New Species of Bunonematoidea (Rhabditida) from Georgia and Tennessee

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Abstract: Three new species of Bunonematidae (*Bunonema husseyi, Rhodolaimus dimorphus, R. stephaniae*) and one of Pterygorhabditidae (*Pterygorhabditis panoplus*) are described from Georgia and Tennessee. The juvenile external morphology of *P. panoplus* is described and illustrated. A lectotype of *P. pakistanensis* is designated and the two species compared, and the dissimilar nature of cuticular tubercles in *Bunonema* and *Rhodolaimus* is discussed. *Key Words: Bunonema, Rhodolaimus, Pterygorhabditis,* microbivores, taxonomy.

Bunonematoidea have rhabditid-like internal organs but are characterized by radical external asymmetry of the lip region and of the right side of the body. They are believed to feed on bacteria (5, 6) and perhaps on fungi (6). A number of bunonematoid species were found recently among nematodes obtained from mosses and rotted wood. Two of the species found were *Bunonema reticulatum* Richters and *B. richtersi* Jägerskjöld, but four others have not been described and are described here. All six species were established in xenic cultures.

MATERIALS AND METHODS

Specimens of three new species of Bunonematidae were obtained by suspending samples of moss, rotted wood, or forest leaf litter in water and pouring the suspension through nested sieves with openings of 0.420 and 0.037 mm. The residue on the sieve with the smaller openings was either concentrated by Mankau's method (3) or processed by a sugar flotation-centrifugation method (2), after which individual nematodes were picked out singly. Concentrated residues or nematodes were placed on 1% or 2% water agar for subsequent culture of associated bacteria. Transfers to new agar plates were made as necessary. A new species of *Pterygorhabditis* was found in numbers sufficient for description of adults, and was also established in xenic culture to obtain juvenile stages. Temporary mounts of males in polyvinyl alcohol–lactophenol were made to determine fusion of spicules.

Specimens concentrated in a small amount of water were fixed by pouring a large volume of hot 4% formalin on them; they were then processed to glycerin by a rapid process (7). Gonad measurements are of the distance from the gonopore to the distal flexure.

Bunonema husseyi n. sp.
Figs. 1–8; Table 1

Measurements and ratios are given in Table 1.

Description. Females: Relatively small and stout bunonematids, becoming plumper with age. Ornamentation on right side consisting of 12–21 pairs of tubercles arranged in two rows (Figs. 1, 2), a single tubercle posteriorly; each tubercle with usually two (sometimes 3–4) thickened rods; the height of tubercles appears to be inversely proportional to the total number. Tubercles firmly attached to nematode body. Polygonal pattern between tubercles rather coarse, irregular, extending nearly to dorsal and ventral ridges; pattern becoming obscure on tail (Figs. 6, 7). In cross-section, left lateral crawling ridge bilobed, the other four entire (Fig. 8).

Lip region on right side consisting of a central projection flanked by two smooth, posteriorly lobed setae; a pair of setae located dorsally and ventrally, and a papilla located between each of these setae and the lobed setae (Fig. 3). On left side, a pair of smooth setae subventrally and subdorsally, their bases obscured by leaflike tetrafurcate setae (Fig. 4).

Stoma cylindrical; cheilorhabdions, telorhabdions distinct, the last forming a small posterior chamber (Fig. 3). Esophagus rhabditoid, metacorpus prominent; basal bulb with crescentic thickenings of the ventral and subdorsal rays embracing the bulb flaps; haustrulum with three short rods. Esophageal gland nuclei not observed.

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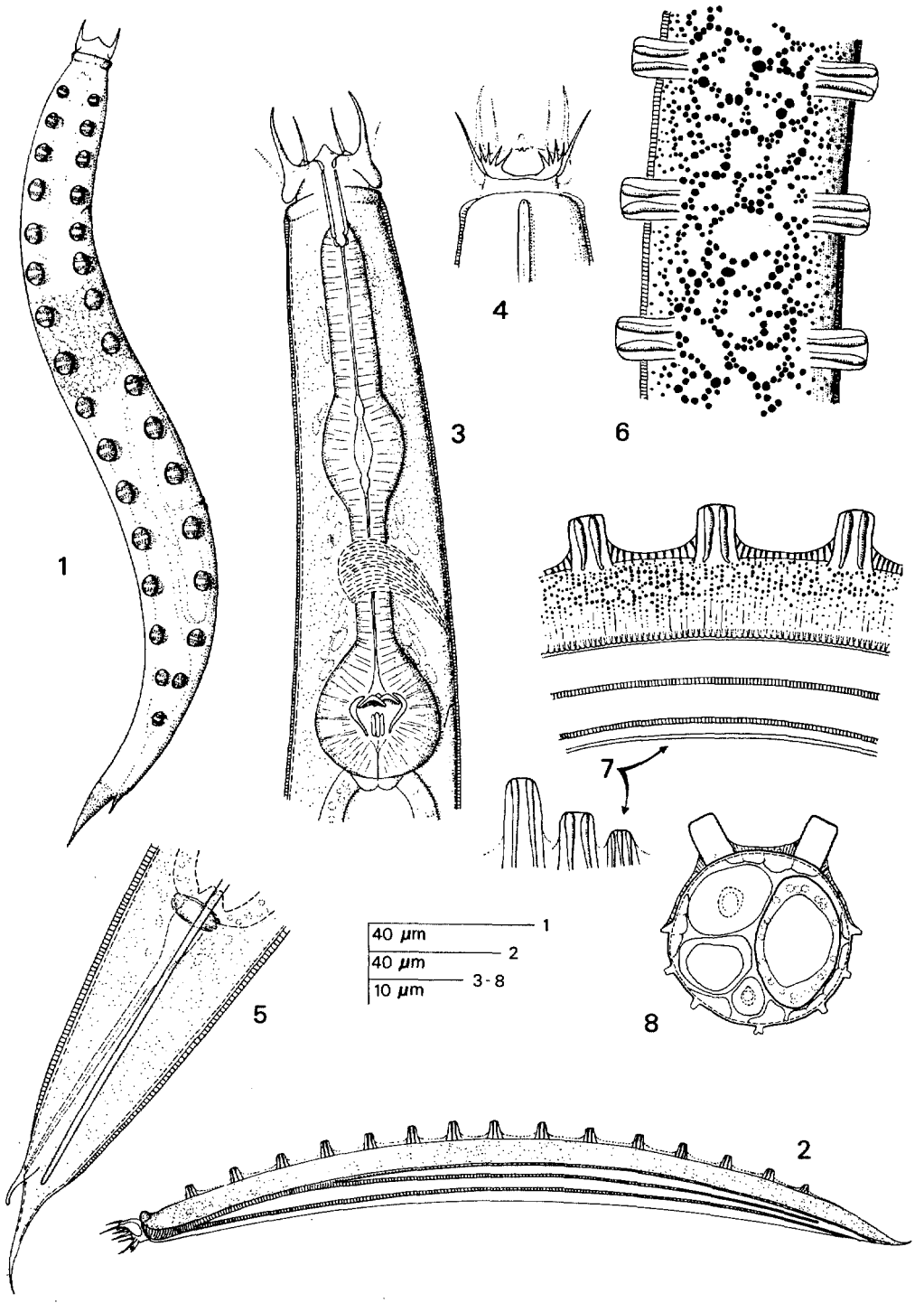

FIG. 1–8. *Bunonema husseyi* n. sp. *1)* Entire female, right side. *2)* Entire female, dorsal view. *3)* Female anterior region, right side. *4)* Female lip region, left side. *5)* Female posterior region, left side. *6)* Midbody cuticular ornamentation, right side. *7)* Midbody ornamentation, ventral view. *8)* Midbody cross-section.

TABLE 1. Measurements and ratios for *Bunonema husseyi*, n. sp.

	Holotype ♀	Paratype ♀♀ (n=20) Mean	Range	SD
Length (μm)	269	261	248 -282	8.42
a	13.0	13.1	11.3 - 14.8	1.04
b	3.64	3.52	3.40- 3.71	0.09
c	—[a]	15.5[a]	13.9 - 17.2	1.40
G1 (%)[b]	13.2	13.4	10.2 - 16.5	1.44
G2 (%)[b]	11.3	11.0	9.2 - 13.4	1.14
V (%)	53.1	53.6	50.8 - 56.8	1.74

[a]Exact tail length not discernible on holotype; values for paratypes based on four measurable specimens. [b]G1 = length of anterior gonad to flexure × 100/body length; G2 = length of posterior gonad to flexure × 100/body length.

Nerve ring crossing esophagus at isthmus; excretory pore opposite basal bulb. Hemizonid and other refractive cuticular elements not seen. Gonads didelphic, amphidelphic, and reflexed. Sperms absent.

Rectum about twice as long as the body width at the rectointestinal junction (Fig. 5). Tail conical, tapering to a fine tip.

Males: None found.

Types and locality: Type specimens were selected from a mass collection out of a culture maintained in the Department of Agricultural Biology, University of Tennessee, Knoxville, and deposited in the USDA Nematode Collection (USDANC), Beltsville, Maryland (holotype female: slide T-301t; paratypes: T-2364p, T-2368p, T-2369p). The culture was derived from specimens in rotted wood gathered at the University of Georgia Botanical Gardens, Clarke County, Georgia. The species has been found also in Tennessee and Michigan. Additional slides of paratypes deposited in the University of California Nematode Collection (UCNC), Davis, California; Michigan State University Nematode Collection (MSUNC), East Lansing, Michigan; and the Purdue University Nematode Collection (PNC), West Lafayette, Indiana. This species is named after Dr. Richard S. Hussey.

Diagnosis: B. husseyi appears closely related to *B. richtersi*. Specimens of the latter species were collected in Georgia and Michigan and studied for comparison. The following differences occur consistently: setae of left side of lip region tetrafurcate, leaflike in *B. husseyi*, simple and pointed in *B. richtersi;* large tubercles usually 21 pairs or fewer on *B. husseyi*, usually 22 or more on *B. richtersi;* polygonal ornamentation of *B. husseyi* coarse (three or fewer polygons between tubercle pairs), ornamentation of *B. richtersi* fine (4-5 polygons between tubercle pairs). Sachs (6) gives illustrations of *B. richtersi*.

Rhodolaimus dimorphus n. sp.
Figs. 9–19; Table 2

Measurements and ratios are given in Table 2.

Description. Adults: Relatively slender Bunonematidae, characterized on the right side by about 35 tubercles arranged in two rows and obliquely offset (Figs. 9, 17), and 1–2 midlateral tubercles anteriorly and posteriorly. Tubercles of various sides depending partially on location on body: first tubercle usually large, hatchet-shaped, 2nd tubercle almost always reduced; these and remaining body tubercles as shown in Fig. 17; each tubercle bearing several embedded, fine rods. Polygonal network on right side fine, with five or more figures between tubercles (Fig. 16); tiny protuberances which form polygon corners arising from body annules (Fig. 17). Both tubercles and meshlike ornamentation easily abraded, apparently without immediate harm to the nematode. Rarely, some individuals without tubercles arising in culture, but no intermediate forms seen. In cross-section, usually five unlobed crawling ridges on the left side; in one case, six ridges seen (Figs. 18, 19).

Lip region on right side with a triangular central projection, with a lobed seta on each side; this seta pectinate, with five inward-pointing bristles. Between central projection and each pectinate seta, a minute papilla; dorsally and ventrally, a smooth, pointed seta; on the left side, slightly thickened basal ridges, each bearing two setiform projections (Figs. 10–12).

Stoma cylindrical, only the cheilorhabdions separate; basal bulb with symmetrical crescent-shaped thickenings of the ventral and subdorsal rays; rods in the haustrulum slender. Esophageal gland nuclei not seen. Nerve ring crossing isthmus medially; excretory duct and pore at an-

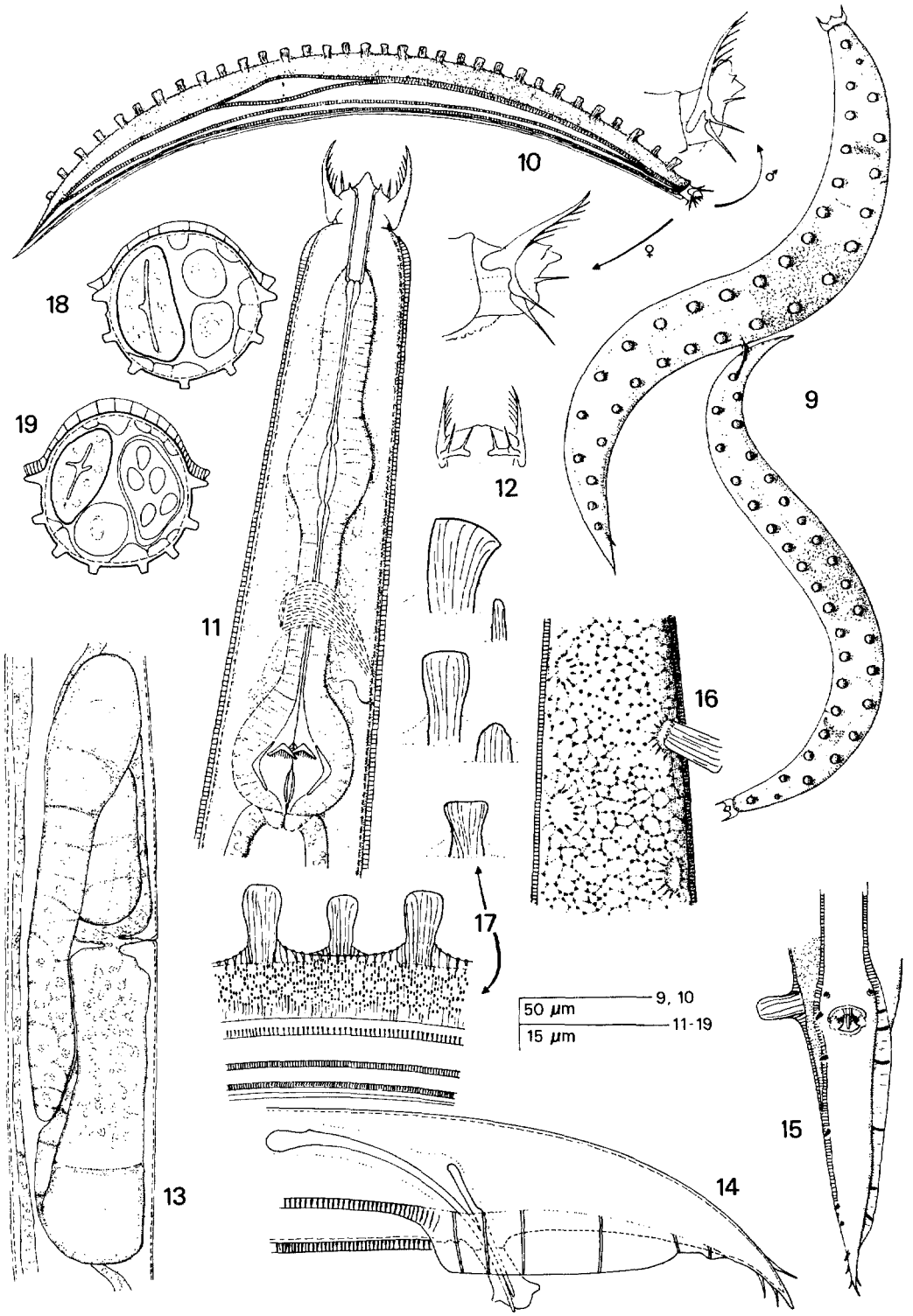

FIG. 9–19. *Rhodolaimus dimorphus* n. sp. *9)* Entire male and female, *in copula*. *10)* Entire female, ventral view, and ventral views of male and female lip regions. *11)* Female anterior region, right side. *12)* Female lip region, left side. *13)* Female reproductive system. *14)* Male posterior region, left side. *15)* Male posterior region, ventral view. *16)* Midbody cuticular ornamentation, right side. *17)* Midbody ornamentation, ventral view, and various tubercle shapes (top to bottom): first tubercle, second tubercle, midbody tubercle, reduced body tubercle, midbody or posterior tubercle. *18)* Midbody cross-section with five subventral, left and subdorsal ridges. *19)* Same, with six ridges.

TABLE 2. Measurements and ratios for *Rhodolaimus dimorphus*, n. sp.

	Holotype ♀	Allotype ♂	Paratype ♀♀ (n=10)			Paratype ♂♂ (n=10)		
			Mean	Range	SD	Mean	Range	SD
Length (μm)	280	256	275	261 -303	12.19	257	248 -263	5.76
a	16.9	18.1	17.3	15.8 - 19.9	1.35	20.6	19.3 - 22.7	1.24
b	3.52	3.44	3.56	3.27- 3.84	0.15	3.45	3.29- 3.77	0.15
c	13.5	7.52	14.8	13.3 - 15.9	0.93	7.89	7.07- 9.23	0.55
G1 (%)[a]	11.2	—	12.4	10.4 - 14.2	1.24	—	—	—
G2 (%)[a]	9.0	—	10.8	8.9 - 14.1	1.70	—	—	—
V (%)	60.1	—	59.9	56.7 - 63.6	2.53	—	—	—
T (%)	—	28.4	—	—	—	30.7	26.7 - 35.6	2.9
Spicule length (μm)	—	25.5	—	—	—	26.8[b]	—	—
Gubernaculum length (μm)	—	—[c]	—	—	—	10.7[b]	—	—

[a]G1 = length of anterior gonad to flexure × 100/body length; G2 = length of posterior gonad to flexure × 100/body length.
[b]Only one paratype clearly measurable.
[c]Not measurable on allotype.

terior level of basal bulb. Hemizonid not seen (Fig. 11).

Female: Stouter than male, tubercles usually larger. Gonads paired, amphidelphic, reflexed; the unreflexed region serving as a combination uterus and spermatheca; sperms ameboid (Fig. 13).

Male: Right side of lip region prolonged as a large papilla which is lacking in the female (Fig. 10).

Testis reflexed distally about one body width. Bursa asymmetrical, well developed on left side, rudimentary on right (Figs. 14, 15). On left side, a preanal papilla and 6 bursal rays: one preanal, one anal, and four postanal; on right side, the same complement of papillae, except for absence of the anal papilla. Tail tip with several pointed papillae. Spicules slender, cephalated, and fused distally; troughlike gubernaculum slender except for hatchet-shaped terminus.

Types and locality: Type specimens selected from mass collection from a laboratory culture; culture started from specimens found in organic litter from a potted pine in a greenhouse at the University of Georgia, Athens. Holotype female (T-302t), allotype male (T-303t), and paratypes (T-2365p, T-2370p, T-2371p) deposited in USDANC, Beltsville, Maryland. Additional paratypes deposited in UCNC, MSUNC, and PNC. The species is named to note the rare form without tubercles seen occasionally in laboratory cultures.

Diagnosis: In the arrangement and general appearance of the tubercles, *R. dimorphus* most closely resembles *R. jakobii* (Sachs) Andrassy (6), but differs most noticeably in the arrangement of bursal rays, all of which are anal or caudal in *R. jakobii.* The first three rays on *R. dimorphus* are grouped together, whereas those of *R. jakobii* are spread out evenly. In addition, *R. dimorphus* lacks the 9–12 simple, small tubercles that *R. jakobii* possesses posteriorly. *R. dimorphus* also is shorter and more slender.

Rhodolaimus stephaniae n. sp.
Figs. 20–31; Table 3

Measurements and ratios are given in Table 3.

Description. Adults: Relatively large, stout Bunonematidae without tubercles (Fig. 21); ornamentation of right side variable (Figs. 20, 27–29), ranging from a slender double row of small hemispherical nodes (Fig. 28) to four heavy longitudinal ridges (Figs. 27, 29); ridges in some forms connected transversely, and with annulation. Polygonal ornamentation (Fig. 30) most highly developed on forms with little longitudinal ridge development, but always absent midlaterally. In cross-section (Fig. 31), five bilobed longitudinal crawling ridges on the left side alternating with six tiny triangular projections.

Lip region on right side (Fig. 22) with a large triangular central projection, flanked on each side by a minute papilla and a posteriorly lobed smooth seta; dorsally and ventrally, a swollen papilla; on the left side subventrally and subdorsally (Fig. 23), a short papilla and a smooth seta. Amphids visible, porelike, larger on the right side (Fig. 22), exceedingly small on the left side (Fig. 23).

Stoma slender, cylindrical; only the cheilorhabdions separate (Fig. 22). Metacorpus of esophagus very well-developed; in the basal bulb, thickenings of the ventral and subdorsal rays sharply bent, longer in the posterior part; rods in the haustrulum slightly thicker posteriorly. No esophageal gland nuclei seen. Nerve ring crossing isthmus at the middle; excretory pore at anterior level of basal bulb. Hemizonid not seen.

Female: Gonads didelphic, amphidelphic, and reflexed, very similar to those of *R. dimorphus.* Sperms ameboid.

Male: Right side of lip region prolonged into a large papilla, possibly the position of the amphid (Fig. 21).

Testis reflexed distally one body width. Bursa asymmetrical (Fig. 25), well developed on the left side, with four ribs: one just post-anal, one about in the middle, two posterior (Figs. 24), these rays matched by papillae on the right side. Preanally, right and left sides with two papillae each, with two additional papillae on the most ventral longitudinal crawling ridge. At the tail tip, two pairs of papillae. Spicules slender, cephalated and fused distally; troughlike gubernaculum sharply flared distally (Figs. 24, 26).

Type specimens and locality: Laboratory culture started from specimens recovered from rotted wood in the University of

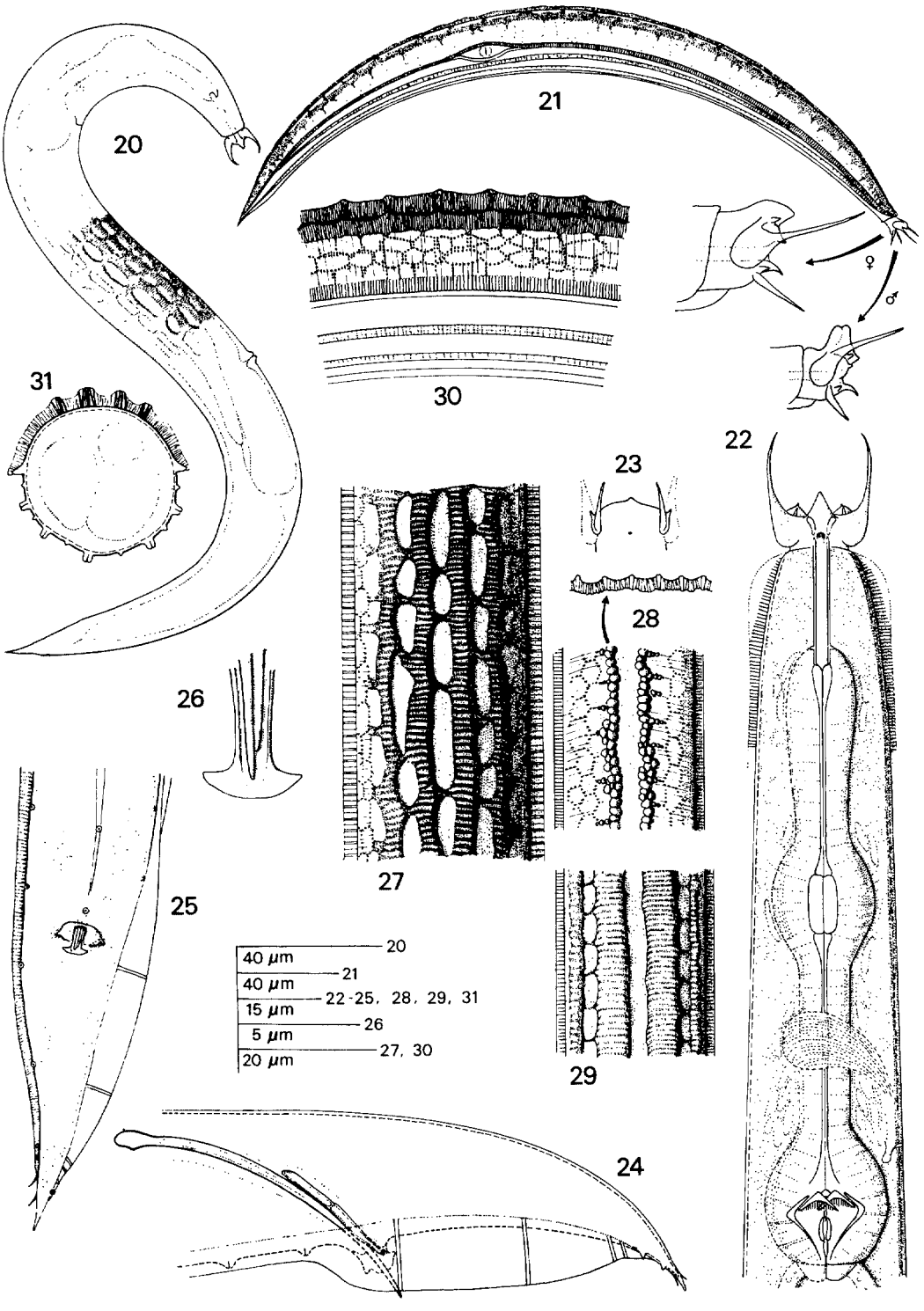

FIG. 20–31. *Rhodolaimus stephaniae* n. sp. *20)* Entire female, right side. *21)* Entire female, ventral view, and ventral views of female and male lip regions. *22)* Female anterior region, right side. *23)* Female lip region, left side. *24)* Male posterior region, left side. *25)* Male posterior region, ventral view. *26)* Apices of gubernaculum and spicules. *27)* Midbody cuticular ornamentation, right side. *28)* Variation of cuticular pattern, and profile view of tubercle region. *29)* Variation of cuticular pattern. *30)* Midbody ornamentation, ventral view. *31)* Midbody cross-section.

TABLE 3. Measurements and ratios for *Rhodolaimus stephaniae*, n. sp.

	Holotype ♀	Allotype ♂	Paratype ♀♀ (n=10)			Paratype ♂♂ (n=10)		
			Mean	Range	SD	Mean	Range	SD
Length (μm)	315	290	307	290 -333	15.4	254	237 -261	8.8
a	11.5	15.2	11.3	10.5 - 12.2	0.52	12.8	11.8 - 15.7	1.27
b	4.37	4.16	4.22	3.96- 4.49	0.18	3.80	3.57- 3.92	0.10
c	18.2	7.89	18.0	16.2 - 19.5	1.06	7.72	7.21- 8.33	0.46
G1 (%)[a]	17.0	—	16.8	15.3 - 18.9	1.19	—	—	—
G2 (%)[a]	16.2	—	15.1	13.5 - 16.4	0.76	—	—	—
V (%)	58.0	—	59.3	53.1 - 62.8	2.95	—	—	—
T (%)	—	30.0	—	—	—	28.0	23.1 - 31.4	2.81
Spicule length (μm)	—	42.0	—	—	—	39.7[b]	36.2 - 42.2	—
Gubernaculum length (μm)	—	—[c]	—	—	—	15.2[d]	—	—

[a]G1 = length of anterior gonad to flexure × 100/body length; G2 = length of posterior gonad to flexure × 100/body length.
[b]Spicules on only three paratypes measurable.
[c]Not measurable on allotype.
[d]Only one gubernaculum measurable.

Georgia Botanical Garden, Clarke County, Georgia; type specimens selected from a mass collection from culture. Holotype female (T-304t), allotype male (T-305t), and paratypes (T-2366p, T-2372p, T-2373p) deposited in USDANC, Beltsville, Maryland. Additional paratypes deposited in UCNC, MSUNC, and PNC.

This species, also seen from several wooded sites in East Tennessee, is named for my wife, Stephanie.

Diagnosis: In the development of the cuticular pattern, *R. stephaniae* resembles no other *Rhodolaimus* sp. *Bunonema striatum* Andrassy (1) bears a similar type of ornamentation, but differs by generic characters.

Pterygorhabditis panoplus n. sp.
Figs. 32–55; Table 4

Measurements and ratios are given in Table 4.

Description. Adults: Body straight to slightly curved ventrally when heat-relaxed, basically cylindrical and tapering at both ends (Fig. 32). In life, color a light brownish yellow, becoming much darker anteriorly. Ornamentation of body highly asymmetrical, dominated by strong longitudinal ridges dorsally, ventrally and on the right side (Fig. 37). Most anteriorly, ornamentation consisting of an oval shield formed from flattened transverse ridges. Surmounting the shield, a narrowly oval series of dumbbell-like bosses (Fig. 33). In the female, eleven longitudinal ridges (Fig. 37); the male with nine ridges. The centermost ridge (right lateral) strong, extending from the anterior esophageal region to the anal level; three ridges extending right subdorsally and right subventrally, each with four points in cross-section (Fig. 37); in the male, one of these three ridges missing on each side. Dorsally and ventrally, very strong three-pointed ridges present; subventrally and subdorsally, truncate ridges. On the left side, two longitudinal ridges, appearing as very small triangular projections of cuticle in cross-section. Largest ridges more than one-third of the body thickness. Entire body, except lip region, enveloped in a transparent, thin cuticular sheath which seems constantly lobed on the large ventral, dorsal, subventral, and subdorsal ridges, and on the two triangular projections of the left side (Fig. 37). Sheath forming a long sleeve extending from the anus (Fig. 36). Tail of female with platelike thickenings.

Head region retractile and mobile; on right side with a rounded protuberance, on each side of which is a long tapering cephalic seta (Fig. 33). Two papillae each on dorsal and ventral side (Figs. 33, 35), a long pair of setae present subdorsally and subventrally on left side (Figs. 34, 35), which also possesses five leaflike projections: the outer two diverging, the middle one straight, the other two converging distally; oral aperture vaguely hexagonal, amphids not seen.

Buccal tube slender, cheilorhabdions separate; possibly three minute denticles present at base of stoma (Fig. 40). Esophagus muscled throughout, metacorpus large, valved, basal bulb oval, cardia small. Nerve ring surrounding esophagus at middle of isthmus; excretory pore near junction of isthmus and basal bulb and in the hemizonid. Hemizonion not seen. Intestine straight; sphincter at intestinal-rectal junction prominent, rectum long (Figs. 38, 39).

Female: Stouter than male, tail elongate-conical, tapering to an unarmored point (Fig. 36). Vulva near midbody, gonads paired, amphidelphic, reflexed (Fig. 41). Anterior gonad slightly longer than posterior; the region of each gonad proximal to the flexure functioning as a combination spermatheca and uterus. Sperms ameboid. Vulval lips thickened, vulva opening transverse. Eggs frequently developing to 4- or 8-cell stage before being laid.

Male: Gonad single, reflexed distally one body-width or less. Spicules heavy, strongly sclerotized, fused distally and bent midway, weakly cephalated, and with several longitudinal reinforcing bars (Figs. 42–43). Gubernaculum difficult to see clearly, about one-third the spicule length, linear in side view, apparently broadened distally in dorsal view. Bursa absent, although the cuticular sheath on the left side is frequently folded over the papillae in such a way as to form a bursalike structure. Caudal papillae consisting of eight or nine pairs arranged symmetrically on each side as follows: three large fused papillae near the gonopore; one strong papilla distal to these; one or two tiny papillae at about the middle of the tail, followed by a long slender papilla; and two

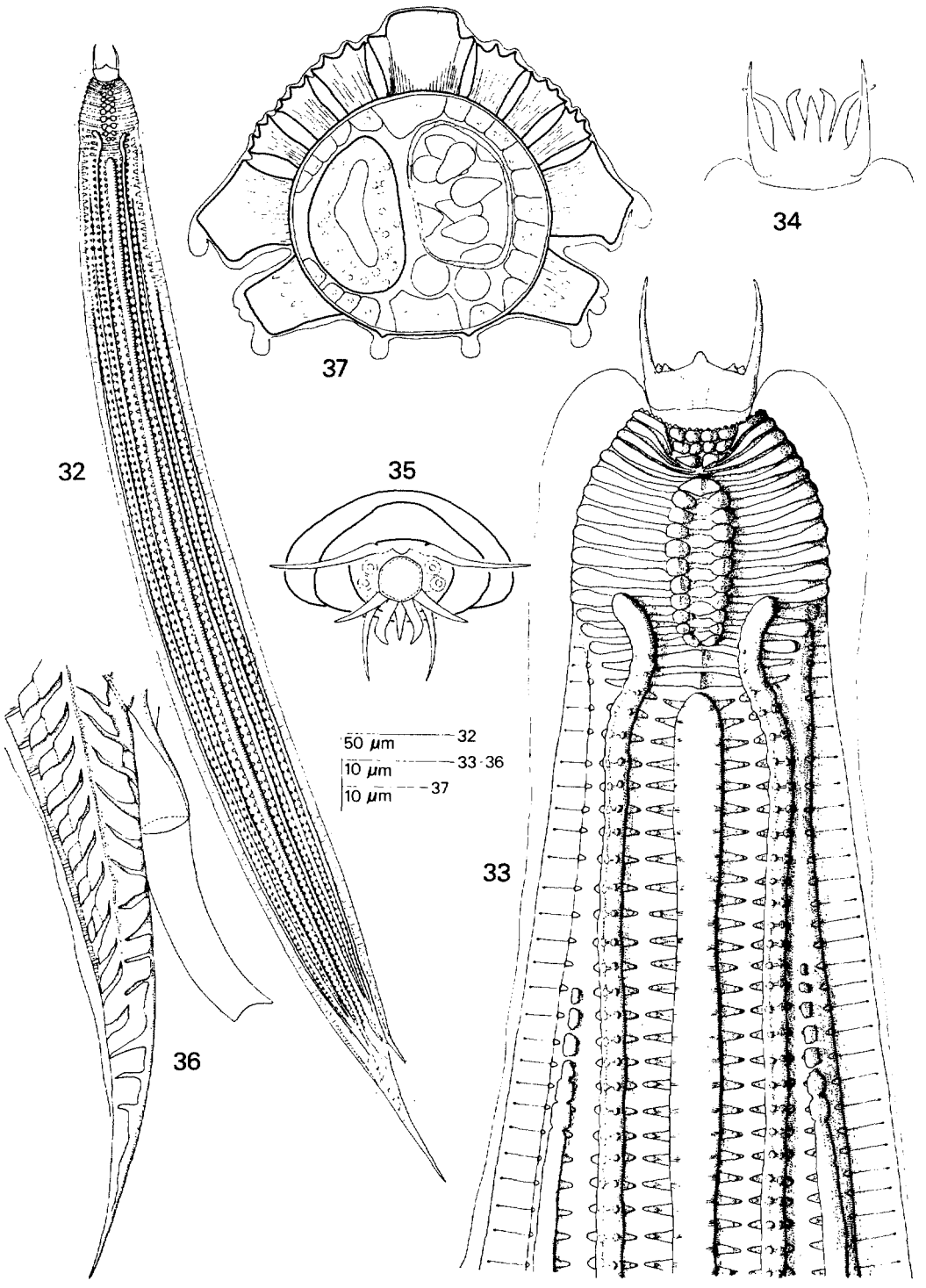

FIG. 32–37. *Pterygorhabditis panoplus* n. sp. Female. *32)* Entire view, right side. *33)* Anterior region, right side. *34)* Lip region, left side. *35) En face* view. *36)* Posterior region, right side. *37)* Midbody cross-section.

TABLE 4. Measurements and ratios for *Pterygorhabditis panoplus*, n. sp.

	Holotype ♀	Allotype ♂	Paratype ♀♀ (n=20)			Paratype ♂♂ (n=20)		
			Mean	Range	SD	Mean	Range	SD
Length (μm)	537	471	516	469 -566	25.6	476	437 -508	20.37
a	13.4	15.1	12.5	11.7- 13.5	0.62	16.2	14.2- 17.8	0.98
b	3.95	3.55	3.76	3.5- 4.2	0.19	3.61	3.4- 3.9	0.13
c	14.2	16.5	14.4	12.7- 15.9	1.00	17.5	15.4- 19.9	1.13
G1 (%)[a]	16.6	—	15.8	14.7- 19.0	1.55	—	—	—
G2 (%)[a]	14.1	—	12.7	10.4- 14.3	1.31	—	—	—
V (%)	52.5	—	53.3	49.7- 57.6	2.67	—	—	—
T (%)	—	47.6	—	—	—	44.1	39.1- 49.3	2.99
Spicule length (μm)	—	59.4	—	—	—	57.4	54.9- 59.9	1.57
Gubernaculum length (μm)	—	18.3	—	—	—	18.2	17.0- 20.8	1.20

[a]G1 = length of anterior gonad to flexure × 100/body length; G2 = length of posterior gonad to flexure × 100/ body length.

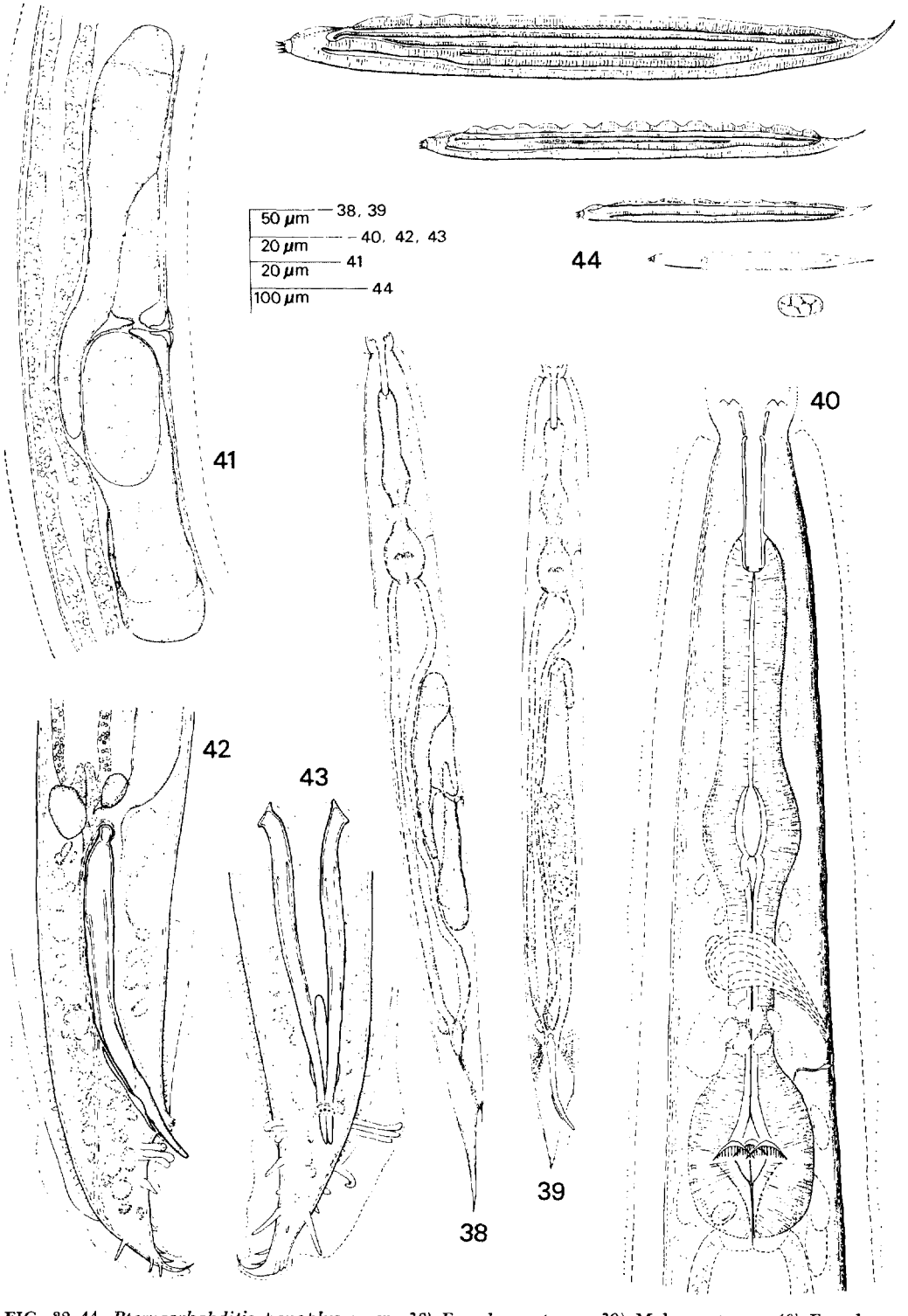

FIG. 38–44. *Pterygorhabditis panoplus* n. sp. *38)* Female anatomy. *39)* Male anatomy. *40)* Female anterior region, right side. *41)* Female reproductive system. *42)* Male posterior region, right side. *43)* Male posterior region, ventral view. *44)* Relative sizes of egg and postembryonic stages.

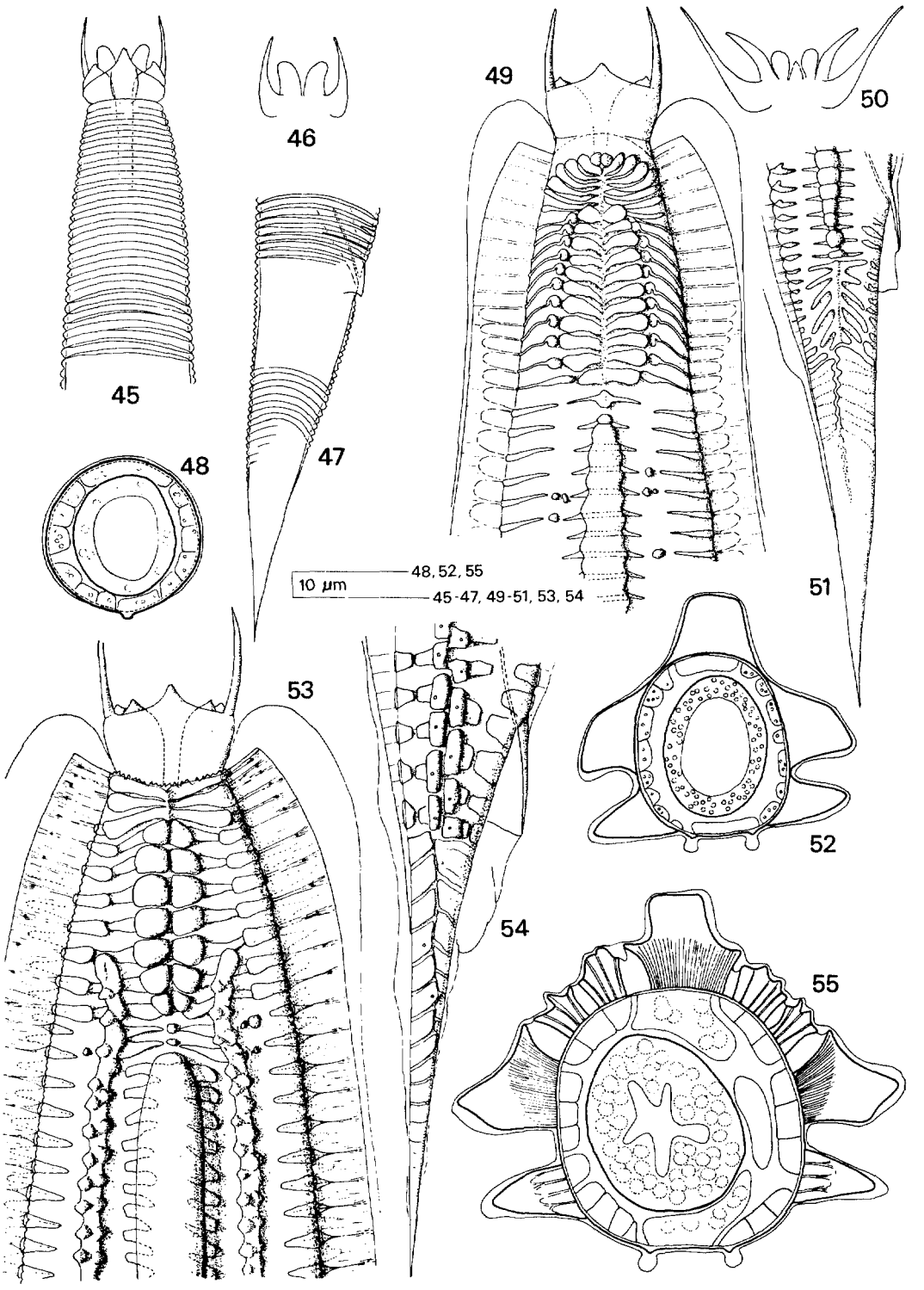

FIG. 45–55. *Pterygorhabditis panoplus* n. sp. 45–48) 2nd-stage juvenile. *45)* Anterior region, right side. *46)* Lip region, left side. *47)* Tail, right side. *48)* Midbody cross-section. *49–52)* 3rd-stage juvenile. *49)* Anterior region, right side. *50)* Lip region, left side. *51)* Tail, right side. *52)* Midbody cross-section. 53–55) 4th-stage juvenile. *53)* Anterior region, right side. *54)* Tail, right side. *55)* Midbody cross-section.

curved pointed papillae distally.

Description of Juvenile External Morphology

The postembryonic instars of *P. panoplus* show increasing cuticular complexity with each successive molt (Figs. 44–55).

Second-stage juvenile: Body overlaid with a cuticular thickening or thin rigid sheath extending around the body except for the midleft region (Fig. 48); this extra layer strongly annulated in the anterior esophageal region, then taking on a peculiar double annulation which undergoes fusion dorsally and ventrally, this double annulation continuing to anus (Figs. 45, 47). On left side, a single longitudinal ridge running most of the body length (Fig. 48). Anus with short flap, tail conical, pointed (Fig. 47).

Head on right side with prominent central projection and large papillae subventrally and subdorsally (Fig. 45); on left side, two divergent leaflike setae medially and two broad-based tapering setae subventrally and subdorsally (Fig. 46).

Third-stage juvenile: This stage assuming the general cuticular patterns of the adult. In cross-section, five strong ridges located on the right side, dorsally and ventrally, and in the left subdorsal and subventral positions (Fig. 52). Right-side ridge wavy in profile (Fig. 44). In the neck region, an oval series of eight to twelve tubercles but no prominent shield (Fig. 49). Cuticular sheath present, similar to that of the adult. Anus with well-developed flap. Tail elongate-conical, pointed, armored in proximal half with lobes and plates (Fig. 51).

Head on right side similar to the adult's, but the dorsal and ventral papillae apparently undeveloped (Fig. 49). Left side similar to adult's but the medial pointed appendage shorter and the convergent appendages only modestly developed, clavate (Fig. 50).

Fourth-stage juvenile: Similar in most respects to adult. In cross-section, nine longitudinal cuticular ridges of form similar to that of the adult female (Fig. 55). Right-side ridge strongly wavy in profile (Fig. 44). Definite anterior shield lacking on right side (Fig. 53). Tail elongate-conical, pointed, with well-developed cuticular plates (Fig. 54). Lip region in all respects similar to that of the adult.

Types and localities: Type specimens collected 5 October 1977 from beetle frass and other organic detritus under the loose bark of a log on the ground, the University of Tennessee, Cherokee Woodlot, Knox County, Tennessee. Holotype female (T-306t), allotype male (T-307t), and paratypes (T-2367p, T-2374p, T-2375p) deposited in USDANC, Beltsville, Maryland. Additional paratypes deposited in UCNC, MSUNC, and PNC. Numerous other individuals collected in organic litter from above locality, December 1978; and on several occasions during summer of 1978 at Big Ridge State Park, Union County, Tennessee.

The specific epithet is a Greek word meaning "fully armored."

Diagnosis: P. panoplus can be separated from its only close relative, *P. pakistanensis* Timm (8), by the following characters: prominent anterior shield developed in *P. panoplus,* absent in *P. pakistanensis;* diamond-shaped interlocking of cuticular bars of *P. pakistanensis* absent in *P. panoplus; P. panoplus* with five foliate setae on left side of stoma, but 8 or more fine setae in the same place on *P. pakistanensis;* spicules stout in *P. panoplus,* slender in *P. pakistanensis;* metacorpus swollen in *P. panoplus,* not swollen in *P. pakistanensis.*

DISCUSSION

Lectotype of Pterygorhabditis pakistanensis. Timm (8) founded the genus *Pterygorhabditis* for strongly armored rhabditoid nematodes collected in Dacca, Bangladesh. Fr. Timm kindly sent a slide holding several specimens of *P. pakistanensis,* but, as noted by him (*in litt.*), the specimens had dried out and were overgrown with mold. Since these were the only known specimens, the fragments were remounted and a lectotype designated. The lectotype is a juvenile with the head appendages and most of the tail missing, but the unusual cuticular pattern of diamonds is quite clear; and since the species is well described, there should be no problem in recognizing it. The lectotype (T-308t) is deposited in USDANC, Beltsville, Maryland. The lectotype slide also contains a large fragment of an adult, and several other small pieces. A sketch of the slide showing location of the lectotype

and fragments has also been submitted to USDANC.

Origin of cuticular ornamentation. Raski and Jones (4) showed that in *Bunonema richtersi* the raised cuticular network of the right side was not part of the cuticle proper, but that the tubercles were an integral part of the cuticle. The dissimilar origins of the network and tubercles in *B. richtersi* are supported by observations on *B. husseyi*. In *B. husseyi*, the network could be rubbed free of the body without damage to the nematode, but the tubercles remained firmly attached. In *Rhodolaimus dimorphus*, both cuticular network and tubercles were easily detached from the body. In culture, living nematodes were frequently seen to lack some tubercles but were still active. Microscopic examination of these indicated that the tubercles had been broken off instead of being merely absent. These observations suggest that the tubercles have different origins in the two species mentioned above. However, determination of the methods of tubercle development will require comparative studies of several Bunonematidae.

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