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Some marine nematodes from North Carolina. B. G. CHITWOOD, U. S. Bureau of Animal Industry.

During the summer of 1934, extensive collections of marine nematodes were made by the writer while stationed at the U. S. Bureau of Fisheries Laboratory, Beaufort, N. C. Much of this material has been studied in connection with a revision of the Nematoda now in preparation, and since the majority of the representatives of the genera studied appear to be new, it seems advisable to publish descriptions of these forms. This paper, therefore, contains descriptions of a number of new species belonging to the families Desmodoridae, Axonolaimidae, Comesomidae, Camacolaimidae, Linhomoeidae, Monhysteridae, Siphonolaimidae, Plectidae, and Desmoscolecidae. The representatives of the Desmodoridae have been most completely studied and as a result of this study certain revisions in generic groupings have been made.

The writer is indebted to Dr. G. Steiner, of the Division of Nematology, U. S. Bureau of Plant Industry, for making available the facilities of his office and for much helpful advice and criticism during the course of this work.

Family DESMODORIDAE Steiner, 1927

The family Desmodoridae at the present time contains such a large number of genera that a subdivision seems to be essential. The following grouping of genera is appended both to clarify the placing of new genera and to indicate the writer's views regarding the relationships involved.

1. Desmodorinae Micoletzky, 1924. Amphids spiral, rarely circular; rigid helmet present; dorsal tooth usually present; cuticle not tiled. Genera: *Desmodora*, *Brachydesmodora*, *Micromicron*, *Amphispira*, *Zalonema*, *Bolbonema*, *Croconema*, *Mastodex*, *Heterodesmodora*, *Brachydesmodora*, *Aculeonchus*, *Acanthopharynx*, *Xanthodora*, and *Acanthopharyngoides*, n. g.
2. Stilbonematinae, n. subfam. Amphids minute, slit-like; ? rigid helmet present; dorsal tooth minute or absent; cuticle not tiled or longitudinally broken. Genera: *Stilbonema*, *Catanema*, *Leptonemella*, *Laxonema*.
3. Ceramonematinae Cobb, 1933. Amphids obscurely spiral to shepherd's crook in form; rigid helmet present; dorsal tooth absent; cuticle tiled or longitudinally broken by spined alae. Genera: *Ceramonema*, *Pselionema*, *Pristionema* (syn. *Pristinonema*), *Dasynemella* (syn. *Dasynema*), and *Dasynemoides*, n. g.
4. Richtersiinae Cobb, 1933. Amphids spiral or quadrangular; without a rigid helmet; dorsal tooth present or absent; cuticle not tiled, sometimes broken by longitudinal rows of bristles or hooks.
 - (a) Richtersiacea Kreis, 1929. Dorsal tooth absent; cuticle bearing longitudinal rows of hooks. Genus: *Richtersia*.
 - (b) Metachromadoracea, n. tribe. Dorsal tooth present, very well developed; cuticle sometimes bearing rows of bristles. Genera: *Metachromadora* (syn. *Chromadoropsis*, *Neonyx*, ? *Oistolaimus*, ? *Bradylaimus*), *Chromaspirina* (syn. *Chromaspira*, *Mesodoros*), *Onyx* (syn. *Sigmophora*, ? *Oistolaimus*, ? *Bradylaimus*), *Polysigma* and *Metonyx*, n. g.
 - (c) Spirinacea, n. tribe. Dorsal tooth minute or absent; cuticle smooth or nearly so, without rows of bristles. Genera: *Spirina*, *Laxus*, and *Eubostichus*.

5. Monoposthiinae Filipjev, 1934. Amphids circular; rigid helmet present or absent; annulation coarse, forming a rigid cephalic region; dorsal tooth present; cuticle not tiled but broken longitudinally by alae bearing spines. Genera: *Monoposthia*, *Nudora*, and *Rhinema*.

Subfamily DESMODORINAE Micoletzky, 1924

Desmodorella cephalata Cobb, 1933

Description.—Cephalic setae 6 on lips, 4 on helmet. Amphids dispiral. Cuticle with annules anastomosing; longitudinal markings or ridges discontinuous, 12 to 20, marked by minute spines (fig. 1, B) becoming setose in postvulvar region. Submedian somatic setae at intervals of about 10 annules. Helmet "etched" (fig. 1, A). Esophagus terminated by an ovoid swelling indistinctly divided into 3 parts. *Female* 880 μ long; α , 13.6; β , 6.8; γ , 12; vulva dividing body in proportions of 64:36; anterior ovary extending to within $\frac{1}{2}$ body length from anterior extremity, posterior ovary extending to within $\frac{1}{5}$ body length from posterior extremity.

Habitat.—Marine (below low-tide mark).

Locality.—Beaufort, N. C.

Specimens.—U.S.N.M. Helm. Coll. No. 41817.

Heterodesmodora hirsuta, new species

Description.—Cephalic setae 4, opposite level of amphids; subcephalic setae 8, posterior to amphids (fig. 1, C). Amphids multispiral. Cuticle coarsely annulated and bearing 10 longitudinal rows of minute bristles (fig. 1, D). Stoma unarmed; esophagus terminated by a small swelling. *Female* 133 mm long; α , 20; β , 11; γ , 14.4; vulva dividing body in proportions of 62:38. Ovaries extending to within $\frac{1}{2.5}$ and $\frac{1}{3}$ body length from respective extremities.

Habitat.—Marine (sand flats and depth of 20 feet).

Locality.—Beaufort and Shackelford's Banks, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41818.

Heterodesmodora hirsuta differs from *H. ditlevseni* (Mic., 1922) in that the 8 subcephalic setae are anterior to the amphids in that species, and from *H. pilosa* (Ditlevsen, 1926) in that the cephalic setae are anterior to the amphids in that species.

Acanthopharyngoides, new genus

Diagnosis.—Desmodorinae: Helmet well developed, elongated, and clearly jointed (fig. 1, E). Cuticle finely striated, striae not broken longitudinally. Cephalic setae 4 (dl. and vl.). Amphids obscurely spiral (fig. 1, E). Stoma cylindrical, containing a large dorsal tooth and 2 sub-ventral teeth, ventral wall of stoma double at base (fig. 1, E); esophagus cylindrical, enlarged in posterior part. *Male* with a medioventral row of papilloid supplementary organs.

Type species.—*Acanthopharyngoides scleratum*, n. sp.

The genus *Acanthopharyngoides* appears to be most closely related to *Xanthodora*, *Aculeonchus*, *Acanthopharynx*, and *Brachydesmodora* in that the esophagus is cylindrical or terminated by an elongated swelling; it differs from all of these genera in the cuticular duplication at the base of the stoma, the jointed form of the helmet, and from all of them except *Brachydesmodora* in the arrangement of cephalic setae.

Acanthopharyngoides scleratum, new species

Description.—*Male* 2.31 to 2.64 mm long; α , 62 to 69; β , 7.3 to 8; γ , 31 to 47. Spicules arcuate, cephalated, gubernaculum proximally hooked; 13 to 14 preanal supplementary organs present. *Female* unknown.

Habitat.—Marine (sand banks and depth of about 50 feet).

Locality.—Near Shackelford's Banks, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41819.

Subfamily CERAMONEMATINAE Cobb, 1933

Ceramonema reticulatum, new species

Description.—Cephalic setae consisting of 2 circles, an anterior circle of 6 (dd., el., and vv.) and a posterior circle of 4 (ld. and lv.); 4 sublateral pore-like spots opposite level of amphids (fig. 1, H). Amphids open spiral verging towards shepherd's crook in form, crook nearly as long as staff. Cuticle tiled, tiles containing groups of granules; annules approximately 160 in number; cuticle longitudinally grooved (fig. 1, I). *Male* 1.12 mm long; α , 52; β , 8; γ , 6.7. Spicules short and thick; gubernaculum present. *Female* unknown.

Habitat.—Marine (sand flats).

Locality.—Beaufort, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41820.

Ceramonema sculpturatum, new species

Description.—Similar to *C. reticulatum* but with more simple cuticular tiles (fig. 1, K) and not containing granules. *Adults* unknown. *Larva* 1.46 mm long; α , 70; β , ?; γ , 8.7.

Habitat.—Marine (shallows).

Locality.—Bogue Sound, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41821.

Both of the foregoing species of *Ceramonema* differ from *C. attenuatum* Cobb, 1920, in that the crook of the amphids is nearly as long as the staff, while in that species the staff is much longer. All three of the species differ in the form of the tiling.

Pselionema annulatum var. *beauforti*, new variety

Description.—Cephalic setae 4, straight, well developed. Amphids shepherd's crook in form. Cuticle with rather flat, wide tiles (fig. 1, L & M); number of annules approximately 100. *Male* 650 μ long; α , 35; β , ?; γ , 6. *Female* unknown.

Habitat.—Marine (below low-tide mark).

Locality.—Beaufort, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41822.

Pselionema annulatum var. *beauforti* is extremely close to *P. annulatum*, differing but slightly in form of tiling (fig. 1, L) and relative size of the amphids.

Pselionema rigidum, new species

Description.—Cephalic setae 4, straight, well developed. Amphids open spiral in form. Cuticle with angulate or curved tiles (fig. 1, Q), depending on body region; number of annules approximately 110. *Male* unknown. *Female* 640 μ long; α , 23; β , ?; γ , 5.6; vulva dividing body in proportions 50:50.

Habitat.—Marine (below low-tide mark).

Locality.—Beaufort, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41823.

Pselionema rigidum differs from *P. hexalatum* in the form of the cephalic setae (fig. 1, P); it may be differentiated from *P. annulatum* by the form of the amphids and the tiling.

Pselionema hexalatum, new species

Description.—Cephalic setae consisting of a single circle of 4 minute bent setae (ld. and lv.) (fig. 1, N). Amphids open spiral in form. Cuticle with angulate tiles (fig. 1, O), number of tiles approximately 86. *Male* unknown. *Female* 602 μ long; α , 21; β , 4.7; γ , 6; vulva dividing body in proportions 50:50.

Habitat.—Marine (shallows).

Locality.—Bogue Sound, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41824.

Pselionema hexalatum differs from *P. annulatum* (Filipjev, 1922), n. comb. (syn. *Steineria annulata* Filipjev, 1922) in the form of the tilings, the minute setae, and the shape of the amphids.

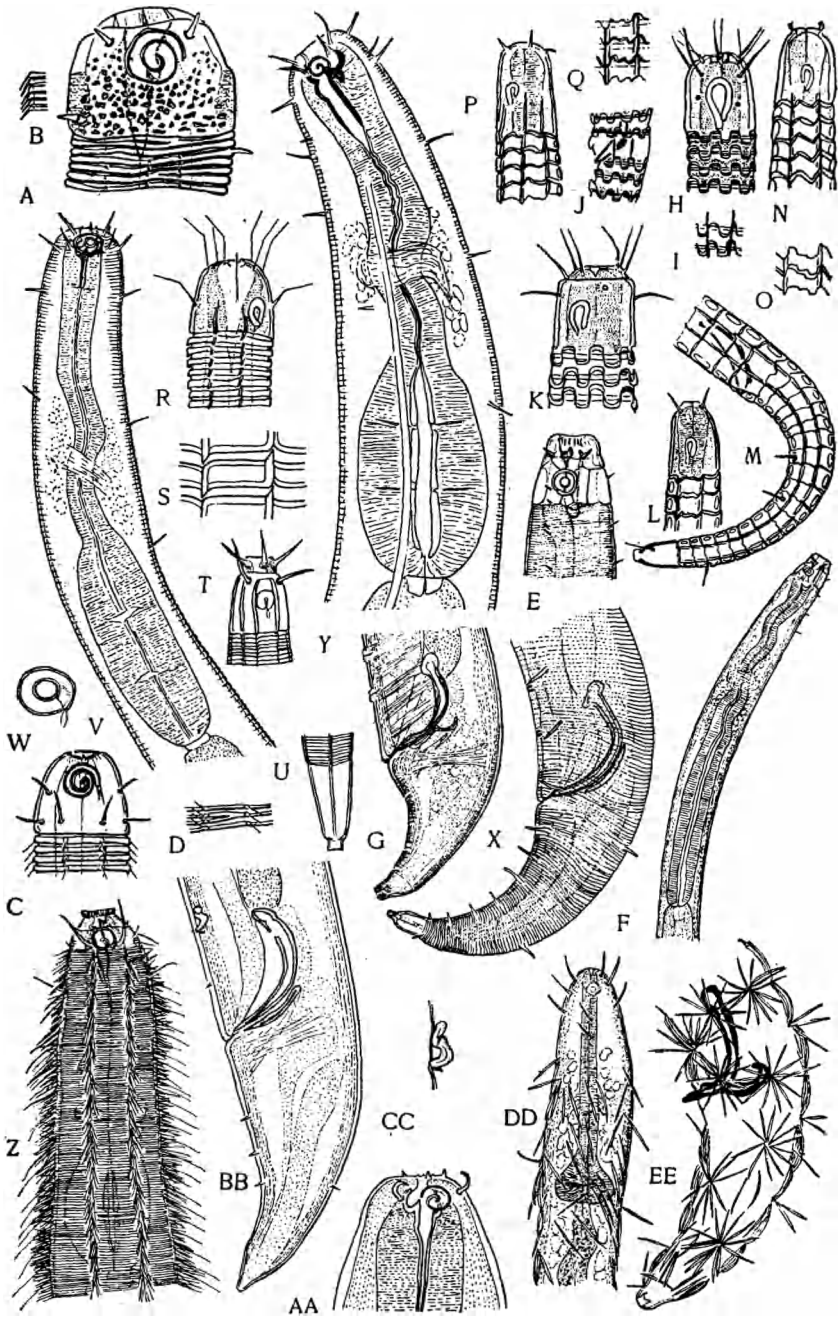


FIG. 1

A-B—*Desmodorella cephalata* (B—Edge of body in mid-region showing spines). C-D—*Heterodesmodora hirsuta*. E-G—*Acanthopharyngoides scleratum*. H-J—*Ceramonema reticulatum*. K—*C. sculpturatum*. L-M—*Pselionema annulatum* var. *beauforti*. N-O—*P. hexalatum*. P-Q—*P. rigidum*. R-S—*Dasynemella phalangida*. T-U—*Dasynemoides setosum*. V-X—*Metachromadora onyxoides* (W—Amphid). Y—*M. obesa*. Z—*Metonyx horridus*. AA-CC—*Polysigma uniforme* (CC—Supplementary organ). DD-EE—*Eubostrichus parasitifera*.

Dasynemella phalangida, new species

Description.—Cephalic setae consisting of an anterior circle of 6 setae (dd., el. and vv.) and a posterior circle of 4 setae (ld. and lv.), setae approximately $\frac{2}{3}$ as long as head width (fig. 1, R). Amphids unispiral. Cuticle coarsely annulate, about 380 annules; annules broken by longitudinal markings (fig. 1, S). Lips 3, indistinct; stoma wide, unarmed, surrounded by esophageal tissue. Esophagus cylindrical, lining thick. *Male* unknown. *Female* 1.58 mm long; α , 61; β , 8.6; γ , 11; vulva dividing body in proportions of 60:40.

Habitat.—Marine (sandy bottom, depth of 20 feet).

Locality.—Off Shackleford's Banks, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41825.

Dasynemella phalangida differs from *D. sexalineata* (Cobb, 1920), n. comb. (syn. *Dasynema sexalineatum* Cobb, 1920) in that the cephalic setae are less than $\frac{1}{5}$ as long as the head width in that species, while they are $\frac{2}{3}$ as long as the head width in the present species.

Dasynemoides, new genus

Diagnosis.—Ceramonomatinae: Helmet longitudinally ridged; 10 longitudinal ridges on body; labial region distinct from helmet (fig. 1, T); cephalic setae thick, 10 in 2 circles, anterior circle of 6 (dd., el., and vv.) and posterior circle of 4 (ld. and lv.). Amphids unispiral. Cuticle coarsely annulated and ridged (fig. 1, U); annules spine-like at ridges. Stoma unarmed; esophagus terminated by a slight glandular swelling. *Female* with 2 reflexed ovaries.

Type species.—*Dasynemoides setosum*, n. sp.

Dasynemoides setosum, new species

Description.—*Male* unknown. *Female* 1.48 mm long; α , 45; β , 11; γ , 14.5; vulva dividing body in proportions of 55:45; ovaries reflexed, extending to within $\frac{3}{8}$ and $\frac{1}{3.2}$ body length from anterior and posterior extremities, respectively.

Habitat.—Marine (depths of 15 and 50 feet).

Locality.—Shackleford's Channel, and off Point Lookout, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41826.

Dasynemoides appears to be most closely related to *Dasynemella* Cobb, 1933; it differs from that genus in the form of the helmet, the cephalic setae, and the labial region (fig. 1, T).

Subfamily RICHTERSHINAE Cobb, 1933

Tribe Metachromadoracea, new tribe

Metachromadora onyxoides, new species

Description.—Oral opening hexalobed, eversible, bearing internal circle of 6 papillae; external circle consisting of 6 short setae (dd., el., and vv.) and 4 long setae (ld. and lv.); subcephalic setae present, somewhat variable (fig. 1, V); submedian somatic setae present. Amphids obscurely spiral (fig. 1, W). Alae absent. Esophagus terminated by an elongated swelling divided into 3 regions. *Male* 1.19 to 1.45 mm long; α , 43 to 45; β , 6.1 to 6.7; γ , 14 to 15.7. Testis extending to within $\frac{1}{3}$ to $\frac{1}{4}$ body length from anterior extremity. Subventral setae present; supplementary organs 9 to 10, placed on a very slight medioventral elevation. *Female* 1.54 to 1.73 mm long; α , 27 to 37; β , 6.9 to 7.1; γ , 18 to 18.7; vulva dividing body in proportions of 52:48 to 61:39. Ovaries reflexed, extending to within $\frac{2}{3}$ to $\frac{1}{3}$ and $\frac{1}{5}$ body length from anterior and posterior extremities, respectively. Oviparous; egg 74μ long by 41μ wide; 4 to 5 pairs of subventral setae in vulvar region.

Habitat.—Marine (beach below low-tide mark and sand flats).

Locality.—Beaufort, Shackleford's Banks, and Bogue Sound, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41827.

Metachromadora obesa, new species

Description.—Similar to *M. onyxoides* except amphids distinctly spiral and lateral alae present (fig. 1, Y). *Male* 880 μ to 900 μ long; α , 16 to 24; β , 5.6 to 6.3; γ , 8 to 10; subventral setae present; supplementary organs 8, placed on a conspicuously raised medioventral elevation. *Female* 900 μ to 1.1 mm long; α , 9.5 to 11.5; β , 4.6 to 5.4; γ , 12 to 13. Vulva dividing body in proportions of 53:47 to 65:35; ovaries reflexed, extending to within 1/3 and 1/6 body length from anterior and posterior extremities, respectively. Heavy coat of minute setae in subventral vulvar region extending anteriorly and posteriorly but less marked.

Habitat.—Marine (beach, below low-tide mark).

Locality.—Beaufort, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41828.

The genus *Metachromadora* contains several species which may be distinguished from the above forms as follows: *M. vivipara* (de Man, 1907) has a double esophageal bulb; *M. cancellata* (Cobb, 1933), n. comb., has 8 longitudinal rows of 5 setae in the cephalic region; *M. cystoseirae* Filipjev, 1918, has a thickened cuticle around the amphids; *M. macroutera* Filipjev, 1918, has short blunt cephalic setae; *M. alata* (Cobb, 1933), n. comb. and *M. campycoma* (Cobb, 1933), n. comb., are similar to *M. obesa* and differ from *M. onyxoides* in the presence of lateral alae. *M. obesa* may be differentiated from *M. campycoma* by its relative obesity. *M. alata* must be considered a *species inquirenda* since the description is inadequate.

Metonyx, new genus

Diagnosis.—Richtersiinae; Metachromadoracea: Cuticle striated nearly to head, without a rigid helmet. Somatic setae in 10 rows, composed of 2 types, large bristles and small bristles (fig. 1, Z). Cephalic setae 6 short, conoid (dd., el., and vv.) and 4 long, attenuated (ld. and lv.). Amphids unispiral. Stoma containing a large dorsal tooth and 2 subventral teeth; esophagus terminated by a double bulb. *Male* unknown. *Female* with 2 reflexed ovaries.

Type species.—*Metonyx horridus*, n. sp.

Metonyx horridus, new species

Description.—*Male* unknown. *Female* 770 μ long; α , 171; β , 6.2; γ , 9.6; vulva dividing body in proportions of 67:33; ovaries reflexed, extending to within 1/2 and 1/6 body length from corresponding extremities.

Habitat.—Marine (sand bar).

Locality.—Off Shackleford's Banks, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41829.

The genus *Metonyx* appears to be most closely related to *Metachromadora* Filipjev, 1918, but differs from that genus in the presence of a very heavy coat of bristles.

Polysigma uniforme Cobb, 1920

Description.—Oral opening surrounded by 6 minute papillae of internal circle; external circle consisting of 6 conoid papillae and 4 setae (fig. 1, AA). Amphids unispiral, thin walled. Cuticle smooth. Esophagus terminated by an ovoid swelling; nerve ring approximately 1/2 length of esophagus from anterior extremity. *Male* 2.0 to 2.1 mm long; α , 40 to 50; β , 10 to 15; γ , 20.9 to 32. Supplementary organs (fig. 1, BB & CC) variable in number (totals of 40 and 60 counted), extending about 1/2 length of body.

Habitat.—Marine (beach, below low-tide mark, and sand banks).

Locality.—Beaufort and near Shackleford's Banks, N. C.

Specimen.—U.S.N.M. Helm. Coll. No. 41831.

The great variability in numbers of supplementary organs appears to be a growth phenomenon, and in this case their numbers cannot be considered as specific.

Tribe Spirinacea, new tribe

Eubostrichus parasitiferus, new species

Description.—Cephalic setae 4 (ld. and lv.); somatic setae in sublateral irregular rows (fig. 1, DD). Amphids obscurely spiral. Cuticle nearly smooth; minute striations. Stoma unarmed, rudimentary. *Male* 2.8 to 2.92 mm long; α , 75 to 100; β , 31 to 33; γ , 26 to 30. Spicules arcuate; gubernaculum proximally hooked. *Female* 2.8 mm long; α , 75; β , 30; γ , 30; vulva dividing body in proportions of 43:67; ovaries ? reflexed, extending to within 1/3.3 and 1/2.3 body length from anterior and posterior extremities, respectively.

Habitat.—Marine (depth of about 15 feet, and beach below low-tide mark).

Locality.—Shackleford's Channel and Beaufort, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41830.

Eubostrichus was originally described by Greeff (1869, Arch. Naturg. 35: 47-48) as being coarsely annulated. This appearance is due to the presence of spores of fungi (fig. 1, EE). In the case of *E. filiformis*, the anterior and posterior extremities were reversed in the original illustrations. The present species differs from both *E. filiformis* Greeff, 1869, and *E. phalacrus* Greeff, 1869, in that it is much smaller, being less than 3 mm long as against 8 mm in Greeff's species.

Tribe Richtersiacea Kreis, 1929

Richtersia beauforti, new species

Description.—Collar apparently absent, cephalic region drawn into stoma, multiridged; cephalic setae not observed clearly (fig. 2, A & B). Cuticle with only about 20 to 30 longitudinal rows of hooks, particularly marked in preanal region (fig. 2, C). Stoma cylindrical, unarmed; esophagus cylindrical. *Male* 705 μ long; α , 9; β , 3; γ , 10.2. Spicules arcuate; gubernaculum simple.

Habitat.—Marine (beach, below low-tide mark).

Locality.—Beaufort, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41832.

Richtersia beauforti differs from *R. collaris* Steiner, 1916, in that there are fewer longitudinal rows of hooks, there being 50 to 60 rows in *R. collaris*; *R. beauforti* may be distinguished from *R. tenuis* Kreis, 1929, and *R. demani* Stekhoven, 1935, in that the stoma is elongated and cylindrical in the former species, whereas it is wide and infundibuliform in the latter species.

Subfamily MONOPOSTHIINAE Filipjev, 1934

Monoposthia hexalata, new species

Description.—Oral opening surrounded by 6 small lips bearing internal circle of papillae; external circle consisting of 6 conoid papillae (dd., el., and vv.) and 4 long setae (ld. and lv.). Amphids interrupting first and second annules (often deeper in second annule than illustrated in fig. 2, E). Cuticle bearing 6 longitudinal ridges. Second annule not enlarged. Ridges reversed near base of esophagus. Sublateral somatic setae present. *Male* 1.1 mm long; α , 23; β , 6; γ , 13.7. Ventral annulation anterior to anus raised in 2 regions (fig. 2, H) between which there is a depressed area. *Female* 870 μ to 1.0 mm long; α , 15.7 to 18; β , 5.2 to 5.8; γ , 13.5 to 17; vulva dividing body in proportions of 86:14 to 90:10; ovary extending to within 1/3 body length from anterior extremity.

Habitat.—Marine (beach, below low-tide mark).

Locality.—Beaufort, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41833.

Monoposthia hexalata differs from the majority of the species of this genus in having only 6 longitudinal ridges. It differs from *M. mirabilis* Schulz, 1932, and *M. mielcki* Steiner, 1916, in that the second annule is much wider than the other annules in those species, while such is not the case in *M. hexalata*.

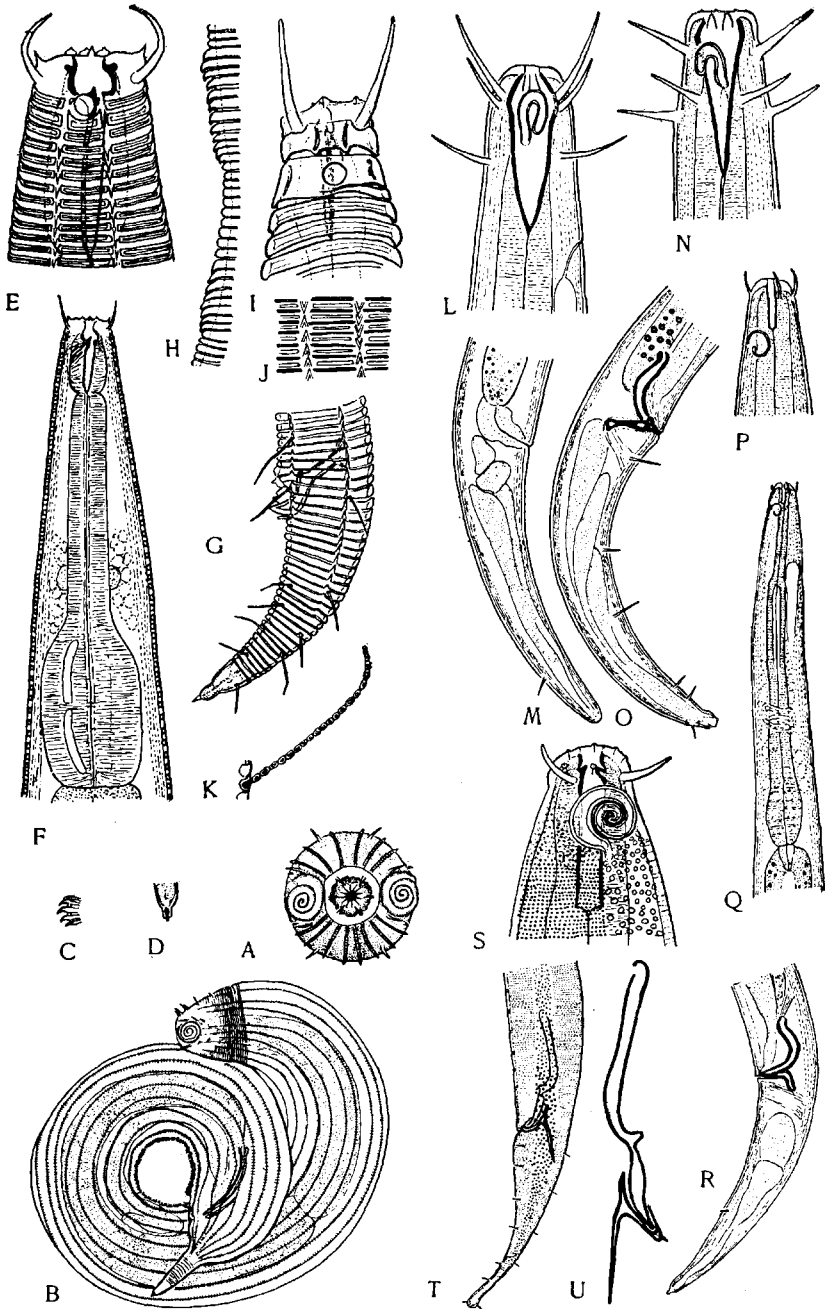


FIG. 2

A-D—*Richterisia beauforti* (C—Hooks on ventral side in preanal region). E-H—*Monoposthia hexalata*. I-K—*M. duodecimalata* (K—Spores of parasitic fungus, *Oidium* sp., projecting through the cuticle; the same type of fungus also commonly parasitizes *Metachromadora* spp.). L-M—*Axonolaimus subsimilis*. N-O—*A. odontophoroides*. P-R—*Araeolaimus* (*Araeolaimus*) *cylindrolaimus*. S-U—*Dorylaimopsis metatypicus*.

Monoposthia duodecimalata, new species

Description.—Oral opening and cephalic setae as in *M. hexalata*. Amphids within second annule (fig. 2, I); second annule enlarged. Cuticle bearing 12 longitudinal ridges. Ridges reversed near middle of body (fig. 2, J). Sublateral somatic setae present. *Male* 1.17 mm long; α , 36; β , 8.4; γ , 10.6. Ventral annulation not modified; spicule as in *M. hexalata*. *Female* 990 μ to 1.06 mm long; α , 26 to 29; β , 6.5 to 7.6; γ , 19; vulva dividing body in proportions 90:10; ovary extending to within about 1/3 body length from anterior extremity.

Habitat.—Marine (beach, below tide mark).

Locality.—Beaufort, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41834.

Monoposthia duodecimalata differs from all other species of the genus which have more than 6 alae in that the second annule is definitely enlarged.

Family AXONOLAIMIDAE Stekhoven and de Coninck, 1933

Axonolaimus subsimilis, new species

Description.—Cephalic setae 4, their length equal to cephalic diameter, and posterior to these 4 additional setae slightly longer than 1/2 cephalic diameter (fig. 2, L); subcephalic setae opposite mid-region of stoma, 1/2 corresponding body diameter in length. Amphids loop-shaped. *Male* unknown. *Female* 1.21 mm long; α , 22; β , 7.2; γ , 12; tail conically elongated.

Habitat.—Marine (beach, below low-tide mark).

Locality.—Beaufort, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41835.

Axonolaimus subsimilis appears to be most closely related to *A. paraspinosus* Stekhoven and Adam, 1931, and *A. typicus* de Man, 1922, differing from the first of these species in that the cephalic setae are 8 instead of 4 in number, and from the latter species in that the cephalic setae are only about 1/3 as long as the head width and subcephalic setae are absent.

Axonolaimus odontophoroides, new species

Description.—Cephalic setae 4, about 2/3 as long as cephalic diameter; subcephalic setae 6, of about equal length (fig. 2, N). Amphids short, loop-like in form. *Male* 1.34 mm long; α , 48; β , 11; γ , 9.9; spicules arcuate; tail bluntly elongated. A few supplementary organs, questionable in character, were observed. *Female* unknown.

Habitat.—Marine (beach, below low-tide mark).

Locality.—Beaufort, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41836.

Axonolaimus odontophoroides superficially resembles species of *Odontophora* in the form of the stoma; however, the denticular plates are not eversible, nor are they as strongly cuticularized as in *Odontophora*. This species appears to be most closely related to *A. paraspinosus*, but differs from that species both in the greater length and number of subcephalic setae as well as the form of the amphids.

Araeolaimus (Araeolaimus) cylindrolaimus, new species

Description.—Cephalic setae 4, about 1/2 as long as cephalic diameter; subcephalic setae absent; ocelli absent; amphids thin-walled, imperfect circle (fig. 2, P). *Male* 1.06 mm long; α , 39; β , 8.8; γ , 10; spicules arcuate; gubernaculum posteriorly directed. *Female* unknown.

Habitat.—Marine (depth of about 50 feet).

Locality.—Shackleford's Channel, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41837.

It appears that the transition in form of amphids, upon which the genus *Araeolaimoides* (originally proposed as a subgenus) is separated from *Araeolaimus*, invalidates the use of this character. Nevertheless, as a convenience the group *Araeolaimoides* may be considered as a subgenus. If this is done, the genus *Araeolaimus* may be subdivided into three groups of species, or subgenera. *Araeolaimus* differs from *Coinonema* and *Araeolaimoides* in that the

amphids are thin walled, broken circle in form, while the latter 2 subgenera differ from each other in that the amphids are 1 1/2 to 2 times the cephalic diameter from the anterior end in *Araeolaimoides* whereas in *Coinonema* they are 1 cephalic diameter or less from the anterior extremity. On this basis the species would be grouped as follows:

1. Subgenus *Coinonema* Cobb, 1920. Species.—*A. (C.) elegans* (de Man, 1888); *A. (C.) steineri* (Filipjev, 1922); *A. (C.) filipjevi* (Stekhoven and Adam, 1931); *A. (C.) longicauda* (Allgen, 1929); *A. (C.) ponticus* (Filipjev, 1922); *A. (C.) spectabilis* (Ditlevsen, 1921); *A. (C.) punctatus* (Cobb, 1920); *A. (C.) macrocirculus* Kreis, 1928, all new combinations.
2. Subgenus *Araeolaimoides* de Man, 1893. Species.—*A. (A.) microphthalmus* de Man, 1893; *A. (A.) zosteræ* (Filipjev, 1918); *A. (A.) leptopharynx* Bresslau and Stekhoven, 1935.
3. Subgenus *Araeolaimus* de Man, 1880. Species.—*A. (A.) bioculatus* de Man, 1877; *A. (A.) zostericola* (Allgen, 1929), n. comb.; *A. (A.) tenuilaimus* (Allgen, 1929), n. comb.; *A. (A.) stenolaimus* (Steiner, 1919), n. comb.; *A. (A.) pellucidus* (Allgen, 1932), n. comb.; *A. (A.) mediterraneus* de Man, 1878; and *A. (A.) cylindrolaimus*, n. sp.

A. (A.) cylindrolaimus appears to be most closely related to *A. (A.) pellucidus* (Allgen, 1932) but differs from that species in that the amphids are situated more posteriorly.

Family COMESOMIDAE Stekhoven and de Coninck, 1933

Dorylaimopsis metatypicus, new species

Description.—Oral opening subtriangular; cephalic papillae consisting of an internal circle of 6 papillae and an external circle of 6 papillae (dd., el., and vv.) and 4 long setae (ld. and lv.). Cuticle coarsely punctuate in lateral areas, punctations irregular (fig. 2, S), finely punctuate dorsally and ventrally, punctations most marked in cephalic and caudal regions. Amphids dispiral. Stoma cylindrical, containing 3 teeth. Esophagus clavate. *Male* 1.62 mm long; α , 29; β , 8; γ , 12; spicules double jointed (fig. 2, U); gubernaculum directed posteriorly. Postanal setae few; 13 or more preanal papilloid supplementary organs. *Female* 1.9 to 2.1 mm long; α , 29; β , 9.4 to 9.8; γ , 13.3 to 13.5; vulva dividing body in proportions of 46.9:53.1 to 48:52.

Habitat.—Marine (depth of 15 feet and depth of 50 feet).

Locality.—Shackleford's Channel and near Point Lookout, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 31838.

Dorylaimopsis metatypicus differs from *D. punctatus* Ditlevsen, 1918, in that the punctations of the lateral areas are irregularly distributed and more numerous, there being only 4 longitudinal rows in *D. punctatus*, and that there are fewer postanal setae in the male, these being very numerous in *D. punctatus*.

Family CAMACOLAIMIDAE Stekhoven and De Coninck, 1933

Subfamily APHANOLAIMINAE, new subfamily

Diagnosis.—Camacolaimidae: Cephalic setae 4 (ld. and lv.); amphids circular or monospiral, very near anterior extremity; esophagus glandular (posterior part non-muscular). Male with cuticularized supplementary organs.

Type genus.—*Aphanolaimus* de Man, 1880.

The subfamily Aphanolaiminae differs from the subfamily Camacolaiminae in that the supplementary organs of the male are cuticularized instead of papilloid.

Anguinoides, new genus

Diagnosis.—Aphanolaiminae: Cuticle coarsely striated, striae interrupted by lateral alae. Amphids obscurely spiral, cephalic in position; cephalic setae 4,

long; stoma containing a massive, posteriorly bilobed stylet. Esophagus very glandular; nearly tylenchoid (fig. 3, A). *Male* with tuboid supplementary organs (fig. 3, B). *Female* with 2 reflexed ovaries.

Type species.—*Anguinoides stylosum*, n. sp.

Anguinoides stylosum, new species

Description.—Ocelli absent. *Male* 1.66 mm long; α , 60; β , 6.6; γ , 14.4; 6 preanal supplementary organs. *Female* 1.55 mm long; α , 33; β , 6; γ , 16.8; vulva dividing body in proportions of 53:47; ovaries reflexed, extending to within 1/3 and 1/4 body length from anterior and posterior extremities, respectively.

Habitat.—Marine (beach, below low-tide mark).

Locality.—Beaufort, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41839.

The genus *Anguinoides* appears to be most closely related to *Deontolaimus* de Man, 1880, but differs from that genus in the presence of cuticularized preanal supplementary organs. The writer sees no reason for assuming Cobb (1920, One hundred new nemas, Contrib. Sci. Nematology, IX, Baltimore, p. 303) in error regarding the tooth of *Onchium ocellatum*, as apparently Bresslau (in Stekhoven, 1935, Nematoda, in Die Tierwelt der Nord u. Osts., v. 5 b) assumed. It appears more probable that the latter author was dealing with a member of the genus *Anguinoides*; if so, the species should be renamed but the present author refrains from doing so, preferring that the material be restudied.

Family PLECTIDAE Oerley, 1880

Leptolaimus maximus, new species

Description.—Oral opening surrounded by 6 small lips bearing papillae of internal circle; external circle represented by 4 well developed setae (I_d and I_v). Amphids circular, with distinct internal tubes (fig. 3, C). Cuticle coarsely striated; lateral alae absent; somatic setae absent; sublateral glands present. Stoma cylindrical, narrow. *Male* (somewhat immature) 2.13 mm long; α , 51; β , 10; γ , 9. Supplementary organs 5 (fig. 3, F), widely spaced on ventral side of posterior third of body. *Female* unknown.

Habitat.—Marine (algae on breakwater).

Locality.—Cape Lookout, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41852.

Leptolaimus maximus differs from *L. papilliger* de Man, 1876, in the presence of cephalic setae and the smaller number of supplementary organs. It differs from *L. setiger* Stekhoven and de Coninck, 1933, in the form of the amphids and its greater size (*L. setiger* being only 950 μ long). The discovery of this species appears to make the differentiation of *Dermatolaimus* Steiner, 1916, from *Leptolaimus* de Man, 1876, impractical since the amphidial form is not sufficiently distinctive. The species *Leptolaimus dittevseni* (Steiner, 1916), n. comb., *L. elegans* (Stekhoven and de Coninck, 1933), n. comb., *L. trichodes* (Kreis, 1929), n. comb., and *L. parelegans* (Allgen, 1934), n. comb., all described in the genus *Dermatolaimus*, are hereby transferred to the genus *Leptolaimus*. All of these species are less than half as large as the present form.

Family LINHOMOEIDAE Filipjev, 1929

Desmolaimus zeelandicus var. *americanus*, new variety

Description.—Cephalic papillae consisting of an internal circle of 6 papillae; external circle consisting of 6 setae, 4 sublateral, 2 median. Amphids circular. Stoma with 2 "rings" (fig. 3, H); esophagus cylindrical, terminated by a well-developed bulb; esophago-intestinal valve (ventriculus of authors) elongated (fig. 3, G). *Male* 1.25 to 1.5 mm long; α , 36 to 43; β , 9 to 11; γ , 9 to 11; ventral preanal region of body very strongly ridged (fig. 3, I). *Female* 1.34 to 1.69 mm long; α , 24 to 31; β , 9 to 12; γ , 10 to 11; vulva dividing body in proportions of 48:52 to 51:49.

Habitat.—Marine (beach, below low-tide mark).

Locality.—Beaufort, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41840.

The present form is nearly identical with *Desmolaimus zeelandicus* de Man, 1880, differing from that species only in the presence of ridges in the preanal region of the male.

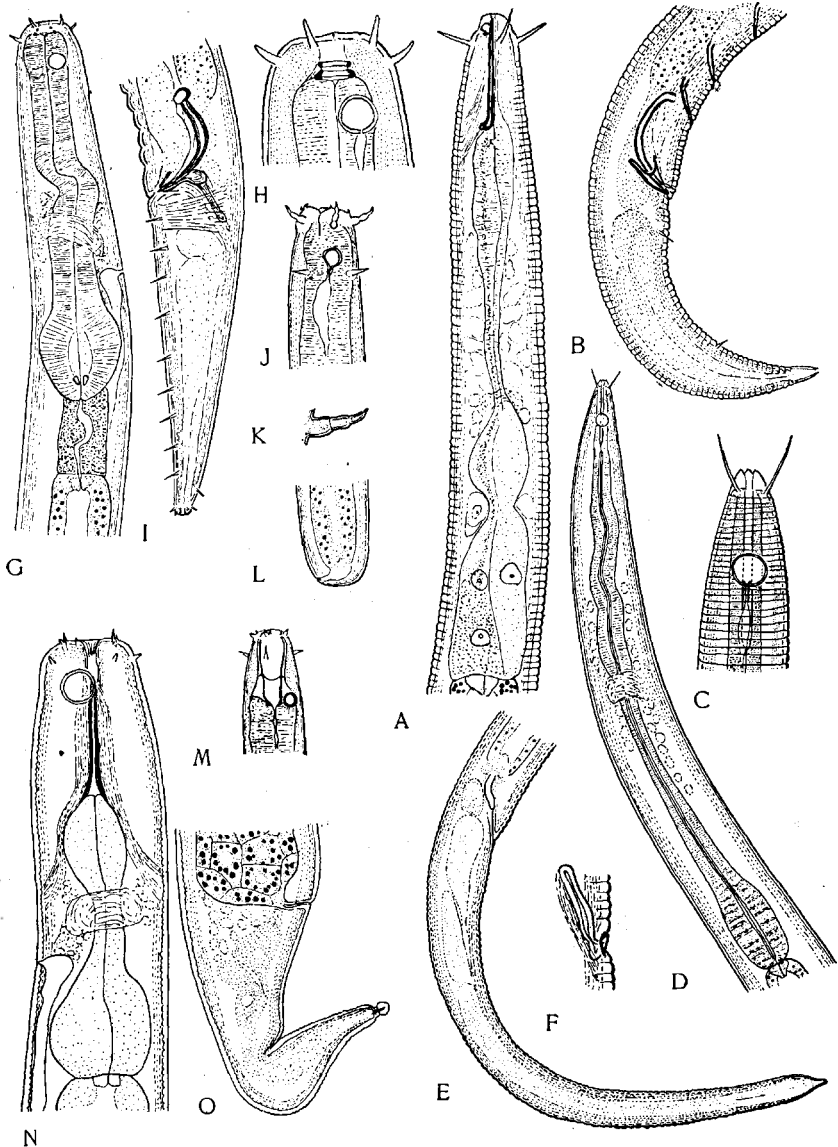


FIG. 3

A-B—*Anguinoides stylosom*. C-F—*Leptolaimus maxinus* (F—Supplementary organ). G-I—*Desmolaimus zeelandicus* var. *americanus*. J-L—*Cytolaimium obtusicaudatum*. M—*Halanonchus macramphidus*. N-O—*Siphonolaimus conicus*.

Family MONHYSTERIDAE de Man, 1876

Cytolaimium obtusicaudatum, new species

Description.—Oral opening surrounded by 3 lips bearing 6 small papillae of internal circle; cephalic setae 6, superficially segmented (fig. 3, K). Amphid broken circle in form; (fig. 3, J); 4 subcephalic setae opposite level of amphids. *Male* unknown. *Female* (immature) 1.33 mm long; α , 39; β , 4.57; γ , 99.9+. Tail extremely obtuse, anus subterminal; caudal glands absent (fig. 3, L).

Habitat.—Marine (depth of 15 feet).

Locality.—Shackleford's Channel, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41841.

Cytolaimium obtusicaudatum differs from the only other species of the genus, *C. exile* Cobb, 1920, in the extremely obtuse form of the tail and the absence of caudal glands.

Halanonchus macramphidus, new species

Description.—Oral opening surrounded by 3 lips; cephalic setae consisting of 1 circle of 12 short setae; 4 subcephalic setae present. Amphids about 1/5 as wide as corresponding head diameter (fig. 3, M). *Male* unknown. *Female* 1.36 to 1.45 mm long; α , 31 to 43; β , 5.4 to 6.1; γ , 29 to 33; vulva dividing body in proportions of 20:80 to 24:76. Ovary extending to within about 1/2.5 body length from posterior extremity. Egg twice body diameter in length. Tail long, narrow, cylindrical.

Habitat.—Marine (beach, below low-tide mark).

Locality.—Beaufort, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41842.

Halanonchus macramphidus differs from *H. macrurus* Cobb, 1920, in that the amphids are twice as large in proportion to the diameter of the body at their level.

Family SIPHONOLAIMIDAE de Coninck and Stekhoven, 1933

Siphonolaimus conicus, new species

Description.—Cephalic setae short, consisting of 6 conoid papillae and 4 small setae; subcephalic setae present. Stoma styletiform; stoma and 3 regions of esophagus (corpus, isthmus, and bulbar region) each about equal in length (fig. 3, N). Intestine containing pigment, nearly black. *Male* unknown. *Female* 4.86 mm long; α , 58; β , 29; γ , 35; vulva dividing body in proportions of 79:21. Tail conically elongated (fig. 3, O).

Habitat.—Marine (beach near low-tide mark).

Locality.—Beaufort, N. C.

Type specimen.—U. S. N. M. Helm. Coll. No. 41843.

Siphonolaimus conicus differs from the majority of species in the genus by the extreme shortness of the cephalic setae; from the remaining species it may be differentiated by the conically elongate tail.

Family DESMOSCOLECIDAE Southern, 1914

Desmoscolex americanus, new species

Description.—Cuticle with 17 large annules (fig. 4, A) bearing concretions (fig. 4, B & C); 2 to 3 striae between annules; setae short, tuboid, subequal in length, arranged subdorsally in pairs on annules 1, 3, 5, 7, 9, 11, 13, 16, and 17, and subventrally on annules 2, 4, 6, 8, 10, 12, 14, and 15 (pair on annule 17 may be either subdorsal or subventral). Pigment spots present. *Male* 430 μ long; α , 6.8; β , 4.4; γ , 4.8. *Female* 460 μ long; α , 5.2 to 5.9; β , 5.2; γ , 5.2; Vulva (†) on 10th annule.

Habitat.—Marine (shallows).

Locality.—Bogue Sound, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41851.

Desmoscolex americanus is extremely close to *D. hupferi* Steiner, 1916, but differs from that species in the separation of the annules by 2 to 3 striae.

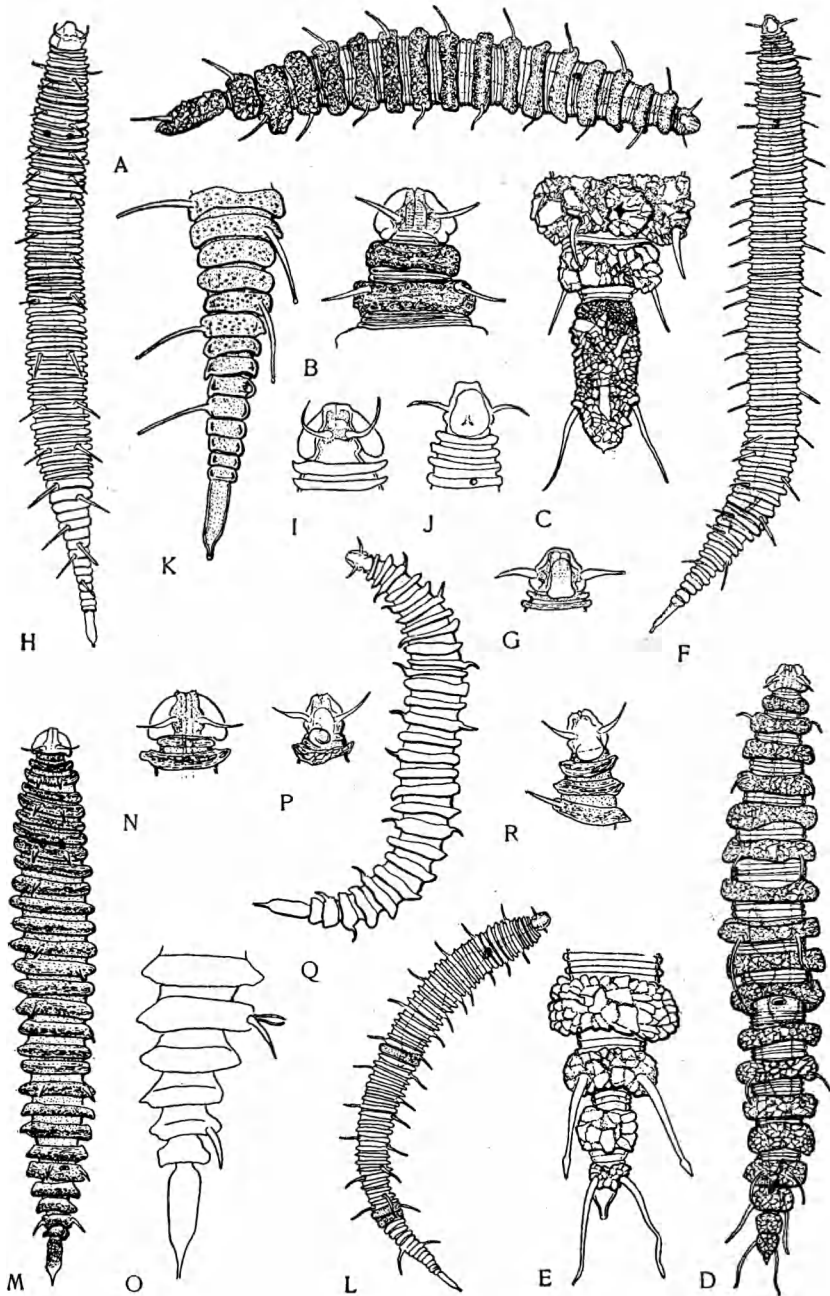


FIG. 4

A-C—*Desmoscolex americanus* (A—Male, lateral view. B—Head, ventral view. C—Tail of male, ventral view). D-E—*D. parvinitus* (E—Tail of female, dorsal view). F-K—*Tricomma adelphus* var. *cylindricauda* (F—Male, lateral view. G—Head of male, lateral view. H—Female, dorsal view. I—Head of female, dorsal view. J—Head of female, lateral view. K—Tail of female, lateral view). L—*T. spinosa*. M-R—*T. aurita* (M—Female, ventral view. N—Head of female, ventral view. O—Tail of female, lateral view. Q—Female, lateral view. P & R—Head of Q, right and left sides).

Desmoscolex paraminutus, new species

Description.—Cuticle with 18 large annules (fig. 4, D) bearing concretions; 2 to 3 striae between these annules. Setae (fig. 4, E) with elongate tips, subdorsal pairs on annules 1, 3, 5, 7, 9, 11, 13, 16, and 18; subventral pairs on annules 2, 4, 6, 8, 12 and 15; unpaired subdorsals on 4 (left side) and 6 (right side); subventral setae on 8th annule elongate. Pigment spots present. *Male* unknown. *Female* 470 μ long; α , 6; β , 5.3; γ , 7.3; vulva dividing body in proportions of 56:44.

Habitat.—Marine (shallows).

Locality.—Bogue Sound, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41850.

Only one other species of *Desmoscolex*, *D. adriaticus* Schepotieff, 1907, is described as having 18 annules. The present species differs from that species in that the interannular regions (fig. 4, D) are narrower than the annules in the regions in the present species, while they are much wider in the latter species. *D. minutus* Claparede, 1863, *D. laevis* Kreis, 1928, and *D. tenuiseta* Filipjev, 1922, are similar in having long subventral setae on the 8th annule but all of these forms have 17 annules.

Tricoma adelpha var. *cylindricauda*, new variety

Description.—Cuticle with dark annules (70-72) definitely separated but interannular striae absent (fig. 4, K); minute concretions on annules. Amphids massive (fig. 4, I). Lateral setae present on 4th annule (fig. 4, J); setae paired but pairs often staggered (fig. 4, H). Ocelli present. *Male* (fig. 4, F) 500 μ long; α , 11.8; β , 6.3; γ , 5; body consisting of 70 annules (annules 55-56 partially fused); tail consisting of 12 annules; 13 pairs of subdorsal setae, 21 pairs of subventral setae. *Female* (fig. 4, H) 476 μ long; α , 11; β , 5.4; γ , ?; position of vulva questionable. Body consisting of 72 annules; 13 pairs of subdorsal setae, 15 (or possibly 17) pairs of subventral setae.

Habitat.—Marine (shallows).

Locality.—Bogue Sound, N. C.

Type specimens.—U.S.N.M. Helm. Coll. No. 41849.

Tricoma adelpha (Greeff, 1869) as described by Schepotieff (1903, Ztschr. Wiss. Zool. 100:191, pl. 8, figs. 17-19) has a more conoid tail than the present form; the setae are said to be irregularly distributed. Aside from these points, the present specimens appear to be the same, but because of the inadequate character of the early descriptions it seems best to give them varietal status until such time as specimens are described from the type locality.

Tricoma spinosa, new species

Description.—Cuticle with 66 coarse annules, annules 51-52 and 63-64 partially fused; annules dark, bearing minute concretions; annules 28 and 50-52 enlarged, dark brownish, chitinous; setae elongate, subequal, pairs somewhat staggered, 12 pairs subdorsal, 14 pairs subventral, 2 pairs sublateral and preanal. Ocelli opposite annules 9-10. *Male* unknown. *Female* (fig. 4, L) 372 μ long; α , 11.9; β , 6.3; γ , 5.1. Vulva on 28th annule, dividing body in proportions of 42:58; anus on 52nd annule.

Habitat.—Marine (shallows).

Locality.—Bogue Sound, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41848.

Among the species of the genus *Tricoma* in which the cuticle has 60 to 70 annules, only *T. steineri* de Man, 1922, and *T. gracilis* Steiner, 1916, have body proportions approaching that of the present species (i. e., the value of α). The relatively great size of the thorny setae immediately differentiates *T. spinosa* from these species.

Tricoma aurita, new species

Description.—Cuticle with 29 deeply marked annules, somewhat separated but apparently without interannular striae (fig. 4, M); annules brownish, chiti-

noid, concretions minute. Amphids vesiculate, with indications of being unispiral (fig. 4, P). Setae short, subequal, spinate; 5 or (?) 6 pairs subdorsal, 9 pairs subventral; setae somewhat staggered (fig. 4, M). Ocelli at level of 7th annule. *Male* unknown. *Female* 410 to 431 μ long; α , 6.3 to 8; β , ?; γ , 4.4; position of vulva questionable. Anus protruberant, on 24th annule.

Habitat.—Marine (shallows).

Locality.—Bogue Sound, N. C.

Type specimen.—U.S.N.M. Helm. Coll. No. 41847.

Tricoma aurita differs from all other species of the genus *Tricoma* in the possession of only 29 annules.

The occurrence of the cestode *Moniezia benedeni* (Anaplocephalidae) in the American moose. WM. L. JELLISON, U. S. Public Health Service (Contribution from the Rocky Mountain Laboratory, U. S. Public Health Service, Hamilton, Montana.

Infestations in moose, *Alces americanus*, with intestinal cestodes determined by the writer as *Moniezia* sp. were recorded by Fenstermacher (1934, Minn. Agr. Expt. Sta. Bull. 308). The material has since been examined by Dr. G. Dikmans, of the U. S. Bureau of Animal Industry and through his courtesy the determination as *Moniezia benedeni* (Moniez) Blanchard is reported. The specimens were collected from a yearling moose autopsied near Grand Marias, Minnesota, October 11, 1933. Over 18 meters of tapeworm sections representing at least 3 individual worms were recovered from the small intestine. The longest unbroken section measured 3 1/2 meters after formalin fixation and contained over 1,000 segments. The host was very emaciated and definitely ill but this condition was not attributed to the *Moniezia* infestation.

Opuscula miscellanea nematologica, III. G. STEINER, U. S. Bureau of Plant Industry.

(1) A NEW SPECIES OF RHABDITIS ASSOCIATED WITH A STRAWBERRY ROOT ROT

Dr. A. A. Hildebrand of the Dominion Laboratory of Plant Pathology in St. Catharines, Ontario, submitted samples of diseased strawberry roots containing large numbers of two nematode species. The disease, a root rot, occurs in the Niagara Peninsula and seems to be of a complex nature, various fungi being associated with these nematodes. The plants submitted came from an experiment, which is described as follows "On June 20th runners of strawberry plants growing in pots in the greenhouse were struck in autoclaved compost soil which, following sterilization, was artificially infested with a form of *Cylindrocarpon* (*Ramularia*) growing on sterilized crushed oats. The roots of the plants were examined microscopically on July 17th. The slides show mycelium and chlamydospores of the fungus (*Cylindrocarpon*), and an abundance of nematodes. The checks have remained absolutely healthy."

The two species of nematodes associated with this disease are *Rhabditis spiculigera*, n. sp., and *Neocephalobus elongatus* (de Man, 1880), n. comb., both present in large numbers. The relationship of these two nematodes to the disease may be that of a carrier in the case of *Rhabditis spiculigera*, whereas *Neocephalobus* may possibly be an agent in producing primary lesions and may be considered as a facultative parasite. However, no exact experiments demonstrating the existence of such an interrelationship have been made, the possible connection of the two forms with the fungi, as suggested above, being based on observations of other related species found under similar conditions. Since one of the two species of nematodes is new, a description follows: