

an irregular shape of the basal oesophageal bulb which envelopes the anterior end of intestine and a more or less straight and comparatively longer tail. However, it comes closest to *B. thylactus* Thorne, 1941 and *B. similis* Khan & Basir, 1963. From the former it can further be differentiated in having a more posteriorly located excretory pore and vulva, while from the latter it differs in the width and nature of lateral field ($\frac{1}{2}$ of body width with four simple lines in *B. similis*), and a comparatively longer spear with more developed knobs.

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Free-living Marine Nematodes, I. *Southerniella youngi*, *Dagda phinneyi*, and *Gammanema smithi*, new species*

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Southerniella youngi n. sp., *Dagda phinneyi* n. sp., and *Gammanema smithi* n. sp., representatives of rarely reported genera with few representative species are described from Pacific Ocean waters. The species are named, respectively, in honor of Drs. R. A. Young, H. K. Phinney, and F. H. Smith, all of Oregon State University.

Southerniella youngi n. sp. (Figure 1, A-C)

MALE (1): L = 0.895 mm, a = 33.1, b = 7.8, c = 10.0.

Only the one male of this species was found. The cuticle is smooth. There is a circle of six small labial papillae followed at a level about midway in the stoma by a circle of four cephalic setae, these being 5.4 microns long. Cervical and caudal setae are present as illustrated. Somatic setae are somewhat shorter than those found in the cervical and caudal regions, and distributed sparsely along four rows (dorso-laterals and ventro-laterals). The amphids are circular, 4.5 microns in diameter (45% of the corresponding head diameter); the anterior rim of the amphid is located 10 microns posteriorly. Body diameter at amphid level is 10 microns.

The stoma is tuboid, 0.9 microns in diameter and 8 microns from base to lips. The esophagus is cylindrical and can be differentiated readily into two sections which are separated by a distinct change in musculature (34 microns posteriorly). An esophageal gland (or glands) is located external of the esophagus directly behind the nerve-ring; unfortunately the specimen at hand provided only a minimum of detail. The nerve-ring is located at 65% of the esophagus. The esophagus terminates in a small, but distinct, cardia.

The excretory pore opens 22 microns posteriorly. The ampulla preceding the excretory duct is distinct; however, the greater part of the tube from the ventral gland could not be resolved. The ventral gland terminates 86 microns posteriorly from the base of the esophagus. There are four cells which appear to be associated with the ventral gland (see fig. 1, B), two located ventrally

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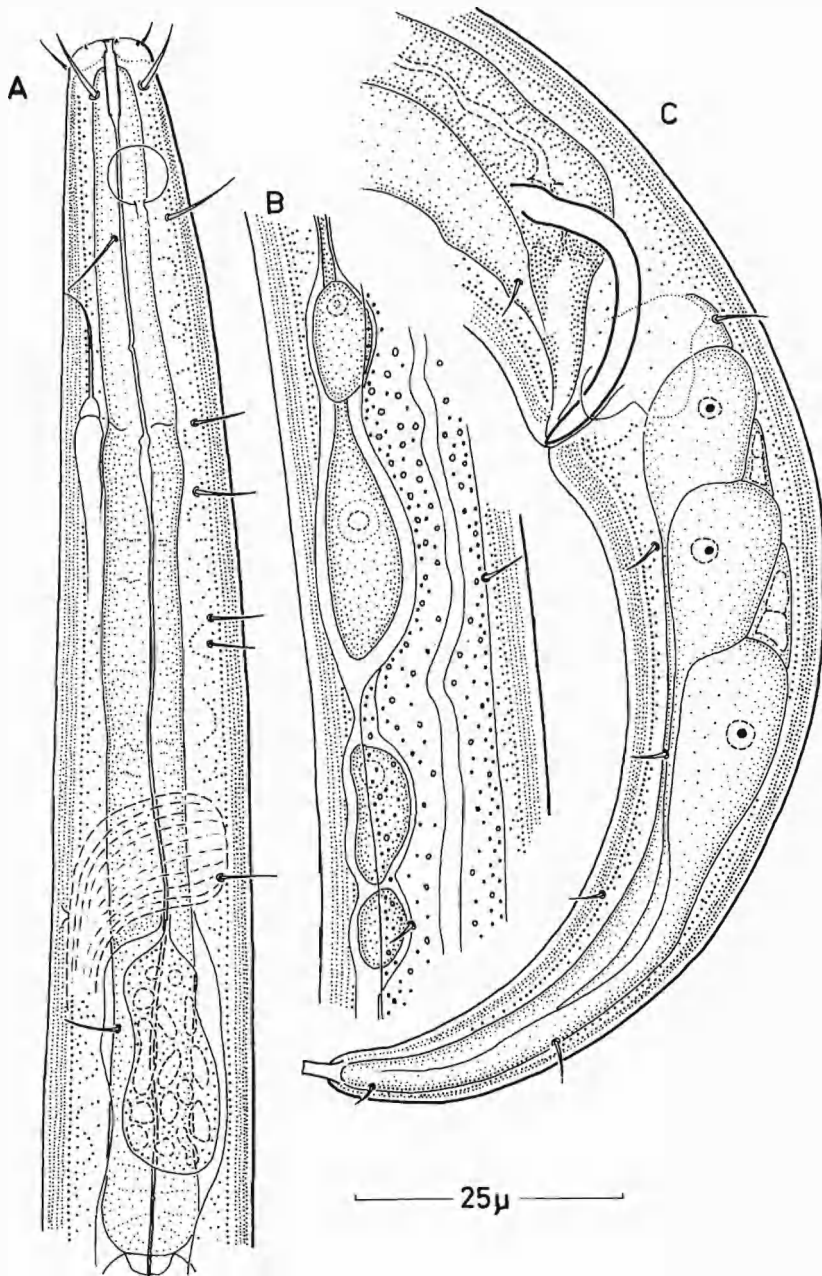


Figure 1. *Southerniella youngi* n. sp. A, anterior region of male, lateral view. B, male, region of ventral gland, lateral view. C, male tail.

(ANT T = anterior testis, C = cells within pseudocoelom, CG = caudal gland, EG = esophageal gland, EJD = ejaculatory duct, INT = intestine, JT = junction of testes, TGZ = growth zone of testis, VD = vas deferens, VG = ventral gland.)

and positioned directly behind the ventral gland in tandem, the remaining two a pair, located ventro-laterally just anterior to the ventral gland on either side of the tubular portion of the gland.

The intestine contains many highly refractive globules; nothing definite could be determined of the contents of the lumen.

The genital system is simple; spicula arcuate, 33 microns long (arc, not chord): a gubernaculum is apparently lacking.

The tail is conoid, 4.4 anal diameters long. Body diameter at level of cloacal opening is 21 microns.

HOLOTYPE: male on slide OSU HM 98, Oregon State University nematode collection: collected 29 August 1961.

TYPE-LOCALITY: inter-tidal sand from Kawaihae, Hawaii.

REMARKS: *S. youngi* is most closely related to *S. simplex* Allgen, 1933. From this species it can be most readily distinguished by the position of the amphids, which in Allgen's description lie opposite the anterior region of the esophagus, the anterior portion of the amphid being adjacent to the cephalic setae, whereas in my specimen the amphid is entirely below the sclerotized portion of the stoma. It is distinguished from what Wieser (1956) considered to be the male of *S. simplex* by lacking a gubernaculum.

Dagda phinney n. sp. (Figure 2, A-C; 5, C-D)

MALE (1): L = 1.75 mm, a = 51.8, b = 6.6, c = 17.5.

A prominently striated nematode with a very heavy cuticle. There is pronounced tapering toward either end. Six rows of somatic setae are present, corresponding in position to the symmetry of the labial papillae. The two lateral rows do not appear to be so well developed as the latero-ventral and latero-dorsal rows. The six labial papillae are quite small. The circle of four cephalic setae lies opposite the base of the stoma: these are about 20 microns long, twice the corresponding head diameter. The stoma is small, about two times as deep as wide, and possesses a powerful, forward projecting, dorsal tooth. The latero-ventral walls of the stoma are also well sclerotized, but there is no evidence of ventral teeth. The amphid is oval, open posteriorly, and is located just behind the lips.

The esophagus terminates in a prominent, conical cardia, possesses a large, muscular basal portion (comprising 27% of the total length), and exhibits a distinct differentiation in musculature in a region about 20 microns posterior from the stoma, the latter reminiscent of the type of esophageal musculature found, for instance, in the genus *Areolaimus*, and present in *Southerniella youngi*. The nerve-ring is located at 50% of the esophagus. The excretory pore, which can be seen only with considerable difficulty, lies just posterior to the nerve-ring. The central portion of the esophagus is surrounded by numerous cells, most of which would appear to be glandular, emptying into the esophagus. Diameter at base of esophagus is 34 microns. It is difficult to determine if the intestine is soenocytic or distinctly cellular in composition. Its walls contain numerous, highly refractive granules. The prerectum is very distinct from the remainder of the intestine, the walls being relatively thin and free of refractive inclusions. The rectum and prerectum are distinctly separated, and joined by a valve-like apparatus, (more complex appearing than a normal sphincter).

The male possesses 24 tuboid supplements. The spicula are simple, arcuate, 42 microns long (arc). The lateral-pieces of the gubernaculum are broadly forked proximally, and toothed distally. The latero-ventral setae are longer

in the region of the ten supplements adjacent to the cloaca than on the remainder of the body. A large ventral papilla is located on the tail; this being preceded anteriorly by a pair of stout genital setae and followed by a similar pair of genital setae midway between the ventral papilla and the tail terminus. The caudal glands are located anterior to the forwardmost supplement. The spinnerett is particularly well-sclerotized. The tail is conical, 3 anal

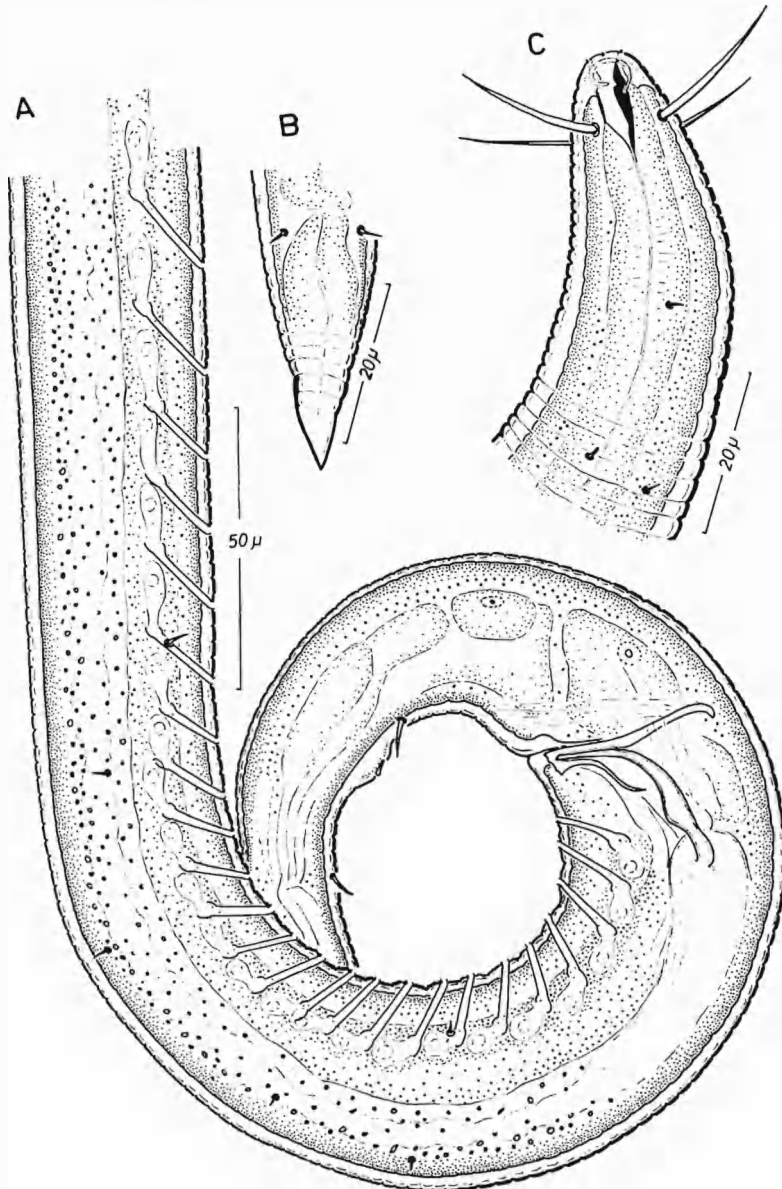


Figure 2. *Dagda phinneyi* n. sp. A, posterior region of male. B, tip of tail, male. C, anterior region of male, lateral view.

diameters long.

HOLOTYPE: male on slide OSU OM 114a, Oregon State University nematode collection. Collected 11 September 1961.

TYPE-LOCALITY: sandy-beach, inter-tidal; Umqua Light House State Park, Oregon.

REMARKS: *D. phinneyi* is the third species to be described within this genus. It is clearly a close relative to the type-species, *D. bipapillata* Southern, 1914. The remaining species, *D. asymmetrica* Gerlach, 1952, is immediately distinguished by possessing six cephalic setae rather than the normal four, and in lacking a distinct basal enlargement of the esophagus. As we become more familiar with nematodes of this group it is unlikely that Gerlach's species can remain within the genus.

D. phinneyi is one-half the length of *D. bipapillata*, bears 24 supplementary organs vrs. 11 for the latter species, and possesses but one distinct dorsal tooth, lacking the prominent subventral teeth of *D. bipapillatus*.

It would appear that the presence of the prominent postanal ventral papilla would be a valid character for this genus, and the lack of the papilla may well prove to be the only valid character separating *Diodontolaimus* Southern, 1914 from *Dagda* Southern, 1914.

Gammanema smithi n. sp. (Figures 3, A-E; 4; 5, A-B)

MALE (1): L = 2.21 mm, a = 41.0, b = 7.3, c = 19.1.

Body of uniform diameter, head blunt with no appreciable tapering; tail conical, taper commencing at anus. Cuticle prominently ringed with regularly arranged punctations, these being in corresponding positions with every other row. Most of the lateral striations appear to be rings which completely encircle the nematode; however, occasionally a ring forks, thus becoming, at least partially, double.

A circle of ten cephalic setae, (6 + 4), are located on the outer rim of the forward surface of the head, these are 5 and 20 microns, respectively, in length. These setae are readily over-looked for one of two reasons: the innate obscurity, particularly of the small lateral setae, and secondly due to the ease with which they break off at the base. There is a circle of six stout labial papillae each apparently encircled by a thin, membranous sheath. A complex circumoral system of rods and membranes was to be seen, but not without difficulty (see fig. 3, E). Somatic setae are sparse, apparently present only in two latero-ventral rows, probably not exceeding 14% of the body diameter in length. Cuticular pores are present running in one lateral row down either side. These are of simple structure, lie in the annules (that is between the punctate striae, without interrupting the latter) and appear at regular intervals with about 34 striations between pores. There are as well four rows of papillae, these corresponding in position to the long cephalic setae. The papillae are not located in the annules, as are the lateral pores, but rather interrupt the striae (fig. 3, D). The interval between papillae is probably the same as that for the lateral pores, however they do not lie laterally in juxtaposition, rather appearing about midway between the pores in relative lateral position. In the cervical region there are additional papillae, however, it is difficult to interpret these as having any particular arrangement.

The amphids are prominent spirals of three turns, interrupting approximately 10 striations (there is about a 10% frequency of anastomosing and forking of striae in this region): they are 14 microns in diameter, about

27% of the corresponding body diameter. The amphids are located approximately opposite the lower portion of the stoma.

The stoma is typically tri-radiate, and divisible into a cyathiform anterior half and a more or less cylindrical posterior half. Midway between the three grooves in the forward half of the stoma (which correspond to the esophageal radii) are located paired sclerotized stomal thickenings which terminate at

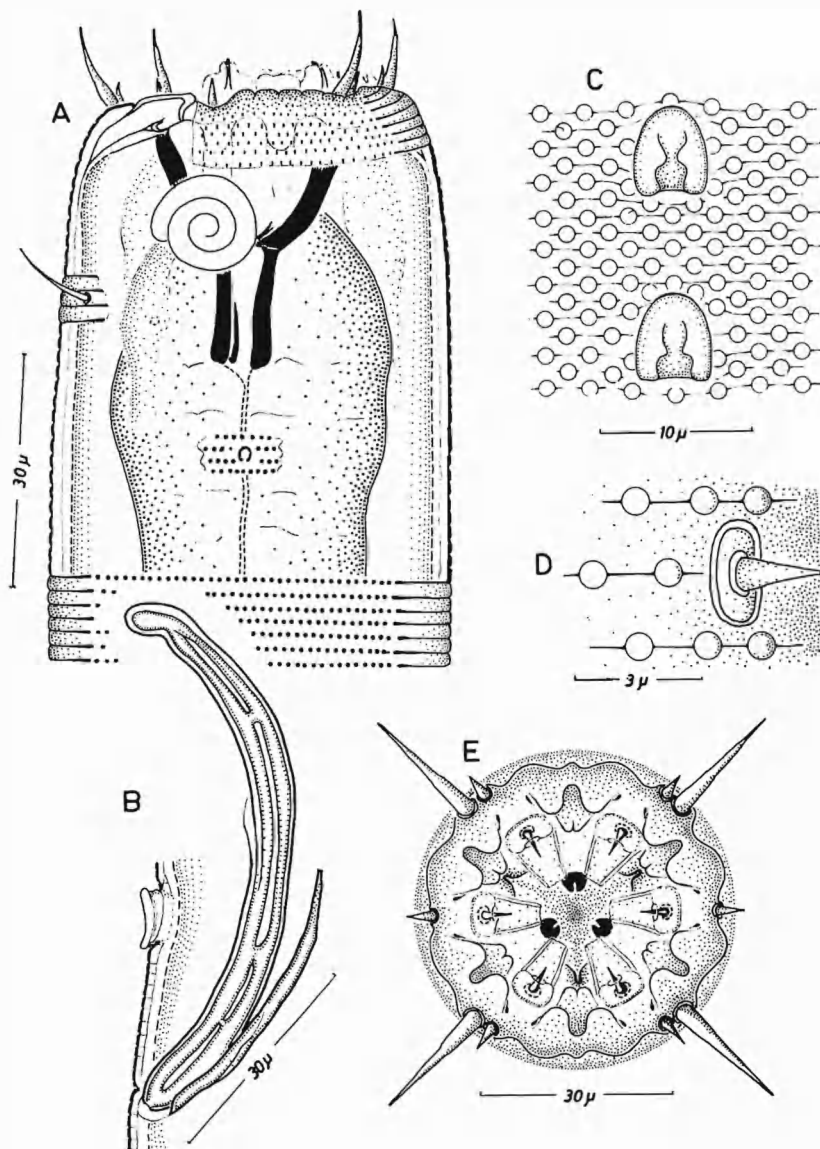


Figure 3. *Gammanema smithi* n. sp. A, male head, lateral view. B, spicular apparatus. C, ventral view of supplements. D, somatic papilla. E, face view of male.

the juncture of the two stomal halves and then project centrally and posteriad so as to form three pairs of powerful teeth.

For the greater part of its length, the esophagus is cylindrical, increasing slightly in diameter at the posterior end to form a none-the-less distinct basal bulb. The position of the nerve-ring could be determined only with difficulty because of the abundance of refractive cells (pseudocoelomocytes?) surrounding the esophagus. Cardia ill-defined, apparently embedded within

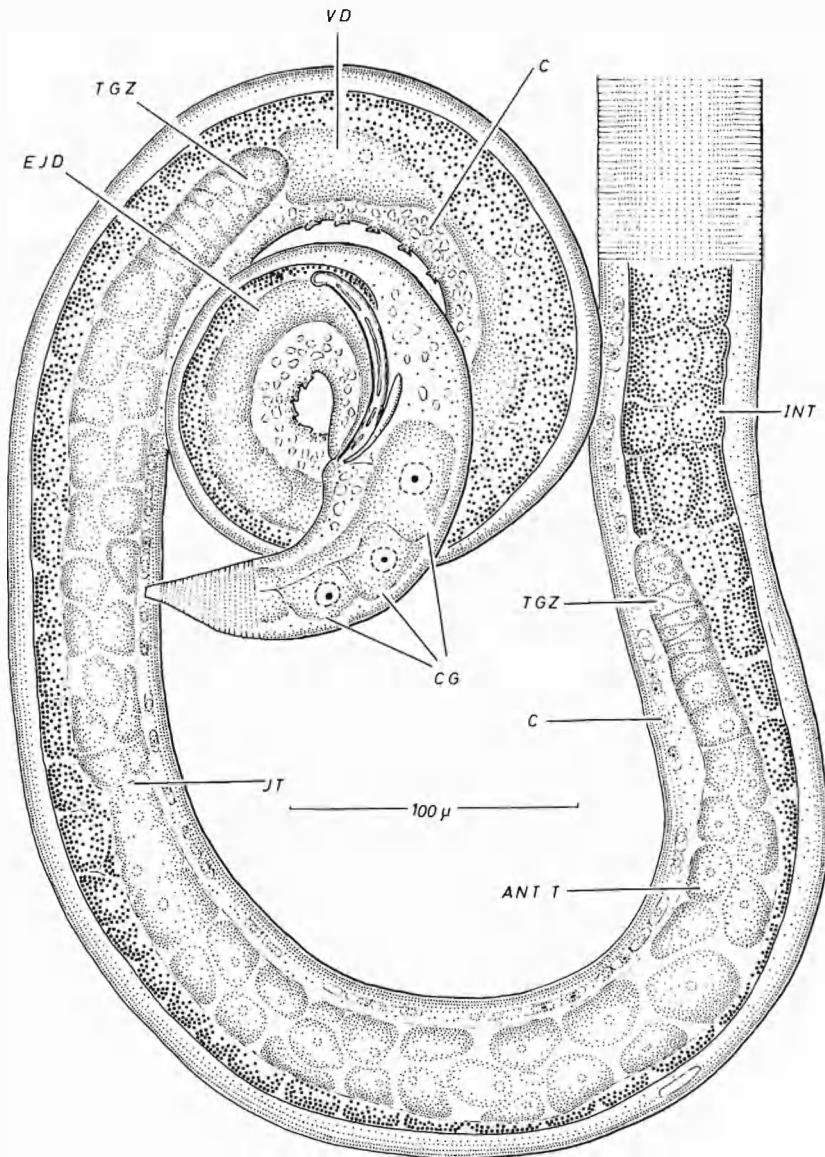


Figure 4. *Gammanema smithi* n. sp., posterior region of male.

intestinal tissue. Neither the limits of the ventral gland, nor the location of the excretory pore could be determined.

The intestine is composed of large, brightly pigmented (rust-orange) cells. Nothing could be determined of the contents of the lumen.

Testes paired, outstretched (see fig. 4), vas deferens leading to a powerful ejaculatory duct. The spicula are 78 microns long, well sclerotized, and form a moderate arc. Lying within the spicular are a series of interrupted, sclero-

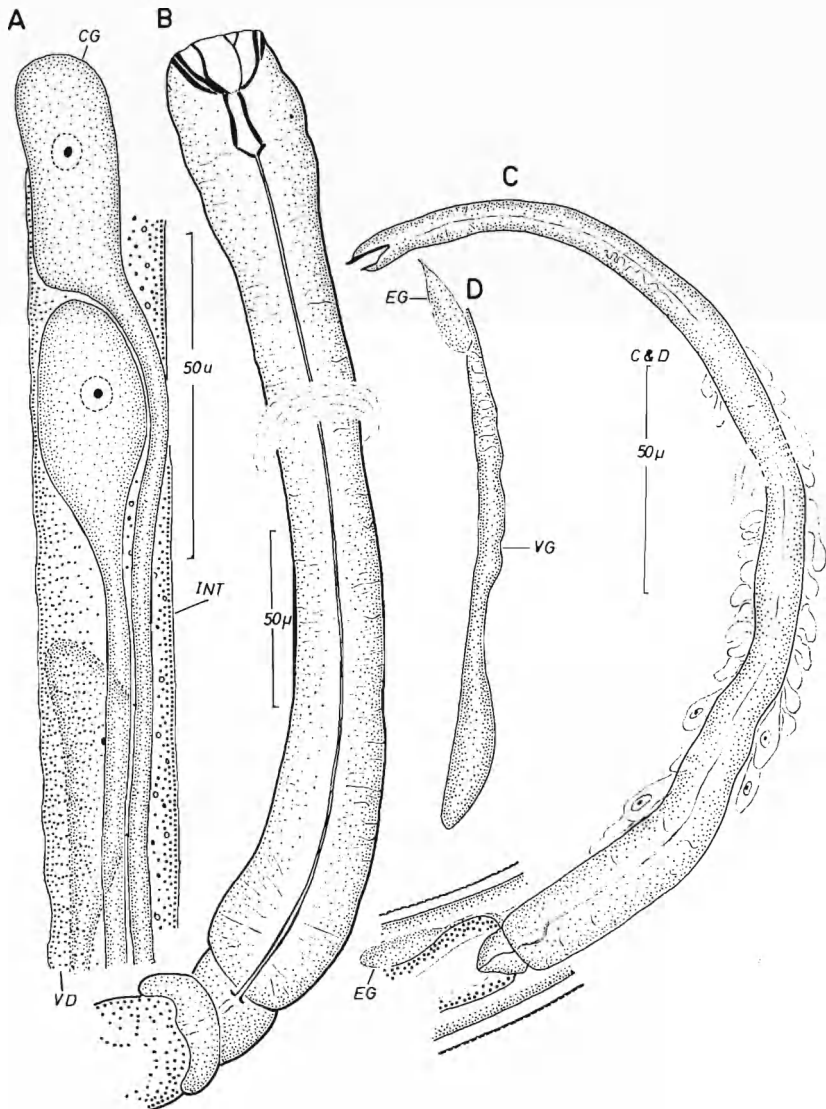


Figure 5. A-B: *Gammanema smithi* n. sp., C-D: *Dagda phinneyi* n. sp. A, caudal glands. B, esophagus. C, esophagus. D, ventral gland. (EG in both cases the same).

tized pieces. The gubernaculum is paired. There are 20 prominent, cup-shaped supplements, the anteriormost being 412 microns from the anus. No genital setae are present.

The tail is conical, about three anal diameters long. The three caudal glands are all contained within the tail.

HOLOTYPE: male contained on slide OSC WM 68c, Oregon State University nematode collection; collected on 14 September 1960.

TYPE-LOCALITY: inter-tidal sand, Bainbridge Island, Puget Sound, Washington.

REMARKS: *G. smithi* is most closely related to the type species of the genus, *G. ferox* Cobb, 1920. It is unfortunate that Cobb failed to illustrate the male genital systems inasmuch as these structures are of utmost importance in classification. The spicula of my species possess very distinct median sclerotizations, a feature as prominent as the external sclerotization of the spicula and not likely to have been overlooked by Cobb, and thus assumed not present in *G. ferox*. The latter species possesses 16 inconspicuous supplements, *G. smithi* possesses 20 (same count on both of two males studied) very conspicuous supplements. The intestine of *G. ferox* is composed of two distinctly different cell types, these containing refractive, but unpigmented granules . . . the mixing of cell types is most pronounced anteriorly: *G. smithi* appears to have but one cell type in the intestinal composition, definitely no recognizable mixture anteriorly, and the cells are brightly pigmented. The 12 labial organs illustrated by Cobb as "free" structures, i. e., setose, are present on *G. smithi*; however, from face view I believe these to be connected at least in pairs, and perhaps entirely, by a fine membrane. *G. smithi* possesses three pairs of onchia, distinct from both lateral and face views; *G. ferox* has 3 unpaired onchia. A distinct esophageal bulb is present in the former, lacking in the latter. The testes of *G. ferox* are described as being short, and outstretched (perhaps because a young animal was observed; however, Cobb's description is emphatic enough to suggest that he considered this condition normal of a mature male), in *G. smithi* they are prominent, occupy a considerable portion of the body area, and are reflexed.

Gerlach (in press) synonymizes *G. ferox* with *Halichoanolaimus rapax* Ssaweljev, 1912. The latter description was without illustration, rendering any subsequent comparison doubtful at best . . . thus I have not accepted the synonymy. In the same paper, Gerlach describes *G. rapax* (Ssaweljev, 1912) from Helgoland (Abb. 10, a-b). I believe this particular species could be readily distinguished from *G. ferox* Cobb, 1920 on the basis of a broad, short spiculum and prominent supplements. Further collections from this locality will probably enable description of a new species.

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