posterior margin bluntly and unevenly crenulate. Legs with the extremities of the coxæ, the whole of the trochanters, the femoro-tibial articulations, the extremities of the last tarsal joints, and the claws rufo-castaneous. Anterior femora 1 or 2 spinose.

Length.—♂ 45 mm., ♀ 48 mm.

Types.—♂ and ♀, Coll. Auct. (♂ No. 91, ♀ No. 92).

Habitat.—Queensland: National Park, Lamington Plateau, elevation 3,000 ft. (H. Tryon, Jan. 1917); Montville, Blackall Range, elevation 1,600 ft. (H. Tryon), (Q. Mus.).

NOTES.—In Jan. 1917 Mr. Tryon captured 2 ♂, 2 ♀, 2 larval ♂, and 1 larval ♀ specimens on the Lamington Plateau, and it gives me much pleasure to name the species after this distinguished entomologist. One ♀ labelled "Montville April 1915" was handed to me for determination by the Queensland Museum, and quite recently Mr. Tryon captured several specimens in the same locality. Like *P. sloanei* this species seems to occur at considerable altitudes. Beyond their difference of colour the two species may be at once distinguished by the form of the supra-anal lamina.

[Wynnum, Q.]

THE ENDOPARASITES OF THE DOMESTIC PIGEON IN QUEENSLAND.

By T. Harvey Johnston, M.A., D.Sc.,

Walter and Eliza Hall Fellow in Biology, University, Brisbane;
Hon. Zoologist, Queensland Museum.

(With Nine Text-figures.)

No internal parasites have as yet been recorded from the domestic pigeon (*Columba livia domestica*) in this State, though an examination of material collected recently in Brisbane revealed the presence of three distinct species.

FACULIFER ROSTRATUS (Buchholz).

In the tissues surrounding the pericardium and the great blood-vessels, in the subcutaneous region of the neck and also below the skin adjacent to the pectoral muscles, there were found many small whitish parasites representing the hypopial nymph stage of *F. rostratus*, a tiny Sarcoptid mite belonging to the subfamily Analginæ, which occurs in its adult condition as an epizoon infesting the barbules of the feathers.

The *Hypopus* appears to be fairly common here, but the only Australian record of its occurrence is that made by Dr. G. Sweet[1] who found it in Melbourne pigeons and published a figure and brief description.

Neumann[2] has also given an account of this acarid.

The same species is to be met with as an internal parasite of the pigeon in the vicinity of Sydney, N. S. Wales.

BERTIELLA DELAFONDI (Railliet).

A number of ripe segments of this rare unarmed cestode were brought to me by one of my students, but unfortunately the greater part of the pigeon's intestine had been thrown away before I had had an opportunity to obtain the remainder of the worm.

[1] G. Sweet, The Endoparasites of Australian Stock, &c., P.R.S. Viet., 21, 1908, pp.500, 523.

[2] L. G. Neumann, Parasites et maladies parasitaires des oiseaux domestiques, Paris, 1909, pp. 46-8, figs. 31-2.

The tapeworm has been recorded from two or three species of pigeons (including the turtle dove) from Europe [Delafond, Megnin, Railliet, Wolffhugel]; from a Brazilian species [Fuhrmann]; and from a South African pigeon [Gough[3]]. The present notice constitutes the first record of its occurrence in Australasia.

A brief account has been given by Megnin[4] and Linstow[5] under the name *Tænia sphenocephala* Rud., and by Railliet[6] who named it *Tænia delafondi*. A summary was published by Stiles[7] but the best accounts have been given by Fuhrmann[8] and Wolffhugel.[9] I have not had access to the papers written by the last-named author regarding *B. delafondi* and consequently have compared my specimens with the account published by Fuhrmann who examined Railliet's original material.

Ripe segments measure 2·5 to 3·2 mm. in breadth by about one millimetre in length. The greater part of the medulla is occupied by the large uterus but the receptaculum seminis and vestiges of the ovary and vitellarium persist.

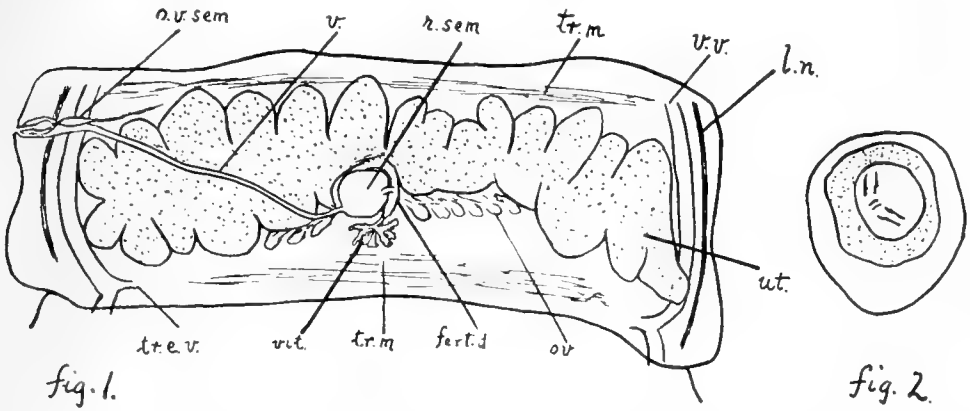


Fig. 1.—*Bertiella delafondi*. Ripe segment showing shape of uterus; also remnants of ovary. *fert.d.*, fertilising duct; *l.n.*, longitudinal nerve; *ov.*, ovary; *o v.sem.*, outer vesicula seminalis; *r.sem.*, receptaculum seminis; *tr.e.v.*, transverse excretory vessel; *tr.m.*, transverse musculature, well developed anteriorly and posteriorly in each ripe proglottis; *ut.*, uterus; *v.* vagina; *vit.*, vitellarium; *v.v.*, ventral vessel.

Fig. 2.—Egg, showing shells and oncosphere.

[3] Gough, Notes on South African Parasites, Rep. S. Afr. Assoc. 6, 1908 (1909), p. 2.

[4] Megnin, Un nouveau Tenia du pigeon ou plutôt une espèce douteuse de Rudolphi rehabilitée, C. R. Soc. Biol., Paris (9), 3, pp. 751-3.

Linstow, Beobachtungen an Vogeltaenien, C. Bakt., 12, 1892, p. 501.

Railliet, Sur une Tænia du pigeon, &c., C. R. Soc. Biol., Paris (9), 4, pp. 49-53.

[7] Stiles, Tapeworms of Poultry, Bull. 12, U.S.D.A., B.A.I., 1896, 88 pp.

[8] Fuhrmann, Die Anoplocephaliden der Vogel. C. Bakt., 32, 1902, pp. 132-5.

[9] Wolffhugel, Ein interessantes Exemplar des Taubenbandwurmes *Bertia delafondi*, Berlin tierarztl Wochenschr., 1904 (3) (not available).

The genital ducts alternate irregularly, opening near the junction of the first and second thirds of the proglottid margin. A genital papilla is absent though there is a relatively long narrow cloaca.

The musculature is strongly developed, especially the longitudinal, which occupies a considerable portion of a transverse section (figs. 3 and 4) and consists of a very large number of small closely arranged bundles forming a zone several bundles in thickness, the largest being situated most inwardly, next to the transverse fibres. The latter are particularly developed in the anterior and posterior regions of each segment (fig. 1 *tr. m.*). Dorso-ventral fibres are rather weak. Calcareous corpuscles do not appear to be abundant. They measure seven to eight micra in diameter.

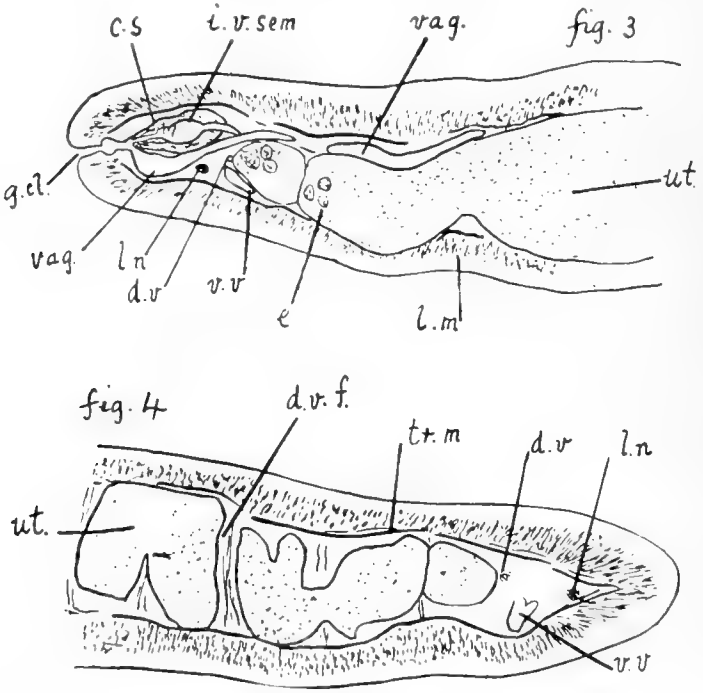


Fig. 3.—Pore-bearing edge of segment in travsverse section.

Fig. 4.—The opposite edge in transverse section. *c.s.*, cirrus sac; *d.v.*, dorsal vessel; *d.v.f.*, dorsoventral muscle fibres; *e.*, eggs; *g.cl.*, genital cloaca; *i.v.sem.*, internal vesicula seminalis; *l.m.*, longitudinal muscle fibres; *l.n.*, longitudinal nerve; *tr. m.*, transverse muscle fibres; *ut.*, uterus; *vag.*, vagina; *v.v.*, ventral vessel.

The excretory system of each side consists of a large thin-walled ventral canal lying close to the transverse musculature, and of a very narrow dorsal vessel, difficult to recognise in sections, situated adjacent to the outer edge of the mature uterus. The transverse canals are wide. The main longitudinal nerve is relatively large. The sex canals pass outwards above it and both excretory vessels.

The only parts of the male apparatus present in my specimens are the ducts. The vas deferens lies anteriorly and, just before crossing the excretory canals, becomes widened to form an "outer" vesicula seminalis (which may be slightly twisted), but again narrows before entering the cirrus sac within which it is again swollen to constitute an "inner" vesicula, terminating in a tubular cirrus. The rather small pyriform sac measures ·15 mm. in length and does not extend inwardly as far as the ventral vessel.

Parts of the ovarian tubes are to be found lying behind the uterus on each side of the prominent receptaculum. The vitellarium is also recognisable as a branching gland situated in the median line on the aporal side of, and close to, the receptaculum, its duct passing forwards beside the latter to enter the fertilising duct. Fuhrmann has published a figure showing the relationships of the various structures belonging to the female complex. The thin-walled vagina leads inwards from the rather wide female pore, generally passing dorsally to the cirrus sac. In fig. 3, a section is drawn in which its position is ventral. Fuhrmann has given an illustration of the more usual course. The female duct soon widens as it passes above (or occasionally below) the sac, narrowing again in the vicinity of the excretory canal where it lies quite dorsally, maintaining this position as it travels inwards and posteriorly close to the dorsal transverse musculature and above the mature uterus, eventually opening into the large rounded receptaculum. The latter has a diameter of about ·25 mm. and lies in the posterior part of the segment near the median line, but is displaced towards the pore-bearing edge. A narrow tube connects it with the fertilising duct.

The uterus does not remain as a simple transverse tube but becomes widened, its cavity being more or less divided up into a series of closely arranged pouches developed as diverticula anteriorly and posteriorly. The ripe organ fills practically the whole of the medulla and extends outwards towards the excretory canals, its postero-lateral extensions often overlapping the ventral vessel.

Ripe eggs possess two shells, the approximate measurements of the diameters being 55 and 40 micra respectively. The oncosphere is about 27 by 18 micra in size.

ASCARIDIA COLUMBÆ (Gmelin).

The above-mentioned nematode is more commonly known as *Heterakis maculosa* Rud., under which name I have recorded its presence in New South Wales.[10] *Ascaris* sp. of Krefft[11] is a synonym.

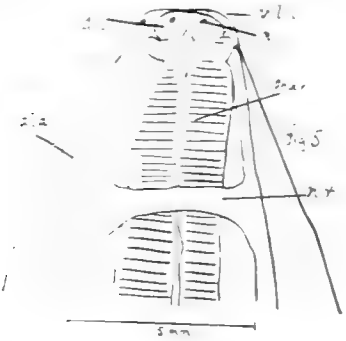
The parasite was found in several Brisbane pigeons, occurring in some of them in considerable number, many of the worms reaching a large size. The maximum

[10] Johnston, Notes & Exhibits, P.L.S. N.S.W., 34, 1909, p. 412; Johnston, On Australian Avian Entozoa, P.R.S. N.S.W., 44, 1910, p. 121; and Rep. Bur. Microbiol. N.S.W., 2, 1911 (1912), p. 135.

[11] Krefft, On Australian Entozoa, &c., Trans. Ent. Soc. N.S.W., 2, 1871, p. 212.

length of the males was 40 mm., and of the females 55 mm. Schneider[12] gives the lengths as 16 and 20 mm. respectively; Railliet[13] as 16 to 26 mm. and 20 to 34 mm. for each; Neumann[14] as 16 to 30 and 20 to 40 or even 70 mm. respectively; while Travassos[15] gives the same dimensions as Railliet. The account and figure given by Travassos differ somewhat from those of earlier parasitologists, particularly in regard to the number and disposition of the male papillæ.

On account of the discrepancies I have deemed it advisable to give a few figures. Most of my mature specimens are much longer than the average mentioned by the authors quoted. The difference between the sexes is not readily recognised by the naked eye, though mature females not infrequently assume a lancet-like form. The shape of the anterior and posterior ends is shown in the accompanying figures.



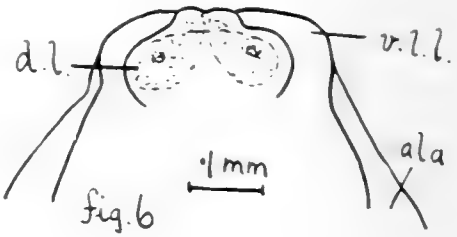


Fig. 5.—*Ascaridia columbæ*. Anterior end—dorsal view. *ala*, ala; *d.l.*, dorsal lip; *n.r.*, nerve ring; *p.*, papilla on dorsal lip; *phar.*, pharynx; *v.l.l.*, ventral lips.

Fig. 6.—Lips, &c.

The three lips are practically equal in size. The dorsal lip is provided with two small papillæ. On the ventral surface of the parasite, just behind the lateral lips, there may be seen a transverse fold of the cuticle. At each side of the anterior end of the worm is a more or less broad though delicate ala of an elliptical outline, extending backwardly for some little distance. The nerve-ring in large specimens lies at about ·5 mm. behind the anterior extremity.

The vagina opens at about the midregion of the body. There is a hollowing of the end of the female between the relatively wide anal aperture and the tip of the tail. Eggs measure from ·06 to ·07 mm. in length by about ·04 mm. in breadth.

[12] Schneider, Monographie der Nematoden, 1866, p. 72.

[13] Railliet, Traité de zoologie medicale et agricole, edit. 2, 1895.

[14] Neumann, Parasites et maladies parasitaires des oiseaux domestiques 1907, p. 146; also in Traité des maladies parasitaires, &c., edit. 2, 1892.

[15] Travassos, Sobre as especies brazileiras da subfamilia Heterakinæ, Mem. Inst. Oswaldo Cruz, Rio de Janeiro, 5, 1913 (3), pp. 271-318. Reprint p. 15.

The male spicules are approximately equal in length (1·59 to 1·61 mm.) though one often appears to be rather longer than the other. The sucker is provided with a chitinous ring and measures from ·15 to ·20 mm. in diameter. On each side of the

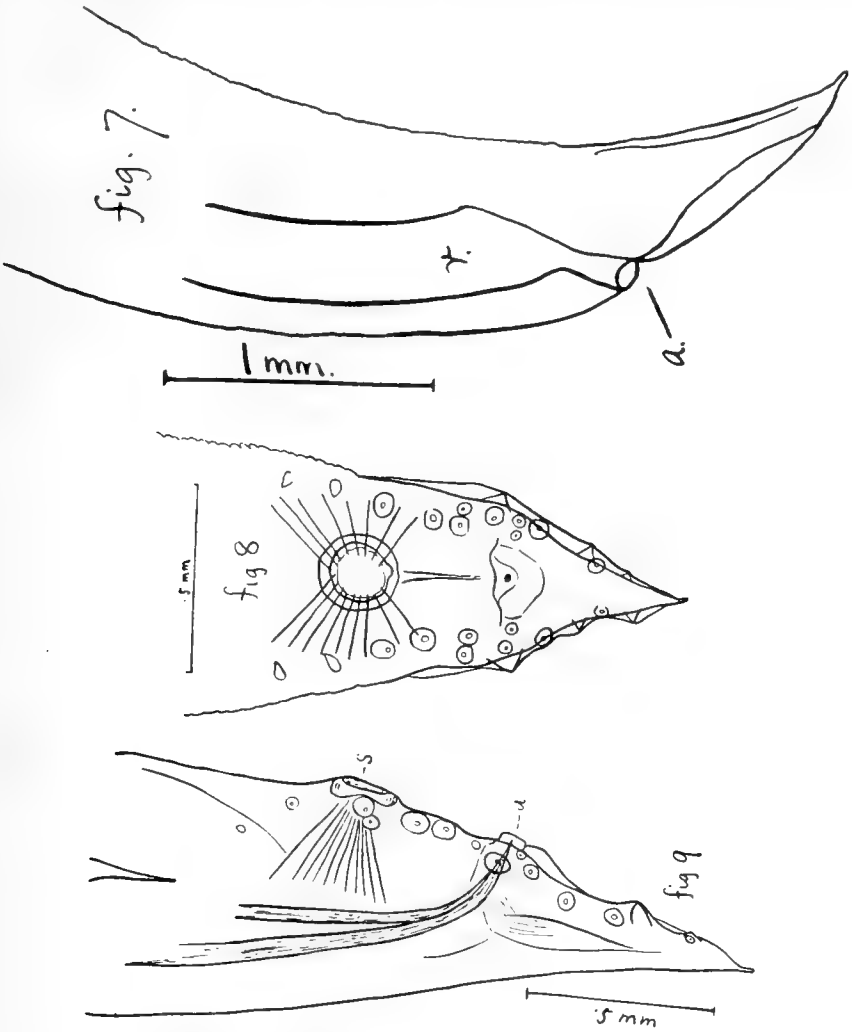


Fig. 7.—Tail of female—side view. *a.*, anus; *r.*, rectum.
Fig. 8.—Tail of a male—ventral view.
Fig. 9.—Tail of another male—side view. *s.*, sucker.

male tail is a small ala. The arrangement of the papillæ is somewhat variable. The presence of four large ones on each side between the anus and the midregion of the sucker appears to be characteristic. In front of these there are two smaller pairs.

Situated laterally to the anus is a prominent projecting papilla in the vicinity of which are two more. Behind these on each side are four others, the last projecting on the ala and situated close to the mucronate tip of the tail. There are thus thirteen or fourteen pairs but some may not be developed on one or other side. The shape of the male tail and the papillary distribution in the specimens examined by me are more like that figured by Schneider though the number of papillæ approximates that recorded by Travassos.

Neumann[16] has referred to constitutional disturbances set up by *A. columbæ* when present in abundance.

Dr. Sweet[17] in 1910 found a few specimens of a *Heterakis* from a domestic fowl in Victoria which she regarded as being closely related to *H. maculosa*. Though some of the characters mentioned suggest that the specimens belong to a species of *Ascaridia*, yet the differences between them and *A. columbæ*, as mentioned by Dr. Sweet, preclude the possibility of these fowl parasites being included under the latter specific name.

[16] Neumann, *l.c.*, pp. 146-8.

[17] G. Sweet, Some New and Unrecorded Parasites from Australian Chickens, P.R.S. Vict., 23, 1910, p. 246.

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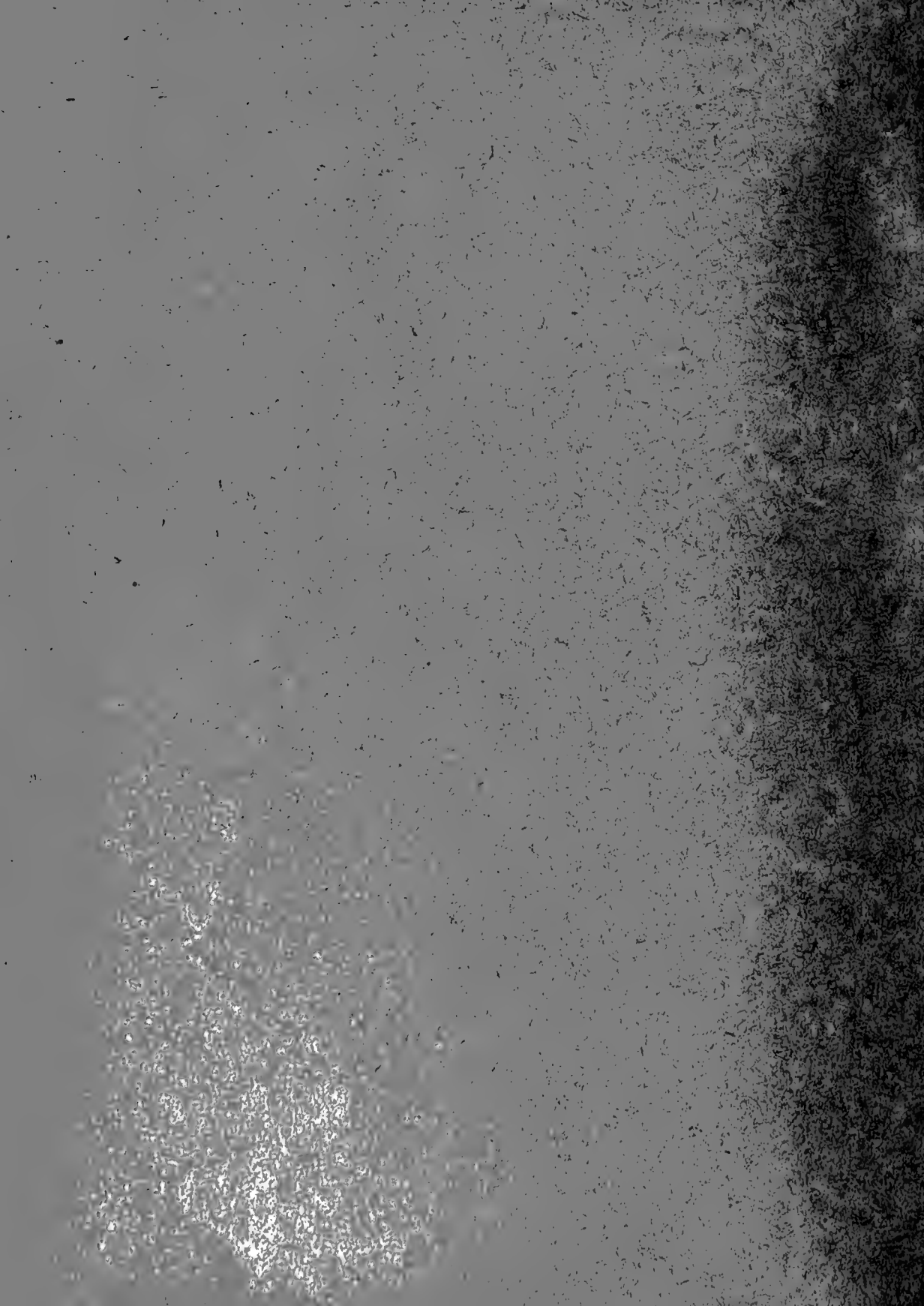

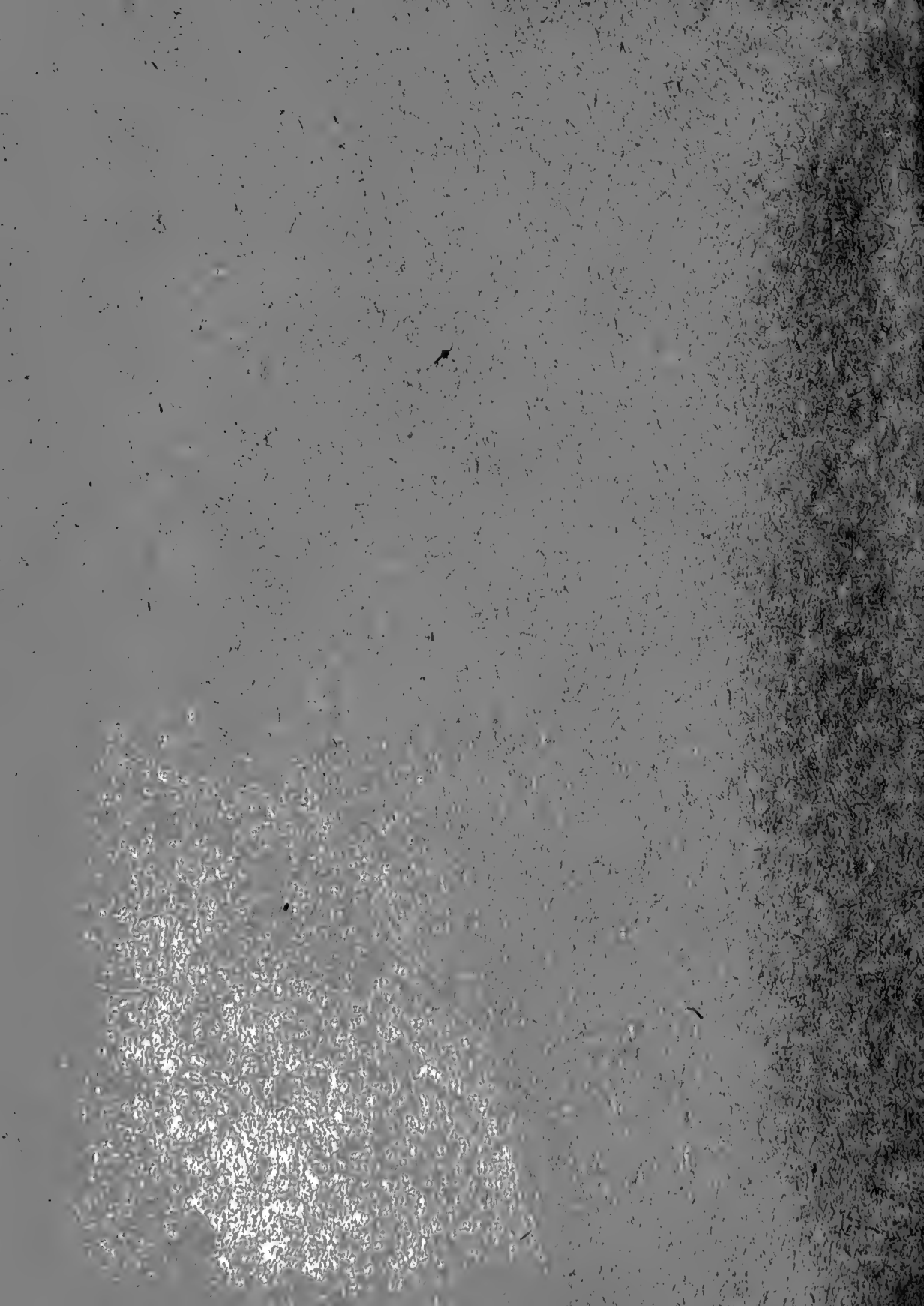

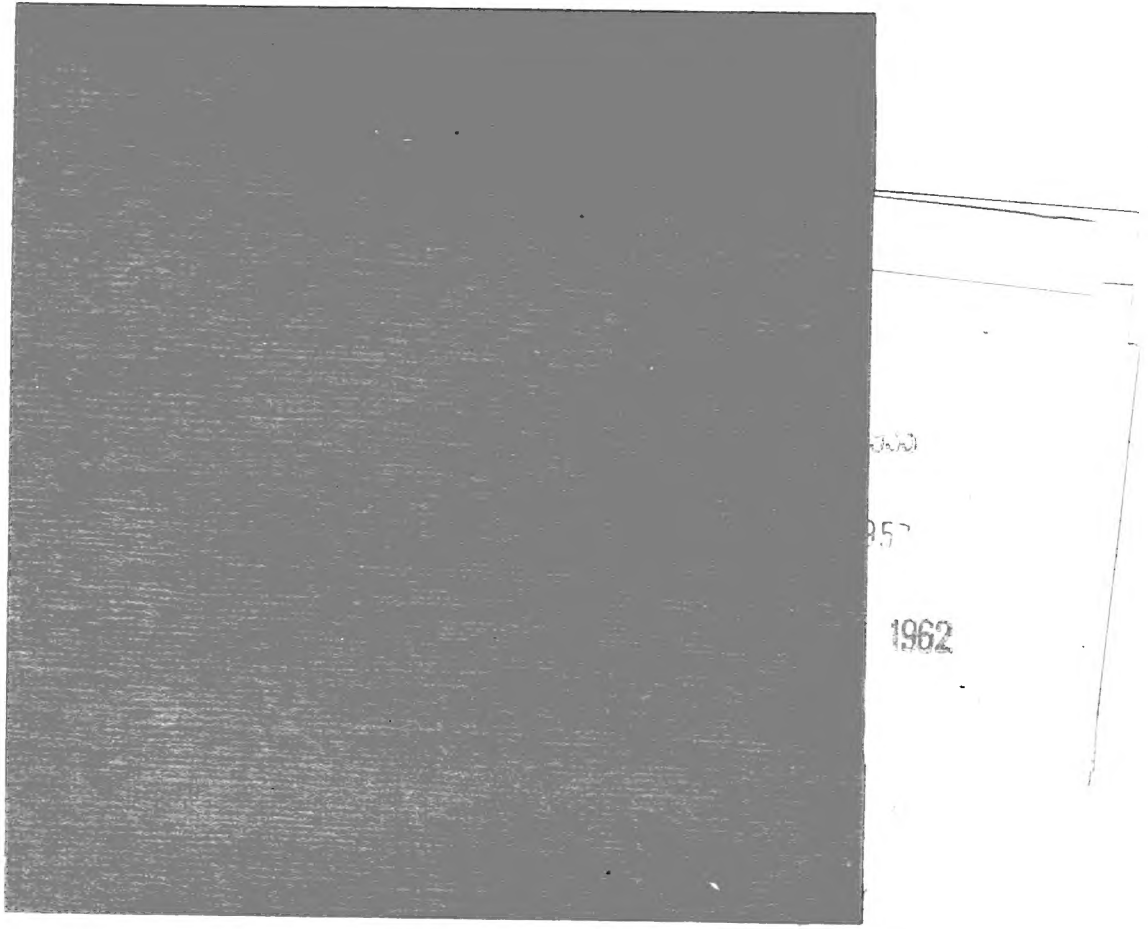
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