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Page 156, line 15 from bottom—*for* convexeusculus *read* convexiusculus.

Page 156, line 13 from bottom—*for* clypens *read* clypeus.

Page 158, line 7 from bottom—*for* Carettocchelys *read* Carettochelys.

Page 161, line 10 from bottom—*for* Carretochelys *read* Carettochelys.

Page 189, line 7 from bottom—*for* Euthyhinus *read* Euthyrhinus.

Page 202, line 3 from top—*for* P. pleuristictus *read* T. pleuristictus.

Page 202, lines 4 and 6 from top—*for* P. lineatus *read* T. lineatus.

Page 226, line 15 from top—*for* C. accuminata *read* C. acuminata.

Page 464, line 9 from bottom—*for* p. 51 *read* p. 139

Page 465, last line—*for* orginal *read* original.

Page 554, line 6 from bottom—*for* Didymogaster silvaticus *read* Didymogaster silvatica.

Page 557, line 15 from top—*for* Sphæxochus *read* Sphærexochus.

Page 558, line 8 from top—*for* Tragoceras *read* Tragocerus.

Page 805, line 16 from top—*for* ptterocosmana *read* pterocosmana.

Page 881, line 10 from top—*for* rubritorquatus *read* rubritorquis.

Page 938, last line—*omit the full stop after* apparently.

Page 946, line 2 from top—*for* Intraclitellian *read* Anteclitellian.

Page 956, line 7 from top—*for* p. 361 *read* p. 561.

Page 973, line 5 from bottom—*for* P. austrinia *read* P. austrina.

Page 1085, line 2 from top } *for* W. H. Boyer-Bower *read* T. H. Boyer-
Page 1096, line 7 from top } Bower.

NOTES ON AUSTRALIAN EARTHWORMS.

Part II.

By J. J. Fletcher, M.A., B.Sc.

(Plate XIII.)

In the following paper attention is called to the fact that the species of earthworm of which I gave a general account on p. 539, supposing it to be the *Lumbricus Novæ-Hollandiæ* of Kinberg, is in reality different from this; and descriptions of nine new species of postclitellian earthworms are given, anatomical details as before being reserved for further consideration. Of these worms one species belongs to the Australian Region (Darnley Island) rather than to Australia proper, and a second is in all probability an introduced species; these two are considered here for convenience. The others are from New South Wales or Queensland.

By the kind permission of the Hon. William Macleay I have been able to examine the earthworms in the Macleay Museum. These, exclusive of several species from this colony of which I have myself collected examples, comprise specimens from Percy and Darnley Islands, and from North Queensland, and represent six species probably all new; I regret therefore, that, owing to a paucity of material or to the immature condition of some of the specimens, I am able to give descriptions of only three.

Percy Island is a well-wooded, fertile, uninhabited island belonging to the Northumberland Group, and lies some 50 miles due east of the Australian coast in latitude about 21° S. During the voyage of the 'Chevert' to New Guinea in 1875, a short stay was made at this island, during which Mr. Masters obtained three earthworms belonging to two species. I am unable to give satisfactory descriptions of these; but as they are interesting forms

apart from their insular habitat, I give such particulars about them as I can, in the hope that any one who has the chance of visiting this island will make an effort to collect earthworms.

At Darnley Island in Torres Straits about 80 miles from the New Guinea coast, and 27 miles from Murray Island, also during the voyage of the 'Chevert,' Mr. Masters obtained two good specimens of a typical perichæte worm, which I have described under the name of *Perichæta Darnleiensis*.

The discovery of earthworms in these two small islands is not without interest, because these animals have not been hitherto recorded from any locality nearer to us than the much more extensive island of New Caledonia, though there can be little doubt that they are to be found in New Guinea.

The other earthworms in the Macleay Museum have recently been collected by Mr. Froggatt in the neighbourhood of Cairns, North Queensland. There are specimens of various stages belonging to three species, of which I am able to give descriptions of two, one of them a typical *Perichæta*, while the other is more like the species met with further south. The third species is represented by two small and immature specimens to which reference is made later on.

Of the other worms described in this paper, one is in all probability an introduced species, while the other five are indigenous to New South Wales, and, with one exception, have been obtained within a radius of 20 miles from Sydney. Two of them are worms somewhat similar in appearance, and having eight rows of setæ, but one of them has two gizzards and is referred to Perrier's genus *Digaster*, while the other has but one, and provisionally is referred to the genus *Cryptodrilus*. The remaining three are new species of the genus *Perichæta*.

The nine species of earthworms which I have now described as belonging to the genus *Perichæta*, fall into two very well-marked groups; one of them characterised by the possession of complete circles of setæ, by the presence of a pair of conspicuous cæca given off by the large intestine in segments XXV or XXVI, by the absence of the mesentery between the two segments containing the gizzard, and by having the latter organ situated a segment or two

further back, as well as in one or two other little matters. To this group belong the Queensland and Darnley Island Perichætes, and a third species supposed to have been introduced into this colony from Mauritius. They are all typical species of the genus *Perichæta*, and are very similar to others described from various parts of S.E. Asia, the East Indies and elsewhere. It is interesting to note the occurrence of these typical perichætes at Darnley Island and North Queensland, whereas, further south they seem, as far as is known at present, to be absent (unless McCoy's *P. Gippslandica* be one), and to be represented by the perhaps more modified forms such as we find in this colony. These belong to the second group characterised by the hemispherical arrangement of the setæ, the circles being interrupted in the median dorsal and ventral lines, by the absence of cæcal appendages of the large intestine, by the gizzard being placed between the two mesenteries of one segment though these are often displaced, and usually by the possession of fewer than four pairs of spermathecæ. I have described six species belonging to this group, all, with the exception of one from North Queensland, from this colony; while I have a few small specimens of at least probably three undescribed species also from New South Wales. Similar differences have been pointed out by other writers in species usually referred to the genus *Perichæta*, so that Beddard has suggested the advisability of instituting a second genus for the reception of species resembling those of the second group above-mentioned. I postpone the further consideration of this matter for the present as I feel sure many new Australian species remain to be discovered.

By the kindness of Mr. Haswell I have been able to see a copy of Kinberg's paper referred to on p. 539, from which I find that the species of worm of which I gave a description under the name of *Lumbricus Novæ-Hollandiæ* is different from that described by Kinberg under this name, and must therefore be separated from it as a new species. The following modifications may, therefore, be made in the list given.

A. *INTRACLITELLIAN WORMS.*

1. Lumbricus Novæ-Hollandiæ, Kinberg.

Lumbricus Novæ-Hollandiæ, Annulata nova, Ofversigt af Kongl. Vetenshaps-Akademiens Förhandlingar 1866, p. 99.

Lobus cephalicus integer, postice quadrangularis, antice semicircularis, segmentum primum corporis longitudine æquans; cingulum segmenta corporis 20-26 occupans; tubercula ventralia (male pores) nulla; longitudo 75 mm.; segmenta 110. Setæ ubique binæ approximatæ; juniores 1-2 validiores. Jun.

Sidney Novæ-Hollandiæ, ubi terram humidam habitat.

Obs.—The above is Kinberg's description in full. I have not yet met with any Australian worm having a clitellum comprising segments xx to xxvi.

2. Lumbricus (Allobophora) Australiensis, n. sp.

Lumbricus Novæ-Hollandiæ, Flet. *ante* p. 539.

For this species of which I have already given a description I propose the above name. It differs from Kinberg's species, among other things, in the clitellum occupying segments xxvii to xxxiv.

Since my description was published I find that in a recent paper Bergh mentions that a fourfold arrangement of the vesiculæ seminales obtains in several European species which are referred to Eisen's sub-genus *Allobophora*, characterised by having the male pores on xv, and the buccal ring only partially divided by the prostomium. (1) As the worm described by me also possesses these three characters, it belongs to the same group.

As further evidence of the abundance and wide distribution of this species I may mention that through the kindness of Mrs. Caird and the Rev. K. Corner to whom my thanks are due, I have received two parcels of worms, one from Braidwood,

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(1) Zool. Anz. ix. Jahrg. p. 232. Abst. in Jour. Roy. Microsc. Soc. Aug 1886, p. 600.

the other from Morpeth on the Hunter. In both cases the specimens, which were collected and sent as samples of the worms of the localities without reference to any particular worm, belong, with very few exceptions, to the species in question, though each parcel also contained one or two immature examples of a new species. One of these from the Hunter is characterised by having three gizzards.

C. *POSTCLITELLIAN WORMS, continued.*

10. DIGASTER ARMIFERA, n. sp.

(Plate XIII, figs. 1-3.)

I have already referred (*ante* p. 559) to *D. lumbricoides* described by Perrier from Port Macquarie, and to some worms found by myself at Marrickville near Sydney, which from the dissection of a single example seemed to belong to the same genus but to a different species. These specimens obtained in April were devoid of clitella; from under a stone at the same spot in July after rain I obtained a single specimen with a well-developed girdle; and in August and subsequently in September from under logs and sheets of bark, also after rain, at a locality near Parramatta I got six specimens of the same worm, all of which even the smallest show at least indications of the clitellum. These worms differ in several points from those described by Perrier.

The largest (spirit) specimen was 125 mm. long, 4·5 mm. broad; the length of the preclitellar region 13 mm., of the clitellum 8 mm., and the number of segments about 205. Body cylindrical, both extremities rather obtuse (in spirit specimens). Colour pale flesh-colour, the dorsal vessel shewing conspicuously through the integument. Prostomium depressed, narrow above, slightly concave inferiorly, extending on to the buccal ring for about $\frac{1}{4}$ of its width. Segments from about V to XIII are widest; after III they are bi-annulate, or as from VI the primary annuli may be more or less completely subdivided each into two, giving four annuli to a segment.

Clitellum comprising at least four segments, XIV to XVII, and sometimes in addition the posterior portion of XIII, or superiorly just the anterior of XVIII, margin or even both may be included in it; incomplete on the median ventral surface. One very small specimen (34 mm. long) has a very good clitellum which takes in a small portion of XII and includes XVII. As is the case with *Didymogaster* and *Notoscolex grandis*, after the breeding season the clitellum disappears; whereas in our *Lumbricus* and in other Australian worms it seems to be a more permanent structure.

The setæ from different regions vary slightly both in shape and length. From the posterior region they are about ·35 mm. long, and shew the usual slight sigmoid curve with divergent tips, the imbedded end being blunt. From a few segments in front of the clitellum they are straighter, slightly longer (·56 to ·63 mm.), with the enlargement about the middle more conspicuous; arranged in eight rows forming four couples, two ventral and two lateral; the setæ of the two outer couples further apart than those of the inner ones as in *Notoscolex*, and not at equal distances as in *Lumbricus*. Segments setigerous after the first. The curved penial setæ presently to be mentioned, are, without allowing for the curve, twice as long (1·26 mm.) as the ordinary ones.

The ventral portion of XVIII carries three pairs of pores of which the first and last on each side are in a line, and are just dorsad of the second row of setæ; they are either the pores of accessory glands, or the penial setæ may be protruded through them. The middle pair, presumably the male pores, are closer to the median line, and correspond with the intervals between the setæ of the ventral couples; all three pores on each side situated on the same eminence, and visible in worms without clitella. In one specimen there is a swollen ridge on the ventral surface of XIX; in another there appear to be a couple of pits or perhaps pores on this segment, with something similar on XVII. Oviducal pores two on XIV, in front of the line of setæ, and a little ventrad of those of the innermost rows. Spermathecal apertures two pairs, between VII and VIII, and VIII and IX, just dorsad of the line of the innermost rows of setæ. Dorsal pores after about XII.

On the median ventral surface of XI and of XII in all the specimens which have any indication of a clitellum there is a swollen nearly rectangular area, about as wide as the interval between the innermost rows of setæ, that on XI occupying the whole breadth of the segment, that on XII only the breadth of the first and second annuli; probably functioning as adhesive organs.

The alimentary canal comprises a muscular pharnyx coated superiorly with a white glandular substance, extending back as far as about IV : a short œsophagus leading to the first globular gizzard in V ; asecond and similar gizzard in VI, the first complete mesentery intervening between them ; a small intestine extending from VII to XVI, of which the piece in VII is narrow, in the rest of its course vascular and with the interseptal portions more or less dilated, but without any special diverticula ; and a large intestine commencing in XVII, unprovided with cæca. In each of the gizzard-segments is a pair of stalked arborescent organs ; the masses of glandular tufts lie in front of the first and second complete mesenteries respectively ; the ducts of the anterior pair run forward and enter the pharnyx, much as Beddard has described in *Acanthodrilus multiporus* (1) ; they are probably salivary glands, but whether the second pair are also, or what their relations may be, the few small specimens available for dissection till now have not enabled me to determine.

Six mesenteries from the second one behind the posterior gizzard to the posterior one of XII are thicker than elsewhere, and have interseptal ligaments.

The genitalia comprise, two pairs of white racemose testes in IX and XII, and not in X and XI as in *D. lumbricoides*, the anterior pair attached to the posterior mesentery of IX, the posterior pair to the anterior mesentery of XII, the testes of each pair independent of each other (2) ; two pairs of ciliated rosettes or vas deferens funnels in X and XI, the posterior portions

(1) P. Z. S. 1885 p. 817.

(2) The bodies alluded to here and elsewhere in this paper as testes, appear to be different from the vesiculæ seminales of *Lumbricus*. The determination of their true character, however, requires special investigation, and I leave it for future consideration.

of the two vasa deferentia joining the prostatic ducts quite close to the prostates; a pair of small flattened slightly lobulated prostates in XVIII or in this and XIX, with a straight or bent genital duct; a pair of ovaries occupying the usual position in XIII; a pair of oviducts having the usual relations; and two pairs of spermathecæ, a pair in VIII, and a second in IX—the former in the second segment behind that containing the second gizzard—each spermatheca is an elongate narrow sac [hardly pear-shaped] the proximal portion for a short distance somewhat bent, with only a very rudimentary cæcum; in one specimen they lay backwards across the width of the segment and were folded on themselves, the distal portions somewhat pear-shaped but not of much greater diameter.

The vacant lower and lateral portions of the body-cavity of segments X and XI were occupied by large white masses consisting of developing and fully developed spermatozoa; but I am at present undecided as to whether they were independent of the ciliated rosettes or whether they were enclosed with these in a thin membranous sac. Behind the genital duct on each side are two narrow sacs lying close together, running outwards and backwards, their outer ends attached to the body-wall just behind the prostate, their inner ends close to the proximal portion of the genital duct; each of them contains two long curved penial setæ, which close to the pointed end are slightly swollen and studded with minute spinose projections; the tips are cleft, one of the divisions being straight the other curved, so as to present a somewhat chelate appearance (fig. 3). In all my specimens these setæ were retracted, so that there was no trace of them visible on the exterior; and it was not until I put one of the sacs under the microscope that I made the unexpected discovery of the presence of such setæ. Perrier makes no mention of them in his description of *D. lumbricoides*, but whether they are absent in that species, or whether, owing to the indifferent condition of his material they escaped his notice, remains to be seen. Similar setæ are characteristic of the genus *Acanthodrilus*; from any species of which, however,

the two gizzards, the single pair of prostates, and the two vasa deferentia of the worm described by me, sufficiently distinguish it.

In the segments behind the gizzards as far back as XII there are transverse hearts.

Small tufts of glandular tubules attached to the cœlomic wall, and sometimes also to the mesenteries probably represent the segmental organs; they are largest in some of the anterior segments. Their external apertures (nephridiopores) are quite undiscernible.

Hab.—Marrickville near Sydney, Auburn near Parramatta, N.S.Wales.

Obs.—From under stones, logs, pieces of bark after rain ; not very common. This species is readily distinguishable from *D. lumbricoides* by (1)the gizzards being in consecutive segments instead of in V and VII, (2) the testes being in IX and XII instead of in consecutive segments—X and XI, (3) the clitellum including segment XVII, (4) the setæ of the outer couples being further apart than are those of the inner ones, whereas Perrier says that in his species the disposition of the setæ is that of *Lumbricus*, [and (5) the presence of penial setæ].

11. Cryptodrilus saccarius, n. sp.

Five (spirit) specimens are from 57 to 74 mm. long, and 5 mm. broad ; the longest of them has the preclitellar region 10 mm. long, and consists of about 160 segments. Body uniformly pale or flesh-colour, cylindrical, posterior region more attenuate. Prostomium small, depressed, only slightly imbedded in the buccal ring. Segments widest and most prominent from the clitellum forwards ; the IV and V are bi-annulate, while after VI they are tri-annulate, the anterior primary annuli being subdivided.

Clitellum comprises nearly five segments, XIII to XVII, a very slight portion on the anterior margin of XIII not included, complete all round, in one case not quite so thick on the ventral portion of XIII, and on XVII slightly encroached upon by the area carrying the male pores.

Setæ shorter than in *Digaster*, from ·28-·35 mm. long, the imbedded portion stouter, with a slight enlargement about the middle; in 8 rows, forming four couples, two ventral and two lateral, the setæ of the latter twice as far apart as they are in the ventral couples. Male pores two, each on a small papilla in the enlarged ends of a dumb-bell-shaped depression with raised rims on XVIII, nearly corresponding with the intervals between the setæ of the inner couples; oviducal pores on the ventral surface of XIV, in front and ventrad of the first seta on each side; spermathecal apertures four, a pair on a slight eminence on the anterior margins of VIII and IX, just dorsad of the innermost setæ, those of each pair the same distance apart. The accessory copulatory organs consist of two pairs of dumb-bell-shaped adhesive discs situated within two nearly elliptical areas on the junctions of XI and XII, and XII and XIII; on XVIII just on the outer side of each of the papillæ carrying the male pores is a second small papilla carrying a pore. The dorsal pores are not distinct in front of the clitellum.

The alimentary canal comprises a muscular pharynx occupying about three segments; a short œsophagus; a large gizzard between the mesenteries of V (or VI); a small intestine extending back to XIV, which in segments IX to XIII is provided with five pairs of large pouch-like diverticula (calciferous glands), very richly supplied with vessels; and a large intestine commencing in XV. In V and VI are two large aborescent stalked masses probably salivary glands.

The genitalia comprise two pairs of racemose testes in XI and XII, attached to the anterior mesenteries; two pairs of small ciliated rosettes lying free in X and XI, the posterior portions of the vasa joining the prostatic ducts close up to the prostates, which occupy segments XIX or XX to XXIV on each side; the genital ducts which come off from the anterior ends of the prostates but very soon bend inwards, are very long, thick, and convoluted or bent; a pair of ovaries in the usual situation in XIII; two oviducts commencing in the same segment and opening by separate pores on XIV; and two pairs of spermathecæ in VIII and IX, opening anteriorly. Each spermatheca consists of three portions, a distal

cylindrical sac, a proximal longer and narrower duct or stalk which is bent or coiled, and a very small rudimentary cæcum or appendage attached to the stalk, wider than high and having on its apex three or four faint elevations. The distal portions of the anterior spermathecæ are apt to be displaced so that they may be found in either of the two preceding segments. On the outer side of each genital duct just as it passes through body wall is a small hemispherical pouch, whose apertures doubtless are those visible on the exterior. In one specimen there is a median one under the nerve cord a few segments further back.

There are about seven pairs of hearts the last of which is in XIII, and of which those in the segments containing the diverticula are the largest, especially the last two or three.

Small tufted masses attached to the cœlomic wall are probably the segmental organs ; they are larger in the anterior segments.

Hab.—Hornsby (20 miles from Sydney), N.S.W.

Obs.—Six specimens obtained in September under logs. These worms do not agree very closely with those previously described as *C. rusticus*, but as I wish to avoid multiplying genera they are placed here for the present.

12. Perichæta tenax, n. sp.

(Plate XIII, fig. 4.)

The largest of four specimens comprises 133 segments, is 123 mm. long, 5 mm. broad, and has a pre-clitellar region 22 mm. long. Body cylindrical, tapering anteriorly and posteriorly, in spirit-specimens narrow at the clitellum. Colour dark red above, below whitish or with a tinge of brownish-yellow. Prostomium pear-shaped, extending back on the buccal ring for nearly its whole width, marked inferiorly and anteriorly by a continuous longitudinal groove, and divided by a transverse groove just behind the anterior margin of the buccal ring. From about VII to XVII the segments are widest (some of them 2 mm.) and except for the setigerous ridge are nearly flat and less convex than usual. After about V the segments are tri-annulate, the setæ being situated on the middle ridge-like annulus.

Clitellum complete all round, comprising three complete segments —XIV to XVI, while in addition a portion of XIII or of XVII or of both may be included. Setæ and dorsal pores visible on the clitellum.

Setæ short, about ·28 mm. long, relatively stout, a slight enlargement between the middle and the free tip but nearer the former; arranged on conspicuous ridges, the rows being interrupted for a narrow space in the median dorsal and ventral regions; the number of setæ per segment is about 28, but in the caudal region there may be from 32 to 36. All the segments setigerous after the first.

Male pores on papillæ on XVIII about in a line with the second row of setæ on each side. The two apertures of the oviducts are on a small elliptical area on XIV, one on each side of and close to the median line. The apertures of the spermathecæ are between VII and VIII, and VIII and IX, rather ventral in position and about in a line with the second or third row of setæ on each side. Dorsal pores present after segment IV. Nephridiopores not visible.

On segments IX and X there is a characteristic arrangement of what are probably adhesive discs. The ventral portion of these segments for the whole or nearly the whole breadth of them, and extending outwards on each side to about the second row of setæ is raised and thickened, and carries four circular pits or perhaps pores, one in front of and one just behind the setigerous ridge on each side. The areas may or may not be subdivided into two by a median longitudinal groove; they may be fairly rectangular, or each of them may consist of two 8-shaped areas side by side, the outlines of the 8's being very broad, with the pit or pore in the centre of each half (fig. 6). All my specimens show these structures, the arrangement of which at once distinguishes them from any other of our known worms.

The mesenteries from the anterior one of segment VIII to the posterior one of XIII are thicker than elsewhere.

The alimentary canal presents the usual divisions; the muscular pharnyx coated with a white glandular mass occupies about three

segments ; the short œsophagus occupying about a segment is followed by the large muscular gizzard in V, bounded posteriorly by the thin mesentery between V and VI, and which being pushed backwards by the large gizzard is invested by the next mesentery behind it ; the small intestine extends back to XV, and in segments XI to XIII is provided with three pairs of pouch-like diverticula ; and the sacculated large intestine commencing in XVI, which is not provided with cæca. As in other worms there are strong ligaments connecting the posterior margin of the pharnyx with the anterior rim of the gizzard.

There are two pairs of testes in segments IX and XII, hardly racemose, the first pair attached to the posterior mesentery, the second to the anterior one ; the two pairs of ciliated rosettes occupy the two intermediate segments X and XI, the vacant portions of the cavities of which were filled with coagulated masses of fully developed and advanced stages of developing spermatozoa, but whether these were enclosed with the rosettes in delicate membranous sacs, or whether simply discharged into these segments, and coagulated by the spirit, was not easy to decide ; the posterior portions of the vasa deferentia doubtless join the prostatic ducts, but I could not trace them in the two specimens dissected ; there is a pair of prostates partly in XVIII and partly in XIX, incompletely divided into three portions by two transverse constrictions ; the very short genital ducts without any *U*-shaped bend pass straight to open on to the exterior. The ovaries in XIII, and the two oviducts partly in this and in XIV have the usual situations and relations ; the two pairs of spermathecæ are in VIII and IX, narrower than in *P. australis*, and each has a club-shaped cæcum, shorter than the main pouch, not dilated at the tip.

In many segments the portions of the dorsal vessel between the mesenteries present indications of being incompletely double ; there are transverse hearts in segments VI to XII, of which the last three pairs are conspicuously large. Small tufts of glandular tubules attached to the cœlomic wall are probably segmental organs.

Hab.—Auburn near Parramatta, N.S.W.

13. Perichæta austrina, n. sp.

(Plate XIII, fig. 5.)

In six specimens the number of segments varied from 110 to 128, the length from 75 to 90 mm., the breadth was 5 mm., and the length of the preclitellar region 12 mm. The worms of this species live together with, and closely resemble *P. australis* (p. 361) in many of their characters, but the two species are readily distinguishable. The new worms are smaller, but, in regard to the shape and colour of the body; in having interrupted circles of setæ, the latter being more numerous in the posterior region; in having the male pores on papillæ on XVIII, and the oviducal pores on XIV; in the principal characters of the alimentary canal, and in the absence of cæca in XXVI; in the number, situation, and characters of the testes, of the ciliated rosettes, of the ovaries, and of the oviducts; and in the general characters of the vascular system, and of the segmental organs, the two species agree very closely.

They differ in the following respects:—(1) the prostomium extends further back on the buccal ring (for $\frac{3}{4}$ or even more of its width), and is marked by a median longitudinal groove which is prolonged backwards so as completely to divide the buccal ring, the latter also divided in the median ventral line by a distinct groove; (2) the clitellum comprises nearly the whole of XVII in addition to XIV, XV, and XVI; (3) the number of setæ is slightly different, there being 16 per segment in front of the clitellum, 24 or sometimes 20 for the greater portion of the region behind it, while in the last $\frac{1}{4}$ or $\frac{1}{2}$ inch of the body except in the last few segments of it, the number may increase from 32 to 40, the setæ in this region being finer, closer together, sometimes at irregular intervals, and the dorsal interruption having all but disappeared. But the most characteristic points of difference are (a) the presence of three instead of two pairs of spermathecæ, and in the more ventral position of their apertures; (b) the presence of ventral rectangular thickenings presumably of the nature of adhesive discs on segments IX and X, and of copulatory or genital papillæ on segments XVII to XIX; and (c) the absence of a *U*-shaped genital duct.

Of spermathecæ there is a pair in each of segments VII, VIII, and IX; opening anteriorly, the apertures being between VI and VII, VII and VIII, and VIII and IX, and nearly in a line with the second row of setæ on each side; each spermatheca is pear-shaped and has a long cæcum as in *P. australis*.

On the ventral portion of segment IX is a raised elliptical or more or less rectangular area occupying the whole width of the segment and extending laterally as far as the second row of setæ on each side, while on it is a pair of small pits or possibly pores, one on each side of and rather close to the median line. The ventral portion of X is similarly modified, but here the thickened area extends further out on each side (to the 3rd row of setæ), and is divided by a median groove into two nearly square or oblong areas, with a depression or pit in the middle of each.

On XVII and occupying the interval devoid of setæ is a pair of small copulatory papillæ with a pit or pore on each, rather close together and with their inner margins joined by a short transverse ridge, so as to form a somewhat dumb-bell-shaped area. On XVIII ventrad of each papilla carrying a male pore is a second but smaller one, so that this segment carries four papillæ. On XIX the arrangement is similar to that on XVII but with the two papillæ a little further apart.

The prostates are very much incised or lobulated, and the short thick ducts run almost perpendicularly, and are joined by the vasa deferentia close to the glands.

The other organs do not differ materially from what has been described in *P. australis*.

Hab.—Burrawang, N.S.W.

The worms of this species live together with the four other species previously described from the same locality, and were collected at the same time as those mentioned, but thinking they were young specimens of *P. australis* I did not pay particular attention to them.

14. Perichæta gracilis, n. sp.

The largest of about 20 specimens comprised about 155 segments, was 110 mm. long, 4 mm. broad, the length of preclitellar region being 11 mm., that of the clitellum 6 mm. Body cylindrical tapering posteriorly less markedly so anteriorly, slightly constricted at the clitellum (in spirit-specimens). After about IX the segments are more or less tri-annulate. Colour when alive a rich dark almost port-wine red above (duller in spirit almost reddish-brown), lighter (yellowish-white) below. Prostomium pear-shaped extending back on the buccal ring for about $\frac{2}{3}$ or more of its width; buccal ring with a median longitudinal ventral groove completely dividing it.

Clitellum well developed, comprising four segments (XIII to XVI), or in younger specimens only partially including XIII; complete all round.

Setæ short, about ·28 mm. long, with a slight enlargement at about $\frac{1}{3}$ from the free tip, the remaining portion somewhat thicker; arranged in two half-series, there being median narrow dorsal and ventral spaces devoid of bristles; all the segments setigerous except the first one and the last three or four. The number of setæ per segment is from 20 to 24, the number on the anterior segments being slightly greater than that elsewhere (one specimen having 24 per segment in front of, and 20 per segment behind the clitellum); they are sometimes at slightly irregular intervals, so that those of the various segments do not form perfectly straight longitudinal rows.

Male pores two, slit-like, on papillæ, the pores well apart on the lateral margins of the ventral surface and about corresponding with the interval between the 2nd and 3rd rows of setæ on each side, and in the line of those of the segment; there is one seta visible on each side on the ventral surface between the pores. The oviducts apparently open to the exterior by a single median pore in front of the line of setæ on XIV. There are three pairs of spermathecal pores between VI and VII, VII and VIII, and VIII and IX, rather lateral in position, and corresponding with the 4th or 5th row of setæ on each side. Dorsal pores after about the 5th

segment. Nephridiopores not discernible. The accessory copulatory organs comprise three single pores in the median ventral line between XVI and XVII, XVII and XVIII, and XVIII and XIX ; apparently a small single papilla in the middle of XVIII ; and a pair of small papillæ also on XVIII just in front of, and in a line with those carrying the male pores ; but with the exception of the last their presence is not constant, and some or all of them may be wanting. None of the specimens show any trace of adhesive discs.

The alimentary canal presents nothing remarkable. The pharnyx extends back about as far as IV, and its hinder portion is coated with a white mass consisting of granular cells, while below it in about III is a pair of tufts of glandular tubules which are probably salivary glands ; the short œsophagus is followed by the gizzard in VI, contained between the two mesenteries of this segment ; the small intestine is devoid of pouch-like diverticula, but in segments XII to XV it is very vascular and the lumen of the intermesenteric portions dilates so as to give them a globular appearance ; the large intestine begins in XVII and has no lateral cæca.

There are two pairs of testes, in segments XI and XII, not racemose, each of them a narrow nearly cylindrical smooth white body attached to the anterior mesentery of the containing segment, and with the long axis transverse ; the inferior extremities of those of each pair are close to, but independent of each other ; then arching round the intestine they nearly touch superiorly in the median line ; there are two pairs of ciliated rosettes, a pair in each of segments X and XI ; in the specimens dissected the vacant portions of the body-cavity in these two segments were crammed with fully developed spermatozoa probably discharged into them from the testes in the segment immediately succeeding in each case ; the posterior portions of the vasa deferentia join the prostatic ducts close up to the prostates, which are a pair of long laterally incised bodies commencing in XVIII and extending back through about the next six segments ; there is a long genital duct on each side with a *U*-shaped bend as in *P. australis* but differently disposed, in this case the long leg of the *U* being anterior, and the concavity of the bend turned towards the prostates ; in another specimen however

they were irregularly *S*-shaped. The two elongate, flattened, stalked ovaries occupy the usual position in XIII, and opposite them are the anterior portions of the oviducts which open separately on the ventral surface of XIV. There are three pairs of spermathecæ in segments VII, VIII, and IX, opening anteriorly ; each spermatheca consists of a large pear-shaped or rounded sac with a narrow but distinct stalk from which at the level of its piercing the body-wall is given off a long filiform cæcum or appendage, much crimped otherwise it would be longer than the stalked pouch.

There are very large hearts in X, XI, and XII.

The small tufts of glandular tubules attached to the cœlomic wall are probably the segmental organs.

Hab.—Auburn near Parramatta, N.S.W.

Obs.—Common under logs and pieces of bark after rain.

15. Perichæta Barronensis, n. sp.

Among the worms collected by Mr. Froggatt from North Queensland there are four small specimens apparently young and immature but sufficiently distinct from those of any other species examined by me, to permit of, at any rate, a preliminary description. The largest of them consists of about 125 segments, and is 62 mm. long, and 4 mm. broad. The prostomium is large, the projecting portion being spherical ; superiorly it is lightly grooved longitudinally in the middle line, the groove continuing backwards, dividing the buccal ring—which is very narrow—and being visible about as far back as segment XVI, interrupted by the dorsal pores where these are present ; all the specimens show it, so that it is probably normal ; the buccal ring is also divided longitudinally in the median ventral line.

The body in all the specimens is constricted from about XIII to XVI ; the diameter at the extremities is much less, and the anterior one slightly bent upwards. After the first few the segments increase in width for some distance, and are tri-annulate.

Clitellum developed in only one specimen, comprises four segments XIV to XVII, complete all round. Setæ about 40 per segment, not in complete circles ; the median ventral break is perfectly

distinct; there is no median dorsal row of setæ, and apparently there is a narrow dorsal break, but as the specimens are small and contracted it is difficult to be quite sure. Male pores two, each on a prominent papilla on XVIII, the ventral portion between the papillæ slightly swollen forming a slight ridge across the interval, on which ventrad of each papilla two or three setæ are visible. Oviducal pores not visible. Spermathecal pores three pairs, between IV and V, V and VI, VI and VII, about corresponding with the intervals between the fourth and fifth rows of setæ on each side. Dorsal pores after about IV. No indications of accessory copulatory organs in any of the specimens.

The pharynx occupies three or four segments; the œsophagus is rather long; the gizzard is in VII, or at least has immediately behind it the posterior mesentery of this segment, but in front of it the mesenteries were thin and apparently incomplete and difficult to make out; it pushes backwards several of the mesenteries behind it; the small intestine occupies segments VIII to XVI, is unprovided with diverticula, but in X to XIV, the intermesenteric portions are dilated, especially in XI to XIII; the large intestine commences in XVI, no cæca in XXVI.

There are two pairs of racemose testes in XI and XII, attached to the anterior mesenteries quite independently of each other; two pairs of ciliated rosettes in X and XI, the posterior portions of the vasa deferentia were not discernible; in XVIII a pair of prostates their proximal portions long, narrow, continuous with the genital ducts, looking more like convoluted thick-walled tubes than solid glands, their distal portions a little more compact. The ovaries and oviducts have the usual situation and relations; the external apertures of the latter were not visible; there are three pairs of small spermathecæ, the posterior pair the largest, the anterior pair the smallest, apparently in segments V, VI, and VII; each of them pear-shaped, very shortly stalked, and with a long filiform cæcum slightly longer than the main sac.

The lower and lateral portions of segments X and XI were filled with white masses of spermatozoa, but whether they were lying free, or enclosed with the ciliated rosettes within a membranous sac or

sacs, could not be determined. Attached to the anterior mesentery of x on either side of and slightly below the intestine were two smooth bodies looking like a third pair of testes, but probably only encysted parasites, though microscopic examination yielded nothing satisfactory. In other worms I have sometimes met with a similar pair of bodies on the anterior mesentery of XIV.

There are transverse hearts in VII to XIII, very large in XI and XII.

The segmental organs consist of pairs of transversely disposed coiled tubes, smaller and less conspicuous after about segment XVIII.

Hab.—Barron River District near Cairns, N. Queensland (*Macleay Museum*).

Obs.—This species is readily distinguishable from the other two (*P. austrina* and *P. gracilis*), which have three pairs of spermathecæ, by the anterior dorsal grooving, and by the absence of accessory copulatory organs.

16. Perichæta Queenslandica, n. sp.

(Plate XIII, fig. 6).

The largest of six specimens comprising about 120 segments gave the following measurements :—Length 15 cm., breadth 7 mm., length of the pre-clitellar region 26 mm. Body cylindrical, tapering anteriorly and posteriorly, the ventral surface for a few segments just behind the clitellum somewhat flattened. Prostomium not well shown ; apparently small, grooved anteriorly and superiorly, and extending on to the buccal ring for only a short distance—less than $\frac{1}{2}$. The segments are relatively wide and flat, widest from about IY to XIII ; in the middle of each segment is a conspicuous transverse ridge carrying the numerous setæ ; two furrows one in front of and the other just behind the ridges divide the segments into three annuli, but in addition the first and last of them may show more or less complete further sub-division into two, so that in such cases the segments shew five annuli.

Clitellum thick and well-developed, comprising three segments—XIV to XVI, complete all round ; a small elliptical depression on the ventral surface of XIV on which are placed the two apertures of the oviducts ; the setæ on the clitellar segments are discernible.

Setæ about ·46 mm. long, with an enlargement at $\frac{1}{3}$ from the free end; forming complete circles, arranged on transverse ridges in the middle of each segment except the first one, and the last few. The number of setæ is tolerably constant throughout and is about 60 per segment; in small specimens a few less. Male pores two, on papillæ on XVIII in the line of setæ, from 4 to 5 mm. apart, with 13 or 14 setæ on the ventral portion of the segment between the pores. The oviducts open on the exterior by two apertures close together, situated on a depression on XIV just in front of the line of setæ. There are four pairs of spermathecal apertures, rather ventral in position, a pair between segments V and VI, VI and VII, VII and VIII, VIII and IX; the pores in a line with about the sixth row of setæ on each side. Dorsal pores after about XII.

The accessory copulatory organs in this species are very well and characteristically developed. Firstly on the ventral surface of each of segments IX, X, and XI (in one case only on X and XI), and in front of the setigerous ridge is a pair of elliptical or circular swollen areas presumably adhesive discs, those of each pair rather close together, and each with a small central pit perhaps carrying a pore. Secondly there are six or seven pairs of accessory-gland pores of which two pairs are in front of the male pores, and four or five pairs behind them, and arranged as follows:—On XVII just in front of the line of setæ is a pair of conspicuous slit-like pores a little closer together than the male pores; the second pair are situated on the junction of XVII and XVIII, just behind the first pair, but a little further apart; the third pair are almost on the junction of XVIII and XIX, the pores of this and of the second pair as far apart as the male pores; the fourth fifth and sixth pairs are on the anterior annuli of segments XIX XX and XXI respectively; when there is a seventh they are on XXII. The last three pairs are closer together even than the first pair; thus while in a good example the pores of the first pair were 2 mm. apart, those of the last two pairs were only 1 mm. apart. In none of the specimens were these pores situated on papillæ (genital or copulatory papillæ), though in the breeding season these are probably developed; but they were placed mostly

on elliptical areas, of which those of the second and third pairs were less distinct, and in most of the specimens situated in well marked transverse pits with the papillæ carrying the male pores standing out well between them; this however may be due to shrinkage as in one of the largest specimens there are no pits and the pores are flush with the surface. In a specimen 92 mm. long in which the clitellum was undeveloped, and the adhesive discs only slightly indicated, six pairs of pores were visible, but were not quite so conspicuous as usual.

The alimentary canal differs in several points from what I have met with in the worms with interrupted circles of setæ, though closely agreeing with what has been described in typical perichæte worms from other parts of the world. The pharnyx occupies about three segments; the œsophagus also about three segments, IV to VI, is rather wide, and being constricted at the mesenteries the intermediate portions appear more or less globular, and are coated with a layer of white glandular matter; the gizzard along with the two posterior pairs of spermathecæ occupies VII and VIII, the mesentery between these two segments being completely wanting; the small intestine extends from IX to XIV, and in the next segment gives place to the sacculated large intestine which continues throughout the rest of the body; the intermesenteric portions of the former in X to XIII are dilated and more or less globular, but there are apparently no pouch-like diverticula. The large intestine in XXV is provided with a pair of long lateral cæca tapering anteriorly, such as have been so frequently described in other species of the genus, though usually as being in segment XXVI; the cæca come off from the sides of the canal, lie alongside it, and are directed forwards, their free tips reaching to XXI.

The genitalia also present some slight differences from what I have met with in the worms with incomplete circles of setæ. In XI and XII are two pairs of white sacs, which appear unmistakably to be vesiculæ seminales. The anterior pair are long, nearly cylindrical bodies, their distal portions tapering, slightly adherent to one or both mesenteries, their proximal portions rising from the floor of the segment independently of each other on either

side of the nerve cord, then curving round the intestine touching superiorly in the median line. The posterior pair are larger, more compressed, and each distally drawn out into a narrow prolongation usually folded on itself, and slightly dilated at the tip ; these bodies are attached by fibrous bands and a stalk to the anterior mesentery of XII, oneach side of and slightly below the intestine. I could find no ciliated rosettes either in X or XII, but there is a single pair in XI, enclosed within the backwardly prolonged basal portions of the anterior sacs, which continue along the floor of the segment on either side of the nerve cord to the posterior mesentery, through which apparently the contents of the posterior sacs gain access to the ciliated rosettes. In one specimen I noticed a pair of small white bodies attached to the anterior mesentery of XI, but enclosed within the sacs, which were probably testes. The presence of a single pair of ciliated rosettes—unless I have overlooked a pair which I do not think is the case—is similar to what Horst has described in *P. Sumatrana* (1).

There is a pair of large lobulated prostates incompletely divided into three lobes, occupying part of from two to four segments (XVIII to XXI) on each side ; the prostatic ducts come off from the middle portions ; the posterior portions of the vasa deferentia were not traceable in the two soft specimens available for dissection ; the genital ducts are rather short, straight or bent but not coiled. There is a pair of flattened ovaries occupying the usual position in XIII ; the oviducts appeared to be as usual ; there are four pairs of spermathecæ, a pair in each of segments V to VIII. Each spermatheca is a stalked pouch, the stalk or duct about half as long as the distal dilated portion, and giving off a very short and rudimentary cæcum from its upper part. The whole ventral wall of the body cavity from segments XVII to XXII is specialised, but separate glandular pouches were not noticeable.

There are transverse hearts in segments VIII to XII ; in front of VIII the dorsal vessel runs along the top of the gizzard ; there are smaller commissural vessels in VI and VII ; in XII below the main

(1) Notes from the Leyden Museum, Vol. v. p. 189.

dorsal trunk is a second small longitudinal vessel adherent to the alimentary canal, from which the hearts in this segment seem to arise.

The segmental organs are probably the small tufts of glandular tubules attached to the cœlomic wall, most conspicuous in the œsophageal segments where they are also attached to the mesenteries.

Hab.—Barron River District, North Queensland (*Macleay Museum*).

Perichæta Darnleiensis, n. sp.

Two specimens comprising 108 and 79 segments were 155 mm. and 111 mm. long respectively, in both cases the breadth being 6 mm., and the length of the preclitellar region 29 mm. Body cylindrical tapering anteriorly and posteriorly. Prostomium extending back on the buccal ring for about half its width. Segments distinct, rather wide and flat, widest (about 3 mm.) in front of the clitellum as far forwards as about v. From about v to viii the segments are tri-annulate, with the setæ on a ridge on the middle annulus; from ix to xiii they shew five annuli; in the remaining region the annulation is not quite so distinct but there may be three or five annuli per segment. Segments setigerous after the first or second.

The setæ are about ·42 mm. long, with a slight enlargement at about $\frac{1}{3}$ from the free end; arranged in complete circles on conspicuous ridges on the middle of the setigerous segments. The number of setæ is from about 60 to 66 per segment, most numerous in the posterior region.

Clitellum comprises three segments (xiv to xvi), is very thick and complete all round; a depression on the ventral surface of xiv on which are the oviducal apertures. Neither setæ nor dorsal pores visible on the clitellum.

The male pores are slit-like with plicated lips on xviii, about 3 mm. apart, in the line of setæ, with about 12 setæ on the ventral surface between the pores. In neither specimen were the pores on papillæ, but the latter are probably developed in the breeding season. The oviducts in one specimen appear to open by

separate apertures; in the other the apertures are not visible. There are no traces of accessory copulatory organs, neither adhesive discs nor genital papillæ or pores. There are four pairs of spermathecal pores, circular apertures between V and VI, VI and VII, VII and VIII, VIII and IX; rather lateral in position, and about in a line with the tenth row of setæ on each side. Dorsal pores after XI or XII.

The alimentary canal differs slightly in the position of the gizzard and in one or two other minor points from that of the Queensland perichæte. The pharynx occupies about four segments; the œsophagus reaches from V to VIII, the distal half of the portion in VIII dilated into a crop-like portion in front of the large gizzard lying in segments IX and X, the intervening mesentery being entirely wanting; the small intestine reaches back to XV but gives off no pouch-like diverticula, though in XI and XIII the intermesenteric portions are dilated; the large sacculated intestine begins in XVI, and in XXVI is provided with a pair of long, lateral, tapering cæca, directed forwards and reaching to about XX, but in the natural position the anterior free portions were tucked under the intestine in XXII.

There are two pairs of testes (1) in segments XI and XII, not racemose, occupying the whole width of the segment except for the space occupied by the transverse hearts which lie behind them; divided into two lateral lobes and a small median upper one, all close together in a compact mass overlaying the intestine, those of each pair nearly touching above in the median line; they are attached in each case partly by fibrous bands and partly by a stalk, to the anterior mesenteries a little below and on each side of the intestine. On the floor of X immediately in front of the mesentery between X and XI, there are apparently two bodies contained in a delicate membranous sac; while on the floor of XI beneath the anterior testes is a similar but larger mass. These bodies I take to be the two pairs of ciliated rosettes enclosed in membranous sacs, in relation in some way to the testes on the other side of the mesentery in each case; or there may be one sac enclosing both pairs. The posterior testes

(1) These bodies, as also in the next case, are possibly vesiculæ seminales.

in XII have nothing of this kind behind them and I was able to see the vasa deferentia passing through the mesentery to which they were attached. There is a pair of much incised prostates occupying nearly three segments, XVII to XIX; the genital ducts which are sickle-shaped and are joined by the distal portions of the vasa deferentia close up to the gland, do not open directly on to the exterior but each on the summit of an elliptical elevation, possibly a sac, nearly as long as the prostate. The whole arrangement is very similar to that figured by Vaillant in *P. cingulata* (1) with this difference, that in the Darnley Island worm both prostates and genital ducts are relatively longer, and the vasa deferentia join the prostatic ducts closer to the glands. I hope to give a figure of these structures later on.

The two ovaries occupy the usual position in XIII; the arrangements of the oviducts I was unable to follow; there are four pairs of spermathecæ in segments VI to IX; each spermatheca consists of a principal pouch and of a cæcum; the former is divided by a constriction into a relatively broad proximal portion or stalk, and a slightly broader nearly cylindrical or depressed distal portion, the whole somewhat pear-shaped; the cæcum is long and narrow, irregularly knobbed or provided with rudimentary blunt processes, of a glistening red colour contrasting with the white pouch, and comes off from the basal portion some distance below the constriction.

In front of the gizzard there are four complete mesenteries; the first one behind is very thick, the next three are also thick, but after those they are quite thin; the thick ones are all concave forwards like saucers, but are not in contact.

There are four pairs of transverse hearts in X to XIII, of which all but the first pair are very large; in some of these segments there is a second longitudinal vessel from which some of the hearts arise.

In segments V and VI tufts of glandular tubules seemingly attached to the posterior mesenteries are especially noticeable; they are perhaps salivary organs. Segmental organs not at all conspicuous.

(1) Ann. Sci. Nat. Zool. (5), Vol. x, pl. x, fig. 7.

Hab.—Darnley Island, Torres Straits (*Macleay Museum, from the 'Chevert' Expedition*).

PERICHÆTA PEREGRINA, n. sp.

The largest specimen comprising about 108 segments when alive and moderately extended was 19 cm. long; after being not unduly contracted in spirit it was 13 cm. long, 5 mm. broad, the length of the preclitellar portion being 18 mm. Body cylindrical; the segments show only faint indications of division into annuli. Colour above of a nearly uniform brown with a tinge of green, lighter below. Prostomium pear-shaped, depressed, extending well back on the buccal ring (for about $\frac{3}{4}$ of its width).

Clitellum comprising three segments (XIV to XVI), complete all round; on the ventral portion of XIV is a small area different in colour or an elliptical depression carrying the two apertures of the oviducts which are close together. Setæ visible on the clitellum.

Setæ about ·42 m.m. long, with a slight enlargement at $\frac{1}{3}$ from free, end from about 40 to 46 per segment, most numerous in the posterior portion of the body, arranged in complete circles on the setigerous segments, not on such conspicuous ridges as in the other two species. Segments setigerous except the first and the last.

Male pores two, conspicuous transverse slit-like apertures in the line of setæ; with about 14 setæ on the ventral surface between them; in one specimen only were they on papillæ, but probably in the breeding season such are developed. Apertures of oviducts two, close together on XIV. Apertures of spermathecæ four pairs, between segments V and VI, VI and VII, VII and VIII, and VIII and IX, in a line with about the seventh row of setæ on each side. Dorsal pores after XI.

The pharnyx occupies about four segments; the œsophagus occupies V, VI and VII; the gizzard occupies two or two and a half segments (VIII and IX and part of X) the first two of these segments also containing the posterior two pairs of spermathecæ; the mesentery between VIII and IX as also that between IX and X entirely absent, the first complete one behind the gizzard being the

anterior of XI. The small intestine extends from the posterior half of X, or XI to XV, and in XVI commences the thin-walled sacculated large intestine ; the former in segments XI to XIV has the lumen of the intermesenteric portions dilated, most noticeable in the last two ; the latter in XXVI gives off a pair of lateral cæca turned forwards and lying beside the canal in this and the two preceding segments, the distal portions of their free tips being folded backwards otherwise they would reach into XXIII. In a fresh specimen the alimentary canal from the gizzard backwards and the dorsal vessel were coated with orange (so-called hepatic) vasifactive tissue, which is not noticeable in spirit specimens.

Of testes there are two pairs of solid white bodies not racemose, in segments XI and XII, partly attached to the anterior mesenteries of these segments, the lower portions of those of each pair touch, but it is difficult to say whether they are in any way confluent ; there are two pairs of ciliated rosettes, a pair in each of segments X and XI just in front of the posterior mesenteries of the segments ; those of each pair do not, however, seem to be free in the segmental cavities but to be enclosed within a delicate membranous sac whose relations are difficult to make out, but probably communicating in some way with the testes in the succeeding segments, or perhaps both testes and ciliated rosettes are enclosed in prolongations of the same sac. The two branches of each vas deferens join in XII on each side, and the posterior portions of the vasa join the prostatic ducts quite close to the prostates, which are smooth transversely incised bodies lying in XVIII ; the genital duct is *U*-shaped with the concavity of the bend looking outwards and backwards. The ovaries are in XIII as usual, and the oviducts have the normal relations. There are four pairs of spermathecæ in segments VI to IX, opening anteriorly ; each spermatheca consists of an elongate somewhat depressed stalked pouch, with a long filiform cæcum with a dilated tip, about as long as the main pouch, given off anteriorly.

There are three pairs of large transverse hearts in XI to XIII ; in front of XI the dorsal vessel runs along the top of the gizzard and continues on to the pharnyx.

Hab.—Sydney (believed to be introduced from the Mauritius).

The worms of this species are not uncommon in the soil of pot-plants in Sydney conservatories, bush-houses, and nurseries, and are regarded as a nuisance by horticulturists on account of their interfering with the drainage of the pots. My attention was called to them by Mr. Masters, to whom I am indebted for specimens and for the information that they are not found in garden soil, and by nurserymen are believed to have been brought with plants from Mauritius to one of the Sydney nurseries, whence they have distributed with pot-plants. At present only one species of earthworm is known from Mauritius, *Lampito Mauritii* of Kinberg, but of which Perrier (1) after an examination of Kinberg's specimens says that it it is simply a species of *Perichæta.* (2) Under any circumstances it is different from the worm described above, because Kinberg says of it that the buccal segment is not incised anteriorly, and that the anterior setæ are more numerous (44) than the posterior ones (30-32).

D. *INCERTÆ SEDIS.*

Of the three worms from Percy Island one has the following characters:—Length 92 mm., breadth 6·5 mm., number of segments 144; body flattened slightly from above and nearly elliptical in section, tapering anteriorly; no trace of a clitellum; a pair of small papillæ on XVIII, doubtless carrying the male pores but these are not distinct; on the depression between the papillæ is apparently a single median aperture; setæ very long, arranged in eight rows, four ventral and four lateral, for the most part straight and regular, but in about the posterior third of the body the two outer rows on each side are most irregular, the setæ on some segments being twice as far apart as on others, but not alternating regularly from segment to segment; in the anterior region where the setæ are shorter they project backwards, but in the posterior region they project forwards, more noticeably so in the case of the lateral rows; the apertures of the oviducts and of the spermathecæ as well as nephridiopores are not discernible. The body is lightly grooved in the median dorsal line.

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(1) Comptes Rendus, Tome CII, No. 15, April 1886, p. 876.
(2) Loc. cit. p. 103.

The other species is represented by two specimens of which the largest is 75 mm. long and 5 mm. broad. Both specimens are much shrivelled and contracted, and their characters are difficult to make out. The anterior extremity is very obtuse; the body tapers from before backwards, the diameter being least in the posterior part of it. The fourth segment is bi-annulate, the next four or five are wider and tri-annulate. There is no trace of a clitellum in either case. Setæ in eight rows, forming two ventral and two lateral pairs, those of each pair at equal distances apart, a point in which it differs from any other Australian worm I have yet seen except *Lumbricus*, from which its other characters at once distinguish it. Two pores on papillæ on XVIII, presumably the male pores; these are quite distinct in the large specimen; on the segment in front of, and on the second and fourth segments behind XVIII, there appear to be pairs of pores, but they are so indistinct that it is doubtful whether they really are so. There are two pairs of spermathecal apertures, between VII and VIII and VIII and IX.

Among the worms sent by Mr. Froggatt were two small and immature worms about 60 mm. long and 2 mm. broad; both are rather soft. The clitellum is undeveloped in both. There are eight rows of setæ forming four pairs, two lateral and two ventral, the setæ of the four pairs at equal distances apart. Dorsal pores after about X or XI. On XVIII there are two conspicuous papillæ doubtless carrying the male pores, from which in one specimen there protrude a pair of long, curved, penial setæ. This worm may be the same species as the foregoing worm from Percy Island, and both may be a species of *Digaster*, but apparently not the same as *D. armifera* in which the setæ of the lateral couples are further apart than are those of the ventral ones.

I am indebted to Dr. Ramsay for a specimen of a large and very fine worm about a foot long from the Richmond, of which as the single speciman is not available for dissection, and its characters cannot be defined without, as well as of some others of which at present my supply of material is insufficient, I hope to give descriptions shortly.

Sufficient evidence has now been offered that earthworms are by no means absent from Australia; and I once more appeal to members of this Society resident in fertile parts of the colony to supply me with information or with specimens.

I have again to thank my friend Mr. R. T. Baker for his trouble in kindly making a number of drawings for me.

EXPLANATION OF PLATE XIII.

List of References.

a.d. adhesive discs
a.p. aperture of accessory copulatory organs
cl. clitellum
g.d. genital duct
p. prostate
s. sac containing penial setæ
♂ male pores
♀ apertures of oviducts

Fig. 1.—Prostate, genital duct, and sacs containing the penial setæ in *Digaster armifera*.

Fig. 2.—Penial seta (enlarged).

Fig. 3.—Tip of a penial seta (much magnified).

Fig. 4.—Anterior portion of the body of *Perichæta tenax* seen from below, to show the "adhesive discs" &c. (enlarged).

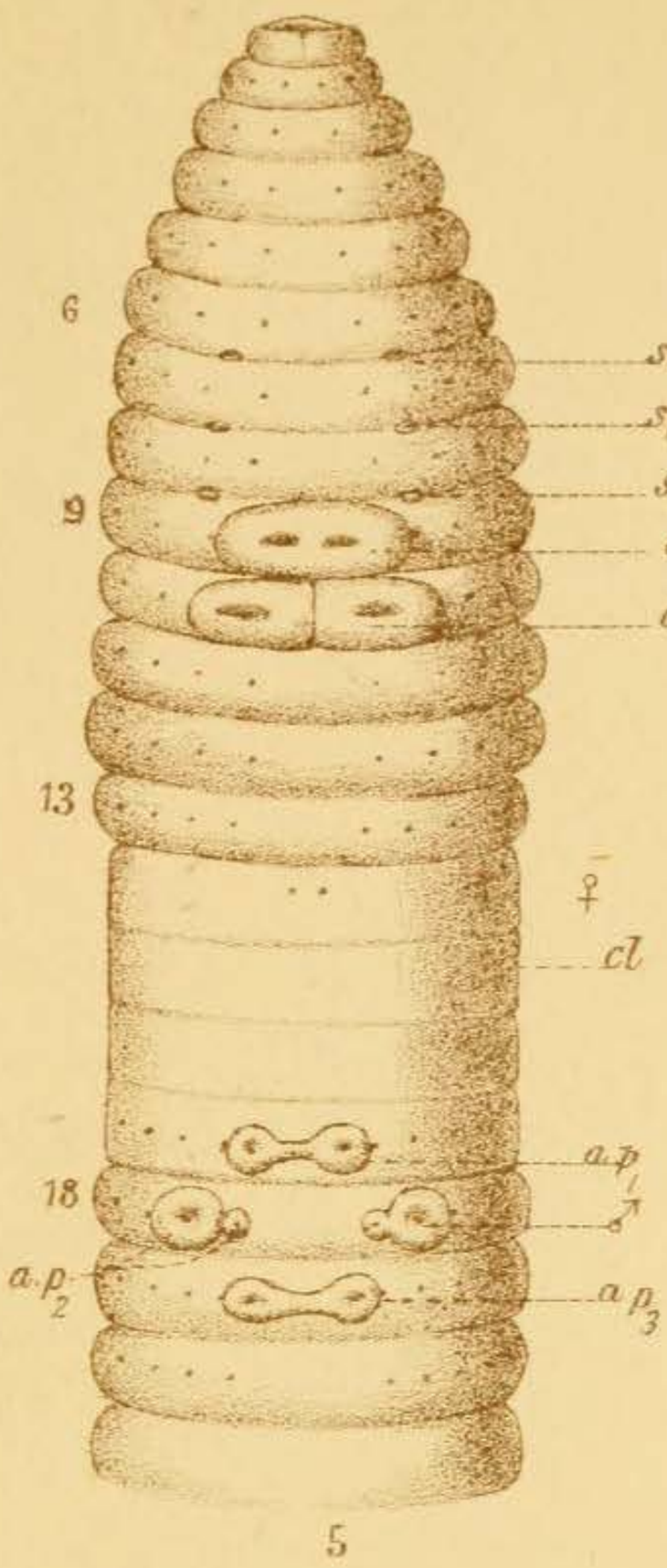
Fig. 5.—Anterior portion of the body of *P. austrinia* seen from below (enlarged).

Fig. 6.—Anterior portion of *P. Queenslandica* seen from below (enlarged).

In figures 4-6 the natural size of the portion figured is indicated by the lines at the side.

Note.—The setæ are not indicated on the clitellar segments in figs. 4 and 5; the lines of demarcation between these segments are a little too distinct. In fig. 6 the papillæ carrying the male pores on XVIII do not show as clearly as they ought to.

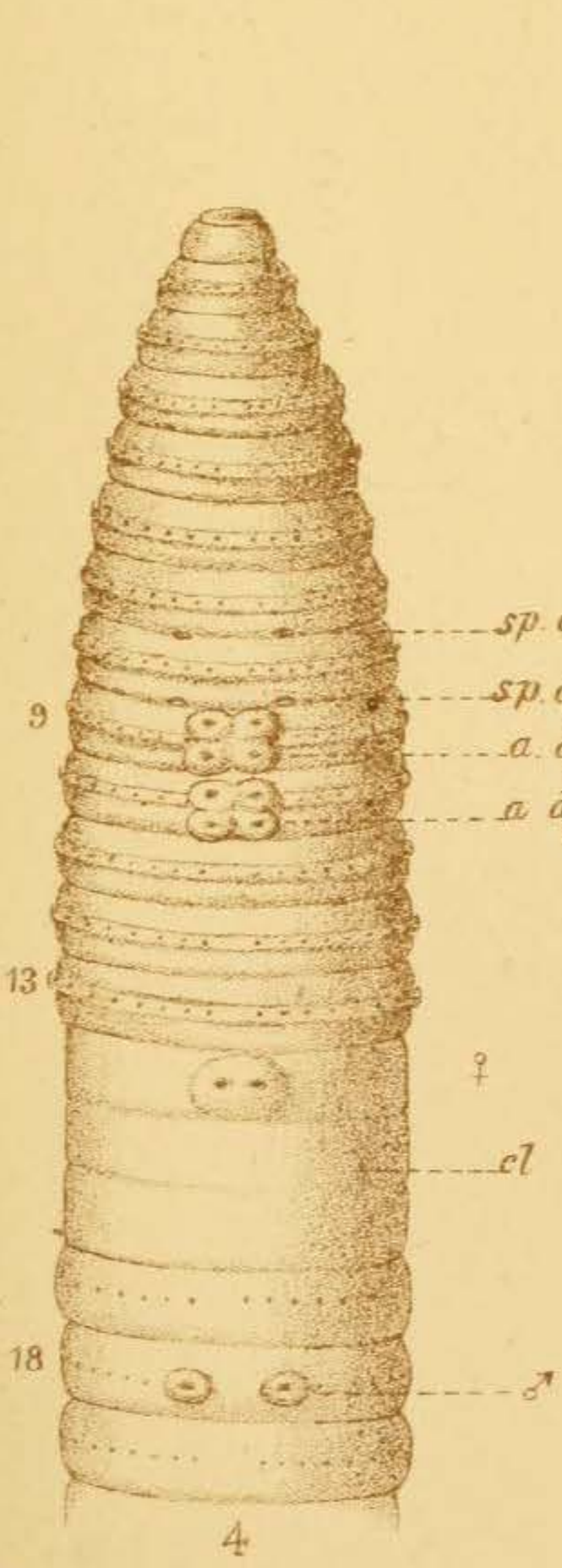
2



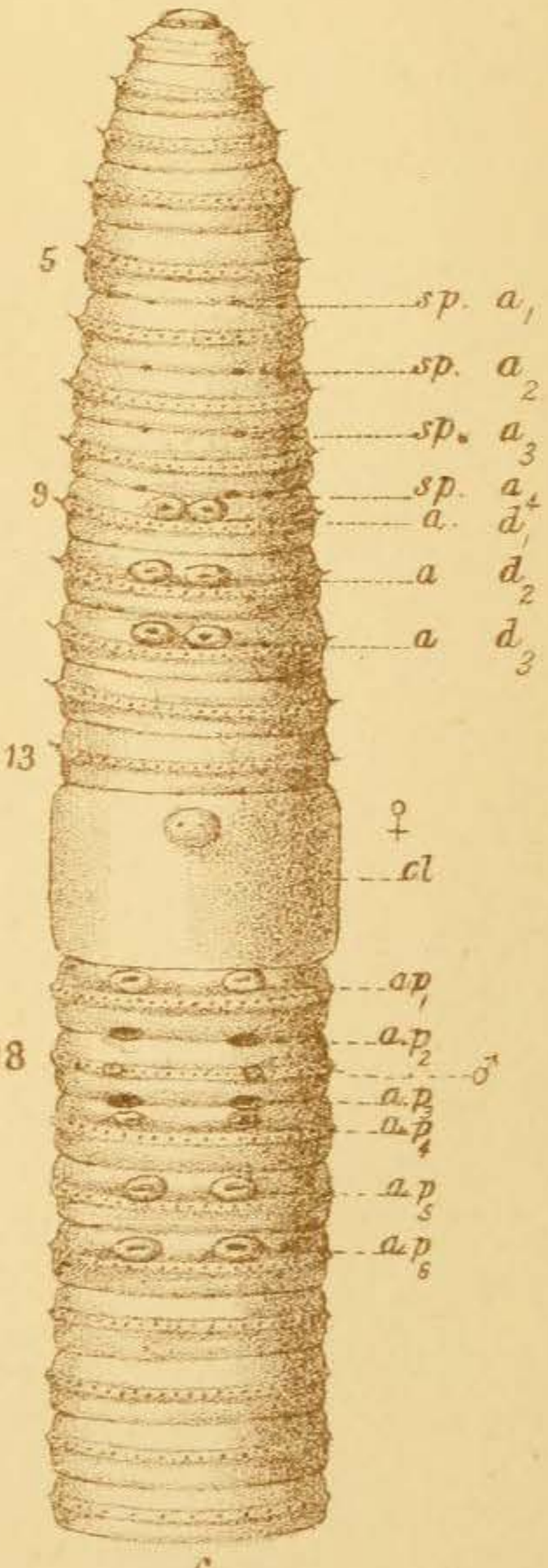
5

3

1



4



6

B.T.Baker del. ad. nat.

S. Sedgfield. lith.