

# ONE HUNDRED NEW NEMAS

(Type Species of 100 New Genera)

CONTRIBUTIONS TO A SCIENCE OF NEMATOLOGY, IX

BY N. A. COBB

The arrangement of the genera in the following pages will serve, to a considerable extent, to define and illustrate the orders proposed on page 214. This is especially true of all except the Litinia, Bolbinia, Mesonchs and Aponchs. In each order, a genus has been selected and given a name philologically connected with that of the order, in fact, the singular of the order name, and, in most cases, these genera may be considered as genera typical of the orders,—for instance, Axonchium may be taken as typical of the order Axonchia.

So far as it is found advisable to accept the classification proposed, it might be well to keep in mind in the establishment of the many new genera which the future will undoubtedly disclose, the application of similar names to those genera which most nearly represent the average structure of the order. In carrying out this idea, such names as Cytolaimella, Isolaimella, and other derivatives at once suggest themselves.

It is already becoming evident that some of these groups may probably early be advantageously subdivided; e.g., Cytolaimia, Anaxonchia. In case of subdivision, the principles alluded to in the footnote to page 213 might lead to some such action as the following: Amending the definition of the existing order and segregating the new order, and utilizing for the new order-name the roots already suggested (see p. 214, lines 27–28) together with appropriate prefixes. This would result in building up a comparatively simple, rather homogenous and characteristic nomenclature for the nema phylum.

In each order the genera are arranged somewhat in accordance with their relationships. Genera of doubtful relationship are usually placed near the beginning or near the end of the order series, and not infrequently appear, in the light of our present knowledge, to be intermediate, or indeterminate, forms. Thus, *Rhadinema flexile* at the beginning of the Isolaimia, p. 256, is doubtfully placed, and may be a cytolaime; so *Nannolaimus*, p. 255, may perhaps be a litinian form. Most of the order series present these special cases.

PHARYNX ABSENT, or so obscure as easily to escape notice*	New Genera
<b>Oesophagus</b> with median or posterior bulb or swelling, or both	
<i>Amphids none</i> , so far as known; or difficult to see and therefore easily overlooked	
Lateral wings to cuticle present; naked; striae fine; spinneret none; pharynx obscure	
Mouth depr.; faint apophyses in pharyngeal bulb; -f-; excretory pore behind neck. <i>Hyhalimus</i> 13	
Mouth not depr.; pharynx obscure, not apophysate; oesophagus faintly cephaloboid	
Head with papillae, minute lat. markings (amphids?); excret. pore front of nerve ring. <i>Litonema</i> 12	
Head without papillae or lateral markings; excretory pore behind the nerve ring.... <i>Choronema</i> 14	
Lateral wings to the cuticle none	
Spinneret abs.; naked; oesoph. faintly cephaloboid; striae very fine; faint wings.. ( <i>Choronema</i> ) 14	
Spinneret present; cephalic setae present	
Amphids invisible, known only as outlets of secretion; striae coarse; setae long. ( <i>Leptonemella</i> ) 21	
Amphids tiny, tubular, labial, forward-pointing, easily overlooked; striae plain	
Striae fine; male postanal tubular organs submedian; pharyngeal swelling present. ( <i>Catanaema</i> ) 56	
Striae coarse; pharyngeal swelling none; cephalic setae 4 or more; head nonstriate	
Mouth cavity present, very small; males without supp. organs; nema 10mm... ( <i>Lazonema</i> ) 20	
Mouth cavity none; vent. row acornshaped organs toward head; setae numerous. ( <i>Stibonema</i> ) 19	
<b>Amphids present</b>	
Form of the amphids more or less irregular, symmetrical to at least one line	
The amphids linear; cephalic setae 12 + 6 small; striae coarse; spinneret present. ( <i>Leptonemella</i> ) 21	
The amphids not linear; no spinneret; naked; labial region with papillae only	
Winged; 'f'; striae rather coarse; amphids semi-ellipses; oesoph. faintly cephaloboid. <i>Iotalaimus</i> 15	
Wings none; striae very fine; amphids with large internal connections..... <i>Bolbinium</i> 16	
Form of the amphids spiral, circular, or elliptical; spinneret present	
Shape of the amphids distinctly spiral; striae fine, resolvable	
Pharynx devoid of teeth; head expanded; cephalic setae 4; body setose..... <i>Bolbonema</i> 49	
Pharynx with 3 minute teeth; setae in longitudinal rows..... ( <i>Alaimonema</i> ) 107	
Shape of the amphids circular; sometimes small, well forward on the head, and obscure	
Lateral wings present; cephalic setae 4; amphids large	
Striae coarse, altered on the lateral fields; lateral wing distinct..... <i>Antomicron</i> 17	
Striae fine, not altered on the lateral fields; lateral wing faint..... <i>Cyartonema</i> 18	
Lateral wings none or faint	
External amphid circular, at least apparently, well developed; head set off	
Body setose; amphids really spiral, on the head; striae rather fine, resolvable.... ( <i>Bolbonema</i> ) 49	
Body naked; amphid circular	
Position of amphid, on head; striae fine; contour not crenate; wings faint.... ( <i>Cyartonema</i> ) 18	
Position of amphid, behind head; striae coarse; contour crenate..... <i>Cincionema</i> 22	
External amphid minute, on the front of the head, tubular, easily overlooked; neck 2-5%	
Striae fine; male postanal tubular organs submedian; pharyn. swelling present. ( <i>Catanaema</i> ) 56	
Striae coarse, plain; cephalic setae 4 or more; head without striae	
Mouth cavity very small; nema 10mm; males without supplementary organs. ( <i>Lazonema</i> ) 20	
Mouth cavity none; cephalic setae in 3 or more circles; males without caudal supplements	
Supplementary organs of acorn shape, found in a ventral row near the head.. ( <i>Stibonema</i> ) 19	
Supplementary organs none, but with special pre- and postanal submed. setae. ( <i>Stibonema</i> ) 19	
<b>Oesophagus</b> plain, i.e. without median or posterior bulb or swelling of palpal size	
<i>Amphids none</i> so far as known, or difficult to see and easily overlooked	
Wings 10-12; spinneret present; f-; striae fine, plain; ceph. setae 6, subceph. 4.... <i>Porocoma</i> 11	
Wings 2, if any, lateral only, in any case faint	
Spinneret abs.; oesoph. faintly cephaloboid; striae very fine; no setae; faint wings.. ( <i>Choronema</i> ) 14	
Spinneret present; amphids minute if any, unclosed	
Female organ single, -f-; 6 cephalic papillae only; spinneret doubtful; nema 0.28 mm. <i>Lilotes</i> 1	
Female organs double, 'f'; striae fine, plain; cephalic setae 4; 2 huge somatic glands. ( <i>Ionema</i> ) 9	
<b>Amphids present</b>	
Form of the amphids more or less irregular, often symmetrical to at least one line	
Contour of the amphids linear, i.e. long and narrow	
Lateral wings none; cephalic setae 6, subcephalic 4; 'f'..... <i>Tycnodora</i> 3	
Lateral wings present; head naked or its setae irregular; spinneret present	
Wings prominent; striae coarse; 'f'; inconspicuous pharynx (?)..... ( <i>Actinonema</i> ) 117	
Wings faint; striae fine; -f-; mouth oblique..... <i>Campylaimus</i> 5	
Contour of the amphids not linear	
Striae interrupted on the lateral fields by wings, plain	
Spinneret absent; oesophagus faintly cephaloboid; 'f'..... ( <i>Iotalaimus</i> ) 15	
Spinneret present; oesophagus narrow, one to two-fifths as wide as neck	
Anterior extremity mitriform, very distinctly set off; wings to the cuticle 6-8.... <i>Xennella</i> 6	
Ant. extremity not mitriform; coarse cuticular elements in rows like tiles; 'f'... ( <i>Ceramonema</i> ) 48	
Striae uninterrupted, fine, plain; spinneret present; slender nemas, up to 1.2%	
Head without setae; amphids relatively large and deep; not ocellate..... <i>Schistodera</i> 4	
Head with 4 cephalic setae; amphids small with obvious internal elements; ocellate. <i>Nemella</i> 10	
Form of the amphids spiral, circular, or elliptical (doubtful in <i>Lilotes</i> )	
Shape of the amphids spiral; striae resolvable, not altered on the lateral fields	
Spinneret absent; striae coarse; probably f (?); contour crenate..... ( <i>Alaimella</i> ) 7	
Spinneret present; striae rather coarse; amphids large	
Head expanded; lip-region elevated, not papillate; ceph. setae 6 plus 10; 'f'... ( <i>Nannolaimus</i> ) 36	
Head not expanded; lips 6, papillate; cephalic setae 4; 'f' (?). .... <i>Alaimella</i> 7	
Shape of the amphids circular or elliptical; spinneret present except perhaps in <i>Lilotes</i>	
Lateral wings perhaps pres.; 'f'; striae plain; lipless; pharynx very minute, conoid.. <i>Nemanema</i> 2	
Lateral wings none (or very faint); head rounded; striae none, or very fine	
Cephalic setae ten or more, in two circles	
Contour of amphids unclosed behind; setae 12, 4 subcephalic; mouth a mere pore. <i>Litinium</i> 8	
Contour of amphids closed; setae 10, no subcephalic; pharynx minute, conoid. ( <i>Linhomoella</i> ) 35	
Cephalic setae none, or small (4 or 6)	
Setae 4, small; ocellate; amphids small, labial, unclosed; body contains huge glands. <i>Ionema</i> 9	
Setae none; nemas of very simple structure; wings none or doubtful	
Papillae representing 6 setae; amphid (?) minute; -f-; nema 0.28 mm; width 5%.. <i>Lilotes</i> 1	
Papillae none; amphids fairly developed, closed; 'f'; nema 2.5 mm; width 1.4%. ( <i>Nemanema</i> ) 2	

\*For abbreviations used in the Key, see foot-note p. 223.

**PHARYNX PRESENT**

New Genera

Wall of the pharynx unarmed (for alternative see page 221, midway)	
Cavity of the pharynx conoid, or irregular	
Oesophagus with median or posterior swelling or both	
Amphids none, or obscure; striae plain, not altered on the lateral fields	
Spinneret none; head subtruncate, naked; contour almost imperceptibly crenate. <i>Cephalobellus</i>	23
Spinneret present	
Striae coarse; pharynx minute (none?) without swelling; head non-striated.... ( <i>Leptonemella</i> )	21
Striae fine; pharynx narrow, enclosed in a swelling; amphids minute labial tubes. ( <i>Catanema</i> )	56
Amphids present	
The amphids linear; pharynx (?) striae coarse, plain; no wings; setae, 3 circlets. <i>Leptonemella</i>	21
The amphids spiral, circular, or elliptical; when tubular, surface contour circular	
Form of the amphids a distinct spiral; spinneret present	
Striae coarse; oesophagus ≠ oxyroid; wings 8; cephalic setae 6, subcephalic 4.... <i>Dasynema</i>	34
Striae fine, plain	
Lateral wings only on tail of male; 'f'; pharynx somewhat zigzag; setae minute.. ( <i>Zalonema</i> )	7
Lateral wings absent	
Head with numerous scattered setae; pharynx small, narrow; onchi vestigial. ( <i>Alaimonema</i> )	107
Head not with numerous setae; pharynx fairly well developed; teeth unobvious; 'f'	
Cheeks thickly cutinized; cuticle thick..... <i>Zalonema</i>	57
Cheeks, if thick, not heavily cutinized; lips 2, large, lateral..... <i>Pseudonchus</i>	58
Form of the amphids a circle or ellipse; striae unaltered laterally	
Spinneret absent; striae fine	
Intestinal cells with crystals; 6 lips, appendiculate; -f; cephalic setae 10.... ( <i>Crystallonema</i> )	67
Intestinal cells not with crystals; lips none; -f; cephalic setae papillloid.... <i>Anticyathus</i>	24
Spinneret present	
Head swollen, unstriated; no pharyngeal swelling; striae coarse, plain	
Cephalic setae 4; lips none; no labial papillae; amphids a single circle..... ( <i>Cinctonema</i> )	22
Cephalic setae none; lips 6, unipapillate; amphids two concentric circles.... <i>Micromicron</i>	104
Head not swollen or set off; pharyngeal swelling alone present; striae fine, plain	
Pharynx narrow; amphids minute; male postanal organs tubular; setae 4 + 6. ( <i>Catanema</i> )	56
Pharynx capacious; amphids well developed, opposite the pharynx or behind it	
Lips 2, lateral; pharyngeal ridges simulate teeth; 'f'; cephalic setae 4.... ( <i>Pseudonchus</i> )	58
Lips 6, each with a digitate appendage; cephalic setae 10..... ( <i>Crystallonema</i> )	67
Oesophagus plain, i.e. without median or posterior bulb or swelling	
Amphids irregular	
Spinneret none; striae unaltered laterally; -f; spiral amphid placed on a deltoid part. <i>Didelta</i>	33
Spinneret present	
Striae altered laterally; 'f'; head naked, set off; cuticle thick; pharynx armed (?). ( <i>Actinonema</i> )	117
Striae not altered on the lateral fields	
Cephalic setae 12 + 6, in two circlets; -f; amphid inconspicuous..... <i>Leptogastrella</i>	28
Cephalic setae 6, in one circlet; amphid $\frac{1}{2}$ the width of the head; spinneret (?). <i>Rhabdocoma</i>	32
Amphids spiral, circular, or elliptical	
The amphids in the form of a spiral; striae not altered on the lateral fields	
Spinneret none (?); amphid $\frac{1}{2}$ the width of the head; naked; wings two..... <i>Neurella</i>	25
Spinneret present	
Buccal cavity with cutinous frame, and 3 apophyses with small apical teeth. ( <i>Trogolaimus</i> )	75
Buccal cavity without distinct framework and without teeth of any kind; striae fine	
Ovaries 'f'; striae resolvable; amphid of 4 winds; cephalic setae 6 + 10.... <i>Nannolaimus</i>	36
Ovaries -f; striae plain; amphids simulating a circle	
Mouth cavity large and obvious; cephalic setae unknown, in any case few.... <i>Margonema</i>	27
Mouth cavity small; head rounded; cephalic setae large, 4 (special) plus 6.... <i>Linhomoella</i>	35
The amphids in the form of circles or ellipses	
Striae altered on the lateral fields by wings; spinneret present	
Head set off by a groove, its appendages varied; striae coarse; wings numerous.. <i>Xenolaimus</i>	30
Head not strongly set off, though usually well developed	
Ovaries reflexed, 'f'; naked; striae fine, plain; pharynx small, obsolescent.... ( <i>Nemanema</i> )	2
Ovaries outstretched; pharynx well developed, but not large; cephalic setae present	
Striae fine, plain; cephalic setae 6, segmented; -f..... ( <i>Cytolaimum</i> )	31
Striae coarse; -f	
Cuticle rough from subdivided wings; setae many; lips 3, mandibulate (?)... ( <i>Xyla</i> )	72
Cuticle normal; lips 6, papillate, appearing somewhat fimbriate; striae plain. <i>Daptoneema</i>	66
Striae not altered on the lateral fields	
Spinneret absent; striae fine, plain; female organs outstretched, except <i>Rhabdocoma</i>	
Ovaries two, -f	
Cephalic setae 6, plainly segmented; lips three, papillate..... <i>Cytolaimum</i>	31
Cephalic setae 4, not segmented; lip-region punctate, amalgamated..... <i>Didelta</i>	33
Ovary one, subcephalic setae 4	
Cephalic setae 6; 'f'; lips 3, flattish, not digitate..... <i>Rhabdocoma</i>	32
Cephalic setae 10; -f; lips 6, small, digitate	
Cells of intestine with crystals; amphids not raised; excretory pore labial. <i>Crystallonema</i>	67
Cells of intestine without crystals; amphids raised; tail with spicate setae.... <i>Zanema</i>	68
Spinneret present	
Pharynx obscure	
Lips in two sets, outer large, low; inner soft extensions of the oesophagus.. <i>Zygonemella</i>	26
Lips not in 2 sets, amalgamated; ceph. setae 4, 3-jointed; phar. prismoid cup. ( <i>Rhadinema</i> )	37
Pharynx more or less obvious; striae plain	
Female organs reflexed, 'f'; striae fine; head naked; pharynx small..... ( <i>Nemanema</i> )	2
Female organs outstretched	
Ovaries two; striae fine	
Mouth cavity small, inconspicuous; cephalic setae 4 (special) plus 6.... ( <i>Linhomoella</i> )	35
Mouth cavity moderate, in a swelling; ceph. setae 6, plainly segmented; -f. <i>Cytolaimum</i>	31
Ovary one, -f; striae coarse; setae 12; lips 6, striate	
Lips conoid, striated, large, tipped with setae, and with a seta near base. <i>Dactylolaimus</i>	29
Lips flat, papillate, appearing fimbriate, three-ribbed..... ( <i>Daptoneema</i> )	66
Cavity of the pharynx more or less prismoid or cylindroid (not conoid or very irregular)	

Oesophagus with median or posterior bulb or swelling, or both	
Amphids none so far as known, or difficult to see and easily overlooked	
Lateral wings present; spinneret absent	
Striae none; wings 2; naked; pharynx like oesophagus lumen.....(Litonema) 12	
Striae fine; wing 1; seta-like papillae 6; pharynx contains glottoid organ.....Cephalobium 54	
Lateral wings absent; striae plain	
Spinneret present	
Striae very coarse; phar. cupshaped; nema 10mm; male, no supplement. organs.(Lazonema) 20	
Striae fine; phar. small, enclosed in bulb; male postanal tub. organs submedian..(Catanema) 56	
Spinneret absent; setae none	
Phar. very long, nar., ending in cylindroid bulb; 'f'; nema 1mm; lips conoid ....Myctolaimus 61	
Pharynx very short; cardiac bulb oblate or spherical; 'f'	
Nema 3.3mm; width 9%; pharyngeal apophyses present; oesophagus clavate.Blattophila 55	
Nema 6mm; width 3%; pharyngeal apophyses absent; oesophagus cylindrical.Potrellus 38	
Amphids present.	
The amphids are somewhat irregular, symmetrical to one line; striae fine, plain; wingless	
Form of amphids not lin.; no spinneret; naked; lips 6; phar. tub.; amphids large.Copurella 39	
Form of amphids linear	
Ovary one, 'f'; spinneret absent; cephalic setae 6 plus 4; pharynx tubular....(Myolaimus) 60	
Ovaries two, -f; spinneret present; ceph. setae 4; ventral (?) onchus near mouth.Pseudolella 53	
The amphids are spiral, circular, or elliptical	
Shape of the amphids a distinct spiral	
Striae coarse; oesoph. =oxyuroid; wings 8; ceph. setae 6, subceph. 4; head unstr..(Dasynema) 34	
Striae fine	
Lateral wings present; striae plain; spinneret present; head thick-walled....Pycnolaimus 40	
Lateral wings absent	
Spinneret none; -f; cephalic setae 10, subcephalic 4; pharynx obscure.....Laimella 44	
Spinneret present	
Phar. armed in front with 3 obscure equal teeth; setae numerous on head..(Alaimonema) 107	
Pharynx without teeth; head rounded	
Lips 2, lateral; 'f'; striae plain; pharyngeal ridges simulating teeth.....(Pseudonchus) 58	
Lips none, or very indistinct	
Cephalic setae 10, subcephalic 4; pharynx obscure, has minute onchus.....Laimella 44	
Ceph. setae four? (or none); lips set off; phar. 2-chamb., 2d tapering ....(Polylaimium) 59	
Shape of the amphid circular or elliptical (anon tubular); striae unaltered laterally	
Spinneret absent; striae plain, fine	
Ovary one, -f; ceph. setae 10, subceph. 6; amphids circular; pharynx broad.(Crystallonema) 67	
Ovaries two	
Cuticle naked; spear (?) minute; ceph. setae 0, 6 pap.; amphids ellip.; 'f' ..(Triplonchium) 80	
Cuticle not naked; without spear; ceph. setae present; amphids circular; -f.Anticyathus 24	
Spinneret present	
Buccal cavity very small and easily overlooked; cephalic setae present; striae plain	
Striae coarse; phar. minute, cupshaped; males without supplementary organs.Lazonema 20	
Striae fine; phar. narrow, bulbed; males with postanal rows of tubular organs.Catanema 56	
Buccal cavity very long; 'f'; striae fine; cephalic setae small or none	
Cephalic setae four (?) or none; amphids large, deep; pharynx 2-chambered...Polylaimium 59	
Cephalic setae 10, short; amphids small; ocellate; pharynx very long.....(Catalaimus) 89	
Oesophagus plain, i.e. without median or posterior bulb or swelling	
Amphids none so far as known, or difficult to see and easily overlooked	
Wings present; spinneret present; striae fine; ovaries two, f=; phar. vestigial..(Porocoma) 11	
Wings absent; striae fine	
Ceph. setae 10, long, segmented; lips 6, thin, each with seta; amphid minute slit..(Trilepta) 92	
Cephalic setae none, or not long or obviously segmented; lips without setae, or lipless	
Buccal cavity tubular; spinneret absent; 'f'; lipless; papillae depressed....(Isolaimum) 41	
Buccal cavity not long and tubular; spinneret present	
Ceph. setae 10; lips 6, obvious; dorsal phar. element bent in at lips; 'f' (?) ..(Asymmetrella) 70	
Cephalic setae 6, papillloid; lipless; -f.....(Litotes) 1	
Amphids present	
Structure of the amphids more or less irregular, usually symmetrical to at least one line	
Contour of the amphids linear; striae not altered on the lateral fields	
Ceph. setae long, segmented; lips 6, thin, each with seta; amphid minute slit..(Trilepta) 92	
Cephalic setae none, or not long and not obviously segmented	
Spinneret absent; 'f'; striae fine; phar. tub.; lips confluent; papillae depressed..Isolaimum 41	
Spinneret present; female sexual organs double; striae fine	
Buc. cavity tub.; amphids long; striae resolve; onchus ventral (?), obscure ..(Pseudolella) 53	
Buccal cavity not tubular; amphids more or less stirrup form; striae not resolvable	
Ocellate; cephalic setae none; lips faint; amphids distinct, though small.....(Illiun) 45	
Ocelli 0; setae 10; cutinized dorsal pharyn. element bent inward at lips..(Asymmetrella) 70	
Contour of the amphids not linear	
Striae altered on the lateral fields; ovaries two, reflexed; spinneret present	
Lateral wings present; striae coarse, like rows of tiles; pharynx narrow .....Ceramonema 48	
Lateral wings none; striae fine, plain; onchia vestigial; six cervical glands.(Anoncholaimus) 93	
Striae not altered on the lateral fields, fine	
Spinneret none	
Cephalic setae 4, forward-pointing; amphids more or less deltoid.....(Didelta) 33	
Cephalic setae 0; amphids more or less reniform.....Colpurella 39	
Spinneret present	
Cheeks thickly cutinized; head conoid; small forward-pointing onchia (?). (Isonemma) 109	
Cheeks not thickly cutin.; head not prom. conoid; no small onchia exc. in Anoncholaimus	
Ovaries outstretched, -f; ocellate; phar. tubular; nearly lipless; ceph. setae 4. (Coinonema) 42	
Ovaries reflexed, 'f'; striae fine, plain; pharynx not tubular; head truncate	
Cephalic setae none; ocellate; lips faint; amphids distinct, though small.....Illiun 45	
Cephalic setae 10; ocelli none; amphids indistinct	
Dorsal cutinized element of the pharynx bent inward at the lips.....(Asymmetrella) 70	
Dorsal wall of the pharynx not differentiated; onchia minute.....(Anoncholaimus) 93	
Structure of the amphids spiral, circular, or elliptical	

	New Genera
Form of the amphids a distinct spiral; spinneret present	
Winged; 'f'; striae coarse, plain; spinneret heavily cutinized; cephalic setae 4..... <i>Cynura</i>	46
Wings none; female sexual organs double; striae fine, plain	
Ovaries reflexed; no lips; pharynx none or nearly obsolete; ocellate..... <i>(Ionema)</i>	9
Ovaries outstretched, -f; cephalic setae 4; pharynx tubular, narrow	
Spiral amphid of one wind, somewhat hook-form; ocellate; pharynx obscure.. <i>Coinonema</i>	42
Spiral amphid of several winds; not ocellate; pharynx well developed..... <i>Xinema</i>	47
Form of the amphids circular or elliptical	
Striae interrupted on the lateral fields; lateral wings present; spinneret present	
Female organs single, -f; amphids 2 concentric circles; setae in groups of 3..... <i>(Omicronema)</i>	50
Female organs double, 'f'; amphids not 2 concentric circles; setae not in groups	
Spinneret heavily cutinized; cephalic setae 4; amphids really spiral..... <i>(Cynura)</i>	46
Spinneret simple, normal; cephalic setae 10; amphids small, elliptical..... <i>(Anoncholaimus)</i>	93
Striae not interrupted on the lateral fields	
Spinneret none; striae fine, plain	
Ovaries 2, -f; setae 4; amphids more or less deltoid; phar. irregularly napiform.. <i>(Didelta)</i>	33
Ovary 1, outstretched; amphids not deltoid	
Amphids very small; ceph. setae in 3 circlets of 6; f-; cuticle reticulated.... <i>Halanonchus</i>	51
Amphids large; setae 10, with 6 subcephalic; -f; lips with digitate processes	
Intestinal cells with crystals; caudal setae none; amphids not raised..... <i>(Crystallonema)</i>	67
Intest. cells without crystals; amphids raised; about 10 thorn-like caudal setae. <i>(Zanema)</i>	68
Spinneret present	
Ceph. setae in 3s; coarse, transverse striae resolvable into elongated elements .. <i>Omicronema</i>	50
Cephalic setae not in groups; striae, if resolvable, not into elongated elements	
Buccal cavity more or less obscure, easily overlooked; wings none	
Ceph. setae 4, 3-jointed; lips confluent; amphid 3 wide as trunc. head, closed. <i>Rhadinema</i>	37
Cephalic setae 6 or more, minute or papilloid.	
Lips none; amphid (?) unclosed behind, minute; head rounded; -f..... <i>(Litotes)</i>	1
Lips soft and rather obscure; amphid fairly well developed, closed..... <i>(Zygonemella)</i>	26
Buccal cavity obvious; setae only in <i>Halinema</i> long, then twice as long as head is wide	
Ocelli present; ceph. cuticle thick; head distinctly conoid; minute onchia (?). <i>Isonemella</i>	109
Ocelli none; cephalic cuticle not thickened; head not distinctly conoid; no onchia	
Ovaries two, 'f'; striae fine, plain; onchia vestigial; 6 cervical glands..... <i>Anoncholaimus</i>	93
Ovary one, -f; striae usually rather coarse; pharynx quite unarmed	
Head end diminished to form a sort of beak; pharynx tubular..... <i>Rhynchonema</i>	43
Head end not diminished to form a beak; pharynx not tubular	
Setae and amphids large; phar. shorter than head is wide; caudal setae pres.. <i>Halinema</i>	52
Setae and amphids medium size; lips conoid, tips with minute "claws". <i>(Dactylaimus)</i>	29
<b>Wall of the pharynx armed with teeth or onchia</b>	
<i>Armature spear-like</i> ; caudal glands and spinneret typically (usually) absent	
Spear with a bulbous base; striae fine, plain	
Oesophagus plain, faintly cephaloboid; -f; cuticle with wings..... <i>Aphelenchulus</i>	81
Oesophagus with a posterior bulb or swelling; cuticle without wings	
Amphids ellip., well devel. internally; 'f'; spear faint; lips 6, faint, unipapillate. <i>Triplonchium</i>	80
Amphids linear, transverse; oesophagus dorylaimoid; 'f'; no labial papillae..... <i>Dorylillum</i>	84
Speaker plain, i.e., without bulbous base; striae fine, nearly always plain	
Oesophagus plain, i.e., without median or posterior swelling; spinneret present	
Amphids 0; -f; cephalic setae 0; head truncate; lip-region set off; spear small "prod". <i>Iotonchium</i>	82
Amphids present; lip-region not set off	
Amphids symmetrical to one line only; setae 10; pharynx long; spear toothlike. <i>(Catalaimus)</i>	89
Amphids spiral, sometimes faint; 'f'; striae unaltered laterally; cephalic setae 4	
Ocellate; amphids labial; "spear" slender in nar. phar.; lips and papillae none. <i>Onchulella</i>	87
Ocelli none; lips 3, papillate; "spear" toothlike, in an open cavity..... <i>(Digitonchus)</i>	95
Oesophagus with posterior swelling which sometimes occupies ½ the neck	
Spinneret present; amphids spiral (?); eyes present; ceph. setae 4; lipless..... <i>Onchium</i>	83
Spinneret none; striae fine	
Amphids 0; -f; no ceph. setae; head truncate; lip-region set off; spear a small prod. <i>Iotonchium</i>	82
Amphids present	
The amphids elliptical; spear-tip bent; 'f'; lips 6, bipapillate..... <i>Campydora</i>	88
The amphids symmetrical to one line only; lips set off by constriction	
Female organs double, 'f'; spear long and very slender; pre-rectum very long... <i>Leptonchus</i>	85
Female organ single, 'f'; spear short, not slender; pre-rectum short	
Posterior oesophageal swelling short, not set off by constriction in front... <i>(Dorylillum)</i>	84
Posterior oesophageal swelling long, set off by constriction from previous part. <i>Axonchium</i>	86
<i>Armature of one or more teeth</i>	
Tooth one (for alternative see top Page 223: "Teeth two—")	
Oesophagus with a median or posterior bulb or swelling, or both (for alternative see Page 222)	
Amphids none or unknown, or so inconspicuous or faint as to be difficult to see	
Striae fine, plain; spinneret none; 'f'; naked; lips 6, bipapillate; spear bent at apex. <i>Campydora</i>	88
Striae altered on the lateral fields	
Wingless; spinneret present; onchulus with large dorsal muscle; setae small.... <i>(Iotadorus)</i>	115
Wings present	
Spinneret present; striae coarse, resolvable; 'f'; lips retractile; setae 4..... <i>(Ptycholaimellus)</i>	116
Spinneret absent; striae fine, plain; 'f'; lips not retractile, naked; spear bent.. <i>(Campydora)</i>	88
Amphidae present	
Structure of amphids more or less irreg., often symmetrical to one line (for alternative see Page 222)	
Contour of the amphids not linear; spinneret present	
Striae altered laterally; onchus small, well forward; setae obscure; lips 12..... <i>Iotadorus</i>	115
Striae unaltered laterally; 'f'	
Setae fasciculate; cuticle thick; lips faint..... <i>Xanthodora</i>	98
Setae not fasciculate; cuticle not thick..... <i>Bolbella</i>	90
Contour of the amphids linear; appearing as transverse slits opposite the pharynx	
Striae altered laterally; spinneret present; 'f'; striae coarse, resolvable	

	<i>New Genera</i>
Lip-region retractile; cephalic setae 4, rather obviously segmented.....	<i>Ptycholaimellus</i> 116
Lip-region non-retractile; cephalic setae 10, not obviously segmented.....	<i>Rhyps</i> 118
Striae not altered laterally, or very little; cephalic setae 10	
Lips thin and flap-like; cephalic setae long and obviously segmented.....	<i>Trilepta</i> 92
Lips not thin or flap-like; cephalic setae shorter, not obviously segmented; 'f'	
Striae resolvable; pharynx not subdivided; onchus not spear-like; no cervical setae. <i>Rhyps</i> 118	
Striae plain; pharynx in distinct chambers; onchus spear-like; cerv. setae long. ( <i>Bolbella</i> ) 90	
Structure of the amphids spiral, circular, or elliptical	
Form of the amphids more or less distinctly spiral; spinneret present, doubtful in <i>Laimella</i>	
Striae altered on the lateral fields; cephalic setae 'f'	
Wings present; striae fine, resolvable; lips 6, confluent, bipapillate; -f-..... <i>Pepsonema</i> 77	
Wingless; tooth with apophysis faintly y-shaped; striae coarse; amphids labial. <i>Ypsilon</i> 96	
Striae not altered on the lateral fields	
Onchus one, with its apophysis somewhat y-shaped; striae coarse; setae 4..... <i>Ypsilon</i> 96	
Onchus not y-shaped, often with small companions	
Amphids distinctly spiral	
Setae 0; body striated (exc. head); pharyn. bulb faint, cardiac napiform.. <i>Amphispira</i> 103	
Setae, cephalic 10, subcephalic 4; non-striated; -f-; onchus spear-like..... ( <i>Laimella</i> ) 44	
Amphids appearing circular	
Lips 12-fold; onchus somewhat spear-like; cephalic setae small, 6 plus 10-12.. <i>Mesodorus</i> 105	
Lips faint, not over 6; onchus not spear-like	
Ovaries -f-; phar. bulbous; amphids circular (?) ; setae 6 + 6; striae fine. ( <i>Bolbolaimus</i> ) 100	
Ovaries reflexed, 'f'	
Striae fine, plain; onchuli minute; lips faint, 6; papillae conical; setae 4.. ( <i>Polysigma</i> ) 106	
Striae coarse; head not striated; cuticle thick; cephalic setae fasciculate.. <i>Xanthodora</i> 98	
Form of the amphids circular or elliptical	
Striae altered on the lateral fields; spinneret present	
Wingless; labial amphids elliptic; striae resolvable; pharyngeal bulb one-sided. <i>Iotadorus</i> 115	
Wings present; striae coarse	
Female sexual organs single, -f-; cephalic setae 4, labial setae 6; wings numerous.. <i>Nudora</i> 113	
Female sexual organs double, 'f'	
Head expanded, naked; striae not retrorse; tooth small; lips minute, obscure. <i>Xenonema</i> 102	
Head not expanded, its setae 4; lips obvious; striae appar. retrorse throughout. <i>Rhinema</i> 114	
Striae not altered on the lateral fields	
Cephalic setae none	
Head hemispher., expanded; lips 6, conoid; spinneret pres.; onchus obscure. ( <i>Micromicron</i> ) 104	
Head not expanded; lips set off, confluent; no spinneret; 'f'; "spear" bent. ( <i>Campydora</i> ) 88	
Cephalic setae and spinneret present	
Onchus spear-like; amphids resemble concentric circles; setae in 2-3 rows.... ( <i>Mesodorus</i> ) 105	
Onchus not spear-like; amphids not concentric circles; setae, if numerous, fascicled	
Female sexual organs outstretched	
Ovaries two; cephalic setae 6+6; submedian onchia present..... ( <i>Bolbolaimus</i> ) 100	
Ovary single; ceph. setae 4; submed. onchi none or vestigial..... <i>Synonema</i> 110	
Female sexual organs reflexed, 'f'; amphids really spiral	
Submedian onchi present; labial papillae conical; setae 4; striae fine..... ( <i>Polysigma</i> ) 106	
Submedian onchi abs.; setae in fascicles; head non-striated; cuticle thick. ( <i>Xanthodora</i> ) 98	
Oesophagus plain, i.e. without median or posterior bulb or swelling; amphids present	
Form of the amphids more or less irregular, usually symmetrical to at least one line	
The amphids linear; spinneret present; 'f'; striae coarse, altered laterally	
Striae plain; head naked, set off by constriction; wing 1, prom.; cuticle thick .. <i>Actinonema</i> 117	
Striae resolvable into rods; ceph. setae 10; wingless; amphid 5-6 times as wide as long. <i>Rhyps</i> 118	
The amphids not linear; striae not altered on the lateral fields	
Head conoid; cheeks thick; ocellate; onchus minute; phar. narrow; setae 10..... ( <i>Isonemella</i> ) 109	
Head not conoid; cuticle of the cheeks not thick; 'f'; striae fine, plain	
Spinneret absent; lips 6, unipapillate; cephalic setae 6; amphid behind pharynx. <i>Onchulus</i> 94	
Spinneret present	
Buccal cavity extending beyond the nerve-ring; onchus spear-like; ocellate. <i>Catalaimus</i> 89	
Buc. cavity not unusually long, its dors. element bent at lips; not ocellate. <i>Asymmetrella</i> 70	
Form of the amphids spiral, circular, or elliptical	
The shape of the amphids more or less distinct spiral; spinneret present; 'f' or -f-	
Striae altered laterally, fine, resolvable; wings present; cephalic setae 10; 'f'.. <i>Acanthonchus</i> 101	
Striae not altered on the lateral fields, coarse, plain	
Spinneret unknown, abs. (?) -f-; setae 10; onchi submedian; contour crenate.. ( <i>Gonianchus</i> ) 97	
Spinneret present; 'f'	
Lips three; setae 6; amphida labial; onchus digitate..... <i>Digitonchus</i> 95	
Lips more than 3; setae num., scattered; amphids not lab.; onchi more than 1. ( <i>Croconema</i> ) 112	
The shape of the amphids circular or elliptical	
Striae altered laterally; wings numerous with retrorse bristles; cephalic setae 4. <i>Rhinema</i> 114	
Striae not altered on the lateral fields	
Head conoid; cephalic setae 10; spinneret present	
Ocelli none; 'f'; rear portion of oesoph. succession of bulbs; striae fine, plain. ( <i>Bolbella</i> ) 90	
Ocelli present; no succession of bulbs in the posterior part of the oesophagus	
Cheeks thick; onchus appressed, minute; pharynx rather long and narrow. ( <i>Isonemella</i> ) 109	
Cheeks not thick; onchus digitate, well developed; pharynx not narrow, short. <i>Cophonchus</i> 108	
Head not conoid; not ocellate; pharynx not long and narrow	
Spinneret unknown; amphids spiral; -f-; setae 10; onchisubmed.; contour cren. ( <i>Gonianchus</i> ) 97	
Spinneret present	
Onchi 3, clustered; phar. unobv.; setae scattered; cuticle thick; contour cren.. ( <i>Croconema</i> ) 112	
Onchus single, dorsal; -f-; cuticle thin	
Setae 4; pharynx small, closed; diameter of amphid $\frac{1}{2}$ the width of the head. <i>Synonema</i> 110	
Setae in 2s and 3s; phar. obv., open; diam. of amphid about $\frac{1}{2}$ width of head. <i>Anticyclus</i> 111	

## New Genera

Teeth two or more

- The teeth more or less equal in size, and usually mobile  
 Oesophagus with median or posterior bulb or swelling, or both  
 Onchi or teeth have an outward throw; amphids circular; spinneret present; -f.. *Aponchium* 79  
 Onchi or teeth have an inward throw  
 Amphids none, or so obscure as easily to escape notice; f.; teeth (?) 12..... (*Synodontium*) 65  
 Amphids present  
 The amphids horse-shoe shaped, faint; striae fine, unaltered laterally; f.... *Synodontium* 65  
 The amphids spiral, circular, or elliptical; striae fine, plain  
 Shape of amphids spiral; winged; spinneret pres.; naked; head expanded.. (*Pycnolaimus*) 40  
 Shape of amphids round or elliptical  
 Terminus hamate; amphid minute,  $\frac{1}{4}$  the width of the head; winged.... *Chambersiella* 64  
 Terminus not hamate; amphid  $\frac{1}{4}$  the width of the head; wingless; f..... (*Aponchium*) 79  
 Oesophagus plain, i.e. without median or posterior bulb or swelling  
 Onchi or teeth have an outward throw; amphids present; spinneret present  
 Form of amphids symmetrical to one line only; striae fine, plain; pharynx bulbous  
 Ovaries two, 'f'; onchi 3, duplex; cephalic setae 6 plus 6; head not set off..... *Ironella* 63  
 Ovary single, f'; lip-region set off; lips 6, bipapillate; spinneret ventral..... *Trissonchulus* 78  
 Form of the amphids spiral, circular, or elliptical  
 The amphids spiral; winged; 'f' (or -f); lips bipapillate; cephalic setae 4..... *Mesonchium* 76  
 The amphids elliptical; striae fine, resolvable, unaltered laterally; setae 4..... *Apodontium* 62  
 Onchi or teeth have an inward throw  
 Amphids 0 or unknown; onchi small, apophysate, lips 12, appendiculate..... *Gammanema* 74  
 Amphids present; spinneret present (questionable in *Crystallonema*)  
 Contour of the amphids circular  
 Wings many; 3 mandibulate lips; setae in 3 circlets; cuticle rough..... *Xyala* 72  
 Wing one or none; striae not altered on the lateral fields  
 Cephalic setae none; armature of three biting plates or hooks; wingless..... *Tripyllum* 71  
 Cephalic setae ten  
 Armature, 18 duplex radiating refractive ribs; winged; -f..... *Monhystrium* 69  
 Armature, 6 talon-like or digitate labial elements; f..... (*Crystallonema*) 67  
 Contour of the amphids spiral; striae resolvable  
 Winged; ovaries reflexed or outstretched; cephalic setae 4; pharynx cylindroid. *Mesonchium* 76  
 Wings absent; the 3 onchia enclosed in a bulb  
 Onchi small, with heavy apophysate; encl. in swelling; amphid of  $2\frac{1}{2}$ -3½ winds. *Trogolaimus* 75  
 Onchi large, without apophysate; phar. bulb spheroidal, amphid of  $1\frac{1}{2}$  winds. *Synonchium* 73
- The teeth usually unequal in size, not mobile**
- Oesophagus plain, i.e. without median or posterior bulb or swelling  
 Amphids none, or obscure and escaping notice; pharynx with many denticles; 'f'. (*Thoönchus*) 91  
 Amphids present  
 The amphids irregular, usually symmetrical to one line; spinneret present; 'f'  
 Form of the amphids not linear; striae fine, plain; pharynx denticulate..... *Thoönchus* 91  
 Form of the amphids linear; striae coarse, resolvable; cephalic setae 10..... (*Rhips*) 118  
 The amphids spiral, circular, or elliptical  
 Form of the amphids spiral; striae coarse, plain, unaltered; spinneret present  
 Pharynx and onchi minute, obsc.; lips not thin; setae scattered; amphids small. *Croconema* 112  
 Pharynx obv.; onchi plate-like, submedian; lips thin; setae 10; amphids large. *Gonionchus* 97  
 Form of amphids circular or elliptical; spinneret present (unknown in *Gonionchus*)  
 Winged; amphids large, faint; lips appendiculate; striae coarse, resolvable. *Anazonchium* 99  
 Wings none; cephalic setae 10; striae plain; lips thin  
 Ovaries 'f'; striae fine; phar. with many denticles; amphids obscure, ellip... (*Thoönchus*) 91  
 Ovary -f; striae coarse, contour cren.; onchi plate-like; amphids spiral..... (*Gonionchus*) 97
- Oesophagus with median or posterior bulb or swelling, or both  
 Amphids none or unknown; pharynx bulbous; striae fine, resolvable..... (*Bolbolaimus*) 100  
 Amphids present  
 Form of the amphids linear; wingless; ovaries reflexed  
 Spinneret present; 'f'; striae coarse, resolvable; cephalic setae 10..... *Rhips* 118  
 Spinneret absent; 'f'; striae fine, plain; cephalic setae 6 plus 4..... *Myolaimus* 60  
 Form of the amphids spiral, circular, or elliptical  
 Shape of the amphids circular; striae fine, unaltered laterally; spinneret present  
 Ovaries reflexed, 'f'; lips bipapil.; setae 4; submed. onchi minute; striae plain. (*Polysigma*) 106  
 Ovaries outstretched  
 Pharynx with distinct spherical bulb; striae resolvable; setae 6 + 6 + 4. *Bolbolaimus* 100  
 Pharyngeal bulb a faint swelling; striae plain; cephalic setae 4..... (*Aponchium*) 79  
 Shape of the amphids a distinct spiral; cuticle wingless; spinneret present  
 Onchus spear-like; lips minute, 12; cephalic setae 6 + 12 + 6; striae fine, plain. *Mesodororus* 105  
 Onchus very small, not spear-like; lips none or obscure  
 Lips bipapillate, papillae conical; 'f'; amphids labial; cephalic setae 4..... *Polysigma* 106  
 Lips non-papillate  
 Setae in 6 longitudinal rows; amphids opp. pharynx,  $\frac{1}{2}$  the width of the head. *Alaimonema* 107  
 Setae none; amphids not opposite the pharynx,  $\frac{1}{2}$  the width of the head.... *Amphispira* 103

## Abbreviations used in Key, not found on p. 341

abs, absent	cutin, cutinized	lin, linear	sim, simple
apophys, apophysate	depr, depressed	nar, narrow	swol, swollen
appar, apparently	devel, developed	numer, numerous	spin, spinneret
arc, arcuate	digit, digitate	obsc, obscure	term, terminal
buc, buccal	dist, distally	obv, obvious	thr, through
chamb, chambered	ea, each	pap, papillae	tub, tubular
clav, clavate	encl, enclosed	pres, present	uni, uniform
col, colored	lab, labial	prom, prominent	unstr, unstriated
cren, crenate			

## New Genera

<b>BURSA PRESENT:</b> spicula two, equal; tail more or less arcuate-conoid; no spinneret	
Accessories pres.; no suppl.; spicula $1\frac{1}{2}$ long as anal body width, straightish; -m. <i>Aphelenchulus</i>	81
Accessories none; spicula $2^{ce}$ as long as anal body diameter, cephalated by constriction	
Supplements 0; spicula L-form; -m; post. half of tail cylindroid; terminus rounded. <i>Iotonchium</i>	82
Supplements 2(2)1;2, clav.-digit., apic., ?'m; spicula obsc., straight; terminus blunt. <i>Myolaimus</i>	60
<b>BURSA NONE</b>	
Spiculum one, straight, uncephalated, 'm; spinneret none; tail acute	
Accessories pres.; 1();1, simple (postanal, single); spicula $2^{ce}$ anal body width.. <i>Cephalobellus</i>	23
Accessories none; supplements present, papillloid; found in insects	
Supplements 2()2; spiculum one-fourth as long as anal body diameter; tail conoid. <i>Blattophila</i>	55
Supplements simple; spiculum twice as long as anal body diameter	
Anus 90; 1();1; small access. (?) tail hemispherical, then conoid; terminus conical. <i>Protrellus</i>	38
Anus 80; accessories (?) tail conical, its terminus pointed..... <i>Cephalobellus</i>	23
Spiculae two, equal, more or less arcuate (exc. <i>Cophonchus</i> , <i>Synonchium</i> , <i>Iotalaimus</i> , <i>Ironella</i> , <i>Bolbinium</i> , <i>Mycolaimus</i> )	
The spicula jointed, long, not distinctly cephalated, of uniform width; spinneret present	
Supplements none; -m; terminus clavate; spinneret armed; accessories apophyses.... <i>Xinema</i>	47
Supplements 25, vent., preanal, simple, rather faint; -m; tail conoid; accs. not apophyses. <i>Rhips</i>	118
The spicula not jointed; tail conoid or subconoid (cylindroid posteriorly in <i>Anicyclus</i> , <i>Anticyclus</i> , <i>Cophonchus</i> , <i>Cyartonema</i> , <i>Gonianchus</i> , <i>Daptonema</i> , <i>Halanonchus</i> , <i>Ironella</i> , <i>Anaxonchium</i> , <i>Monhystrium</i> , <i>Schistodera</i> , <i>Pepsonema</i> , <i>Mycolaimus</i> , <i>Rhabdocoma</i> , <i>Bolbella</i> , <i>Thoénchus</i> , <i>Trilepta</i> , <i>Mesonchium</i> , <i>Cytolaimus</i> , <i>Tripliyum</i> , <i>Zygonemella</i> , <i>Synodonitum</i> and (?) <i>Xennella</i> )	
Accessories to the spicula none, or very faint	
Supplements present; spinneret absent, except in <i>Synonchium</i>	
Supps. dorylaimoid; spic. cephalated by expans., width unif.; -m; term. rounded. <i>Dorylaimus</i>	84
Supps. all ventral; spicula about $1\frac{1}{2}$ - $2^{ce}$ as long as anal body diameter, uncephalated	
Position of supps. not preanal only; 4 preanal, simple; 1 postanal, not simple; =m?. <i>Colpurella</i>	39
Position of supplements preanal only; supplements simple	
No. of supps. 4; spicula not of uniform width; ?=m; tail rather irreg. conoid. <i>Colpurella</i>	39
No. of supps. 2; spicula straight, width rather unif.; tail conoid-hemispherical. <i>Synonchium</i>	73
Supplements none or exceedingly faint	
Spicula slightly cephalated by expansion, unif.; tail conoid, then cylindroid; -m. <i>Zygonemella</i>	26
Spicula not cephalated	
Width of the spicula not uniform; spinneret absent (?)	
Spicula straight; about $\frac{1}{2}$ as long as anal body diam.; tail short, bluntly conoid. <i>Bolbinium</i>	16
Spicula arcuate; -m; tail conoid, then cylindroid, its term. rounded, $\frac{1}{2}$ as wide as base. <i>Trilepta</i>	92
Width of the spicula more or less uniform; spinneret present, except in <i>Triplonchium</i>	
Spicula straight; tail conoid-hemispherical; term. broad; spinneret a pore. ( <i>Synonchium</i> )	73
Spicula arcuate	
Spinneret absent	
Spicula very strongly arcuate; bursa (?) terminus broad, rounded; -m.... ( <i>Triplonchium</i> )	80
Spicula not very strongly arcuate; no bursa; terminus not broad..... ( <i>Rhabdocoma</i> )	32
Spinneret present; spicula not strongly arcuate; no bursa	
Anus 85; tail conoid, then cylindroid; width over 5%; spic. only slightly arcu. <i>Zygonemella</i>	26
Anus 97; term. broad, rounded; width about 1%; -m; single questionable supp.. <i>Nemanema</i>	2
Accessories to the spicula present	
Supplementary organs present near the anus (for alternative see middle opposite page)	
The supplements not all ventral; spicula $1\frac{1}{2}$ - $2$ as long as anal body diameter	
Position, preanal; not simp.; 2 rows 38 ea.; non-unif. spic. uncephalated; -m..... <i>Polysigma</i>	106
Position, not preanal only; no spinneret (except in <i>Catanema</i> and (?) <i>Cytolaimus</i> )	
Form of supplements simple; -m; spicula uncephalated, width rather uniform	
Supplements papillloid, 5 preanal, 4 postanal in pairs..... <i>Isolaimus</i>	41
Supplements discoid, 11 pre-, 5 postanal pairs; spic. $1\frac{1}{2}$ long as anal body diam. <i>Cytolaimus</i>	31
Form of the supplements not simple	
Spicula not cephalated; 16 pairs of supplements; terminus barely swollen; -m. <i>Cytolaimus</i>	31
Spicula cephalated	
Cephalated by constriction, straight?, width not uniform; 9 pairs papillae; 'm. <i>Mycolaimus</i>	61
Cephalated by expansion; width of spicula rather uniform	
Arrangement of papillloid supps. 1,1,1,1,1,1(1),2,1;1,3; 'm; term. hooked. <i>Chambersiella</i>	64
Arrangement of tub. supps. postanal, submed., about 7 prs.; -m; term. straight. <i>Catanema</i>	56
The supplements all ventral; spinneret present (exc. <i>Anticyclus</i> , (?) <i>Anticyclus</i> , <i>Neurella</i> )	
Position, preanal 17, postanal few, simple; spicula uncephalated, tapering (?); -m-. <i>Anticyclus</i>	111
Position of supplements preanal only	
Structure of supplements not simple (for alternative see page 225)	
Proximal ends of the spicula not cephalated	
Width not uniform, length $1\frac{1}{2}$ anal body diam.; 37 "campanulate" supps.; -m. <i>Alaimonema</i>	107
Width of the spicula more or less uniform	
No. of supplements 1; spicula $2\frac{1}{2}$ times as long as anal body diam., straight; =m. ( <i>Ironella</i> )	63
No. of supplements 4 or more; terminus more or less blunt	
Apophysis present; spicula $3^{ce}$ as long as anal body width; supps. 12; 'm.. <i>Aponchium</i>	79
Apophysis none; spicula long as anal body diam.; acc. prom.; supps. 4; -m. <i>Acanthonchus</i>	101
Proximal ends of the spicula cephalated	
Spicula cephalated by constriction, twice as long as anal body diameter	
Supplements 2, not simple; spicula rather uniform, their cephalation faint; -m. <i>Bolbella</i>	90
Supplements 6, mammiform; width of spicula not uniform; -m(?). <i>Xanthodora</i>	98
Spicula cephalated by expansion or contraction; width of spicula rather uniform	
Cephalated by contraction, strongly arcuate, as long as anal body diam.; -m. ( <i>Stilbonema</i> )	19
Cephalated by expansion	
Supplement one, tubular; spicula nearly straight; tail conoid, then cylindroid	
Length of spicula 5-6 anal body diameters; -m; spinneret bluntly conoid.. <i>Cophonchus</i>	108
Length of spicula $2\frac{1}{2}$ anal body diameters; =m; supplement bent toward anus. <i>Ironella</i>	63

## New Genera

Supplements numerous, 8-21	
Length of spic. 2 <sup>nd</sup> anal body width; proximae hooked; supps. 21, flat; -m-. <i>Trogolaimus</i>	75
Length of spicula 1-1½ times as great as the anal body diameter	
No. of protrusile(?) tub. supps. 8; acc. ¾ as long as spic., bends away; -m'. <i>Antomicron</i>	17
No. of faint, non-tubular supps. 16; acc. parallel, ¼ as long as spicula; -m-. <i>Gammanema</i>	74
Structure of supplements simple	
Proximal ends of the spicula not cephalated	
Width of spicula not uniform	
No. of supplements one, flat, faint; accessories, simple, faint; = m(?) .....	<i>Neurella</i> 25
No. of supplements 17, low, papillloid; spinneret (?) term. slightly swollen .....	<i>Anticyclus</i> 111
Width of spicula more or less uniform	
No. of supplements two, obscure; accessories stout; term. convex-conoid, acute.. <i>Nudora</i>	113
No. of supplements 15-20; terminus not acute	
Length of the spicula twice as great as the anal body diameter; 'm..... <i>Anazonchium</i>	99
Length of the spicula as great as the anal body diameter; -m-..... <i>Halanonchus</i>	51
Proximal ends of the spicula cephalated	
Cephalated by constriction, about ¼ as long as anal body diameter; supplements 6-40	
Width of spicula rather uniform; accessories 2, apophysate; -m; term. blunt. <i>Margnema</i>	27
Width of spicula not uniform	
Accessory with apophysis; -m'; tail fine, cylindroid; term. blunt; no spin. ( <i>Anticyathus</i> )	24
Accessories without apophysis, two; terminus convex-conoid, acute..... <i>Bolbolaimus</i>	100
Cephalated by expansion or contraction	
The cephalation is by expansion	
Width not unif.; supps. 5-6; -m'; accessory with apophysis; spinneret armed. <i>Halinema</i>	52
Width of spicula uniform or apparently so	
No. of supplements 3; spicula 1½ times as long as anal body diameter; -m. <i>Rhynchonema</i>	43
No. of supplements 25-65; spicula 1 or 1½ times as long as anal body diameter	
Apophysis to the accessory present; -m'; spinneret armed, 3-lobed... <i>Synodentium</i>	65
Apophysis to the accessory none; -m'; spinneret unarmed; anus raised.... <i>Mesodorus</i>	105
The cephalation is by contraction; width of the spicula not uniform	
No. of the supplements 1-3	
Spicula 1½ times as long as the anal body diam; supps. mere innervations.... <i>Ypsilon</i>	96
Spicula twice as long as the anal body diam; single elevated supp; -m-.... <i>Thoönchus</i>	91
No. of the supplements 4 or more; spicula tapering both ways	
Spicula long as anal body diam; accessory apophysate; -m'; no spinneret.. <i>Anticyathus</i>	24
Spicula twice as long as anal body diameter; accessory not apophysate	
Anus 98; width 1.6%; -m'; single elevated supp; 2 dozen innervations.... <i>Thoönchus</i>	91
Anus 92; width 3.8%; -m'; series of ventral spic.; nar. spinneret-tube. <i>Micromicron</i>	104
Supp. organs 0; spinneret pres. (exc. <i>Crystallonema</i> , <i>Triplonchium</i> , <i>Iotalaimus</i> , <i>Cephalobium</i> )	
Inner ends of the spicula not cephalated, or not obviously so	
Width of spicula not uniform; spicula 1-1½ times as long as anal body diameter	
Form of spic. subarcuate; spin. midway on tail, ventral; 'm-; term. rounded.... <i>Trissonchulus</i>	78
Form of spicula arcuate	
Apophysis to accessory extends backward; spicula 1-1½ long as anal body diameter	
Spinneret none; term. unarmed; -m'; spic. strongly arcuate; no caudal setae. <i>Crystallonema</i>	67
Spinneret present; term. faintly armed; -m'; minute, inconspic. caudal setae. <i>Linhomoella</i>	35
Apophysis to accessory none	
Wings to the cuticle present, also in anal region; spicula strongly arcuate..... <i>Xennella</i>	6
Wings to the cuticle none	
Accessory inconspicuous; spinneret (?); terminus ½ as wide as base of tail; -m. <i>Trilepta</i>	92
Accessories parallel, then bent away; spin. armed; term. ½ wide as base; -m.... ( <i>Stibonema</i> )	19
Width of the spicula more or less uniform	
Length of spicula 2-3 times as great as anal body diameter; acc. with backward apophysis	
Form of spic. straight thr. middle, arc. dist.; 3 <sup>rd</sup> long as anal body diam.; -m-. <i>Mesonchium</i>	76
Form of spicula arcuate throughout, about twice as long as anal body diam.; -m-. <i>Cyartonema</i>	18
Length of the spicula 1½ times as great as the anal body diameter	
Accessories massive; supps. 2, obscure; term. convex-conoid; spin. large, acute.... ( <i>Nudora</i> )	113
Accessories obscure; no suppliments; terminus blunt	
Form of spic. very strongly arcuate; rudiment. bursa pres.; no spinneret; -m. <i>Triplonchium</i>	80
Form of spic. not strongly arcuate, rather stout, blunt; no bursa; spinneret?. <i>Rhabdocoma</i>	32
Inner ends of spicula cephalated; spinneret present, except in <i>Iotalaimus</i> and <i>Cephalobium</i>	
Proximal ends of the spicula cephalated by constriction, width not uniform	
Length of the spicula twice or nearly twice or great as anal body diameter	
Apophysis to acc. tapering; tail not striated; spinneret swan's-head form, unarmed. <i>Nemella</i>	10
Apophysis to acc. none; tail striated; spin. elongated-conoid, armed; -m-. <i>Ptycholaimellus</i>	116
Length of the spicula 1½ times as great as anal body diameter	
Form of spicula straightish; 'm'; term. blunt, nearly ½ as wide as base; no spin. <i>Iotalaimus</i>	15
Form of spicula arcuate	
Spinneret none; -m'; terminus acute, unarmed; width of the body 3%..... <i>Cephalobium</i>	54
Spinneret present	
Spinneret tub.; anus 90; width of body more than 3%; term. unarmed; -m.. <i>Monhystrium</i>	69
Spinneret simple; width of body less than 1%	
Terminus swollen; accessories 2; anus 95%; caudal setae faint, anal only; -m?.. <i>Schistodera</i>	4
Terminus not swol.; acc. 1, more massive dist.; anus 97.5; setae not anal only. <i>Laxonema</i>	20
Proximal ends of the spicula cephalated by contraction or expansion	
Ends of the spicula cephalated by contraction (for alternative see top next page)	
Width of the spicula uniform; spicula about as long as anal body diameter	
Anus 98; -m'; cephalum short, faint; anal annules strongly modified ventrally... <i>Stilbonema</i>	19
Anus 94; -m'; cephalum elongated, contraction distinct..... <i>Cinctonema</i>	22
Width of the spicula not uniform	
Length of the spicula twice the anal body diameter; -m'; terminus rounded.. ( <i>Thoönchus</i> )	91
Length of the spicula equaling anal body diameter	
Cuticle = ½ radius; annules ¼ anal body width, elements not tile-shaped. <i>Actinonema</i>	117
Cuticle less than ½ radius; annules ½ anal body width, elements tile-shaped. <i>Ceramonema</i>	48

	<i>New Genera</i>
Width of the spicula not uniform	
Length of spic. equal to 2 anal body diams.; -m.; tail finally cylindroid; spin.? <i>Gonionchus</i>	97
Length of spicula equal to $1\frac{1}{2}$ anal body diameters	
Apophysis to acc. backward-pointing; spic. $1\frac{1}{4}$ long as anal body diam.; -m. <i>Coinonema</i>	42
Apophysis to accessory none	
Accessories 2, bending away from the spicula; spinneret unarmed; -m. .... <i>Zalonema</i>	57
Accessory 1, parallel to the spicula; spinneret armed; -m.(?) .... <i>Leptonemella</i>	21
Width of the spicula more or less uniform	
Length of the spicula about $1\frac{1}{2}$ times the anal body diameter	
Form of the spicula only slightly arcuate	
Tail diminished to a narrow terminus; -m.; accessory $\frac{1}{2}$ as long as spicula. <i>Zygonemella</i>	26
Tail not diminished to a narrow terminus; accessory $\frac{1}{2}$ long as spicula, sigmoid. <i>Rhinema</i>	114
Form of the spicula distinctly arcuate, or bent	
Apophysis to the accessory present	
Term. swol.; spin. rounded, unarmed; -m.; proximal 3rd of spic. straight. <i>Campylaimus</i>	5
Terminus apiculate; spinneret acute, armed; -m.; acc. soon bends away. ( <i>Coinonema</i> )	42
Apophysis to the accessory none	
Spicula not L-shaped; acc. slender, parallel, $\frac{1}{2}$ as long as the spicula; = m. <i>Alaimella</i>	7
Spicula L-shaped; striae resolvable into elements	
Accessory $\frac{1}{2}$ as long as dark-colored spicula; tail without wings ..... <i>Omicronema</i>	50
Accessory $\frac{1}{2}$ as long as spicula; tail with wings. .... <i>Xyala</i>	72
Length of the spicula about twice to thrice that of anal body diameter ( <i>Tripylium</i> , $1\frac{1}{2}$ )	
Form of spic. normally straightish, arcuate in strong acc.; spinneret blunt. ( <i>Leptogastrella</i> )	28
Form of the spicula arcuate	
Apophysis to the accessory present	
The accessory surrounds posterior $\frac{1}{2}$ of hamate spicula; -m.; caudal setae few. <i>Iotadorus</i>	115
The accessory parallel to narrow spicula; -m.; caudal setae many, in 4 rows. <i>Peponema</i>	77
Apophysis to the accessory none	
Accessory tub., strongly developed, enveloping spic.; numer. setae; -m. <i>Leptogastrella</i>	28
Accessory not tubular	
Accessory bends away from spic., $\frac{1}{2}$ long as spic.; -m.; term. blunt, armed. <i>Apodontium</i>	62
Accessory parallel to the spicula	
Anus 85; acc. surrounds laterally bent, dark-col. spic.; -m.; spin. armed. <i>Daptinema</i>	66
Anus more than 90; spicula not laterally bent, not dark-colored; spinneret unarmed	
Spinneret blunt, tubular; anus 93; -m.; accessory $\frac{1}{2}$ as long as spicula. .... <i>Tripylum</i>	71
Spinneret conical, plain; anus 96; -m.; accessory parallel to distal halves. <i>Pseudonchus</i>	58

## THE NEMA FORMULA

Nema dimensions sometimes vary perceptibly with varying technique.

As a rule, information conveyed in the keys, formulae and illustrations is not repeated elsewhere. Following other authors, the measurements for the ovaries are given separately instead of in the form of a single measurement as formerly. Furthermore, the oblique stroke indicating the presence and position of the excretory pore is here, in No. IX, placed below the formula line, the assumption being that the formula shows the nema ventral side down. The general form of the spicula and accessories is shown in the formula for the male, as is also the presence, number and position of the supplements,—indicated by small suffixes before and after the anal measurement figure. The spicula diagrams are of three different degrees of curvature, indicating nearly straight, arcuate and strongly arcuate spicula. The nature of the proximal ends of the spicula is indicated, i. e. whether cephalated, and if cephalated, whether by contraction, constriction or expansion. Also, if it exists, the presence of an apophysis to the gubernaculum is indicated. The short, horizontal marks indicating the wings and the presence and relative diameter of the oesophageal swellings are only dotted when these features are not of a pronounced nature. The mark indicating the presence of a spinneret is either plain or so conventionalized as to indicate that the spinneret is supplied with setae. The absence of any particular mark in the formula is practically always to be taken as indicating that the particular feature in question is non-existent. Doubt is expressed by a question mark. The reason

for calling attention to these special marks is that until one becomes accustomed to them they may appear rather insignificant. Once recognized, they may save the reader considerable time and trouble.

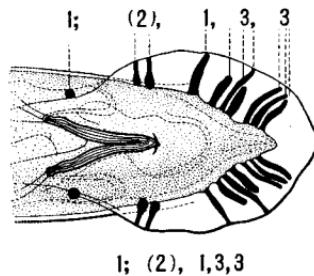
The adjacent table shows the various formula lines by which the number of striae per millimeter is indicated. See also pages 6 and 7, where the various signs used in the formula are explained in full.

Terminology Relating to Striae of Cuticle		
Number of Striae 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 ± to	None	

In this number, 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 is indicated by suffixes in front of and behind the anal measurement figure. Furthermore, as already noted, the form of the spicula and gubernacula is indicated by conventionalized sketches appropriately placed. See, for instance, page 279.

#### BURSAL FORMULA FOR NEMAS

In the following rather arbitrary designations, which are expressed in a written formula, only the papillae and ribs on one side of the bursa are considered. They are designated according to their proximity to each other and not according to their anatomical and physiological characters. They are regarded as either anal, pre-anal, or post-anal, according as they are opposite to, in front of, or behind the anus. In the graphical bursal formula, the anus is represented by a pair of parenthesis marks; all papillae opposite the anus are indicated in the parenthesis, the pre-anal papillae are indicated in front of the parenthesis, and the post-anal papillae after the parenthesis. The papillae and ribs are considered as a single longitudinal series, and each group is indicated by a digit representing the number of ribs or papillae in the group. The longitudinal spaces separating the groups of papillae and ribs are indicated by commas and semicolons, the comma representing a short space, the semicolon a longer space. In some cases before and after the parenthesis, the punctuation mark may be omitted, thus indicating that the ribs or papillae are even nearer to the anus than in those cases where the separation is indicated by a comma or semicolon. A blank space in the type after the comma, or after the semicolon, indicates a longer space than is indicated by the comma or semicolon alone. By such simple means it is possible to indicate with considerable accuracy the grouping and latitude of these various organs and groups of organs. A glance at the above illustration, Fig. 0, and formula immediately underneath will make the matter clear.



1; (2), 1, 3, 3

GENERAL—*Unless otherwise indicated,—*

1. The species described under a generic name is to be regarded as the type species of the genus; where more than one species is described, the type species is specifically designated.
2. The text terms and formulae apply to the nemas as viewed in profile. References to stain are restricted to acid carmine.
3. The cuticle is colorless.
4. The cuticle is striated,—sometimes, however, so finely striated as to be resolvable only with the highest powers of the microscope used skillfully under favorable conditions. The division line of the formula is used to indicate approximately the number of striae per millimeter. (See page 227.)
5. The striae are approximately uniform in width throughout the length of the body except toward the extremities.
6. The contour is plain.
7. The striae are not resolvable into secondary elements. The presence of secondary elements is indicated in the formula. (See page 7.)
8. The longitudinal striations are due to the attachments of the musculature.
9. There are no obvious series of pores in the cuticle.
10. There are no eye-spots.
11. There are no definite valves in the oesophageal bulbs.
12. The lining of the oesophagus is a distinct, but not conspicuous, feature, practically throughout its length.
13. The intestine is set off from the oesophagus by a distinct constriction.
14. The arrangement of the granules in the cells of the intestine is not such as to give rise to a tessellated effect.
15. There is no pre-rectum.
16. The rectum extends inward and forward at an angle of about thirty to forty degrees.
17. The tail, at least that of the female, is straight, or nearly so.
18. The somatic, as well as the posterior cervical, setae, are perpendicular to the cuticle, or nearly so.
19. The renette cell lies behind the base of the neck.
20. The nerve-ring surrounds the oesophagus rather squarely.
21. Absence of the formula for either sex indicates that that sex is unknown at the present time.

FEMALE—*Unless otherwise indicated,—*

22. The vagina is understood to lead inward at right angles to the ventral surface.
23. The uterus is more or less straight.
24. The eggs are thin-shelled and smooth, and are deposited before segmentation begins.

MALE—*Unless otherwise indicated,—*

25. There is no bursa.
26. The tail of the male is similar to that of the female in form.
27. The spicula are two in number, equal in size, and appear moderately articulate when viewed in profile, and are simple, i.e., without obvious extra component longitudinal stiffening elements.
28. The accessory piece (or pieces), gubernaculum, lies more or less parallel to the spicula, and has no inward or backward-pointing apophysis.

### New Data

Apart from indicating that the nema phylum can be divided into valid, natural orders on the basis of the structure of the mouth parts and related organs, this article records numerous additions to our knowledge of the morphology of nemas. Facts announced in a sentence or two, or through the medium of illustrations, might perhaps have been advantageously made the subject of separate papers. Among these additions to our knowledge, the following may be mentioned:

1. In a miscellaneous lot of over one hundred new genera of nemas, thirty per cent prove to have jointed setae. Probably a much larger percentage have jointed setae. Among the nemas having setae, jointed setae are probably the rule rather than the exception.
2. The distal ends of the cephalic setae sometimes exhibit considerable complexity, indicating that they are specially developed sense organs; e.g., in *Linhomoella* and *Crystallonema*.
3. Additional evidence that bilateral mouth-parts arise by elimination of dorsal elements exists in *Pseudonchus*.
4. There is a large group of nemas with six well-developed onchia having an outward stroke, adapted for digging; e.g., *Apodontium* and relatives.
5. More than ever, it is clear that amphids are practically universal among the free-living nemas. They may be small and difficult to see; as in *Stilbonema* and *Laxonema*. In the past, they have been sometimes overlooked. Some Triplonchs possess amphids; e.g., *Onchium*, *Triplonchium*.
6. All amphids have backward connections,—often, perhaps always, tubular and containing coagulable substance. Of unusual interest are the huge glands of *Ionema*.
7. Lateral series of organs occur in so many of the genera described, as to lend additional weight to the opinion that such series are a normal element of the nema structure.
8. There is much additional evidence of differentiation of form and structure among the various cells of the intestine.
9. The presence of oesophageal glands is established for *Axonchium* and its relatives, (*Dorylaimus*, etc.) They occur in the posterior enlargement of the oesophagus, one emptying into the lumen dorsally in its anterior part, and often two others emptying into the lumen farther back.
10. Non-terminal spinnerets and mouth openings seem practically always ventral; e.g., *Trissonchulus*, *Campylaimus*.
11. A large unicellular gland is connected with each supplement of the males of *Bolbella* and *Eurystoma*.
12. The presence of pairs of cloacal glands in the male, first observed by de Man in *Euchromadora*, is established for many other genera.
13. Cytolaimian transition-forms exist between the parasitic and free-living nemas; e.g., *Monhystrum*.
14. The existence of double-jointed spicula is established for *Rhips* and *Xinema*.
15. Nemas are disclosed in which the sperm cells are of extraordinary size; such species may prove useful in studies in genetics.
16. *Rhynchonemas* are distributed in various oceans. They are free-living nemas with beak-like heads, but otherwise normal in form. Presumably, this beak serves to extract food from receptacles the entrances to which are narrow.
17. There is a marked absence of syngonism in marine forms.
18. The existence is demonstrated of special spermatheca, in the form of special separate branches of the female sexual organs.

## I. Order Litinia

*1. Litotes minuta n. sp.* .<sup>.4</sup><sub>.7</sub> 13.<sup>4</sup><sub>2.8</sub> 28. <sup>25</sup><sub>4.</sub> 61. <sup>88.</sup><sub>5.1</sub> .<sup>.28</sup><sub>3.2</sub> Cuticle thin, naked.

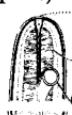
The mouth opening is almost imperceptibly depressed. The conoid neck carries a conoid oesophagus. The presence of amphids is indicated by slight, narrow external markings of a very faint character. In the region of the nerve-ring the oesophagus is three-fifths as wide as the corresponding portion of the neck, while finally it is five-sixths as wide as the base of the neck; its lining is indistinct, its musculature fine and colorless. No oesophageal glands. The intestine becomes at once three-fourths as wide as the body, is thin-walled, and but few of its cells are required to complete its girth. The intestinal lumen is distinct.

or  (phpp16) The distinct cardiac collum is two-thirds as wide as the body.

  Near its beginning the intestine is pressed well to one side by the renette cell, which is more or less ellipsoidal in form and  granular in structure. It is about as long as the body is wide and about half as wide as long, and contains a very indistinct nucleus of medium size. There are few granules in the cells composing the intestine. The tail is conoid. Nothing is known concerning the longitudinal fields. The nerve-ring is medium-sized and accompanied by more or less distinct groups of nerve cells. The small indistinct vulva is more or less continuous with the ventral surface of the body. The rather weak, tubular, non-refractive vagina extends obliquely forward apparently about half way across the body. The ellipsoidal granular eggs are about three times as long as the body is wide, and nearly one-third as wide as long. The broad, tapering ovary contains six to eight ova arranged single file.

*Habitat:* Algae, near the lighthouse, Bahia, Brazil. Bears some resemblance to *Monhystera* and *Oxystoma*. Differs from *Monhystera* in having no pharynx and no distinct amphids; from *Oxystoma* in the form of the amphids and the form of the female sexual organs. Sublimate to balsam. Fig. 1.\*

*2. Nemanema simplex n. sp.* Head with faint traces of papillae on the outer part, indicated by refractions in the cuticle. Possibly the exceedingly minute

 or pharynx contains an acute, forward-pointing projection or tooth, but all details are so exceedingly minute that even under the very highest powers of the microscope they are resolvable with difficulty. The oesophagus expands but little until after it passes through the nerve-ring; thereafter it expands until near its posterior extremity, where

 .<sup>.2</sup><sub>.3</sub> 7.9. <sup>19.</sup><sub>.9. (n)</sub> 1. <sup>231.<sup>10</sup></sup><sub>1.4</sub> 97.<sup>4</sup><sub>.8</sub> >2.5.. it is two-thirds as wide as the base of the neck; the posterior extremity of the oesophagus stains somewhat differently from the rest. Cardia large,

 .<sup>.2</sup><sub>.3</sub> 9.2. <sup>21.</sup><sub>.9. (n)</sub> 1. <sup>51-M</sup><sub>1.</sub> 97.<sup>1</sup><sub>1.</sub> >2.2.. conoid, half as wide as the base of the neck. From

 the distinct cardiac collum the intestine becomes at once two-thirds as wide as the body; its cross-section comprises about six cells. The lateral fields are about half as wide as the body. When viewed dorso-ventrally the amphids are seen to be connected with refractive, cutinized ducts which lead inward and backward for a short distance and then become indefinite. Tail conoid, its terminus three-fifths as wide as its base. The large, elongated, narrow caudal glands lie tandem on the ventral side in front of the anus, the foremost being removed from the anus a distance three to six times as great as the length of the tail. Observations on the ventral gland and excretory pore

\* Each figure is designated by the number of the genus it illustrates. If two species of the genus are illustrated, the figures are designated *a* and *b*, respectively.

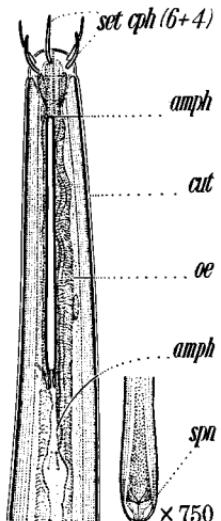
have not been satisfactory, but it appears as if there is a small, narrow, elongated ventral gland a short distance behind the cardiac constriction, where the intestine lies a little to one side. Each lateral field contains large ellipsoidal cells,—too large to be placed side by side within its limits; they are placed alternately to one side and then the other. Their size is such that, in the neck at least, if they were arranged single file they would make a continuous series a little more than half as wide as the field and about one-third as wide as the body. From the raised vulva, the vagina leads half way across the body, where it joins the single uterus, which extends backward. The ovary reaches about half way back to the vulva and contains a score or more of developing ova, which are arranged for the most part single file. Anterior branch rudimentary. The elongated eggs are about four times as long as the body is wide and about one-sixth as wide as long. The tail of the male is slightly more arcuate than that of his mate. Opposite the proximal ends of the spicula there is a very low, rounded, ventral elevation. Near the ventral line in front of the anus for a distance two to three times as great as the length of the tail there are a few minute setae, about one-eighth as long as the body is wide, and immediately behind the anus there are one or two similar setae; otherwise there are no indications of special papillae or setae. Spicula about one and one-half times as long as the anal body diameter. Their proximal ends lie near the dorsal side of the body.

*Habitat:* Algae and marine sand at their bases, in surf, Island off Port Royal, Jamaica. Sublimate to balsam. Fig. 2, p. 230.

3. *Tychnodora pachydermata* n. sp. .14 13. 23.  $\frac{15}{.36}$   $\frac{52}{1.2}$   $\frac{15}{1.5}$   $\frac{89.6}{1.8}$   $\frac{2.2}{.84}$  Cuticle thick, glassy; near the head more nearly colorless, sometimes smoky, at any rate after treatment with Flemming's solution; near the middle of the body, occupying one-sixth the radius; near the spinneret much thinner than elsewhere; rather suddenly diminishing in thickness near the nerve-ring. Lining of oesophagus sub-distinct; the musculature fine and colorless. There is no cardia. The thin-walled intestine is separated from the oesophagus by a collum one-fourth as wide as the body. The lumen of the intestine is faint. From the depressed anus the inconspicuous rectum extends inward a distance twice as great as the anal body diameter. Very few granules are to be seen in the intestinal cells. The contents of the intestine are finely granular. The more or less arcuate tail is first conoid, then cylindroid in the posterior fourth, where it is about one-fourth as wide as at the anus. The lateral fields are one-half as wide as the body. From the inconspicuous vulva, the cutinized vagina extends one-third the way across the body. The somewhat cylindroid ovaries extend two-fifths the way back to the vulva and carry twelve to twenty ova arranged more or less single file.

*Habitat:* "Seagrass," shoal, two miles off Key West, Fla., U. S. A. Flemming to glycerine jelly. Resembles *Halalaimus*, but the female has two reflexed ovaries. Fig. 3.

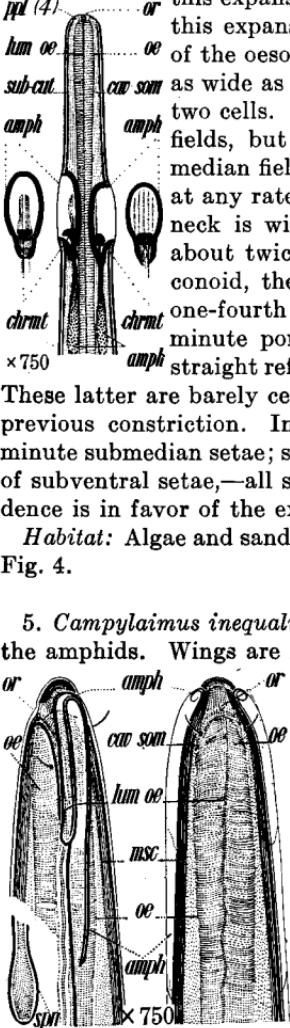
4. *Schistodera exilis* n. sp. .1 8.2 15.  $\frac{15 \times 10^2}{.2 .7 .8}$   $\frac{95}{.9 .7}$   $\times 2.7$  The naked cuticle is extremely thin. From the mouth about one-third the way to the anterior margin of the lateral organs, the lining of the oesophageal tube is a little more massive than farther back. The amphids are interesting on account of the presence



in the posterior portion of the cavity of each of a strongly staining body, which may be assumed to be protoplasmic. The bottoms of the amphids are strongly cutinized. Oesophagus conoid, finally about half as wide as the base of the neck; just where it joins the intestine it appears to expand suddenly, although *ppd* (4) or this expansion could hardly be called a bulb. It is possible that *lum oe* *oe* this expansion indicates the presence of glands about the base of the oesophagus. The intestine becomes at once three-fourths *sub-cut* *aw som* as wide as the body and in cross-section appears to present only *amph* two cells. Little that is definite is known concerning the lateral fields, but it is presumed that they are well-developed. The median fields are rather distinct. They contain a series of cells, at any rate in the neck; these cells are about half as long as the neck is wide and are separated from each other by distances about twice as great as their length. Tail of the male at first *chmt* *chmt* conoid, then cylindroid in the posterior half, where it is about one-fourth as wide as at the base. The spinneret has a very *x 750* minute pore. The caudal glands lie in front of the anus. A straight refractive piece appears to subtend the arc of the spicula. These latter are barely cephalated by an almost imperceptible expansion and a previous constriction. Immediately behind the anus there are two or three minute submedian setae; similarly, close to the anus, and in front, there is a pair of subventral setae,—all seen with considerable difficulty. The balance of evidence is in favor of the existence of two testes.

*Habitat:* Algae and sand at their bases, in surf, Island off Port Royal, Jamaica.  
Fig. 4.

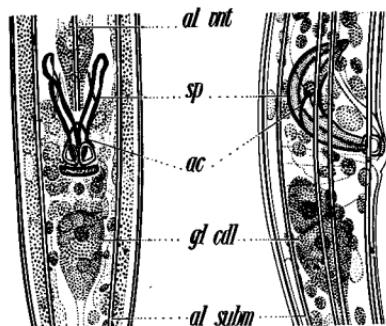
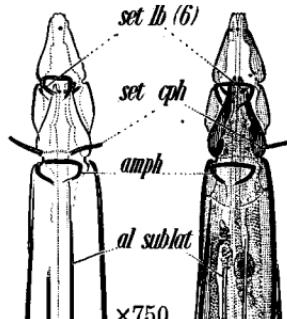
5. *Campylaimus inqualis* n. sp. Striae more easily seen along the margin of the amphids. Wings are indicated by the presence in the lateral fields of two *or* *amph* *or* 1.2 7.5 17. 2<sup>1</sup>-50-<sup>28</sup> 85. longitudinal lines *oe* *aw som* 2.1 3.2 4.1 4.5 2.9 >.7.. very close together and barely resolvable *lum oe* 1.3 9.4 17. 4<sup>2</sup>-M 84. with high powers. *msc* 2. 3.4 3.9 4.2 3.2 >.6.. Like the mouth-opening the cephalic setae are asymmetrically placed. The mouth is a simple, unarmed, conoid depression on the ventral side of the head a little behind the anterior extremity. There are no distinct lips, but the anterior extremity is modified so as to resemble a lip-region; it is set off by a minute constriction and presents a minute depression that takes acid-carmine stain more strongly than do the adjacent parts. No doubt this terminal "cap" serves some distinct function,—as tactile or gustatory. The conoid oesophagus finally becomes almost three-fourths as wide as the base of the neck. There does not appear to be any distinct cardia. Around the base of the oesophagus there is a circlet of small cells which stain in the same manner as do the cells of the intestine. This latter becomes at once about three-fourths as wide as the body. The lateral fields have not been distinctly seen. Nothing definite is known about the renette and excretory pore. Tail conoid to the simple terminus, which is set off by a broad, shallow constriction. The caudal glands appear to be located in front of the anus, probably a long distance in front of it. In the male the anus is slightly raised. Spicula



about one and one-half times as long as the anal body diameter, their proximal ends slightly cephalated by expansion. They are rather markedly arcuate in their distal two-thirds, but nearly straight in the proximal third. There seems to be but a single testis.

*Habitat:* Marine sand and mud, San Pedro, California. Fig. 5.

6. *Xennella cephalata n. sp.* .17 11. — 23.  $\frac{19}{2.3}$  92.  $\frac{.94}{2.2}$  The cuticle, which is of medium thickness, is traversed by six to eight longitudinal ribs or wings on each side. There are at least four cephalic setae, possibly six; otherwise the cuticle seems to be naked. The mitriform head is set off by a distinct constriction. The neck is cylindroid. The somewhat conoid oesophagus is at first one-ninth, near the nerve-ring one-fifth, and at last two-fifths as wide as the corresponding portion of the neck. A final obscure swelling contains one or more nuclei, which differ from all other nuclei in the organ. The lining of the oesophagus is indistinct. The intestine is separated from the oesophagus by a colum one-fourth as wide as the base of the neck, and becomes at once two-thirds as wide as the body, and in cross-section presents but few cells. The anterior part of the intestine for a distance about equal to the length

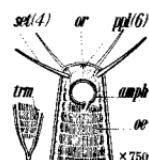


of the corresponding body-diameter has a structure different from the portion that follows. The cells of the intestine contain numerous very minute granules. The elongated granular renette cell is about as long as the corresponding body diameter, and lies a little in front of the cardia. It is not reflexed. Apparently the excretory pore is located near the nerve-ring. This latter is oblique, distinct, and broad. The spicula when viewed dorso-ventrally appear to make an angle of about thirty degrees with each other. The specimens were molting.

*Habitat:* "Sea-grass," shoal, two miles off Key West, Florida. Figs. 6a and b. It is believed only the spinneret was missing from the single specimen measured.

The actual measurements are, —  $\frac{2.}{3.} \frac{106.}{19.7} \frac{219.}{18.} \frac{41\frac{1}{2}}{22.} \frac{866.}{21.} (944. \text{ microns})$

7a. *Alaimella cincta n. sp.* Cuticle relatively thick. The secondary elements of the striae are on the limits of visibility and reach nearly across the annule. There are probably six, flat, amalgamated lips. The conoid neck contains an oesophagus which is more or less clavate at the rear end. Near the mouth it is one-half, at the nerve-ring two-fifths, and finally three-fifths, as wide as the corresponding portion of the neck; its lining is indistinct. There may be a faint, conoid cardia. Intestine at once about three-fourths as wide as the body, more or less thin-walled, and presenting but few cells in cross-section. The intestinal cells contain numerous, rather uniform granules, regularly placed. From the continuous anus, the cutinized rectum



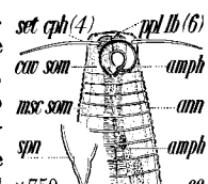
$\frac{0}{.4} \frac{9.6}{1.1} \frac{19.}{1.3} \frac{92.5}{1.5} ? 1.3 \text{ -- }$

$\frac{0}{.5} \frac{9.7}{1.1} \frac{18.}{1.5} \frac{X}{1.4} \frac{90.3}{1.1} ? 1.3 \text{ -- }$

is about twice as long as the anal body diameter. Tail conoid. The eggs are two to three times as long as the body is wide. The ova are arranged more or less in single file, and the ovary extends two-thirds the way back to the vulva. The proximal ends of the slender, somewhat tapering, rather frail, subacute spicula lie opposite the body axis. There are two rather frail, simple accessory pieces.

*Habitat:* Sand-bar, Biscayne Bay, Florida, U. S. A. Flemming to glycerine jelly. Fig. 7a, p. 233.

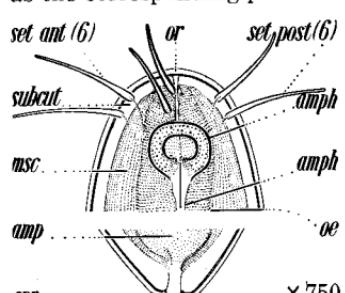
b. *Alaimella truncata* n. sp.  $\frac{.6}{.8} \frac{16}{15.8} \frac{1.5}{1.5} \frac{30}{1.5} \frac{90}{>1.5} >1.3$  \*\* This, the type species of Alaimella, rather closely resembles *Alaimella cincta*. Secondary markings of the cuticle faint, if any. Oesophagus as in *cincta*, except relatively a trifle narrower. Intestine as in *cincta*, but narrow and displaying only two cells in cross-section, the cells containing minute inconspicuous granules. Proximally the slender, uniform, simple, frail and subacute spicula expand much and suddenly, to form flattish cephalia, located about opposite the body axis. There seem to be two simple, frail, sub-slender, more or less arcuate accessory pieces, which are probably joined together at the anus. There appear to exist throughout the length of the body an unusual number of nuclei ventrad from the narrow intestine, which keeps well to the dorsal side. Both before and behind the anus there are some very slender ventrally submedian setae half as long as the body is wide. Ejaculatory duct about one-third as wide as the body. Forward-pointing testes two-fifths as wide as the body. In the single male examined, which appears to be immature, one testis ended four tail-lengths from the anus, the other five tail-lengths from the anus. At one tail-length in front of the anus there occurred one or two glands (?) with very brilliantly staining nuclei, whose connections remain unknown.



*Habitat:* Algae, near lighthouse, Bahia, Brazil. Sublimate to balsam. Fig. 7b.

8. *Litinum aequale* n. sp.  $\frac{.8}{1.3} \frac{4.5}{1.7} \frac{9.5}{1.8} \frac{12.2^e}{1.8} \frac{98.}{1.7} >1.9$  \*\* Oesophagus at first three-sevenths, near the nerve-ring one-third, and finally three-sevenths, as wide as the corresponding portion of the neck. Its lining is indistinct. There seems to be no distinct cardia. The intestine, which is separated from the oesophagus by a collar three-sevenths as wide as the neck, becomes at once half as wide as the body. Its walls are thick and its lumen faint. The granules contained in the cells of the intestine are numerous and more or less uniform. The anus is more or less continuous, the rectum inconspicuous. The hemispherical-conoid tail tapers from the anus to the terminus. There are no caudal setae. The caudal glands are located in front of the anus. The lateral fields are about one-fourth as wide as the body. The nerve ring is of medium size and on either side of it are obscure nerve cells. From the large, depressed, but rather conspicuous vulva, the vagina leads obliquely backward a distance two-thirds as great as the body diameter. Judging from the size of the ovum just before it leaves the ovary, the eggs are about one and one-half times as long as the body is wide. In the broad, cylindroid ovary are twenty to forty ova arranged single file except in the distal half, where they are arranged irregularly.

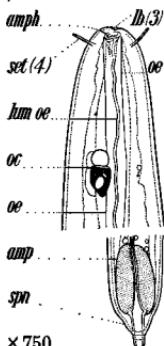
*Habitat:* Sand, Ocean Beach, Miami, Florida, U. S. A. Flemming to glycerine jelly. Fig. 8.



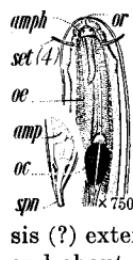
.2      5.9      7.0      <sup>10.6</sup><sub>15.7</sub><sup>18</sup>      92.  
 .4      1.      1.      1.3      1. > 2.1\*\*

9. *Ionema ocellatum* n. sp. The thin cuticle is naked except for the cephalic setae. There are no traces of lips. The amphids are very inconspicuous. The neck is cylindroid posteriorly, and convex-conoid anteriorly, especially near the head. The eye-spots are light brown in color, and each has a refractive element in front. In the pigmented portion of each eye there is a more or less central nucleus with a subsidiary, small companion object. The cylindroid oesophagus is at first one-third, near the nerve-ring one-fourth, and finally one-fifth, as wide as the corresponding portion of the body. Its lining is indistinct. There is no cardia. Owing to the presence of large somatic glands, observation of the junction of the oesophagus with the intestine is difficult. The collum appears to be one-fifth as wide as the corresponding portion of the body. The intestine is two-thirds to three-fourths as wide as the corresponding portion of the body, and is thick-walled, and has a very faint lumen. The cells of the intestine, which appear somewhat as if overlapping, contain more or less uniform, yellowish, scattered granules; they have large, spherical, granular nuclei with conspicuous nucleoli. The arcuate, conoid tail tapers from the anus to the unarmed convex-conoid terminus. The conoid spinneret is simple in structure. The ellipsoidal caudal glands occur in a loose tandem series in the anterior half of the tail. There are no caudal setae. The lateral fields are two-fifths as wide as the body. The granular, elongated, pyriform renette is one and one-half times as long as the body is wide, and one-half as wide as long. It is not reflexed and lies near the middle of the body, a little in front of the flexure of the front ovary. The nerve-ring is of medium size and is accompanied by rather obscure nerve cells. From the small, elevated, more or less inconspicuous vulva the medium-sized vagina leads inward half way across the body; it is more or less strongly cutinized. The size, form and covering of the eggs is unknown, but the ripe ova are about as long as the body is wide. The broad, cylindroid ovaries extend five-sixths the way back to the vulva, and contain about twenty ova, arranged single file in the proximal half, but irregularly in the distal half. The duct of the renette is necessarily very long and is slender; there is a distinct, elongated ampulla, with a very long and very slender duct leading from it to the pore. This latter duct is about as long as the body is wide. This genus, of which there are several species, is made very remarkable by the possession of a pair of relatively huge glands filling most of the body cavity behind the base of the neck and ending two and one-half times as far behind the neck as this latter is behind the head. The points of exit of these glands appear to be at the head end. Each gland has a nucleus near its blind end. In the vicinity of the nerve-ring the glands diminish in size, and half way from this point to the head appear to come to a narrow, rounded end, strictly lateral in position, and from thence there appear to be narrow ducts leading toward the lip-region to pores, where foreign particles are seen to cling, and which are designated in the drawing as amphids. Near the middle these glands are pressed to one side by two subdorsal cells, apparently nerve cells.

*Habitat:* Marine algae, Panama. Hot sublimate to balsam. This genus is of wide occurrence in tropical oceans; specimens from both the East and West Indies are known to the writer. While specifically different, these forms do not vary much one from another. Fig. 9.



.4      8.4      16.5      <sup>49</sup><sub>3</sub>      91.      > 1.7"

10. *Nemella ocellata* n. sp. .4      1      1.1      1.2      > 1.2" Except for the cephalic setae, the thin cuticle is naked. At a distance from the anterior extremity about equal to the width of the head, the striation of the cuticle ceases, so that the head is set off by an absence of striations, as well as by a slight thickening of the cuticle. The neck is cylindroid. From the faint amphids, an inner element can be traced backward to near the base of the head. The two eye-spots are brownish in color, and each has a colorless lens. The oesophagus, which has an indistinct lining, is at first one-half, near the nerve-ring also one-half, and finally three-fifths, as wide as the corresponding portion of the neck. There is no cardia. The intestine, which is set off from the oesophagus by a collum one-half as wide as the neck, becomes at once three-fourths as wide as the body. Its wall is thick, its lumen faint, and it is made up of cells of such a size that probably only two are required to complete a circumference. These cells are packed with colorless granules of variable size, the largest of which are about one-twentieth as wide as the body. The tail is conoid to the convex-conoid spin-  
  
 amphi-  
 oe-  
 amp-  
 oc-  
 spn-

neret, which at its base is one-third as wide as the base of the tail, and has somewhat the profile of a swan's head. No setae were seen on the tail. At their widest part the simple, frail, tapering, subacute spicula are about one-fifth as wide as the corresponding part of the body. Their proximal ends, which are minutely cephalated by contraction and constriction, appear to lie a little ventrad from the body axis. They are supported by a simple, frail, slender, faintly S-shaped accessory, with a tapering apophysis (?) extending backward from the spicula at an angle of about ninety degrees, and about one-third as long as the anal body-diameter, its proximal end lying opposite the caudal axis. Whether there is one testis or two remains to be determined.

*Habitat:* Eel-grass, Biscayne Bay, Miami, Florida, U. S. A. Flemming to glycerine jelly. Fig. 10.

.3      13.      <sup>28.</sup>  
<sub>1.5</sub>      <sub>1.5</sub>      1.7      1. > .93"

11. *Porocoma striata* n. sp. .3      13.      <sup>28.</sup>  
<sub>1.5</sub>      <sub>1.5</sub>      1.7      1. > .93" The rather thin cuticle appears to be destitute of setae except at the extremities. The body is traversed nearly from end to end by about ten to twelve wings. Between the wings the transverse striae seem to be resolvable into excessively minute elements. In addition to the cephalic setae, there is a ventral seta-like organ, opposite the sub-cephalic setae and just behind the excretory pore. This is a little stouter, longer, and more blunt than the cephalic setae, and seems to have a special relation to the excretory pore. The mouth is surrounded by relatively thick, minute lips. It is possible that a more or less vestigial pharynx extends back to near the cephalic setae, its presence being indicated by a slight difference in the lining of the canal, and by a break in the musculature. Posteriorly the neck is cylindroid, anteriorly convex-conoid. No distinct traces of amphids have been seen, but possibly obscure ones exist opposite the bases of the lateral setae. The oesophagus is cylindroid, then conoid in its posterior eighth. Near the head it is one-half, near the nerve-ring two-sevenths, and finally three-fourths, as wide as the corresponding portion of the neck. Its lining is indistinct. There is a flattish cardia, one-half as wide as the base of the neck. The thick-walled intestine is separated from the oesophagus by a collum one-half as wide as the base of the neck and becomes at once two-thirds as wide as the body, and would present two to three cells in cross-section. Its cells contain scattered granules of variable size, the largest of which have a diameter about equal

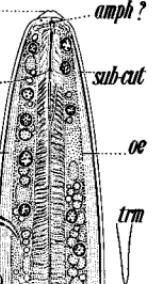
to the width of two of the adjacent annules; tessellated effect faint. The tail, which tapers from in front of the anus, is conoid, and then cylindroid in the posterior half, where it is about one-half as wide as at the base. Apparently the ellipsoidal caudal glands are packed in a close tandem in the anterior fourth of the tail. The lateral fields are one-half as wide as the body. The elongated, outstretched, granular renette cell lies one to two body-widths behind the base of the neck. It is two to three times as long as the base of the neck is wide and about one-fourth as wide as long. The broad oblique nerve-ring is accompanied by obscure nerve cells. While both ovaries are essentially behind the vulva, one of them extends forward a distance about twice as great as the corresponding body diameter, and is then reflexed, and extends backward, so as to lie parallel to the other. The medium-sized, but rather conspicuous vulva is continuous with the ventral surface. The rather strongly cutinized vagina extends inward two-fifths the way across the body. It is possible that the narrow, cylindroid ovaries are reflexed for a short distance near their blind ends.

*Habitat:* Biscayne Bay, from sponges and associated material. Flemming to glycerine jelly. Fig. 11.

## II. Order Bolbinia

12. *Litonema nudum* n. sp.  $\frac{1.3}{1.4} \quad \frac{13.}{3.5} \quad \frac{21.}{4.3} \quad Y \quad \frac{89.}{2.} \quad .63\text{--}$  The presence of the two wings, which begin on the neck and end near the anus, is indicated by two refractive, longitudinal markings, which occupy a space equal to one-fourth to one-third the width of the body. The cuticle is entirely naked. There appears to be a vestigial pharynx nearly as long as the base of the head is wide,—simple, narrow, tubular, obscure. The neck is conoid. Almost on the front of the head, but near its margin, there are two minute, lateral pores, which may possibly be amphids. Connected with these pores are inner tubular elements, which may be followed backward for a considerable distance. The more or less cephaloboid oesophagus has a very faint, elongated, posterior swelling, one-fourth as wide as the base of the neck. Near the pharynx the oesophagus is one-third, near the nerve-ring one-eighth, and in front of the cardiac swelling one-seventh, as wide as the corresponding portion of the neck. The optical expression of the lining of the oesophagus consists of two distinct, refractive lines, having a distance apart about equal to one-tenth the width of the oesophagus. There is no cardia. The thick-walled intestine presents a faint lumen, and becomes at once five-sixths as wide as the body. Anus continuous; rectum inconspicuous. The cells of the intestine are packed with granules of rather uniform size, the largest of which are one-seventh as wide as the body. The conoid tail tapers from in front of the anus. There are no caudal glands. The lateral fields are probably one-third as wide as the body. The excretory pore and the duct leading to it are so refractive as to be easily visible.

*Habitat:* About the roots of the lady's slipper, *Cypripedium acaule* Linn., sphagnum swamp, Wisconsin, U. S. A. Flemming to balsam. Fig. 12.



1.7 . . 2 . . . 4.5 . . 25-25 . . 90 . . 1.7 . . 2.3\*\*

13. *Hyalaimus brevicollis n. sp.*  $\frac{1.9}{2} \quad \frac{2.1}{2.7} \quad \frac{15.5}{5.1} \quad \frac{Y}{2.6} \quad \frac{67}{1.8} \quad 1.**$  The colorless, naked skin displays irregular markings and a finely crenate contour. The colorless, transparent, conoid neck ends in a truncate head without setae and having very flat lips, if any. Six rather conspicuous, sub-marginal, wart-like papillae occur in a circlet on the front of the head. No amphids are to be seen. The mouth is a mere depression one-sixth as deep as the head is wide; from it faint apophyses, of which the ventral is the longest and most conspicuous, extend backward and seem to indicate that the real depth of the pharynx is equal to the length of the distinct pharyngeal bulb, and accordingly the dimensions are so given in the above formula. The somewhat phalangiform oesophagus begins with the bulb just mentioned as filling the head, and which is two-fifths as long as the neck. Behind this bulb there is a broad, shallow constriction, the remainder of the oesophagus being fusiform and in its widest part two-thirds as wide as the neck. For a short distance the irregular intestine, three-fourths as wide as the body and separated from the oesophagus by a not very deep constriction, appears transparent and almost bulbous. The cardiac cavity is small and the cardia very flat. The large cells composing the intestine are filled with small granules, displaying no very definite arrangement. The narrow, colorless, transparent rectum is thrice as long as the anal body-diameter, and has a distinct lining. The ventral excretory pore is situated as far behind the cardia as the head is in front of it, the duct in the immediate vicinity being very transparent and distinct, and having a distinct lining. The granular lateral fields are one-fourth as wide as the body, and from head to tail a finely crenulate, cuticular wing extends along each lateral line. The tail of the female is conical to the pointed terminus. The unusually large, flat, elevated vulva is two-thirds as wide as the body, and from it the vagina extends backward a distance greater than the body-diameter. The two straight uteri in the only specimen seen contained six to eight eggs, each a little longer than the body width, and measuring 56-60 x 132-140 microns. The ovaries extend two-thirds the distance to the cardia and anus respectively and contain ova arranged single file.

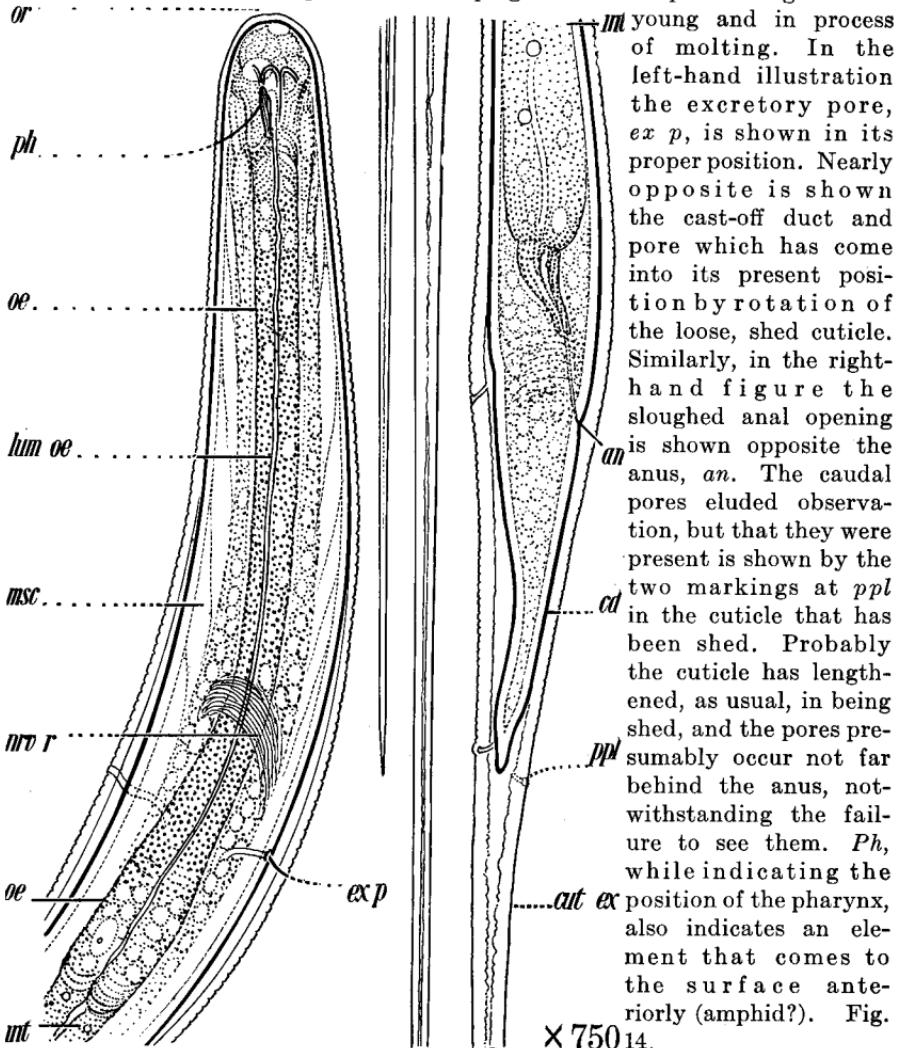
*Habitat:* Intestine of an earth-worm, Moss Vale, New South Wales, Australia, April, 1894. It is not certain that this nema may not be con-generic with one or more of those mentioned by earlier authors under the generic names *Anguilla*, *Nematodum*, etc., nemas also found in earth-worms, but insufficiently described; hence the proposal of a new genus for its reception.

1.4 . . 10 . . 15 . . Y . . 67 . . 1.\*\*

14. *Choronema simplex n. sp.*  $\frac{1.6}{2.1} \quad \frac{2.1}{2.6} \quad \frac{2.6}{2.6} \quad \frac{Y}{2.6} \quad \frac{67}{1.8} \quad 1.**$  The thin cuticle is entirely naked. The wing, which begins near the head and ends on the tail, is possibly double in structure. There is no cardia. The rather thick-walled intestine is separated from the oesophagus by an indistinct collar one-half as wide as the base of the neck, and becomes at once about three-fifths as wide as the body. It has a faint lumen and presents few cells in cross-section. Anus subcontinuous; rectum inconspicuous. The cells of the intestine contain scattered colorless granules of variable size, the largest of which are one-fifteenth as wide as the body. In the specimen examined the tail was destined at the next molt to become very much shorter, so that the anus would lie at about 90%, and the tail would therefore be about four times as long as the anal body-diameter. Two sublateral papillae existed on the tail nearly opposite each other.

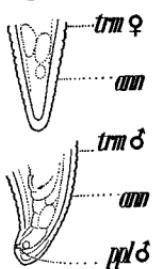
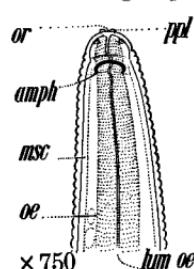
*Habitat:* Soil about the roots of plants, Arlington Farm, Virginia, opposite

the city of Washington, U. S. A. Flemming to glycerine jelly. This species, of which but a single young specimen has been seen, has the general appearance of being a deteriorated *Cephalobus* or *Diplogaster*. The specimen figured was



young and in process of molting. In the left-hand illustration the excretory pore, *ex p.*, is shown in its proper position. Nearly opposite is shown the cast-off duct and pore which has come into its present position by rotation of the loose, shed cuticle. Similarly, in the right-hand figure the sloughed anal opening is shown opposite the anus, *an.*. The caudal pores eluded observation, but that they were present is shown by the two markings at *ppl* in the cuticle that has been shed. Probably the cuticle has lengthened, as usual, in being shed, and the pores presumably occur not far behind the anus, notwithstanding the failure to see them. *Ph.*, while indicating the position of the pharynx, also indicates an element that comes to the surface anteriorly (amphid?). Fig. X 750/14.

that at last it is about half as wide as the base of the neck. The lining is faint, and there are no refractive breaks in its structure to indicate the presence of vestigial bulbs. There is no distinct cardia. The intestine becomes at once two- to three-fifths as wide as the body. It is composed of cells containing scattered groups of granules. The distinct "lumen," instead of appearing as

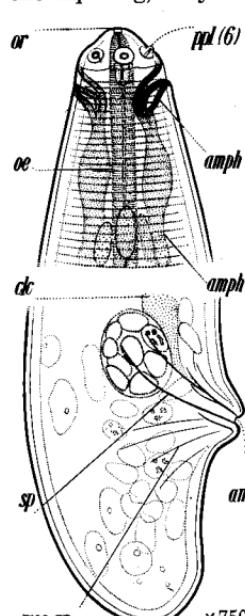


a cavity with a refractive lining, as it usually does when a distinct feature, seems to have a different structure of about the same general appearance. From the slightly depressed anus the conspicuous rectum extends a distance about one and one-half times as great as the anal body diameter. The lateral fields are one-third

as wide as the body. It appears as if there is a renette cell opposite the posterior portion of the oesophagus. The tail is conoid to the blunt terminus, which has a diameter about one-third as great as that of the base of the tail. There are no caudal glands. It is possible there is a pair of subventral papillae immediately behind the anus. A trifle behind the middle of the tail, there are two faint, lateral innervations close together on each side, one in front of the other, doubtless connected with surface papillae. Ventrad from these, it is possible there is a third papilla belonging to the same group. There are probably one or two pairs of subventral papillae near the terminus. The proximal ends of the tapering, very slightly arcuate spicula are bent in a ventral direction so as

to appear to lie on the ventral side of the body-axis, and so appear cephalated. The accessory piece is more strongly refractive than the spicula themselves, the framework of which is not particularly conspicuous.

*Habitat:* About the roots of Bamboo, Yuma, Arizona, U. S. A. Fig. 15, above.



16. *Bolbinium brevicolle* n. sp. Cuticle of medium thickness, naked. Posterior half of the neck cylindroid, anterior half convex-conoid. Amphids unusually large, with large internal connections that can be followed backward for some distance. The narrow oesophagus continues to have the same diameter until near the posterior, pyriform, cardiac swelling, which is one-half as wide as the base of the neck. Many of the nuclei connected with the cells of the neck are large and well-developed. In the dorsal and ventral fields there are strands that appear to be composed of closely-packed cells. The cardiac bulb has no distinct valve.

$\begin{array}{ccccccc} .5 & 6.8 & 12 & M^{68} & 97 & & \\ 1.2 & 3 & 2.8 & 2.7 & 2.7 & 1.2 & \end{array} \text{--} \text{--}$

The spiculum is vestigial. In a variety of ways this nema seems related to the Mermithidae,—for instance, in the structure of the mouth, the cephalic papillae, the amphids, the internal structure of the tissue of the neck and of the body, the absence of spinneret, and the short, rounded, broad tail.

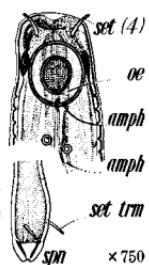
*Habitat:* Soil, about the roots of citrus plants, Florida, U. S. A. Fig. 16.

.5 .8.7 15. -M<sup>41</sup> 91. 2.1 \*\*

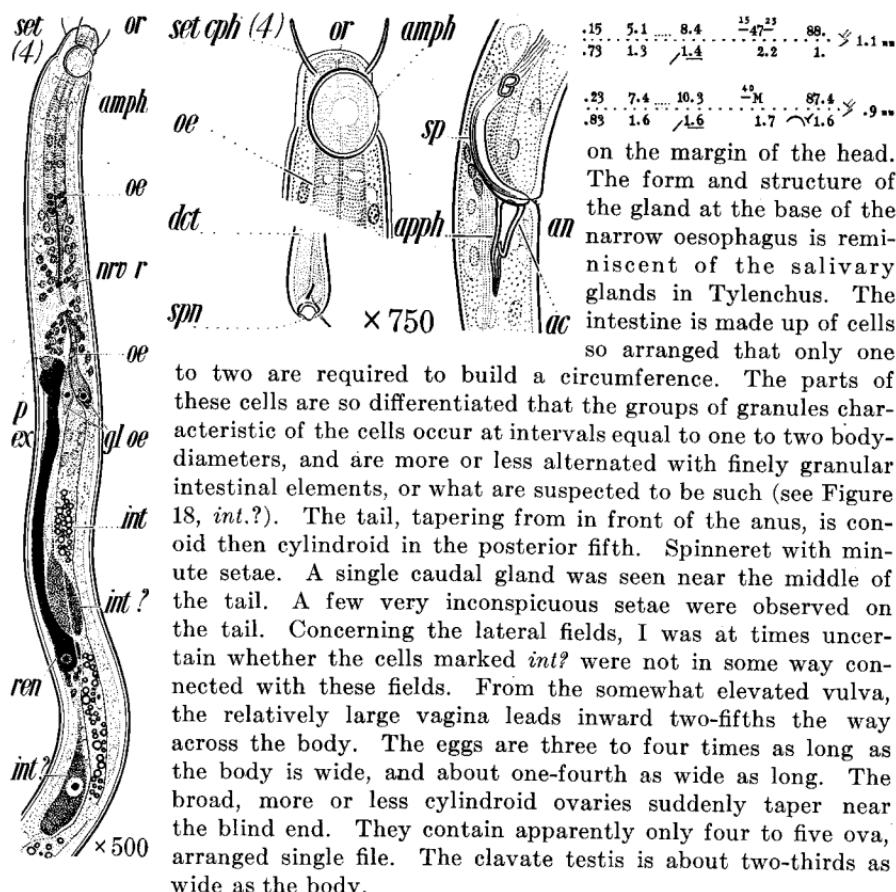
1.4 2.4 2.7 2.7 2.6

17. *Antomicron pellucidum* n. sp. Except for the cephalic setae the cuticle is naked. On the ventral side of the distinctly projecting wing there is a subordinate line to be seen throughout the greater portion of the length of the body, which is not as conspicuous as the main part of the wing. Neck conoid. The very minute pharynx (?) is apparently conoid;—whether armed or not is unknown. The lip-region has not been examined with success on account of deficient material. That portion of the amphid inside the two ellipses stains more strongly than the tissues elsewhere. The borders of the two amphids approach each other so closely on the dorsal side that they sometimes almost touch, in fact appear to be connected by a special cuticular element. Oesophagus cylindroid for some distance back, and then expanding rather suddenly to form an almost imperceptible swelling near the beginning of the middle third of the neck; thereafter it diminishes almost imperceptibly to near the nerve-ring, then begins to expand gradually until near the end, where it rapidly expands to form an obscure, small, elongated, pyriform cardiac bulb, almost half as wide as the base of the neck. There is a rounded cardia one-fourth as wide as the base of the neck. Considering the size of the oesophagus its lining is prominent. The intestine is separated from the oesophagus by a broad, shallow constriction, and soon becomes half as wide as the body, and apparently would present only two or three cells in cross-section. The lateral fields appear to be nearly one-third as wide as the body. It seems probable that a renette cell occurs at some distance behind the base of the neck, but no excretory pore has been seen. The tail of the male is conoid to near the terminus. The caudal glands are located in an open tandem series in front of and behind the anus. The eight supplementary organs occupy a distance nearly four times as great as the length of the tail; each is a nearly straight, cutinous tube, half as long as the body is wide, arranged at an angle of forty-five degrees with the body axis, and having its distal extremity protruding backward slightly through the cuticle. The organs taper slightly in the vicinity of the distal end, which is suddenly somewhat ventrally arcuate at the terminus. They are probably protrusile, though they have not been seen in a protruded position. These tubes have a diameter approximately equal to the width of one of the adjacent annules of the cuticle, and their proximal ends show indications of an attachment extending forward. There are a number of specially-developed setae in the vicinity of the anus; especially prominent are two submedian setae, one on each side of the anus, one-third as long as the anal body-diameter. A little in front of these is another pair, one on each side, of slightly smaller size, and on the tail there are a few similar ventrally submedian setae of smaller size. Spicula a little longer than the anal body-diameter, and tapering to a point in their distal thirds. The accessory piece surrounds the spicula in their distal fourths, and then extends forward to the dorsal side of the body from the middle of the spicula at a small angle. The appearance of the proximal portion of the accessory piece somewhat resembles that of the proximal ends of the spicula, though it is straighter and more solid. From its cephalated proximal end a muscular strand joins the body wall on the dorsal side of the anterior portion of the tail. The posterior testis is the smaller.

*Habitat:* Marine; Punta Arenas, Pacific Coast of Costa Rica. Unfortunately the single specimen examined is of such a character that the details of the pharynx must be left undetermined. Fig. 17.



18. *Cyartonema flexible n. sp.* Except for the cephalic setae the cuticle is naked. There appears to be a circlet of six, inconspicuous, minute papillae

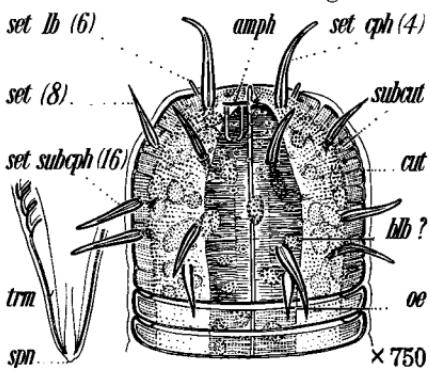


on the margin of the head. The form and structure of the gland at the base of the narrow oesophagus is reminiscent of the salivary glands in *Tylenchus*. The intestine is made up of cells so arranged that only one

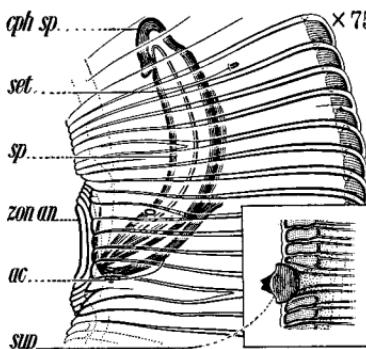
to two are required to build a circumference. The parts of these cells are so differentiated that the groups of granules characteristic of the cells occur at intervals equal to one to two body-diameters, and are more or less alternated with finely granular intestinal elements, or what are suspected to be such (see Figure 18, *int?*). The tail, tapering from in front of the anus, is conoid then cylindroid in the posterior fifth. Spinneret with minute setae. A single caudal gland was seen near the middle of the tail. A few very inconspicuous setae were observed on the tail. Concerning the lateral fields, I was at times uncertain whether the cells marked *int?* were not in some way connected with these fields. From the somewhat elevated vulva, the relatively large vagina leads inward two-fifths the way across the body. The eggs are three to four times as long as the body is wide, and about one-fourth as wide as long. The broad, more or less cylindroid ovaries suddenly taper near the blind end. They contain apparently only four to five ova, arranged single file. The clavate testis is about two-thirds as wide as the body.

*Habitat:* Clean, white sand, in about five feet of water, in a cove near the entrance to Buzzard's Bay, Mass., U. S. A. Sublimate to balsam. Fig. 18.

19. *Stilbonema brevicolle n. sp.* Annules plain, retrorse in the posterior half of the body, the reverse in the anterior. Exceedingly short, submedian, slender setae are found throughout the length of the body, six to nine annules apart, those at the extremities being somewhat the longer. Neck cylindroid. Immediately around the mouth there is probably a row of exceedingly minute papillae. In most of the neck the diameter of the oesophagus hardly exceeds the thickness of the cuticle; it finally expands to form a pyriform bulb about three-fifths as wide as the base of the neck. There is no distinct cardia. The very



narrow intestine, joined to a depression in the posterior surface of the cardiac bulb, becomes at once about one-sixth as wide as the body, and then enlarges gradually until it is one-fourth as wide. Its cross-section would show two cells. The lateral fields are about one-fourth as wide as the body, and contain numerous nuclei. Nerve-ring oblique. Tail conoid, arcuate.

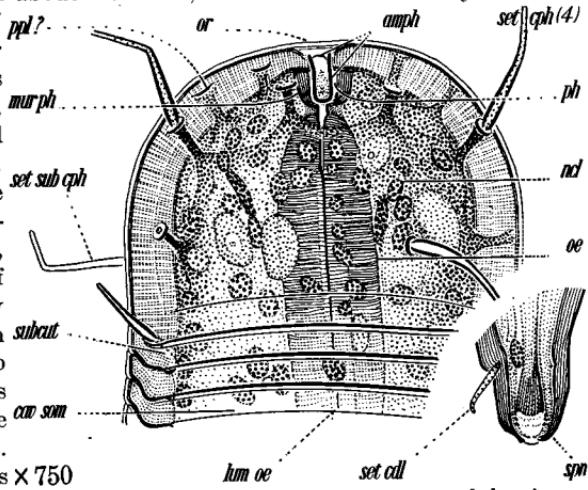


$\times 750$  Spicula slender. "Acorn-shaped" accessory organs (see figure) far forward, so that the anterior one is a little behind the neck. The cup-shaped part of these organs has slightly different refractive properties from the "acorn" itself, which is plainly innervated.

*Habitat:* Shoal in Kingston Harbor, Jamaica, in one foot of water. Sublimate to balsam. Fig. 19a, p. 242; Fig. 19b.

20. *Laxonema majum* n. sp.  $\frac{2}{6} - \frac{3}{7} - \frac{1.9}{7} - \frac{6.4}{7} - \frac{97.5}{7} \times 10.$  Cephalic cuticle radially striated; the basal part of the cephalic setae penetrate and interrupt the cuticle. Inside the cephalic setae, as shown in the sketch, other interruptions occur in the cuticle; possibly in some cases these are the "stumps" of lost setae. There are two circlets of papillae inside the cephalic setae, one at a distance from the mouth pore somewhat greater than the thickness of the body cuticle, and the other twice as far away. Oesophagus nearly cylindroid, finally expanding to form a pyriform cardiac bulb two-thirds as wide as the base of the neck. There is no cardia. The intestine soon becomes about one-fifth as wide as the body; at a distance back about twice as great as the body-diameter it expands and becomes thicker-walled and one-third to one-half as wide as the body. Its cross-section is composed of about four cells, each with ten to twenty brownish granules, the largest of *ppl?* which have a diameter about one-fourth as great as the thickness of the cuticle, and the smaller one-third to one-fourth this size. Renette unknown. The lateral fields are about one-fourth as wide as the body, and contain a double row of nucleated cells, generally somewhat rectangular in *subaut.* form and separated into two series. The nerve-ring is probably a little behind the *car. som.*

The tail of the male is  $\times 750$  arcuate-conoid and ends in a spinneret destitute of striations and having a length about equal to the sum of the widths of the last eight striae. The tip of the spinneret is somewhat differentiated, and its core presents minute longitudinal "striations" which end just anterior to the terminal pore. The caudal



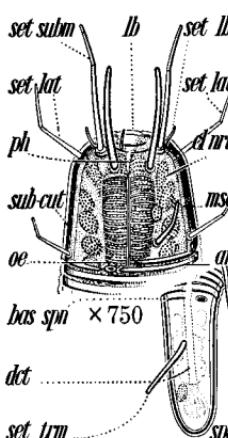
glands are probably located in front of the anus. No supplementary organs have been seen. There are no caudal papillae, but both in front of and behind the anus there are a number of ventrally submedian setae; five or six on each side of the anterior half of the tail; while an equal number in front of the anus gradually merge into the scattered setae found all over the body. The proximal ends of the rather stout acute spicula are somewhat diminished and set off by a broad and deep constriction. The framework composing the spicula is relatively massive. The rather straight accessory piece is half as long as the spicula. The ejaculatory duct is about one-fourth as wide as the body. There appears to be a single outstretched testis, though there remains a little doubt on this point.

*Habitat:* Shoal in Kingston Harbor, Jamaica, in about one foot of water. Fig. 20, p. 243. Sublimate to balsam.

21. *Leptonemella cincta* n. sp.  $\frac{3}{2} \cdot \frac{2.8}{1.1} \cdot \frac{5.2}{1.1} \dots \frac{20}{1} \frac{96}{1.2} > 2.2$ . The contour is more or less serrate, the annules being retrorse posteriorly and the reverse anteriorly. In addition to the cephalic setae there are scattered cervical setae arranged at right angles to the surface and one-third as long as the neck is wide. No somatic setae have been seen. Apparently at every eight to ten annules along the lateral lines there are pores, each with its longest diameter arranged transversely. Seemingly there are six, very minute, more or less amalgamated lips. Posteriorly the neck is cylindroid, anteriorly conoid. Amphids are present in the form of straight transverse slits, one-sixth as long as the corresponding diameter of the head, and located between the bases of the submedian cephalic setae. Their presence and their form is proved by the ribbon-shaped outflow plainly seen issuing from each amphid. The cylindroid oesophageal tube ends behind in a broad, pyriform cardiac bulb, two-thirds as wide as the base of the neck. There is no cardia. The thick-walled intestine is separated from the oesophagus by a collar one-tenth as wide as the neck, and becomes at once one-fourth as wide as the body. Its lumen is indistinct. Its cells contain fine, rather numerous granules of more or less uniform size. Several submedian, slender, tapering, cuticular "thorns" are seen on the tail, each about one-fourth as long as the anal body-diameter. The lateral fields are one-fourth as wide as the body. The nerve-ring is accompanied by obscure nerve cells. The tail is more or less conoid from the anus, but tapers more rapidly in the posterior half. The strong, tapering, acute, colorless spicula are more or less compound in structure and their extremities appear to lie somewhat ventrad from the body axis. The single, slender, rather strong, simple parallel accessory is three-fifths as long as the spicula.

*Habitat:* Sand, Ocean Beach, Miami, Florida, U. S. A. Flemming to glycerine jelly. Fig. 21.

22. *Cinctonema tenue* n. sp.  $\frac{6}{2} \cdot \frac{4.4}{1.2} \cdot \frac{7.5}{1.2} \dots \frac{20}{1.4} \frac{94.5}{1.4} > 1.0$ . Cuticle thin, naked, its striae not further resolvable. Neck, cylindroid posteriorly, conoid anteriorly. In the specimen examined the lip-region was not favorable for observation. Oesophagus about half as wide as the head and continuing to have this diameter until after it passes through the nerve-ring, behind which it begins to increase



a little, and finally enlarges to form an elongated, pyriform cardiac bulb, three-fourths as wide as the base of the neck. The intestine is very narrow where it joins the center of the posterior face of the cardiac bulb,—hardly or wider than one of the annules. Very soon, however, it becomes two-fifths as wide as the body. The lateral fields are about one-fifth as wide as the body and contain nuclei, two of which placed side by side would span the field. Tail of the male conoid; on it there are a few setae in front of the anus. The rather slender, acute spicula are about one and one-fourth times as long as the anal body-diameter.

*Habitat:* Sand and algae near East Drive, east shore of Kingston Harbor, Jamaica. Sublimate to balsam. Fig. 22.

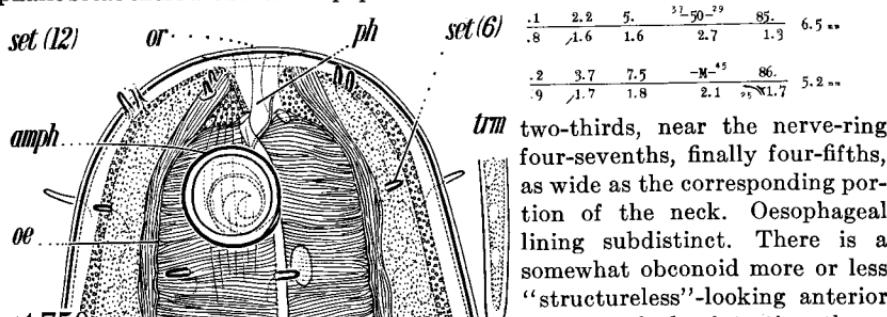
### III. Order Cytolaimia.

23. *Cephalobellus papilliger n. sp.* Annules of the cuticle 2.2 microns wide. Head continuous with the conoid neck. There are probably six lips, but no labial papillae have been seen. The pharynx resembles that found in the genus *Monhystera*, being a conoid or more or less pyramidal depression one-third as wide as the head. Oesophagus cylindroid, one-fourth as wide as the middle of the neck, joining a pyriform cardiac bulb two-thirds as wide as the base of the neck and containing a distinct valve. Lining of the oesophagus rather faint. The rather thick-walled intestine is three-fifths as wide as the body, and is separated from the neck by a shallow, cardiac constriction. The ventral renette cell is situated just in front of the flexure in the testis. From the somewhat elevated anus the tail is conical to the acute terminus. A pair of tall, conical, sub-ventral papillae are located opposite the middle of the spiculum. Taken altogether, the papillae are situated as follows: 1; () 1; 1. Spiculum slender, somewhat irregular, twice as long as the anal body diameter, placed at angle of forty-five degrees with the body-axis. The ejaculatory duct was of equal length with the testis, and was connected with it by a tube also of the same length.

*Habitat:* Intestine of the larva of a lamellicorn beetle, from soil under cow-dung, Moss Vale, New South Wales, Australia. 1893.

24. *Anticyathus tenuicaudatus n. sp.* Body wall thick. In addition to cephalic setae there are scattered papilloid cervical setae. Conoid oesophagus at first

set (12)	or	ph	set (6)	.1 .8	2.2 .4.6	5. 1.6	51-50-29 2.7	85 1.3	6.5 ..
				.2 .9	3.7 .1.7	7.5 1.8	-M-5 2.1	86 1.7	5.2 ..



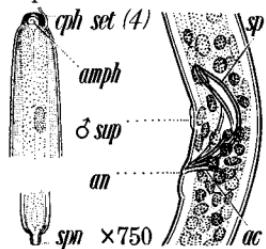
two-thirds, near the nerve-ring four-sevenths, finally four-fifths, as wide as the corresponding portion of the neck. Oesophageal lining subdistinct. There is a somewhat obconoid more or less "structureless"-looking anterior element of the intestine three-fourths as long as the body is wide; this may be regarded as a cardia one-half as wide as the neck. The thick-walled intestine, which has a faint lumen, is set off



by a collum one-fifth as wide as the base of the neck, and becomes more or less gradually three-fourths to five-sixths as wide as the body. Its cross-section is composed of twenty to fifty cells. These cells contain numerous granules of variable size. The tail tapers from in front of the anus; it is first conoid, then cylindroid in the posterior fourth, where it becomes one-fifth as wide as at the anus. There are no caudal glands. Fifteen to twenty almost invisible setae, as long as the cuticle is thick, occur on each ventrally submedian line on the tail. The longitudinal fields are one-third as wide as the body. Near the excretory pore is an ampulla one-sixth as wide as the corresponding portion of the neck. The nerve-ring is accompanied by obscure nerve-cells. Vulva medium-sized, more or less elevated; vagina non-cutinized. Near the proximal end, each ovary presents a double flexure, occupying a distance about equal to one body-width; thence onward the ovaries are outstretched in opposite directions,—at last not over one-tenth as wide as the body. The eggs occur in the uteri about nine at a time. They are about one-half to two-thirds as long as the body is wide, though they are often so crowded together in the uterus that they appear wider than long. The narrow tapering ovaries contain seventy to eighty ova, arranged single file. The strong, rather simple, stoutish, tapering, rather blunt spicula are as long as the anal body-diameter, and are so placed that their proximal ends, which are cephalated by expansion, appear to lie somewhat dorsad from the body-axis. At their widest part the spicula are about one-eighth as wide as the corresponding portion of the body; the apophysis is more or less uniform, and one-fourth as long as the anal body-diameter, so that its proximal extremity appears to lie opposite to or dorsad from the axis of the tail. The 25 supplementary organs, hardly more than innervations, are papilloid and of slight elevation, rather farther apart anteriorly, and occupy a distance five to six times as great as the corresponding body-diameter. There is a single papilla-like ventral seta close to the anus.

*Habitat:* Sand, Coco-plum Beach, Miami, Fla., U. S. A. Flemming to glycerine jelly. Fig. 24, p. 245.

25. *Neurella simplex n. sp.* Striae resolvable with great difficulty into secondary elements. The narrow, sharply-defined wings begin near the head and end on the tail. The cuticle appears to be naked, except that at the base of the amphids there are elements of problematical significance and number. The neck



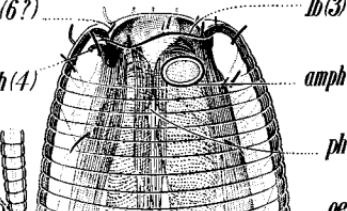
is cylindroid posteriorly, conoid anteriorly, convex-conoid toward the head. There seem to be three lips surrounding the somewhat irregular but more or less distinct, relatively small pharynx. Oesophagus cylindroid; at first one-half, near the nerve-ring one-third, as wide as the corresponding portion of the neck; its lining is indistinct. The separation between the oesophagus and the intestine was not very clear-cut. The thick-walled intestine gradually becomes one-half as wide as the body; its section is made up of two cells containing scattered granules of variable size, the largest about one-eighth as wide as the body. Not until near the middle of the body does the intestine acquire very definite characteristics. Anus more or less elevated. Tail of the male, as far as seen, conoid; apparently only its tip was missing. Located well toward the middle of the body there is a long, granular cell empty-

the intestine gradually becomes one-half as wide as the body; its section is made up of two cells containing scattered granules of variable size, the largest about one-eighth as wide as the body. Not until near the middle of the body does the intestine acquire very definite characteristics. Anus more or less elevated. Tail of the male, as far as seen, conoid; apparently only its tip was missing. Located well toward the middle of the body there is a long, granular cell empty-

ing forward;—probably the renette cell. Excretory pore unknown. Nerve-ring oblique, accompanied by distinct cells arranged in groups.

*Habitat:* "Sea-grass," shoal, two miles off Key West, Florida, U. S. A. Sub-limate to balsam. The view of the tail of the female was slightly foreshortened; the formula must be interpreted accordingly. Fig. 25, p. 246.

26. *Zygonemella striata* n. sp.  $\frac{1.4}{3.1} - \frac{7.3}{4.1} - \frac{13.6}{4.6} - \frac{-N^{48}}{5.3} - \frac{84.8}{3.6} > 1.2^{**}$  In addition to the cephalic setae, scattered on the anterior part of the neck, there are a considerable number of other similar setae, some of which are longer than those near the margin of the head. Lips three, massive but low, faintly bi-lobed; within these there is a rather broad inner mouth consisting of three soft, low, flat lobes, which appear to be extensions of the tissue of the oesophagus. These latter present faint refractive elements, the expression of minute foldings of the lip tissues, that make possible the great expansion necessary for the deglutition of the relatively large diatoms constituting the food. In appearance the pharynx closely resembles the lumen of the oesophagus. It would, in fact, be indefinable, were it not for the pharyngeal swelling which is half as wide as the head, that is to say, a very little wider than the remainder of the oesophagus. Immediately behind the pharyngeal swelling the oesophagus diminishes gradually, so that where it passes through the nerve-ring it is about *set lb(6?)* *lb(3)* two-fifths as wide as the neck; thence onward it is cylindroid. The lining of the oesophagus is a conspicuous feature *set qph(4)* throughout its length. The tubular cardia is prominent, about one-fourth as wide as *spn* the base of the neck, and about one and one-half times as wide as long. The intestine is almost at once fully half as wide as the body and is separated from the oesophagus by a broad and deep constriction. Its cross-section probably comprises only two cells. The cells contain scattered granules of small size and rather uniform diameter. The lateral fields, about one-fourth as wide as the body, contain cells packed with fine uniform granules. Renette unknown. The tail of the male is conoid in such fashion that at the beginning of the final third it has a diameter about equal to the width of two of the corresponding annules; thence onward it is very nearly cylindrical. The anus is slightly raised,—its posterior lip elevated. The caudal glands are packed in a tandem series opposite the anus and occupy a space somewhat longer than the anal body-diameter; their ducts are narrow. Spicula acute, not quite as long as the anal body-diameter; their width about equal to the width of one of the adjacent annules. They taper in the distal fourths to slender, acute points. The posterior testis is only about half as long as the anterior. Ten unicellular glands are a prominent feature of the anatomy of the male. (1) A pair of clavate glands immediately behind the blind end of the reflexed posterior testis. Each of these glands has a length nearly equal to that of the adjacent body-diameter, and empties through a duct extending backward. The ducts have a width somewhat greater than that of one of the adjacent annules. (2) Just behind the pair of glands already mentioned is a second clavate pair of larger size and very similar; these are about half as wide as the body and somewhat longer than the body is wide, and the ducts extending backward from them have a width greater than that of two of the adjacent annules. (3) Behind the second pair of glands there are six small, pyriform glands, i.e., a set of three on each side of the body, arranged longitudinally close together, but having separate ducts, also extending backward. It



has been impossible to determine with exactitude the entire course of the ducts of these various glands, but most of them have been seen to be connected with the rectum, and all are believed to be so connected, though it is possible that some of them may deliver into a common duct before reaching the rectum. As to the structure of these glands, the description of one of them will answer fairly well for all the others. In the fixed specimens, the anterior extremity of each contains a spherical nucleus with a strongly staining nucleolus: the nucleus lies in the midst of chromatin matter which stains rather strongly with acid carmine. The nucleus and chromatin occupy the anterior fourth, or third, of the glandular cell. The remainder of the contents is of a uniformly fine, granular nature. This granulation is also characteristic of all the ducts.

*Habitat:* Punta Arenas, Pacific Coast of Costa Rica. Diatomivorous. Sub-limate to balsam. Fig. 26, p. 247.

27. *Margonema ringens* n. sp. Striae unaltered on the lateral fields. Cuticle apparently naked, but it is possible that through rough handling cephalic setae ~~ph~~ <sup>pplb</sup> may have been broken off, as was the case with some other specimens in the same collection. Lips three and double. ~~ph~~ <sup>amph</sup> Neck cylindroid. Amphids faint. Oesophagus at first two-thirds, near the nerve-ring one-half, and finally two-thirds, as wide as the corresponding portion of the neck; its lining <sup>org?</sup> ~~oe~~ <sup>cut</sup> indistinct. There is a faint, rather flat cardia about half as <sup>lumen</sup> ~~cut~~ <sup>osm</sup> wide as the base of the neck. The cross-section of the thick-walled intestine is made up of two cells. These transparent, elongated cells have very distinct nuclei, but few and small <sup>set spn</sup> <sup>x750</sup> inconspicuous granules. The intestine becomes at once two-thirds as wide as the body, and is separated from the oesophagus by a collar two-thirds as wide as the base of the neck, and has a faint zig-zag lumen. <sup>1. 6.2 12. 24-60-24 94.2 > 1.7 ..</sup> <sup>.9 / 1.2 1.2 1.5 1.2</sup> From the anus, the posterior lip of which is elevated, the prominent rectum extends a distance about as long as the anal body-diameter. The conoid tail tapers from the anus. The three ellipsoidal caudal glands lie in a loose tandem in the anterior two-fifths of the tail. There are no caudal setae. The lateral fields are about one-third as wide as the body, and contain both small and large nuclei. At a distance behind the neck equal to twice the width of the body lies the ellipsoidal renette cell, which is about as long as the body is wide and about half as wide as long. It empties through an ampulla about as long as the neck is wide, and about one-fourth as wide as long. This latter is connected with the excretory pore by a very short duct. The nerve-ring surrounds the oesophagus squarely, and is accompanied by distinct cells apparently not very definitely arranged. From the somewhat depressed, more or less continuous vulva, the tubular vagina extends nearly half way across the body. The vagina is bifurcated, each branch being about half as long as the body is wide. The uteri are narrow. The eggs are three-fifths as wide as the body, and six times as long as the body is wide. The narrow ovaries taper but little, and contain about a dozen ova approximately in single file. At their widest part, the slender, acute spicula are about one-eighth as wide as the corresponding portion of the body. Their arcuate, cephalic portions, viewed in profile, appear to lie somewhat ventrad from the body-axis. The subarcuate, rather slender, frail, simple accessory pieces are joined together at the anus. The separate apophysis

is uniform and one-fourth as long as the corresponding body-diameter. There are thirty to forty low, about equidistant supplementary organs, of such a character that the ventral contour becomes crenate when the tail end is incurved; the crenations are then nearly contiguous. There are a few, scattered ventrally submedian setae on the tail. The acute ends of the spicula are minutely and sharply curved through an angle of 180 degrees at the very tip. One male specimen was seen in which there were two renette cells, each with a separate duct for some distance.

*Habitat:* Salavery, Peru. Marine. Sublimate to balsam. Fig. 27, p. 248.

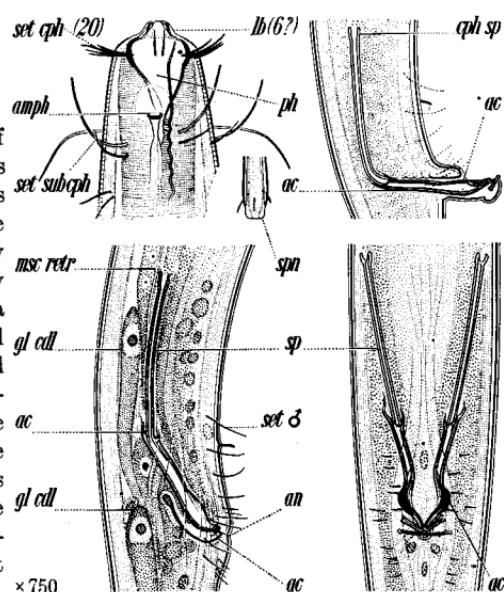
28. *Leptogastrella pellucida n. sp.* Except for the setae near the head and on the tail of the male, the cuticle appears to be naked. The neck is cylindroid posteriorly, becoming faintly convex-conoid toward the rounded head, which may be set off by an almost imperceptible, broad constriction opposite the base of the pharynx. The membranous lips, are either six in number, or three and each two-parted. The oesophagus is cylindroid. There is an elongated cardia, one-half as long as the body is wide, and about two-thirds as wide as long. The intestine, separated from the oesophagus by a shallow constriction, becomes at once two-fifths as wide as the body, and then diminishes slightly so that it has about one-third the width of the body. Its cross-section would appear to be made up of not more than two cells. The intestine is so narrow as to give the nema quite an unusual appearance. It is thick-walled and has an exceedingly narrow lumen. Its cells are packed with exceedingly minute yellowish granules. Correspondingly, the body-wall is unusually thick and muscular, and slightly oblique longitudinal striations due to the refractions of the muscular fibres can

1.	9.1	22.	45.69	88.9	1.5 ..
2.1	2.9	3.3	3.3	2.2	
1.3	9.	20.	17.4	90.9	1.2 ..
2.	2.5	2.9	3.4	2.	

be seen throughout the length of the body. The lateral fields appear to be about one-third as wide as the body. The renette has not been seen. Vulva slightly elevated. The outstretched ovary contains forty or more ova arranged single file. The blind end of the ovary lies not far behind the nerve-ring. The eggs occurring in the uterus appear to be about as long as the body is wide and one-third to one-fourth as wide as long. The tail of the male is conoid to near the terminus, where it has a diameter about one-fifth as great as at the anus.  $\times 750$

Caudal glands are located in the base of the tail. There are no supplementary organs, nor have any special papillae or setae been seen either in front of the anus or behind it. The spicula slide in tubular accessory pieces.

*Habitat:* Marine mud, San Pedro, California, U. S. A. At first glance this



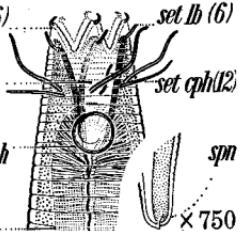
nema appears to be a typical Monhystera, but careful examination fails to reveal any such well-developed amphids as are characteristic of Monhystera. The spicula are quite different in form from the typical spicula of Monhystera. The intestine also is highly peculiar. Occurs also at Woods Hole, Mass. Fig. 28, p. 249.

1.6    9.3    19.    44.84.    91. > m 1. "

29. *Dactylaimus aequalis n. sp.* Cuticle naked. Three of the six lips are somewhat more substantial than those alternating with them. Distal thirds of the lips free, the remaining  $\frac{1}{3}(6)$  portions webbed. From the head, the oesophagus continues to have the same diameter to near the oblique nerve-ring, but then begins to swell gradually so that finally it is two-thirds as wide as the base of the neck. There is a small cylindroid cardia. The intestine, *amph* separated from the oesophagus by a deep constriction, becomes at once about two-thirds as wide as the body.

Its circuit appears to comprise about four cells. The *oe* lumen of the intestine presents a refractive and distinct contour. From the inconspicuous, slightly depressed anus, the rectum is considerably shorter than the anal body-diameter. The distinct lateral fields are about one-third as wide as the body and contain numerous cells whose nuclei are arranged in two indistinct rows along the margins of the field, which they fill fairly well. Renette unknown. The description is derived from a single young female, with the vulva in process of development. The tail is conoid in such fashion that at a distance from the anus about five times as great as the length of the anal body-diameter, where the annules vanish, it has a width about one-sixth as great as at the anus. An indefinite, but probably not considerable portion of the tail of the specimen examined was possibly missing. Hence, the above formula may be only approximately correct. The following formula is in terms of absolute lengths expressed in microns:

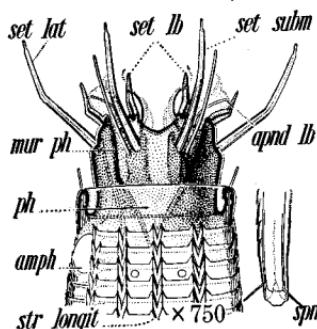
17.    96.    199.    860.    940.    1030    1100  
17.    22.    24.    25.    25.    21.    21.



*Habitat:* Fine marine mud, San Francisco Bay, California, U. S. A. Sublimate to balsam. Fig. 29.

1.2    12. (n)    25.    72.    86. (n)  
1.7    2.9    2.6    3.1    2.4    3.1.7 "

30. *Xenolaimus striatus n. sp.* Cuticle naked, and complicated, the annules retrorse posteriorly and the reverse anteriorly. The twelve longitudinal wings extend to near the spinneret, becoming fewer on the tail. The thick, somewhat digitate lips are united by a membrane. The

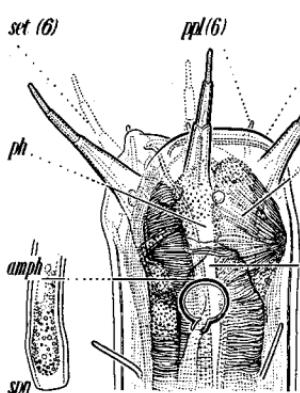


portion of the head containing the pharynx is protrusile and appears as if surrounded by a balustrade composed of the anterior annules of the cervical cuticle. The large, simple, regular, conoid pharynx is fully three-fourths as long as the head is wide. Each of the six lips bears a two-jointed seta, and appears to be armed internally with a slender, flexible element considerably longer than the seta. In the illustration, what appear to represent two minute setae on the foremost annule of the neck are probably the optical expression of an exceedingly tenuous membrane surrounding the head. Although the oesophagus was not plainly seen, it is evident that it is cylindroid as in Trachynema. The intestine becomes at once three-fourths as wide as the body. The anus appears continuous. The cells of the intestine con-

tain scattered granules of variable size, the largest of which are one-half as wide as one of the annules. The conoid tail tapers from in front of the anus and ends in a spinneret.

*Habitat:* Marine mud from near the government-dredged cut, Biscayne Bay, Florida, U. S. A. Sublimate to balsam. Fig. 30, p. 250.

31. *Cytolaimium exile n. sp.* Cuticle thin, without setae except those on the head. Lips with thin distal flaps as in *Monhyphera*. The cylindroid oesophagus is at first three-fifths, near the nerve-ring one-half, and finally three-fifths, as wide as the corresponding portion of the neck. There is a conoid cardia one-third as wide as the base of the neck. The thick-walled intestine, which has a faint lumen, becomes at once three-fourths as wide as the body. Its cells contain scattered granules of variable size, the largest of which, near the neck, are one-fifteenth as wide as the corresponding portion of the body, but near the middle of the nema are one-tenth as wide as the body. The conoid tail tapers rather regularly from somewhat in front of the anus, but faster near the anus. No clear evidence of the presence of caudal glands. The lateral fields are about one-half as wide as the body. The narrow nerve-ring is accompanied by obscure nerve cells. From the small, continuous, inconspicuous vulva, a small, more or less weak, non-cutinized vagina extends inward one-third the distance across the body. In the narrow, tapering ovaries, the ova are arranged single file. Only one egg at a time occurs in each uterus. The eggs are three times as long as the body is wide and appear about three-fourths as wide as the body. The tail of the male is first conoid, then cylindroid in the posterior two-fifths, where it is one-third as wide as at the base. The somewhat stout, rather blunt spicula are strong, non-cephalated, and so situated that their proximal ends appear to lie

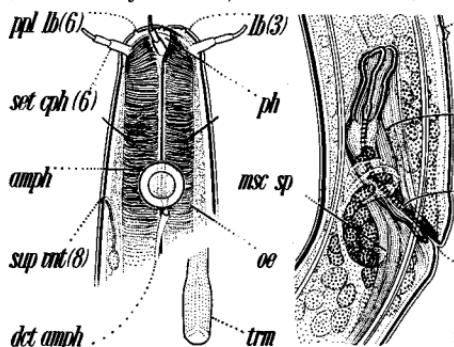


opposite the body-axis. There is a refractive short element in front of the tips of the spicula. Accessory piece slender, apparently strong, one-third as long as the spicula. The 16 pairs of submedian, equidistant, discoid, slightly-elevated supplements are not cup-shaped, and are relatively less cutinized than in well-developed Chromadora supplements. The posterior pre-anal pair lies opposite the distal parts of the spicula. Thence, forward, placed at intervals about equal to three-fourths the body-diameter, the organs occupy a space

eight to nine times as long as the anal body-diameter. The post-anal five pairs occupy the anterior three-fifths of the tail. The discs are about one-fourth as wide as the body, and one-fourth as wide as high, the distance between them being about one and one-half times their diameter. There appears to be an innervated element that projects from near the center of each disc. The ejaculatory duct, which is co-extensive with the pre-anal supplementary organs, is one-half as wide as the corresponding portion of the body. The vas deferens is one-half to one-third as wide as the body. Each testis is at first about one-third as wide as the body and cylindroid, but afterwards tapers. The anterior testis is much the longer.

*Habitat:* Sand-bar opposite Miami River, Biscayne Bay, Fla., U. S. A. Sublimate to balsam. Fig. 31.

32a. *Rhabdocoma americanum* n. sp. Type species. Cuticle thin, naked except for the cephalic setae. Lips three. Wall to the pharyngeal cavity in optical section showing three somewhat thickened elements, that are possibly minutely transversely ribbed; these elements, however, are very small and difficult of



.14	3.2	6.5	<sup>41</sup> N	59.	3.4 ..
.4	,7	.7	-7	..	.6

.17	3.5	7.	<sup>22</sup> 17	58.	3.1 ..
.4	,6	.7	.9	.6	

resolution. Neck somewhat conoid anteriorly. Oesophagus at the nerve-ring two-fifths, at the cardia two-thirds, as wide as the corresponding portion of the neck, and containing glands, as is indicated by fine granular matter in branched

$\times 750$  cavities. Cardia more or less

spheroidal, one-half as wide as the base of the neck. The rather thick-walled intestine presents a faint lumen and becomes at once about one-half as wide as the body; its cross-section presents but few cells. Anus continuous; rectum about as long as the anal body-diameter. The intestinal cells contain granules of variable diameter, the largest one-tenth as wide as the body. Doubly refractive granules occur in all parts of the intestine, but are not numerous; these tend to have quadrate contours and do not present St. Andrew's crosses. The tail tapers very gradually throughout, commencing well in front of the anus. Renette unknown. There is an anterior rudimentary branch to the female sexual organ, about as long as the body is wide. From the rather large, more or less depressed vulva the well-developed cutinized vagina extends inward three-fifths the distance across the body. The elongated eggs are twice as long as the body is wide. The broad, cylindroid ovary reaches three-fourths the distance back to the vulva and contains very many ova, those of the two-thirds next the uterus being arranged single file. The frail spicula are about one and two-thirds times as long as the anal body diameter and are rather wide apart. Accessory pieces faint. Supplements papillloid, twelve to sixteen, occupying a distance in front of the anus ten to twelve times as long as the body-diameter, while a second series of about eight, occurs on the neck. The members of the anal series are somewhat farther apart anteriorly; of the cervical series, posteriorly.

*Habitat:* Sand among mussels, Devil's Island, Woods Hole, Mass. Fig. 32.

b. *Rhabdocoma macrurum* n. sp.  $\frac{.4}{1.}$  ? 13.  $\frac{?}{1.4}$   $\frac{64.}{1.3}$   $\frac{2.3 (7)}{}$  Very closely resembles the preceding, but differs in the following respects: straight setae, nearly as long as the head is wide, digitate, with a minute setose muero; amphids a trifle farther forward, somewhat elongated; apparently four, submedian, minute, short setae opposite the posterior margin of the amphids; accessory pieces one-half as long as the spicula and parallel to them.

*Habitat:* Sulphurous sand, Bay of Naples, toward Vesuvius, 1888.

33. *Didelta maculatum* n. sp.  $\frac{.35}{.9}$  2.6 7.6  $\frac{10-44-11}{1.4}$   $\frac{81.}{1.5}$   $\frac{3.5}{1.8}$  \*\* Cuticle, which is above medium thickness and naked except for the setae on the head, is characterized by the presence of peculiar transversely-elongated refractive subcuticular

markings, reminiscent of the bubbles in defective window glass. The simple, subregular, somewhat asymmetrical, napiform pharynx is about one-third as wide as the head. On the dorsal side of the base of the pharynx there is a more or less glottoid, low, flat elevation, so that the more or less refractive dorsal wall of the pharynx appears only about half as long as the ventral wall. Posteriorly the neck is cylindroid, anteriorly, more or less conoid. The elliptical amphids are in reality spirals of about one wind. They occur on large, somewhat equilaterally triangular or deltoid areas on the sides of the head; hence, the name Didelta. The oesophagus is at first about three-fourths, near the nerve-ring one-half, and finally two-thirds, as wide as the corresponding part of the neck. The lining is distinctly indicated by a more or less zig-zag, refractive line; the musculature is coarse and colorless. There are no valves, and there is no cardia. The thick-walled intestine, which has a distinct refractive lining, becomes at once three-fourths as wide as the body; its cross-section being composed of about six cells. It is separated from the oesophagus by a collum one-third as wide as the base of the neck. The cells of the intestine are packed with more or less uniform granules, having a diameter about one-ninetieth that of the body. Arranged in elliptical clusters, they give rise to a distinct tessellation. The tail, which tapers from the anus, is first conoid, and then more or less cylindroid in the very narrow posterior half. It really tapers throughout, but is nearly cylindroid in the setaceous part. There is no spinneret. The lateral fields are about one-fourth as wide as the body. The nerve-ring is of medium size, and is accompanied by obscure nerve cells. From the rather inconspicuous, but somewhat elevated vulva, the cutinized vagina leads inward two-fifths the distance across the body. The tapering ovaries were not favorable to detailed observation.

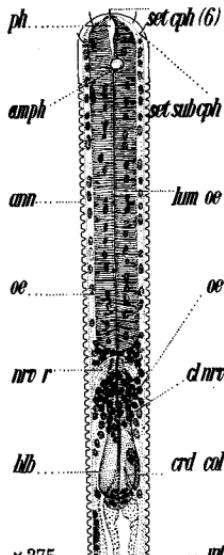
*Habitat:* "Sea-grass," shoal, two miles off Key West, Florida, U. S. A. Fleming to glycerine jelly. Fig. 33.

1.3	?	18.4	Y	82.5	>	.6
3.8	?	3.7	3.1	2.4		

34. *Dasynema sexalineatum* n. sp. Striae resolvable into secondary, elongated elements. Annules retrorse posteriorly, and the reverse anteriorly. Cuticle naked except for the setae on or near the head.

Fig. 33. Drawing of the head and neck of *Dasynema sexalineatum* n. sp. showing the arrangement of the setae and the structure of the head. The drawing shows the head in dorsal view with various setae labeled: *set cph (6)*, *set sub cph (6)*, *amph*, *oe*, *ph*, *al*, *spn*, and *ppl lb (6)*. The neck is shown below the head, with a magnification factor of  $\times 750$ . Below the head drawing, another drawing shows the head in a different orientation with labels *set cph (6)*, *set sub cph (6)*, *amph*, *oe*, *ph*, *al*, *spn*, and  $\times 750$ . The text continues to describe the morphology of the head and neck, mentioning the presence of three lips, each with a dark, cutinized apex, and a number of small cells forming the beginning of the intestine.

no granules. From the anus, the posterior lip of which is elevated, the prominent rectum leads inward a distance one and one-half times as great as the ph.....  
 set qph(6) anal body-diameter. The tail is sub-conoid,—at first conoid, then more or less cylindroid. The elongated caudal glands appear to lie in the anterior half of the tail.

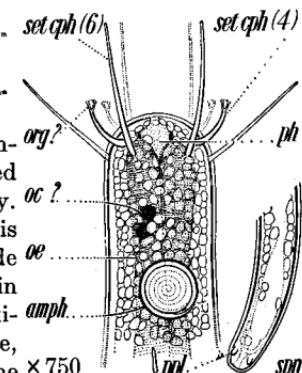


*Habitat:* Eel-grass, Woods Hole, Mass., U. S. A. Sub-limate to balsam. Described from a young specimen. Fig. 34a, p. 253; Fig. 34b.

35. *Linhomoeella exilis* n. sp. The shorter cephalic setae are differentiated at the extremity, suggesting that they bear special sensory organs. Cuticle naked except for the setae on or near the head. Lips apparently confluent. Possibly there are papillae immediately around the mouth opening. It sometimes appears as if there is a minute pharynx like that of *Monhyphystera*, but this may be a deception due to the structure of the front part of the oesophagus; possibly there is no true buccal cavity. Neck cylindroid. The more or less cylindroid oesophagus is at first three-fifths, near the nerve-ring two-fifths, and finally two-thirds, as wide as the corresponding portion of the neck.

$\times 375$  It is colorless and has a fine musculature. The cylindroid cardia is three-fourths as wide as the neck. The intestine, which is separated from the oesophagus by a collum three-fifths as wide as the base of the neck, becomes at once three-fourths as wide as the body. Near its anterior end, however, there is a broad, shallow constriction, in which region its lumen is faint. Anteriorly the walls are thick, while posteriorly they are thin. A cross-section of the intestine is probably made up of about three cells. These cells contain scattered granules of variable size, the largest of which are about one-twelfth as wide as the body and appear to have the structure of spherical shells. The arcuate tail tapers from the anus to the terminus, where it is one-fourth as wide as at the anus. Caudal

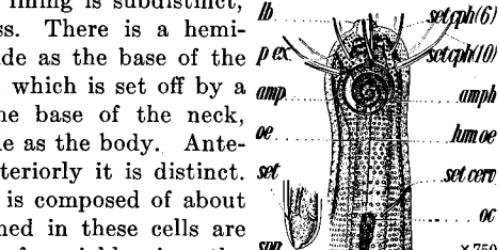
glands were not seen. .1 .2.2 .4.5 .<sup>9</sup>62<sup>14</sup> .94.5 .<sup>9</sup>3.3<sup>..</sup> set qph(6)  
 The caudal setae are .4 .8 .8 1.1 6  
 very minute and very .2 .4 .6.1 .<sup>9</sup>6<sup>..</sup> .92.8 .<sup>9</sup>2.7<sup>..</sup> set qph(4)  
 inconspicuous,—five to .5 .8 .9 8 .<sup>9</sup>8  
 six on each ventrally submedian line. From the conspicuous, fairly large, elevated vulva the cutinized vagina extends one-third the distance across the body. The slender eggs are ten times as long as the body is wide, and appear to be about three-fourths as wide as the body. The narrow tapering ovaries contain twenty or more ova arranged single file. The proximal extremities of the stoutish, tapering, acute, rather strong spicula appear to lie ventrad from the body axis, and are not materially cephalated. The part of the accessory piece near the spicula is refractive; the apophysis, however, is faint, and a little more than half as long as the anal body-diameter. As to supplementary organs, there are almost invisible ventral innervations, equidistant and separated from each other by spaces about two-thirds as great as the body-diameter. The ejaculatory duct and vas deferens are about one-third as wide as the body. The tapering testes are very narrow.



*Habitat:* Sand-bar, Biscayne Bay, off the mouth of the Miami River, Florida, U. S. A. Flemming to glycerine jelly. Fig. 35, p. 254. The almost imperceptible constriction occurring in the cephalic region, as shown in the illustration, is somewhat more marked when seen dorso-ventrally; the amphids are located in the midst of a broad and shallow depression.

36. *Nannolaimus guttatus n. sp.*  $\mu$ .  
 .4 - 7.3 - 14. - 158.<sup>31</sup> - 91. - >1.3 " Cuticle of medium thickness, naked except for the cephalic setae, of which there is a circlet of ten, with a circlet of six immediately preceding it. There are, however, a few, scattered setae on the neck, one-third as long as the neck is wide, arranged at right angles to the surface. Lips confluent, very small, thin and minute, probably six in number. No labial papillae have been seen. Pharynx almost non-existent, simple, conoid. Neck cylindroid. The oesophagus is at first one-half, near the nerve-ring two-sevenths, and finally two-thirds, as wide as the corresponding portion of the neck; its lining is subdistinct, *lumoe* its musculature fine and colorless. There is a hemispherical cardia, one-fourth as wide as the base of the neck. The thick-walled intestine, which is set off by a *amp*, becomes at once two-thirds as wide as the body. Anteriorly its lumen is faint, but posteriorly it is distinct. *set* The cross-section of the intestine is composed of about three cells. The granules contained in these cells are *spn* scattered to numerous, and are of variable size, the largest having a diameter equal to the width of two of the adjacent annules. They have the appearance of hollow shells, more or less thick-walled. The conoid tail tapers from the anus to its terminus, which is one-third as wide as its base. Though the caudal glands were not clearly seen, they appear to be broadly saccate and to be arranged in a close tandem behind the anus in the anterior half of the tail. There appear to be about three slender, somewhat cylindroid, subacute setae on each submedian line on the tail. The lateral fields are two-fifths as wide as the body. The huge renette cell begins at the cardia and extends backward a distance equal to the length of the neck. It is two-fifths as wide as the body, and, of course, is not reflexed. It is granular and possesses a large nucleus. The elongated ampulla is one-third as wide as the head and empties through a short duct near the base of the lips. Vulva more or less continuous, small; cutinized vagina of medium size. The thin-shelled, elongated eggs are probably five to six times as long as the body is wide. According to the condition of the uterus, the broad tapering ovaries reach from three-fifths to the whole of the distance back to the vulva. They contain about a dozen ova arranged more or less single file, except near the blind end.

*Habitat:* Sand, Cape Florida, Biscayne Bay, Florida, U. S. A. Flemming to glycerine jelly. This genus resembles *Cyatholaimus* more or less but has no onchia and the excretory pore is farther forward. The labial features are smaller and less definite than in *Cyatholaimus*. It is notable also that no pores are to be seen in the cuticle. The oesophagus ends behind in an almost imperceptible elongated swelling. The color of the ocelli, through oversight, was not noted. Until the male is known, the affinities will remain doubtful. Fig. 36.

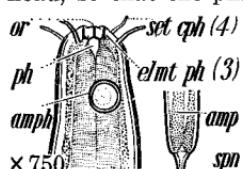


## IV. Order Isolaimia

37. *Rhadinema flexile n. sp.* .15 5.7 9.5 <sup>59</sup>M-(Y) 99.8 >1.4 .. Cephalic setae 3-jointed; cuticle otherwise naked. The thick, small lips confluent. Pharynx exceedingly minute, two-thirds as deep as the head is wide; wall characterized by six longitudinal elements of minute size, exactly parallel to the axis of the head, so that the pharynx appears to be a more or less shallow, cylindroid or prismoid cup, two-thirds as deep as wide. The lining of the oesophageal canal is more or less modified as far back as the base of the amphids. The circumference of the amphids is almost imperceptibly broken on the dorsal side. The somewhat cylindroid oesophagus is almost imperceptibly swollen in the posterior fifth. At first it is three-fifths, near the nerve-ring one-half, and finally two-thirds, as wide as the corresponding portion of the neck. The lining is subdistinct. There is a more or less hemispherical cardia three-fifths as wide as the base of the neck. The thick-walled intestine, which has a distinct, refractive, more or less zig-zag lumen, becomes at once three-fourths as wide as the body. Its cells are packed with uniform colorless granules of variable size, the largest of which are one-sixteenth as wide as the body. They do not give rise to more than a faint tessellation. The tail is conoid. The more or less narrow elongated caudal glands are arranged in a loose tandem behind the anus in the anterior third of the tail. The elongated renette cell lies at a distance behind the base of the neck equal to twice the body-diameter; it is one body-width long, about one-third as wide as long, and contains a rather large nucleus. The rather broad oblique nerve-ring is accompanied by somewhat obscure nerve cells.

*Habitat:* Clear, "white" sand, 5 feet of water, cove at the entrance to Buzzard's Bay, Mass., U. S. A. Sublimate to balsam. Fig. 37.

38. *Protrellus aureus n. sp.* .4 3.2 7.3 5.3, 94.7 6 .. Annules as much as 20 microns wide. Striae are visible throughout the length of young specimens, which also differ from the adults in not having the cuticle inflated on the neck. No setae or amphids. The conoid neck ends in a truncate head, bearing a lip-region set off by constriction, and apparently composed of six lips. There is at least one papilla on each lip. The prismoid pharynx is half as wide as deep. The major part of the oesophagus is simple and cylindrical, having the same width as the lip-region, and is separated from the cardiac bulb by a broad constriction. The triquetrous lining of the oesophageal tube is easily seen, and ends in a distinct manner near the base of the pharynx. The intestine is modified, i.e., enlarged, to form a sort of "stomach," for a distance equal to twice the width of the body; thereafter its width does not exceed one-fourth that of the body. The length of the rectum is one and one-half times that of the anal body-diameter, and it has the peculiarity of lying close to the ventral side of the body. Region of the ventral excretory pore conspicuously marked by a large colorless ampulla. The lateral fields are one-third as wide as the body. The nerve-ring encircles the oesophagus squarely. The anterior fourth of the tail is somewhat hemispherical, and at the end of this part one-third as wide as at the anus; thence onward it is conical to the acute terminus. The large, elevated, and very prominent vulva is situated far forward, somewhat *in front of*



the cardiac bulb, in fact, and from it the vagina and long single uterus are directed backward, the vagina being highly muscular, and in its contracted condition thrice as long as the body is wide. The uterus ends and the ovaries begin near the commencement of the posterior third of the body. There are numerous fusiform, slightly curved eggs, measuring  $50 \times 104$  microns, the shells of which acquire a bright yellow color on entering the uterus. In many cases these golden-shelled eggs give the nemas, when seen with the unaided eye, a bright yellow appearance. The ovaries extend forward, then backward again; the ova are arranged single file. The eggs in the proximal part of the ovaries and in the uterus have the less-pointed end saddled with a peculiar organ. The saddled end of the egg is directed away from the vulva.

.8. 10. 21. 29. 90.  
2.5 4.5 6.6 7.8 33: .61\*\*

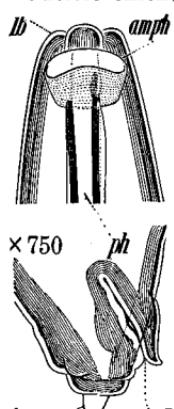
On the very much smaller male, the plain, transverse striae measure 3 microns apart on the neck, and 2 microns on the body. There is no distinct boundary between the rounded head and the conoid neck. The lips are very small and connate. Small, low, refractive papillae occur near the margin of the head. The somewhat irregular pharynx is half as deep as the head is wide, and about two-thirds as wide as deep. The anterior three-fifths of the oesophagus is a tube two-fifths as wide as the middle of the neck, the remaining two-fifths being flask-shaped, the neck of the flask being somewhat narrower than the anterior tube, and the ovoid bulb being two-thirds as wide as the neck. Cardiac collum, though shallow, distinct. The thin-walled intestine is at first at least two-thirds as wide as the body. The nerve-ring encircles the oesophagus squarely. The tail diminishes rapidly behind the anus, until only one-third as wide as at the anus. There are three pairs of papillae, all sub-ventral:—one pair of conical papillae, the largest of all, just in front of the anus; a second smaller pair somewhat behind the anus; and a third pair near the middle of the tail. The single linear, acute spiculum makes an angle of  $45^\circ$  with the axis of the body; its length equal to that of the narrow part of the tail. Testis-flexure such that the cardia lies half way between it and the nerve-ring.

*Habitat:* Rectum of the cock-roach, *Polyzostaria melanaria* Erich., Moss Vale, New South Wales, Australia, August 17, 1894. Examined in water.

(1.6) 7.6 15. 90. " = M 98. 1.6 ..

39. *Colpurella fontinalis* n. sp. Cuticle thick, naked. No labial papillae. Pharynx very long and tubular. Neck cylindroid posteriorly. The oesophagus is at first three-fifths, near the nerve-ring two-fifths, and finally two-thirds, as wide as the base of the pharynx. It is a little narrower through the middle, so that one may detect a faint posterior swelling. No cardia. The thick-walled intestine, which has a faint lumen, is separated from the oesophagus by a collum one-fourth as wide as the neck, and becomes at once one-half as wide as the body. Numerous, minute, uniform granules occur in the cells of the intestine. Renette unknown. Female unknown. Five somewhat equidistant, papillate supplementary organs, one-third as high as the cuticle is thick, occupy a distance equal to two and one-half times the length of the body-diameter. The posterior supplement is near the proximal part of the spicula. The organs are wider apart anteriorly. Oblique copulatory *tm.* muscles coextensive with the supplements. Exact form of the testes unknown.

*Habitat:* Spring, at Country Club, Washington, D. C., U. S. A. Sublimate to balsam. Fig. 39. *n.* designates a caudal pocket, and not the anus, which is farther forward.

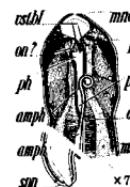


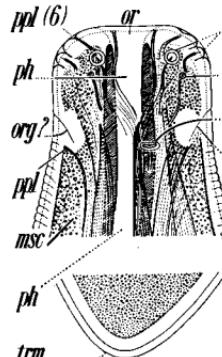
5.8    18.    38.    Y    88.    .2 \*\*  
 4.7    6.    7.3    7.7    4.9

40. *Pycnolaimus pygmaeus n. sp.* Cuticle thin naked. Near the middle of the body the very narrow, exceedingly minutely crenate wings occupy a space about equal to the width of two annules of the cuticle. Neck conoid. From the amphids an internal element extends inward and backward a distance twice as great as the width of the corresponding portion of the neck. Lip-region difficult to decipher. Cephalic cuticle very thick, especially near the base of the lips. When the head is viewed in profile and in optical section there are seen connected with this thickened portion of the labial cuticle elements that extend forward over the vestibule. At first sight these extensions appear to be thin, cutinized flaps, that are very minutely transversely striated. A careful examination, however, appears to indicate that they may have somewhat the structure of odontia, inasmuch as a short distance behind the apices, which are decidedly sharp, the inner contours curve in toward the axis of the head, and the longitudinal section of the elements, including the bases, above described, appear claw-shaped. The dorsal and ventral elements, thus viewed, are very much alike. Concentrating attention on either lateral surface of the head one finds, opposite the axis, two elements which extend forward parallel to each other and then bend toward the axis, arching inward to meet the dorsal and ventral elements already described, and appear to be the median elements of lateral labial organs. These elements are not so finely striated as the labial elements first mentioned, and appear to be slightly darker. The napiform vestibule leads to the pharynx, the entrance to which seems to be nearly closed ~~at the mouth~~ by a very slight curvature on the anterior part of one of the cuticular elements marking its contour. The oesophagus diminishes slightly in diameter as it passes backward, so that its middle part is hardly two-fifths as wide as the corresponding portion of the neck. It then diminishes more rapidly, so that just in front of the cardiac bulb it is only about one-third as wide as the corresponding portion of the neck. There is no vestige of a median bulb. Cardiac bulb somewhat pear-shaped, or sub-spherical, three-fifths as wide as the base of the neck, and containing a rather complex central valve half as wide as the bulb itself. Two small, refractive elements occur one in front of the other in the midst of the valve. There is a sub-spherical cardia one-third as wide as the base of the neck. The intestine becomes at once three-fourths as wide as the body; its cross-section presents apparently only two cells. These cells contain granules of various sizes and kinds; the largest and clearest are spherical, and have a width two to three times that of one of the annules of the cuticle. The smaller and darker granules are not distinctly spherical and vary in size down to those of very minute size. From the inconspicuous but very slightly raised anus, the refractive rectum extends inward a distance a little greater than the anal body-diameter. The tail is conoid from the anus, but is convex-conoid at the terminus. The description is derived from a specimen much too young to give any indication as to the position and form of the sexual organs. The measurements must be correspondingly interpreted.

*Habitat:* From green-house soil, Ann Arbor, Mich., U. S. A. Fixed in Flemming; examined in water. Fig. 40.

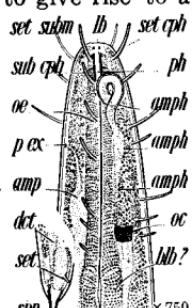
41. *Isolaimium papillatum n. sp.* Cuticle rather thin, naked. Neck convex-conoid anteriorly. Cuticle with surface innervations along the edges of the lateral field. Nerve-ring oblique. Pharynx tubular, one-sixth as wide as the head measured opposite its base. Tail of the male conoid, slightly arcuate, a



little longer than the anal body-diameter, blunt, its ventral contour nearly straight, its dorsal contour arcuate. The rather simple, blunt, uniform, more or less slender, arcuate spicula are about as long as the anal body-diameter. Their non-  
  
 cephalated proximal ends lie ventrad from the body-axis. The frail, slender, arcuate accessory piece is parallel to the spicula and one-third as long; at its proximal end it has a very small, backward-pointing apophysis from which muscular strands pass forward to the dorsally submedian lines and backward to the ventral field near the middle of the tail. The six papilloid or mammiform, sub-equidistant supplements occupy a space about three times as great as the anal body-diameter. Each comprises about six annules of the cuticle and has the same slightly crenate contour as the ventral surface. The tail bears four pairs of flattish, conoid papillae, a little behind its middle; one dorsally submedian, one lateral, one ventrally submedian and one subventral.

*Habitat:* Soil, Plummer's Island, Potomac River, Virginia, U. S. A. Fleming to glycerine jelly. Fig. 41.

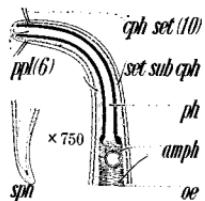
42. *Coinonema punctatum* n. sp. Lips thick. Neck conoid. Eye-spots two, far apart, brown to yellow, solid, with backward connections. The cylindroid oesophagus is at first one-half, at the nerve-ring one-third, and finally also one-third, as wide as the corresponding portion of the neck; lining subdistinct. There is a cylindroid cardia one-fourth as wide as the base of the neck. The intestine, set off by a collum one-fifth as wide as the base of the neck, becomes at once three-fourths as wide as the body. Anteriorly it is thick-walled, posteriorly thin-walled. Its cross-section is composed of four to five cells. These cells contain numerous granules packed together in such a way as to give rise to a faint tessellation. The granules are of variable size, the largest *set subm. ll* being one-tenth to one-sixteenth as wide as the body. The anus *sub qph* is continuous, the rectum three-fourths as long as the anal body-diameter. The conoid tail tapers from the anus to the *oe* rather minute spinneret. The three, broadly-saccate caudal glands lie in a close tandem in the anterior third of the tail. The ellipsoidal renette cell stretches along behind the base of the neck for a distance equal to  $1. \quad 9. \quad 14. \quad 18 \frac{52}{52} \frac{16}{16} \quad 87. \quad 1. \quad ..$  twice the width of the body; it  $1.2. \quad 2.5. \quad 2.7. \quad 3.1. \quad 2.1. \quad ..$  is two-thirds as wide as long.  $1.1. \quad 9.1. \quad 13.5. \quad -N \frac{52}{52} \quad 89. \quad 1. \quad ..$  From the continuous, rather  $1.2. \quad 2.3. \quad 2.4. \quad 2.7. \quad 2.2. \quad ..$  inconspicuous vulva, the rather weak, non-cutinized, medium-sized vagina leads inward one-third the way across the body. The eggs occur one at a time in each uterus, and are one and one-half times as long as the body is wide. They appear elongated in form and are deposited after segmentation begins. In the medium-sized, tapering ovaries are ten to twelve ova arranged single file. The acute spicula are rather frail and slender. Their proximal ends appear to lie ventrad from the body-axis. A refractive "chord" appears to subtend the arc of the spicula. The rather frail, somewhat slender, arcuate accessory pieces have an



applied part one-third as long as the spicula, and projecting at right angles to this is a uniform, blunt apophysis, one-half as long as the anal body-diameter having its proximal end opposite the axis of the tail. The testes are wide and more or less tapering.

*Habitat:* Key West and Biscayne Bay, U. S. A., on algae. Flemming to glyc-erine jelly. Fig. 42, p. 259.

43. *Rhynchonema cinctum n. sp.* Annules of the cuticle retrorse posteriorly, the reverse anteriorly. Neck cylindroid, very rapidly narrowing just behind the



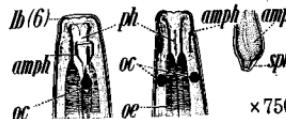
head, and thence nearly cylindroid, so that the entire head forms a kind of flexible beak. There are no eye-spots. Conoid oesophagus at the nerve-ring two-fifths, and finally one-half, as wide as the corresponding part of the neck; it has a fine colorless musculature with no indication of glands. The lining is indistinct. There is no cardia. The intestine, set off by a collum one-fifth as wide as the neck, becomes at once three-fourths as wide as the body. It has a distinct refractive lumen and is thick-walled; its cross-section presents two to three cells. From the continuous anus, the rather inconspicuous though cutinized rectum is three-fourths as long as the anal body-diameter. Only the first few cells of the intestine show granulation. The conoid, sub-arcuate tail tapers from the anus to the non-striated spinneret, whose width is about equal to that of three of the caudal annules. At the base of the spinneret there are always about three minute nuclei that stain strongly. The ellipsoidal caudal glands form a close tandem in the anterior two-fifths of the tail. The lateral fields are about one-third as wide as the body, but are more or less indistinct. Renette unknown. In the vicinity of the vulva about eight of the annules present simply a crenate, instead of a serrate contour. The broadly elevated vulva is rather conspicuous, particularly in front. Vagina small. A mass of small sperm cells has been noted near the vulva. The eggs are about eight times as long as the body is wide and one-twelfth as wide as long. They are granular and have a prominent central nucleus. The narrow cylindroid ovaries contain ova arranged single file. The spicula of the male, about as wide as one of the adjacent annules, are slender, rather frail, and sub-acute, and when seen in profile appear to have their proximal ends about opposite, or a little dorsad from, the body-axis. There is a slender, frail accessory piece. The three minute papilloid supplementary organs occupy a space three times as great as the body-diameter, and are about one body-width apart; the posterior member is about two body-widths in front of the anus. They hardly more than accentuate the annules on which they occur, but are rendered visible by carmine stains. The ejaculatory duct is one-fourth as wide as the corresponding portion of the body, the cylindroid testis one-half as wide.

*Habitat:* Salaverry, Peru, near low tide mark; marine. *Rhynchonema* is composed of a considerable number of species occurring in at least the Atlantic and Pacific Oceans. With low powers it is difficult to distinguish the head end from the tail end. The flexible, narrow head suggests the functions of a beak. One may imagine it to probe the depths of some receptacle containing food, for instance the neck of an algal oögonium. However, nothing is known with certainty concerning the food habits. Fig. 43.

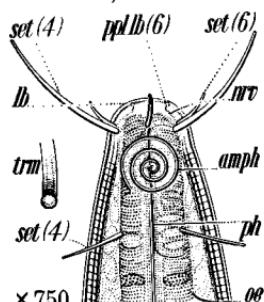
44. *Laimella longicauda* n. sp.  $\frac{1.3}{1.3} \dots \frac{5.4}{1.7} \dots \frac{9.2}{2.0} \dots \frac{18.29}{2.4} \dots \frac{1.7}{1.7} \dots \frac{7.0}{1.7} \dots \frac{1.7}{1.7} \dots$  Striae difficult to detect, but resolvable into almost invisible dots. Cuticle naked. Labial papillae obscure. Pharynx closed, inconspicuous, but undoubtedly present. There is a slight thickening or extra-refractiveness at one portion of the pharyngeal wall that suggests the presence of an extremely minute onchium. The cylindroid oesophagus near the nerve-ring is two-fifths as wide as the neck, and ends in an ellipsoidal valveless bulb three-fourths as wide as the base of the neck. The oesophagus has a fine colorless musculature. Hemispherical cardia, two-sevenths as wide as the base of the neck. The thick-walled intestine, set off by a cardiac collum one-fifth as wide as the neck, becomes gradually five-sixths as wide as the body, its cross-section presenting about six cells. From the somewhat depressed anus, the rather prominent cutinized rectum extends inward a distance equal to the anal body-diameter. The colorless, scattered to numerous intestinal granules are of variable size, the largest of them at first only twice as wide as one of the annules, but near the middle of the body six to eight times as wide. Tail setaceous, but conoid for a distance six times as great as the anal body-diameter, at which distance it is one-fifth as wide as at the base; thence it tapers very gradually to the terminus. It is very doubtful if there is a spinneret. There are elements in the base of the tail, simulating caudal glands, but no definite ducts have been seen, and the terminus seems too fine to afford space for a spinneret. About six very slender caudal setae, each about two-thirds as long as the anal body-diameter, occur on each of the four submedian lines. Similar setae occur throughout the body. The lateral fields are two-fifths as wide as the body. The large, non-granular, elongated renette cell lies just behind the base of the neck, and empties through an ellipsoidal ampulla, one-third as wide as the neck. The broad, oblique nerve-ring is accompanied by rather obscure nerve cells. From the small, more or less continuous vulva, the moderate-sized, conoid, cutinized vagina extends three-fifths the distance across the body. The elongated eggs are one to one and one-half times as long as the body is wide. The ellipsoidal sperm cells in the uterus are granular and about half as long as the body is wide. The cylindroid ovaries contain at least ten ova, arranged single file.

*Habitat:* Algae, Key West; also mud-flat, Biscayne Bay, Florida, U. S. A. Flemming to glycerine jelly. Fig. 44. Terminus, *trm*, shown foreshortened.

45. *Illium exile* n. sp.  $\frac{.3}{.4} \frac{10.9}{.9} \frac{21.4}{1} \frac{58.8}{1.1} \frac{95.4}{.6} > 2.5 \dots$  Cuticle naked. Neck conoid. Oesophagus conoid, finally about three-fourths as wide as the base of the neck. Cardia elongated, half as wide as the base of the neck. The intestine becomes at once about two-thirds to three-fourths as wide as the body. Its cross-section appears to be made up of about six cells. The posterior lip of the anus is slightly elevated. From it there extends inward the rather strongly cutinized rectum, which is about as long as the anal body-diameter. The lateral fields are a little more than one-third as wide as the body. The ventral gland is a much elongated cell, lying at a distance behind the base of the neck equal to about three to four body-diameters, and having a width about one-fourth as great as that of the corresponding portion of the body. There is a distinct ellipsoidal ampulla



$\times 750$



$\times 750$

one-third as wide as the middle of the neck, connected with the excretory pore by a short, rather sharply curved, minute duct. The caudal glands are located in a tandem series a considerable distance in front of the anus, that which is farthest forward being somewhat farther from the anus than is the spinneret. The tail is conoid in the anterior three-fifths in such a fashion that at the beginning of the fourth fifth it has a diameter about one-fourth as great as at the anus; thence onward the tail is cylindroid to the terminus which bears a slightly oblique spinneret. From the inconspicuous vulva the rather strongly cutinized vagina leads inward more than half way across the body. The ovaries reach about two-thirds the distance back to the vulva, at any rate in the only specimen so far examined, which was a rather immature female. Nothing is known concerning the number, size and structure of the eggs.

*Habitat:* Green algae, Carlisle Bay, Jamaica. Fig. 45, p. 261.

46. *Cynura uniformis n. sp.*  $\frac{.7}{.9} \quad \frac{4.9}{1.3} = \frac{9.3}{1.2} \quad \frac{50^{11}}{1.2} \quad \frac{97.5}{1.3} > \frac{9.3}{1.2} \dots$  The rather thick cuticle is naked. The two wings, occupying a space one-third as wide as the body, begin near the head and end on the tail. Pharynx very strongly reminiscent

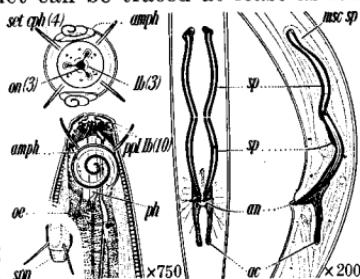
of that of *Plectus*;—is continued by a longer posterior part, whose presence is indicated mainly by alterations in the lining. This part, however, is rather easily distinguished from the oesophagus proper. Neck cylindroid posteriorly, convex-conoid anteriorly. The cylindroid oesophagus near the nerve-ring is three-sevenths, finally three-fifths, as wide as the corresponding portion of the neck. The radial oesophageal tissue continues to the middle of the anterior chamber of the pharynx, but is narrower there. There is the faintest possible break in the lining of the oesophagus near the nerve-ring,—possibly the vestige of a bulb. There is a large cylindroid cardia, three-fifths as wide as the neck. The thick-walled intestine becomes at once two-thirds as wide as the body; while its lumen is faint anteriorly, it is very pronounced posteriorly. From the elevated anus, the strongly-built, prominent rectum,—the lining of which is somewhat cutinized,—extends a distance three-fourths as great as the anal body-diameter. The cells of the intestine are packed with granules of variable size, the largest of which have a width equal to that of

one of the annules. The tail is cylindroid, then conoid in the posterior three-sevenths. The blunt, conoid terminus is strengthened by a large, obliquely-truncate cap, the several component plates of which are minutely punctate. The caudal glands probably lie in front of the anus; they end in the terminus in three simple, prominent ampullae. There are no caudal setae. The lateral fields appear to be about one-third as wide as the body. The granular ellipsoidal renette cell, two-thirds as long as the body is wide, and half as wide as long, lies about two body-widths behind the base of the neck. The medium-sized nerve-ring is accompanied by obscure nerve cells. From the medium-sized, more or less elevated, refractive and therefore conspicuous vulva, the vagina leads inward half way across the body. The inner wall of the vagina is also cutinized. The short, broad, cylindroid ovaries contain about fifteen ova arranged somewhat irregularly. Ellipsoidal granular spermatozoa, seen in the uteri, are one-eighth to one-tenth as wide as the body of the female.

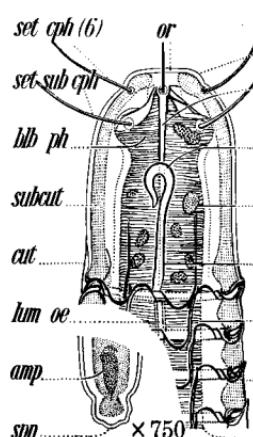
*Habitat:* Seaweed, washed up at Ocean Beach, Miami, Fla., U. S. A., after a storm. Flemming to glycerine jelly. Only a single specimen seen. Fig. 46, p. 262.

47. *Xinema perfectum* n. sp. Neck conoid. Somatic setae papilloid, or nearly so; cuticle becoming much thinner in the region of the lateral organs, thickening again in front of them and becoming again as thick as ever on the front of the head. The oesophagus continues to have the same diameter until after it passes through the nerve-ring, when it begins to expand gradually, until finally it is nearly three-fourths as wide as the base of the neck. The two ventrally submedian sectors of the oesophagus appear to contain glands,—at least in each there extends from near the posterior end of the oesophagus forward a minute duct, which stains distinctly with carmine. This duct can be traced at least as far as the nerve-ring. There does not appear to be any very distinct cardia. The intestine gradually becomes three-fourths as wide as the body. In cross-section it is composed of six to eight cells, containing relatively large nuclei and numerous small, uniform granules. The renette cell, nearly as long as the body is wide and about one-third as wide as long, is located just behind the base of the neck. Its ampulla, about one-fourth as wide as the corresponding portion of the neck, is connected with the excretory pore by means of a very short duct. The lateral fields are about one-third as wide as the body. The nerve-ring surrounds the oesophagus squarely. The tail tapers from considerably in front of the anus, being convex-conoid in such a fashion that at the beginning of the final fifth it has a diameter about one-fifth as great as at the anus, or even less; thence onward, the tail expands a little. The caudal glands are located near the anus. From the depressed vulva, the vagina leads inward more than half way across the body, where it joins the two symmetrically-placed uteri; its internal walls are distinctly cutinized. The ovaries contain twelve to fifteen ova arranged single file. Occasionally the tips of the ovaries are reflexed. Apparently the females possess a pair of spermatheca, which when filled reach to near the bases of the ovaries. The spermatozoa appear to be elongated. The elongated eggs are about twice as long as the body is wide and a little less than half as wide as long; they have been seen in the uteri one at a time. Tail of the male a little more bulky than that of the female and a little narrower in the posterior part, which instead of constituting one-fourth of the tail, constitutes about one-third. No supplements or special setae. Spicula consisting of two, equal segments, one in front of the other. The muscular tunic enclosing the spicula is continuous at the elbow. While the spicula and their sheaths tend to stain in acid carmine, the accessory pieces do not do so, but retain a slight yellowish color of their own. The caudal glands are located alongside the accessory pieces, both in front of the anus and behind it. The ejaculatory duct is about one-fourth as wide as the body, the vas deferens about one-third.

*Habitat:* Marine mud, San Pedro, California, U. S. A. Specimens of this species appear to have a tendency, when killed with hot sublimate, to twist and present a dorsoventral view of the head instead of a lateral. Fig. 47.



48. *Ceramonema attenuatum* n. sp.  $\frac{.5}{1.6} \dots \frac{2.3}{2.4} = \frac{17}{2.8} \dots \frac{16^{*}48^{*}}{3} \dots \frac{82}{1.9} > 1.1^{**}$  Each annule of the thick, transparent, naked cuticle is made up of eight elements so fitted together as to be reminiscent of the arrangement of corrugated roof-tiles; hence, the name "Ceramonema" (see *an*, Fig. 48). Neck cylindroid, with minute, somewhat forward-pointing setae one-fourth as long as the annules are wide. The setae occur in longitudinal rows, one on each annule, but whether on each of the longitudinal lines is problematical. Lips amalgamated. It is probable that there are minute papillae a little in front of the anterior row of cephalic setae. The very narrow pharynx joins the oesophageal lumen with little alteration. The oesophagus gradually narrows to near its posterior part, becoming at its narrowest point about one-fourth as wide as the neck; thence onward, however, it expands so that where it joins the intestine it is about half as wide as the base of the neck. There is no distinct cardia. The thin-walled intestine becomes at once two-thirds as wide as the body. Possibly its cross-section is



composed of as few as three or four cells. Anus inconspicuous; rectum fully twice as long as anal body-diameter. Salivary glands unknown. The renette appears to be a unicellular gland located immediately behind the cardiac constriction; it is about half as long as the body is wide, and, as usual, *nd* tapers anteriorly to join the narrow excretory tube. The excretory pore is perhaps just to the rear of the nerve-ring. It is very difficult to observe the longitudinal fields, owing to the highly refractive nature of the elements composing the cuticle. These latter join each other in such fashion as to give rise to eight longitudinal lines, two of which are, of course, sub-lateral and span a distance equal to about one-third the width of the body. The nerve-ring surrounds the oesophagus near where it is narrowest. Tail conoid; terminus having a diameter about half as great as that of the base of the tail. The final caudal segment of the cuticle is more than twice as long as the penultimate, though it seems also to be compound in its structure. The caudal glands appear to be located in front of the anus, near the place where the intestine joins the rectum. From the depressed and inconspicuous vulva the vagina leads inward nearly half way across the body. The reflexed portions of the ovaries reach well back toward the vulva. The eggs are long and narrow, though no specimens have been seen containing well-matured eggs.

*Habitat:* Mud among marine algae, shores of Kingston Harbor, Jamaica. Sub-limate to balsam. The male of another undescribed species has stoutish, tapering, subacute, rather frail spicula, accompanied by a more or less arcuate, rather slender, frail, simple accessory piece half as long. There are no supplementary organs. This undescribed species is so similar to *C. attenuatum* that it is believed the male of *attenuatum* will be found to present similar features. Fig. 48.

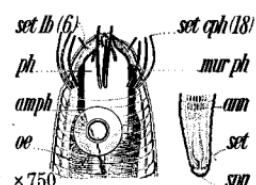
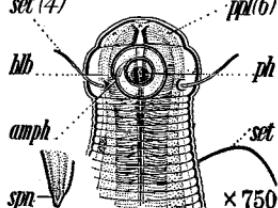
49. *Bolbonema brevicolle* n. sp.  $\frac{.4}{1.4} \dots \frac{4.8}{2.3} \dots \frac{7.8}{2.5} \dots \frac{16^{*}46^{*}}{3.7} \dots \frac{92}{1.8} > 1.3^{**}$  Neck conoid. The walls of the pharynx are a little more strongly cutinized than those of the oesophagus, especially toward the minute mouth opening. The cylindroid oesophagus is about three-fifths as wide as the base of the head, but expands finally to form the pyriform cardiac bulb, which is about four-fifths as wide as the base of the neck. This bulb has no distinct valve, though the cutinous

lining is more strongly developed in the bulb than it is elsewhere. There appears to be an elongated cardia,—perhaps one-third as long as the neck is wide. The intestine begins as a narrow tube only about one-fourth as wide as the base of the neck, and enlarges gradually so that near the middle of the nema it is about one-half as wide as the corresponding portion of the body. For a distance behind the bulb as great as the body-diameter, the cells of the set(4) intestine contain nuclei which stain more strongly with carmine than do their neighbors. Thence onward the *hb* cells contain granules of variable size, the largest being larger than any of the nuclei in any of the adjacent cells. The intestine shows about four cells in cross-section; their contents are so disposed that there is a distinct tessellated effect. Anus slightly raised; the *spn* rectum as long as the anal body-diameter. There appears to be no doubt about the existence of a unicellular renette cell just behind the neck, but the position of the excretory pore is unknown. Lateral fields about one-third as wide as the body. Tail conoid. From the slightly raised vulva, the vagina leads inward fully one-third the distance across the body. The eggs appear to occur one at a time in each uterus. They are fully twice as long as the body is wide, and considerably less than half as wide as long. It seems probable that segmentation sets in before the eggs are deposited.

*Habitat:* Mud, shallows of Kingston harbor, Jamaica. Sublimate to balsam.  
Fig. 49.

50. *Omicronema litorium* n. sp.  $\frac{1.7}{1.5} - \frac{8.8}{2.1} - \frac{19.}{1.9} - \frac{41-85.}{2.1} - \frac{92.}{1.6} > 1.23$   $\mu$ . Cuticle rather thin, naked, its striae more easily resolvable into rows of longitudinal markings near the extremities. Wings faint. No labial papillae. Amphids yellowish. Oesophagus at the nerve-ring one-half as wide as the middle of the neck; thereafter it expands somewhat, so that finally it is about two-thirds as wide as the base of the neck. The oesophagus has a somewhat wavy lining. There is a narrow, elongated cardia, nearly half as long as the body is wide. The intestine, set off by a deep and broad constriction, becomes at once about three-fourths as wide as the body. The lateral fields appear to be about one-fourth as wide as the body. The female has a single outstretched ovary extending forward. From the more or less conspicuous, depressed vulva, the rather weak, more or less cutinized vagina connects with the straight uterus, which contains elongated eggs, twice as long as the body is wide and about one-eighth as wide as long. The narrow ovary is first cylindroid, then tapering. The larger ova are arranged single file; toward the blind end, however, the ova are arranged irregularly. The conoid, arcuate tail tapers from the anus, or from somewhat in front of it. The three ellipsoidal caudal glands lie in a loose tandem in the anterior half of the tail.

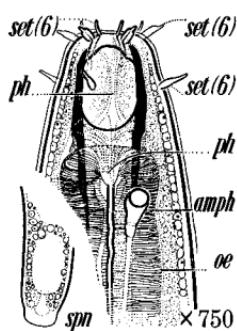
$\frac{1.9}{1.3} - \frac{8.4}{1.5} - \frac{16.6}{1.7} - \frac{46-81}{1.7} - \frac{93.}{1.9} > 1.2$   $\mu$ . The tail of the male is arcuate and conoid to the spinneret, which is one-sixth as wide as the base of the tail. No supplements, though there are inconspicuous setae on the submedian lines, both behind and in front of the anus. The dark rather slender spicula attain their greatest width at their bent middle parts. Accessory piece nearly as long as the anal body-diameter. Near the bends of the spicula the accessory piece takes on a sigmoid contour, and this portion is connected with the body wall both anteriorly and posteriorly by strands of muscle. The ejaculatory duct is about one-third as wide as the body.



*Habitat:* Ocean beach-sand, vicinity of Los Angeles, Calif., U. S. A., near low tide mark. Fig. 50, p. 265.

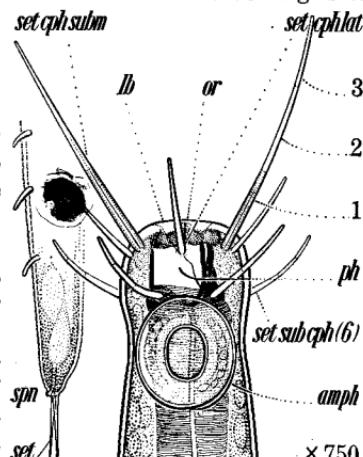
51. *Halanonchus macrurus n. sp.* 1. .... 6. .... 14. .... 18<sup>33</sup> .... 66. .... 2.14<sup>..</sup> The naked cuticle is very finely and somewhat irregularly reticulated upon the head. Outer row of cephalic setae stout, two-jointed. Lips probably distinct and six in number, thin, flap-like. Pharynx somewhat deeper than the base of the head is wide. The pharynx has a faint triquetrous framework, the three, slender, longitudinal elements of which are split behind (and also less conspicuously in front), the set(6) branches thus made bowing round together; this imparts to the wall of the pharynx, opposite the beginning of the posterior fourth, a junction-like effect. As a whole the pharynx is much like an elongated and naked and weakened *Oncholaimus* pharynx destitute of onchia. The cylindroid to conoid oesophagus near the nerve-ring is three-fifths, and finally two-thirds, as wide as the neck. The distinct refractive lining appears to be composed of two to three faint elements, occupying a space three-fifths as wide as the oesophagus; the musculature is coarse. Probably glands are present in the oesophageal tissues. There is a more or less hemispherical cardia, one-third as wide as the neck. The thick-walled intestine is set off by a constriction one-third as wide as the base of the neck, and becomes at once two-thirds as wide as the body. In cross-section it is composed of about twelve cells. The rather inconspicuous rectum is as long as the anal body-diameter. The cells of the intestine contain scattered, colorless granules, of variable size, the largest of which are one-twentieth as wide as the body. The larger granules darken in Flemming's solution. The tail is first conoid, and then cylindroid in the posterior two-thirds, where it is one-third as wide as at the base. It tapers from in front of the anus to the terminus, which is apparently devoid of spinneret. The lateral fields are three-fifths as wide as the body; their margins are rather distinctly indicated by the abrupt beginning of the longitudinal musculature. Renette unknown. Nerve-ring accompanied by obscure nerve cells. From the large, conspicuous, somewhat elevated vulva the large, tubular to conoid, non-cutinized vagina extends obliquely backward a distance equal to the body-diameter. The uterus is twice as long as the body is wide, and contains four to seven eggs, which are probably deposited after segmentation begins. The narrow ovary tapers but little, and contains about thirty ova arranged single file. The sub-arcuate, rather simple, frail, blunt spicula are one-eighth as wide as the body; viewed in profile their non-cephalated proximal ends appear to lie dorsad from the body-axis. The single, more or less straight, very slender, frail, simple, parallel accessory piece is one-third as long as the spicula. The fifteen to eighteen very inconspicuous, sub-equidistant, papillloid, ventral supplementary organs occupy a space in front of the anus seven times as long as the body-diameter; the posterior one lies opposite the middle of the spicula. The distance between these organs is about one-fourth of one body-diameter. For each supplement there is a "pore" in the cuticle, and to this comes a "nerve-ending" that appears to project more or less. The sperm cells are long and cylindroid.

*Habitat:* Sand inside government cut, Biscayne Bay, Florida, U. S. A. Flemming to glycerine jelly. Fig. 51.



52. *Halinema spinosum n. sp.* There are a few, very inconspicuous cervical setae, one-third as long as the neck is wide. Cephalic setae three-jointed (Fig. 1, 2, 3). Lips three, possibly double. Neck more or less cylindroid. Oesophagus cylindroid, with an almost imperceptible cardiac swelling;—at the nerve-ring four-sevenths, and finally three-fourths as wide as the corresponding portion of the neck. The sub-distinct lining of the oesophagus is optically expressed by refractive lines occupying a space two-sevenths as wide as the organ itself. The colorless musculature is rather coarse. No cardia has been noted, but the intestine is at first more refractive in its lining, and otherwise altered. The thick walled intestine is set off by a collum one-fourth as wide as the neck, and has a faint, but somewhat refractive lining. It soon becomes two-thirds as wide as the body, and in cross-section is composed of few cells. From the anus, the posterior lip of which is elevated, the rather inconspicuous rectum leads inward a distance three-fourths as long as the anal body diameter. The intestinal cells contain scattered granules of variable size, the largest of which are about one-tenth as wide as the body; they darken on treatment with Flemming's solution, and are strongly refractive in glycerine jelly. The conoid tail tapers from the anus. The broadly saccate caudal glands, three in number and relatively small, form a close tandem in the anterior eighth of the tail. The posterior half of the tail bears eight pairs of ventrally submedian stiff setae. The rather fusiform, non-granular retene cell lies on the ventral side of the body a little behind the base of the neck; it empties through a rather conspicuous ampulla one-third to one-fourth as wide as the corresponding portion of the neck. The nerve-ring is of medium size and is accompanied by obscure nerve cells. The female sexual apparatus presents a vestigial posterior branch. Vulva rather large, somewhat elevated; vagina more or less cutinized. The eggs are five times as long as the body is wide, and evidently occur in the uterus one at a time. The narrow tapering ovaries contain few ova arranged single file. The spicula are rather strong, somewhat slender, tapering and acute. Their expanded proximal ends appear to lie ventrad from the body-axis. The applied parts of the two rather frail accessory pieces are one-fourth as long as the spicula. They have tapering apophyses, one-third as long as the anal body diameter, whose proximal ends lie ventrad from the body-axis. Papilloid sub-equidistant supplementary organs on the ventral line occupy a space five to six times as long as the body diameter, the distance between them being about equal to three-fourths the corresponding body diameter. Of these almost imperceptible innervations, the posterior one lies opposite the distal portions of the spicula. Ejaculatory duct two-fifths as wide as the body. There seem to be two narrow, tapering testes, but there is a little uncertainty about the posterior one.

*Habitat:* Sand bar, opposite the mouth of the Miami River, Biscayne Bay, Florida, U. S. A. Flemming to glycerine jelly. Fig. 52.



4.8    10.2    16.2    21<sup>11</sup>-54<sup>11</sup>    86.    >8<sup>\*\*</sup>  
 2.8    5.3    9.7    13.8    2.7    2.7

53a. *Pseudolella cephalata* n. sp. Cuticle naked; wings optically expressed in the form of closely approximated, indistinct longitudinal lines. The unusually long amphids are of such a character as to be mistaken at first for wings. Behind the neck the amphids gradually narrow, so that somewhat in front of the middle of the body, where they end, their width is only about one-third as great as opposite the base of the pharynx. Neck conoid. Cuticula much thinner on the head. Lips thick; six, or three and two-set (4) parted. Internally the lips are armed with six very minute odontia (?), apparently having an outward stroke. From the expanded base of the pharynx muscular fibres are seen passing to the front, clearly indicating that the entire structure can be moved forward; such movement would be entirely in accord with the structure of the labial region. The oesophagus maintains the same diameter until after it passes through the nerve-ring; it then expands rather rapidly so as to form the pyriform cardiac bulb nearly two-thirds as wide as the base of the neck. There is a flattish-conoid cardia, one-third as wide as the base of the neck. The front end of the intestine is pressed to one side by the strongly developed renette cell, but behind this cell it becomes about two-thirds to three-fourths as wide as the body; its cross-section probably is composed of six or more cells. These cells contain scattered yellowish to brownish granules of small but variable size. The anus is rather inconspicuous. The rectum is about as long as the anal body diameter. The tail is at first conoid, so that at a distance from the anus equal to five times the anal body diameter, its diameter is not over one-sixth as great as at the base. The remainder of the tail, probably a short part only, is missing. Caudal glands probably located in the base of the tail. The renette cell, half as wide as the body and about twice as long as it is wide, is located behind the base of the neck a distance equal to two body diameters. From the slightly elevated vulva the rather massive vagina leads inward fully half way across the body. About eight ova are arranged single file in each ovary. The eggs are two to three times as long as the body is wide, and a little less than one-third as wide as long. The spermatozoa seen in the uterus are about one-sixth as wide as the body, and are finely granular and have their chromatin in an ellipsoidal form surrounded by a clear area.

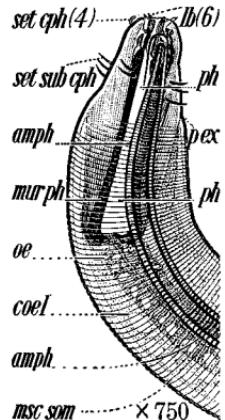
*Habitat:* Punta Arenas, Pacific Coast of Costa Rica. The following are the actual measurements in microns:

57.    78.    124.    410<sup>11</sup>    658.    >800<sup>\*\*\*\*</sup>

22.    26.    28.    29.    21.

Fig. 53a.

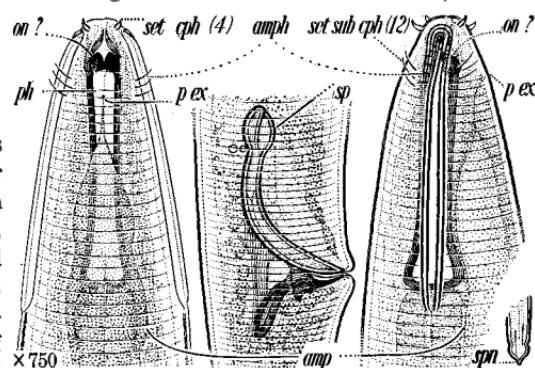
b. *Pseudolella granulifera* n. sp. Type species. Cuticle as in *P. cephalata*, but without wings. Neck convex-conoid anteriorly; especially at the head, which is somewhat bluntly pointed. Cephalic setae four, arcuate, spreading, and one-third as long as the corresponding diameter of the head, arranged about one-fourth of the distance back to the beginning of the tubular portion of the pharynx. Lips confluent, obscure, probably three in number. No labial papillae seen. Amphids long, slender; beginning some distance behind the pharynx and extending forward in the form of a band or groove about half as wide as the pharynx, and having refractive cutinized edges. This band extends to very near the lips, then suddenly narrows and turns back on itself and ends indefinitely in front of



the middle of the pharynx. At its widest, i.e., toward the front, the amphid is a little narrower than the pharynx. Lips relatively thick, closing to form an exceedingly narrow, cutinized vestibule. Pharynx and all parts of the alimentary canal like those of *P. cephalata*. Pharynx sub-uniform, about one-sixth as wide as the base of the head. A little behind the lips the lining of the pharynx is discontinuous and the cavity bends slightly toward the ventral side, and there appears to be a pair of very small, ventrally submedian onchia of equilateral profile. It is difficult to make out the details sufficiently well to state positively that these refractive, cutinous elements are homologous with ordinary onchia. Opposite the onchia on the dorsal side the cutinized, pharyngeal elements are discontinuous, two or three in number, but not very variable in character. The onchia and the elements opposite them and in front of them are fully as robust as the walls of the pharynx, of which the ventral side supporting the "onchia" is considerably thicker than the dorsal. The cross-section of the intestine appears to be made up of few cells, perhaps only two or three. The granules in the intestinal cells, the largest of which are half as wide as the nucleus of the renette cell, are a very conspicuous feature and give rise to a very indistinct tessellated effect. In its anterior half the tail is conoid from the anus, and at the middle is one-fifth as wide as at the base. Thence onward, it tapers but little and ends in a somewhat rounded, unarmed spinneret. There are no caudal setae. Caudal glands occur in the anterior part of the tail. Lateral fields indistinct, apparently one-third as wide as the body. Both before and behind the renette cell there are bodies of unknown significance that stain with carmine. Nucleus of the renette cell distinct, slung in a conspicuous protoplasmic network. Behind the renette cell is a spindle-shaped, distinctly nucleated cell fully one-third as wide as the body and about twice as long as wide. Still further back, after a

4.3 . . 8.5 . . 12.9 . .  $^{+5} \cdot 53^{-23}$  . . 86. . . >1. ..  
 3/ . . 3.3 . . 3.6 . . 4.4 . . 2.7

4.1 . . 7. . . 12.7 . .  $^{+M^{-2}} \cdot 86.$  . . >1. ..  
 2.7 . . 3. . . 3.3 . . 3.8 . . 2.9

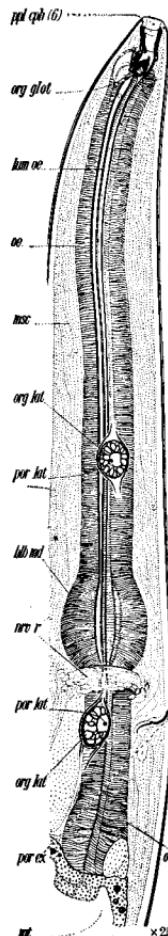


considerable interval, there is another similar cell of larger size; these two latter cells seem connected by a narrow process, and the anterior smaller cell presents a narrow process extending forward. Spicula uniform, arcuate, one and one-half times as long as the anal body diameter; their proximal ends rather prominently and obliquely cephalated by expansion. Proximal ends a little dorsad from the body-axis. The spicula taper to a fairly acute point in the distal fourths and their cutinized framework is duplex; at their widest part, the middle part, the spicula are about one-sixth as wide as the corresponding portion of the body. Two accessory pieces adjoining the distal fourths of the spicula; extending backward at right angles to the spicula are the blunt apophyses three-fifths as long as the anal body diameter. The number and the structure of the testes is uncertain, but apparently there are two, of which the anterior is reflexed and the posterior outstretched. The sexual cells are of unusually large size and their walls appear to divide up the testes in an irregular geometric fashion.

*Habitat:* Marine mud and sand, Noumea, New Caledonia. Fig 53b.

## V. Order Polylaimia

This order cannot at present be so satisfactorily defined as most of the others herein represented. There probably can be removed from it sooner or later a number of groups of ordinal rank, but the time seems hardly yet ripe for such a removal. For the present, therefore, the genera and families ranged under this name are of a more heterogeneous character than under most of the other twelve orders here presented. Some slight effort has been made, here as elsewhere, to place these new genera in the order of their family relationships. In general, the genera that are first mentioned in an ordinal group, and the genera placed at the end of the group, as here presented, exhibit more or less manifest relationships to genera included in other orders. (See p. 217.)



54. *Cephalobium microbivorum* n. sp. The wing begins near the head and ends near the terminus. Its optical expression is either a pair of lines, or a single line, in the middle of a field one-twelfth as wide as the body. The contour of the body may become crenate in the anal region. There are about thirteen lateral organs in each lateral field connected with pores in cuticle (see *org. lat.*, Fig. 54). Base of the pharynx containing a large, complicated and peculiar dorsal glottoid organ. No amphids. The rather thin-walled intestine is set off by a collar one-eighth as wide as the neck, and has a rather distinct lumen. It becomes at once five-sixths as wide as the body, and in cross-section presents two to four cells. From the somewhat depressed anus, the narrow, cutinized rectum extends inward a distance one and one-fourth times as great as the anal body diameter. Scattered yellowish granules of variable size occur in the cells of the intestine, the largest being one-twenty-fifth as wide as the body. In addition, there are numerous very small granules. The subarcuate, conoid tail tapers from in front of the anus to the acute fine terminus. There is no spinneret. From the elevated vulva, the rather small, somewhat weak vagina extends inward one-fourth the way across the body. Along the middle half of the body the two equal uteri contain ellipsoidal eggs two-thirds as long as the body is wide, which are deposited after segmentation begins. No embryos were seen in these eggs,—only blastulas. For the most part the ova are arranged irregularly in the somewhat tapering ovaries. The rather strong, slender, tapering, subacute spicula, when seen in profile, have their proximal ends nearly opposite the body-axis. Toward

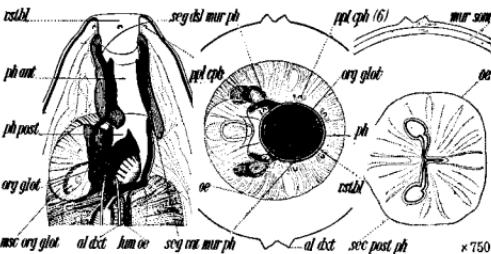
$\begin{array}{ccccccc} 1. & 10.3 & 12.8 & 31.48 & 10 & 86 \\ 1. & 2.5 & 2.6 & 3.3 & & 1.6 \\ \hline 1.1 & 2.4 & 2.8 & 2.9 & & 1.9 \end{array}$

their distal ends four slender stiffening pieces are apparent.

$\begin{array}{ccccccc} 1.2 & 10. & 15. & 74 & 90 \\ 1.1 & 2.4 & 2.8 & 2.9 & 1.9 & 2.8 \end{array}$

There is a strong, and rather solid, straight accessory piece, bending back from the spicula at an angle of about 90 degrees, so that its proximal end lies opposite the body-axis. Near the beginning of the second quarter of the tail there is a pair of lateral pores (?) similar to those on the female. On the female these pores have been shown by intra vitam staining to be homologous with those mentioned above, and shown in the illustration at *por lat.* Pairs of papillae on the tail of the male flattish-conoid, plainly innervated, rather

inconspicuous, occupying the anterior two-thirds of the tail, thus: 1(1); 111; 1. The members of the posterior four pairs are not located exactly opposite each other, the right hand member of each pair being slightly behind the left hand member. Spicula conspicuous, rather close together; at the widest part about one-eighth as wide as the corresponding portion of the body, ending in minute "buttons." The lateral pores on the tail are the final members of the series of lateral organs.



*Habitat:* Intestine of field cricket, *Gryllus neglectus* Scudd. Fig. 54a and b.

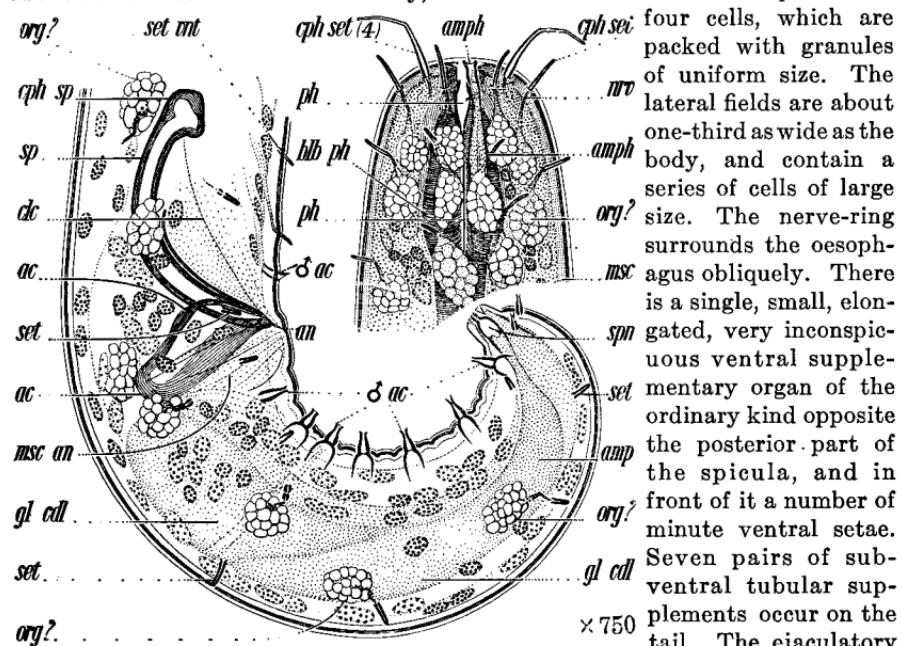
55. *Blattophila sphaerolaima n. sp.* Cuticle marked with plain transverse striae, 3 microns apart on the head and 24 microns apart on the body, where they are much less plainly to be seen, though they cause a slight crenation of contour. No amphids or setae of any sort. The head is somewhat hemispherical, bearing very small lips almost in the form of an annular elevation about the mouth. The pharynx and its apophyses are contained in a small spherical pharyngeal bulb,—hence the specific name. When closed, the pharynx is a prismoid cavity one-fourth as deep as the head is wide and about half as wide as deep, and backward from its base spring apophyses, a dorsal one dominating. The mouth can probably be turned partially inside out. The anterior three-fourths of the oesophagus is clavate, averaging one-third as wide as the corresponding part of the neck; this anterior part is connected by a narrow and very short tube with an oblate cardiac bulb one-half as wide as the base of the neck. The intestine, which appears to be only one-third as wide as the body, is set off by a broad and very deep constriction. The rectum is one and one-half times as long as the anal body-diameter. The renette plexus is quadruple. The nerve-ring encircles the oesophagus obliquely. The acute, conoid tail tapers rapidly near the anus, where there is a somewhat indistinct constriction. The anterior lip of the anus projects. The vulva is not very prominent. The numerous elongated ellipsoidal eggs measure 40-48 × 88-104 microns, and may segment before deposition.

4 7.7 15. 9. 82. 1. 3. 4.5 / 5.4 3.1 2.52.. Of the papillae on the male two are pre-anal, being large submedian ones adjoining the anus and having a truncate-conoid form with a mucro; there are also two post-anal papillae similar to the foregoing but smaller, and removed from the anus a distance equal to one-third of the body diameter. The spicula appear to be represented by a mere rudimentary point, —no longer than the larger papillae,—conical in form and projecting with the anus when the nema is killed with osmic acid. The single testis is reflexed at a point somewhat farther behind the cardia than the latter is behind the head.

*Habitat:* Intestine of *Panesthia brevicollis* Sauss., the common spiny-legged wild cockroach; Moss Vale, New South Wales, Australia. 1889. Osmic to water?

.15 2. 3.3 .40-M 97. 3.4.. 56. *Catanema exile n. sp.* ? 1. .9 1. 1. 1. The mouth opening is closed by three or six very minute, slightly refractive structures. About opposite the bases of the cephalic setae there are exceedingly minute onchia (?), possibly six,—difficult to see in profile; impossible to count because of their

small size and their overlapping. Amphids forward-pointing, minute, difficult to see. The oesophagus becomes slightly narrower where it passes through the nerve-ring; posterior bulb napiform, three-fourths as wide as the base of the neck. There is no distinct cardia. The thick-walled intestine becomes at once about two-thirds as wide as the body, and its cross-section is made up of about



duct is about two-fifths as wide as the body. The caudal glands are evidently located in front of the tail, but their exact position has not been made out.

**Habitat:** Marine sand about the bases of algae, in surf, Island off Port Royal, Jamaica. This genus resembles *Laxonema* in many respects, and also resembles *Laxus* but differs in the form of the lateral organs and in other ways. Sublimate to balsam. Fig. 56.

57. *Zalonema nudum* n. sp. Cuticle naked. The face view of the striae gives the impression of a series of narrow, contiguous hoops. The cuticle becomes thicker on the neck, and much thicker on the head. Lips, thick, small, plain. On the male there are very distinct and prominent wings, beginning about three times as far in front of the anus as the terminus is behind it. Each wing extends backward and ends opposite the proximal ends of the spicula. The width of this wing is about equal to the corresponding thickness of the dorsal or ventral cuticle as seen in optical section. None of the irregularities in the wall of the pharynx are suggestive of the ordinary pharyngeal organs, and yet they are very distinct features. Two of them are rather prominent, one on the dorsal side, opposite the anterior portion of the cephalic thickening, and the other on the ventral side opposite the middle or posterior portion of the cephalic thickening. The oesophagus continues with the same diameter until it expands to form the very broadly pyriform or napiform cardiac bulb, which is three-fourths as wide as the base of the neck. The lining of the oesophagus occupies nearly one-third of the optical section. The oesophageal lumen continues through the bulb.

The intestine joins the middle of the posterior surface of the cardiac bulb, and at this point the collum is nearly one-third as wide as the base of the neck. The rather thin-walled intestine becomes at once about two-thirds as wide as the body. From the nearly continuous anus, the tail is arcuate and conoid. There are no supplementary organs. The moderately stout spicula taper to a blunt point in their distal halves. At their widest part they are about one-fifth to one-sixth as wide as the corresponding part of the body; they are accompanied by accessory pieces half as long. The distal ends of the accessory pieces are applied closely to the spicula, but the proximal ends curve away slightly and then recurve. The ejaculatory duct is about one-third as wide as the body. Apparently there is but a single testis.

*Habitat.* Marine mud and sand, Noumea, New Caledonia. Sublimate to balsam. Fig. 57.

58. *Pseudonchus rotundicepsalus n. sp.* 1.4 1.5 4.8 63, 96.7 > 2.3 .. In most portions of the body longitudinal striations have been observed, apparently connected with the cuticle rather than with the musculature. Neck cylindroid. Lips two, each lateral. See Fig. 58. The mouth is very difficult to see in the lateral view. In the dorso-ventral view it is easily seen, and is found to be a dorso-ventral opening running across the head. Each lip has about six very minute, refractive, double, cutinous markings, each presenting two blunt-edged "teeth" directed toward the base of the pharynx. It appears that these represent foldings in the closed lips. In any case they represent, when viewed laterally, the roof of the pharynx, located opposite the bases of the anterior cephalic setae. The elements in the pharynx opposite the anterior borders of the amphids, which, at first sight, appear to be onchia, prove on careful examination to be ridges, (see *pseudon*, in the illustrations). The pharynx is unusual in structure and rather difficult to understand. The amphids of the female occur in about the same position as those of the male, but instead of appearing spiral appear

round, and not more than one-third as wide as the corresponding portion of the head;—they are, however, in fact, spirals of one wind. The narrow oesophagus has the same diameter until it expands to form the somewhat obscurely pyriform bulb, which is three-fourths as wide as the base of the neck. There is a flattish cardia, about one-third as wide as the base of the neck. The intestine is set off by a constriction about one-half as wide as the body, and in cross-section presents about half a dozen cells. There appear to be faint indications of the presence of wings. Renette unknown. Lateral fields are about one-fourth as wide as the body. Nerve-ring oblique. The tail is convex-conoid to the termini.

nus, where the conoid spinneret has a diameter about one-fifth as great as that of the base of the tail. From the slightly elevated vulva the vagina leads inward half way across the body, where it joins the two, symmetrically placed uteri. The ovaries reach about half way back to the vulva, at least in specimens in which the uteri are empty. There are eight to ten ova in each ovary, arranged single file.

1.1    3.3    5.8    <sup>10</sup>-H    95.9 > 2.6 mm  
1.2    1.3    1.3    1.4    1.4

The spinneret of the male is about one-third as wide as the base of the tail. No supplements or special setae or papillae have been observed either in front of the anus or behind it. The spicula are rather uniform and taper to an acute point in their distal thirds; in profile their proximal ends are seen to lie near the ventral surface of the body. The ejaculatory duct is about half as wide as the body.

*Habitat:* Mud, tide pool, Portsmouth, N. H., U. S. A. Sublimate to balsam. Fig. 58, p. 273.

59. *Polytairium exile n. sp.*  $\frac{1.5}{.7} \quad \frac{6.3}{1} \quad \frac{10.}{1.2} \quad \frac{13^{\circ}41^{\circ}15^{\circ}}{1.2} \quad \frac{85.}{1} > 1.6$  mm Striae of the thin cuticle minute. It seems very likely that four cephalic setae have been lost from the specimen from which the description and illustration are drawn. Lips three, and double, (or possibly six), with six minute labial papillae. Cuticle naked. Neck convex-conoid, especially toward the head. The oesophagus at the nerve-ring is one-half, just in front of the cardiac swelling one-half, and finally two-thirds, as wide as the corresponding portion of the neck. The elongated to pyriform cardiac bulb is very small. The lining of the oesophagus is quite distinct and at first is indicated by two refractive lines, occupying a space one-sixth as wide as that of the oesophagus. There appear to be no glands in its fine colorless musculature. There is an indistinct cardia. The thick-walled intestine is set off by a collum one-third as wide as the base of the neck; it has a faint lumen and becomes at once two-thirds as wide as the body. In cross-section it is made up of two to three cells. Anus more or less continuous; rectum somewhat cutinized, equal in length to the anal body-diameter. The granules contained in the intestinal cells are numerous, uniform and colorless. The tail is conoid from the anus, and then cylindroid in the posterior half, where it is two-thirds as wide as at the base. It is probable that the caudal glands are small and located near the anus. There are no caudal setae. Renette present; excretory pore probably located near the nerve-ring. Full-grown ova are twice as long as the body is wide, and nearly one-half as wide as long. The reflexed parts of the ovaries reach about three to four body-widths back toward the vulva.

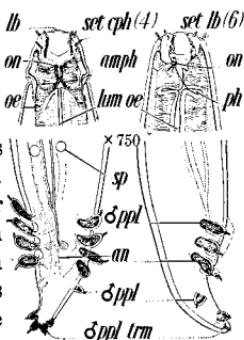
*Habitat:* Sand below low-tide mark, Belmar, New Jersey, U. S. A. Sublimate to balsam. Apparently the species is syngonic. Up to the present time extremely few free-living marine nemas have been observed to be syngonic. A similar species with four setae occurs at Woods Hole, Mass., U. S. A. Fig. 59.

60. *Myolaimus heterurus n. sp.* Cuticle thin, naked; striae fine. Lips thin, low, flat, confluent; six, or three and two-parted. Amphids faint, in the form of transverse slits. That portion of the pharynx in front of the amphids is about half as wide as the lip region; this chamber is continued by a narrower tubular portion, nearly one-third as long as the neck and surrounded by a peculiar radial musculature, differing from that of the oesophagus proper. Nearly as far behind the amphids as these latter are behind the anterior extremity, there is a prominent infolding in the wall of the pharynx. The amphids are difficult



to detect with the nema in profile,—more easily when viewed dorso-ventrally. Behind the anterior chamber of the pharynx, which in many respects resembles that of *Diplogaster*, there is a muscular portion closely resembling the oesophagus in size and structure, but which seems undoubtedly pharyngeal. This is indicated in two ways; first, the lining is different from that of the portion of the oesophagus immediately following it, and second, it behaves differently with staining material, indicating that its muscular wall also is considerably different in nature from that of the oesophagus. The dimensions given in the formulae relate to the anterior or labial chamber. At the base of the anterior pharyngeal chamber there appear to be minute cutinous processes which perhaps may function as onchia. It would appear possible that all that portion of the pharynx in front of the folds in its lining are capable of being opened out or everted. From the pharynx the oesophagus is cylindrical to near the nerve-ring, where it diminishes rather suddenly in diameter near the very faint vestiges (?) of a median structure. The vestiges consist in internal modifications of the oesophagus only. From the nerve-ring onward the oesophageal tube is about two-fifths as wide as the corresponding portion of the neck. It finally expands to form the elongated-ellipsoidal cardiac bulb, which bears a more or less distinct cardia, and is separated from the intestine by a shallow constriction. The cardiac valvular apparatus appears to be comparatively simple. The intestine becomes at once four-fifths as wide as the body. The intestinal walls are rather thick, and the cells are packed with minute granules. The rectum is about twice as long as the anal body diameter. The lateral fields appear to be half as wide as the body. The tail of the female is conical to the acute terminus and presents the peculiarity of diminishing in diameter very suddenly immediately behind the anus, the diminution taking place on the ventral side. The anal region is, therefore, conspicuous on this account, as well as on account of the fact that it is slightly depressed, and again on account of the refractive nature of the lining of the comparatively long and large rectum. The salient lips of the vulva are conspicuous, a property that is increased by the refractive nature of the lining of the vagina, which extends inward two-fifths the distance across the body. Tail of the male very different from that of the female. There is a bursal membrane connected with the digitate organs shown in Fig. 60. The specimens seen were molting, so that the exact nature of the membrane, which is believed to connect these organs one with another, has not been deciphered. It seems also certain, however, that the anterior four are joined together by means of a ventrally submedian membrane somewhat as in the case of the bursa in *Rhabditis*. The spicula are very weak and poorly developed in the specimens thus far seen. They appear to be as long as the tail, and are probably cephalated at their proximal ends by constriction; but they are very difficult to discern, and it is possible that the appearances are deceptive and that they are altogether absent. The testis extends forward to near the posterior end of the neck and appears to be reflexed for a short distance, but this is somewhat uncertain.

*Habitat:* Loamy soil, El Paso, Texas, U. S. A. Flemming to glycerine jelly.  
Fig. 60.



61. *Myctolaimus pellucidus* n. sp. 9.5 13. 16.6 45<sup>2</sup> 83. 1. " There are traces of a very fine transverse striation. No amphids or setae of any sort to be seen. Head continuous. Six relatively large, obtusely conical lips, each supplied with an obscure papilla, surround the mouth. The cuticle at the base of the lips, and at the beginning of the pharyngeal tube, is somewhat thickened, and this gives rise to obscure rings at the base of the lip-region. The unusually long pharynx is divided into two very distinct parts of about equal length, together occupying nearly two-thirds the length of the neck. The anterior part is a simple, narrow, straight strongly cutinized tube, having a lumen one-third as wide as the lip-region. The succeeding second part of the pharynx is a cylindroid bulb, rounded at both ends, and two-thirds as wide as the corresponding part of the neck. Its lumen is triangular and of about the same width as that of the anterior part of the pharynx, from which it is separated by a distinct break in the continuity of the cutinous lining. From this elongated bulb a tube one-sixth as wide as the corresponding part of the neck passes backward and gradually expands into a valveless bulb half as wide as the base of the neck, thus completing the oesophagus. The intestine, which at first is colorless and transparent and only one-fourth as wide as the body, gradually expands and becomes half as wide as the body and distinctly granular. The refractive lining of the intestine is a prominent feature. The cardia is unusually long and narrow, and opens into a small cardiac cavity. The cells composing the intestine are relatively large. The length of the well-cutinized rectum is about one and one-half times that of the anal body diameter. Renette unknown. The width of the lateral fields is one-third that of the body. The nerve-ring is small and narrow. The acute tail is almost exactly conical. The vulva is very slightly elevated. The ovaries extend back as far as the vulva, and are often there again reflexed. Each uterus contains one to two eggs, measuring 32 X 56 microns. Segmentation takes place in the uterus, and proceeds to at least the gastrula stage, probably beyond it.

9. 12. 16. 65<sup>2</sup> 91. 1. " The tail of the male instead of being conical is convex-conoid in the anterior half, tapering in this part in such a fashion that the middle of the tail is one-fourth as wide as the base; thence onward the tail is cylindroid to the acute terminus. While the anterior part of the tail is ventrally arcuate, the remainder is dorsally arcuate. No ventral supplements or bursa. Nine pairs of papillae, mostly finger-shaped, are arranged as follows: 1; 1(1)1; 1; 1, 3. The linear, tapering, rather blunt spicula somewhat exceed the anal body diameter in length. The spicula are supported by sigmoid accessory pieces half as long as they themselves. The reflexed part of the testis is nearly equal to the neck in length; it can be seen to contain small glassy, globular spermatocytes, which reach their full growth near the middle of the body, becoming as long as the body is wide and two-thirds as wide as long. At this stage they are granular, with a large central nucleus containing a prominent nucleolus. By division these large cells give rise to the granular spermatozoa, an elongated parcel of a dozen or more of which is usually to be seen in each uterus of the female.

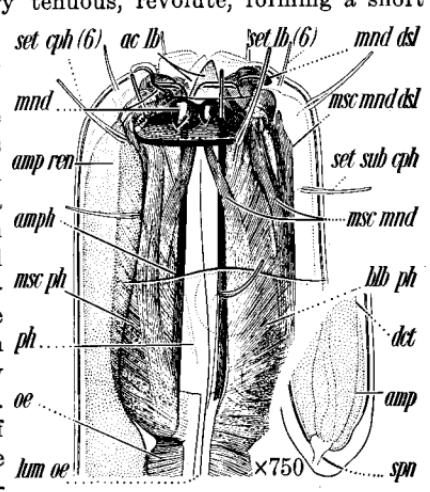
*Habitat:* Sheep-dung, Moss Vale, New South Wales, September 2, 1894. It will be seen that this genus is similar to *Cephalobus*. It is equally clear that it is generically distinct. It is unfortunate that no specimens of this species were preserved, and hence no drawings can be presented. This is all the more to be regretted because the genus is evidently closely related not only to *Cephalobus* but to one or two others of similar character.

## VI. Order Apodontia

62. *Apodontium pacificum n. sp.*  $\frac{7}{.7}$   $\frac{5}{1.2}$   $\frac{9.4}{1.3}$   $\frac{67-M}{1.5}$   $\frac{94}{1.4}$   $\times 2.3$  Striae resolvable into dot-like elements. Neck cylindroid posteriorly, convex-conoid anteriorly. The cylindroid oesophagus ends in an inconspicuous, flattish-conoid cardia one-third as wide as the base of the neck. The thin-walled intestine is set off by a collum two-thirds as wide as the base of the neck, has a somewhat distinct lumen, becomes at once two-thirds as wide as the body, and in cross-set(10)?  $\times 750$  section presents three to four cells containing granules of uniform size. From the somewhat elevated anus the prominent rectum extends inward a distance equal to the anal body diameter. Tail conoid from the anus. The conspicuous, more or less elongated caudal glands are packed in a close tandem behind the anus in the anterior half of the tail. There are about eight ventrally submedian and two dorsally submedian setae on each side of the tail. These stoutish, tapering setae are about one-fourth as long as the anal body diameter. The large granular, ellipsoidal renette cell, two-thirds as long as the body is wide, and two-thirds as wide as long, lies a short distance behind the base of the neck, and empties through an ellipsoidal, thin-walled ampulla. The nerve-ring is accompanied by obscure nerve cells. The yellowish spicula are slender and subacute. Their proximal ends appear to lie somewhat dorsad from the body-axis. There are two separate, strong, rather stout, simple accessory pieces. They are one-half to two-thirds as long as the anal body diameter, and their proximal ends lie near the dorsal body wall. There are no supplementary organs, special setae, or papillae on the tail of the male. The ejaculatory duct is one-third, the vas deferens one-third, and the testis one-half, as wide as the body. The testis tapers and is at last narrow.

*Habitat:* Marine; Mollendo and Salaverry, coast of Peru, S. A. Sublimate to balsam. Fig. 62.

63. *Ironella prismatolaima n. sp.*  $\frac{2.7}{.6}$   $\frac{?}{?}$   $\frac{20}{1.9}$   $\frac{44-M}{2}$   $\frac{94}{1.1}$   $\times 2.1$  Lateral wings very faint. Body naked. Lips six, very tenuous, revolute, forming a short tube one-fourth as wide as the lip-region. There are six obscure, flat, conical, labial papillae, not shown in the illustration. Labial setae minutely "furcated" at the extremity. Each of the three odontia is duplex, the two parts of the submedian ones being of unequal size. The odontia are contained in a somewhat napiform cavity. Odontia acute, with an outward stroke; when at rest somewhat outward-pointing, and blocking the entrance to the pharynx. Posterior part of the napiform cavity apparently lined with exceedingly minute denticles. Neck cylindroid.  $\text{oe}$  Amphids faint, apparently consisting of an almost imperceptible transverse groove partially encircling the head. The cylindroid oesophagus is at the nerve-ring four-sevenths, and finally three-fifths, as wide as the corresponding portion of the neck; its lining is prominent, occupying one-third the diameter of the organ. In the coarse, colorless musculature there are



three glands which empty at the mouth. There is a cylindroid cardia two-sevenths as wide as the base of the neck. The thick-walled intestine is set off by a column one-third as wide as the base of the neck, and becomes at once one-half to three-fifths as wide as the body. Its cross-section is composed of four to six cells. It has a faint zig-zag lumen. Very fine, colorless, more or less polyhedral granules of variable size are found scattered in the intestinal cells. The largest of these are one-twenty-fifth as wide as the body. They give rise to no more than a faint tessellation. The more or less arcuate tail of the male tapers from in front of the anus, and is first conoid then cylindroid and two-fifths as wide as at the anus. The caudal glands are probably preanal. There are no caudal setae. The lateral fields are one-fourth as wide as the body, and faintly granular. The very frail, straight, slender, subacute spicula become arcuate near the tips, and are faintly cephalated by expansion. Their proximal extremities appear to lie dorsad from the body-axis. The frail, simple, arcuate, slender accessory piece lies parallel to, and is two-fifths as long as, the spicula. There is a single supplementary organ opposite the posterior part of the spicula. The internal part is refractive and more or less irregularly cylindrical, and bent back parallel to the ventral surface. It is one-half as long as the body is wide, and one-fourth to one-fifth as wide as long, and is probably protrusile through the small, short, cylindrical element at the ventral surface, where there is also a single, strongly curved seta, of considerable size. The ejaculatory duct is one-third as wide as the body. The testes are characterized by the presence of numerous, elongated elements, which constitute one phase in the development of the sperm. These elements are apparently two-thirds as long as the body is wide and one-fifth to one-eighth as wide as long, and are rounded at the end. From the living nema.

*Habitat:* Sand, Nobsca Beach, Woods Hole, below low tide. Fig. 63.

## VII. Order Synodontia

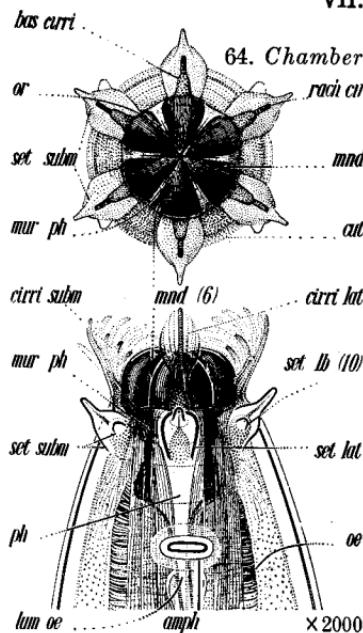


FIG. 63a. The cirri are omitted from the upper illustration in order to show more clearly the mandibles and the setae.

forward. The eggs are elongated, apparently more or less long and slender. The gently tapering ovary contains 50–100 ova; reflexed to near anus.

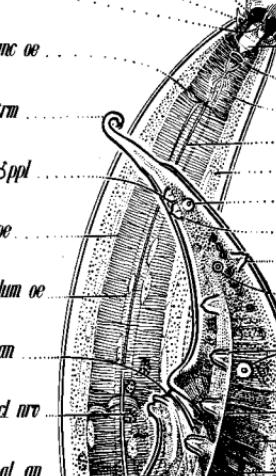
.8    12.7    20.2    45.58    93.6    .67 ..

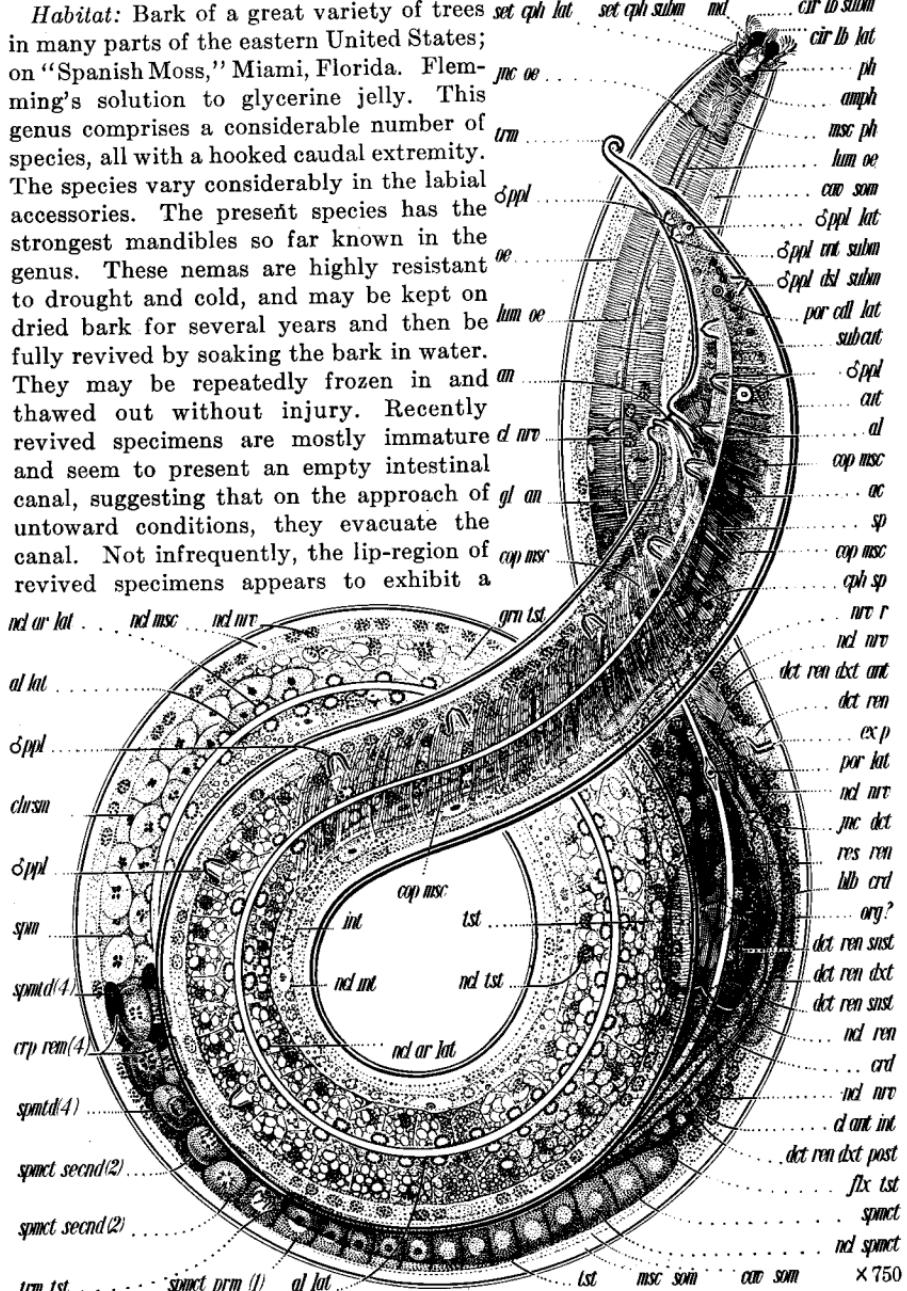
1.9    3. /    3.3    3.7    3.1

Only the external walls of the six odontia are cutinized and this portion, but not the interior, stains very strongly in acid-carmine. The odontia are used to nibble the mycelium of the fungi constituting the food. The cells of the vas deferens are packed with transparent, homogeneous, ellipsoidal granules, whose maximum diameter is about one-third as great as that of the spermatozoa; the cells of the ejaculatory duct are packed with similar granules having about half as great a diameter. The junction of the ejaculatory duct and the vas deferens is distinctly marked by the change in the size of the granules contained in these cells composing their walls. The lateral pores on the tail of *Chambersiella rodens* connect with elongated, clavate cells located opposite the anus in a lateral position. The nuclei of these cells usually lie a trifle behind the anal region. From the elevated and conspicuous vulva, the somewhat cutinized large vagina leads inward and obliquely

.6      14.      20.8       $^{54}\text{M}$       94.1      .63 mm  
 1.7      2.7      3.1      2.8      1.5,

1.7    2.7    3.1    2.8    1.5;    The males are less common than the females.  
**Habitat:** Bark of a great variety of trees set *qph lat.* set *qph subm* and *cir lb sub*  
 in many parts of the eastern United States;  
 on "Spanish Moss," Miami, Florida. Flem- *jnc oe*.  
 ming's solution to glycerine jelly. This  
 genus comprises a considerable number of *trm*  
 species, all with a hooked caudal extremity.  
 The species vary considerably in the labial  
 accessories. The present species has the *δpp1*  
 strongest mandibles so far known in the  
 genus. These nemas are highly resistant  
 to drought and cold, and may be kept on  
 dried bark for several years and then be *hum oe*  
 fully revived by soaking the bark in water.  
 They may be repeatedly frozen in and *an*  
 thawed out without injury. Recently  
 revived specimens are mostly immature *d mrv*  
 and seem to present an empty intestinal  
 canal, suggesting that on the approach of *gl an*  
 untoward conditions, they evacuate the  
 canal. Not infrequently, the lip-region of *cop msc*  
 revived specimens appears to exhibit a

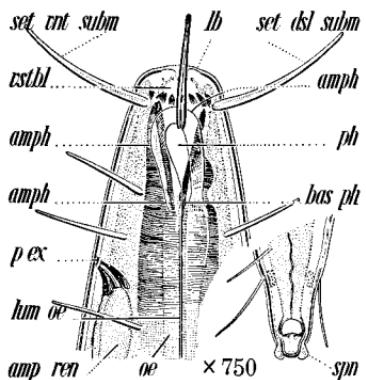




pluglike accession, seen also in the mouth opening of similarly revived Cephalobi. The opening is protected during "suspended animation" by means of this dried-up evacuation from the oesophagus. Fig. 64a, p. 278; Fig. 64b.

The name of this remarkable genus, the abundant species of which are widely distributed on trees, commemorates the classic work in this field of Mr. W. E. Chambers, through whose untimely death science has lost one of its greatest graphic interpreters.

65. *Synodontium secundum* n. sp. About forty setae occur on the neck; those on the anterior part are about one-half, while those on the posterior part are one-fourth, as long as the corresponding portion of the neck is wide. There are six subdistinct lips, each with a somewhat forward-pointing, innervated, conoid papilla. The pharynx is fairly well cutinized, and bears probably twelve closely approximated odontia, forming a distinct circlet opposite the bases of the cephalic setae; only their points are easily visible. The conoid neck becomes more decidedly conoid near the head. At first sight the oesophagus appears as if composed mainly of glands, which extend backward to the cardia. These glands are, however, outside the oesophagus and empty near the bases of the odontia by means of three or four ducts. At the nerve-ring the oesophagus is three-sevenths, and finally one-half, as wide as the corresponding part of the neck, and ends posteriorly in a faint, elongated, pyriform, valveless bulb. The lining of the oesophagus is narrow; its musculature fine. The thin-walled intestine has a faint lumen and is set off by a collum two-fifths as wide as the base of the neck and becomes at once one-half as wide as the body. In cross-section it presents four to five



cells. The scattered granules contained in the

intestinal cells are of variable size, the largest being one-fifteenth as wide as the body. The nuclei of the intestinal cells are one-seventh to one-eighth as wide as the body at the base of the neck. Tail conoid from the anus, but tapering faster near the anus. The end of the spinneret is in the form of a hemispherical button, the three sectors of which are eversible, so that the organ may appear three-lobed. The ducts of the caudal glands are sepa-

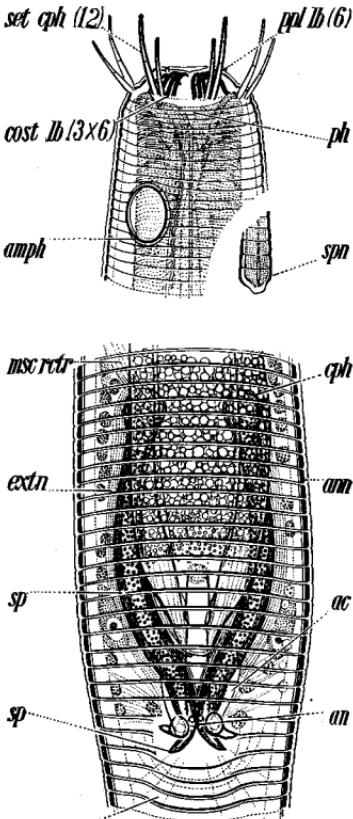
rate, practically to the spinneret pore. There are about fifteen ventrally submedian, and about ten dorsally submedian, slender, flexible, tapering setae on each side of the tail of the male. There is a much smaller number of setae on the tail of the female. The lateral fields are one-third as wide as the body. The granular, ellipsoidal renette cell, two-thirds as long as the body is wide and two-thirds as wide as long, is located at a distance behind the neck equal to the body diameter. The obscure, rather broad nerve-ring is accompanied by distinct and numerous nerve cells of large size, extending back to the base of the neck. The large, elevated, conspicuous vulva leads to a conoid, rather muscular, cutinized vagina accompanied by small, ellipsoidal glands. There is a small anterior branch to the female sexual organs, about as long as the body is wide. The uterus extends back to near the middle of the body. The eggs are one and one-half to two times as long as the body is wide and one-fourth to one-third as wide as long. Numerous, granular, spherical sperm cells, one-fifteenth as wide as the body, are abundant near the middle of the body, disarranging the chain of eggs in such a way as to suggest the presence of a spermatheca. The broad ovary tapers gradually, and contains twenty to thirty ova arranged single file. The egg, just before deposition, lies opposite the vulva, one-half of it being in the small anterior branch of the uterus. The spicula are strong, somewhat slender, sub-uniform, and rather blunt. Their proximal ends appear to lie ventrad from the body-axis. The two strong, well-separated accessory pieces are one-fourth

as long as the spicula. Their uniform, blunt apophyses extend backward at an angle of ninety degrees with the spicula, and are one-half as long as the anal body diameter. Fifty to seventy equidistant supplementary organs, in the form of a series of slight undulations, extend forward in front of the anus a distance three to four times as great as the length of the tail. The undulations are separated from each other by a space about equal to one-fourth the body diameter, though they become gradually a little farther apart anteriorly. Their elevation is slight, and every other undulation is opposite a granular, saccate gland, about one-third as wide as the body. These glands form a contiguous series and seem to empty ventrally. There is no bursa. The ejaculatory duct is one-third, and the testes are one-half, as wide as the body, these latter gradually tapering so that they are narrow at the extremities.

*Habitat:* Sand, below Bathing Beach, Woods Hole, Mass., U. S. A. Also beach-sand, Squibnocket, Martha's Vineyard, Mass., U. S. A. Flemming to glycerine jelly. Fig. 65, p. 280.

66. *Daptonema fissidens* n. sp.  $\frac{.9}{1.9} \quad \frac{9.1}{2.8} \quad \frac{22}{3.2} \quad \frac{-M^{1\frac{1}{2}}}{3.2} \quad \frac{85}{2.6} \quad >1.4$  Type species. The contour of the moderately thick cuticle is crenate, the annules being separated by refractive lines. Toward the head end the *set qph* (12) annules diminish in width until they elude detection. Neck conoid; head rounded. Here and there on the neck occur long, slender hairs, as long as those on the head, but colorless and very much more slender. Each of the six lips is strengthened by three, dark-brown, or blackish, strongly areuate, incurved, slender, acute, cutinized ribs or teeth. Lips capable of being *amph* turned over into the pharynx so as to form a flattish, centrally indented dome. From the head backward the oesophagus narrows a little, becoming two-thirds as wide as the corresponding portion of the neck. There is no very distinct cardia. The rather thick-walled intestine becomes at once about half as wide as the body, and in cross-section presents about four cells. The cells contain scattered brownish granules, of variable size, the largest of which are nearly as wide as one of the annules of the cuticle. The lumen of the intestine is quite narrow, and its lining somewhat refractive. Renette unknown. The tail of the male is conoid from the anus to the somewhat blunt terminus, which has a plain, rather blunt spinneret, armed with two setae considerably longer than the diameter of the terminus. The caudal glands appear to be located in front of the anus. The brownish spicula have been seen only in dorso-ventral view. The accessory pieces are curved distally *msc dn* in the same way as the spicula, and end in minute points. The ejaculatory duct is about one-third, the vas deferens about one-half, as wide as the body.

*Habitat:* Larat, East Indies; marine. In the general form of the neck and pharynx these nemas closely resemble *Monhystera*, but the food habits are



×750

probably different, and the structure of the male differs materially from the structure of the male of *Monhyphista*,—dark-colored, punctate, out-bending spicula; and two testes. A very similar marine species occurs

.8	9.3	24	64-70	89.5	>1.6
2.1	3.8	4.9	5.2	3.2	

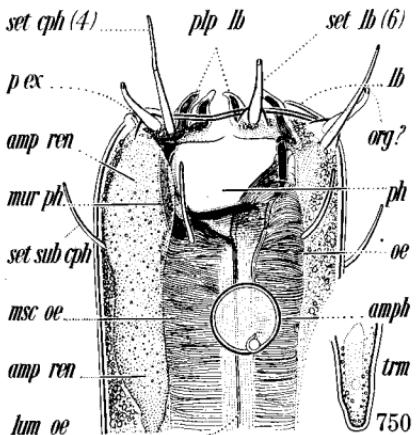
microns

in the harbor at Portsmouth, N. H., and at Woods Hole, Mass., U. S. A., namely *Daptonema fimbriatum*, n. sp. of which the formulae and the figure of the head end are given on this page. The head of *Daptonema fissidens* differs but slightly from that of *D. fimbriatum*.

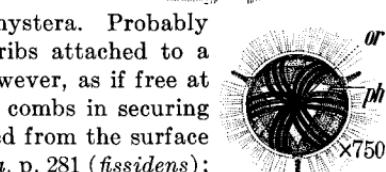
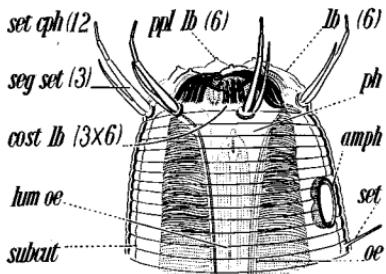
*Daptonema* is manifestly an offshoot of *Monhyphista*. Probably the eighteen refractive labial elements are ribs attached to a thin membrane. They sometimes appear, however, as if free at the extremities, and if so, would function as combs in securing the food, which is probably combed or scraped from the surface of algae and other submarine objects. Fig. 66a, p. 281 (*fissidens*); Fig. 66b (*fimbriatum*).

67. *Crystallonema fuscacephalum* n. sp. The longer, cephalic setae are two-jointed. The scattered, inconspicuous cervical setae are one-tenth as long as the neck is wide. Opposite the pharynx the head contains dark brownish gray pigment. The consistency of the labial palps (?) remains undetermined, that is to say, it is uncertain whether they are apodontia with an inward stroke and capable of executing a firm grip, or whether they are more or less flabby palps. Neck somewhat cylindroid, expanding a little toward the head. Amphid with a pore near the posterior margin, from which there

set qph(4) pph lb set lb(6) leads inward and backward a narrow duct with granular contents. There is a faint, elongated, more or less pyriform cardiac swelling. Near the nerve-ring the oesophagus is one-half, just in front of the cardiac swelling three-fifths, and finally two-thirds, as wide as the corresponding portion of the neck. The musculature of the oesophagus is rather coarse and colorless. Cardiac column two-fifths as wide as the body. The intestine begins with a specially modified segment, two-thirds as long as the corresponding body diameter. The intestine, which has a somewhat irregular lumen, gradually becomes one-half to two-thirds as wide as the body. The colorless granules in the intestinal cells are scattered in groups and are of variable size, the largest granules being about as wide as one of the annules on the neck. The nema is strongly characterized by the presence of more or less angular, doubly refractive crystalline masses, having about the same diameter in every direction, and being about one-sixth as wide as the body. The crystalline bodies are one-half to one body-width apart and seem to lie in the longitudinal fields. The conoid tail tapers from the anus, but at last for a short distance is more or less

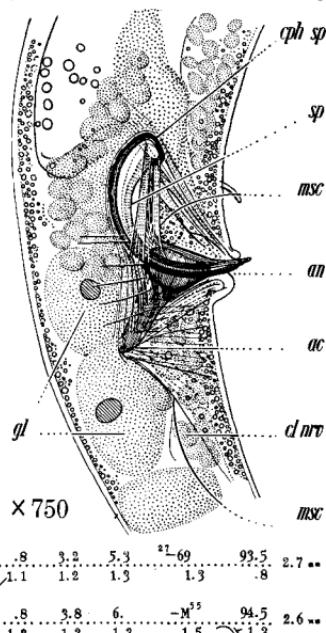


750



cylindroid and one-fifth as wide as at the anus. There are no caudal setae. The ellipsoidal to prolate renette cell lies close behind the neck, and is one-half as long as the body is wide and five-sixths as wide as long. The large, continuous vulva is inconspicuous. The medium-sized vagina extends two-fifths the way across the body. There is a posterior rudimentary branch to the sexual organs, three times as long as the corresponding body diameter. The uterus is four times as long as the body is wide, and one-sixth to one-fifth as wide as long. The elongated eggs are three times as long as the body is wide. The relatively very small ovary contains twelve ova, which diminish rapidly in size toward the blind end, and are arranged single file. The finely-granular, ripe ova are three times as long as the body is wide, and three-fourths as wide as long.

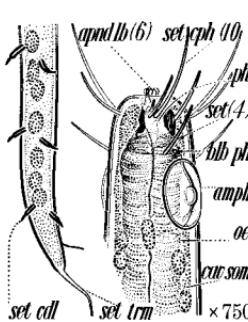
*Habitat:* Sand, below Bathing Beach, Woods Hole, Mass., U. S. A. Flemming to water. The males of this species, *C. fuscacephalum*, are unknown, but the males of two other species are known to the writer. As these two are structurally closely related to *C. fuscacephalum*, it may be assumed that the spicula of *C. fuscacephalum* are similar to those of these others, one of which is *Crystallonema simile n. sp.*, Miami, Fla., the anal region of the male of which is shown in the adjacent illustration, together with the dimensions of both sexes. Besides being smaller, *C. simile* differs in lacking pigment at the head end; in having relatively slightly longer and more nearly equal cephalic setae; in having amphids relatively larger,—three-sevenths as wide as the head; in having the posterior oesophageal swelling almost indistinguishable; in having the preliminary segment of the intestine as long as the body is wide, and the intestine itself relatively a little wider,—three-fourths as wide as the body. Fig. 67a, p. 282, *C. fuscacephalum*; Fig. 67b, *C. simile*, *n. sp.*, type species.



68. *Zanema acanthurum n. sp.* Cuticle naked.

Neck cylindroid. It is possible that very small or broken members of the submedian group of cephalic setae have escaped notice, and that there are really three submedian setae on each lip. There appear to be six lips, but this number is assumed largely on the basis of the six labial appendages, shown in the illustration. The lips are relatively rather thick, and are arched together over the somewhat spheroidal pharynx. Oesophagus cylindroid. The intestine becomes at once three-fourths as wide as the body, and appears to be made up of cells of large size, so that perhaps only two appear in the cross-section.

The posterior lip of the anus is slightly raised; rectum about as long as the anal body diameter. The tail tapers from a little in front of the anus and soon is reduced to a diameter about half as great as at the base. Thence onward it tapers gently, so that near the terminus it has a diameter about



one-fourth as great as at the anus. Posterior two-fifths of the tail armed with short, backward-pointing, arcuate, acute thorn-like setae to the number of ten on each ventrally submedian line. No caudal glands. The lateral fields appear to be fully one-third as wide as the body. The excretory pore appears to be connected with a large, ellipsoidal ampulla, nearly half as wide as the neck. The position of the renette cell has not been determined. From the depressed vulva the vagina leads slightly forward. Beyond this fact little is known concerning the internal organs. As no traces of ova have been seen behind the vulva it is assumed that the organs are asymmetrical.

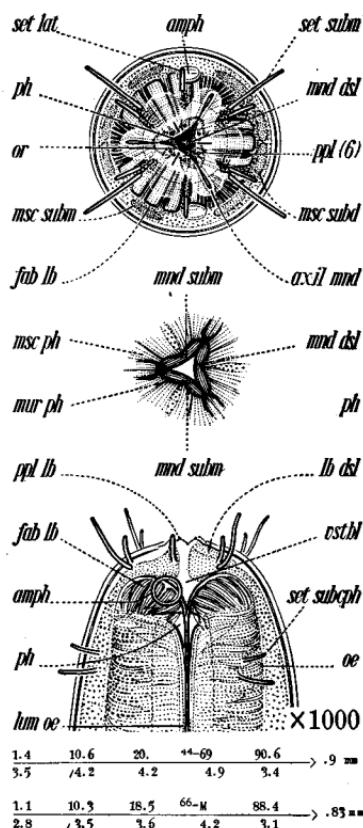
*Habitat:* Mud, tide pool, low tide, Portsmouth, N. H., U. S. A. The single specimen examined contained numerous yellowish, spherical, crystalline bodies, arranged in an obscurely double series, beginning at the base of the neck and ending at the anus. Whether these are natural or have been induced by the method of preservation remains to be determined. The peculiarities of the species justifying the establishment of a new genus are as follows: (1) the formation of the pharynx and of the lips with their distinct forward-pointing appendages; (2) the unusual size and form of the amphids; (3) the absence of caudal glands; and (4) the peculiar thorn-like setae on the tail. These, combined with the very slender form, make it difficult to refer this specimen to any known genus. Fig. 68, p. 283.

69a. *Monhystrium transitans* n. sp. Type species. Cuticle naked, except for the setae on the head. Lips three, more or less confluent, thick and mobile. Pharynx double; the closed lips forming a narrow vestibule reaching one-third the way to the base of the pharynx. Anterior chamber of the pharynx pyramidal, the posterior more or less napiform. The lips come to a sharp edge, and are stiffened by several refractive "plates," whose direction is radial but indefinite, as if due to the folding of a cutinized membrane. Oesophagus cylindroid, ending posteriorly in a pyriform cardiac bulb five-sixths as wide as the base of the neck. Its lining finds expression in three longitudinal lines, occupying a space equal to two-sevenths the width of the whole organ. Its musculature is rather coarse. There is no cardia. The thick-walled intestine, which has a distinct, refractive lumen, is set off from the oesophagus by a constriction one-fourth as wide as the base of the neck, and becomes at once three-fourths as wide as the body. Its cross-section shows two cells. In contour, it is more or less crenate, at least in alcoholic specimens, because of the pronounced nature of the intestinal cells. These latter contain numerous granules of rather uniform size. The walls of the intestinal cells are refractive. The tail is at first conoid, then cylindroid in the posterior two-fifths. It tapers from in front of the anus to the almost imperceptibly swollen, more or less apiculate, unarmed, symmetrical terminus, which presents a profile similar to that of a swan's head. It bears a simple, unarmed, blunt spinneret. Only two caudal glands are to be seen; these are broadly saccate cells, forming a close tandem in the anterior third of the tail. The more or less finely granular longitudinal fields are one-third as wide as the body. The post-cervical renette cell empties through the excretory pore a little in front of the nerve-ring by means of a more or less spherical ampulla, and final slender duct one-half as long as the body is wide, leading therefrom to the excretory pore. The vulva is large and more or less elevated. The ellipsoidal eggs are three-fourths as long as the body is wide and are deposited after segmentation; it is probable that the species is viviparous, or ovoviviparous. The small posterior branch of the sexual organ is one-half as long as the body is wide.

The tapering ovary is at first broad, and contains numerous ova arranged for the most part single file. At its blind end, it is one-eighth as wide as the base of the neck. At their widest part, that is, near the middle, the spicula are one-sixth as wide as the corresponding portion of the body. They taper to a rather blunt point, and present a faint, stiffening element. These colorless, rather frail spicula appear to have their proximal ends somewhat dorsad from the body-axis. There is a faint, frail, slender, arcuate accessory piece, lying parallel to the spicula, probably consisting merely of a differentiation of the lining of the cloaca. Obscure papillae occur on the middle part of the tail, near the place where it suddenly diminishes a little in diameter. These are probably as follows: one ventrally submedian pair opposite the middle of the spicula; three ventrally submedian pairs, one of them nearly anal, the other two at the beginning of the middle third, and occurring one in front of the other; one dorsally submedian pair. The large spermatocytes in the testes are three-fourths to two-thirds as wide as the body. That portion of the testis, containing them is correspondingly wide, but the testis tapers so as finally to be only about one-fourth as wide as the body.

**Habitat:** Gill-chambers of the Land Crab, *G. ruricola*, Jamaica. Coll., Dr. C. B. Wilson, Westfield, Mass. Described from more or less shrunken alcoholic specimens, mounted in balsam and in glycerine jelly. May be looked upon as a transitional form between a free-living and parasitic state. Hence, the specific name *transitans*. While much reduced and flabby, the cephalic setae still exist. Very few parasitic nemas possess cephalic setae. Fig. 69a.

b. *Monhystrium wilsoni* (Baylis). Very narrow wings extend from the base of the neck to near the anus. Each wing is expressed as a double line. Eight to twelve longitudinal striations occur on each submedian field. The longitudinal striae do not anastomose, and seem to be in the outer cuticle. Lips confluent, elastic, closing to a small central pore. Pharynx of two chambers; the anterior, pyramidal, the posterior appearing roughly napiform in profile, but really three-sided as shown in the illustration. The distinct, refractive lining becomes rapidly thicker in the posterior half of the second chamber. About eighteen duplex radial refractive ribs of small size occur in the anterior chamber, somewhat as in *Cyatholaimus*; i.e., there are about six refractive radial markings on each of the three lips. These have a rather definite duplex outer end, or contour, but are not so definite as the "rods" of *Cyatholaimus*, being more like folds. Neck conoid; head convex-conoid. The cylindroid oesophagus near the nerve-ring is two-fifths, just in front of the pyriform cardiac swelling two-thirds,



finally two-thirds, as wide as the corresponding part of the neck. There are no oesophageal bulbs, but there is a pyriform anterior segment of the intestine, set off on both sides by a distinct constriction, in some ways resembling a cardiac bulb. This pseudo-bulb is three-fourths as wide as the corresponding portion of the body, as measured in alcoholic specimens. The lining of the oesophagus is a prominent feature, and its optical expression consists in three refractive lines, occupying a space one-fourth as wide as the entire organ. The oesophageal musculature is coarse. At the cardiac constriction there are three elements, questionably glands, each one-third as wide as the corresponding portion of the body. There is no cardia. The thick-walled intestine has a very distinct refractive lumen and soon becomes five-sixths as wide as the body. The cells composing the intestine are about twice as long as the body is wide, and are so arranged that each cross-section presents practically only two of them. These cells are packed with exceedingly fine granules of more or less uniform size. The tail is first conoid, then cylindroid in the posterior half. It tapers from in front of the anus; the terminus has a contour more or less resembling that of a swan's head. The simple, unarmed, symmetrical, blunt spinneret is half as wide as the terminus. The three, broadly saccate caudal glands form a close tandem in the anterior fourth of the tail. Their ducts and ampullae are distinct. There are no caudal setae. The tail, like the body, is naked. The elongated renette cell lies two to four body-widths behind the neck, and empties through a wide duct separated from the ampulla by a constriction; the ampulla is one-fourth as wide as the corresponding portion of the neck, and empties through a pore located half-way back to the nerve-ring. The nerve-ring is accompanied by distinct nerve-cells arranged in groups. From the somewhat large, more or less conspicuous vulva, the large, rather muscular, cutinized vagina leads half-way across the body. The straight uterus is about fourteen times as long as the body is wide, and contains ellipsoidal eggs, each about as long as the body is wide, which are deposited after segmentation begins,—in fact, the species may be viviparous. Fully-formed embryos occur in the eggs near the vulva. Spermatozoa, half as wide as the body of the female, and with strong refractive nuclei, occur in the uterus. There is a rather narrow, ventral posterior rudimentary part to the female sexual organ, about one and one-half times as long as the corresponding portion of the body is wide. The ovary is nearly cylindroid, but tapers slightly, and contains numerous ova arranged single file. Toward its blind end, it suddenly narrows, and is reflexed, or thrown into an "S" form, in a space one to two times as long as the body is wide; here it is only one-sixth as wide as the body. The rather frail, somewhat simple, rather slender, subacute spicula are one and one-half times as long as the anal body diameter. At their widest part near the middle, they are about one-sixth as wide as the corresponding portion of the body. Their proximal ends appear to lie dorsad from the body-axis. The single, frail, very slender, more or less arcuate, accessory piece is somewhat removed from the spicula, at least from the refractive part. Its proximal extremity lies dorsad from the body-axis. There are no supplementary organs. About ten pairs of papillae occur on the tail of the male. These are very inconspicuous and are arranged as follows: one ventral, single, and two submedian pairs just in front of the anus; third, fourth, fifth and sixth pairs behind the anus, opposite the two anterior caudal glands; seventh and eighth, lateral, opposite the posterior caudal gland; ninth and tenth farther back, not so close together, averaging about twice as far from the anus, as the seventh and eighth. There is a rudimentary bursa; i.e., there are submedian longitudinal elevations of considerable magnitude

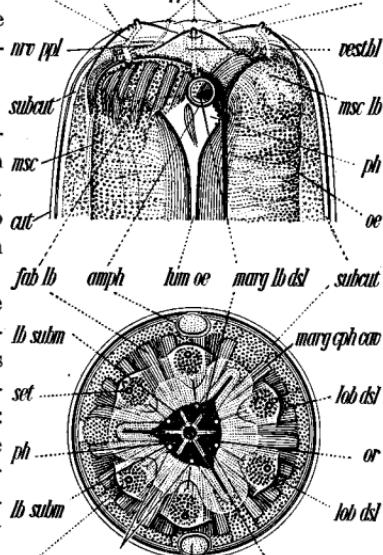
beginning some distance in front of the anus and extending on to the tail to a point opposite the posterior caudal gland. Most of the papillae described occur on the ventral surface of these welt-like elevations. A cross-section taken near the anus clearly discloses these well-developed organs. The ejaculatory duct is one-fourth, the vas deferens one-fourth, the testis two-thirds, as wide as the corresponding portion of the body. Toward its blind end, however, the testis tapers so as to be only one-eighth as wide as the corresponding portion of the body. Spermatocytes, occupying a considerable portion of the length of the testis, are one-half to two-thirds as wide as the body, so that the testis bears considerable resemblance to an ovary. The *nrv set lab subm ppl lb* *set lat set subm* deceptive appearance created by these large spermatocytes might easily lead to the conclusion that the males are hermaphrodites.

*Habitat:* Found with the preceding.

One is inclined to suggest that this Monhystrium also represents a transitional form from a free-living to a parasitic condition. A careful study of such forms is destined to throw much light on the relationship between the Laimia and Alaimia.

Although bearing considerable resemblance to Monhystera, this species and its close relative just described seem to make a new genus desirable for their reception. The distinguishing differences may be listed as follows: (1) In Monhystrium, the pharynx is a double chamber; moreover, the anterior chamber has a distinctly radiated structure, more easily seen if the specimen is viewed slightly obliquely instead of laterally, as shown in the illustration. These radial elements are stiffening factors enabling the lips to bite more efficiently. The margins of the lips are sharp-cutting edges, as is clearly shown in the profile view in the illustration. Further study is necessary to determine whether these organs are odontia or onchia. (2) The pseudo-bulb, which is not common in Monhystera. (3) Monhystrium is ovoviparous or viviparous. (4) There is a pronounced renette. (5) There are no cephalic setae or the setae are very weakly developed. (6) The species is presumably carnivorous; the more typical Monhysteras, perhaps all, are vegetarian.

Larvae removed from the uterus of alcoholic specimens present differences from the adults as follows: (1) The amphids are farther back. (2) The pharynx is tubular, and not in two parts. (3) The head is more tapering. (4) The spinneret is not so well defined. (5) No wings were seen. (6) The pseudo-bulb is less conspicuous. Fig. 69b, on this page. Syn. *Monhystera wilsoni* Baylis.



lob subm	ppl subm	amph	sut lb	mary ph or
.6	6.4	12.5	47.67.5	90.
1.3	2.1	2.3	9.3	2.1

lob subm	ppl subm	amph	sut lb	lob dsl
.7	6.7	12.	64 - H	89.
1.5	2.2	2.4	9.3	2.3

$\rightarrow 1.7 \text{ mm}$

$\rightarrow 1.6 \text{ mm}$

1.3	14.	27.	( $\frac{1}{62}, \frac{1}{95}$ )	95.
1.4	2.6	2.3	1.8	1.6

70. *Asymmetrella glabra* n. sp. Lips three, distinct, unequal, flat, thin. Pharynx with a peculiar dorsal onchium, bent inward at right angles at the apex. Oesophagus surrounding the posterior two-fifths of the pharynx in the form of three, somewhat finger-shaped processes. Wall of the pharynx fairly well cutinized, especially near the lips on the dorsal side,

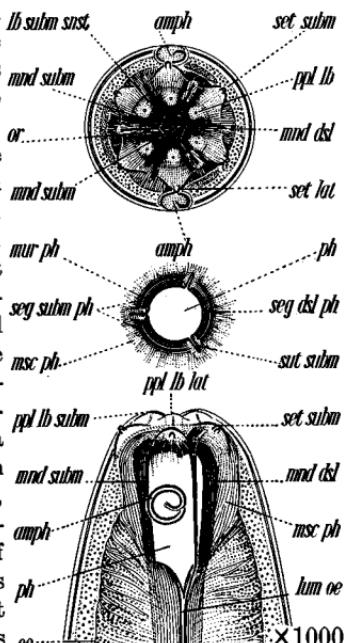
where it bends inward and forms an elbowed lip, giving to the front of the head an asymmetrical appearance; hence, the generic name. Neck cylindroid posteriorly, convex-conoid anteriorly. Amphids faint. At the base of the pharynx there are three spherical collections of black, loosely-placed granules (ocelli?), one collection dorsal and two submedian, the dorsal collection being the least pronounced. The cylindroid oesophagus at the nerve-ring is one-third, and finally is one-half, as wide as the corresponding portion of the neck; it has an indistinct lining, and a fine, colorless musculature. There is a more or less hemispherical cardia, three-fifths as wide as the base of the neck. The thick-walled intestine, which is set off by a constriction one-half as wide as the base of the neck, becomes at once three-fourths as wide as the body. It has a faint lumen, and its cross-section exhibits about four cells. In all parts of the intestine the cell walls are rather distinct and optically give rise to a network effect. From the more or less continuous anus the prominent, on <sup>set 101</sup> *lbc* *amph* *ph* *oe* *spn* <sup>x 750</sup> cutinized rectum extends inward a distance three-fourths as great as the anal body diameter. The rather numerous, more or less yellowish granules contained in the cells of the intestine are of variable size, the largest being about one-thirty-fifth as wide as the body. They are so arranged as to give rise to a more or less distinct tessellation. The lateral fields are one-fourth as wide as the body. The tail tapers from the anus, and is at first conoid, and then convex-conoid in the posterior eighth. It is arcuate to the unarmed, more or less symmetrical terminus. There is a conoid, symmetrical spinneret. In it a compound ampulla is apparent. Renette unknown. The female sexual organs are probably double and symmetrically placed.

*Habitat:* Marine tap water, laboratory, Woods Hole, Mass., U. S. A. Fleming to glycerine jelly. Fig. 70.

### VIII. Order Synonchia

71. *Tripyllum carcinicolum* (Baylis). Cuticle naked. Cephalic setae papillloid. Wall of the pharynx fairly thick and refractive, and curved inward on the inner surface of each pair of lips so as to form three  $120^{\circ}$  biting organs, which close together as shown in the illustration. Pharynx cylindroid. Neck cylindroid posteriorly, conoid anteriorly. Oesophagus cylindroid, its lining a trifle stronger behind the pharynx for a distance equal to the length of the pharynx. The anterior portion of the intestine is altered so as to produce the effect of a pyriform bulb three-fourths as wide as the base of the neck, set off on both sides by a constriction. At the nerve-ring, the oesophagus is two-thirds, and finally three-fifths, as wide as the corresponding part of the neck. The lining of the oesophagus finds optical expression in three refractive lines, occupying two-fifths of the width of the organ. There is no cardia. What appear to be glandular cells occur opposite the cardiac constriction,—two, one on each side, each ellipsoidal and half as wide as the neck, finely granular and with a prominent nucleus. The thick-walled intestine has a distinct, refractive, more or less zig-zag lumen, and becomes at once three-fourths as wide as the body; in cross-section it presents two cells. The cardiac column is one-fourth as wide as the neck. From the more or less continuous anus, the cutinized rectum extends a distance equal to the length of the anal body diameter. Fine uniform granules pack the cells of the intestine; there is a faint tessellated effect due to the refractive nature of the cell walls. From in front of the anus, the straight tail is first

The illustration consists of two main parts. The upper part is a circular diagram representing a transverse section through the vulval region. It features a central dark circular area surrounded by radiating lines. Various anatomical structures are labeled with abbreviations: 'set subm' (setal submedian), 'mnd subm' (median submedian), 'amph' (anterior median papilla), 'ppl lb' (large labial papilla), 'ppl lb subm' (submedian labial papilla), 'mnd dsl' (dorsal submedian), 'set lat' (lateral seta), 'mnd subm' (median submedian), 'or.' (ovary), 'mnd subm' (median submedian), 'mnd subm' (median submedian), 'mnd subm' (median submedian), 'mrd ph' (rectal papilla), 'seg subm ph' (submedian pharyngeal segment), 'seg dsl ph' (dorsal pharyngeal segment), 'ppl lb lat' (lateral labial papilla), 'ppl lb subm' (submedian labial papilla), 'mnd dsl' (dorsal submedian), 'set subm' (setal submedian), 'mnd subm' (median submedian), 'amph' (anterior median papilla), 'ppl ph' (posterior pharyngeal papilla), 'msc ph' (mesenteric pharynx), and 'sut subm' (submedian suture). The lower part is a longitudinal section of the posterior part of the body, showing the rectum, testis, and oesophagus. Labels include 'lum oe' (oesophagus), 'oe' (oocyte), 'ppl ph' (posterior pharyngeal papilla), 'msc ph' (mesenteric pharynx), 'amph' (anterior median papilla), 'mnd subm' (median submedian), 'ppl lb subm' (submedian labial papilla), 'mnd dsl' (dorsal submedian), and 'set subm' (setal submedian). A scale bar at the bottom right is labeled 'X1000'.



2.	6.6	17.	63-N	92.5	> 1.1 mm
2.2	3.1	3.2	3.5	2.3	
2.5	12.	18.	63-N	92.5	> 0.9 mm
2.8	3.9	4.1	4.2	3.2	

**Habitat:** Found in the gills of the Land Crabs, *Gecarcinus ruricola* and *Cardisoma guanhumi*, Jamaica. Collected by Dr. Chas. B. Wilson, Westfield, Mass. This genus differs from *Monhyphista* as follows: (1) Male has caudal papillae; (2) Has a cardiac bulb or pseudo-bulb; (3) Is viviparous; (4) Is parasitic in crabs; (5) Has three biting edges to the segments of the pharynx. Fig. 71. Syn. *Monhyphista carcinicola* Baylis.

72. *Xyala striata* n. sp. Cuticle with numerous wings, especially anteriorly, where there are sixteen, increasing to about thirty-two on the head; behind the vulva the number is twelve, at the terminus four. Contour dentate. There are a few cervical setae, about as long as the body is wide, occurring in groups of four; no somatic setae. Lips thick, armed with three, mandible-like odontia, or onchia, somewhat flap-shaped, and apparently very mobile. Pharynx simple, regular, more or less conoid, large and long, three-fourths as wide as the head, having the form of a deep cup. There is a distinct, transverse, cutinized raised

circle on the inner wall of the pharynx, dividing it into two more or less distinct parts; nevertheless, the inner contour of the pharynx is rather regular on the whole. Neck cylindroid. Oesophagus plain, except that there is a pyriform bulb surrounding the pharynx, tapering gradually into the oesophagus, which is at first two-thirds, at the nerve-ring one-half, and finally two-fifths, as wide as the corresponding portion of the neck. There is a more or less cylindroid cardia one-third as wide as the base of the neck. The thick-walled intestine has a distinct lumen, and becomes at once two-thirds as wide as the body. Cardiac collum one-half as wide as the body. The scattered, rather uniform yellow

*set cph extr(10)* *mnd* *lat* *set cph intr(6)*

$\frac{1.1}{1.9} : \frac{12}{2} = \frac{32}{2.1} : \frac{85}{2.2} : \frac{92}{1.7} > 1.4..$  granules,

*lb* ..... *mnd*

$\frac{1.1}{1.4} : \frac{7.6}{1.7} = \frac{25}{1.8} : \frac{45}{2.2} : \frac{91}{1.6} > 1.8..$  found in the intestinal

*set sub cph* ..... *ap*

$\frac{1.1}{1.4} : \frac{7.6}{1.7} = \frac{25}{1.8} : \frac{45}{2.2} : \frac{91}{1.6} > 1.8..$  cells, are less

*bas ph* ..... *amph*

than half as wide as one of the annules.

*str longit* ..... *an*

From the continuous anus the more or

*spn* .....  $\times 750$

less cutinized rectum extends inward a

distance hardly as great as the anal body

diameter. The conoid tail tapers from

the anus, near which, in the anterior third

of the tail, the three ellipsoidal, caudal

glands lie in a close tandem. There are

very few, inconspicuous, slender, tapering,

acute, dorsally submedian caudal

setae. Renette unknown. The nerve-

ring surrounds the oesophagus obliquely and is accompanied by obscure nerve

cells. From the large, conspicuous vulva, the large, tubular, muscular, cutinized

vagina extends forward a distance equal to the width of the body, where it

joins the straight uterus, which is six times as long as the body is wide and con-

tains eggs two and one-half times as long as the body is wide, and one-third as

wide as long,—if one may judge the size of the eggs from that of a full-grown

ovum. There is a spermatheca extending forward a distance five to six times

greater than the body diameter, the extent of which is plainly indicated by the

definite contour of its blind end. The rather narrow, tapering ovary contains

about twenty ova arranged single file. The spicula are slender, uniform, and acute.

Their spherical proximal ends appear to lie dorsad from the body-axis.

The two, separate, slender, acute, strong accessory pieces have proximal parts

that appear to envelop the spicula. There are no pre-anal ventral supplement-

ary organs, or special papillae. The ejaculatory duct is one-third as wide as the

body. The narrow, cylindroid testes finally taper to a width two-fifths as great

as that of the body.

*Habitat:* Eel-grass, Woods Hole, Mass.; also Belmar, New Jersey, U. S. A.

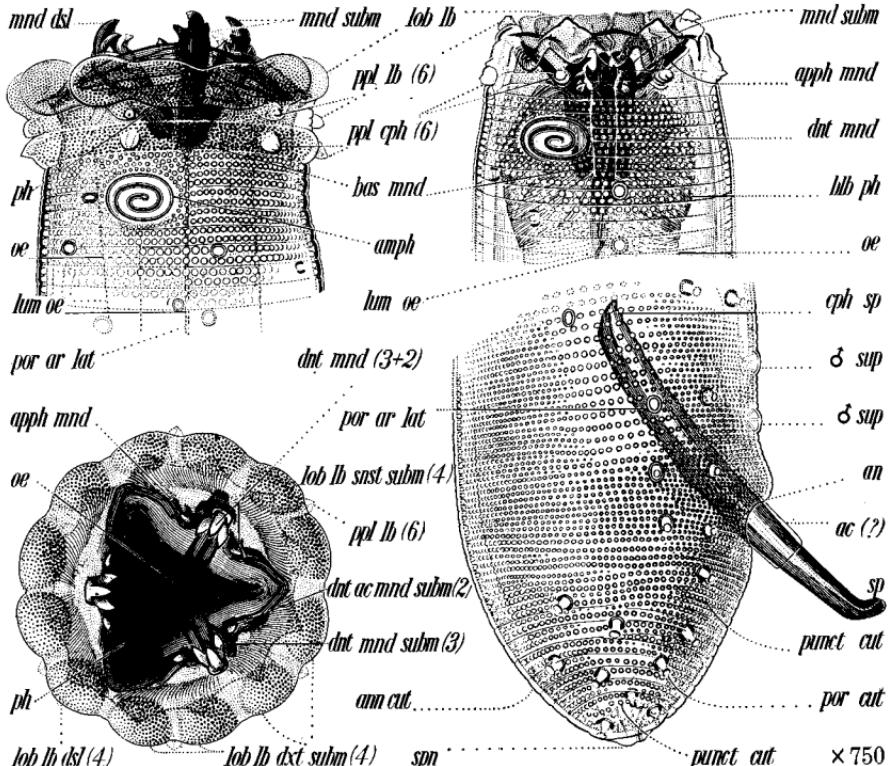
Sublimate to balsam. Fig. 72.

2.	7.5	:	15.	61	97.2	
3.2	3.5	:	3.6	3.4	3.3	> 1.3..

There are no wings.

On the lateral fields, which are about one-fourth as wide as the body, the secondary elements of the annules become scattered and coarser, and oval or elongated in contour. There are two laterally submedian, irregular rows of pores, one to two times as wide as the annules, lying along the margins of the lateral fields, and separated from each other transversely by a distance about equal to one-fourth the width of the body; measured in a longitudinal direction, the distances between the pores are about the same, but somewhat irregular. These pores have a special arrangement on the tail. (See illustration.) Neck cylin-

droid; oesophagus somewhat cylindroid, but presenting a more or less spheroidal bulb about the mandibles. At the base of the neck, the oesophagus is two-thirds as wide as the corresponding portion of the body. Its lining is more or less distinct; its musculature colorless. The rather thick-walled intestine has a faint lumen, and becomes at once five-sixths as wide as the body. Throughout the



body under the cuticle, there are coarsely granular, spherical organs one-fourth to one-third as wide as the body, located in the lateral fields, and separated from each other longitudinally by a distance about equal to the body diameter. It is probable that the female organs are double, and symmetrically reflexed.

.8 .7 .13. 440<sup>M</sup> 98.  
2.7 3.1 3.1 3.1 > 2.8. Apparently there are only two small supplementary organs in front of the anus. (See illustration, sup.) Resembles Enoplus, from which it is distinguishable, however, by the form of the spicula, and other organs of the male, as well as by the form of the amphids.

*Habitat:* Seaweed, drifted ashore, Ocean Beach, Miami, Florida, U. S. A. Fig. 73.

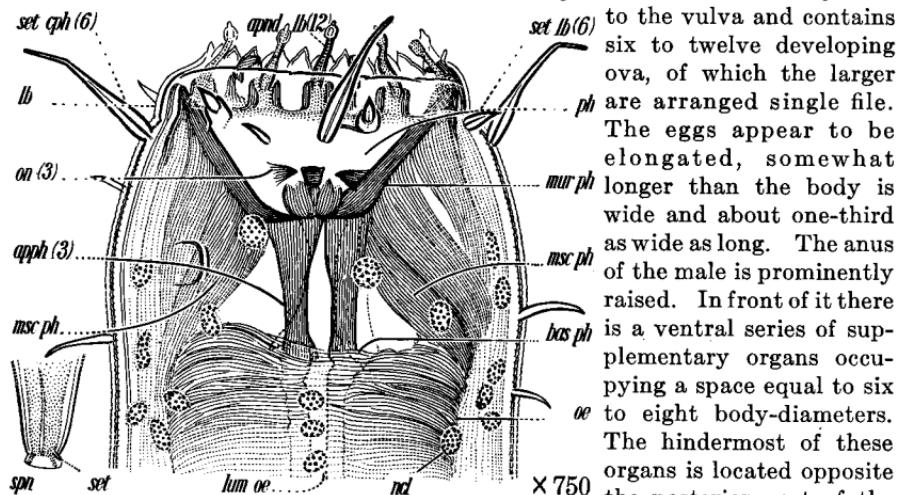
74. *Gammanema ferox* n. sp. Neck cylindroid. Cuticle naked, except for the setae on the head. Lips joined by a membrane, variously armed as shown in the illustration. Probably the twelve "spatulate" appendages are sensory organs, if one may judge by their form and position. The pharyngeal bulb contains three "apophyses," each carrying near its summit an inward-pointing, acute onchium,—or perhaps it would be better to say, each of the three strong ribs of

2.5 10.5 16. 60. 96.1 > 2.5. 3.4 3.1 3.1 3.2 2.5.

2.5 6.2. 12.7. -M<sup>24</sup> 93.9 > 2.5. 2.8 2.9 2.8 3.5 2.9.

2.5 6.2. 12.7. -M<sup>24</sup> 93.9 > 2.5. 2.8 2.9 2.8 3.5 2.9.

the posterior portion of the pharynx bears one of these onchia. The oesophagus gradually diminishes so that at no great distance behind the head it is but little more than half as wide as the neck, and continues thus throughout. There is a somewhat small, hemispherical cardia about one-third as wide as the base of the neck. The intestine becomes at once about three-fourths as wide as the body. In cross-section it presents four to six cells, manifestly of two different kinds, one of which, a minority, is much more distinctly granular than the other and is more numerous in the anterior portion of the intestine than in the posterior. The limits of each cell, of whichever kind, are rather clearly marked on account of the refractive nature of the cell-walls. The cells are packed with a multitude of fine, nearly colorless granules. The anus is prominently raised; the rectum is as long as the anal body diameter. The tail is conoid to the convex-conoid terminus, which forms a convex-conoid, somewhat truncate spinneret of large size, in which is the group of large ampullae of the caudal glands, which nearly fills the terminus, its diameter being about half as great as that of the base of the tail. The large caudal glands are located in a close tandem just behind the anus, in the anterior two-thirds of the tail. The lateral fields are fully one-third as wide as the body, and contain cells of unusual size,—of such a width as to reach nearly across the fields themselves. These cells are not contiguous, and there are found with them in the lateral field cells of small size. Renette unknown. From the elevated vulva the vagina leads inward half way across the body, where it joins the single uterus, which extends backward. The ovary reaches about half way back



spicula, and the penultimate opposite the middle of the spicula, and the third from the last nearly opposite the proximal ends of the spicula; the series continues along the ventral line with a somewhat equidistant arrangement, the total number of supplements being at least sixteen. Each supplement is a somewhat narrow cutinized structure of small size, extending outward and backward, and its distal extremity is capable of being exserted. These organs are not very conspicuous. A few submedian setae are seen near the anus, one pair opposite the distal parts of the spicula, and one or two on the bulky portion of the tail. The slender, uniform spicula have their proximal ends located opposite the body-axis. The width of the spicula is not much greater than that of the surrounding nuclei,—in other words, the spicula are quite slender. They are accompanied

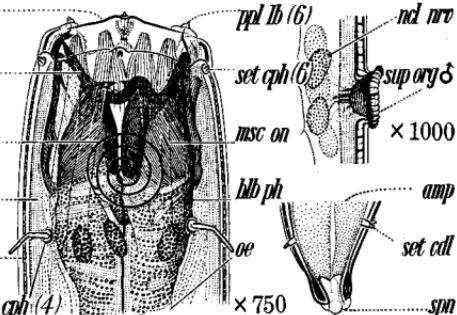
*set qph(6)* to the vulva and contains six to twelve developing ova, of which the larger *ph* are arranged single file. The eggs appear to be elongated, somewhat longer than the body is wide and about one-third as wide as long. The anus of the male is prominently raised. In front of it there is a ventral series of supplementary organs occupying a space equal to six to eight body-diameters. The hindermost of these organs is located opposite

X 750 the posterior part of the

by obscure accessory pieces. The ejaculatory duct is about one-third as wide as the body, the vas deferens about half. The testes are unusually short and broad, only about four to six body-diameters long, and are, at their broadest, two-thirds as wide as the body; they taper rapidly to the blind ends, which are only about one-fourth as wide as the body.

*Habitat:* Marine; coral sand, New Hebrides. Sublimate to balsam. Fig. 74 p. 292.

75. *Trogolaimus uniformis* n. sp.  $\frac{.7}{1.3} \quad \frac{4.9}{1.3} \div \frac{10.}{1.5} \quad \frac{-M-5^{\circ}}{1.6} \quad \frac{96.1}{1.4} > 2.8 \text{--}$  Lip-region divided into twelve parts, readily distinguishable, though not cutinized. The broadly cup-shaped anterior portion of the pharynx is that part referred to in the formula. From its rather flattish base three *sc ph* apophyses extend backward close together, near the axis of the head, a distance about equal to the depth of the open portion of *msc* the pharynx, thus adding a second chamber. Each of these apophyses has a small, inward-pointing *onchium* at its apex. These *set sub qph* (4) onchia meet together and cross at the middle of the floor of the anterior portion of the pharynx. As usual, the apophyses serve for the attachment of muscles, and all that portion of the pharyngeal bulb in front of the bases of the apophyses is different in character from the wall of the oesophagus, being more completely fibrous and destitute of the large nuclei that occur in the oesophageal musculature. The oesophagus continues with the same diameter until after it passes through the nerve ring, when it begins to expand gradually, so that finally it is more than half as wide as the base of the neck. In optical section the lining of the oesophagus appears wavy. There is no distinct cardia. The intestine, which is separated from the oesophagus by a deep constriction, becomes at once about three-fourths as wide as the body. Its cross-section probably presents two to four cells. These contain a multitude of minute, evenly distributed granules. The walls of the cells are refractive. The lateral fields are about two-fifths as wide as the body, and appear to be composed of two rows of cells. Renette unknown. The tail of the male is conoid from the prominently raised anus. It diminishes in diameter rather slowly until near the end. The diameter of the base of the spinneret is about one-sixth to one-eighth as great as that of the base of the tail. The caudal glands appear to be located in front of the anus. In *Cyatholaimus*, with which *Trogolaimus* may be compared, it is usually easy to discover the ventral gland and excretory pore. So far these have not been seen in the present species. The following is a description of the tail of a young female: The posterior lip of the anus is distinctly raised and rather broad. The rectum is somewhat longer than the anal body-diameter. The tail is cylindrical to the rounded or conoid-hemispherical terminus, which ends in a somewhat cylindrical spinneret, having a diameter about one-sixth as great as that of the base of the tail. The length of the tail is about two and one-half times as great as that of the anal body-diameter. This description is derived from a specimen in which the sexual organs are represented by an oval body consisting mainly of two cells. Supplements twenty-one, slightly elevated, flat, similar to those frequently seen on the males of *Chromadora*. These organs occupy a



distance about three times as great as the length of the tail; the posterior ones are a little nearer together than the anterior ones. The two hindermost are opposite the anterior halves of the spicula, while the antepenultimate is a little in front of the proximal ends of the spicula. The average distance between the organs is one and one-half to two times as great as their diameter. No special setae or papillae have been seen on the tail either in front of the anus or behind it. The strongly developed spicula taper at both ends. The proximal ends are slightly hooked toward the ventral side of the body, and also slightly enlarged, so that they are distinctly cephalated. The main portion of the framework of each spiculum consists of four refractive elements arranged in two pairs,—one dorsal, the other ventral. The slightly curved accessory piece leaves the surface of the spicula somewhat and then recurses so as to touch them again. The ejaculatory duct is half as wide as the body.

*Habitat:* Mud, tide pool, low tide, Portsmouth, N. H., U. S. A. At first sight this species appears to be a *Cyatholaimus* but examination shows a number of important differences. The pharynx is not striated in the same way as that of *Cyatholaimus*, nor is there a dorsal onchium. The examination has not revealed the pores frequently to be seen along the borders of the lateral fields in *Cyatholaimus*. Most *Cyatholaimi* have a single testis. This genus also bears a considerable resemblance to *Halichoanolaimus*, but differs in that the numerous, minute pharyngeal denticles of *Halichoanolaimus* are lacking. Alternating with each pair of the twelve amalgamated lips there are papillae which extend an exceedingly short distance beyond the margin of the lips. Fig. 75, p. 293.

## IX. Order Mesonchia.

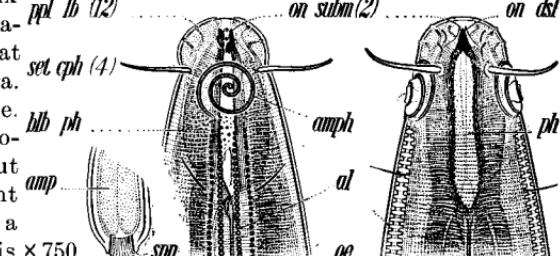
76. *Mesonchium poriferum* n. sp. The thickish, colorless cuticle has on the females three rows of round cuticular elements on the lateral fields, on the males, two; similar markings arranged irregularly occur on the ventral surface. Setae, half as long as the corresponding part of the body is wide, are found scattered on the neck. None are seen on the body. Rows of pores occur on the lateral fields, one row on each side just outside the longitudinal rows of lateral markings. The diameter of these pores is about equal to the width of two annules; the distances

separating them longitudinally are about equal to the diameter of the pores. Lips confluent, rounded, thick. Each onchium appears to be the apex of a plate which forms one of the three faces of the pharyngeal cavity. These plates are thickened at the anterior end of the pharynx. Pharynx surrounded by longitudinal muscles, which probably serve to force the three teeth forward in a direction parallel to the axis of the head. Neck conoid. Oesophagus conoid, with a faint cardiac swelling, hardly to be called a bulb. Near the nerve-ring, the oesophagus is one-half, and finally three-fifths, as wide as the corresponding portion of the neck. The lining of the oesophagus finds optical expression in three parallel, refractive lines. Its musculature is rather coarse. There is a more or less hemispherical cardia, one-fourth as wide as the base of the neck. The intestine becomes at once three-fourths as wide as the body, its

cells containing numerous granules of rather uniform size, and of about the same diameter as the dot-like lateral, cuticular elements. The conoid tail tapers from in front of the anus and becomes cylindroid in the posterior third, where it is one-seventh as wide as at the base. The elongated caudal glands, which empty by separate ducts, are packed in the anterior half of the tail. Slender, rather tapering setae, to the number of twelve occur on each ventrally submedian line in front of the anus; about seven setae occur on each of the submedian lines on the tail. The pre-anal setae are scattered through a distance about equal to the length of the tail, and are mostly very inconspicuous, especially anteriorly. The lateral fields are two-sevenths as wide as the body. The non-granular, ellipsoidal renette cell occurs near the cardia, and is one-third as wide as the base of the neck. The large, rather conspicuous, elevated vulva leads into a large, conoid, muscular, more or less cutinized vagina, which extends inward half way across the body. It is probable that the prolate eggs are about as long as the body is wide, but there is some uncertainty about this. An unusual feature is that the ovaries are reflexed only near their blind ends. Each contains about twenty ova, arranged more or less single file. The tail of the male is cylindroid in the posterior two-fifths, where, at its widest, it is only one-tenth as wide as at the anus. The rather long, slender, uniform, more or less acute, colorless spicula are straight to near the middle, but are arcuate distally. Their proximal ends appear to lie more or less ventrad from the body-axis. The rather strong, slender accessory piece has an applied part one-fourth to one-third as long as the spicula; its uniform, more or less blunt, rather slender apophysis bends and extends backward parallel to the body-axis. The proximal extremity of the apophysis lies dorsad from the body-axis. To be seen along the posterior half of the region occupied by the oblique copulatory muscles, is a pre-anal series of almost invisible ventral innervations, the distances between which are about equal to one-third the body-diameter. The space occupied by the oblique copulatory muscles is about two and one-half times as long as the tail.

*Habitat:* Marine algae, Key West, Fla., U. S. A. Flemming to glycerine jelly. Fig. 76, p. 294.

77. *Pepsonema pellucidum* n. sp. Cuticle of medium thickness. Anteriorly the number of the longitudinal rows of "beads" appears fewer than near the tail, where there are sometimes six or possibly eight rows. Formation of the cuticula like that found in the genus *Spilophora*. Somatic setae very minute. Lips six, or three and two-parted. Mouth-opening about one-fourth as wide as the front of the head, and leading into a minute vestibule, which is  $\times 750$  nearly twice as wide as the mouth opening and very shallow. The pointed, cutinized apices of three inner lips come together in this vestibule; they are of nearly equal size, the dorsal being only slightly larger than the two submedian ones. It may possibly be questionable whether this genus should not be placed in the Anaxonchia. At the base of the pharynx, there are one or two minute, onchium-like processes, which are so small as to be easily overlooked. The oesophagus continues to have the same width, or to decrease slightly, until it



passes through the nerve-ring. Thence onward it increases rather regularly, though finally there is a tendency to form a much elongated bulb two-thirds to three-fourths as wide as the base of the neck. There is a distinct though small cardia. The intestine begins as a tube one-half to one-third as wide as the body, but soon expands so as to become two-thirds as wide as the body. It presents

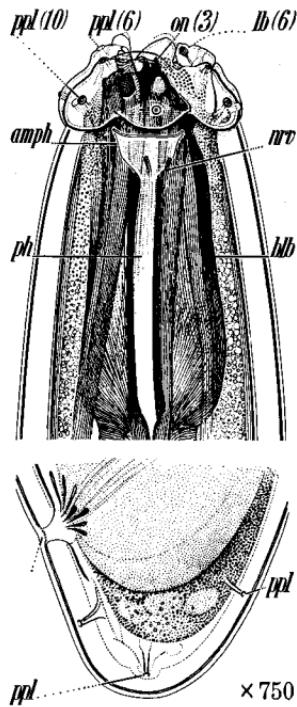
$\underline{1.2} \ . \ 5.4 \pm 12.$  . . .  $\overset{14}{\sim} \overset{47}{\sim} \overset{28}{\sim}$  .  $\overset{92}{\sim} \overset{2.3}{\sim} \dots$  the very interesting peculiarity of containing in  
 $\underline{1.3} \ . \ 2.5 \pm 3.$  . . .  $\overset{3.6}{\sim} \overset{2}{\sim} \dots$  its anterior part about a score of cells whose  
 $\underline{1.4} \ . \ 6.7 \pm 14.$  . . .  $\overset{-M-}{\sim} \overset{91}{\sim} \overset{2}{\sim} \dots$  staining properties indicate that a different phys-  
 $\underline{1.3} \ . \ 2.5 \pm 2.8$  . . .  $\overset{3.7}{\sim} \overset{2.8}{\sim} \dots$  iological function is discharged in this portion of

the intestine, possibly some gastric function. This is in line with other anatomical observations, indicating that the anterior portion of the nema intestine possesses functions differing from those of the middle and posterior portions. Opposite the cardiac constriction, there are two or three bodies closely resembling those usually seen in this position in the genus *Trilobus*. The nature of these organs still remains problematical. From the slightly depressed anus, the rectum, which is somewhat shorter than the anal body-diameter, extends inward almost at right angles to the ventral surface. Owing to the strong development of the somatic muscles, the intestine is only about one-half as wide as the body. The tissues of the oesophagus evidently contain glands, of which the dorsal is much the more highly developed; from its structure, it would be easy to suppose that the gland in the dorsal sector empties at the pharynx, but no conclusive proof of this has been obtained. In a similar way, it may be surmised that the glands in the submedian sectors empty into the lumen of the oesophagus in the vicinity of the nerve-ring. The tail is at first convex-conoid in such fashion that at the middle it is only about one-sixth as wide as at the anus; from the middle onward it is cylindroid, expanding slightly to form the rather rounded spinneret. The ovaries may be reflexed for a short distance near their blind ends. The tail of the male is rather strongly ventrally arcuate. For a distance in front of the anus equal to about five-body-diameters, there is found a ventral row of sub-equidistant innervations probably amounting, in fact, to a series of supplements. These begin near the anus, where they are only one-third as far apart as at the front end of the series. These very inconspicuous organs are nearly co-extensive with the series of oblique copulatory muscles. There are two lateral and two ventrally submedian rows of setae on the tail, the lateral rows lying close to the outside lateral rows of beads. Of these lateral pairs there are eight or nine. Each of the two sub-ventral rows has about twelve to fourteen setae. There are a few other setae scattered irregularly on the ventral side of the tail, as well as in the dorsally submedian positions. Spicula much elongated, narrow, acute; guided by accessory pieces about as long as the anal body-diameter, which have, projecting backward from their middle parts, processes nearly as long as they themselves are. The distal ends of the spicula are obscurely retrorsely barbed. The caudal glands seem to be located in the tail. It appears that sometimes the distal extremity of the anterior testis may be reflexed for a short distance. The posterior testis is considerably smaller than the anterior.

*Habitat:* Mud in the shallow portions of the harbor of Kingston, Jamaica. The name *Pepsonema* is suggested by the interesting cells found in the anterior portion of the intestinal wall. Such specially differentiated cells are now known for all parts of the nema intestine. In general the specialized cells of the posterior part of the intestine are histologically different from the specialized cells of the anterior portion. Fig. 77, p. 295.

## X. Order Aponchia.

78. *Trissonchulus oceanus n. sp.* Cuticle naked, practically without marks of any kind. Onchia refractive, in contour roughly equilateral, slightly curved, apparently with an outward stroke. When the mouth is slightly open, the apices of the teeth are on a level with the surface of the head. Neck slightly conoid, —convex-conoid at the head. Amphids very faint. Inner surface of each of the six lips armed with scores of exceedingly minute, closely set denticles. Oesophagus cylindroid, then conoid in the posterior fourth, where there is a faint cardiac swelling, which can hardly be called a bulb. At the nerve-ring the oesophagus is one-half, and finally three-fifths, as wide as the corresponding part of the neck. The indistinct lining is expressed by three parallel lines occupying a space two-sevenths as wide as the oesophagus. There is a conoid cardia one-half as wide as the base of the neck. The thin-walled intestine becomes at once three-fourths as wide as the body, at least when gorged. Its cross-section is probably made up of eight to ten cells. These cells contain scattered colorless granules of variable size, the largest of which are one-fortieth as wide as the body. Tail sub-cylindroid in the anterior three-fourths. The spinneret presents the peculiarity of being on the ventral surface of the tail some distance from the tip. (See illustration.) The elongated-ellipsoidal caudal glands, as long as the body is wide and one-third as wide as long, are located in front of the copulatory muscles. They form a loose tandem, and empty through distinct ducts and ampullae, the latter being large and filling the tail. There are no caudal setae. The lateral fields are one-third as wide as the body and contain large, ellipsoidal cells nearly as wide as the fields themselves, occurring at intervals of one to three body-widths; these are apparently glandular, and connect with the surface by means of pores on the lateral line. The excretory pore is at the lips and is directed forward. The renette cell, one neck-length behind the cardia, and as long as the neck, is granular and contains a large nucleus; its duct is about as wide as the cuticle is thick, and being coarsely granular, is rather easily followed. There is an anterior rudimentary part to the female sexual organs two to three body-widths long. From the continuous vulva, the medium-sized, more or less tubular vagina leads inward two-fifths the distance across the body. The broad, cylindroid ovary contains about thirty ova, arranged single file proximally, but irregularly distally. Tail of the male smaller and more arcuate than that of the female, and more nearly conoid. The proximal ends of the stoutish, tapering, rather blunt spicula appear to lie opposite the body-axis. There is a rather frail, slender accessory piece. There is a low and more or less obscure ventral pre-anal elevation at the anterior portion of the region occupied by the copulatory muscles. This may perhaps partake of the nature of a supplementary organ. On each side, in front of the anus, there are



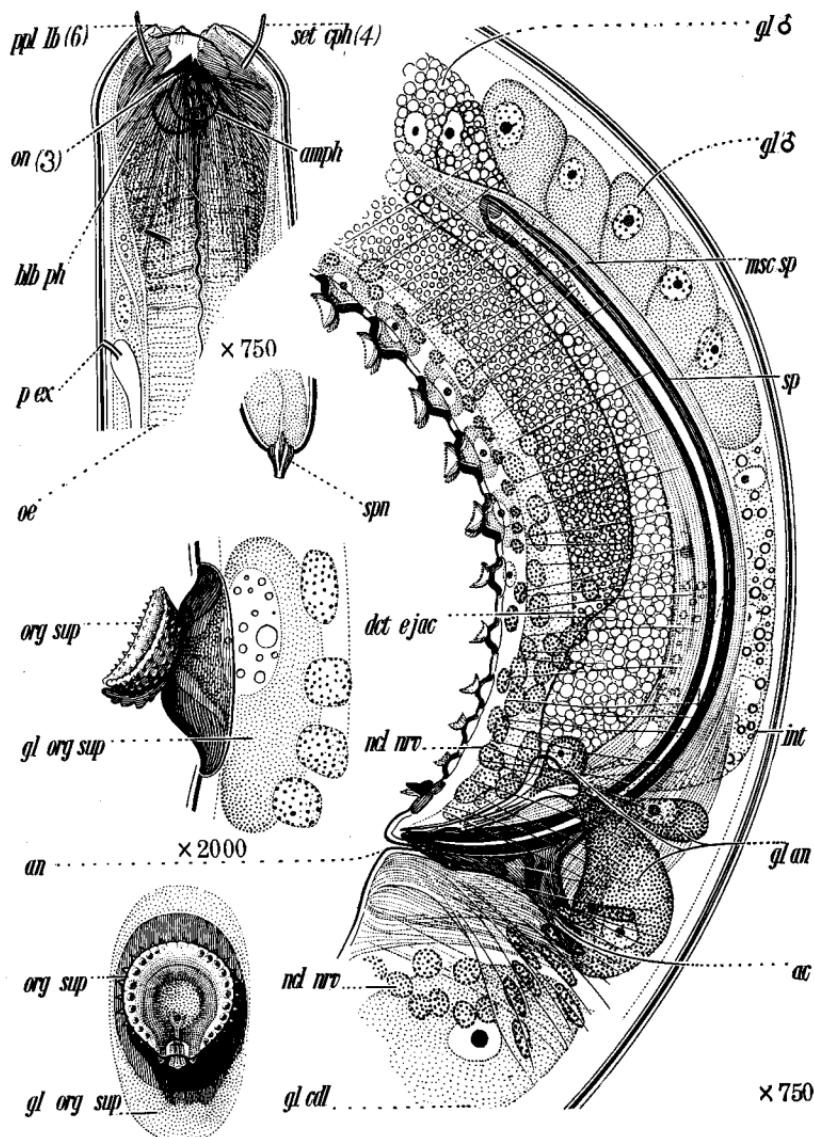
1.8	4.2	10.4	$43^{17}$	98.1	> 3.7
<u>1.9</u>	1.4	1.8	2.	1.7	
1.5	4.2	9.8	$94^{79}$	98.5	> 3.6
<u>1.1</u>	1.9	1.5	1.6	1.4	

three, and behind the anus four, ventrally submedian papillae, the former separated by spaces about one and one-half times as great as the width of the body. Of those on the tail two are in front of the spinneret pore and two behind. Of the two testes the anterior one is much the longer; both are narrow. The ejaculatory duct is one-half as wide as the body, the vas deferens one-fifth to one-third. The copulatory muscles occupy a space five times as long as the tail. The spermatozoa are more or less ellipsoidal, and one-fifteenth to one-tenth as wide as the body of the female. In the male, at a distance in front of the anus four to eight times the length of the tail there are seven clavate, long glands connecting backward with the ejaculatory duct. These glands darken in Flemming's solution. In front of these glands, for a distance equal to four to five times the body-diameter, there are about seventeen spherical glands not darkening in Flemming. These also seem to connect with the ejaculatory duct.

*Habitat:* Seaweed that drifted ashore after a storm at Ocean Beach, Miami, Florida, U. S. A. Also found in beach sand at Ocean Beach. Flemming to glycerine jelly. Fig. 78, p. 297.

79. *Aponchium cylindricolle* n. sp. When the lips are closed the three onchia almost completely fill the pharyngeal cavity. Extending backward and slightly outward from the bases of the teeth are refractive markings in the pharynx, indicating folds,—evidence that the cavity containing the teeth can be everted. The pharyngeal cavity seems to merge gradually into the lumen of the oesophagus; it probably extends backward a distance equal to the diameter of the head. Onchia of very slightly unequal size;—the dorsal perhaps smallest, the submedian ones equal. The oesophagus continues to have the same diameter until after it passes through the nerve-ring, when it expands to form the elongated, pyriform, posterior bulb or swelling, three-fourths as wide as the base of the neck. There is a distinct, somewhat cylindroid cardia, about one-third as long as the neck is wide. The thick-walled intestine, which is separated from the oesophagus by a broad and deep constriction, soon becomes three-fourths as wide as the body. Its cross-section would display six to eight cells. The cells of the anterior portion of the intestine for a distance twice as great as the corresponding body-diameter appear to be of a slightly different character from those farther back, as they almost invariably stain somewhat differently. The preliminary cells of the intestine, namely, a transverse series of about six cells, are undoubtedly of a larger size than those immediately following, and stain in a different manner; they fail to take acid carmine stain, when the cells immediately following stain well. These cells are packed with granules of rather uniform size. The succeeding intestinal cells contain numerous yellowish granules of variable size, which are rather irregularly disposed. A notable feature of the intestine is the lining, which is unusually thick, and consists of two elements; an interior thin, refractive membrane surrounded by a non-staining layer nearly as thick as that portion of the intestine containing the granules, already mentioned. In many parts of the intestine this lining, composed of the two above-mentioned elements, occupies fully half the optical longitudinal section. Anus raised, rectum somewhat shorter than the anal body-diameter. The tail begins to taper slowly from some little distance in front of the anus. Behind the anus it tapers somewhat more rapidly, and is conoid to the terminus. The three saccate caudal glands form a close tandem series in the anterior half of the tail. The nuclei of these cells

are slung in a rather fine net-work of protoplasm. The lateral fields are fully one-third as wide as the body. The renette cell is not yet fully understood. There is a series of rather prominent cells a short distance behind the base of the neck on the ventral side of the intestine which undoubtedly constitutes the



renette. In one typical specimen these cells were arranged as follows: First, an elongated-ellipsoidal cell, which failed to take the carmine stain, but contained a distinctly stained nucleolus in its nucleus. This was followed by a cell which stained rather strongly, which in turn was followed by a pair of cells which did not stain, except in their nuclei; these two cells were arranged side by side, and were the largest of the series, being nearly half as wide as the body, and nearly twice as long as wide. Behind this pair of cells there was a single cell

resembling the first member of the series, and behind this one or two others arranged tandem. This entire series occupies a distance equal to the length of the neck. From the raised vulva the vagina extends inward and forward. The outstretched ovary contains fifty or more developing ova arranged in double file, except near the blind end, which is located near the middle of the body. The eggs are of large size, elongated, about one and one-half times as long as the body is wide and about two-fifths as wide as long. In all those thus far seen the spherical nucleus is of unusually large size. There is no posterior rudimentary branch to the sexual organs. Well-developed accessory pieces surround the distal ends of the spicula. With them a median piece extends along the spicula and appears to end opposite the body-axis, near the base of the apophysis. The karyokinesis of the spermatocytes shows the arrangement of the chromosomes in spireme threads, something very uncommon in nemas.

*Habitat:* Larat, East Indies. Marine Fig. 79, p. 299.

## XI. Order Triploonchia.

80. *Triplonchium cylindricum* n. sp. Cuticle naked as in the case of nearly all Triplonchs.

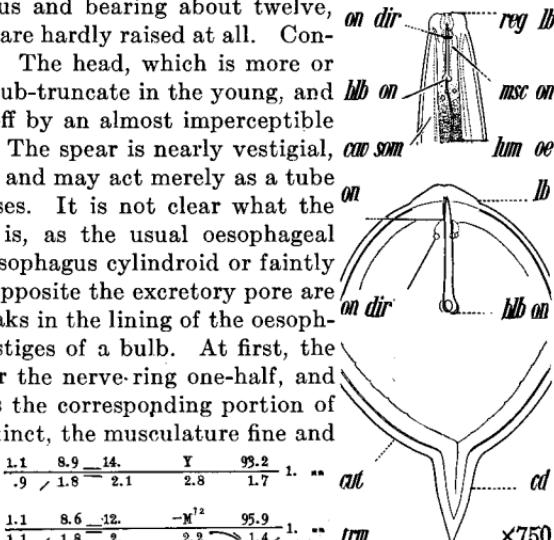
Measurements: *ppl(6)* 1.8 6.9 13. 27<sup>1</sup>/<sub>2</sub> 54<sup>1</sup>/<sub>2</sub> 98. 1.2 \*\* Cylindroid neck  
on 2.3<sup>1</sup>/<sub>2</sub>(0) 3.1 3.2 3.3 2.8 ending in a con-  
pex? 2.5 7.8 15. 62<sup>1</sup>/<sub>2</sub> 97. 1. \*\* vexit-conoid head.  
nrvnd amph oo  
nrvnd nrvnd  
nrvnd nrvnd  
al qph  
ac sp  
dkt  
an  
hrs? nrd  
trm nrd  
nsc an nrd  
x 750 nrd

Amphids more or less protrusile, projecting considerably in all specimens killed with Flemming's solution. (See illustration.) In some respects the amphids are reminiscent of those of certain Mermithidae. Oesophagus mainly cylindroid, but finally expanding to form a pyriform bulb nearly two-thirds as wide as the base of the neck, and having a rather indistinct valve one-sixth as wide as itself. The lining of the oesophagus is not a very distinct feature. There is no very distinct cardia. The intestine becomes at once about two-thirds as wide as the body. The cells contain numerous refractive spherical granules, the largest of which are about one-sixth as wide as the body, the smallest of which are very much smaller. These granules are packed so closely together as to obscure the details of the histological structure of the intestine. Anus continuous; rectum slightly refractive. The lateral fields have not been clearly seen, but appear to be about one-fourth as wide as the body. Renette unknown. The nerve-ring surrounds the oesophagus squarely, and there are numerous nerve cells close together, both in front of the nerve-ring and behind it, filling the greater part of the cavity of the neck. From the slightly raised vulva the distinctly cutinized vagina leads backward a distance nearly equal to half the corresponding body diameter; it then joins the single uterus, which extends first backward, then forward. This latter, when empty, appears to be about two-fifths as wide as the body. The end of the posterior ovary lies about one to two body-widths behind the vulva. Nothing is known concerning the size and form of the eggs. There is a cell located about as far behind the base of the neck as this latter is behind the anterior extremity, which attracts attention on account of its somewhat peculiar appearance. It presses the intestine to one side, and has a distinct nucleus, with a

refractive nucleolus. Possibly this cell is the renette cell. The tail of the male is a little more strongly developed than that of his mate. No pre-anal supplements, though there appear to be one or two obscure papillae just in front of the anus. There are very obscure, straight accessory pieces; these may be little more than thickenings of the wall of the cloaca. The ejaculatory duct is two-fifths, the vas deferens about two-thirds, as wide as the body. In glycerine specimens the spermatocytes are distinctly refractive, ellipsoidal bodies, about one-sixth as long as the body is wide. The dorso-ventral view of the amphids is very instructive. As seen in glycerine preparations fixed with Flemming's solution, the external amphids appear as tubular protrusile organs, arcuate in form, and three to four times as long as wide. They may be protruded for at least half their length. Their outer surface is of a refractive character, and there appears to be a slightly refractive core. At the extremity they are almost imperceptibly expanded, somewhat hemispherical in form, with the terminal surface much thinner and less refractive than the lateral. They appear to slide in an inner tube located in the head, which is also cutinized. This tube extends inward and backward, and ends opposite the base of the pharynx, and is therefore arcuate like the amphid itself. Tubes leading back from the external amphid may be traced at least half way to the nerve-ring. The inner elements of the tube are refractive, and are seen to lie more or less parallel to the body-axis, but as yet have not been connected up with any internal cellular structure. There are comparatively few ova in the ovary, perhaps about a dozen in all, arranged somewhat irregularly.

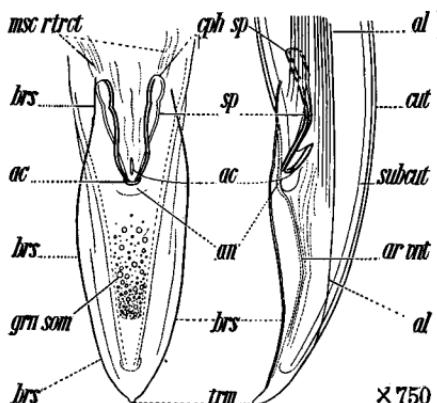
*Habitat:* Humus, Plummer's Island, Potomac River, near the District of Columbia, U. S. A. Fig. 80, p. 300.

81. *Aphelenchulus mollis* n. sp. Cuticle thin, naked; the wings, extending from the neck to near the terminus and bearing about twelve, very fine, longitudinal striae, are hardly raised at all. Contour, very minutely crenate. The head, which is more or less rounded in the adult, is sub-truncate in the young, and the region is sometimes set off by an almost imperceptible broad, shallow constriction. The spear is nearly vestigial, probably nearly functionless, and may act merely as a tube through which the food passes. It is not clear what the motive force in deglutition is, as the usual oesophageal bulbous pump is absent. Oesophagus cylindroid or faintly cephaloboid. In the larvae opposite the excretory pore are to be seen two successive breaks in the lining of the oesophagus, which are probably vestiges of a bulb. At first, the oesophagus is two-fifths, near the nerve-ring one-half, and finally one-fourth, as wide as the corresponding portion of the neck; the lining is subdistinct, the musculature fine and colorless. There is no cardia. The oesophagus changes gradually into the intestine, as in *Aphelenchus*. In the larvae, the thick-walled intestine gradually becomes three-fifths as wide as the body. Its lining is refractive and in cross-section, it presents one to two cells only, which alternate with each other as in some Rhabdites. The anus is con-



Upper Fig.—Adult male. Lower Figs.—Adult female.

tinuous, the rectum inconspicuous and about as long as the anal body diameter. The nuclei of the intestinal cells are clear, and have twice the diameter of the largest intestinal granules, and present a nucleolus. The cells of the intestine are usually packed with granules of variable size, the largest of which are one-ninth as wide as the body and are so arranged as to give rise to a more or less distinct tessellated effect. Tail of the adult, as shown in the illustration. The tail of a larva is more or less cylindroid, but slightly conoid and at the end bluntly rounded and almost imperceptibly apiculate. There are no caudal glands.



*al* Opposite the base of the oesophagus, there are two to three nuclei similar to those often found in the genera *Tylenchus* and *Aphelenchus*, and probably having the same function, namely, that of salivary glands. The long renette, which appears to be sometimes on the right, sometimes on the left, extends back along the lateral field a long distance; it has been followed for three-fourths the length of the body. The nerve-ring is accompanied by rather obscure nerve cells.

*Only the blind end of the tapering ovary is reflexed. The vulva is large and conspicuous, and is somewhat elevated, especially in front.*

The straight uterus contains ellipsoidal to elongated eggs, which are about as long as the body is wide, measuring forty by twenty-five microns. They begin segmenting before deposition.

*Habitat:* Found at Falls Church, Va., U. S. A., parasitic in a wood-boring beetle, determined by Mr. F. C. Craighead as *Cylleene picta* Drury. Sixteen thousand larvae and a few adult females were found in one beetle. Both male and female beetle are infested, usually with only a few female parasites;—at least such is the condition in the month of May. Of fourteen female insects, three were infested; of twelve males, seven were infested. As a rule, only a few adult females of *Aphelenchulus mollis* occur in one host, about one to eight. Two living adult males of *Aphelenchulus mollis* were found in the castings of beetles taken from infested logs. These are the only adult males so far seen. This finding may indicate that the females are fertilized before entering the host. The parasites are found in the thorax of the beetle, as well as the abdomen. Fig. 81a, p. 301; Fig. 81b.

82. *Iotonchium imperfectum* (Bütschli) nom. nov.      .4      (1)      14.      78-88.      92.      1.8  
 Striae fine; contour entire. Head abruptly truncate, set off by expansion. Spear exceedingly minute, eight microns long, about one-fourth to one-fifth as long as the head is wide, simple, plain, apparently not bulbed; in the male, the spear is difficult to see, being reduced to a mere point. Neck conoid; amphids?. Intestine very transparent; anus indistinct. Tail of the female conical from the vulva, acute. Excretory duct single, much coiled. Ovary outstretched forward; eggs somewhat longer than body is wide, half as wide as long, deposited after segmentation. Spicula L-form, tapering, cephalated by constriction, considerably longer than the anal body-diameter; accessory pieces none; bursa well-developed, springing from considerably in front of the spicula and extending somewhat beyond the terminus.

*Habitat:* In rotting fungi, Germany. Syn. *Tylenchus imperfectus* Btsli.

## XII. Order Axonchia

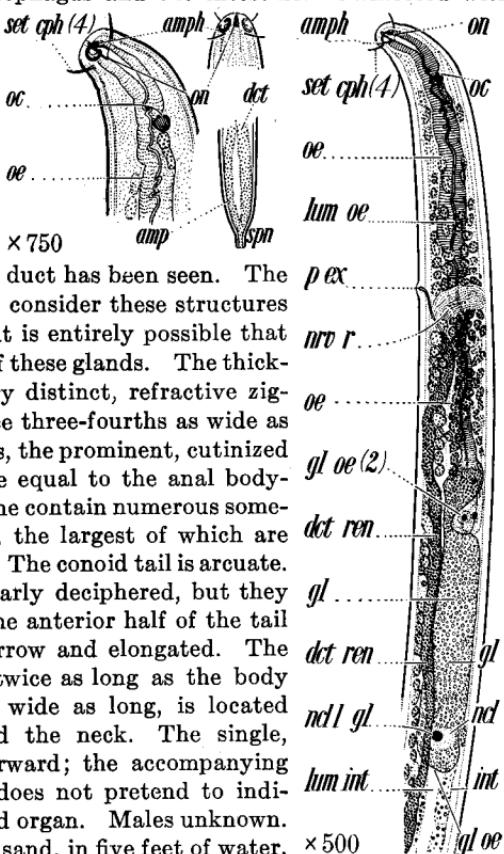
.27	7.2	19.	$\Sigma^t_{52} \frac{1}{2}$	90.
.7	1.8	1.8	1.8	1.2

83. *Onchium ocellatum* n. sp. Cuticle thin, the transverse striae almost impossible of resolution. Except for the cephalic setae, the cuticle is naked. Spear hollow, brownish, very thin-walled. Though the yellowish, solid, refractive eye-spots are sublateral in position, they are rather near together. The specimens thus far examined do not enable one to make a clear distinction between the oesophagus and the intestine. Connected with the posterior part of the oesophagus are large glandular cells, probably three in number, judging by the number of nuclei. These structures seem to be homologous with those found in a similar position in *Tylenchus* and *Aphelenchus*, but their actual connection with the lumen of the oesophagus  $\times 750$

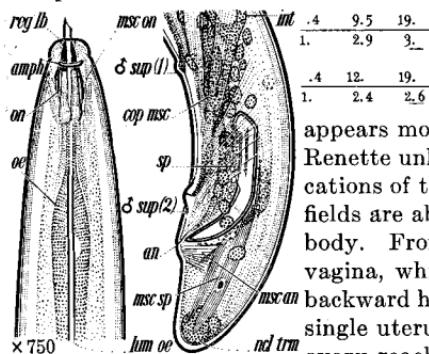
is problematical, as no connecting duct has been seen. The best interpretation seems to be to consider these structures as a part of the oesophagus, but it is entirely possible that the oesophagus ends just in front of these glands. The thick-walled intestine, which has a very distinct, refractive zig-zag lumen, becomes almost at once three-fourths as wide as the body. From the elevated anus, the prominent, cutinized rectum extends inward a distance equal to the anal body-diameter. The cells of the intestine contain numerous somewhat variable yellowish granules, the largest of which are one-sixteenth as wide as the body. The conoid tail is arcuate. Caudal glands have not been clearly deciphered, but they probably lie behind the anus in the anterior half of the tail in a loose tandem. They are narrow and elongated. The elongated, granular renette cell, twice as long as the body is wide, and about one-third as wide as long, is located six to eight body-widths behind the neck. The single, reflexed sexual organ extends forward; the accompanying formula, correct for the larvae, does not pretend to indicate the true form of the developed organ. Males unknown.

*Habitat:* Clean "white" marine sand, in five feet of water, from a cove near the entrance to Buzzard's Bay, Mass., U. S. A., Also from "sea-grass," Key West, Florida. Fig. 83.

84. *Doryllium uniforme* n. sp. Cuticle naked, very minutely transversely striated. Neck conoid. Spear minute, dorylaimoid, but with a distinct, somewhat refractive posterior swollen part. The oesophagus continues with slight variations until it joins the pineapple-shaped cardiac bulb, which is two-thirds as wide as the base of the neck and is separated from the preceding portion of the oesophageal tube by a constriction. This bulb contains, among other things, a spherical nucleus with a distinct nucleolus, presumably indicating the existence here of glands like those of *Dorylaimus*. The narrow intestine joins the middle of the posterior surface of the bulb, and becomes at once about two-fifths



as wide as the body; its cross-section would present only about two cells. These cells contain scattered yellowish granules of uniform size. From the inconspicuous anus the rectum extends a distance longer than the anal body-diameter. The pre-rectum is about four times as long as the corresponding body-diameter.

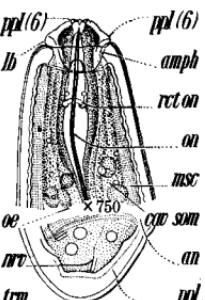


reg/lb  
amphi  
on  
oe  
sp  
δ sup(1)  
cop msc  
δ sup(2)  
an  
msc sp  
msc an  
lum oe  
ad trm  
x 750

and is readily distinguished from the rest of the intestine by differences in structure;—it appears more transparent and more nearly colorless. Renette unknown. There seem to be very faint indications of the presence of a lateral wing. The lateral fields are about one-fifth to one-fourth as wide as the body. From the rather inconspicuous vulva, the vagina, which is well cutinized, extends inward and backward half way across the body, where it joins the single uterus which extends backward. The reflexed ovary reaches half way back to the vulva, and contains ten to twenty ova arranged for the most part single file. There is an anterior rudimentary branch to the uterus which is a little longer than the corresponding body-diameter. Eggs unknown; judging from the full-grown ova they are about as long as the body is wide and about half as wide as long. Single male supplement two body-diameters in front of the anus, four times as far away as the anal pair.

**Habitat:** Brackish soil on the banks of a marine estuary, Los Patos, California, U. S. A. Differs from Dorylaimus in the form of the spear, and the oesophagus. Most species of Dorylaimus have two ovaries. Differs also in the reduced number of supplementary organs;—outside the anal pair, there is only one. Differs in material respects also from Tylencholaimus, to which it may be compared. Fig. 84.

55. *Leptonchus granulosus* n. sp.      .7      7.2      20.      15+59,15      99.      1.      " Cuticle naked, its transverse striae resolvable with difficulty into exceedingly minute dots. One of the inner striae seems to correspond to about four of the outer. Cuticle also possessed of inconspicuous longitudinal striae. Neck conoid. Amphids broad, faint, somewhat stirrup-shaped, their anterior contours opposite the labial constriction. The oesophagus begins as a tube about one-fourth as wide as the base of the head, and continues to have this diameter until it finally expands to form the clavate or elongated pyriform cardiac swelling, which is about one-half as wide as the base of the neck. There is an inconspicuous conoid cardia about one-third as wide as the body. The oesophagus is therefore essentially tubular throughout most of its length. It is, however, a trifle wider near the middle, in the neighborhood of the nerve-ring, usually behind it, and at this point there appears to be a slight alteration in the lining, suggesting in the faintest possible manner vestiges of a median bulb; at its widest part, however, the slender part of the oesophageal tube is not more than one-fourth to one-fifth as wide as the corresponding portion of the neck. At its narrowest part, just in front of the cardiac swelling, it is about half as wide as it is at its widest part. The lining of the oesophagus is not a conspicuous feature. The intestine, which becomes at once fully three-fourths as wide as the body, is made up of cells of such a size



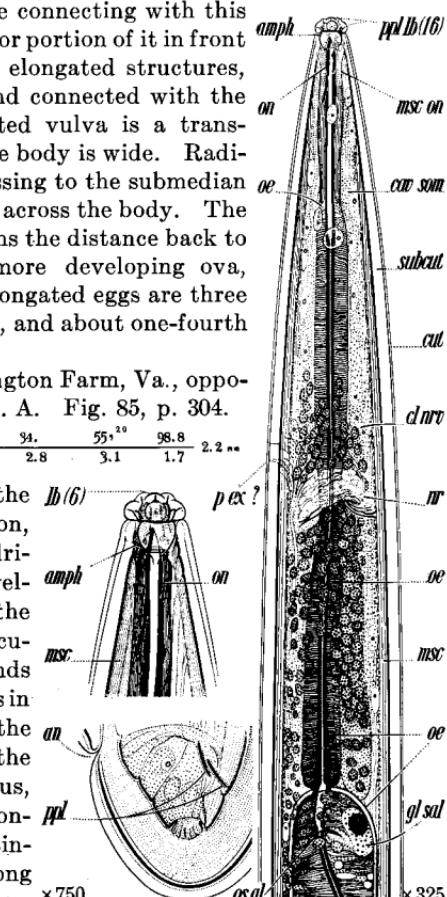
that its cross-section presents but two of them. These cells are packed with granules of variable size, the largest having a diameter one-eighth as great as that of the body, while the smallest are very minute. The tail begins to taper from some distance in front of the anus. There are a few inconspicuous papillae near the posterior extremity of the tail of the female. The pre-rectum is of most unusual length, extending to a little beyond the flexure of the anterior ovary, and hence occupying about half the length of the body. It is set off from the front portion of the intestinal tube by a distinct constriction, and differs also in structure. The lateral fields are about one-third as wide as the body. The ventral fields appear to be wider than the lateral,—nearly half as wide as the body, at least appearances half way between the vulva and the anus give rise to this measurement. The traces of the excretory pore are difficult to observe, but they are uniform in the different specimens, and as no other similar "break" in the cuticle is to be deciphered it seems impossible that the single "break" opposite the nerve-ring can be anything but an excretory pore. No indications are seen of the existence of an internal structure connecting with this pore, but the neck, especially the posterior portion of it in front of the cardiac swelling, is occupied by elongated structures, which may be of a glandular nature and connected with the aforesaid "pore." The slightly elevated vulva is a transverse slit about one-fourth as long as the body is wide. Radiating from its ends are four muscles passing to the submedian fields. The vagina leads about halfway across the body. The reflexed ovaries reach about three-fourths the distance back to the vulva, and contain a dozen or more developing ova, arranged somewhat irregularly. The elongated eggs are three to four times as long as the body is wide, and about one-fourth to one-fifth as wide as long.

*Habitat:* Soil about willow trees, Arlington Farm, Va., opposite the city of Washington, D. C., U. S. A. Fig. 85, p. 304.

.2      6.7      94.      55.<sup>20</sup>      98.8  
       .6      1.9      2.8      3.1      1.7      2.2 \*\*

86. *Axonchium amplicolle n. sp.*

Cuticle naked. The two portions of the *Jb/6* oesophagus are separated by a constriction, as shown in the figure; both parts cylindroidal. Lining of the oesophagus well-developed, but more or less obscured by the well marked, rather coarse, colorless musculature in the posterior part. Salivary glands in the posterior part of the oesophagus as in *Dorylaimus*, one gland emptying into the lumen near the anterior portion of the larger cylindroid half of the oesophagus, the others farther back. Anus subcontinuous; the rectum prominent and cutinized, and one and one-third times as long as the anal body-diameter. The anal muscles are clearly disclosed. The pre-rectum is five times as long as the anal body-diameter, and set off by a definite but faint constriction. The cells of the intestine contain numerous, colorless granules of variable size, the largest of which are one-twenty-fifth as wide as the body. Tail of the adult female as shown in the illustration. In the youngest larvae, however, the tail is cylindroid in the

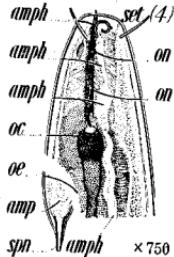


posterior half, and in this part, about one-third as wide as at the anus, the terminus being rounded. The coarsely granular lateral fields are one-fourth to one-sixth as wide as the body. Renette problematical. From the small, inconspicuous, faintly elevated vulva, the rather weak, non-cutinized vagina leads inward two-fifths the distance across the body. The elongated eggs are three times as long as wide and twice as long as the body is wide. The tapering ovary reaches about half way back to the vulva, and contains about twenty ova, the largest of which are arranged single file, while the others are arranged irregularly.

*Habitat:* Soil about the roots of Luca da Persia, Brazil. The part of Brazil from which the plants came is unknown. The soil examined was removed from the roots after they were imported into the United States. It is probable that the species is syngonic. Another tropical species, originally described by the writer under the name of *Dorylaimus longicollis*, from about banana roots, Fiji, possibly also belongs to this genus. Fig. 86, p. 305.

87. *Onchulella ocellata* n. sp.       $\begin{array}{ccccccc} 1.5 & 10.9 & 16.8 & 104 & 48,^{10} & 83 & \\ 1.2 & 1.4 & 1.6 & & 1.7 & 1.3 & \end{array} > 1.7 \text{ mm}$  Cuticle naked.  
 Striae almost impossible of resolution. Spear solid, refractive and apparently "structureless" throughout. The two yellowish ocelli are wide apart, their lenses colorless. The oesophagus is at first about one-half, near the nerve ring two-fifths, and finally five-sixths, as wide as the corresponding portion of the neck; the anterior part is cylindroid, the posterior part more or less obscure. The oesophageal region seems to be largely filled with a series of elongated, clavate glands, some granular and some not, and hence of two kinds. The hindmost of these is the largest, and with reference to the oesophagus lies in much the same way as the larger salivary gland of *Tylenchus*. There is also a large spherical nucleus in this gland, as in *Tylenchus*. This is the only one of the granular cells having a large conspicuous nucleus. The non-granular cells are smaller; two or three of them present nuclei. The measurements given in the formula for the base of the oesophagus really refer to the posterior limits of these glands. Just in front of the ocelli there are two lateral, external, elliptical, cuticular elements, two-thirds as long as the corresponding diameter of the neck, and one-third as wide as long. These connect backward by means of ducts, and it seems probable that they are connected with one of the two kinds of glandular cells contained in the neck. The lining of the oesophagus is indistinct, its musculature fine and colorless. No cardia has been seen. The thick-walled intestine, which has a distinct, refractive, ziz-zag lining, becomes at once five-sixths as wide as the body. The anterior lip of the anus is more or less elevated. The inconspicuous rectum is about three-fourths as long as the anal body-diameter; anal muscles are dimly to be seen. The cells of the intestine, of which only two to three would be presented in cross-section, are packed with colorless granules of variable size, the largest of which are one-fifteenth as wide as the body. The arcuate tail tapers from the anus to the terminus, and presents a spinneret about one-sixth as wide as its base. Caudal glands tandem in front half of tail. No caudal setae. Renette unknown. From the somewhat depressed vulva, the more or less cutinized vagina extends inward three-fifths the distance across the body. An ovum, apparently full-grown and about to enter the uterus, is twice as long as the body is wide, and one-third as wide as long.

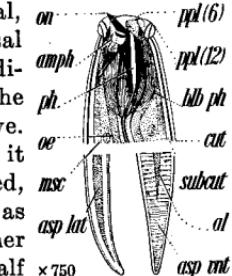
*Habitat:* Eel-grass, Biscayne Bay, Miami, Florida, U. S. A. Flemming to glycerine jelly. Only one specimen—that, a shrunken one—seen. Fig. 87.



## XIII. Order Anaxonchia

.6	12.2	33.	<sup>15.56</sup>	85.	.6..
1.7	/ 3.4	4.	4.2	2.8	

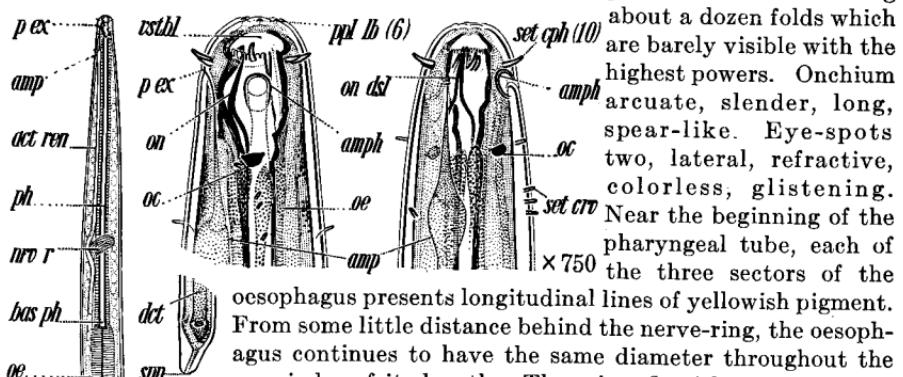
88. *Campydora demonstrans n. sp.* Cuticle naked. Eight longitudinal striae exist throughout the length of the body. In certain parts, especially along the neck, the longitudinal striae are more marked than elsewhere, attaining almost the magnitude of wings. There appear to be four such "wings," but an exact count has not yet been made. Neck conoid. There are six rounded, somewhat flat, partly confluent lips, bearing two circlets of labial papillae, as shown in the illustration. These are plainly innervated, and are of the sort commonly seen in *Dorylaimus*. The inner circlet has six members; the outer circlet twelve, i.e., six pairs. The six slender structures extending forward around the mouth, the inner circlet, may also end in organs having the nature of papillae, but if so, they are of a different character from the outer papillae. Base of the solid onchium axial, or nearly so, the apex however, bent considerably to the dorsal side. The onchium may be protruded by means of longitudinal muscles composing the pharyngeal bulb. Lining of the posterior portion of the pharynx considerably less refractive. The oesophagus has about the same relative diameter until it finally expands suddenly to form the somewhat elongated, cylindroid cardiac bulb, which is fully five-sixths as wide as the corresponding portion of the neck, and contains a rather faint, elongated, three-parted valve occupying about half the optical longitudinal section. This cardiac bulb has a peculiar formation in that the valve extends very nearly from end to end of the bulb and is manifestly triquetrous, so that by the contraction of the radial muscles, the bulb can be thrown into the form of a chamber. Lining of the oesophagus unusually distinct. The central oesophageal tube, when seen in optical section presents each of its walls with a double contour, and the lumen has about the same width as the thickness of the walls. The entire width of this tube is considerably greater than the thickness of the cuticle, and is about equal to one-twelfth the diameter of the middle of the neck. The intestine becomes at once about five-sixths as wide as the body. There is a comparatively distinct, broad, low cardia. The walls of the intestine are comparatively thick. Its cross-section would probably present two to four cells. These cells contain doubly-refractive, spherical, scattered granules of variable size, the largest of which have a diameter one-tenth as great as that of the body, the smallest being very much smaller. When seen with crossed Nicols, these granules show a prominent St. Andrew's cross. All the granules appear to be of the same character; their walls, seen in optical section, present a double contour. Behind the base of the neck for a distance about equal to one body-diameter, the granules are few in number and small in size. Elsewhere, they are about equally distributed, or perhaps a little less abundant toward the posterior end. The tail is conoid from near the anus, and the cuticle becomes thicker on the posterior extremity and more strongly striated. In young specimens it expands laterally to form wings, which appear quite distinctly striated when viewed dorso-ventrally. From the conspicuous, depressed anus, the strongly refractive, cutinized rectum is considerably longer than the anal body-diameter. Excretory pore depressed and rather conspicuous. From it, the cutinized duct can be distinctly seen leading inward. From the depressed somewhat circular vulva, the cutinized



vagina leads inward nearly half way across the body, where it joins the single uterus, which apparently extends forward. The ovary extends backward past the vulva. Nothing is known concerning the size and form of the eggs.

**Habitat:** About the roots of citrus trees, Corfu, Greece. Fig. 88, p. 304.

89. *Catalaimus acuminatus* n. sp.  $\frac{(1.1) 15.}{1.9} \quad 12. \quad 22. \quad 135^{15}}{1.8 \quad 1.9 \quad 2.4} \quad 93. \quad > 2.2$  \*\* Naked cuticle traversed by exceedingly fine transverse striae. Lips when closed exhibiting



about a dozen folds which are barely visible with the highest powers. Onchium arcuate, slender, long, spear-like. Eye-spots two, lateral, refractive, colorless, glistening. Near the beginning of the pharyngeal tube, each of the three sectors of the oesophagus presents longitudinal lines of yellowish pigment. From some little distance behind the nerve-ring, the oesophagus continues to have the same diameter throughout the remainder of its length. There is a flattish conoid cardia, about one-third as wide as the base of the neck. Lining of the oesophagus apparently wavy, occupying one-third of the optical section. The intestine, which becomes at once three-fourths as wide as the body, is made up of cells of large size, at least some of the cells are of very large size,—of such a size that probably two only would be required to build a circumference. Whether there are other smaller cells scattered among these larger cells remains to be determined. The large cells are packed with nearly colorless granules of rather uniform size, having a width about half as great as the thickness of the body wall. While the anus is depressed, its posterior lip is slightly raised. Rectum about as long as the anal body-diameter. The nema tapers gradually from a considerable distance in front of the anus. Near the anus, it begins to taper more rapidly, so that at the middle of the tail, the diameter is only about half as great as at the anus; thence onward, the tail is nearly cylindroid and ends in an elongated spinneret. No distinct traces of caudal glands are to be seen in the base of the tail; hence it is assumed that they are located in front of the anus. Obscure indications have been seen of their presence half as far in front of the anus as the terminus is behind it. The lateral fields have not been distinctly seen. The location of the renette cell remains undetermined. This description is derived from a young female, and all that can be said is that the ovaries are probably double and reflexed.

**Habitat:** Marine mud and sand, Noumea, New Caledonia, and Biscayne Bay, Fla., U. S. A. Other species of this genus occur in the Indian Ocean and in the Mediterranean Sea. Fig. 89.

90. *Bolbella tenuidens* n. sp. Transverse striae excessively fine, more readily seen in the subcuticle with high powers under favorable conditions. Longitudinal striations are  $\frac{.44 \quad 8.9 \quad 19.5}{1.4 \quad 1.9} \quad 2.4 \quad 1.2 \quad 15^{44}, 17 \quad 92.8 \quad > 2.9$  \*\* present throughout the length of the body. Body wall massive, occupying one-third the radius. As  $\frac{.5 \quad 9. \quad 19.}{.4 \quad 1.5 \quad 1.7} \quad 2. \quad 2^{10} \quad 93. \quad > 2.7$  \*\* compared with related species the anterior chamber of the pharynx is somewhat more foreshortened. There are two to three

dozen very long and very slender cervical setae, those toward the head end being nearly twice as long as the cephalic setae,—more of them than are shown in the illustration. Glandular tissue exists in the oesophagus, the granular branches of which may be seen more particularly between the oesophageal bulbs; a duct appears to lead to the pharynx. A cross-section of the intestine would present four to six cells. In the female, from the more or less continuous anus, of which, however, the posterior lip is slightly elevated, the inconspicuous rectum extends inward a distance equal to the anal body-diameter. A narrow renette cell exists two to three body widths behind the cardia on the ventral side. The slightly elevated vulva is of medium size, and leads to a large tubular vagina, at first at right angles to the ventral surface and then leading obliquely forward. The wall of the vagina is well cutinized. Each branch of the two-horned uterus is about one and one-half times as long as the body is wide. Two eggs have been seen in a uterus at one time, each about twice as long as the body is wide. The spherical spermatozoa existing in the uterus are about one-sixteenth as wide as the body. The broad, more or less cylindroid ovaries extend two-fifths the way back to the vulva, and contain eight to ten countable ova arranged for the most part irregularly. The two supplementary organs of Bolbella, like the similar organs of Eurystoma, are connected with large glands, one to each supplement. One of these glands is very well shown in the illustration at  $gl\ sup\ \delta$ .

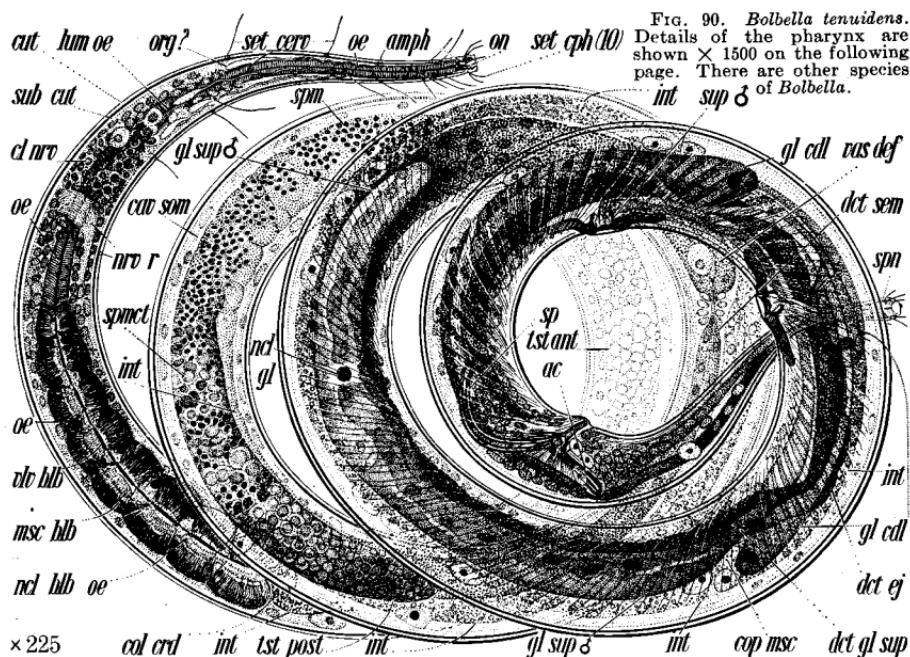
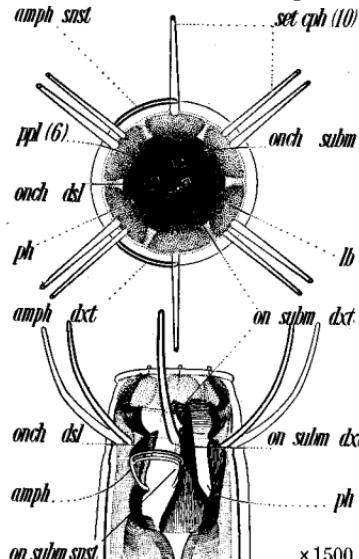


FIG. 90. *Bolbella tenuidens*. Details of the pharynx are shown  $\times 1500$  on the following page. There are other species of *Bolbella*.

The gland is long and unicellular and its nucleus is shown at *ncl gl*. A natural supposition is that these two supplements are cup-shaped organs attachable by suction. The supposition appears, at first thought, to find support in the existence of the "anchors," which are manipulated by special muscles. It is rather difficult to harmonize this theory with the existence of such large glands, so much so that one feels inclined to give up all idea that suction plays any part in the functioning of these organs. The so-called cups of the supplements are

to a considerable extent protrusile, just as in *Eurystoma*. The males of *Bolbella* seem to be considerably less common than the females.



*Habitat:* Sand, Bathing Beach, Woods Hole, Mass., U. S. A. Flemming to glycerine jelly. Sublimate to balsam. Resembles *Symplocostoma* Bastian, but differs materially in the structure of the posterior part of the oesophagus, as well as in the absence of eye-spots. The males of *Symplocostoma* have no supplements.

The strongly tapering neck of *Bolbella* results in a head of small size. Notwithstanding its small size, one is immediately struck by its strong resemblance to the head of *Eurystoma*. The following differences, however, are to be noted. The amphid is smaller and of a different form, though here also, as in *Eurystoma*, located on the dorsal side of the lateral lines.

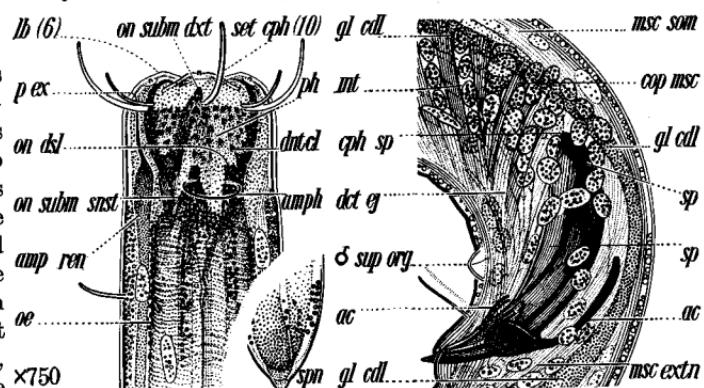
While the pharynx is divided into two more or less distinct chambers, the division line is not marked by transverse rows of denticles. Fig. 90a, p. 309; Fig. 90b.

91. *Thoönchus ferox* n. sp. Striae resolvable with difficulty. The thin, colorless lips are arched over the pharynx as in *Oncholaimus*, but the minute flaps often seen on the tips of the lips of *Oncholaimus* appear to be absent in this species, or at any rate, much reduced. Labial papillae located in the midst of shallow depressions. Amphids faint. Pharynx denticulate. The oesophagus has the same diameter throughout its anterior half, after which it begins slowly to expand and finally is two-thirds as wide as the base of the neck. There is a distinct, bluntly convex-conoid cardia, nearly half as wide as the base of the neck. The intestine, which is separated from the oesophagus by a deep constriction, becomes at once three-fourths as wide as the body. It is rather thin walled and in cross-section presents about six cells. These cells contain scattered, yellowish granules of variable sizes, so arranged as to give rise to an obscure tessellated effect. The largest granules have a diameter nearly equal to the thickness of the body wall. Posterior lip of the anus strongly elevated. Rectum equal in length to the anal body-diameter. Renette elongated, located a little distance behind the cardia. The lateral fields appear to be rather narrow; they are characterized by the presence in them of numerous, rather scattered, yellowish granules, which are more numerous toward the edges of the field, and which, therefore, define the fields more distinctly than is usually the case. At the base of the head, the fields are seen to widen out and terminate in a rounded contour; the margin of this contour marks the position of the amphids. The granules found along the lateral fields appear also in longitudinal rows outside these fields. Thus, on either side of the lateral fields, there is a single distinct row of these granules; on the submedian line, another very distinct assemblage of granules, consisting of several irregular rows. Then comes another scattered faint row; then a ventral or sub-ventral assemblage consisting of several rows. There is thus produced on the neck as well as elsewhere quite a distinct longitudinal

1.4	.8.5	22.	17	63	17	96.9	2.2	—
1.2	1.4	1.6	1.8	—	1.1	—	—	—

1.6	7.5	20.	—	19	—	97.5	2.1	—
1.2	1.4	1.5	1.6	—	1.3	—	—	—

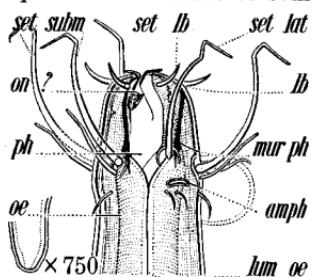
"striping" whose presence is indicated mainly by the arrangement of these minute yellowish granules. The stout tail diminishes rapidly from the posterior lip of the anus, so that at the middle it has a diameter about two-thirds as great as at the base; thence onward it is nearly cylindroid to the rounded terminus. The caudal glands are located in a tandem series considerably in front of the anus; the hindermost being about four times as far from the anus as the terminus. The two anterior glands are close together and are nearly as far in front of the hindermost as this latter is in front of the anus. From the elevated vulva, the vagina extends inward half way across the body. The ovaries reach about one-third the distance back to the vulva in specimens that contain three eggs in the uterus. Eggs elongated, about twice as long as the body is wide and about one-third as wide as long. Each of the two uteri may contain three eggs at one time. Tail of the male more strongly arcuate than that of his mate. Clavate caudal glands about as long as the body is wide and about one-third as wide as long, arranged some distance apart in a tandem series. When the body of the male is closely coiled, the ventral surface toward the posterior end becomes corrugated in a definite way for some distance in front of the anus, suggesting that this area may be systematically innervated and serve the purpose of a ventral series of about two dozen subequidistant supplementary organs. These corrugations are apparently innervated, but no distinct corresponding breaks or openings have been seen in the cuticle. On the ventral side at a distance in front of the anus three times as great as the length of the tail, there is an elevated supplementary organ in the form of a transverse ridge. This occurs in the midst of the corrugations just described,—at least, it appears that the corrugations extend beyond it, although they are not quite so close together or so marked in this region. This supplementary organ begins near the submedian lines and extends across the ventral region. Its internal structure has not been satisfactorily elucidated. It appears probable that the cuticle on the ventral line is interrupted, but even this is not clearly established. This swelling has two to three times the width of the corrugations and occurs at the same position on three different male specimens, so there can be



x750  
no doubt about its being a distinct supplementary structure. Opposite the middle of the spicula, also, there is a pair of subventral supplementary papillae, accompanied by slender subventral setae in the rear. There are a few short delicate setae on the tail, especially on the submedian lines, but also in front of the anus for some distance, where they are longer,—more nearly the size of those on the anterior extremity. About a dozen pairs of copulatory muscles occur in the ventrally submedian region, in a space four to five times as long as the tail. Testes relatively small.

*Habitat:* Open-ocean beach-sand, South California. Bay City, Huntington Beach U. S. A. Fig. 91.

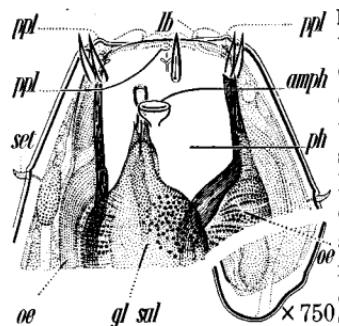
92. *Trilepta guttata* n. sp.  $\frac{.3}{.3} \quad 3.1 \quad 12. \quad \frac{52.4}{.5} \quad \frac{98.4}{.5} > 15.4$  " Cuticle naked except for the cephalic and cervical setae. Lips probably three, and double, rather thick and well-developed. When closed the pharynx appears as if longitudinally ribbed. This appearance, however, may be due to the folding of the rather massive lips, which close together and form a vestibule nearly one-half as long as the remainder of the pharynx. Neck cylindroid. The cylindroid oesophagus near the nerve-ring is one-half, and also finally one-half, as wide as the base of the neck; its musculature is fine and its lining indistinct. There is an indistinct cardia one-third as wide as the base of the neck. The thick-walled intestine, set off by a collum two-fifths as wide as the neck, and presenting a faint lumen, becomes at once two-thirds as wide as the body, and in cross-section is made up of but few cells containing scattered to numerous, small, more or less uniform, yellowish granules. Neither spinneret nor caudal glands have been distinctly seen. The lateral fields are one-fourth as wide as the body. Renette unknown. From the raised anus the tail diminishes rather suddenly, then tapers gently to the middle, where it is about one-half as wide as at the base; thence onward it is cylindroid to the terminus, which is one-third as wide as the base of the tail. The two simple, slender, rather frail and more or less tapering, acute to sub-acute spicula are arcuate or somewhat bent, and are one and one-half times as long as the anal body-diameter. Viewed in profile their proximal ends appear to lie dorsad from the body-axis. The inconspicuous accessory piece lies parallel to the spicula. There are no supplementary organs. The ejaculatory duct is one-third, the vas deferens one-half, as wide as the body. The cylindroid testis is one-half as wide as the body, even at its rounded, blind end. Oblong, fusiform, chromatin masses are to be seen in the sperm cells.



*Habitat:* Sand, below low-tide mark Bathing Beach, Woods Hole, Mass., U. S. A. Sublimate to balsam. Fig. 92.

93. *Anoncholaimus mobilis* n. sp.  $\frac{.8}{1.2} \quad 7.8 \quad 17. \quad \frac{14+60,14}{2.3} \quad \frac{98.}{1.2} > 3.6$  " The cuticle is so very thin that it wrinkles on the inside of the curve when the body bends. Though there are no true wings, there is a faint, clear wing-space about one-eighth as wide as the body. The thin, flat lips resemble those of *Oncholaimus*. There is a vestigial dorsal onchium opposite the bases of the cephalic setae,—faintly shown in the illustration. The neck is cylindroid. In the oesophagus near the base of the pharynx there are scattered yellowish granules. The oesophagus is a little wider at both ends than elsewhere. Near the pharynx it is two-thirds, at the nerve-ring two-fifths, and finally three-fifths, as wide as the corresponding portion of the neck. It has a distinct, refractive, apparently corrugated lining; among its radial muscles there is more or less of yellow pigmented matter, which occurs in straightish radial lines. There are at least two submedian glands in the tissues of the oesophagus, emptying at the pharynx. The thick-walled intestine is set off by a constriction half as wide as the neck, and has a faint ziz-zag lumen; it becomes at once two-thirds as wide as the body, and in cross-section presents about ten to twelve cells. There are numerous yellow granules of variable size in the cells of the intestine, the largest being one-thirtieth as wide as the body; owing to their arrangement there is a faint tessellated effect. From the anus, the posterior lip of which is elevated, the rather prominent rectum extends a distance one and one-fourth times as great as the anal body-diameter.

The convex-conoid tail tapers from the anus to the spinneret, which is armed with submedian setae. The caudal glands lie in front of the anus. There are



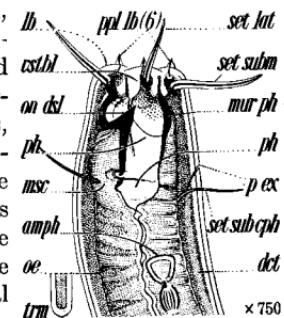
practically no caudal setae. The lateral fields are two-fifths as wide as the body and contain large cellular elements. Anoncholaimus has eight cervical glands, six emptying into the anterior part of the pharynx opposite the bases of the setae and two smaller, a little farther back, on the dorsally sublateral lines. The granular contents of the ducts of these glands, increased slightly in volume, form a prominent feature of the head. These ampullae move back and forth during the various movements of the head. Hence the specific name "mobilis."

The cervical glands lie behind the nerve-ring, since their ducts have been followed backward to behind the nerve-ring. There are also ducts of glands to be seen in the ventrally submedian sectors of the oesophagus. The pyriform renette cell, which lies a very short distance behind the base of the neck, empties through a rather distinct ampulla twice as far back as the base of the pharynx. The narrow nerve-ring is accompanied by large distinct nerve cells arranged in groups. From the rather large and conspicuous, more or less elevated vulva, the large muscular, non-cutinized vagina leads inward to the two straight uteri. The eggs are twice as long as the body is wide, and two and one-half times as long as wide. Judging by their size when empty, the uteri are adapted to receive one egg at a time, possibly two. The posterior ovary is a little the smaller; both are more or less cylindroid, finally tapering, of medium size, and reach three-fourths the distance back to the vulva. The ova in them are arranged single file. An ovum about to enter the oviduct is two to three times as long as the body is wide, and about one-fourth as wide as long.

*Habitat:* Sea-weed, Squibnocket, Martha's Vineyard, Mass., U. S. A.; Bathing Beach, Wood's Hole, Mass., U. S. A.; not common. Examined living, in water. Fig. 93.

94. *Onchulus longicaudatus* n. sp. 2.1 8.3 18. 1<sup>43</sup>,<sup>7</sup> 64. 1.1\*\* Cuticle naked except for the setae on the head; its striae very difficult of resolution. Whether the onchium is hollow and perforated remains uncertain, but seems probable. Neck subcylindroid. The cylindroid oesophagus is at the nerve-ring three-fifths, and finally three-fourths, as wide as the corresponding portion of the neck. Throughout its length, the colorless, coarse musculature is interspersed with granular, glandular tissues, as in *Oncholaimus*, making it seem probable that the pharyngeal outlets are similar, but no duct has been definitely established in the dorsal onchium. There is a cylindroid cardia, about one-third as wide as the base of the neck. Scattered setae having a length equal to the breadth of two annules occur on the tail. There are no caudal glands. The description is derived from a single young specimen in which the vulva was not yet developed. The immature ovaries reached two-thirds the way back to the location of the future vulva.

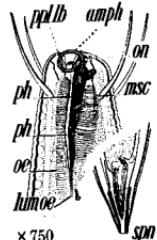
*Habitat:* Soil about the roots of living plants imported from Brazil into the United States. Flemming to glycerine jelly. Fig. 94.



95. *Digitonchus uniformis* n. sp.  $1. . . 6.9 . . . 17. . . 2.51 . . . 95 . . . 1.5 > 2.4$  " Possibly the transverse striae are resolvable into exceedingly minute markings. Cuticle naked except for the cephalic setae. Lips three, possibly very faintly double. *an.* *ph(6)* *ll(3)* *on* *amph* *set(6)* *msc* *dd* *oe* *lumoe* *spn*  $\times 750$  Onchium spear-like, solid. Anteriorly, the neck is convex-conoid. The oesophagus has not been well seen but appears to be more or less cylindroid; its diameter at the base is about half as great as that of the base of the neck. Its lining is subdistinct, its colorless musculature fine in texture. The more or less thick-walled intestine, which has a faint lumen, becomes at once half as wide as the body. Cardiac collum one-third as wide as the base of the neck. From the more or less elevated anus, the prominent, cutinized rectum is about as long as the anal body-diameter. The conoid, arcuate tail tapers from the anus to the rather simple spinneret. The rather broadly saccate caudal glands are packed behind the anus in the anterior third of the tail; they empty by separate ducts. The lateral fields are one-third as wide as the body. Renette unknown. The nerve-ring is accompanied by obscure nerve cells. From the more or less continuous, inconspicuous vulva, the vagina extends inward three-fifths the distance across the body. It is muscular and more or less cutinized. The medium-sized, tapering ovaries reach half way back to the vulva.

*Habitat:* Beach sand, Squibnocket, Martha's Vineyard, Mass., U. S. A. Fleming to glycerine jelly. Fig. 95.

96. *Ypsilon exile* n. sp.  $1. . . 7.4 . . . 2. . . 17. . . 2.1 . . . 2.6 . . . 96 . . . 1.6 > 2.$  " There are a very few cervical setae about half as long as the neck is wide. Three flat, minute, confluent lips bear a circlet of six forward-pointing or somewhat spreading papillae around the mouth opening. Though there are six nerves, one to each papilla, they are not precisely equidistant, but seem to be arranged in three, somewhat distinct pairs. Pharynx relatively strongly cutinized. In optical contour, the anterior end of the onchium is more or less crescent-shaped; this cup-shaped head is fixed obliquely on the strong, straight element that forms the main portion of the dorsal wall of the pharynx. The head of the onchium is yellowish in color. The cylindroid posteriorly, convex-conoid anteriorly. The oesophagus, narrow and more or less cephaloboid in form, ends in a somewhat cylindroid cardiac swelling, two-sevenths as long as the neck, and three-fifths as wide as the base of the neck. At the nerve-ring, the oesophagus is one-third, just in front of the cardiac swelling also one-third, as wide as the corresponding portion of the neck. The lining of the oesophagus is rather prominent. The colorless musculature of the oesophagus is of fine texture; in it, traces of oesophageal glands have been seen. There is a distinct, refractive, cylindroid cardia, two-sevenths as wide as the base of the neck. The intestine, which is thick-walled and has a faint, zig-zag lumen, gradually becomes three-fourths as wide as the body. The cardiac column is one-third as wide as the body. The anus is elevated, and the rectum is one and one-fourth times as long as the anal body-diameter. The intestinal cells are packed with pearly granules, such as are often seen in *Aphelenchus*; the largest of these are one-eighth as wide as the body. These granules tend to be larger posteriorly than anteriorly, and sometimes appear to be polyhedral. The posterior part of the body tapers from in front of the anus, is at first conoid then convex-conoid, and ends in a spinneret one-sixth as wide as the base of

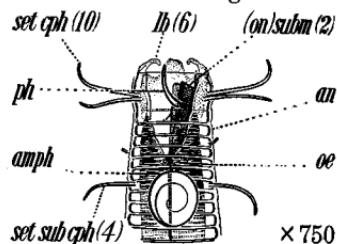


$\times 750$

the tail. The ellipsoidal to broadly saccate caudal glands are packed in a close tandem behind and opposite to the anus in the anterior three-fifths of the tail. Their large, distinct ampullae are two-sevenths as long as the tail. There are one or two slender setae at the middle of the tail, and near the terminus. The lateral fields are about one-fourth as wide as the body. The much elongated renette cell lies about one body-width behind the neck. The frail, strongly arcuate, rather slender, tapering, subacute spicula are cephalated by a constriction on the ventral side in such fashion that the proximal ends appear to be more or less barbed. The simple, frail, very slender, arcuate accessory piece is one-third as long as the spicula and presents a faint apophysis; its proximal end, like those of the spicula, lies dorsad from the body-axis. At first it is parallel to the spicula, then recedes and bends away at an angle of ninety degrees. There are three faint and minute supplementary organs in front of the anus, occupying a space one and one-half times as long as the body-diameter,—little more than innervations. The posterior of these is opposite the distal ends of the spicula. The distance between the first and second is equal to two-thirds, that between the second and third, to one-half, the body-diameter. At the posterior end of the middle fifth of the tail there is a somewhat raised small area supplied with two subventral nerve endings.

**Habitat:** Coarse sand, Beach, Devil's Island, Woods Hole, Mass., U. S. A. The sexual organs are difficult to decipher on account of the granules in the intestine. It does not seem advisable to refer this species to *Acmaeolaimus* Filipjev. The following differences may be noted: (1) The cuticle is coarsely striated. (2) The cephalic setae are in one circlet only. (3) The amphids are not "split." (4) The pharynx is not open. (5) The dorsal organ is "Y"-shaped. Possibly the Filipjevian specimen might have been referred to *Camacolaimus* de Man. Fig. 96, p. 314.

97. *Gonionchus villosus* n. sp. Annules separated by strongly refractive lines. Neck conoid in the anterior half. About twice as far from the anterior extremity as the amphids are four submedian groups of hairs, which are longer than the cephalic setae. These groups consist of three each, arranged one in front of the other, the members being separated by a distance equal to the width of one of the annules. Similar submedian long and slender hairs occur throughout the length of the body and are so numerous as to constitute a very striking feature. The amphids at first appear "O"-shaped; in reality, however, they are spiral. The terminal flaps are hinged to the lips, and the anterior portion of each lip apparently is hinged to the main portion of the wall of the head, which is itself unusually thin. Onchia apparently more or less plate-like. The oesophagus continues to have the same diameter until after it passes through the nerve-ring; thereafter, it expands very little so that finally it is about two-thirds as wide as the base of the neck. There is a distinct conoid cardia, having a base about one-third as wide as the base of the neck. The intestine becomes at once about two-thirds as wide as the body. It is rather thick-walled, and its cross-section would present about four to six cells. The lining of the intestine is refractive, so that the lumen is readily followed; in fact it is a rather striking feature. The cells contain scattered yel-



1.3	10.4	24.	55	76	88.	> 1.4 mm
1.6	2.6	(1)	2.6	2.9	2.	

1.	9.5	22.	N. 59	84.4	
1.2	2.1	(1)	2.2	2.4	1.9 mm

1.	9.5	22.	N. 59	84.4	
1.2	2.1	(1)	2.2	2.4	2.

lowish granules of variable size, arranged irregularly. The posterior lip of the anus is slightly raised. Rectum only about two-thirds as long as the anal body-diameter. The tail is conoid in such fashion that, at a distance from the anus equal to eight times the anal body-diameter, it has a diameter about one-fourth as great as at the anus. The remainder of the tail has been lost from the specimen from which the description was drawn and is therefore of unknown form; hence the dimensions given in the *formula must be interpreted accordingly*. The tail is just as distinctly striated as the body. The lateral fields are about one-third as wide as the body. It is probable that the renette is located at a distance behind the base of the neck about equal to two body-diameters. At this point there is an elongated structure somewhat longer than the body is wide and about one-fifth as wide as it is long, which bears a general resemblance to a renette cell. From the slightly elevated vulva, the vagina extends inward and forward. The tapering ovary ends somewhat in front of the cardia where it is about one-fourth as wide as the corresponding portion of the neck. The eggs are about three times as long as the body is wide, and about one-fourth as wide as long. There is a small posterior rudimentary branch to the sexual organs, extending back from the vulva a distance equal to two to three body-diameters. This has been seen to contain spermatozoa and may function as a spermatheca. The presence of caudal glands remains problematical. Unfortunately, also, in the case of the only male specimen available, the tail is broken, but that portion of it remaining is about two-thirds as long as the neck. It tapers a little more rapidly at first than it does farther back,—in fact, toward the terminus, it must be very nearly cylindroid. It seems probable that caudal glands are present, but there is some doubt about this. There are no special supplements, papillae or setae on the male. The long and slender hairs found on the body occur also on the tail, and are there equally long and slender so far as observed. The proximal ends of the acute, slender spicula present the peculiarity of being separated from the remainder of the spicula by straight shafts, having a length somewhat greater than that of the cephalic portions. The cephalic portion, together with this shaft constitutes about one-fourth of the spiculum; the remaining portion of the spiculum is uniformly arcuate, and tapers regularly to the subacute terminus. The proximal ends of the spicula lie toward the dorsal side of the body. There are inconspicuous accessory pieces arranged parallel to and close by the spicula, and which are about half as long as these latter. The ejaculatory duct is one-third, and the vas deferens about one-half, as wide as the body. Development of the spermatozoa in the two testes presents rather marked contrasts. From the blind end of the anterior testis, lying near the base of the neck, the spermatozoa develop regularly and form spermatocytes half as wide as the body, which develop into spermatozoa with nuclei that stain prominently. The blind end of the posterior testis contains spermatocytes which, for a short distance, resemble those already described, but they do not form large spermatocytes. They nevertheless develop into spermatozoa having the character just described. At a distance in front of the anus about equal to the length of the tail, there are three glands on each side of the body, arranged tandem. These glands are accessory to the male organs. Each is more or less homogeneous anteriorly, and granular posteriorly, the granules not retaining carmine stain, as do the nucleus and the anterior parts. The ducts of these glands lead backward to the cloaca.

*Habitat:* Mud, tide pool, near low tide mark, Portsmouth, New Hampshire, U. S. A. Fig. 97, p. 315.

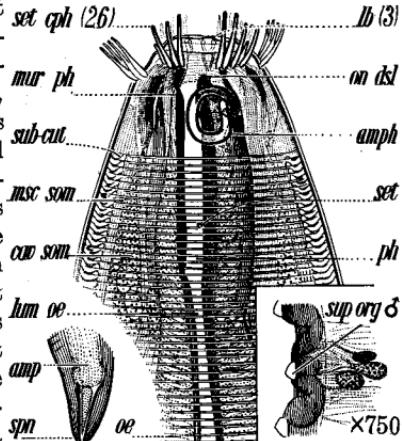
98. *Xanthodora nuda* n. sp. The striae of the yellow, naked cuticle have the appearance of a series of hoops that are considerably wider on the neck, especially toward the head. The anterior half of the neck is convex-conoid, the convexity increasing steadily toward the head. From the point where the

$\frac{.8}{1.2} \dots 6.1 \dots 16.9 \dots 20.49, ^{24}_{23} \dots 95. \dots >2.2$  mm

$2.7 \dots 7.4 \dots 20.6 \dots M^{61} \dots 92.3, ^{24}_{23} >2. \dots 2.6 \dots 3.5 \dots 3.8 \dots 4.5 \dots 2.9$

striae cease on the head, the cuticle diminishes very rapidly in thickness, so that opposite the dorsal tooth, it is not more than one-third as thick as a little farther back; thence onward, it is thin to a point half way between the circlet of

setae and the axis of the mouth opening. At this point, the hard cuticle ceases and there is a very minute, faint groove encircling the lip-region. The lips come together so as to form a vestibule having a width about one-third as great as the diameter of the circlet of setae. The tissues of the lips apparently reach back a little farther than the apex of the dorsal tooth, and their limits are rather easily noted on account of the fact that they attract carmine stain more than the surrounding tissues do. The lip-region appears to be longitudinally striated internally, and probably to consist of about a dozen elements folded together. When the mouth is open and the onchium thrust forward, the labial region is seen to be practically continuous and entire on its anterior margin, from which it follows that any striations appearing when the mouth is closed are due to foldings of the lip-region. When the mouth is open and the lips expanded, the amphids become more nearly circular. When the lips are closed, the vestibule widens out but little in front of the dorsal tooth, whose apex lies in the axis of the vestibule. The pharynx is surrounded by muscles which appertain particularly to it, as is indicated by the fact that they are separated from the oesophagus by a broad but fairly distinct constriction. The oesophagus continues to have the same diameter until near the nerve-ring, where it diminishes somewhat in diameter. Very soon after passing through the nerve-ring, it enlarges, sometimes rather suddenly, to form the elongated posterior three-fifths of the organ. This enlarged part averages to be about  $set\ qph\ (26)$  three-fifths as wide as the corresponding portion of the neck, and contains a massive lining, which, when viewed in optical section, occupies one-fifth of the diameter. This enlarged portion of the oesophagus is divided into three regions by breaks in its radial musculature, of which one region comprises nearly the whole of the anterior half. The other two parts are of subequal size. Though the lining of the oesophagus is quite distinct in the narrow portion, it is considerably less so in the wider portion, and ceases a short distance in front of the posterior end of the oesophagus. Cardiac collar less than one-third as wide as the base of the neck. For a short distance, the intestine is composed of small cells differing from those which make up its main part. These cells stain more strongly with carmine and contain nuclei of relatively larger size. This region probably may be regarded as a sort of cardia. The intestine becomes almost at once two-fifths as wide as the body. Its cross-section would present about eight cells. The cells are packed



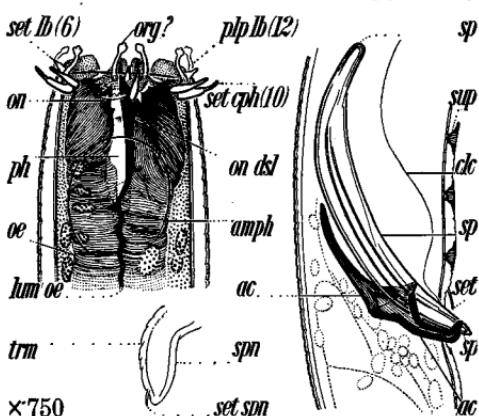
with numerous yellowish granules. In the body cavity at the cardiac collum, there are three ellipsoidal groups of cells, two dorsally submedian and one ventral or nearly so. These groups contain eight to ten nuclei, and one of them is seen to be connected to a distinct, refractive strand, extending forward along the surface of the oesophagus. These groups of cells have their nuclei close together and seem to have a general membrane covering them. In addition to these groups of cells, there are two other granular bodies, ventrally submedian, each containing a single, strongly staining nucleus, and a second body which does not stain so strongly. The structure of these latter is suggestive of that of the ordinary renette cell, but their connections have not been made out. Rectum somewhat longer than the anal body diameter. The three caudal glands are arranged in a close tandem in front of, opposite to and behind the anus. Each is a large cell with a protoplasmic network, in the midst of which the single nucleus is slung. The lateral fields are about one fourth as wide as the body and are composed of two ranges of cells with a space between them, in which lie nuclei belonging to cells of a different group. Renette unknown. From the slightly raised anus, the arcuate tail is conoid to the terminus, which has a diameter about one third to one half as great as that of the base of the tail. From the very slightly elevated vulva, the well cutinized vagina extends fully half way across the body. The ovaries reach half way back to the vulva and contain ten to fifteen ova arranged, for the most part, single file. The moderately thin-shelled eggs are twice as long as the body is wide and one-third as wide as long. They occur in the uteri one at a time. The spermatozoa in the uterus are one-seventh as wide as the body. The conoid, arcuate tail of the male begins to taper from a short distance in front of the anus. The six supplementary organs occupy a distance equal to the length of the tail. The posterior supplement is nearly opposite the posterior thirds of the spicula; the second, third and fourth succeed each other without intervening spaces, in such a way that the third and fourth are pretty nearly opposite the proximal ends of the spicula. The fifth is separated by a greater space from the fourth, and the sixth is about as far from the fifth as the fifth is from the fourth. The fifth and sixth are of smaller size than the others, the inconspicuous sixth being the smallest of all. Their apices are more transparent than the other portions. An unusual feature is the presence of nerve endings between the organs. It is possible that nearer the anus still than any described, there is another inconspicuous organ of somewhat the same character. The strongly arcuate, somewhat acute, yellowish spicula are about twice as long as the anal body-diameter. They appear to be widest in the middle and to taper both ways. The cephalated portion of the spicula are cut off obliquely. The proximal ends lie a little to the dorsal side of the body-axis. The accessory pieces are for the main portion of their length not very conspicuous. Surrounding the distal ends of the spicula, however, there is a rather prominent portion which must be reckoned a portion of the accessory apparatus. Oblique copulatory muscles are present for a distance twice as great as the space occupied by the supplementary organs. The ejaculatory duct is about one-third, and the vas deferens a little more than one-third, as wide as the body. It remains uncertain whether there is one testis or two, but the evidence seems to favor the supposition that there is one only, and that its blind end lies about as far behind the base of the neck as the nerve-ring is in front of it.

*Habitat:* Larat, East Indies. Marine. Fig. 98, p. 317.

99. *Anaxonchium litorium* n. sp.  $\frac{1.6}{2.4} \cdot \frac{7.6}{2.1} \pm \frac{17.1}{2.9} \cdot \frac{52.4}{2.4} \frac{90.1}{19} \frac{3.1}{1.9}$  Cuticle thin, but considerably thicker near the head. Striae resolvable with difficulty into dot-like elements, which are close together on the body, more distant on the head. The striae are altered on the lateral fields so as to give rise to a ladder-like pattern, with the "rungs" very close together. Cephalic setae two-jointed. No pores are seen in the cuticle; nevertheless, they may have been present and escaped notice. The lips are thick and double. In the single male specimen examined, the conical branches of the lips end in minute setae, each about as long as the labial setae, and terminating in a "blob,"—this latter hardly an artefact. Dorsal onchium opposed on the ventral side by several irregularly arranged, small denticles; among which probably two submedian ones dominate. Apparently somewhat similar denticles occur behind and above the dorsal onchium. Amphids peculiar, large, faint. The plain oesophagus, near the nerve-ring is one-half, and finally three-fourths, as wide as the corresponding portion of the neck. Its lining appears corrugated; its colorless musculature is more or less coarse, but there seem to be no indications of the presence of glands, and there is no distinct cardia. The thin-walled intestine, which has a rather faint, though distinctly visible lumen, becomes at once half as wide as the body, and in cross-section would present four to six cells. Cardiac collar one-half as wide as the neck. The cells of the intestine contain scattered yellow granules of variable size, having a diameter about equal to the width of two annules of the cuticle. The tail tapers from the anus, and is at first conoid then cylindroid in the posterior third, where it is about one-fourth as wide as at the anus. A few, rather small, tapering, subacute setae occur on the tail. The lateral fields are about one-third as wide as the body. The non-granular ellipsoidal renette cell lies only a short distance behind the neck, and is three-fourths as long as the body is wide, and one-third as wide as long. The rather pronounced clavate ampulla empties through the distinct pore lying close to its anterior end. The nerve-ring is accompanied by obscure nerve cells. The yellowish spicula are guided by two separate, strong, rather wide, more or less arcuate, somewhat shoe-shaped pieces near the anus, with a single median piece between and behind them. Ejaculatory duct one-fourth, testis two-thirds, as wide as the corresponding portion of the body.

*Habitat:* Marine; Belmar, N. J., U. S. A., below low tide mark in beach sand. Female unknown. *Anaxonchium* bears considerable resemblance to *Cyatholaimus*, but differs, among other ways, in the almost obsolete amphid (?), the reflexed testis, and in the large number of small supplementary organs. Fig. 99.

100a. *Bolbolaimus pellucidus* n. sp. Type species. Naked except for the setae on the head; possibly there are very inconspicuous wings. Lips subdistinct, the region elastic and finely subdivided. Margin of the lip-region serrated by the forward projection of about fifteen papillae (?) with minute bristles outside the serrations. The appearance is as if each papilla is armed with a pair of minute



bristles very difficult to see. Onchium capable of being protruded past the lips. Opposite the onchium is a pseudo-onchium, somewhat smaller, and more distinctly visible in some attitudes of the pharynx than in others. Amphids exceedingly inconspicuous, nearly circular, a little the wider transversely, apparently circular but really consisting of spirals of one wind slightly open behind. At the nerve-ring, the oesophagus is three-fifths, just in front of the cardiac bulb one-half, and finally five-sixths, as wide as the base of the neck. This latter measurement is that of the elongated, ellipsoidal cardiac bulb. The rather prominent, apparently corrugated lining of the oesophagus is distinctly visible.

*set qph (6)* *cst rsthb* *set lb (6)* *on subm* *on dsl* *ph* *msc lbb* *car som* *dt* *spn* *MSR 00* *nd*

	1.9	6.6	12.9	"46.6"	?	> 1.2..
<i>set qph (6)</i>						
<i>on subm</i>	2.3	2.5	2.6	2.8	?	
<i>on dsl</i>						
<i>ph</i>	2.1	7.2	13.7	"46.6"	91.6	> 1.2..
<i>msc lbb</i>	2.4	2.4	2.5	2.5	2.1	
<i>car som</i>						
<i>dt</i>						
<i>spn</i>						
<i>MSR 00</i>						
<i>nd</i>						

The musculature becomes coarse near the cardiac bulb. There is a transverse division of the musculature of the cardiac bulb near the middle. The wall of the intestine is of variable thickness; the lumen is distinct. Gradually the intestine becomes two-thirds to three-fourths as wide as the body; its  $\times 750$  cross-section would present five to six cells. Often the lumen of the intestine presents the appearance of having certain cells bulging inward. Cardiac collar one-sixth as wide as the neck. From the more or less elevated anus, the cutinized rectum extends inward for a distance five-sixths as great as the body-diameter. From the anus, the tail is conoid to the rather blunt terminus. The long, simple spinneret is in its basal part one-third as wide as the base of the tail. The broadly saccate caudal glands form a loose tandem behind the anus in the anterior half of the tail; they empty through separate ducts and ampullae, the latter elongated. The lateral fields are one-third to two-fifths as wide as the body. The ellipsoidal, non-granular renette cell lies close behind the neck, and is two-thirds as long as the body is wide and two-thirds as wide as long. The ampulla is one-third as long as the neck is wide, and three-fourths as wide as long. The nerve-ring is accompanied by obscure nerve cells. From the small, inconspicuous, rather continuous vulva, the small tubular vagina extends inward one-third the distance across the body. Its inner wall is cutinized, so that its rectangular furcation is plainly to be seen. The ellipsoidal eggs are one and one-half times as long as the body is wide and appear to begin segmentation before being deposited. One or two at a time occur in the uteri, which are five times as long as the body is wide. The somewhat narrow, tapering ovaries contain about a dozen ova arranged single file for the most part, but irregularly near the blind end. The faint, acute, tapering, stoutish spicula are colorless and one and one-half times as long as the anal body-diameter. They are so located that their proximal ends appear to be opposite the body-axis. The simple, strong, separate accessory pieces are somewhat slender. They are yellow and quite as conspicuous as the spicula. Their applied parts are two-thirds as long as the spicula, from which they recede a little. Their proximal ends appear to lie dorsad from the body-axis. The six, very small and inconspicuous, equidistant supplementary organs occupy a distance somewhat less than the length of the tail. The last is opposite the proximal parts of the spicula. The spaces between them are about equal to half the body-diameter. They hardly disturb the ventral contour of the body. Possibly there is also one near the anus. They are papillloid and have but slight elevation. The ejaculatory duct is one-half, the vas deferens one-half, and

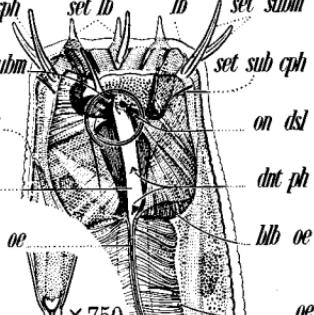
the testes two-thirds, as wide as the corresponding portion of the body, but the testes taper so that at their blind ends they are only one-half as wide as the body. The various regions of the male sexual organs are separated from each other by narrower channels. After synapsis, the spermatozoa grow and become granular.

*Habitat:* Sand, below low tide mark, Belmar, N. J., U. S. A. Sublimate to balsam. Fig. 100a, p. 320.

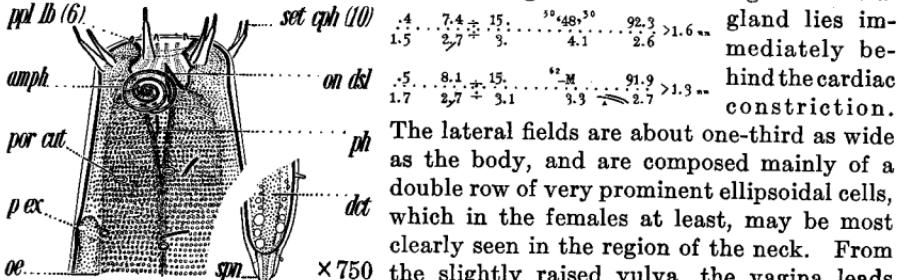
b. *Bolbolaimus punctatus n. sp.*  $\frac{1.8}{2.6} \quad \frac{5.5}{2.8} \quad \frac{19}{3} \quad \frac{34-46-34}{3.3} \quad \frac{93}{2.3} > 1.6$  Striae resolvable into rows of dots, of which about every third row is a trifle coarser, thus indicating the real width of the annules. Labial papillae six, setose, about one-third as long as the cephalic setae. Around the mouth, there are fine, longitudinal striations due to foldings in the vestibule. The punctate walls of the pharynx are well-cutinized. There are two very small ventrally submedian projecting onchia opposite the dorsal onchium. The oesophagus near the nerve-ring is two-fifths, just in front of the cardiac bulb a little more than two-fifths, and finally three-fourths, as wide as the base of the neck. This latter measurement is the diameter of the somewhat elongated cardiac bulb, which is two-sevenths as long as the neck. There is an obscure, elongated, two-parted valve in the cardiac swelling, one-third as wide as the swelling *set qph* *set lb* *lb* *set subm* itself. The cardiac valve is divided into three parts, corresponding to breaks in the musculature, the anterior part inconspicuous, the other two each occupying nearly one-half the length *on subm* *px* of the bulb. The thick-walled intestine becomes at once three-fifths as wide as the body. Its *ph* cross-section would present three to four cells, containing scattered granules of variable size, *lum oe* the largest of which are about one-twenty-fifth as wide as the body. Cardiac collar one-fourth *set sub qph* *on dsl* *dnt ph* *lb oe* *oe* as wide as the base of the neck. From the continuous, inconspicuous anus, the rectum extends inward a distance two-thirds as great as the anal body-diameter. The conoid tail tapers from the anus to the blunt, conoid, symmetrical, unarmed spinneret. The broadly saccate caudal glands lie behind and opposite the anus in the anterior half of the tail. Measured near the neck, the lateral fields are one-fourth as wide as the body. The ellipsoidal, non-granular renette cell, one body-width behind the neck, is one-half as long as the body is wide and five-sixths as wide as long. From the small, inconspicuous, continuous vulva, the rather weak vagina extends inward two-fifths the distance across the body. The elongated eggs are as long as the body is wide and three-fourths as wide as long, and are packed three to five in each uterus at once. The tapering ovaries contain about twenty ova arranged single file.

*Habitat:* Marine sand, Nobsea Beach, Woods Hole, Mass., U. S. A. Flemming to glycerine jelly. Fig. 100b.

101. *Acanthonchus viviparus n. sp.* There are distinct wings, whose presence is indicated by about four to six longitudinal striations, resolvable, at least the outer ones, into rows of dots. The wings extend from near the head to near the tail. Neck conoid. Setae two- (or three-) jointed. The lip-region appears to be divided into twelve parts, or into six parts, each of which is double. The mouth cavity is cyathiform and shallow when the lips are closed and is entered



through a narrow vestibule. The cavity itself is very small, and a good deal wider than it is high when the lips are closed. In fact, when the lips are closed they appear to form a depression on the front of the head, so that their interior margins actually rest on the dorsal tooth and on the base of the pharynx. The pharynx actually continues to twice the depth indicated in the formula, though when the mouth is closed this posterior portion appears to be very similar to the lumen of the oesophagus. The oesophagus swells a little in the anterior third, then diminishes almost imperceptibly, and finally swells toward the posterior extremity where it is two-thirds as wide as the base of the neck. The thick-walled intestine becomes at once two-thirds as wide as the body, and expands so as soon to be three-fourths to four-fifths as wide as the body. Its cross-section would probably present about eight cells. The elongated ventral

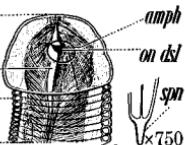


The lateral fields are about one-third as wide as the body, and are composed mainly of a double row of very prominent ellipsoidal cells, which in the females at least, may be most clearly seen in the region of the neck. From

the slightly raised vulva, the vagina leads inward about half way across the body. The uteri are generally about one and one-half times as long as the neck, and contain numerous developing eggs or embryos. The ovaries are reflexed for a distance about twice as great as the body-diameter, and contain a dozen or more ova arranged in several series. This species is viviparous. Tail of the male is very much like that of the female, but more arcuate. Its terminus has a diameter one-fifth as great as the diameter of the base of the tail. The equidistant supplements are of unequal size, those more distant from the anus being much the larger. The first is opposite the proximal ends of the spicula and is very minute. It is visible mainly on account of the refractive nature of the material of which it is composed. The second is about twice as far from the anus as the first and of about the same size. The third, which is three times as far from the anus as the first, is very much larger, having a length half as great as the body-diameter; its internal walls are brown and strongly lined and refractive. It is somewhat curved and passes inward and forward; its proximal portion is slightly cephalated. The fourth of these organs is more than four times as far from the anus as the first, and is more than twice as long as the third, having a length approximately equal to the body-diameter. Its internal walls are strongly cutinized, and it is a very prominent feature, almost as much so as the spicula. Where it passes through the cuticle, its point is curved backward; thence inward, it is somewhat sigmoid, enlarging all the time, so that its proximal portion is about one-fifth as wide as the corresponding portion of the body. The slightly arcuate, rather uniform spicula are somewhat longer than the anal body-diameter. Their proximal ends are not distinctly cephalated. Parallel to the spicula, and extending inward from the prominently raised anus for a distance three-fourths the length of the spicula, are the accessory pieces, whose distal extremities are two to three times as wide as the spicula, but which decrease in size internally. They are considerably more prominent than the spicula. The ejaculatory duct is about half as wide as the body.

*Habitat:* Marine mud, San Pedro, California. Possibly another species exists at Woods Hole, Mass., U. S. A. Sublimate to balsam. Fig. 101, p. 322.

102. *Xenonema obesum n. sp.*  $\frac{1.4}{2.2} \frac{7.6}{2.9} \frac{+ 13.2}{3.8} \frac{66}{7.3} \frac{89.5}{2} > .95$  Striae resolvable with high powers into rows of dots or elongated markings which are altered somewhat on the lateral field, where there is a wing extending from near the base of the neck to the base of the tail. There are setae on all parts of the body, but they do not appear to be very numerous. Pharynx apparently consisting of a cavity whose walls are folded and which is capable of being opened outward. The oesophagus continues to have the same diameter until near the posterior end, where it contracts slightly and then expands to form the pyriform cardiac bulb, four-fifths to five-sixths as wide as the base of the neck. There is no cardia. The intestine at first is only one-fourth as wide as the oesophageal bulb. Its cross-section presents about four or five cells; that those next the oesophagus are physiologically different from those following is shown by the way in which they stain. The intestine soon enlarges so that its maximum diameter is twice as great as that presented near the bulb, but nowhere does the intestine become more than about half as wide as the body. Its cells contain a few yellowish or brownish granules of variable size, the largest of which have a diameter about equal to the distance between two striae of the cuticle, the smallest being not more than one-tenth as wide; otherwise, the cells of the intestine are very transparent so that their nuclei can readily be seen. These latter are of large size and each presents a distinct nucleolus; the average diameter of one of these nuclei is rather more than double the distance between two successive striations. The anus is elevated; the rectum is two and one-half to three times as long as the anal body-diameter. Immediately behind the anus, the tail diminishes abruptly in diameter, and in this region for a short distance near the anus on the ventral surface, the striations of the cuticle are much less conspicuous. The location of the excretory pore and the ventral gland remains uncertain, but it appears possible that the latter lies a short distance in front of the cardiac bulb. The lateral fields are about one-fourth as wide as the body, corresponding approximately in width, at least in the anterior part of the body, with the alterations in the transverse striae which exist along the sides of the body. The tail is conical from a short distance behind the anus. Behind or the anus, the tail diminishes so rapidly in diameter, especially on the ventral side, that it becomes almost at once  $\frac{ph}{ann}$  only about two-thirds as wide as at the anus; thence  $oe$  onward, it is conical. The three caudal glands are located in a tandem series in front of the anus. From the enormously developed vulva, the vagina leads inward and forward at an angle of forty-five degrees with the body-axis a distance equal to the span of eight to ten striae. The walls of the vagina are brownish, thick, and highly refractive. There is a single uterus connected with two short ovaries, each containing three to four ova. This entire system of organs is clustered near the vulva and occupies a distance about five times as great as the average body-diameter. The size and nature of the eggs remains to be discovered. Overhanging the vulva is a flap-like expansion of the cuticle which adds much to the ventral prominence. Tissues of the body-wall are contained also in the cavity of this peculiar expansion of the cuticle. Owing to the peculiar development in this region, the diameter of the body here is more than twice the average body-diameter. In fact



these structures are so very peculiar as to suggest abnormality, but as there is no evidence of any disease or malformation in the single, very transparent specimen examined, it seems best to regard it as the normal form of a very exceptional species.

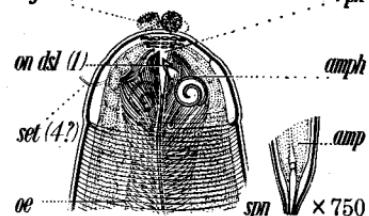
*Habitat:* Salt River, Jamaica, in six inches of water. Fig. 102, p. 323.

103. *Amphispira rotundicephala n. sp.* 3. 1.8 10. 16. Y 88. -> .8\*\* Contour plain, or exceedingly finely crenate. Apparently there are very faint subcephalic setae near the base of the "cuirasse." At the mouth opening of the single specimen examined there are three punctate spherical elements, as shown in the illustration. The significance of these remains problematical; while they may possibly be fixation products, such a supposition is doubtful. Neck conoid. The oesophagus retains the same diameter until it expands to form the flattish-pyriform cardiac bulb, which has a faint valve one-third as wide as itself. There appears to be an almost imperceptible break in the musculature near the middle of the oesophagus, and a corresponding very slight swelling. The thick-walled intestine has a faint lumen and soon becomes one-half as wide as the corresponding?

portion of the body. Its cross-section presents few cells. From the apparently continuous anus the prominent rectum extends a distance equal to the anal body-diameter. The scattered to rather numerous, spherical granules found in the cells of the intestine are of variable size, the largest being one-thirtieth as wide as the body. Tail arcuate, conoid, ending in a spinneret one-third as wide as its base. The broadly truncate caudal glands are located opposite to and behind the anus in the anterior third of the tail. The lateral fields are one-third as wide as the body. What appears to be the renette cell is located about three body-widths behind the neck; it is one-third as long as the body is wide and one-half as wide as long. The location of the excretory pore remains unknown. Nerve-ring oblique. From the location of the rudimentary sexual organs in the single young specimen seen it seems probable that they will develop to be double and symmetrically reflexed.

*Habitat:* Soil, Arlington Farm, opposite the District of Columbia, U. S. A. Flemming to glycerine jelly. This species almost seems out of place in the habitat in which it was discovered, as it is most closely related to marine forms. Fig. 103.

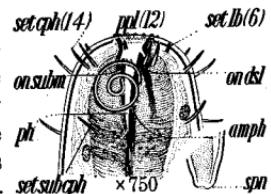
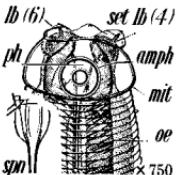
104. *Micromicron cephalatum n. sp.* 2.8 1.2 7.8 13.8 -M<sup>4</sup> 92.9 -> .7\*\* Neck short, cylindroid. There seems little doubt that the mouth cavity is armed with a single, dorsal tooth, which can be placed so closely against the dorsal wall of the pharynx as to be difficult of detection, although the tooth itself is of considerable magnitude. It appears to have an acute apex, located opposite to or a little behind the labial constriction. Oesophagus cylindroid, ending behind in a prolate or pyriform cardiac bulb four-fifths as wide as the base of the neck. Cardia faint. The intestine, which joins the middle of the posterior surface of the cardiac bulb, is at first about one-third as wide as the neck. It widens out gradually so as to become about half as wide as the body, and its cross-section would appear to be composed of about six to eight cells containing yellowish granules of rather uniform size. The lateral fields are about one-fourth as wide as the



body. Just behind the base of the neck, there are cells which stain a little more strongly than the adjacent structures,—possibly renette cells. The tail of the male is conoid to the terminus, where it has a width one-fourth as great as at its base. The caudal glands seem to be located in the base of the tail. The presence of a series of ventral supplementary organs is indicated by corrugations occurring in the cuticle on the ventral surface when the posterior extremity is incurved. This series extends from the anus forward a distance about equal to twice the length of the tail, and must be composed of about twenty elements. Each probably consists of an inconspicuous modification of the ordinary cuticle, in the midst of which there is a nerve ending. In front of the anus on the ventrally submedian lines there are series of setae, each seta being nearly one-third as long as the body is wide. There is one of these setae in front of the anus on each side, a second pair nearly opposite the proximal ends of the spicula, and so on. Similar setae occur on the anterior two-thirds of the tail on the submedian lines. When seen in profile, the spicula appear at the middle to be about one-third as wide as the body. They taper rapidly to the acute distal extremities. The proximal ends are slightly arcuate in a ventral direction. Near the proximal extremities there is a break in the framework on the ventral side. The framework of the spicula is rather frail, considering the size of the spicula themselves. Muscular fibers appear to pass from the inner free end of the accessory piece backward to the ventral surface of the anterior portion of the tail.

*Habitat:* Punta Arenas, Pacific Coast of Costa Rica. The intestine contained a considerable number of diatoms. Sublimate to balsam. Fig. 104.

105. *Mesodorus cylindricollis* n. sp.  $\frac{.8}{1.9} \quad \frac{4.5}{1.7} \quad \frac{7.9}{1.9} \quad \frac{61-M}{1.9} \quad \frac{95.1}{1.7} > 1.8$  " Naked cuticle traversed by exceedingly fine, plain transverse striae. Neck cylindroid. In certain aspects, the amphids appear to consist of one circlet within another, but are in reality true spirals. No doubt the papillae surrounding the mouth opening correspond with folds in the lip-region; these, however, are so very minute as to be difficult of resolution. From the base of the onchium backward, the pharynx is narrow and tapering, and joins the lumen of the oesophagus in an indefinite way at a point distant from the anterior extremity nearly equal to the diameter of the front of the head. From behind the pharyngeal swelling, the oesophagus continues with about the same diameter until it expands to form the rather obscurely pyriform cardiac bulb, which is fully three-fourths as wide as the base of the neck, and contains a relatively large  $setaph(14)$   $ph(12)$   $setlb(6)$  though rather simple valvular apparatus, having a diameter half as great as that of the bulb itself. This valve is about twice as long as wide. The relatively narrow intestine joins the middle of the posterior surface of the  $onsubm$   $ondsl$  cardiac bulb and soon enlarges so as to be two-fifths as wide as the body. There is no distinct cardia. In cross-section, the intestine presents six to eight cells. The lateral fields are about one-fourth as wide as the body. Nothing is known concerning the renette or the excretory pore. The nerve-ring surrounds the oesophagus squarely. The tail of the male is strongly arcuate and conoid from the prominently raised anus. The terminus is blunt and bears a simple spinneret. The caudal glands are packed together in the anterior third of the tail, extending a little in front of the

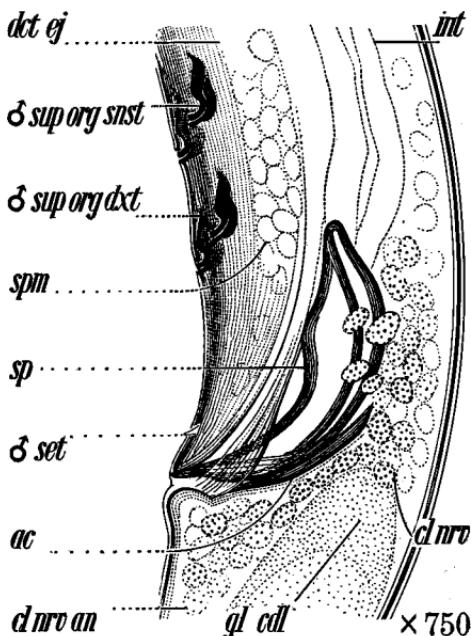


$\times 750$

anus. The twenty-five supplements are rather simple and when the body is curved, take on the form of semi-cylindroid, transverse elevations, the distance between them increasing anteriorly. There are two opposite the spicula and a third a short distance in front of the proximal ends of the spicula; and then for a distance equal to four times the length of the tail, the organs are separated by spaces not greater than their own width. Thence forward, the organs are separated by wider spaces, and occasionally one of the series appears to be missing. The two anterior ones are separated by a distance about twice as great as the width of one of the organs. The entire series occupies a distance about eight times as long as the tail. No special papillae or setae have been seen on the tail end, either in front of the anus or behind it. The proximal ends of the strongly arcuate, slender-looking spicula appear to lie nearly opposite the body-axis. Apparently connecting the cephalic expansions with the anus are slightly curved, refractive lines, indicating that the spicula may be broader than would appear from an examination of only the more striking portions of the framework. Accessories parallel to, and two-fifths as long as the spicula. Ejaculatory duct one-third as wide as the body. The blind end of the testis is about half as wide as the body.

*Habitat:* Mud, tide pool, Portsmouth, N. H., U. S. A., near low tide mark. This genus resembles Onyx. Fig. 105, p. 325.

106. *Polysigma uniforme* n. sp. Cuticle, if striated at all, very finely so. Body naked except for the setae on the head. Lips minute, more or less confluent, relatively thick, six and double, or possibly twelve. Near the nerve-ring and just in front of the cardiac bulb, the oesophagus is one-half, and finally three-fourths, as wide as the corresponding portion of the neck, this latter figure being the measurement of the pyriform cardiac bulb. The refractive lining is one-twentieth as wide as the oesophagus. In the posterior half of the oesoph-



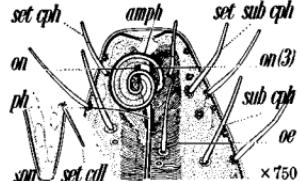
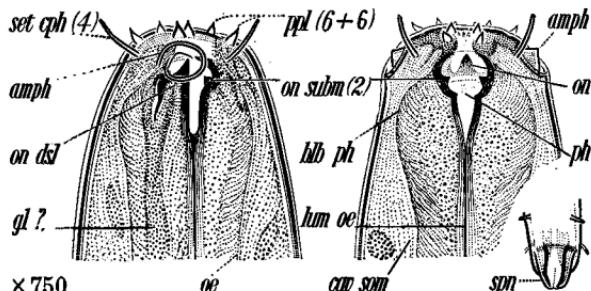
.8	4.5	8.1	12 <sup>1</sup> •63 <sup>13</sup>	97.	1.93	—
1.2	1.2	1.2	1.5	1.1		
.7	4.	6.8	6 <sup>1</sup> •2	97.	3.17	—
1.	1.3	1.3	1.4	1.4		

agus, there are pigment granules in the fine-textured musculature. The two elongated masses of brown pigment granules begin suddenly at the middle of the cardiac bulb and end suddenly near the middle of the neck. There are quite prominent, pigmented submedian glands in the oesophagus, but apparently no dorsal one. The thick-walled intestine, which has a faint lumen, becomes at once half as wide as the body, and in cross-section would present three to four cells. Very minute, but distinct, yellowish granules of uniform size are scattered in the intestinal cells. The cardiac collar is two-fifths as wide as the neck. The medium-sized nerve-ring is accompanied by distinct nerve cells, not very definitely grouped. From the more or less elevated vulva, the fairly-well cutinized vagina extends inward half

way across the body. The eggs are probably about three times as long as the body is wide. The broad, tapering ovaries, which contain about ten ova arranged mostly in single file,—but irregularly near the blind end,—reach about half way back to the vulva. The tail of the male is conoid to the spinneret, which is nearly one-third as wide as the base of the tail itself. The slightly yellowish, rather strong, subsleender, rather acute spicula appear to have their slightly expanded proximal extremities nearly opposite the body-axis. There are seventy-six yellowish, refractive supplementary organs in two subventral rows of thirty-eight each. They are subequidistant, but somewhat wider apart anteriorly. They appear to be more or less protrusile. Ejaculatory duct one-third to two-fifths, the testis one-half, as wide as the body. The testis is cylindroid, but tapers near its blind end.

*Habitat:* Marine mud, twenty-five fathoms deep, Woods Hole, Mass., U. S. A. Fig. 106a, p. 326; Fig. 106b.

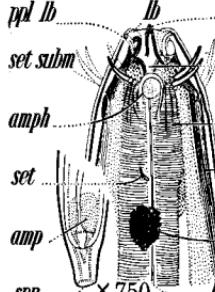
107. *Alaimonema multicinctum* n. sp. 1.5 : 2.7 : 5.7 : 11.4 : 95.3 2.1.. Striae over 1500 to the millimeter, resolvable with difficulty into very exceedingly fine dot-like elements. Cephalic and subcephalic setae sixteen, in four sets of four. Cervical setae scattered, the first four to eight larger than the cephalic setae, the others smaller. Somatic setae scattered, inconspicuous, about one-sixth as long as the body is wide. In two series on the borders of the lateral fields, every twenty to thirty annules throughout the nema, there are round, pore-like markings, twice as wide as the annules. The two rows of pores opposite the lateral fields are removed from each other by a distance about equal to three-fifths the body-diameter. There are no lips. The simple, more or less triquetrous pharynx is so small as to be very easily overlooked. The three very small onchia are more or less equal in size. Their forward-pointing, acute apices are about opposite the anterior borders of the amphids. The oesophagus is at first three-fifths, near the nerve-ring and in front of the cardiac bulb two-sevenths, and finally three-fourths, as wide as the corresponding portion of the neck. The pyriform cardiac bulb contains a more or less spheroidal, simple valve, two-sevenths as wide as the bulb itself. The oesophagus has a subdistinct, narrow lining, and a fine musculature. The intestine, which has a more or less thick wall and a faint lumen, soon becomes half as wide as the body. In cross-section it presents but few cells. The cardiac collum is one-fourth as wide as the base of the neck. The widest of the variable, colorless granules found scattered in the intestinal cells are twice as wide as one of the annules. The longitudinal fields are three-fifths as wide as the body. The tail is conoid from the rather prominently raised anus. The large, rather frail, tapering, somewhat blunt spicula, at their widest parts, near the proximal ends, are one-fourth as wide as the corresponding portion of the body. There is a rather frail, slender accessory piece. The elevated, "campanulate," subequidistant supplementary organs begin opposite the proximal parts of the spicula and are stationed at a



distance from each other varying from one-sixth of one, to one, entire body-diameter. The organs are nearly as high as they are wide, and are more or less asymmetrical. Each is connected with an internal, refractive piece, a little farther forward. They somewhat resemble the well-developed supplementary organs of Chromadora. The ejaculatory duct is one-half, the vas deferens three-fifths, as wide as the body. A considerable portion of the male sexual organs is filled with spherical granular spermatocytes, one-third as wide as the body, and having a distinct ectosarc.

*Habitat:* Beach sand, Bathing Beach, Woods Hole, Mass., U. S. A. Flemming to water. Fig. 107, p. 327.

108. *Cophonchus ocellatus n. sp.* .6 10.5 26. -H<sup>-45</sup> 95. > 2.6.. Transverse striae exceedingly minute; the cuticle is also longitudinally striated. The some-  
 pp1 lb on what cylindroid neck is almost imperceptibly convex-  
 set subm on the head. A few short setae occur here and there on  
 amph the neck. There appear to be three somewhat confluent  
 set oe lips with papillae on their outer margins, probably to  
 amp msc the number of six. There are two dark-brown dorsally  
 spn oc submedian eye-spots and opposite them in the ventral  
 lum oe portion of the oesophagus a linear collection of pig-  
 mented granules, from which there also extends backward  
 throughout the oesophagus in groups of a score or more.  
 Spear-like onchium very slightly sigmoid. It is probable that the pharynx  
 extends back to opposite the row of cephalic setae. The cuticle on the anterior  
 surface of the head, as far back as the cephalic setae or a little farther, reminds  
 one of the covering on the head in *Thoracostoma*, but the thickening is less pro-  
 nounced, and the cuticle here is not materially different in color or texture from  
 that elsewhere on the body. Where the cuticle reaches its maximum thickness,  
 near the lips, it is three to four times as thick as elsewhere on the body. From  
 this point backward to near the base of the head, it gradually grows thinner.  
 The oesophagus continues to have the same diameter until after it passes through  
 the nerve-ring; there it begins to enlarge, so that finally it is two-fifths as wide  
 as the base of the neck. The intestine, set off by a deep constriction, becomes  
 at once about two-thirds as wide as the body. Its cross-section would present  
 four to six cells packed with minute granules. The conoid cardia is one-fourth  
 as wide as the corresponding portion of the body. The renette cell is about  
 half as wide as the body, and is located on the ventral side just in front of the  
 cardia; its pyriform ampulla is one-fifth as wide as the corresponding portion of  
 the neck. The lateral fields appear to be about one-third as wide as the body,  
 and to contain numerous, rather small, scattered nuclei. The nerve-ring sur-  
 rounds the oesophagus squarely. Tail of the male conoid in the anterior four-  
 fifths; thence cylindroid for a short distance to the almost imperceptibly swollen  
 terminus. The caudal glands are apparently located opposite to and a little  
 behind the anus, and present the peculiarity that one of them, the one on the  
 ventral side, has a separate duct leading to the separate smaller ampulla in the  
 slightly enlarged spinneret, while the other two have their ducts parallel and  
 close together and appear to join in a single, much larger ampulla opposite the  
 smaller one. From these ampullae, minute ducts lead backward to the pore  
 of the spinneret, which presents a minute, conoid depression on the terminus.  
 Supplementary organ tubular, of about the same diameter as the spicula, extend-

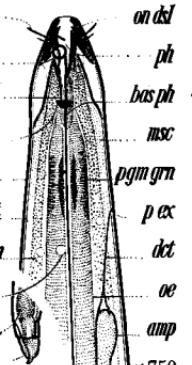


ing first inward, then directly forward. It is about one-third as long as the corresponding body-diameter. Its outlet is opposite the middle of the spicula. There appear to be some obscure papillae on the tail, evidenced by almost imperceptible ventral elevations. Mention may be made of one of these near the beginning of the middle third, and another near the beginning of the posterior third. Spicula slender, uniform, acute, one and one-half times as long as the tail, and five to six times as long as the anal body-diameter. Their proximal ends are cephalated by expansion. They are accompanied, both in front and behind, at their distal extremities, by accessory pieces two-thirds as long as the anal body-diameter. The ejaculatory duct is one-fourth as wide as the body, and extends forward to near the middle of the body, where it joins the testes.

*Habitat:* Shoal in Kingston Harbor, Jamaica, in about one foot of water. This genus bears a very considerable resemblance to *Digitonchus*. Fig. 108, p. 328.

.4	12.8	27.	Y	90.4	> 1.9**
.7	2.6	2.9	2.8	2.1	

109. *Isonemella acuta* n. sp. Body-wall thick and muscular; in the middle of the single specimen seen it takes up about three-fifths of the radius. There are a few exceedingly minute setae to be seen on the tail; otherwise than these, and those shown in the illustration, no others are known. There appear to be three lips, but they are so small and so thoroughly amalgamated that it is very difficult to decide on their structure, and it is possible that there is no division of the margin of the mouth into lips. The mouth opening is nearly as wide as the front end of the head. Between the thin lips there is a very short vestibule, whose limits are marked by the presence of an internal refractive structure on the inner wall of the pharynx very near the margin of the lips. It is impossible to say from the observations so far made whether this refractive marking is a circular affair or whether it is dis-  
continuous and represents special thickenings on the inner surface of the three components of the lip-region. The result of this thickening is a sudden, but very slight narrowing of the vestibule. The very short vestibule, therefore, begins nearly as wide as the front of the head, widens out posteriorly and then soon suddenly narrows to the beginning of the pharynx proper. At its base this latter tapers to join the lumen of the oesophagus. At first sight it appears that, with the exception of the above-mentioned, excessively minute, cutinized processes at the base of the vestibule, the pharynx does not present any feature suggestive of a particular armature, but there is nevertheless a minute, forward-pointing ventral (?) onchium of small size. The walls of the pharynx, though distinctly outlined by the refractive nature of the cuticle, are very thin throughout. The lip-region stains more strongly than any of the succeeding tissues of the head, or of the anterior part of the neck. All that portion of the lip-region in front of the middle of the pharynx takes part in this staining, and the posterior contour of the stained portion extends outward and backward from the front part of the pharynx. Behind this stained portion, indicated in the illustration, there are two elongated "cavities," beginning opposite the middle of the pharynx and ending a little behind the eye-spots, one dorsal and one ventral, and the outer contour of the head opposite these "cavities" is very slightly elevated, in the single specimen so far examined. When viewed in profile these "cavities" have a size and contour



x 750

somewhat similar to that of the pharynx. The amphids, difficult to observe, have a somewhat elongated, inward, refractive extension, as shown in the illustration. Eye-spots colorless or slightly yellow. There are rather inconspicuous collections of golden brown pigment granules in the anterior portion of the oesophagus. This latter continues with much the same diameter for some distance, but gradually enlarges. After it passes through the nerve-ring it is two-fifths as wide as the corresponding portion of the neck, and it finally becomes three-fifths as wide as the base of the neck. Its radial musculature is very strongly marked in the posterior half, reminding one to some extent of the oesophagus in *Bolbella*. The nerve cells both before and behind the nerve-ring are an unusually prominent feature. A little more than half way from the head to the nerve-ring the foremost of these cells occur as two lateral ellipsoidal granular cells half as wide as long, and having a length one-third as great as the corresponding width of the neck. Almost on a level with these is a ventral cell, and immediately behind them are other lateral cells of somewhat smaller size, and thence onward the neck is packed with cells of the same character, which gradually become globular and continue behind the nerve-ring and cease about half way between the nerve-ring and the cardia. There is a collection of similar cells in front of and behind the anus. The cardia is convex-conoid and about one-third as wide as the corresponding portion of the body. The intestine becomes at once about two- to three-fifths as wide as the body. The anus is almost continuous, though the posterior lip is very slightly raised. The refractive, narrow rectum is about one and one-half times as long as the anal body-diameter. The tail begins to taper from a little in front of the anus, and tapers at much the same rate behind the anus, in such a fashion that at its middle the diameter is about one-third as great as at its base; thence onward, it tapers but little and ends in a terminus about one-fourth as wide as its base. Caudal glands appear to be located in the base of the tail. The renette cell is located just behind the base of the neck. The lateral fields appear to be about one-half as wide as the body, and are characterized by a succession of groups of cells, which are larger than usually seen in these regions. These groups contain dozens of nuclei packed rather closely together. The groups do not seem to be very regularly arranged, but succeed each other with intervals between them that are shorter than the length of the groups. The groups are of rather uneven size, and are most conspicuous between the neck and the anus.

*Habitat:* Larat, East Indies. Marine. Fig. 109, p. 329.

.7      5.6      9.       $\frac{19}{(9)} - 70.$       92.7  
 $\frac{1.3}{1.3} / \frac{1.5}{1.5} \quad \frac{1.7}{1.7} \quad 1.8 \quad 1.2 > 1.6$  "

110. *Synonema brasiliense* n. sp. Cuticle naked except for the setae at the anterior end. Mouth depressed. Lips subdistinct, flat, rather thin, fairly developed, flap-like; lip-region apparently twelve-ribbed, closing nearly together over the rather small pharynx, which may be reckoned to extend at least a short distance behind the base of the dorsal onchium. The oesophagus near the nerve-ring is one-half, just in front of the cardiac bulb one-half, and finally three-fourths, as wide as the base of the neck. This latter measurement represents the diameter of the valveless, pyriform cardiac bulb. The musculature of the oesophagus is colorless, with no indication of the presence of glands. There is a cylindroid cardia one-third to two-fifths as wide as the base of the neck, and two-thirds as long as the body is wide. The thick-walled intestine, which has a distinct, refractive lining, becomes at once three-fourths as wide as the body, and in cross-section would present about four cells. Cardiac collum one-half as wide as the neck. From the more or less depressed anus, the

prominent cutinized rectum extends inward a distance equal to the anal body-diameter. Anal muscles are dimly to be seen. The intestinal cells have conspicuous nuclei, and as there is an almost entire absence of granules, the intestine is very transparent. Tail arcuate, conoid. The three saccate caudal glands form a close tandem in the anterior half of the tail; they empty through separate ducts and ampullae. No caudal setae are to be seen. The lateral fields have not been clearly seen; they are probably one-third as wide as the body and composed mainly of two rows of cells. The granular renette cell is three times as long as the body is wide and one-sixth as wide as long. It is placed from two to six body-widths behind the neck, and seems to be composed of about six ellipsoidal, granular cells, arranged more or less in pairs. The excretory pore is two-fifths the way back to the nerve-ring; there is no ampulla. The nerve-ring is accompanied by distinct nerve cells arranged in groups. The following description of the sexual organs is derived from an immature specimen: The tubular, muscular, more or less cutinized vagina extends obliquely forward two-thirds the distance across the body, where it joins the straight uterus, which is about twice as long as the body is wide. Ova prolate; the maturest six to eight being arranged single file, the others irregularly,—about thirty in all. Ovary medium-sized and tapering. Male unknown.

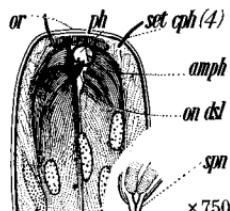
*Habitat:* Algae, near lighthouse, Bahia, Brazil. Sublimate to balsam. The multicellular renette is highly peculiar. Fig. 110.

111. *Anticyclus exilis* n. sp. Cephalic setae sixteen, subcephalic four; cuticle otherwise naked. The rather thin lips, apparently six in number, arch together over the pharynx, somewhat as in *Oncholaimus*. According to the state of the

muscular contraction in the lips, the head is slightly convex on the front surface, or slightly concave. Margins of the amphids strongly refractive, so that their contours are exceedingly distinct. At first, the oesophagus has a diameter

.5	4.1	8.2	$^{20}-43^2$	85.	> 2.2--
1.3	1.3	1.4	2.3	1.1	

fully two-thirds as great as that of the corresponding portion of the neck, and it retains this diameter until after it passes through the nerve-ring; about half way between the nerve-ring and the intestine, it begins to expand, and continues to do so very gradually, so that finally it is about three-fourths as wide as the base of the neck. The anterior cells of the intestine are more transparent and otherwise different in appearance from those which succeed, and it not infrequently happens that they present a strong resemblance to the oesophagus, so that the real position of the cardiac constriction is likely to be mistaken. The intestine is at first about two-thirds as wide as the body. It soon, however, becomes three-fourths to four-fifths as wide as the body, and is composed of rather massive cells, so that the lumen is narrow. Its cross-section probably presents about six cells. These contain numerous granules, rather uniform in size and so arranged as to give rise to an indistinct tessellation. From the inconspicuous anus, the rectum, which has about the same length as the anal body-diameter, extends inward and forward. The lateral fields are one-third as wide as the body. Renette unknown; it is possible that the renette cell is unusually small and located near the cardiac constriction. The tail of the female is supposed to be like that of the male described below, but there is



uncertainty on this point, as all the female specimens so far examined have lacked the posterior portion of the tail;—the portion present has the same form as the corresponding portion of the tail of the male. From the inconspicuous vulva, the vagina leads inward and probably slightly forward. The eggs are about three to four times as long as the body is wide and about one-fourth as wide as long. The tail of the male is conoid in the anterior fourth in such fashion that at the beginning of the second fourth, its diameter is about one-third as great as at the anus; thence onward, it tapers much less rapidly, and in the posterior half hardly tapers at all, the diameter for a considerable distance in front of the terminus being no greater than that of the thickness of the body-wall. There is present behind the anus a collection of cells which bear some resemblance to caudal glands, but whether they really are caudal glands and empty through a spinneret at the terminus remains uncertain. The seventeen equidistant supplementary organs are rounded, low, conoid papillae separated by distances about equal to their own diameters, and occupy a distance from two to three times as great as the corresponding body-diameter. These organs appear to be innervated, but they at times closely resemble mere transverse corrugations of the cuticle. Behind the anus, at least when the tail is incurved, there are folds in the cuticle that present a very similar appearance to those just described as supplementary organs, occurring in front of the anus; these are confined to the wide and muscular portion of the tail, and do not extend, as a rule, as far backward as the corresponding appearances in front of the anus extend forward.

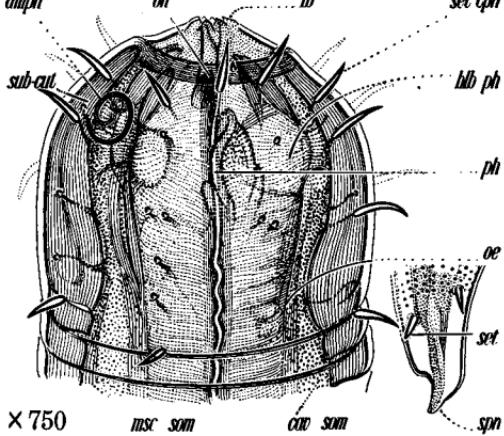
*set subm* Spicula somewhat longer than the anal body-diameter,  
*set ant subm* more strongly arcuate toward their proximal extremities  
*on* than near the anus. They extend about two-thirds the  
*ph* distance across the body and then curve around toward  
*subcph* the body-axis. There extend from the proximal ends  
*amph* toward the anus nearly straight refractive elements that  
*oe* may possibly indicate that the spicula are much wider  
*spn* in the middle than at either extremity. The spicula are  
*lum oe* accompanied by accessory pieces which extend inward  
 from the anus pretty nearly at right angles and end near  
 the body-axis. The ejaculatory duct is two-fifths as wide as the body. Posterior testis much the smaller.

*Habitat:* Bath Tub Springs, Jamaica, near Salt River. These are salt springs having about body temperature. Fig. 111.

112. *Croconema cinctum* n. sp.  $\frac{1.6}{2.3} - \frac{5.3}{2.6} - \frac{10.1}{2.6} - \frac{11.61.9}{3.6} - \frac{95.9}{1.8} > 2.4 ..$  Cuticle thick transparent, yellow, composed of about 500 annules imparting to the contour of the body throughout a distinctly crenate appearance, and bearing numerous short, stiff, slightly curved bristles, having a length somewhat greater than its own thickness. The cuticle of the head seems to consist of a single, somewhat hemispherical helmet-like piece. In all, there must be at least six irregular longitudinal rows of setae on the "helmet," but it seems impossible to pick out any single circlet of these setae that particularly merit the term cephalic setae. The spreading setae on the neck curve backward. Both here and toward the tail end, these setae are shorter than near the middle of the body where they are tapering, acute, nearly twice as long as the cuticle is thick and have a base one-fourth as wide as the distance between two successive annules of the cuticle. When the mouth is closed, the tips of the lips are bunched at the middle of the front of the head. There appear to be about twelve of these tips. The pharynx

is about one-eighth as wide as the base of the head and is fairly well filled by the apices of the teeth. Two of these onchia (?) have been distinctly seen, a dorsal one which extends to the base of the lips and has a subacute, conical, refractive apex, and whose base is about one-eighth as wide as the corresponding diameter of the head, and a larger submedian one with a conical, refractive apex, and having a base somewhat wider than that of the dorsal one. This latter has a length somewhat greater than the width of the amphids, and its base lies near the center of the head and rather behind the middle of the pharyngeal bulb. The pharynx is strongly *amph* cutinized, and manifestly extends backward through the greater part of the region surrounded by the "helmet." The rather obscure change from pharynx to oesophagus takes place suddenly along two loci which extend obliquely outward and forward from the lumen of the oesophagus. The oesophagus retains the same diameter until after it passes through the nerve-ring; soon after that it begins to enlarge gradually in diameter, so that finally it is three-fourths as wide as the base of the neck. The intestine is at first very narrow, about one-fifth as wide as the body, and for a short distance has a different structure from the portion that follows. Possibly this first part should be considered a cardia. In this cardiac portion, there are no cells containing granules. Immediately behind the "cardiac" portion, the intestine is half as wide as the body and would present eight to ten cells in cross-section. The cells contain brownish granules of uniform size, so arranged as to give rise to a distinct tessellation. The intestine is moderately thick-walled. From the raised anus, the strongly cutinized rectum, which is somewhat longer than the anal body-diameter, extends inward and then almost directly forward, so that it joins the intestine considerably ventrad from the body-axis. The tail is arcuate-conoid, and presents the peculiarity that the annules of the cuticle cease in front of the middle; thence onward, the cuticle is considerably thicker and is traversed by radial markings, which pass outward and a little backward and give to the surface of this portion of the tail a distinctly punctate appearance, which, however, is less marked than the similar appearance on the head. The caudal glands are arranged tandem immediately in front of the anus, extending from the end of the intestine proper to a little behind the anus. There is apparently a small renette cell immediately behind the oesophagus. The nerve-ring surrounds the oesophagus obliquely. From the slightly elevated, rather inconspicuous vulva the vagina extends nearly half way across the body. The ovaries reach more than half way back to the vulva, and contain a dozen to twenty developing ova, arranged irregularly.

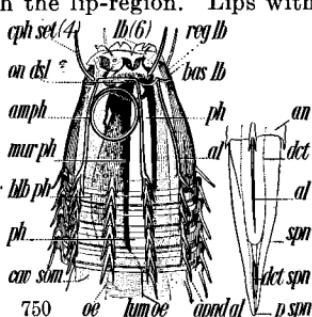
*Habitat:* Sand and marine algae, in surf, shore of small island off Port Royal, Jamaica. Fig. 112.



113. *Nudora lineata* n. sp. Cuticle two to three times as thick at the head end as elsewhere; more or less like that of *Desmodora*, but with longitudinal striae somewhat like those of *Monoposthia*. The annules increase in width, and are more accentuated, toward the head. Each of the ten longitudinal wings appears to comprise a series of "V"-like markings on the anterior portion of the body, which are reversed on the posterior. Following the serrate contour of the head it is discovered that this reversal takes place not far behind the neck. There seem to be twelve, subdistinct, more or less conoid, minute, blunt labial elements. The labial papillae are more or less setose, one seta between each pair of labial elements. Limits of the pharynx rendered very definite on account of the elongated pharyngeal swelling. Anterior part of the pharynx cyathiform, posterior triquetrous-tubular. Posterior part of the neck cylinder(6) setib(6) setgh(4)  $\frac{2.3}{1.8} - \frac{7.2}{2.9} - \frac{13.}{2.7} - \frac{-89}{2.7} - \frac{93^{(1)}}{1.5^{(v)}} > 1.76 ..$  droid, anterior convex-conoid. The amphids appear to be cylindroid depressions about as deep as the cuticle is thick. In front of the wide annule bearing the amphids, there is another about as wide as those on the neck, which, however, does not thin out on its anterior edge, as do the regular annules. Following this annule comes the lip-region, which in contra-distinction takes a carmine stain. The elongated, pharyngeal bulb, one-half as wide as the neck, is set off from the remainder of the oesophagus by a constriction. The oesophagus is at first one-third, near the nerve-ring one-third, preceding the cardiac bulb one-third, and finally five-sixths, as wide as the corresponding portion of the neck. The cardiac bulb is cylindroid and makes up one-third of the oesophagus. Its musculature is coarse and colorless. The oesophageal tube expands suddenly to form the cardiac bulb, which is divided into two main parts by a break in its musculature. There are smaller breaks, also, near each end. The lining of the oesophagus appears to occupy one-sixth of its width. The rather thin-walled, narrow intestine becomes at once one-fifth as wide as the body. At the cardiac constriction the intestine joins the center of the posterior surface of the oesophageal bulb. Minute granules are scattered in the intestinal cells. The conoid tail, on which there are obscure longitudinal striae, tapers from the anus to the non-striated, simple, symmetrical spinneret. The broadly saccate caudal glands form a close tandem in the anterior half of the tail. Slender caudal setae occur on the tail end, both preanal and postanal, three to four ventrally submedian, and three to four dorsally submedian, just in front of as well as behind the anus, about one and one-half body-widths apart, and shorter on the male than on the female. The rather broad ovary tapers near its blind end. The flattish ova are arranged for the most part single file. The spicula are frail, very slender, mostly uniform, but finally tapering and acute. Their proximal ends appear to lie about opposite the body-axis. The yellow accessory pieces are somewhat longer than the spicula. They are arcuate and stoutish, and their proximal ends appear to lie somewhat dorsad from the body-axis. There are two obscure supplementary organs, the anterior of which is located at a distance in front of the anus equal to one and one-half body-diameters, the posterior being opposite the middle of the spicula. These consist of slight elevations further accentuated by small alterations in about three consecutive annules.

*Habitat:* Sand, below low tide mark, Hull, Massachusetts, U. S. A. Fig. 113.

114. *Rhinema retrosum* n. sp. Cuticle thick, interrupted at twelve places so as to form exceedingly distinct longitudinal wings, which when brought into focus give a somewhat "fishbone"-like effect. The annules and their modifications give a retrorse appearance to the entire cuticle, but in reality the striae are retrorse in the posterior part of the body, and the reverse in the anterior part. Some of the cuticular markings cease in front of the anus on the male and are not continued on the tail, so that the tail has a somewhat unusual appearance. There are submedian longitudinal striations extending to the middle of the tail. Neck for the most part cylindroid. Opposite the dorsal tooth there is a distinct junction with the cuticle of the lip-region indicated by an almost imperceptible constriction encircling the head. In front of this constriction there are two others, close together, connected with the lip-region. Lips with outward-curved apertures, surrounding a cyathiform cavity having a diameter about three-fifths as great as that of the front of the head, and a depth not more than half that amount. Into the midst of this shallow cavity the dorsal onchium projects. Sometimes, however, this cavity is deeper, namely, when the dorsal tooth is withdrawn to a greater extent. Then the cavity is about half as wide as the head, and about as deep as wide, and the lip-region is manifestly more closely folded. Onchium faintly spear-like. Muscles of the pharynx of an entirely different character from those of the oesophagus, which begins as a tube about half as wide as the corresponding portion of the neck, and continues to have this diameter until after it passes through the nerve-ring, thereafter expanding gradually, but finally somewhat faster, so that at the end it becomes two-thirds as wide as the base of the neck. The posterior swelling is of such a character that one might speak of it as a bulb. There is no very distinct cardia. Renette unknown. Vagina reaching half way across the body. Mature ova at the flexure, ready to enter the uterus, are one and one-half times as long as the body is wide and about half as wide as long, with nuclei one-third as broad as themselves. The narrow ovaries are more or less cylindroid and contain comparatively few ova, apparently arranged more or less single file. Anus of the male distinctly raised. Tail arcuate and conoid to the naked terminus, which has a length about equal to that of five of the preceding annules. Position of the caudal glands doubtful, but it seems quite possible that they are located in the base of the tail. There are a few inconspicuous hairs on the smooth terminus that are not shown in the illustration, of which two have been seen in the ventrally submedian position, having a length about two-thirds as great as the corresponding diameter of the terminus. No supplements or special papillae or setae have been seen, though it is possible that very small setae may have escaped observation. The slender, slightly arcuate, rather uniform spicula have their proximal ends almost imperceptibly cephalated by expansion. The uniform proximal three-fourths of the spicula, when viewed in profile appear to have approximately the width of one of the adjacent annules. In the distal fourths the spicula taper to an acute point. There is a single, nearly straight but slightly "S"-shaped accessory piece, two-thirds as long as the spicula, which is acute at its distal extremity and capable of protrusion to a certain extent. It is fully as wide as the spicula.



Its proximal half curves away from the spicula and then recurves, and is connected with the ventral part of the body-wall a short distance behind the anus by means of oblique muscles.

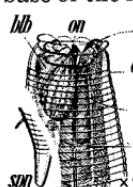
*Habitat:* Coral sand, New Hebrides. This genus differs from Chromadora, Spilophora and Euchromadora in the possession of distinct circular amphids, and also in the possession of twelve longitudinal cuticular costae. In this latter respect it resembles Monoposthia, but here the spicula are double, and there are no supplementary organs or swellings. The lip-region and pharynx also present contrasts with any of the above genera. The striking differences are: (1) The continuation of the pharynx in its narrow part as a definite well lined posterior chamber, ending definitely opposite the point where the pharyngeal bulb is separated from the oesophagus by a distinct constriction. (2) By the form of the lips, which, instead of being soft and internally folded so as to give rise to about twelve refractive ribs, or folds, are more strongly built, cutinized and outwardly recurved, and are only six in number. (3) -M-Fig. 114, p. 335.

115. *Iotadorus punctulatus* n. sp.  $\text{sp. } \text{v.} \frac{3.8}{5.4} : \frac{16.6}{5.6} \dots \frac{9.7}{6.5} \dots \frac{16.6}{5.9} \dots \frac{9.7}{5.9} \dots > .4$  - Striae of the naked cuticle resolvable into rows of dots, which are modified a little on the lateral fields, where there are distinguishable two longitudinal rows of markings close together on each side of the lateral line, at least toward the anterior extremity and on the neck. The neck is cylindroid. There are probably four or six short and inconspicuous cephalic setae in the midst of the labial constriction. There are twelve lips of the character usually found in the genus Cyatholaimus, but smaller, and in such a position in the specimen examined that it is impossible to make out the details, except that when the mouth is open about twelve papilla-like lips of small size are to be seen toward the margin of the head. Behind the pharyngeal bulb the oesophagus is about one-half as wide as the base of the head. It continues to have this diameter until after it passes through

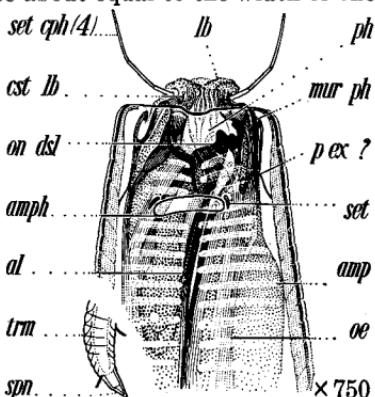
*bb* the nerve-ring, when it expands to form the pyriform cardiac bulb, which contains a distinct but simple valvular apparatus.

*bb* *ann* The intestine joins the middle of the posterior surface of the *ph* cardiac bulb, and is at that point only about one-fourth as wide *oe* as the base of the neck; it gradually widens out so as to become half as wide as the body. It would present few cells in cross-section, perhaps only two. The renette cell is about one-third as wide as the body, and fully twice as long as wide, and lies a short distance behind the base of the neck. The tail of the male is conoid in the anterior three-fourths; thence onward it tapers more rapidly to the minute spinneret. The posterior fourth of the tail is more finely striated than the remainder. Caudal setae few, minute, and scattered. The proximal ends of the uniform spicula are bent over toward the ventral side of the body. The spicula are of very peculiar form, the proximal halves being much more strongly arcuate than the distal halves. At the distal extremity each spiculum is bifurcated, one fork, the anterior, being rudimentary, while the other, the posterior, is somewhat S-shaped and acute distally. The finger-shaped apophysis of the accessory extends backward nearly parallel to the body-axis. The apophysis is nearly as strongly cutinized as the spicula themselves, and has a length nearly equal to that of the anal body-diameter. The apophysis is nearly twice as wide as the spicula, which have a width about equal to that of three of the adjacent annules of the cuticle. Ejaculatory duct about one-third as wide as the body; vas deferens about half.

*Habitat:* Punta Arenas, Pacific coast of Costa Rica. Marine. Fig. 115.



116. *Ptycholaimellus carinatus n. sp.* Cuticle rather thin and naked, resolvable near the anterior extremity into elements which are interrupted on the lateral fields. Near the middle of the body, the division line between the annules is resolvable into dotlike elements; these are interrupted by two prominent lateral wings. These wings begin near the head and end behind the middle of the tail, and near the middle of the body occupy a space about equal to the width of one of the annules.  $\frac{1.9}{2.3} - \frac{8.1}{3.2} \pm \frac{15.5}{3.9} - \frac{14.49}{4.3} \frac{16}{2.2} > \frac{90}{2.2} > 1.5 \dots$  set qph/4.  
 Neck conoid;  $\frac{2.7}{2.4} - \frac{8.8}{3.2} \pm \frac{16}{4} - \frac{35}{4.4} = \frac{89.6}{2.9} > 1.3 \dots$  cst lb.  
 the head protrusile, and connected with the anterior margin of the cervical cuticle by a thin, flexible membrane. When the mouth is closed, it is surrounded by twelve folds in the lip-region, which come together and form a striated, somewhat tubular vestibule, having a length about equal to the width of two of the adjacent annules of the cuticle. The lip-region stains strongly with carmine, and is a very striking feature in stained specimens. The lips arch together over the somewhat spheroidal anterior portion of the pharynx, which is about one-third as wide as the front of the head and contains the strongly cutinized apex of the massive dorsal onchium, which has, passing backward from it, distinct refractive extensions that gradually merge into the structures of the oesophagus. The narrow portion of the pharynx merges gradually into the lumen of the oesophagus. The pharyngeal swelling contains special muscles for the operation of the lips and dorsal onchium; these are much more strongly developed on the dorsal side, and the pharyngeal swelling presents the peculiarity of being widest near its anterior part, and tapering gradually nearly half way to the nerve-ring, where the diameter has been so reduced as to be one-third that of the corresponding portion of the neck. The oesophagus continues to have this width until after it passes through the nerve-ring, where it enlarges rather gradually for a short distance, and then more rapidly to form the clavate, or elongated-pyriform, strongly developed cardiac bulb, which occupies the posterior three-sevenths of the neck, and becomes three-fourths as wide as the base of the neck. This bulb is divided into two approximately equal parts by a transverse division of the musculature and its valvular apparatus is correspondingly divided. This latter consists essentially in a plain expansion of the lining of the oesophagus, which is in its widest part, about one-third as wide as the bulb. There is no distinct cardia. The intestine joins the middle of the posterior surface of the cardiac bulb, and at this point is only one-fifth as wide as the neck. It gradually widens out so as to become half as wide as the body and then diminishes again to give place to the enormously developed renette cell, behind which it again becomes about half as wide as the body. The intestine is rather thin-walled, its cross-section presenting about four to six cells containing scattered yellowish granules of variable size, the largest of which have a diameter nearly as great as the width of one of the adjacent annules of the cuticle. From the slightly raised anus, the rectum extends inward a distance equal to the anal body diameter. The lateral fields are fully one-third as wide as the body. The renette cell, two-thirds to three-fourths as long as the neck, is clavate, and at its widest part half



as wide as the body. It contains a single nucleus, which is swung centrally in the protoplasmic network. The renette cell has two spherical ellipsoidal companion cells in the rear. The excretory pore lies at the base of the lips, and is connected with the elongated, fusiform ampulla by means of a duct which extends from the base of the lips to nearly opposite the base of the pharynx. Sometimes the ampulla is much elongated, and one-fourth as wide as the corresponding portion of the neck, reaching nearly to the nerve-ring. The tail begins to taper from far in front of the anus, and tapers at about the same rate for some little distance behind the anus, then tapers more rapidly for a short distance, and then finally tapers gradually to the terminus. The caudal glands are located in the base of the tail. The vulva is massive and yet does not project much beyond the main ventral contour. It is prominent on account of a depression which surrounds it. From the vulva the large vagina leads inward half way across the body. The tapering, reflexed ovaries reach half way back to the vulva and contain upwards of ten ova arranged single file. The prolate eggs are nearly as long as the body is wide and have been seen in the uterus one at a time. The distance between the wings on the cuticle, near the anus of the male, is about equal to the width of two of the annules. The tapering, yellowish spicula are more strongly arcuate in their proximal halves than elsewhere. At their widest part they are about one-sixth as wide as the corresponding portion of the body. Their proximal ends, when viewed laterally, appear to lie opposite the body-axis. An indistinct refractive line passes from the proximal ends of the spicula to the distal ends, indicating that the spicula may be wider than would be judged by a consideration of only the main portion of their framework. The accessory pieces are one-half as long as the spicula and in the main parallel to them and are arranged in comparatively close contact. Near the anus, however, the framework of the accessory pieces bends away from the spicula. Each accessory piece ends in an acute protrusile point, which is rather suddenly and rather markedly bent forward. The spicula present the same arcuate appearances at their tips as do the accessory pieces. Both the ejaculatory duct and vas deferens are about one-third as wide as the corresponding portion of the body.

**Habitat:** Larat, East Indies. Marine; apparently very common. Sublimate to balsam. Fig. 116, p. 337. An examination of sloughed cuticle of the head gave equally satisfactory evidence of the existence of joints in the setae.

117. *Actinonema pachydermatum* n. sp. Cuticle naked, very thick, occupying one-half the radius as measured at the base of the neck. Annules alike except or  <sup>lb</sup> .35 8.6 — 16. <sup>15.50.15</sup> — 81. <sup>.8</sup> <sup>2.4</sup> <sup>3.5</sup> <sup>4.2</sup> <sup>2.5</sup> >.83 .. that they grow narrower toward on? <sup>.35</sup> 9.2 — 16. <sup>“</sup> <sup>85.</sup> <sup>1.</sup> <sup>2.4</sup> <sup>2.7</sup> <sup>2.9</sup> <sup>2.5</sup> >.9 .. the extremities, especially the head amph <sup>x 750</sup> narrow grooves between the annules, the contour of the body is irregularly crenate. Head set off by constriction and a deep constriction, subtruncate; mouth more or less depressed. The lip-region is one-half as high as wide, and appears to be composed of three fairly well developed, rounded, sub-distinct lips, which are set off by constriction. This lip-region appears as if protruding from within the thick cuticle, and stains in carmine while the cuticle remains quite colorless. On the lips there are no obvious signs of a cuticle. The

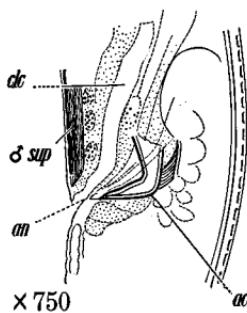
pharynx is very small and inconspicuous, or even absent apparently. There seems to exist, however, a minute, more or less arcuate dorsal onchium, to be seen in balsam specimens only when exserted. The neck is conoid, the head convex-conoid. Amphids nearly straight transverse slits, four-fifths as long as the corresponding diameter of the head, and apparently eight times as long as wide. One of the foremost annules appears to be more or less dislocated;—that is to say, the regular succession of the fore-most annules is somewhat disturbed by  $\times 750$

the presence of the amphids, which are otherwise almost invisible. Oesophagus more or less conoid, but decidedly clavate posteriorly. Near the head it is two-fifths, near the nerve-ring about one-fourth, and finally one-half, as wide as the corresponding portion of the neck. There is no distinct cardia. The rather thin-walled intestine, which becomes at once two-fifths as wide as the body, has a distinct lumen. Its cross-section presents four to six cells. Cardiac collum one-fifth as wide as the body. From the depressed anus the prominent cutinized rectum is one and one-fourth times as long as the anal body-diameter. The cells of the intestine contain numerous, very fine, colorless granules. The conoid, subarcuate tail tapers from in front of the anus to the simple, unarmed, convex-conoid, rather blunt spinneret. The ellipsoidal caudal glands are small and inconspicuous, more or less unsymmetrical, and apparently lie in a close tandem opposite the anus. The elongated to fusiform, granular retene cell lies behind the neck a distance equal to one and one-half body-diameters; it is as long as the body is wide and one-fifth as wide as long. Female sexual organs double. The tapering ovaries are of moderate size and extend half way back to the vulva. They contain few ova arranged for the most part single file. The simple, strong, tapering, rather stout spicula are at their widest part about one-sixth as wide as long. Their proximal ends appear to lie more or less opposite the body-axis. The simple, rather frail, slender accessory piece is about two-thirds as long as the spicula. There are no supplements or special papillae.

*Habitat:* "Seagrass," shoal, two miles off Key West, Florida, U. S. A. Fig. 117.

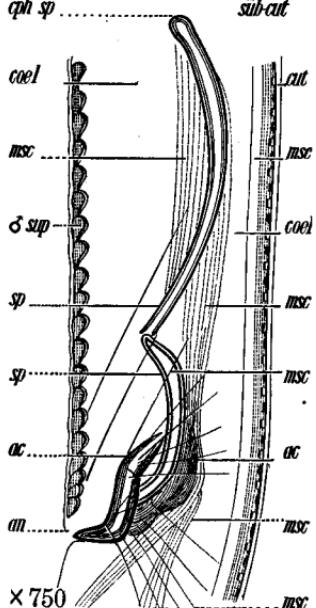
118. *Rhips ornata* n. sp.  $\frac{.9}{1.3}$   $\frac{6.}{2.2}$   $\frac{12.}{2.6}$   $\frac{21.}{3.}$   $\frac{53^{\prime}}{1.9}$   $\frac{90.}{1.9}$   $>1.5^{**}$  Cuticle thick, contour more or less crenate. Striae resolvable into rod-like markings, set(10) ppl(6) changing so as to produce a basket-work-like effect on the neck. On the posterior half of the body on each lateral field each annule presents two forward-pointing, "V"-shaped marks of unequal size, the ventral being the larger; these are inconspicuous, but are less so posteriorly. These markings occur also on the anterior half of the body, but are there reversed. On a par with the cephalic setae, and just in front of the ends of the amphids, there are four sublateral, special scales, or short,  $\times 750$  more or less conical horns, about half as long as the setae, (ppl Fig. 118a.). What function is associated with these peculiar appendages is unknown. Lips very minute, apparently six and double. The neck has the peculiarity of diminishing more rapidly from the middle forward for a short distance. The dorsal onchium is opposed by one or two very minute ventrally submedian ones. The oesophagus is conoid, though there is a more or less pronounced clavate cardiac swelling. At the nerve-ring, the oesophagus is one-half, and finally three-fourths,

as wide as the corresponding portion of the neck. The rather prominent lining of the oesophagus finds expression in about three parallel refractive lines, occupying a space equal to two-fifths its width. The *ph sp*.....  
*subat*  
 fine musculature is more or less pigmented. There  
 is a decided thickening of the lining in the cardiac  
 swelling. There is no cardia. The thin-walled  
 intestine presents a faint lumen, and becomes at  
 once three-fifths as wide as the body. Cardiac column one-fourth as wide as the neck. From the  
 more or less continuous anus, the inconspicuous rectum leads inward a distance one and one-fourth times as great as the anal body-diameter. The postanal region has the appearance of lacking one of the regular striae. Colorless granules of variable size are scattered in the intestinal cells. The largest of them are about half as wide as one of the annules. The conoid, subarcuate tail tapers from in front of the anus to the convex-conoid spinneret. Apparently, the caudal glands lie in the anterior third of the tail. Though the renette has not been clearly seen, it appears to lie two body-widths behind the neck, to be elongated and twice as long as the body is wide. The large, elevated, conspicuous vulva, occupying twenty-five to thirty annules of the cuticle, leads to a medium-sized vagina. The female sexual organs are double and symmetrically reflexed. The eggs are probably rather large, since an ovum which has not yet entered the uterus, but appears to be mature, is three times as long as the body is wide. Spherical, granular spermatozoa,



.9 .7.3 14. -M<sup>66</sup> 90. 1.2 1.9 2. 8.1 2.0 > 1.2 ..  
 one-half as wide as the body, were seen in the uterus. Spicula two-jointed, as shown in the illustration. A mature specimen was seen in which the spicula were lacking, suggesting that possibly they are lost at the time of copulation. See adjacent illustration. Accessory pieces, two in front of the spicula and two behind, with an additional median one behind,—that is to say, five in all. The ventral, longitudinal optical section, about twenty-five annules in front of the anus, is such that the subcuticle appears more or less as if retrorsely serrate. This alteration in the annules is co-extensive with the oblique copulatory muscles, so that no doubt these structures must be regarded as indicating the presence of supplementary organs.

*Habitat:* Marine mud, Ocean Beach, Florida, U. S. A. Fig. 118a, p. 339; Figs. 118b and c.



## ABBREVIATIONS USED IN ILLUSTRATIONS

Frequently the abbreviations are combined, thus: *set trm*, seta terminalis, terminal hair; *set cph dxt subl, seta cephalica dextra sublateralis*, right sublateral cephalic seta.

<b>A</b> <sup>c</sup> , accessory	<i>fr</i> , front, frontal	<i>post</i> , posterior
<b>A</b> <sup>af</sup> , afferent	<i>frt</i> , fertile, fertilized	<i>pp</i> , <i>ppl</i> , papilla, papillate
<b>aL</b> , wing	<i>frc</i> , furcation, forked	<i>prerc</i> , prerectum
<b>amp</b> , ampulla		<i>prm</i> , primary, first
<b>ampb</b> , amphid		<i>prok</i> , prokinesis, prophase
<b>an</b> , anus, anal		<i>prph</i> , protophyte
<b>anak</b> , anakinesis, anaphase		<i>prtz</i> , protozoon
<b>ann</b> , annule		<i>prx</i> , proxima, proximal
<b>ant</b> , anterior		<i>pseudon</i> , pseudonchium
<b>anus</b> , anus		<i>punct</i> , point, bead, dot
<b>apic</b> , apiculum		<i>pyl</i> , pylorus, pyloric
<b>apmd</b> , appendage		
<b>apph</b> , apophysis		
<b>ar</b> , area, field		
<b>asp</b> , aspect, view		
<b>ast</b> , aster		
<b>axil</b> , axil, axillary		
<b>ax</b> , axis, axis		
<b>Bas</b> , base		
<b>birefr</b> , birefringent		
<b>bb</b> , bulb, bulbous		
<b>brs</b> , bursa, bursal		
<b>Cal</b> , lime, calcareous		
<b>cav</b> , cavity		
<b>cd</b> , cd, tail, caudal		
<b>cer</b> , ceratin, ceratinous		
<b>cerv</b> , cervical		
<b>chrn</b> , color, chromatic		
<b>chrm</b> , chromatin		
<b>chrsm</b> , chromosome		
<b>chrt</b> , chromatin		
<b>cir</b> , cirrus, cirri		
<b>cl</b> , cell, cellular		
<b>clic</b> , cloaca, cloacal		
<b>clv</b> , cleavage, cleft		
<b>cntr</b> , centrosome		
<b>col</b> , colum, constriction		
<b>com</b> , commissure		
<b>comp</b> , companion		
<b>constr</b> , constriction		
<b>cop</b> , copulatory		
<b>corp</b> , body, thing, corpus		
<b>cost</b> , costa, rib, costal		
<b>cph</b> , cephalum, cephalic		
<b>cpl</b> , hair, capillary		
<b>crd</b> , cardia, cardiac		
<b>crib</b> , sieve, mesh		
<b>crp</b> , corpus, body, thing		
<b>crv</b> , neck, cervical		
<b>cryst</b> , crystal, crystalline		
<b>ct</b> , costa, rib, costal		
<b>cut</b> , cuticle, cuticular		
<b>cutn</b> , cutin, cutinous		
<b>cyt</b> , cytoplasm		
<b>Dct</b> , duct		
<b>dep</b> , deposit, deposited		
<b>dias</b> , diaster		
<b>dir</b> , directrix, guide		
<b>dnt</b> , tooth, dental		
<b>dntcl</b> , denticle, little tooth		
<b>dsc</b> , disc, discoid		
<b>dsl</b> , dorsal, dorsad		
<b>dst</b> , distal, far, farther		
<b>dxt</b> , right, right-hand		
<b>Ef</b> , efferent		
<b>elast</b> , elastic spring, springy		
<b>elev</b> , elevation		
<b>elm</b> , element, component		
<b>emb</b> , embryo, embryonic		
<b>eq</b> , equator, equatorial		
<b>ex</b> , excreta, excretory		
<b>ex p</b> , excretory pore		
<b>extn</b> , extension, extended		
<b>extnl</b> , external		
<b>extr</b> , exterior, outer		
<b>Fab, fb</b> , framework		
<b>fasc</b> , fascicle		
<b>fib</b> , fibre, fibrous		
<b>flx</b> , flexure		
<b>Gam</b> , gamete		
<b>gl</b> , gland, glandular		
<b>glot</b> , glottis, glottoid		
<b>gub</b> , gubernaculum, guide, accessory piece		
<b>gnd</b> , gonad		
<b>gng</b> , ganglion		
<b>grn</b> , granule, granular		
<b>I</b> <sup>m</sup> , immature		
<b>ing</b> , ingested		
<b>int</b> , intestine, intestinal		
<b>intr</b> , internal, inner		
<b>Jnc</b> , junction, junctional		
<b>Kar</b> , karyokinetic figure		
<b>L</b> line		
<b>lac</b> , lacuna, pit, depression		
<b>lam</b> , lamina, plate, laminate		
<b>lat</b> , lateral, laterad		
<b>lb</b> , lip, labial		
<b>lns</b> , lens (of eye)		
<b>lob</b> , lobe, lobate		
<b>longt</b> , longitudinal		
<b>lr</b> , larva, larval		
<b>lngth sec</b> , longitudinal section		
<b>lum</b> , lumen, luminal		
<b>Maj</b> , major, the larger		
<b>mat</b> , mature		
<b>marg</b> , margin, edge, marginal		
<b>md</b> , middle, median		
<b>mesok</b> , mesokinesis, mesophase		
<b>metak</b> , metakinesis, metaphase		
<b>micrph</b> , microphyte		
<b>micrz</b> , microzoon		
<b>min</b> , minor, the lesser		
<b>mit</b> , mitosis, mitosis-figure		
<b>mnd</b> , mandible, jaw, mandibula		
<b>monast</b> , monaster		
<b>msc</b> , muscle, muscular		
<b>mur</b> , wall, mural		
<b>N</b> nerve		
<b>ncl</b> , nucleus, nuclear		
<b>nema</b> , nema, nematode		
<b>n r</b> , nerve-ring		
<b>nrv</b> , nerve		
<b>nud</b> , naked		
<b>O</b> <sup>c</sup> , eye, ocular		
<b>oe</b> , oesophagus, oesophageal		
<b>on</b> , onchium, tooth, spear		
<b>onch</b> , onchium, spear, onchial		
<b>öcyt</b> , öcocyte		
<b>or</b> , mouth, oral		
<b>org</b> , organ		
<b>org?</b> , organ in doubt, doubtful		
<b>os</b> , ostium		
<b>ov</b> , ovum, egg		
<b>ovr</b> , ovary, ovarian		
<b>P</b> por, pore		
<b>par</b> , parasite, parasitic		
<b>pct</b> , pectoral		
<b>pclr</b> , peculiar, remarkable		
<b>pigm</b> , pigment, pigmented		
<b>ph</b> , pharynx, pharyngeal		
<b>phs</b> , phase, state, condition		
<b>pigm</b> , pigment, pigmented		
<b>pip</b> , palp		
<b>plr</b> , polar		
<b>puct</b> , point, dot, punctate		
<b>por</b> , pore		
<b>Tb</b> , tube, tubular		
<b>teg</b> , shell, tegument		
<b>telek</b> , telekinesis, telephase		
<b>tesl</b> , tessellation		
<b>trans</b> , transverse		
<b>trm</b> , end, blind end, terminal		
<b>ttd</b> , tetrad, four-fold		
<b>tum</b> , tumor, swelling, swollen		
<b>U</b> <sup>t</sup> , uterus, uterine		
<b>V</b> vessel		
<b>vag</b> , vagina, vaginal		
<b>valv</b> , valve, valvular		
<b>vas</b> , vessel		
<b>vas def</b> , v def, vas deferens		
<b>vesic</b> , vesicle, vesicular		
<b>vlv</b> , vulva		
<b>vnt</b> , ventral, ventrad		
<b>vst</b> , vestige, vestigial		
<b>vestbl</b> , vestibule, vestibular		
<b>vestg</b> , vestige, vestigial		
<b>Zon</b> , zone, zonal		

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