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1911-14.

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

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VOL. VI. PART 7.

EDITED BY E. A. BRIGGS, D.Sc.,
UNIVERSITY OF SYDNEY.

MARINE FREE-LIVING NEMAS

BY

N. A. COBB, B.Sc., Ph.D.,

Bureau of Plant Industry, U.S. Department of Agriculture.

WITH FOURTEEN TEXT FIGURES

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CONTENTS.

MARINE FREE-LIVING NEMAS.

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[With fourteen Text Figures.]

EXAMINATION of these Antarctic free-living nemas corroborates the impression created by previous examination of the free-living marine nemas of the Shackleton Expedition; in other words, it becomes abundantly evident that the Antarctic marine waters are populated by an infinitude of nemas belonging to widely varied species that time will undoubtedly prove to be an important link in the organic series culminating in the fishes, birds, and marine mammals of Antarctica.

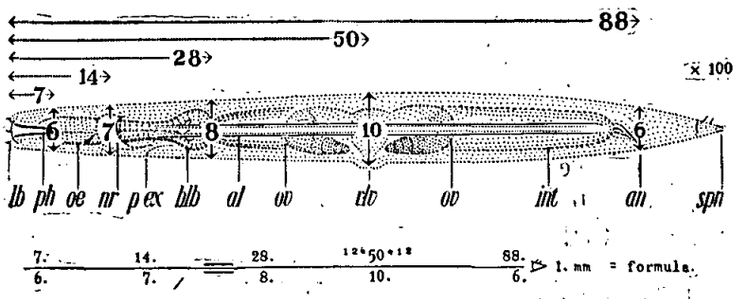
With regard to the locality from which the nemas were collected, Mr. J. G. Hunter, Chief Biologist of the Mawson Expedition, says:

"The specimens were collected by Dr. McLean, 1913, from a muddy sediment, 3 fathoms, Commonwealth Bay (Adelie Land). Small nemas could always be found in abundance in this mud; the larger forms were obtained from amongst the roots of brown algæ (Fucoideæ)."

The specimens were preserved in formalin originally. After receipt by the writer, they were treated with corrosive sublimate and examined in balsam after staining with carmine.

Unfortunately many of the specimens were very defective, owing, no doubt, to the great difficulties under which they were collected, so that obtaining from them the data here published required much patience and delay.

The following diagram illustrates the decimal formula used for nemas; 6, 7, 8, 10, 6 are the transverse measurements, while 7, 14, 28, 50, 88 are the corresponding longitudinal measurements. A formula assembling these measurements appears just below the diagram. The unit of measurement is the hundredth part of the length of the body, whatever that may be. The measurements become, therefore, percentages of the length. The absolute length of the nema is given in millimetres as a final term—in this case 1 mm.



The measurements are taken with the animal viewed in profile; the first are taken at the base of the pharynx, the second at the nerve-ring, the third at the cardiac constriction or end of the neck, the fourth at the vulva in females and at the middle (M) in males, the fifth at the anus. In most cases the formulæ given represent an average derived from the measurements of several adult individuals.

By the use of suggestive conventional signs the formula is made to convey considerable additional information. Thus the formulæ for *Spilophora aberrans* (No. 11), p. 19 indicate that:

The cuticle is traversed by rather coarse transverse striæ,[1] which are resolvable into rows of dot-like markings[2] modified on the lateral fields,[3] where there are distinct wings to the cuticle, one on each side of the lateral line.[4] The excretory pore is at the base of the lip region.[5] There is an almost imperceptible pharyngeal swelling and a cardiac swelling three-fourths as wide as the base of the neck.[6] The ovaries are double and reflexed, the anterior one occupying 18 per cent. of the length of the body, the posterior one 17 per cent.[7] The male has a single outstretched testis occupying 63 per cent. of the length of the body.[8] There is an unarmed symmetrical spinneret.[9] The spicula are arcuate and their proximal ends cephalated by constriction.[10] There is only one gubernacular piece; it is arcuate, slender, lies parallel and close to the spicula, and is one-half as long as they.[11] There are probably ten preanal ventral supplementary organs.[12]

Terminology Relating to Striation of Cuticle

Number of Striæ to the millimeter	Corresponding text term	Corresponding formula line
100 down	Very coarse	—— ——
250	Coarse	— — — —
500	Rather coarse	- - - - - - -
750	Rather fine	. . . . .
1000	Fine	. . . . .
1500	Very fine	. . . . .
2000 up	None	

[1] Formula line of short dashes. See table of striation of cuticle on this page.

[2] Dots above and below the line between the second and third terms.

[3] Modified dots outside those just mentioned in [2].

[4] Short lines above and below formula line between second and third terms.

[5] Oblique line on the first transverse term.

[6] Underscoring the first and third diametral measurements, thus indicating the presence of a bulb at that point. Length of mark indicates size of bulb. The first stroke is dotted to indicate that this bulb is faint. A median bulb would be indicated by a mark under the second term.

[7] Single quotes before and after 47, and 18 and 17 used as exponents. Ovaries double and outstretched are indicated by dashes before and after vulva measurement, *e.g.*, —47—; if single, —47.

[8] The straight stroke before M, and 63 used as exponent.

[9] Angular sign at end of formula line. Armature is expressed by strokes across the sign. See *Parasabatieria antarctica*, p. 16.

[10] The curved line with separated end in front of last transverse measurement.

[11] Small curved mark next the one mentioned in [10]. If there is an apophysis to gubernaculum, a stroke is indicated at the proper angle to this mark. ⟩ indicates an apophysis that extends backward at an angle of 90 deg. with the spicula.

[12] 10 used as subfigure in front of spicula. ? expressing probability.

The presence of a bursa is indicated by a curved stroke under the transverse anal measurement figure, and the number of bursal ribs in front of and behind the anus by suffixes in front of and behind the anal measurement figure. Different degrees of curvature of the spicula are expressed in marks placed in front of the transverse anal measurement of the male. Straight spicula, arcuate (as shown in male formula for *S. aberrans*) and strongly arcuate may be indicated by straightening or curving the arc. The nature of the proximal ends is given, *i.e.*, whether cephalated and if cephalated whether by expansion, contraction or constriction, *e.g.*,

When the features represented in the diagram are not of a pronounced nature, the marks are dotted to indicate faintness. The absence of any mark in the formula is practically always to be taken as indicating that the particular feature in question is non-existent, although the possibility must not be overlooked that it was present but escaped notice.

Thus the formula is a sort of conventionalized sketch of the organism, much use being made of "place value" as well as form value, just as in mathematical notation, music, etc.

KEY.

Pharynx absent, or, rather, apparently so	–♀– –♂–	(*Parasabatieria antarctica*)	8
Pharynx present, though sometimes very small			
Wall of the pharynx armed with one or more onchia or teeth—			
Onchium only one.			
Cardiac bulb none	–♀	*Cobbia mawsoni*	6
Cardiac bulb distinct, pyriform or elongate.			
Cuticular "wings," 12; pharyngeal bulb set off by constriction		*Monoposthia apiculata*	12
Cuticular "wings," 2; pharyngeal bulb not set off by constriction	'♀' –♂	*Spilophora aberrans*	11
Onchia two or more.			
Neck 23%; pharynx capacious; its 3 teeth large, oncholaimoid		*Hyptiolaimus cephalatus*	13
Neck 15% or less; pharynx and teeth not large, external amphids linear.			
Width 4·3%; total length 1·3 mm.	'♀' –♂	*Chromadora dubia*	9
Width 2·8%; total length 2·4 mm.	'♀' –♂	*Euchromadora meridiana*	10
Wall of the usually ob-conoid pharynx unarmed; lips armed in Axonolaimus—			
Œsophagus plain, valveless, cylindroid or conoid.			
Amphids sometimes obscure	– ♀ –♂–	(*Monhystera naviculivora*)	3
Amphids present, obvious.			
External amphids linear, *i.e.*, more or less narrow slits	'♀' ?♂	*Anticoma subsimilis*	1
External amphids spiral, circular, or elliptical.			
Form of the amphids a distinct spiral, appearing circular in 2.			
Lips armed with 6 distinct, outward acting odontia	–♀– –♂–	*Axonolaimus polaris*	15
Lips inward acting, without distinct odontia.			
Annules resolve to secondary elements; lips amalgamated	–♀– –♂–	*Parasabatieria antarctica*	8
Annules not so resolvable; lips, 3, distinct, well developed	'♀'	*Tripyloides vivipara*	2
Form of the external amphids circular, elliptical, or elongate.			
Contour of external amphid not circular.			
Amphid elongate and relatively large; œsophagus 13%; width 2·5%	–♀– –♂–	*Axonolaimus antarcticus*	14
Amphid equidiametral; œsophagus 6·2%; width 1·1%	–♀– –♂–	*Axonolaimus polaris*	15
Contour of external amphid circular.			
Ovaries two, outstretched.			
Lips inward acting, subdistinct, unarmed	–♀– ?♂?	*Metalinhomoeus meridionalis*	7
Lips armed with 6 outward acting odontia	–♀– –♂–	(*Axonolaimus polaris*)	15
Ovary one, outstretched; striæ simple, faint (unknown in No. 4).			
Male with 2 outstretched testes; width 3·8% or more	–♀ –♂–	*Monhystera naviculivora*	
Male with 1 outstretched testis, (unknown in No. 6); width 2·5% or less.			
Outer amphid 2½ head-widths back	–♀ –♂	*Monhystera septentrionalis*	5
Outer amphid 1 head-width back.			
Length 2·2 mm.	–♀	(*Cobbia mawsoni*)	6
Length 1·2 mm.	–♂	*Monhystera neglecta*	4
Œsophagus with posterior swelling; amphids spiral	–♀– –♂–	(*Parasabatieria antarctica*)	8

DESCRIPTIONS OF THE SPECIES.

Characters Common to all the Species.

The cuticle is colorless, except in *Spilophora aberrans* n.sp., where it is yellowish. Transverse striæ are present, not materially altered on the lateral fields except in *Chromadora* and *Spilophora*. No longitudinal striæ have been seen in these balsam preparations, except in *Hyptiolaimus* n.g.

There are no eyespots.

There is no median œsophageal bulb. The musculature of the œsophagus is colorless and fine, except in *Tripyloides*. Glands in the interior of the œsophagus have not been seen except possibly in *Hyptiolaimus* n.g. There are no valves in the œsophagus except in *Spilophora aberrans* n.sp.

There is no prerectum. The intestinal granules give rise to a tessellation only in *Cobbia mawsoni* n.sp. and possibly *Tripyloides vivipara* n.sp.

The tail is of approximately the same form in both sexes (if both are known) and in all cases is supplied with a simple spinneret, and with caudal glands, the latter confined to the tail, except possibly in *Hyptiolaimus* n.g.

The renette, when present, has its cell behind the neck, except in *Anticoma*.

The nerve-ring surrounds the œsophagus squarely in *Axonolaimus polaris* n.sp. and nearly so in all others.

There are two equal simple spicula. There is no bursa. There are no special papillæ or setæ on the male except in *Anticoma subsimilis* and *Axonolaimus antarcticus* n.sp.

Genus ANTICOMA *Bastian*, 1865.

Anticoma subsimilis *Cobb.*

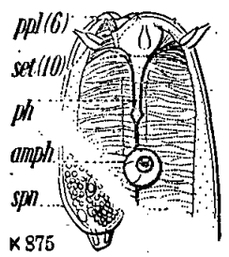
1. *A. subsimilis* Cobb, 1914. $\frac{0.2}{0.7}$ $\frac{11.}{1.7}$ $\frac{24.}{2.}$ $\frac{12}{}$ $\frac{49.}{2.1}$ $\frac{13}{}$ $\frac{90.8}{1.6}$ > 1.7mm — Supplementing the original data, these are the measurements of a single female specimen undoubtedly belonging to this species.

Genus TRIPYLOIDES *De Man*, 1886.

Tripyloides vivipara *n.sp.*

2. *T. vivipara* n.sp. $\frac{0.6}{1.}$ $\frac{6.5}{1.8}$ $\frac{12.}{1.9}$ $\frac{22}{}$ $\frac{47.}{2.3}$ $\frac{23}{}$ $\frac{94.}{1.4}$ > 2.4mm — The thin layers of the transparent, naked cuticle are traversed by exceedingly fine transverse striæ which are very difficult of resolution. The contour of the body is plain. At

least the largest of the cephalic setæ are two-jointed. There are no subcephalic or cervical setæ. The mouth opening is depressed. There are three distinct, mobile, thick, more or less blunt, rounded, well developed lips, not set off by constriction, which, when open, show a definite axil between each adjacent two. The simple, regular, pyramidal or concave-conoid pharynx is of moderate size. There are perhaps obscure cutinous ridges in the basal part of the pharynx. There are only traces of a separate chamber as seen in some *Tripyloides*. The inconspicuous circular amphids are really spirals of one wind, obscurely open behind. The intestine, which becomes at once



three-fourths as wide as the body, has thick walls,—becoming thinner posteriorly, however,—and in each cross section presents about twenty cells with relatively large nuclei; the intestinal lumen is only very faintly to be seen. The colorless granules of the intestine are few and inconspicuous; there is no distinct tessellation although the contours of the relatively small, numerous cells are distinctly seen. From the slightly raised anus, the posterior lip of which is the more prominent, the straight tail is first conoid, then finally subcylindroid in the posterior fourth. It tapers to an unswollen, rounded, naked, symmetrical terminus which ends in an unarmed, truncate-conoid, somewhat inconspicuous spinneret. The spinneret presents a central boss of considerable size. The broadly saccate caudal glands are located in the anterior two-fifths of the tail in a close tandem series and empty through distinct ducts which widen into three distinct ampullæ. There are no caudal setæ. From the small, inconspicuous, continuous vulva, the medium-sized, tubular, more or less weak vagina leads inward and at right angles to the ventral surface about halfway across the body. In the adult females the uteri contain four to six fully developed larvæ which have manifestly escaped from the shells; *i.e.*, the species is probably truly viviparous. The ovaries are broad, somewhat tapering, with their contents irregularly arranged. In young specimens the ovaries may reach back to the vulva; when gravid one-third to halfway. Alongside the ova in the reflexed part of the ovary, there are cells of a different character with elongated nuclei near the periphery. These are probably developing spermatozoa. The collection contained many females in gravid state.

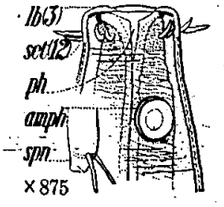
Genus MONHYSTERA *Bastian*, 1865.

In addition to the characters given on page 9, the following are common to all the species of *Monhystera* here described.

The elements of the cuticle are difficult of resolution and are not further resolvable into secondary elements. Submedian cephalic setæ are present, but there are no cervical setæ. The amphids are circular. The œsophagus is without swellings. The males have a single, slender gubernacular piece without apophysis.

MONHYSTERA NAVICULIVORA *n.sp.*

3. *M. naviculivora* n.sp. $\frac{0.5}{1.4}$ . . . $\frac{8.2}{2.4}$ . . . $\frac{22.}{2.7}$ . . . $\frac{55-67.}{3.8}$ . . . . $\frac{67.}{2.3}$ ♂ 1.6 mm.—The moderately thin, transparent, naked cuticle is traversed by plain transverse striæ. The contour of the nema is plain. The body wall is thick and relatively muscular. There are longitudinal muscle-striæ prominently interrupted by the lateral chords. The conoid neck ends in a more or less cylindroid, rounded, continuous head, bearing three thin, well developed lips set off by almost imperceptible expansion. No papillæ were seen on these evidently mobile lips. No subcephalic setæ were seen. The simple, conoid, regular pharynx of moderate size is of typical monhysteroid form and about half as wide as the lip region and about two-thirds as long as it is wide; it has no armature. Behind the cyathiform part of the pharynx there are three straight cutinized refractive elements capable of closing together at the axis of the head. These are about as long as the cyathiform part is deep. Hence the pharynx is deeper than might be thought and is capable of being opened to a plain conoid cavity two-thirds as deep as the head is wide. The amphids seen in dorso-ventral view appear as round-bottomed cavities reaching one-fourth the distance to the body axis. There is a staining nucleus on the outer margin in front of the amphid,—of somewhat irregular form. The œsophagus is of typical form. The thick-walled intestine becomes at once three-fifths as wide as the body. The cells of the intestine are packed with small brownish granules; its lumen is rather distinct, sometimes appearing as if longitudinally corrugated. The anus is elevated in the male and the tail is conoid, then cylindroid in the posterior fourth, where it is about one-eighth as wide as at the anus. The spinneret is somewhat swollen; it is rounded and symmetrical and is armed with setæ. The three somewhat broadly saccate caudal glands, packed in the anterior third of the tail, empty through distinct ducts, one starting from the ventral side of each gland at its hind end. Nothing is known concerning the renette. From the large, conspicuous, depressed vulva, the vagina leads inward and forward, there being no very noticeable portion of the sexual organ behind the vulva. The ovary, of course, is single, and at its blind end, which lies near the cardiac collum and apparently is not reflexed, there is sometimes to be seen a very distinct and strongly staining "terminal" cell. Nothing is known concerning the eggs. The ventral region on both sides of the vulva is slightly elevated. A rather sudden and noticeable diminution in diameter of the nema occurs just behind the vulva. The taper of the tail really begins near the vulva but continues gradually until behind the anus, where it becomes more abrupt. From the large depressed anus, the rectum, which has a rather conspicuous but thin refractive lining, extends inward and forward a distance equal to the anal body diameter. This species is distinctly diatomivorous; the diatoms seen in the intestine of the present specimens are mainly a species of *Navicula*. Not



infrequently the intestine is crowded with the frustules of the *Navicula*, many of which are fully as long as the body of the nema is wide and half as wide as the head end of the nema. As many as 150 diatoms have been seen in the intestine of one individual.*

$\frac{0.5}{1.2}$ $\frac{8.}{2.6}$ $\frac{21.}{3.2}$ $\frac{78-M}{3.9}$ $\frac{88.}{2.7}$ >1.6mm—The spicula are more or less L-shaped, becoming arcuate when exserted. They are more or less equal, slender, uniform, rather blunt and appear to be not quite one-twelfth as wide as the body, and one and one-half to one and three-fourths times as long as the anal body diameter. They are cephalated by constriction and then slight expansion. They are simple and their proximal ends appear to lie somewhat dorsad of the body axis. The ejaculatory duct is one-fourth, the vas deferens one-fourth, and each of the two testes two-thirds as wide as the body; these testes are large, wide and equally well developed, tapering near their ends. There is a very obscure accessory piece, somewhat straight or slightly arcuate, very slender and frail, lying parallel to the spicula; its applied part is about one-third as long as the spicula. This accessory piece ends nearly opposite the body axis. There are no supplementary organs and no special male papillæ. There were only two poor specimens, diatomivorous. The presence of two testes indicates the probability that this species should be placed in a separate new genus, *Diatomphila*. The change, however, should await the examination of better material.

MONHYSTERA NEGLECTA *n.sp.*

4. *M. neglecta* n.sp. $\frac{0.26}{0.55}$ $\frac{5.}{1.5}$ $\frac{7.9}{1.5}$ $\frac{78-M}{2.}$ $\frac{94.4}{1.6}$ >1.2mm—The thin layers of the transparent naked cuticle are traversed by exceedingly fine transverse striæ. No caudal setæ have been seen. There are traces on the head of setæ about halfway back to the amphids, at a distance from the anterior extremity nearly equal to the corresponding diameter of the head. These setæ are about one-third to one-fourth as long as the corresponding portion of the head is wide, are spreading, slightly curved, and apparently nearly cylindrical; but their number remains unknown. There certainly are submedian setæ in this latitude, and it would seem safe to assume that there are either six or ten setæ in a circlet halfway back to the amphids, but the observations do not establish this. The neck becomes very faintly conoid anteriorly and ends in a rounded head not set off in any way. The head region from the amphids on, however, in the single balsam specimen examined, is narrower than the portion of the neck immediately behind, and the very anterior cephalic portion is almost cylindroid. Whether this is due to shrinkage and the fact that the specimen is viewed only dorso-ventrally remains to be determined. Through the narrow open vestibule, which is less than one-fourth as wide as the front of the head, the obconoid pharynx is entered; the pharynx is small and obscure for a *Monhystera*. There are no distinct indications of overlapping, thin, transparent, membranous lips, such as are often to be seen in *Monhystera*. The round, external amphids, whose anterior borders are located at

*Dr. Albert Mann has identified the diatoms as being chiefly *Navicula cancellata* Donk, *N. aspera* var *antarctica* Perag., *N. gracilia* var *antarctica* Perag., and perhaps one or two *Achnanthes antarctica* Perag.

a distance from the anterior extremity about equal to the corresponding diameter of the neck, are about three-fifths as wide as the corresponding part of the neck. They are reminiscent of a helix and have a definite broad central elevation which in face view appears as a fleck. They are flattish cavities, one-third to one-fourth as deep as they are wide, with a slightly elevated central portion. Just behind the amphids the œsophagus is about half as wide as the neck; opposite the circlet of cephalic setæ the œsophagus is two-thirds to three-fourths as wide as the corresponding portion of the head. The œsophagus, of course, is monhysteroid and simple. The specimen is such that very little can be said about the structure of the anus. The arcuate tail of the male is conoid to the conoid terminus, which is about one-fourth as wide as the base of the tail. The spinneret is conoid and, so far as observed, unarmed. The sub-equidiametral caudal glands are apparently of the structure normal for the genus and are located in the anterior fourth of the tail. The arcuate, somewhat uniform spicula, which at their widest part are one-fourth as wide as the corresponding portion of the body, are one and one-half to two times as long as the anal body diameter. They are rather strong and refractive but are hardly cephalated, and, when seen in profile, have about the same width through about two-thirds of their length; in the distal third they appear to taper to a blunt point. They are accompanied by an apparently double gubernacular piece which is rather slender and is rather closely approximated to the spicula along their distal halves.

MONHYSTERA SEPTENTRIONALIS *Cobb*, 1914.

5. *M. septentrionalis* Cobb. $\frac{0.3 \quad 9. \quad 16. \quad 40–58. \quad 87.}{0.6 \quad 1.8 \quad 2. \quad 2.5 \quad 1.6} \rightarrow 0.76^{mm}$ — In addition to the original data, the following information has been derived from the Mawson specimens. The very thin layers of the transparent, naked cuticle are traversed by transverse striæ, all alike. The contour of the nema is plain. The very minute, simple, regular, conoid to cyathiform pharynx is about half as wide as the front of the head and seems about twice as deep as wide. There are straight elements behind the minute cyathiform cavity that at least simulate a cylindroid or prismoid pharynx about two to three times as long as the front of the head is wide; somewhat the same has been seen in some of the Shackleton specimens of *M. septentrionalis*. In dorso-ventral view, the circular amphids are shown to be depressions,—slightly oblique backward. The anterior part of the intestine, for a distance equal to one body width, is set off behind also by a constriction, distinct though rather shallow. The rather straight, conoid tail becomes cylindroid in the posterior fourth, where it is one-sixth as wide as at the anus. The uterus is straight and presents no posterior rudiment.

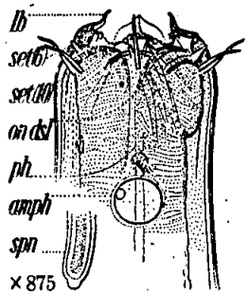
$\frac{0.3 \quad 10. \quad 17. \quad 54–M \quad 66.4}{0.8 \quad 2.2 \quad 2.5 \quad 2.5 \quad 1.8} \rightarrow 0.74^{mm}$ —The tail of the male is conoid then cylindroid in the final fourth where it is about as wide as the spicula. The simple, non-cephalated, arcuate, slender, uniform, subacute or rather blunt, colorless

spicula, which at their widest part are about one-sixth as wide as the corresponding portion of the nema, are located very close together and are two to two and one-half times as long as the anal body diameter. The proximal ends are curved a little ventrad. There is one arcuate, very slender and frail accessory piece, about one-third as long as the spicula and lying parallel to them; this presents no backward apophysis, but is sometimes pulled away from the spicula. No preanal ventral supplementary organs have been seen. The ejaculatory duct is about two-fifths as wide as the corresponding portion of the body. In front of the spicula and attached to the proximal end is a cutinized "duplicate," three-fifths the size of the main part so that the whole is reminiscent of the double-jointed spicula of the genus *Xinema*. This additional part is frailer as well as smaller than the spicula. It is not clear that there are two of them.

Genus COBBIA *De Man*, 1907.

COBBIA MAWSONI *n.sp.*

6. *C. mawsoni* n.sp. $\frac{0.6}{1.1}$ ..... $\frac{6.3}{1.2}$ ..... $\frac{14.}{1.5}$ ..... $\frac{48-65.}{1.6}$ ..... $\frac{92.6}{1.}$ >2.2 mm.—The somewhat thin layers of the transparent, naked cuticle are traversed by plain transverse striæ, all alike, and about two microns apart. The striæ are difficult of resolution and not further resolvable into secondary elements. The contour of the nema is plain or sometimes almost imperceptibly crenate, at any rate toward the extremities. The subtruncate head is almost imperceptibly set off by expansion, and bears six distinct, thin, longitudinally striated, fairly well developed lips, which, however, are not set off in any way at the base. There are at least a few scattered very slender cervical setæ—the longest of which, toward the head, are nearly as long as the radius of the neck. The typical, conoid, subregular, shallow pharynx is of moderate size, about three-fourths as wide as the head, and about as deep as wide. There is a small, conical, dorsal onchium, with a corresponding alteration in the musculature of the pharynx as shown in the illustration. There is a somewhat irregularly shaped granular nucleus just in front of each amphid, that stains strongly in acid carmine after mercuric chloride. The cylindroid œsophagus, which at the nerve-ring is two-thirds, and finally about three-fourths as wide as the corresponding portion of the body, presents a fairly distinct lining. It may be that there is a conoid cardia. The thick-walled intestine, which becomes at once three-fourths as wide as the body, presents a faint lumen; it is made up of cells of such size that about six would be presented in each cross section. The lining of the intestine is refractive and appears somewhat zigzag. The rectum,

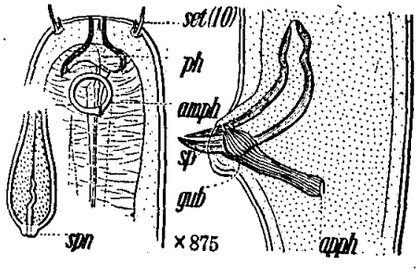


which presents a cutinized lining, passes inward and forward from the somewhat elevated anus a distance one and one-fourth times as great as the anal body diameter. The cells of the intestine contain small, brownish, somewhat uniform granules; these are numerous and give rise to a faint tessellated effect. The conoid subarcuate tail ends in an unarmed, blunt, conoid spinneret about one-sixth as wide as the base of the tail. The more or less ellipsoidal caudal glands form a close tandem in the anterior third of the tail. No caudal setæ were seen. Nothing is known concerning the renette. While the female sexual organ is of the type common to the genus, it has not been distinctly seen. The body diameter probably diminishes a little just behind the vulva, which is somewhat conspicuous. The blind end of the ovary lies two body widths behind the cardia. A poor specimen only, diatomivorous. Pending further investigation, the only course seems to be to refer this specimen to de Man's genus *Cobbia*.

Genus METALINHOMŒUS *De Man*, 1907.

METALINHOMŒUS MERIDIONALIS *n.sp.*

7. *M. meridionalis* n.sp. $\frac{0.4 \quad 3.0 \quad 6.2 \quad 18\text{–}51.\text{–}21 \quad 94.5}{0.9 \quad 1.2 \quad 1.2 \quad 1.5 \quad 1.}$ 2.5mm.—The rather thick layers of the transparent, naked cuticle are traversed by exceedingly fine transverse striæ, all alike, very hard of resolution and not further resolvable into secondary elements. Of the ten cephalic setæ, at least the longer submedian ones are jointed. No subcephalic or cervical setæ have been seen. The mobile subdistinct lips are thick, and fairly well developed. They are folded over the small, more or less discoid pharynx, and are not set off by constriction. The simple, typical, wide-napiform pharynx is two-fifths as wide as the head and has a depth equal to three-fifths the radius of the head. The vestibule of the pharynx is narrow when the lips are closed, and is as long as the lips are deep. In some aspects of the fixed specimens there seems to be a forward projecting ridge in the pharynx, which in optical longitudinal section appears like an onchium. When seen dorso-ventrally, the amphids appear as depressions two-thirds as deep as wide, having a well-cutinized lining, the bottom part of which is somewhat rounded up in the center. The lining of the œsophagus is an indistinct feature and finds its main optical expression as a single refractive "line." Behind the pharynx the diameter of the œsophagus is three-fifths, at the nerve-ring also three-fifths, and finally three-fourths as wide as the corresponding portion of the neck. The thick-walled intestine, about four cells in girth, becomes at once three-fourths as wide as the body; it narrows somewhat



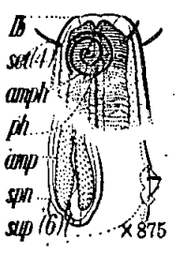
anteriorly so that the cardiac collum is only about two-fifths as wide as the base of the neck. From the anus, which is depressed, the cutinized rectum extends inward and forward a distance equal to the anal body diameter, or a little more. The cells of the intestine contain fine, rather conspicuous, brownish, more or less uniform granules which at the beginning are absent for a space equal to one body width. The granules are of such size that three would be required to span one of the amphids. The anterior part of the intestine for a distance equal to one body width appears rather "structureless" and almost without granules. The straight tail of the female tapers from in front of the anus, is at first conoid, then convex-conoid, then somewhat cylindroid in the posterior two-fifths, and presents a sub-apiculate, gradually swollen, rounded terminus armed with exceedingly fine short setæ. The transparent, rounded, symmetrical, blunt spinneret with exceedingly fine lateral wing-lines, is armed with almost invisible setæ. The caudal glands are situated behind the anus in the anterior half of the tail. The caudal setæ are few, scattered and inconspicuous. The renette was not seen. The tapering ovaries become quite slender, and contain ova arranged single file.

$\frac{0.5 \quad 4.4 \quad 6.6 \quad 60 \quad 94}{1.1 \quad 1.5 \quad 1.5 \quad 1.5 \quad 1.5}$ 2.2mm.—The two equal spicula are yellowish. There are two straight, rather slender, but strong, simple accessory pieces joined behind and surrounding the spicula near the anus. The very inconspicuous, equidistant, preanal, ventral supplementary organs extend to opposite the proximal part of the spicula, and are hardly more than mere innervations. The specimens are shrunken and too poor to permit of satisfactory observation concerning the internal male organs.

Genus PARASABATIERIA *De Man*, (1906) 1907.

PARASABATIERIA ANTARCTICA *n.sp.*

8. *P. antarctica* n.sp. $\frac{0.3 \quad 3.2 \quad 9. \quad 31 \quad 49 \quad 86 \quad 94}{0.6 \quad 1.5 \quad 1.6 \quad 2.1 \quad 1.5}$ 2.5mm.—The layers of the thin, transparent cuticle are traversed by exceedingly fine transverse striæ, further resolvable into very fine dots. The contour of the body is plain. No special subcephalic setæ have been seen. Scattered cervical setæ, minute, slender, and half as long as the cephalic, are present; there are similar scattered somatic setæ. The neck, which is convex-conoid in the anterior part and more or less cylindroid in the posterior part, ends in a subtruncate head set off by a broad, almost imperceptible constriction. The somewhat fixed lips are so well amalgamated that there can hardly be said to be any really distinct lips. The conoid pharynx is very obscure. It is small, simple, regular, shallow and unarmed. It is about half as wide as the lip region and half as deep as wide. Behind the pharynx the cylindroid



œsophagus,—which has an almost imperceptible swelling posteriorly,—is two-thirds to three-fourths, at the nerve-ring three-fifths, and finally two-thirds as wide as the corresponding portion of the neck. The lining of the œsophagus is subdistinct. The intestine becomes at once three-fourths as wide as the body. It presents a faint lumen and is made up of cells of such a size that probably only about five are present in each cross section. The cardiac collum is half as wide as the neck. The colorless granules of the intestinal cells are indistinct. From the continuous to somewhat depressed anus, the rectum extends inward and forward a distance equal to the anal body diameter. The straight tail of the female, which is conoid, then cylindroid in the posterior third, where it is one-sixth as wide as at the anus, tapers from the anus to a symmetrical terminus. The spinneret is armed with two pairs of slender, arcuate setæ; there are relatively large setæ also on the swollen part farther forward. The caudal glands are packed together in the anterior two-fifths of the tail, which they fill more than usually full. Each gland has a distinct duct. There are about sixteen slender, tapering, acute, caudal setæ—twelve ventrally submedian, postanal, and four ventrally submedian near the terminus. The lateral chords appear to occupy one-third the body width. The rather large ellipsoidal renette cell is one-third as wide as long. There is an apparent ampulla. The cells of the nerve-ring are obscure. From the rather conspicuous vulva, the more or less muscular vagina leads inward and at right angles to the ventral surface about half way across the body. The straight uterus contains smooth, thin-shelled, elongated eggs, one body width long, apparently deposited before segmentation begins. The long, slender, tapering ovaries contain about fifty ova each.

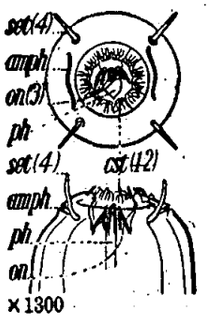
$\frac{0.3}{0.6}$ ... $\frac{6.6}{1.6}$ ... $\frac{9.5}{1.7}$ ... $\frac{68}{1.8}$ ... $\frac{94.}{1.7}$ > 2.1mm—The rather yellowish, strong, arcuate, noncephalated spicula are one and three-fourths times as long as the anal body diameter and at the widest part, one-fifth as wide as the corresponding portion of the body. Near the anus there is apparently a massive gubernaculum three-fifths as long as the anal body diameter bending back from the spicula and at right angles to them. The six preanal, somewhat mammiform, subequidistant, supplementary organs, which are considerably elevated and rather prominent, when the tail is arcuate, occupy a space equal to the tail length. There were two females and one male.

Genus CHROMADORA *Bastian*, 1865.

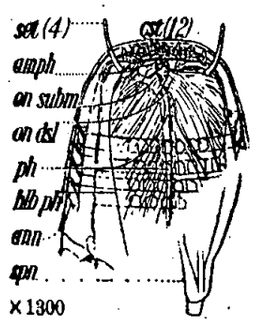
CHROMADORA DUBIA *n.sp.*

9. *C. dubia* n.sp. $\frac{1.2}{1.7}$ ... $\frac{8.1}{2.6}$ ... $\frac{13.}{3.}$ ... $\frac{18}{4.3}$ $\frac{47.}{4.3}$ $\frac{19}{4.3}$ ... $\frac{89.}{2.4}$ > 1.3mm—The thick layers of the transparent, naked body cuticle, occupying one-fifth the radius of the neck, and becoming thinner and ceasing opposite the base of the pharynx, are traversed by transverse striæ, all alike, with markings like those of *Euchromadora*,

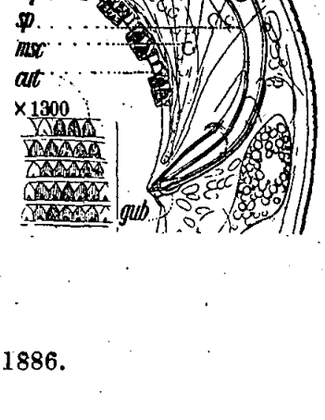
becoming basketwork-like; on the back part of the neck they are easy of resolution,



and further resolvable into distinct roundish dots, which become slightly elongate farther back, where they are fainter on the lateral fields and where there are also faint wings. The contour of the body is slightly crenate. There are no subcephalic or cervical setæ. The neck is cylindroid in the posterior part and somewhat conoid to convex-conoid in the anterior part. There are probably twelve minute, mobile lips, distinct at their acute tips. The small, typical, obpyramidal pharynx is as long as the radius of the head. There is one dorsal and two ventrally submedian teeth;—conoid, acute, slightly arcuate, nearly axial, and reaching in among the lips when these latter are closed. These onchia are about one-fourth as long as the head is wide. The dorsal one extends ventrad beyond the axis of the head and between the two subventral ones, so the three make a very compact group when the mouth is closed. The very inconspicuous, fleckless, outer amphids, are elongate transversely, symmetrical to two lines, and with closed peripheries; their anterior borders are removed hardly at all from the anterior extremity, *i.e.*, they lie between the cephalic setæ and, as seen in profile, appear very narrow when the lips are closed. The conoid, bulbless œsophagus is very slightly swollen anteriorly and again posteriorly. Behind the pharynx it is three-fifths, at the nerve-ring two-fifths, and finally two-thirds as wide as the corresponding portion of the neck. The thick-walled intestine, which is soon half as wide as the body, is four cells in girth near the cardiac region, and posteriorly twelve to fifteen cells in girth. Its cells contain minute, indistinct granules. It presents a faint lumen. From the depressed anus the rectum extends inward and forward a distance as great as the anal body diameter. The conoid tail which finally becomes convex-conoid, tapers from the anus to an unswollen, convex-conoid, very slightly unsymmetrical, unarmed, acute spinneret which is *not* striated. The apparently distinct, saccate caudal glands lie in the anterior fourth of the tail. There are no caudal setæ. The renette presents a somewhat elongated cell, one body width long and one-third as wide as long, situated from one to two body widths behind the neck. It has an ellipsoidal companion cell behind, which is one-fourth as long as the body is wide and half as wide as long. The lateral chords are about one-fourth as wide as the body. From the large, refractive, somewhat depressed, rather conspicuous vulva, the medium-sized vagina extends inward at right angles one-third the distance across the body. The uteri are straight. The broad, tapering ovaries reach two-thirds of the way back to the vulva, and each contains about twenty ova in single file, which are, however, arranged irregularly near the blind end. The excretory pore was not seen.



$\frac{1.}{1.3}$ ---- $\frac{6.4}{2.1}$ $\frac{+}{\nu}$ $\frac{14.}{2.4}$ ---- $\frac{\alpha\ 21}{4.1}$ ---- $\frac{90.}{2.8}$ > 1.4mm —The strong colorless spicula are compound at their distal ends and are not cephalated. There is a faintly visible chord extending across the inner arc and they may be therefore wider than they appear to be. The arcuate, slender accessory piece, with rather strong frame, lies parallel and close to the spicula, and is about half as long as the spicula; there is no apophysis. The ten equidistant, preanal ventral supplementary organs, the last nearly opposite the middle of the spicula, are of the sort typical for *Chromadora* and occupy five body diameters. They occupy a distance equal to one and one-fourth times the tail length. The ejaculatory duct is one-third, and the wide cylindrical, then tapering testis, two-thirds as wide as the body.



Genus EUCHROMADORA *De Man*, 1886.

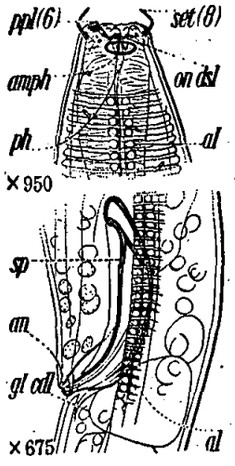
EUCHROMADORA MERIDIANA *Cobb.*

10. *E. meridiana* Cobb, 1914. A full description and formulæ of this species may be found in the "*Free-Living Nematodes of Shackleton Expedition.*" Sir Douglas Mawson's collections give rise to the following amendments and additions to the original description :—The obscure reversal of the striæ in the male takes place at about latitude 33 degrees. The strongly arcuate, sub-slender, rather strong and tapering spicula, somewhat cephalated at the tapered distal ends, are one and two-thirds times as long as the anal body diameter, and lie with their proximæ apparently very slightly ventrad of the body axis. There are two, more or less separate, duplex accessory pieces, one behind the spicula, the other, the telamon, in front. The two separate parts of the telamon, well separated, are somewhat like much reduced spicula. The posterior part consists of a broad, strong, double groove, one-fourth as long as the spicula, reinforced by three inward protruding arcuate elements, lying parallel to them; the longest one is median, and the other two, equal and shorter, are laterad from the median. This latter serves for the attachment of a muscle extending backward and ventrad in the tail. The ejaculatory duct is one-fifth, the vas deferens one-half as wide as the body.

Genus SPILOPHORA *Bastian*, 1865.

SPILOPHORA ABERRANS *n.sp.*

11. *S. aberrans* n.sp. $\frac{1.}{1.4}$ ---- $\frac{9.}{3.1}$ $\frac{+}{\nu}$ $\frac{15.}{3.4}$ $\frac{18\ 47.\ 17}{4.1}$ ---- $\frac{87.}{2.4}$ > 1.2mm —The rather yellowish cuticle is traversed by transverse striæ, all more or less alike, easy of resolution, and materially altered on the lateral fields by two distinctly scalariform wing areas. Where relatively thickest, near the head end, the cuticle occupies nearly



one-third the radius of the head. The dots into which the striæ are resolvable are obscure and have been seen only near the extremities of the nema. The contour of the body is crenate near the head. There are no obvious subcephalic or cervical setæ. The neck, which on the whole is conoid but may be described as conoid in its posterior part and convex-conoid anteriorly, ends in a convex-conoid, somewhat rounded or subtruncate, continuous head. The twelve mobile, subdistinct, conoid, minute lips, closing over the pharynx, constitute a lip region whose contour is not set off. Notwithstanding their small size, the lips are rather readily distinguishable in the specimens examined; their apices lie close together and are forward pointing. The pharynx, which in reality probably extends backward to the region where the annules begin, is a simple, subregular, but apparently somewhat shallow, cyathiform, rather minute affair, approached through a short vestibule. It is armed with a small and forward-pointing dorsal tooth which stands in the midst of the lips. Being not very refractive, it is not easy to see. Apparently there are one or more inconspicuous submedian onchia. There is an almost imperceptible pharyngeal swelling, and an elongate cardiac swelling three-fourths as wide as the base of the neck. Behind the pharynx the œsophagus is one-half, at the nerve-ring two-fifths, just in front of the cardiac bulb two-fifths, and finally, three-fourths as wide as the corresponding portion of the neck. Beginning with a slight swelling, the intestine becomes almost at once half as wide as the body. The cells of the thick-walled intestine contain uniform colorless granules. The cardiac collum separating it from the œsophagus is one-third as wide as the base of the neck. From the depressed anus the rather prominent rectum, equal in length to the anal body diameter, leads inward and forward. The slightly arcuate conoid tail tapers from somewhat in front of the anus to the unarmed, more or less symmetrical, rather acute spinneret. The caudal glands form a close tandem in the anterior two-fifths of the tail; they are more or less broadly saccate. There are no caudal setæ. Nothing was discovered concerning the longitudinal chords. The ellipsoidal renette cell, two-thirds as wide as long, extends backward, and is accompanied by a faintly staining accessory cell half as large. The excretory pore is at the base of the lip region; no distinct ampulla was seen. The only thing known about the female sexual organs is that they are double and reflexed.

$\frac{1.}{1.5}$ ---- $\frac{9.5}{3.}$ $\frac{\perp}{\top}$ $\frac{15.}{3.2}$ ---- $\frac{63-M}{4.}$ ---- $\frac{66.}{2.6}$ → 1.2mm—There appears to be only one gubernacular piece; it is arcuate, slender, rather frail and simple, and lies parallel to and close to the spicula, and is half as long as they. There are several minute preanal ventral supplementary organs, perhaps as many as ten; these are equidistant and appear to be coextensive with the rather distinct oblique copulatory muscles which occupy two to three tail-lengths. The posterior one of these supplementary organs is

opposite the middle of the spicula. The ejaculatory duct is one-fourth as wide as the body. The blind end of the narrow cylindroid testis is nearly as far behind the base of the neck as this latter is behind the anterior extremity. It is half as wide as the body. Numerous specimens of this species were found.

Genus MONOPOSTHIA *De Man*, 1889.

MONOPOSTHIA APICULATA *n.sp.*

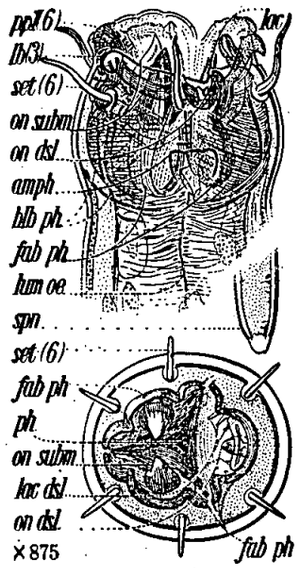
12. *M. apiculata* n.sp. $\frac{3.}{3.7}$ $\frac{14.}{4.8}$ – $\frac{23.}{5.6}$ . . . $\frac{\text{Juv}}{5.}$ . . $\frac{84.}{3.7}$ >0.6mm — The layers of the thick, transparent cuticle are traversed by plain transverse striæ, all alike and readily resolvable with moderate powers, which cease halfway between the anterior border of the amphids and the anterior extremity. The contour of the body is serrate, the annules being retrorse posteriorly, and the reverse anteriorly. Opposite the middle of the pharyngeal bulb the cuticle is equal to one-fifth the radius—thinner elsewhere. There are twelve longitudinal wings to be counted near the cardia; ten counted near the anus. These longitudinal wings appear as if composed of "fish-bone-like" elements, as is usual in *Monoposthia*. There are no subcephalic or cervical setæ. The more or less cylindroid neck, the anterior part of which, however, is somewhat convex-conoid, ends in a rounded, continuous, convex-conoid head. There are probably twelve distinct mobile, minute, conoid lips with inconspicuous papillæ—comprising a lip region almost imperceptibly set off by constriction. The long typical pharynx, which is entered through a narrow short vestibule, is cyathiform just behind the closed lips, then narrow. There is a single short dorsal onchium extending inward, then forward a little—its ventral face sub-axial. Behind the pharynx there is a distinct constriction. Here the œsophagus is one-fourth, at the nerve-ring one-third, in front of the cardiac bulb one-third, and finally five-sixths as wide as the corresponding portion of the neck. The elongated pharyngeal bulb, as long as the head is wide, is three-fifths as wide as the base of the head. The pineapple-shaped cardiac bulb is divided into three parts by transverse breaks in its masculature, the anterior part being small. The lining of the œsophagus is a distinct feature throughout. The thin-walled intestine soon becomes one-half as wide as the body and starts from a depression in the posterior surface of the cardiac bulb. It presents a faint lumen. The cardiac collum is one-third as wide as the neck. From the inconspicuous, almost continuous anus the cutinized rectum extends inward and forward a distance three-fourths as great as the anal body diameter. The tail, which is conoid, tapers from in front of the anus to a continuous blunt, rounded, unarmed, more or less unsymmetrical terminal part about one-half as wide as the basal part; this latter bears an unarmed, blunt, spinneret in the form of a large cylindrical apiculum slightly unsymmetrical at the very apex. The saccate caudal glands form a close tandem and are located behind and opposite to the anus in the anterior two-fifths of the tail. There are no caudal setæ. No renette has been seen.

Genus HYPTIOLAIMUS.

HYPTIOLAIMUS CEPHALATUS *n.sp.*

13. *H. cephalatus* n.g.n.sp. $\frac{0.9}{1.3}$ $\frac{6.1}{1.8}$ $\frac{23.}{2.3}$ $\frac{?-M\ Juv-?}{2.2}$ $\frac{92.3}{1.6}$ 2.5mm.

The thin layers of the transparent naked cuticle are traversed by exceedingly fine transverse striæ, resolvable with difficulty with the highest powers. These striæ do not seem to be further resolvable into secondary elements. There are no subcephalic, cervical or caudal setæ. The three large, rather thin, but muscular, faintly two-lobed lips are well developed, and each presents two low, conical, papillæ located, apparently, just inside the rather thick margin of the lips. It is assumed that the lips can be closed together so as to form a triquetrous mouth opening. In the single specimen seen the pharynx is open and the main features of its armature have been fairly well made out. It presents the peculiarity that the two ventrally submedian *equal* onchia are much more strongly developed than the dorsal one. Each submedian onchium springs from near the middle of the muscular bulbous pharynx and extends forward to an acute point. They are nearly twice as long as they are wide at the base and appear to be "hollow," after the manner of the onchia of *Oncholaimus*. The dorsal onchium is not more than half as large as those just described. When the pharynx is open,—the only position in which it has as yet been seen,—the apices of the submedian onchia are nearly on a level with the front of the lips. On each side of the small dorsal onchium there are three small seta-like appendages on the interior of the pharynx (*lac dsl* in Text Fig.), and there extends over the onchium, dorsad, a refractive flap-like pharyngeal element which lies in the wall of the pharynx parallel to the outer wall of the head. It is the well developed muscles of the pharynx that give rise to the somewhat bulbous appearance of the head,—at least the head is somewhat bulbous in the single specimen seen. It will be seen, therefore, that while the pharynx of this genus has a general resemblance to that of *Oncholaimus*, there are marked differences,—enough, no doubt, to justify the establishment of a separate genus for this species. The neck and œsophagus are like those of *Oncholaimus*. Except for the swelling at the front, the œsophagus maintains a rather uniform ratio in diameter to the corresponding portion of the neck,—namely, is about three-fifths as wide as the neck. Toward the very end it narrows somewhat so that the cardiac collum is only about half as wide as the base of the neck. There is a small conoid cardia,—an indistinct feature, about one-third as wide as the base of the neck. The intestine becomes at once two-thirds as wide as the body and is made up of cells of such a size that probably twenty are required to complete the circumference. The lateral chords are well developed, appear to be about one-fourth as wide as the body, and contain numerous nuclei of such a size that



five to six would be required, placed side by side, to span the width of the chord. The tail is conoid to the slightly convex-conoid, unarmed spinneret. However, it must be added that the terminus is of such a nature that the spinneret is left somewhat in doubt, especially as there are no clear indications in the tail of the presence of caudal glands; this, however, may be due to the fact that the specimen is not in a good state of preservation. It seems likely that the single specimen examined is a young male, and the indications are that there are two testes extending in opposite directions. The nerve-ring surrounds the œsophagus considerably in front of the middle. There are fairly clear indications in the structure of the œsophagus of the presence of œsophageal glands. Longitudinal striæ, due to the attachment of the musculature, are plainly seen throughout the greater portion of the body. Nothing was discovered concerning the renette. The labial papillæ are innervated. The outward parts of the amphids are believed to exist slightly in front of the base of the pharynx in the form of somewhat shield-like markings about one-fifth as wide as the base of the head. The lining of the œsophagus is a fairly distinct feature throughout its length. The intestine is thick-walled; its cells contain relatively large nuclei and granules of very small size that are not very numerous. Judging by the pharynx, this species may be a relative of *Oncholaimus*.

Genus AXONOLAIMUS *De Man*, 1889.

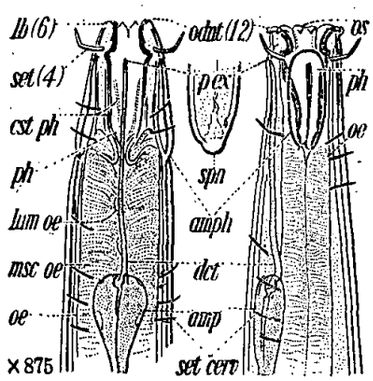
The following are characters in addition to those given on page 9, which are common to both the species of *Axonolaimus* here described.

The layers of thin cuticle are traversed by transverse striæ, difficult of resolution, all alike, and most easily seen near the tail. Subcephalic setæ are present. The six eversible lips when at rest are closed over a simple, pyramidal pharynx, the walls of which are strongly cutinized. The œsophagus is conoid. The walls of the intestine are thick, and its cells contain very fine granules. From the raised anus, the rectum extends inward and forward a distance equal to the anal body diameter. The tail tapers from the anus. The non-granular renette cell is as long as the body is wide. The spicula of the male are blunt and arcuate.

AXONOLAIMUS ANTARCTICUS *n.sp.*

14. *A. antarcticus* n.sp. 1. 0.7 8. 1.6 13. 1.7 28–54.–55 2.5 92. 1.6 >2.0mm.—The layers of the transparent cuticle are traversed by fine transverse striæ. In addition to the cephalic setæ there is apparently also a set of four subcephalic setæ opposite the base of the pharynx. There are scattered cervical setæ. The faintly conoid neck ends in a subtruncate head which is continuous or set off by a broad, almost imperceptible, shallow constriction. The distinct, conoid, somewhat acute, well developed lips are mobile to such an extent that the lip region may become even revolute. The odontia are not so strongly developed as in some other *Axonolaimi*. The lips, even when

everted, do not show very distinct traces of odontia, at least in balsam specimens; but there are really six of them and each is two-parted,—that is, each odontium presents two separate, equal, subacute, arcuate-conoid, distal elements. The amphids are of typical axonolaimoid form. While they are undoubtedly referable to the helicoid type of amphid, they have the appearance of being bent double in front and the two subequal parts laid close together, so that the amphid appears as an elongated affair rounded at both ends, but particularly in front. The two branches are slightly different in length,—the dorsad slightly the longer; otherwise the amphid appears to be a quite symmetrical affair. The œsophagus behind the pharynx is three-fourths, at the nerve-ring three-fourths, and finally two-thirds as wide as the corresponding portion of the neck. The lining of the œsophagus, which is a distinct feature throughout its length, finds its main optical expression as a single axial refractive element. The initial cells of the intestine, very close to the cardiac collum, stain more strongly than the remaining ones. The intestine becomes at once two-thirds as wide as the body; the lining of the lumen stains with acid carmine. The inconspicuous rectum extends inward and forward from the anus. Anal muscles have been distinctly seen. Granules of a yellowish color apparently exist in the cells of the intestine. The tail is convex-conoid, then cylindroid in the posterior fourth, where it is one-third to one-fourth as wide as at the anus; it ends in a somewhat swollen or rounded, unarmed, symmetrical spinneret. The three caudal glands, of saccate form, are located in a loose tandem in the anterior half of the tail. The ducts of the caudal glands are distinct and end in elongated ampullæ near the spinneret. The longitudinal chords are probably about one-third as wide as the body. The ellipsoidal renette cell, located three body-widths behind the base of the neck, is two-thirds as wide as long. The nerve-ring is accompanied by obscure nerve cells. The large, elevated, somewhat conspicuous vulva is half as wide as the body. From it the large cutinized vagina extends inward at right angles halfway across the body. The straight elongated uteri extend in opposite directions; they contain thin-shelled, smooth, elongated eggs about as long as the body is wide, which apparently are deposited before segmentation begins. The eggs have been seen one at a time in each uterus. As seen in the balsam specimen the shell of each egg presents a longitudinal mark, which, however, may be a wrinkle due to shrinkage. The proximal parts of the outstretched ovaries are broad, but taper to become one-fourth as wide as the body and contain about fifty ova each, arranged single file.



$\frac{0.9}{0.6}$ 7. $\frac{9.5}{1.3}$ $\frac{70}{1.5}$–M– $\frac{93.}{1.9}$ $\frac{}{75}$ $\frac{}{1.8}$ >2.4mm—The stoutish, sub-uniform, yellowish spicula, which at their widest part, namely at the middle, are one-fifth as wide as the corresponding portion of the body, present two denticles at their tips. The spicula

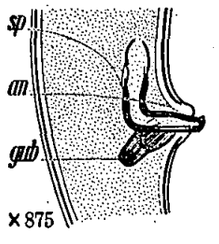
are so strongly arcuate as to appear somewhat semicircular, and are one and one-half times as long as the anal body diameter. They are strongly cephalated by expansion in such a fashion that their proximal ends lie opposite the body axis. In oblique view the cephalic ends of the spicula appear bifurcated and one and one-half to two times as wide as the shaft. There are two bent, stoutish, strong gubernacula joined together and presenting an apophysis two-fifths as long as the spicula,—blunt, half as long as the anal body diameter, and extending backward at almost an angle of ninety degrees; the free ends, close together, appear to lie somewhat ventrad of the body axis. There are seven preanal, ventral, supplementary organs and possibly more, occupying a distance about equal to three body diameters. They are subequidistant, inconspicuous,—hardly more than mere innervations,—and occupy a space two to three times the length of the spicula. There are about ten ventrally submedian setæ on the tail of the male. No oblique copulatory muscles have been observed. The ejaculatory duct is half as wide as the corresponding portion of the body and leads to the narrow tapering testes, and finally becomes about one-third as wide as the body. Two tail lengths in front of the anus of the male there is a longitudinal series of finely granular cells one-third as wide as the body, placed close one after the other. The first four are arranged in a moniliform manner, the remainder in pairs side by side. There are about twelve of these in all. These are probably the special glands found in male nemas, emptying into the cloaca.

AXONOLAIMUS POLARIS *Cobb.*

15. *A. polaris* Cobb, 1914. $\frac{0.8}{0.6}$ ..... $\frac{4.4}{1.}$ ..... $\frac{6.2}{1.}$ $\frac{(87)}{}$ $\frac{50.}{1.1}$ $\frac{(?)}{}$ ..... $\frac{97.}{.8}$ > 2.4mm

These specimens collected by Sir Douglas Mawson may very well be *Axonolaimus polaris* Cobb, and afford much additional information. There seem to be no important differences between them and the young specimen upon which *A. polaris* was based. The additional information derived from the present specimens is as follows: The apex of each lip is a convex-conoid refractive acute piece of cuticle two-thirds as long as the front of the head is wide. The walls of the pharynx are regular.

$\frac{0.7}{0.5}$ ..... $\frac{?}{?}$ ..... $\frac{6.}{1.}$ $\frac{(?)}{}$ $\frac{M}{1.1}$ ..... $\frac{97.}{1.}$ > 2.4mm—In addition to the details given in the formulæ it may be said that the arcuate or L-shaped, tapering, non-cephalated spicula, which at their widest part are about one-sixth as wide as the corresponding portion of the body, are hardly longer than the anal body diameter. In the single male examined they are accompanied by a gubernacular piece about half as long as the spicula, extending inward and backward from the anal region at an angle of about forty-five degrees and ending bluntly nearly opposite the axis of the tail. The general appearance of these spicula is as that of



immature specimens, or as if something might possibly be missing. Nevertheless, the specimen otherwise appears to be in good condition, so it must be assumed, for the present at least, that details of the spicula are as given. No series of preanal, ventral, supplementary organs has been seen. The specimens are considerably shrunken and not very well preserved.

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