

AUSTRALASIAN ANTARCTIC EXPEDITION

1911-14.

UNDER THE LEADERSHIP OF SIR DOUGLAS MAWSON, O.B.E., B.E., D.Sc., F.R.S.

SCIENTIFIC REPORTS
SERIES C.—ZOOLOGY AND BOTANY.

Edited by Professor T. Harvey Johnston,
University of Adelaide.

VOL. X, PART 3.

LEECHES

BY

PROFESSOR J. P. MOORE,
UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA.

WITH ONE PLATE AND ONE TEXT FIGURE.

PRICE: TWO SHILLINGS AND SIXPENCE.

Wholly set up and printed in Australia by
DAVID HAROLD PAISLEY, GOVERNMENT PRINTER, SYDNEY, NEW SOUTH WALES, AUSTRALIA.

1938.

Series C.—BIOLOGICAL REPORTS.

		PRICE.
		£ s. d.
VOL. I—		
Part 1.—DIATOMS.	By ALBERT MANN, Ph.D., U.S. National Museum, Washington, D.C.	0 9 0
„ 2.—FORAMINIFERA.	By F. CHAPMAN and W. J. PARR, Melbourne	1 2 6
„ 3.—PARASITIC INFUSORIA FROM MACQUARIE ISLAND.	By Prof. T. HARVEY JOHNSTON, University of Adelaide. (<i>In press.</i>)	
VOL. II—		
Part 1.—MALLOPHAGA AND SIPHUNCULATA.	By Prof. L. HARRISON, University of Sydney	0 6 0
„ 2.—CRUSTACEA, ISOPODA AND TANAIDACEA.	By H. M. HALE, Director, S.A. Museum	0 6 6
„ 3.—IXODOIDEA.	By Prof. T. HARVEY JOHNSTON, University of Adelaide	0 3 0
„ 4.—CRUSTACEA AMPHIPODA (GAMMARIDEA).	By Prof. G. E. NICHOLLS, University of Western Australia. (<i>In press.</i>)	
„ 5.—CRUSTACEA AMPHIPODA (HYPERIIDEA).	By Dr. K. H. BARNARD, South African Museum, Cape Town	0 1 6
„ 6.—CRUSTACEA MACRURA.	By FREDA BAGE, M.Sc., F.L.S., Women's College, University of Queensland. (<i>In press.</i>)	
„ 7.—CRUSTACEA CIRRIPIEDIA.	By FREDA BAGE, M.Sc., F.L.S., Women's College, University of Queensland. (<i>In press.</i>)	
„ 8.—PYCNOGONIDA.	By Dr. J. GORDON, British Museum. (<i>In press.</i>)	
VOL. III—		
Part 1.—FISHES.	By E. R. WAITE, late Director South Australian Museum	0 8 6
„ 2.—PTEROBRANCHIA.	By W. G. RIDWOOD, D.Sc.	0 2 6
„ 3.—ASCIDIAE SIMPLICES.	By Sir W. A. HERDMAN, C.B.E., F.R.S.	0 4 0
„ 4.—RHABDOPLEURA.	By Prof. T. HARVEY JOHNSTON, University of Adelaide	0 2 6
„ 5.—ASCIDIAE COMPOSITAE.	By Dr. HERVE HARANT and Dr. PAULETTE VERNIERES, University of Montpellier. (<i>In press.</i>)	
VOL. IV—		
Part 1.—PELECYPODA AND GASTROPODA.	By C. HEDLEY	0 8 6
„ 2.—CEPHALOPODA.	By Dr. S. S. BERRY	0 3 6
„ 3.—BRACHIOPODA.	By Dr. J. A. THOMSON	0 6 0
VOL. V—		
Part 1.—ARACHNIDA.	By W. J. RAINBOW	0 1 0
„ 2.—BRACHYURA.	By M. J. RATHBURN	0 1 0
„ 3.—COPEPODA.	By G. S. BRADY	0 5 6
„ 4.—CLADOCERA AND HALOCYPRIDAE.	By G. S. BRADY	0 2 0
„ 5.—EUPHAUSIACEA AND MYSIDACEA.	By W. M. TATTERSALL	0 1 6
„ 6.—CUMACEA AND PHYLLOCARIDA.	By W. T. CALMAN	0 1 3
„ 7.—OSTRACODA.	By F. CHAPMAN	0 4 7
„ 8.—INSECTA.	By R. J. TILLYARD	0 2 9

AUSTRALASIAN ANTARCTIC EXPEDITION

1911-14.

UNDER THE LEADERSHIP OF SIR DOUGLAS MAWSON, O.B.E., B.E., D.Sc., F.R.S.

SCIENTIFIC REPORTS.
SERIES C.—ZOOLOGY AND BOTANY.

Edited by Professor T. Harvey Johnston,
University of Adelaide.

VOL. X PART 3.

LEECHES

BY

PROFESSOR J. P. MOORE,
UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA.

WITH ONE PLATE AND ONE TEXT FIGURE.

PRICE: TWO SHILLINGS AND SIXPENCE.

Wholly set up and printed in Australia by
DAVID HAROLD PAISLEY, GOVERNMENT PRINTER, SYDNEY, NEW SOUTH WALES, AUSTRALIA.

1938.

CONTENTS.

	PAGE.
Pontobdella rugosa n.sp. ...	5
Oxytonostoma varituberculata ...	10
Platybdella levigata (<i>Harding</i>) ...	12

HIRUDINEA

OF THE

AUSTRALASIAN ANTARCTIC EXPEDITION.

By Professor J. PERCY MOORE, University of Pennsylvania, Philadelphia.

(With one plate and one text-figure.)

So little is known of the marine leeches of the Antarctic Seas that the small collection on which this paper is based, consisting of six lots representing three species, furnishes a welcome addition to our knowledge. The opportunity of examining this material I owe to the kindness of Sir Douglas Mawson and the authorities of the Australian Museum, Sydney. Two of the species are represented by ample material sufficiently well preserved for general taxonomic purposes, the other, unfortunately, by only three, more or less distorted, specimens. Types of the two new species will be on deposit at the Australian Museum and co-types at the Academy of Natural Sciences of Philadelphia. The text figure of *Pontobdella rugosa* was prepared by T. T. Chen, with the aid of a grant from the Faculty Research Fund of the University of Pennsylvania.

ICHTHYOBDELLIDAE.

PONTOBELLA RUGOSA n. sp. (Pl. I, figs. 1-3; and text-figure.)

A very distinctive species of rather small size belonging to the typical quadrannulate division of the genus with *P. muricata* et. al.

The well-extended type (Plate I, fig. 1a) measures in mm.: Length 4.5; to ♂ pore 8.5; widths, cephalic sucker 1.2, at ♂ pore 1.4, maximum (XXII) 2.3, anus 1.7; depths at same points respectively 1, 1.2, 2 and 1.7; diameter of caudal sucker .2. Other specimens vary little from this size, some being slightly longer, others slightly shorter. Form slender, the length 16-18 times the greatest diameter which is in the fifth-sixth, tapering regularly and gently forward to the nuchal constriction and slightly to the caudal peduncle; approximately terete throughout.

Cephalic sucker (text-fig. 1) sub-hemispherical; fixed excentrically so that it is longer dorsally than ventrally and the circular margin is directed obliquely ventrad; a well marked marginal welt bearing about 54 minute marginal papillae and two additional circles of submarginal papillae. Dorsal surface very faintly annulated posteriorly; no tentacular papillae but laterally small papillae representing remnants of the four rows of somites II to V; no definite eyes but a posterior pair of ill-defined pigment spots which sections show include 2 or 3 visual cells on each side, indicating that they are vestigial eyes. Oral face deeply cupped, the surface finely granulate; low conical papilla in the exact centre with the minute mouth pore at its apex.

No deep nuchal constriction and no sharp division of the body into "neck" and "abdomen." Preclitellum slender with the annuli well defined and the principal ones strongly tuberculate (fig. 1). Clitellum (cl.) ill-defined, comprising somites XI and XII and possibly an abutting annulus of X and XIII, neither enlarged nor constricted but distinguished from the neighbouring regions chiefly by the absence of large tubercles, smoothness and paler colour of the skin and the presence of a thin glandular layer. Male pore on XI *a*2, near the anterior margin, a fairly large slit-like orifice bounded by prominent tumid anterior and posterior lips; female pore a minute transverse slit or round orifice in a glandular area at XII *a*1/*a*2. Both pores vary somewhat in position, the male being situated usually as described but sometimes farther back on *a*2 and rarely as far forward as the furrow XI *a*1/*a*2, while the female may be as far forward as the middle of *a*1 (*b*1/*b*2). They may, therefore, be separated by from $2\frac{1}{2}$ to 3 annuli. The female pore varies little in appearance but the male varies considerably, being sometimes a simple pore flush with the surface, or provided with swollen protruding lips, or, if the bursa be everted a discoid or annular papilla with a central orifice. The post-clitellar region is strongly annulated and roughened by numerous prominent tubercles or warts. The skin is closely punctated with translucent glands and each annulus bears a ring of minute sensory papillae. No nephropores could be discerned with certainty. Anus XXVI/XXVII usually raised on a small but rather prominent papilla about the size of the larger tubercles but differing from them in being median in position, cylindrical and truncate in form and colourless. Caudal sucker contracted on all specimens, cylindroid, cup-shaped, on most specimens not exceeding the maximum diameter of the body but slightly more in the one figured and on all slightly exceeding the thick peduncle. The expanded sucker doubtless would be wide, circular and discoid. The margin bears numerous shallow radiating furrows but no distinct papillae and the cavity is not deep.

For this genus the colour is unusually fine and the pattern striking and in one lot of material (Sta. 7) well preserved. The range of variation is indicated by the photographs (Plate I, figs. 1-3). Typically the pattern is metameric, blotched and annulated, with the ground colour a rich ferruginous brown marked with very pale yellow. Brown pigment heaviest on *a*1, appearing as a dark ring contrasting strongly with the marginal yellow blotches which extend more or less continuously, with constrictions at the furrows, over *a*2, *b*5 and *b*6 and with the brown and yellow mottled pattern of the dorsal and ventral surfaces of these annuli. There is a further ill-defined annulation with yellow in the furrows and brown spotted with yellow, largely on the tubercles; on the annuli. A constant feature on every specimen is that both number and size of the yellow spots is greater on the venter. On the preclitellar region the dark bands become relatively wider, extending from *a*1 on to *b*6 of the preceding somite, while *a*2 and *b*5 remain mottled and paler and retain the lateral yellow blotches, thus giving the effect of wide metameric, pale, and intermetameric, dark bands. Head generally light yellow with a pair of large irregular dorsal and smaller lateral and ventral brown spots and a ring of brown, usually incomplete, on the marginal rim, the whole tending to an annular pattern. Caudal sucker pale with 12 brown rays, 2 being median dorsal and ventral and 10 in lateral pairs.

Details vary greatly, especially in the relative amount of brown and yellow pigment, but the fundamental pattern remains. On the darkest example (*b*) the brown is intense and solid in four intersegmental preclitellar and twelve postclitellar zones alternating with as many paler zones due chiefly to marginal yellow spots restricted to annuli *a2* and *b5* of somites VII to X and XIII to XXIV inclusive. On the dorsal field the yellow spots are few and small mostly, including the tubercles of *a2*. On the venter the brown is less intense and the yellow spots larger and more numerous. Head mostly brown, deepest in three rings—a very narrow one round the marginal rim and two broad ones across the middle zone. Dorsally these unite into a solid brown area with a pair of darker eye-like spots at the posterior border, and ventrally merge into a single ring. On the sides of the head is a large pale spot posterior to the second ring and a smaller one at the same level between the two rings. Caudal half of head ventrally pale. On the lighter specimens (*c*) these tendencies are reversed, the brown areas becoming less intense and more restricted as encroached upon by increase in number and size and the coalescence of the yellow areas until on the lightest individuals the ground colour appears to be yellow with brown markings. But there is no change in the fundamental segmental and field relations of the light and dark areas. On the caudal sucker, for example, there are six pairs of brown spots on a yellow ground.

Annulation strongly marked except on the suckers but owing to the obscurity of the segmental sensillae and nephropores which are the best external criteria of metamerism the neural annuli were determined by dissection of the ventral nerve cord (text-fig. 1). Typical complete somites of the post-clitellar region are strictly quadrannulate with little or no indication of further subdivisions, in contrast to preclitellar somites in which such subdivisions of many annuli are quite obvious, though somewhat exaggerated in the figure.

Somites I to IV and the first and second (*a1* and *a2*) primary annuli of V constitute the cephalic sucker, their relative positions being indicated by the arrangement of the sensory papillae and pigment bands but, except for two or three faint furrows in the posterior dorsal field in the zone of IV and V, the annulation cannot be made out in this material. V *a3* is the first free annulus; it lacks brown pigment and is reduced ventrally. VI 3-annulate (*a1 = a2 = a3*), of approximately equal size, all bearing small sensory papillae and about equally pigmented with brown mottled with yellow. VII 4-annulate, approximately equal or $a2 > a1 = b5 = b6$, *a1* and *a2* faintly biannulate; *a1* and *b6* are chiefly brown, *a2* and *b5* largely mottled with yellow, especially on their contiguous halves; papillae are much less evident on *b6*. VIII 4-annulate, similar to VII but much longer and more elaborated, with the papillae-bearing tubercles conspicuous on *a1*, *a2* and *b5*. IX 4-annulate ($a1 = a2 > b5 > b6$) but highly elaborated, *a1* and *a2* have distinct small post-tubercular annuli (*b2* and *b4*) and *b6* bears tubercles only less prominent than those on the larger annuli; brown pigment predominates on *a1* and *b6*, yellow on *a2* and *b5*. X 4-annulate ($a2 > a1 > b5 > b6$ or $b5 = b6$) and noteworthy for the large size of *a2*; *a1* and *a2* both biannulate, *b5* and *b6* undivided; both rings

of a_1 are heavily brown and the first and larger bears large tubercles; the large ring of a_2 is brown anterior to the tubercles and chiefly pale yellow behind and on them, the smaller posterior ring is again faintly subdivided into two, each bearing a narrow ring of brown on a pale background; b_5 is pale blotched with brown especially caudad of the large tubercles and b_6 is more heavily brown and may be smaller. Clitellar region ill-defined and embracing somites XI and XII and perhaps X b_6 and XIII a_1 . Genital somites reduced, with the tubercles smaller and the pigmentation nearly uniform brown but paler than the brown of other somites. XI 3-annulate (a_1 slightly $>$ a_2 slightly $>$ a_3), the annuli usually differing little in size and strictly undivided, ♂ gonopore on a_2 , XII 3- or 2-annulate; similar to XII with the ♀ gonopore between the first and second or a little forward on the first annulus. In cases where there are only two annuli, as in the specimen figured and on the type, the pore is similarly situated, which indicates that a_3 is the missing annulus, though this is not fully established. XIII to XXIII are all complete and 4-annulate, rarely with any trace of further division especially on b_5 and b_6 ; while there is some variation especially in the first two annuli, the usual size relation is $a_1 > a_2 > b_5 = b_6$; all annuli alike in structure and all bear similar papillae and tubercles as described below; pigmentation pattern is described above under colour. At the caudal end of the series, especially on XXIII, b_5 and b_6 become relatively shorter. XXIV 3-annulate ($a_2 <$ or $= a_1 < a_3$), the third annulus is longest and may show traces of the b_5/b_6 furrow, otherwise typical. XXV 2-annulate ($a_1, a_2 >$ a_3). XXVI and XXVII uniannulate, without tubercles. On the last four somites the dark brown bands become obsolete and the marginal yellow blotches tend to coalesce across a_1 to form a continuous irregular stripe.

Papillation (text-fig.) characteristic and differing from all known related species. Large, pointed, conical, tubercles bearing one or more sensory papillae at the summit occur nearly uniformly on all annuli of complete somites, there being no especially large ones on certain annuli* and no median tubercles except as a rare variation. On all annuli there are two dorsal pairs (outer paramedian and supra-marginal) of large tubercles. On all annuli but a_2 they form a nearly regular series, but on a_2 they are displaced laterad so that the outer paramedians approach the intermediate line and the supra-marginals lie in the marginal pale spots, thus making way for the segmental sensillae. On the venter the arrangement is similar on a_1 , b_5 and b_6 , each of which bears a pair of ventral paramedian and a pair of submarginal tubercles, similar in form but usually smaller than the dorsal ones. On a_2 there is only one ventral pair which lies near the intermediate line between the levels of the others. Besides the larger tubercles, which are subject to variations and irregularities, there may be some small but similar ones, and on each annulus is a circle of Bayer's tactile papillae. On a_1 the large tubercles are usually brown with a pale tip but on light-coloured specimens the whole may be pale yellow. On the other annuli the tubercles are usually entirely or mostly pale but may have a brown apex. Tubercles are absent or much reduced on anal somites, the

* The dorsal tubercles of a_1 may be slightly more prominent.

clitellum and somites anterior to VIII, but on preclitellar somites VIII to X are essentially typical except that on *b6* they are smaller. Sensillae are very difficult to detect on light-coloured individuals but on dark brown ones may be seen as minute translucent dots on the neural annuli (*a2*) in line with the summits of the tubercles. On the dorsum are three pairs, the dorsal paramedians about $\frac{1}{3}$ as far apart as the dorsal paramedian tubercles, the intermediate just laterad of the latter and supramarginals immediately dorsad of the supramarginal tubercles; marginal sensillae are immediately ventral to the latter. There are two pairs of ventral sensillae, paramedian and submarginal in line with the corresponding tubercles of other annuli.

On several specimens the very slender proboscis is protruded, in two cases about $2\frac{1}{2}$ times as far as the one figured. The last pair of gastric caeca are united into a single median one beginning at ganglion XIX and extending to somite XXV. It is perforated by five slit-like fenestrae through which pass strands of dorso-ventral muscles anterior to the several ganglia. Reproductive organs are highly developed. The atrial horns are very massive and loops of the ejaculatory ducts reach forward to X. Epididymes and spermatic vesicles very large, much looped, packed with sperm and reach caudad to XVI where they receive the vasa deferentia. The testicular sacs are unusual. Of three specimens studied for internal anatomy, two have three and one four pairs, in the latter placed from XV/XVI to XVIII/XIX and in the former lacking the first pair. They are remarkable in being asymmetrical and for the most part arranged alternately in staggered fashion. This is most pronounced in those with three pairs. Those of the right side occupy chiefly the post-neural half of somites XVI, XVII and XVIII, those of the left side the preneural half of XVII, XVIII and XIX but they overlap in the intersegmental zones. Elsewhere a single very large testes will occupy the entire width of the body cavity and push the stomach dorsad and to one side. In the third specimen the testicular sacs are smaller and while asymmetrical the two of a pair will lie side by side for a much greater distance. The simple ovisacs extend from the gonopore to somite XIV or XVI in the specimens examined.

P. rugosa belongs to the section of the genus with quadrannulate somites and without regional differentiation of the body. Its closest relative appears to be *P. aculeata* Harding, but it differs in the absence of median tubercles, colour pattern, details of annulation and other features. *P. planodiscus* Baird 1869 and *P. variegata* Baird 1869, both from Patagonia and probably one species, resemble *P. rugosa* in having a brown and yellow annulated colour pattern but are much larger and otherwise different as described. Unfortunately the types are not available for comparison.

Three lots: Commonwealth Bay, King George V Land, September 3, 1912; 25 fathoms, from fish, 2 specimens; Sta. 3, lat. S. $66^{\circ} 32'$, long. E. $141^{\circ} 39'$, 157 fathoms. December 31, 1913: 1 specimen; Sta. 7, lat. S. $65^{\circ} 42'$, long. E. $92^{\circ} 10'$, 60 fathoms. January 21, 1914, 16 well preserved specimens with colour intact, type and cotype from this lot. Hosts not stated on labels.

OXYTONOSTOMA VARITUBERCULATA n. sp. (Pl. I, figs. 4, 5.)

Type measures in mm.: length 27, to ♂ pore 5.5; widths at anterior sucker 1.5, ♂ pore 0.7, maximum (XVIII) 2.4, anus 1.4; depths at same points 0.7, 0.6, 1.6 and 1.4; diameter of caudal sucker (contracted) 1.5. Other specimens measure 16×1.2 and 13×0.9 mm. Form (fig. 4) slender, fusiform, with the greatest diameter a little caudad of the middle; the postclitellar region moderately depressed, the preclitellar very slender, tapered to head and terete, but no sharp division into "neck" and "abdomen"; anal region little tapered and nearly terete. Cephalic sucker widely expanded, twice width of the neck, bowl-shaped but strongly excentric, the dorsal limb nearly three times as long as the ventral, the opening circular and facing cephaloventrad with faintly crenulate margin. Dorsal face convex with three well defined annuli posteriorly and further forward about eleven very faint transverse lines which may be muscle bands but which correspond with as many rows of minute sensory papillae; about 30 sensory papillae on marginal rim. No eyes. Ventral face of sucker more or less deeply concave with a large, low central papilla bearing the pore-like mouth at the summit and surrounded by radiating furrows which become deeper as they approach and meet the margin. Immediately behind the sucker is a very sharp nuchal constriction in somite V forming the peduncle and doubtless permitting great mobility to the head. Behind this constriction for two or three annuli the diameter increases rapidly and then remains nearly uniform to the clitellum which is slightly enlarged especially ventrally but otherwise not clearly defined; apparently extends over X a2 to XIII a2 inclusive or nine primary annuli but may be one or two less. Gonopores both small and in furrows and separated by three primary annuli, the ♂ XI a1/a2 the ♀ XII a1/a2, the latter minute and rounded like a pin prick, the former somewhat larger, in the type crescent-shaped with a slightly protruding posterior lip or prominence marked by radiating furrows. On the smallest specimen each of the pores is inclosed in a raised circular rim. Post-clitellum two to three times diameter of preclitellum, nearly uniform but reaching a maximum size about somites XVI to XX where it is a little more depressed than elsewhere. Nephropores not seen. No lateral pulsatile vesicles, but traces of marginal flanges. The posterior end tapers gently without any well marked peduncle into the caudal sucker and it is in this region that the annulation and tuberculation are most distinct. Anus XXVI/XXVII. Caudal sucker contracted and cylindrical, continuing the direction and diameter of the body to the margin which bears about thirty crenulations; cavity deep. There is no colour or indication of a pigmented pattern except a faint brownish patch on the posterior part of the cephalic sucker; elsewhere all three specimens are faded to a nearly uniform yellowish grey. The skin is closely punctated all over with minute translucent spots representing glands.

Annulation obscure in the middle but fairly distinct toward the ends. As pulsatile vesicles are absent, and no nephropores or segmental sensillae were detected, the neural annuli were determined by exposure of the ganglia of the ventral nerve cord. Somites I-IV and part of V constitute the cephalic sucker. As described above faint

annulations bearing transverse rows of sensory papillae extend nearly to the anterior margin and probably represent the first four somites. Three more distinct posterior annuli probably represent V a_1 and a_2 and two very small annuli in the nuchal constriction V a_3 . VI 3-annulate, a_1 much shorter than a_2 with which it unites laterally and ventrally, and equal to a_3 , like which it bears eight equal small papillae. VII 3-annulate ($a_1 = \frac{1}{2} a_2 = a_3$) each of the latter two faintly biannulate with the secondary annuli papillated. VIII similar to VII but better developed with a_2 and a_3 more distinctly biannulate and a_1 faintly biannulate. IX 4-annulate $a_1 = a_2$ slightly $> b_5 = b_6$ and each of these bearing two rows of minute papillae between which is a shallow furrow. X 6-annulate, $b_1 (c_1 + c_2) = b_2 > b_3 = b_4 (c_7 + c_8) = b_5 (c_9 + c_{10}) = b_6 (c_{11} + c_{12})$. XI 3-annulate ($a_1 = a_2 = a_3$), δ pore a_1/a_2 . XII 3-annulate like XI but a_1 and a_2 less distinct, φ pore a_1/a_2 . The annuli of both clitellar somites are deeply furrowed and corrugated and the papillae much reduced. XIII 3- or 4-annulate ($a_2 < a_1$ and much $< a_3$) all biannulate, the last strongly so. XIV 7-annulate ($b_1 = b_2 = b_3 = b_4 > c_9 =$ or $> c_{10}$ and $< b_6$). This is the obvious annulation as seen under slight magnification, but under a higher power all but c_9 and c_{10} are seen to be biannulate, making 12 tertiary ultimate annuli with the formula $c_1 - c_{12}$. XV to XXIII are complete and like XIV 7- or 12-annulate according to the order of subdivision upon which emphasis is placed. Rarely c_9 is divided into the quaternary annuli d_{17} and d_{18} raising the number to thirteen. XXIV 4-annulate ($a_1 = a_2 = b_5 = b_6$) with fainter subdivisions representing the 7- and 12-annulate stages. XXV 4-annulate but with b_5 and b_6 much reduced ($a_1 = a_2 > b_5 = b_6$). XXVI 2-annulate ($a_1 + a_2 > a_3$, followed by the anus and the uniannulate XXVII.

Papillae and tubercles afford a further clue to the annulation and confirm the preceding interpretation. The irregularity and poor preservation of the tubercles made their study somewhat time-consuming but the following plan was arrived at. The small sensory papillae as well as the larger tubercles present the same typical arrangement throughout the body but are seen best toward the ends. Each of the 12 (or 13) ultimate annular divisions bears a ring of up to 30 or 32 dorsal and as many ventral, small, conical papillae each with a minute whitish apical point. Usually these form a straight line but they may be somewhat scattered and some may be missing. Besides these are much larger, irregular, soft excrescences or tubercles which bear from one to three of the sensory papillae, being in the former case conical and in the latter elongated transversely. These are confined to the dorsal surface, though the marginal pair may be displaced a little ventrad. They are well shown in figure 4. In general there are six longitudinal series; a pair each of paramedians, supramarginals and marginals or submarginals and on each of the larger somites occupy annuli corresponding to the divisions of the quadrannulate somite. On complete somites the paramedians are normally borne on b_1, b_3, b_5 and b_6 and form a pair of very crooked series in which the tubercles lie anywhere between the inner and outer paramedian lines. Supramarginals are similar but vary less in position and are borne on b_1, b_4, b_5 and b_6 . Marginals are a very large and constant tubercle on the c_7 element of the neural annuli, together with

smaller ones which may occur on some of the other annuli. On some somites all of these tubercles are present as described but more frequently one or more are absent or shifted in whole or part to a contiguous annulus within the proper zone of each, or divided into two, or additional, usually smaller, tubercles may be present. One of the most common variations is the presence of a median tubercle, which, when the paramedians are close together, may unite them into a continuous transverse ridge in the median field. Large tubercles are absent from the venter, the clitellum and both suckers. On the preclitellum they gradually appear and become larger from before backward, being conspicuous on VIII but increasing in size to X. On XXVI, XXVII, two post-anal annuli, and the caudal sucker there are no large tubercles but circles of small but very distinct sensory papillae.

Unfortunately no material was available for dissection or sectioning. The type specimen had been cut open along the median ventral line of the middle region, through which the position of the nerve ganglia and the presence of a single posterior gastric caecum were ascertained. The latter is formed by the union of the last pair of caeca which is complete except for small slits anterior to the ganglia, serving for the passage of dorso-ventral muscles.

Two lots: Sta. 2, lat. S. 66° 55', long. E. 145° 21', December 28, 1913, 288-300 fathoms, 2 specimens (type and 1 cotype). Some notes by Mr. C. Badham indicate that there was originally a third and larger specimen. Sta. 9, lat. S. 66° 8', long. E. 94° 17', 120 fathoms, January 27, 1914, 1 small example.

The reference of this species to *Oxytonostoma* must remain subject to revision until the internal anatomy is known. All external characters and the single posterior gastric caecum accord with the type species. European species are described as having 12 or 14 annuli to the complete somite. This species has 12 or rarely 13 final annular divisions which would doubtless be sharp and evident on larger and better preserved specimens. If the tertiary annulus c10 were subdivided as is c9 occasionally, there would be 14. The genus has not been reported previously from the Antarctic.

PLATYBDELLA LEVIGATA (*Harding*). (Pl. I, figs. 6; 7.)

Cryobdella levigata Harding 1922.

Harding has given an excellent description of this species in the Natural History Reports of the "Terra Nova" Expedition, which my own studies confirm in nearly all respects but I see no present reason for separating it generically from the well-known genus *Platybdella*.

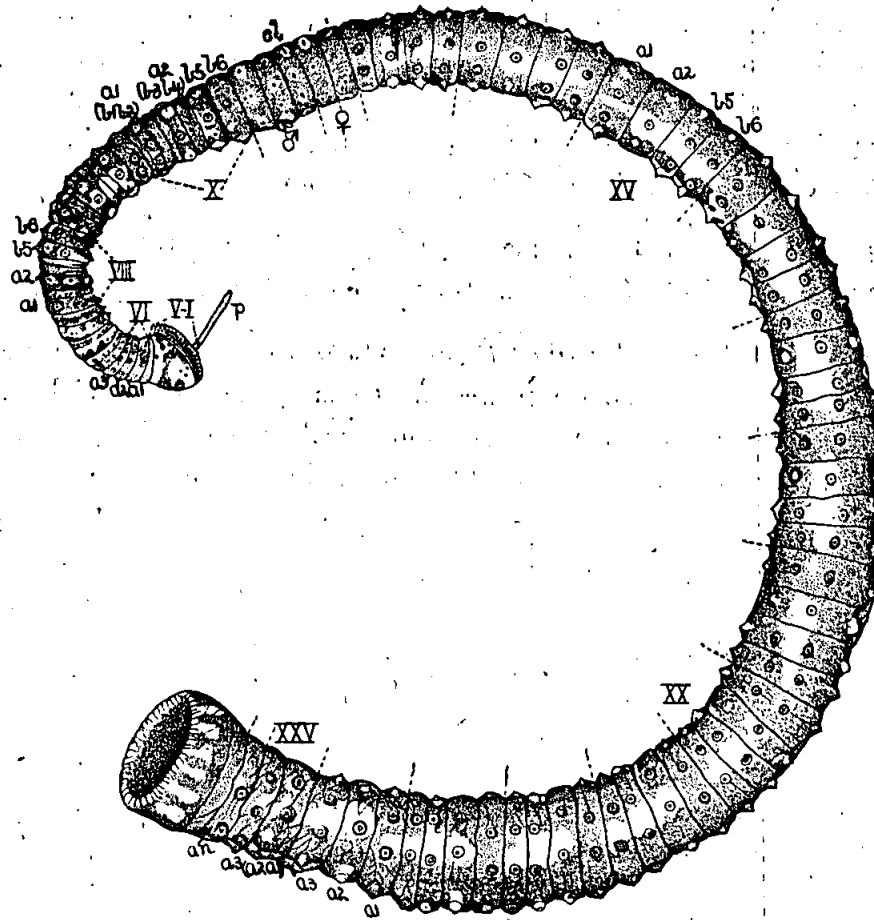
The colour is a uniform neutral or brownish grey, evenly and closely peppered with melanophores contracted to irregular dots. The very large caudal sucker has a very finely serrated margin of about 160 teeth, the peripheral terminations of as many

delicate radiating muscle bands, which are crossed by numerous circular and reticular bands. A peculiar feature is that nearly every specimen has the sucker reversed, that is, bent sharply dorsad on the body. The nuchal constriction is deep.

The annulation is in agreement with Harding's diagram, but as in the case of *O. varituberculata* more minute examination brings to light further elaboration of the obvious annuli. On complete somites (XIV. to XXII) the arrangement is as follows: The six secondary annuli are clearly defined but the furrows separating the primary annuli are much deeper. All of the secondary annuli but *b*1 are further divided into tertiary annuli and *c*9 again into quaternary annuli, the complete formula being $b1 > c3 = c4 = c5 = c6 = c7 = c8 = d17 = d18 = c10 < c11 > c12$ or 12 in all. In some cases *c*9 is undivided in which case it joins with *b*1 and *c*11 in being larger than the others. Figs. 6 and 7 show the general appearance of these leeches.

One lot from lat. S. 60° 28', long. E. 92°, January 22, 1914, from "behind gills" of *Trematomus hansonii* Boulenger, 9 well-preserved specimens.

Johansson (1911) has described *P. michaelsoni* from small specimens found among algae in the Fremantle region of South-west Australia. They are especially distinguished by a longitudinally striped colour pattern, but as colour pattern in leeches is often lost with increasing age, the two may prove to be stages in the same species.



Text-fig. 1.

Pontobdella rugosa.—Lateral view showing details of metamerism and annulation, the arrangement of the principal tubercles, and on the head and a few anterior segments the sensory papillae which are omitted elsewhere. Stippling is omitted from the marginal pale spots and other most conspicuous spots, but the details of the colour pattern are not brought out. Key segments are numbered in Roman and the limits of others indicated by dotted lines. The annular constitution of several is indicated in italics. *an*, anus; *cl*, clitellum; *p*, proboscis; ♂ and ♀ the gonopores. × 8.

DESCRIPTION OF PLATE I.

All leeches were photographed in water and are enlarged three times.

Figs. 1 and 2.—*Pontobdella rugosa*, chiefly lateral views to show colour pattern and variation in intensity of pigmentation; *a* in fig. 1 is the type, *s* in fig. 2 is a spermatophore projecting from the ♂ bursa.

Fig. 3.—*P. rugosa*, dorsal and ventral views to show annulata. All of these are from Sta. 7.

Fig. 4.—*Oxytonostoma varituberculata*, dorsal and ventral aspects of type. Annulation and tuberculation shows clearly in the posterior part of the dorsal view. The dark spotting in the caudal half of the ventral view is due to the gastric caeca showing through the cut in the body wall.

Fig. 5.—Smaller cotype. Annulation shows well in caudal half.

Fig. 6.—*Platybdella levigata*, left and right sides of a well-preserved specimen.

Fig. 7.—*P. levigata*, dorsal and ventral views of another.



*4594—B

		PRICE.
		£ s. d.
VOL. VI—		
Part 1.—CALCAREOUS SPONGES.	By Prof. A. S. DENDY	0 2 0
„ 2.—CHAETOGNATHA.	By Prof. T. HARVEY JOHNSTON and B. B. TAYLOR	0 1 10
„ 3.—POLYCHAETA.	By Prof. W. B. BENHAM	0 12 0
„ 4.—OLIGOCHAETA.	By Prof. W. B. BENHAM	0 3 0
„ 5.—GEPHYREA INERMIA.	By Prof. W. B. BENHAM	0 2 0
„ 6.—POLYZOA.	By Miss L. R. THORNLEY	0 2 0
„ 7.—MARINE FREE-LIVING NEMAS.	By Dr. N. A. COBB	0 5 0
VOL. VII—		
Part 1.—MOSESSES.	By H. N. DIXON and W. W. WATTS	0 1 0
„ 2.—THE ALGÆ OF COMMONWEALTH BAY.	By A. H. S. LUCAS	0 3 6
„ 3.—VASCULAR FLORA OF MACQUARIE ISLAND.	By T. F. CHEESEMAN	0 6 6
„ 4.—BACTERIOLOGY AND OTHER RESEARCHES.	By A. L. McLEAN	0 16 0
„ 5.—ECOLOGICAL NOTES AND ILLUSTRATIONS OF THE FLORA OF MACQUARIE ISLAND.	By H. HAMILTON...	0 5 0
VOL. VIII—		
Part 1.—ECHINODERMATA ASTEROIDEA.	By Prof. RENE KOEHLER	1 18 0
„ 2.—ECHINODERMATA OPHIUROIDEA.	By Prof. RENE KOEHLER	0 10 8
„ 3.—ECHINODERMATA ECHINOIDEA.	By Prof. RENE KOEHLER	1 18 0
„ 4.—CRINOIDEA.	By Dr. A. H. CLARK, U.S. National Museum, Washington, D.C.	0 3 0
VOL. IX—		
Part 1.—THE BRYOZOA (SUPPLEMENTARY REPORT).	By A. A. LIVINGSTONE...	0 10 0
„ 2.—ACTINIARIA.	By Prof. OSKAR CARLGRÉN and Dr. T. A. STEPHENSON	0 5 0
„ 3.—ALCYONARIA, MADREPORARIA AND ANTIPATHARIA.	By Prof. J. A. THOMSON and Miss N. RENNIE	0 10 0
„ 4.—HYDROZOA.	By Assist. Prof. E. A. BRIGGS, University of Sydney. (<i>In press.</i>)	
„ 5.—NON-CALCAREOUS SPONGES.	By M. BURTON, M.Sc., British Museum. (<i>In press.</i>)	
VOL. X—		
Part 1.—TREMATODA.	By Prof. T. HARVEY JOHNSTON, University of Adelaide	0 4 0
„ 2.—ACANTHOCEPHALA.	By Prof. T. HARVEY JOHNSTON and EFFIE W. BEST, M.Sc., University of Adelaide	0 2 6
„ 3.—LEECHES.	By Prof. J. P. MOORE, University of Pennsylvania	0 2 6
„ 4.—CESTODA.	By Prof. T. HARVEY JOHNSTON, University of Adelaide	0 10 0
„ 5.—PARASITIC NEMATODA.	By Prof. T. HARVEY JOHNSTON, University of Adelaide	0 3 9
„ 6.—ACARINA.	By H. WOMERSLEY, A.L.S., F.R.E.S., South Australian Museum	0 6 0
„ 7.—ECHINODERIDA.	By Prof. T. HARVEY JOHNSTON, University of Adelaide. (<i>In press.</i>)	

The Reports on the Birds, Mammals and certain Invertebrata will be included in the records of the British, Australian and New Zealand Antarctic Expedition of 1929-1931 as joint reports.