

Taxonomic Notes on Some *Hemicriconemoides* Species and Description of a New Species

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Abstract: *Hemicriconemoides scottolamassesei* n. sp., named after Dr. C. Scotto la Massese, from New Caledonia, is described and illustrated. Primary diagnostic characters are females with a continuous head and three lip annules, the first annule being the smallest, stylet length of 65–75 μm , vulva without lateral flaps, and acute tail terminus; J4 has a smooth cuticle without scales or spines; the male has a lateral field with two incisures. Emended measurements, descriptions, illustrations, and new records of distribution are given for *H. brachyurus* (Loos, 1949) Chitwood & Birchfield, 1957, *H. mangiferae* Siddiqi, 1961, and *H. kanayaensis* Nakasono & Ichinoe, 1961. Relationships of *H. promissus* Vovlas, 1980, based on study of paratypes, and *H. intermedius* Dasgupta, Raski & Van Gundy, 1969 are discussed; both are proposed as synonyms of *H. brachyurus*.

Key words: *Basellina pancheri*, distribution, *Garcinia* sp., *Hemicriconemoides brachyurus*, *H. intermedius*, *H. kanayaensis*, *H. litchi*, *H. mangiferae*, *H. promissus*, *H. scottolamassesei* n. sp., host, nematode, New Caledonia, new species, new synonymy, *Psychotria* sp., *Rapanea asymetrica*, *Salacia* sp., synonymy rejection, taxonomy, *Weinmannia* sp.

The ORSTOM (Institut Français de Recherche Scientifique pour le Développement en Coopération) nematode collection houses numerous specimens of *Hemicriconemoides* spp. collected by the first author in new locales and habitats. While studying these specimens, it became apparent that certain of the known, geographically remote species were more variable morphometrically than previously reported. Characteristics of these species are presented to clarify their identities and relationships, and a new species is described.

MATERIAL AND METHODS

Specimens used for this study were extracted from soil by selective sieving of water suspensions, killed in hot FA 4:1, processed to glycerin by Seinhorst's (1959) rapid method, and permanently mounted on Cobb's metal slides.

SYSTEMATICS

Hemicriconemoides scottolamassesei n. sp.
(Fig. 1)

Holotype (female): L = 0.446 mm; a = 12.9; b = 4.5; c = 15.4; V = 91.5; V' = 38 μm ; R = 127; Rex = 36; Rv = 11; Ran = 8; Rvan = 3; VL/VB = 1.31; stylet length = 71 μm .

Paratypes (25 females): L = 0.348–0.462 (mean 0.415; SD 0.031) mm; a = 11.2–14.4 (13; SD 1.1); b = 3.5–4.5 (3.9; SD 0.26); c = 15.4–24.2 (18.4; SD 2.5); V = 91.2–93.5 (92; SD 1.0); V' = 25–38 (33; SD 3.0) μm ; R = 118–150 (125; SD = 8.0); Rex = 31–37 (34; SD 1.4); Rv = 9–13 (11; SD 1.1); Ran = 5–9 (7; SD 1.0); Rvan = 3–5 (4; SD 0.7); VL/VB = 1.27–1.64 (1.41; SD 0.15); stylet length = 65–75 (69; SD 2.3) μm . Body slightly curved ventrally when relaxed. Cuticular sheath more or less closely appressed along entire body; body annules retrorse. 2.6–3.5 μm wide at midbody, outer cuticle annules somewhat flattened. Lip region truncate, not set off; lip annules three, rarely two; first annule smaller than second; oral disc depressed. Stylet long, knobs anchor shaped, with prominent processes directed anteriorly; dorsal gland orifice 2–4 μm posterior to stylet knobs. Excretory pore 99–120 μm from anterior end; hemizonid 104–116 μm from anterior end,

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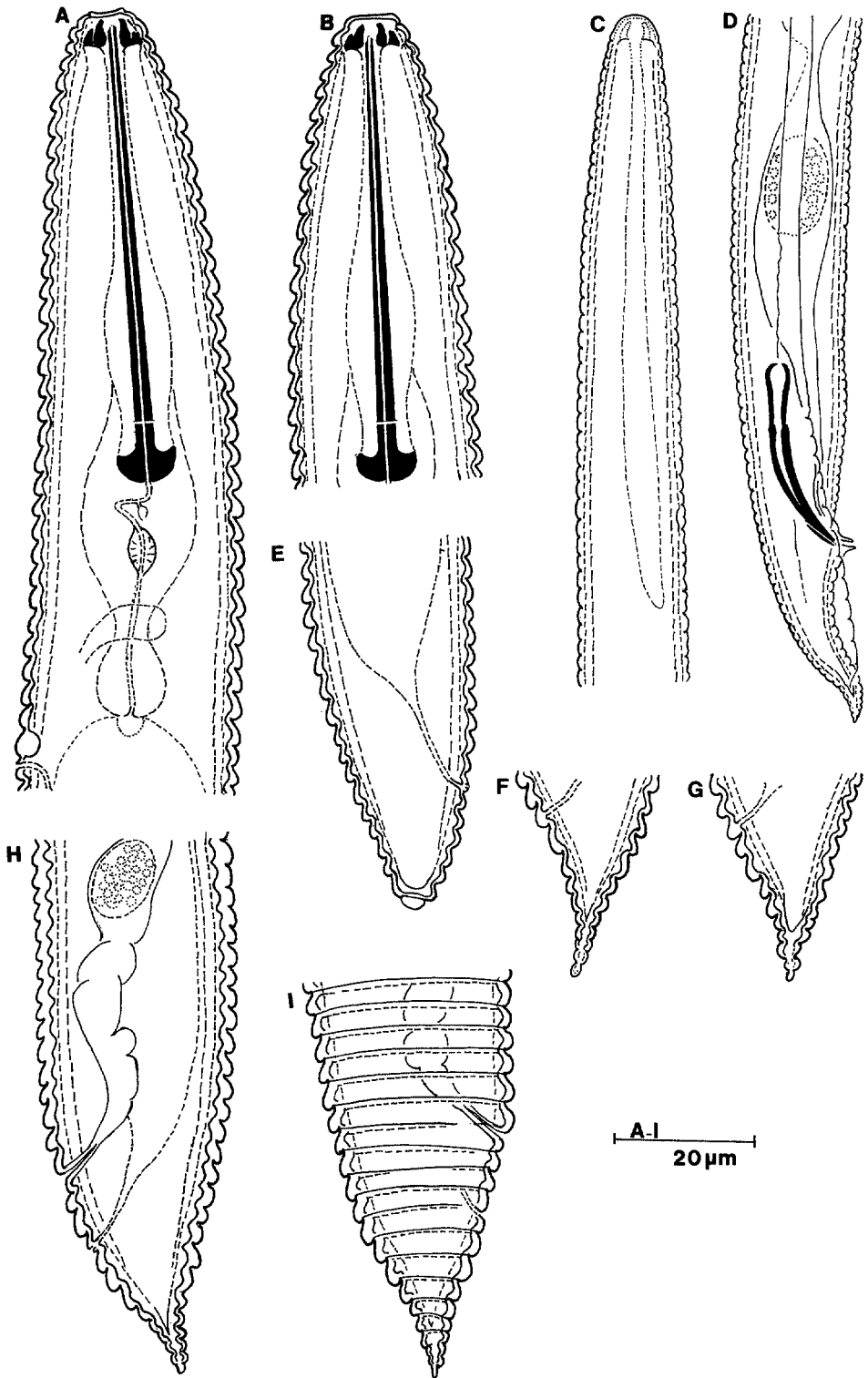


FIG. 1. *Hemicriconemoides scottolamassei* n. sp. A) Female, anterior region. B) Juvenile, anterior region. C) Male, anterior region. D) Male, posterior region. E) Juvenile, posterior region. F, G) Female tail. H, I) Female, posterior region.

posterior to excretory pore, one annule long. Vulval cuticular flaps absent. Spermatheca oval, filled with sperm. Tail conoid; terminus acute, slightly dorsally recurved.

Allotype (male): L = 0.344 mm; a = 21.5; b = ?; c = 13.5; T = 33.1; spicule length = 29.5 μm ; gubernaculum length = 4 μm .

Paratypes (6 males): L = 0.324–0.352 (0.335; SD 0.013) mm; a = 18.3–21.5 (20.6; SD 1.3); b = 3.4–3.6 (3.5; SD 0.06); c = 11–13.8 (12.3; SD 1.21); T = 30.6–39.4 (33.1; SD 3.03); spicule length = 24.5–29.5 (26.6; SD 2.06) μm ; gubernaculum length = 4–5 (4.5; SD 0.45) μm . Body slightly curved ventrally when relaxed. Lip region slightly truncate, not set off, not annulated. Stylet absent. Esophagus reduced, degenerate. Excretory pore 73–87 μm from head end. Hemizonid anterior to excretory pore, 69–79 μm from head end, two annules long. Lateral field with two incisures. Spicules and gubernaculum slightly curved dorsally. Tail conoid; terminus acute, slightly recurved dorsally. Caudal alae reduced, margins crenate.

Fourth-stage juvenile (n = 1): L = 0.402 mm; a = 15.2; b = 4.1; c = 25.9; R = 124; Rex = 34; Ran = 8; stylet length = 63.5 μm . Similar to female. Body annules retrorse, posterior margins smooth; without rows of scales or spines. Lip region truncate, not set off. Excretory pore 112 μm from anterior end. Hemizonid not observed. Tail conoid; terminus bluntly rounded, slightly dorsally recurved.

Type host and locality

Forest soil around the roots of *Basellina pancheri* (allotype), *Garcinia* sp., *Psychotria* sp., *Rapanea asymerica*, *Salacia* sp., *Weinmannia* sp. (holotype). Forêt à mousse, Montagne des Sources, New Caledonia.

Type specimens

Holotype (female): Type slide no. Ab 850. *Allotype (male)*: Type slide no. Ab 845. *Paratypes (25 females, 6 males, 1 juvenile)*: Type slides no. Ab 842, 844, 846, 847, 849, 851–856, 858. Holotype, allotype and paratypes are deposited in the Antenne ORSTOM

d'Antibes collection, Laboratoire de Nématologie, 123 Bd. F. Meilland, B. P. 2078, 06606 Antibes Cedex, France.

Diagnosis

Primary diagnostic features distinguishing *Hemicriconemoides scottolamassesei* n. sp. from other known species: female, head continuous with three lip annules, the first annule being the smallest, a relatively long stylet 65–75 μm , lack of lateral cuticular vulval flaps, and an acutely pointed tail tip; male has two lateral incisures; and the J4 has a smooth cuticle without spines.

Relationships

Hemicriconemoides scottolamassesei n. sp. is most similar to *H. cocophilus* (Loos, 1949) Chitwood & Birchfield, 1957, *H. affinis* Germani & Luc, 1970, *H. snoecki* Van Doorselaere & Samsoen, 1982, *H. conicaudatus* Phukan & Sanwal, 1983, and *H. varionodus* Choi & Geraert, 1972. From the first four species *H. scottolamassesei* differs primarily by lacking lateral vulval flaps and by the longer stylet (66–75 versus 32–58 μm), and from *H. varionodus* by the shorter stylet (less than 80 versus 84–94 μm).

Hemicriconemoides brachyurus (Loos, 1949)

Chitwood & Birchfield, 1957

syn. *H. intermedius*

Dasgupta, Raski & Van Gundy, 1969

n. syn.

H. sacchariae Heyns, 1970

H. promissus Vovlas, 1980 n. syn.

(Fig. 2)

Population from Piper nigrum, Tay Ninh, Viet Nam. Female (n = 9): L = 0.36–0.46 (0.44; SD 0.039) mm; a = 9.8–11.6 (11; SD 0.6); b = 4.3–5.3 (4.7; SD 0.3); c = 13.7–26.8 (17.3; SD 4.06); V = 90.8–95.5 (92.4; SD 1.42); V' = 20–38 (33.2; SD 5.2) μm ; R = 93–105 (97; SD 5.4); RSt = 12–14 (13; SD 0.9); ROe = 19–23 (20; SD 1.4); Rhem = 21–25 (24; SD 1.5); Rex = 27–31 (29; SD 1.6); Rv = 7–9 (8; SD 0.7); Ran = 6–8 (7; SD 1.0); Rvan = 1; VL/VB = 0.71–1.33 (1.18; SD 0.19); stylet length = 47–59 (53; SD 3.5) μm .

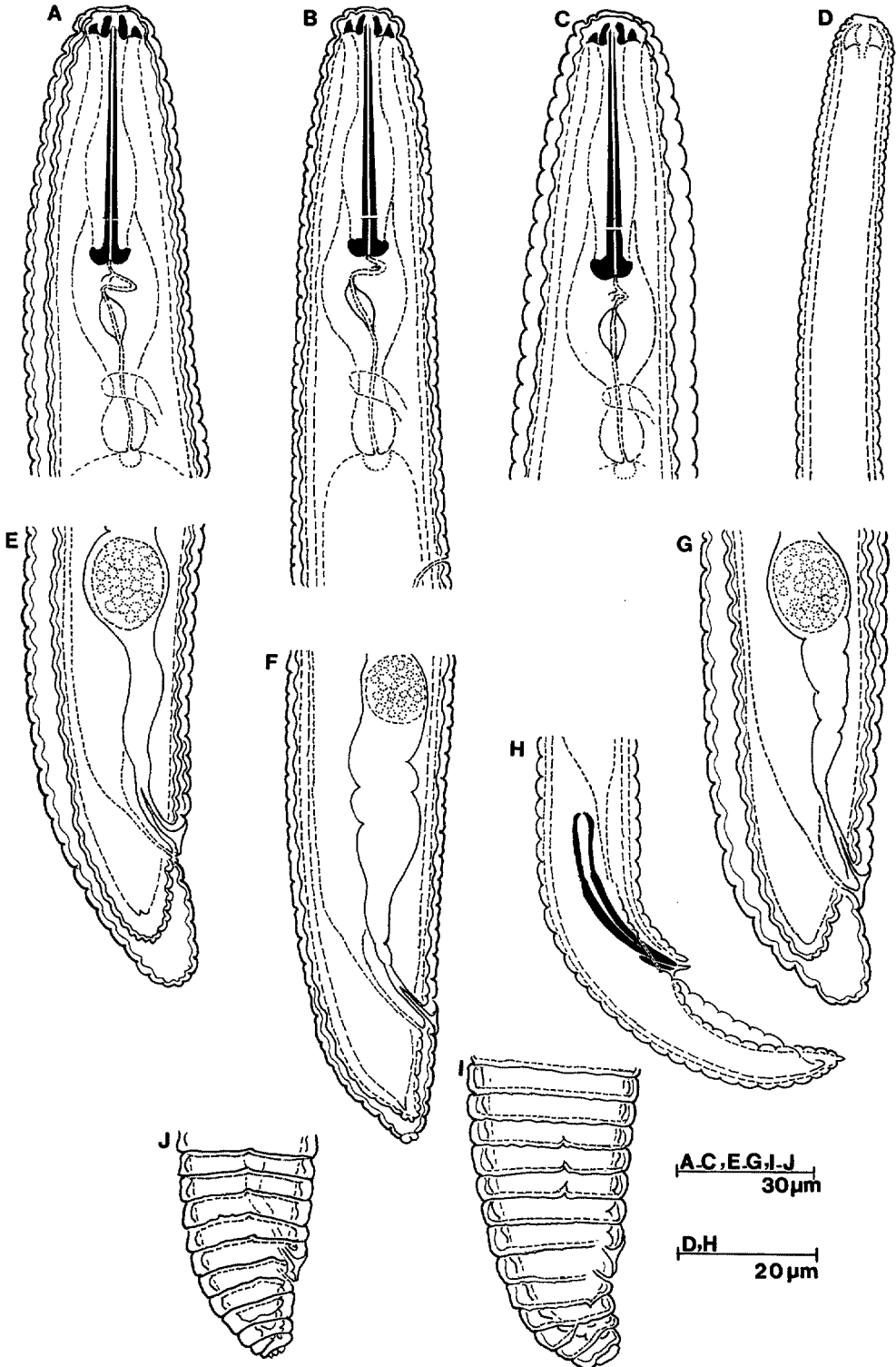


FIG. 2. *Hemicriconemoides brachyurus*. A-C) Female, anterior end. A) From Tay Ninh, Viet Nam. B) From Marsena, France. C) From Onesse, France. D) Male, anterior region; from Onesse, France. E) Female, posterior region; from Tay Ninh, Viet Nam. F, G) Female, posterior region. F) From Marsena, France. G) From Onesse, France. H) Male, posterior region; from Onesse, France. I, J) Female, posterior region. I) From Onesse, France. J) From Marsena, France.

TABLE 1. Range in measurements (μm) and ratios of three species of *Hemicriconemoides* Chitwood & Birchfield, 1957.

	<i>H.</i> <i>brachyurus</i>	<i>H.</i> <i>intermedius</i>	<i>H.</i> <i>promissus</i>
L	350-760	350-440	460-750
a	10-19	12-18	15-20
b	3.8-5.6	4.3-5.4	5.5-6.4
c	14-40	20-32	27-35
V	91-97	93-96	94-95
V'	14-38	14-25	27-32
VL/VB	0.7-1.4	0.8-1.1	0.8-1.0
R	83-119	88-94	89-102
RSt	11-16		8-9
ROes	19-29		14-16
Rhem	21-28		
Rex	25-33		23-26
RV	4-10	7-8	7-8
Ran	3-8	6-7	6-7
Rvan	0.5-2.0	1.0	1.0
Stylet length	47-64	47-52	48-51

Data based on Loos (6), Gotoh (4), Dasgupta et al. (2), Heyns (5), Van den Berg and Heyns (11), and this study.

Population from meadow, Marsena, France.

Female ($n = 10$): L = 0.46-0.76 (0.52; SD 0.036) mm; a = 11.3-15.1 (13; SD 1.22); b = 4.3-5.6 (4.9; SD 0.42); c = 25-33.8 (28; SD 2.95); V = 94.7-96.3 (95.5; SD 0.52); V' = 19-30 (24; SD 3.0) μm ; R = 95-101 (98; SD 3.65); RSt = 11-14 (12; SD 1.0); ROe = 17-22 (19; SD 1.4); Rhem = 23-26 (25; SD 1.1); Rex = 26-30 (27; SD 1.7); Rv = 4-6 (5; SD 1.0); Ran = 3-4 (4; SD 1.0); Rvan = 1; VL/VB = 0.75-1.1 (0.87; SD 0.12); stylet length = 53-56 (55; SD 1.0) μm .

Population from Pinus pinaster, Onesse, France. *Female* ($n = 5$): L = 0.55-0.59 (0.58; SD 0.015) mm; a = 12.6-14.3 (13; SD 1.22); b = 4.8-5.3 (5.1; SD 0.18); c = 22.1-32.8 (24.8; SD 4.05); V = 93.8-95.6 (95; SD 0.65); V' = 25-36 (29.1; SD 4.0) μm ; R = 93-97 (94; SD 1.6); RSt = 10-12 (11; SD 0.8); ROe = 16-21 (18; SD 1.8); Rhem = 21-25 (23; SD 1.5); Rex = 27-28 (28; SD 0.43); Rv = 5-7 (6; SD 1.0); Ran = 4-6 (5; SD 0.3); Rvan = 1; VL/VB = 0.93-1.26 (0.99; SD 0.14); stylet length = 56-60 (58.6; SD 1.5) μm .

Male ($n = 6$): L = 0.40-0.47 (0.44; SD 0.025) mm; a = 29-34 (31; SD 1.8); b = ?; c = 12.5-15.8 (13.5; SD 1.21); spicule

length = 28-34 (30.7; SD 1.97) μm ; gubernaculum length = 5-7 (5.5; SD 0.38) μm .

Female: Double cuticle very close at anterior end, well separated at tail region. Head continuous with body, rounded; lip annules two, first annule smaller than second; labial disc flattened. Body annules smooth; width at midbody 4.3-5.3 μm , widths irregular at level of vulva and tail. Stylet knobs anchor shaped, dorsal gland orifice 4-6 μm posterior to knobs. Excretory pore 112-116 μm from anterior end. Lateral vulval flaps present, flap length two annules. Spermatheca rounded, somewhat elongated, filled with sperm. Tail conoid, terminus hemispherical or broadly rounded.

Male: Similar to that of *H. promissus* Vovlas, 1980. Body cylindrical, tapering at each end. Body cuticle finely striated. Lip region subspherical, not set off; labial disc elevated, flattened, labial framework indistinct. Stylet absent. Esophagus obscure. Lateral field with four incisures. Testis single; spicules and gubernaculum ventrally arcuate. Bursa reduced, margins crenate. Tail cylindrical, tapering to pointed terminus. Phasmids not observed.

Remarks

Hemicriconemoides intermedius Dasgupta, Raski & Van Gundy, 1969 and *H. promissus* Vovlas, 1980 are proposed as junior synonyms of *H. brachyurus* (Loos, 1949) Chitwood & Birchfield, 1957. Comparative measurements and ratios for these species are in Table 1.

Hemicriconemoides intermedius differs from *H. brachyurus* only in having a subacute tail terminus vs. broadly rounded (4). However, tail morphology in *H. brachyurus* has been observed by us and other workers (2,4,11) to be highly variable in some populations, ranging from hemispherical to subacute. Their proportions may vary within populations, thereby negating the diagnostic value of tail shape. Consequently, we consider that these species are conspecific.

Hemicriconemoides promissus which, like *H. intermedius*, has a subacute tail terminus,

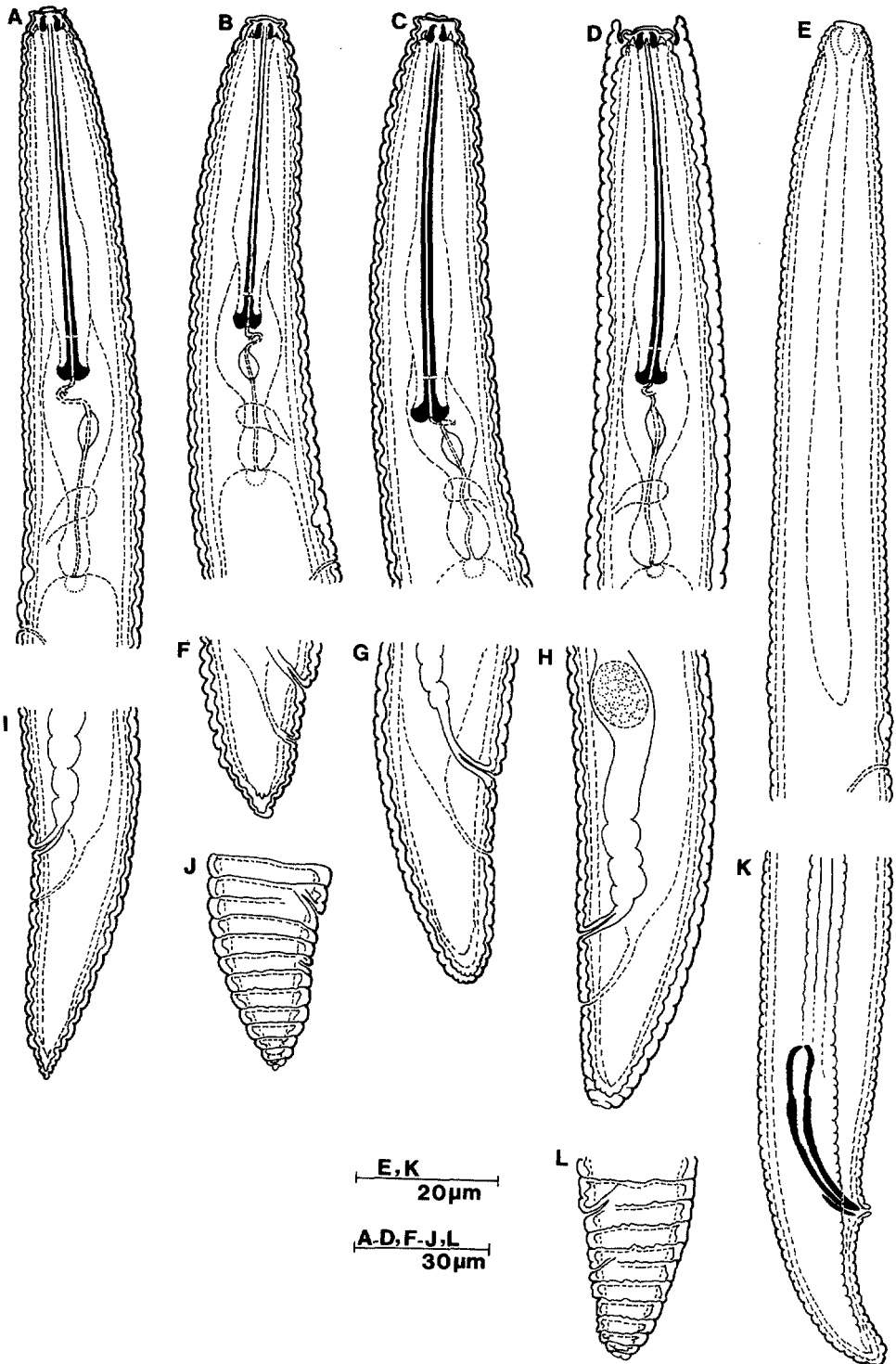


FIG. 3. *Hemicriconemoides mangiferae*. A-D) Female, anterior end. A) From Hahin, French Polynesia. B) From Ben Tre, Viet Nam. C) From Koumac, New Caledonia. D) From Pindaï, New Caledonia. E) Male, anterior end. F-J) Female, posterior end. F) From Ben Tre, Viet Nam. G) From Koumac, New Caledonia. H) From Pindaï, New Caledonia. I) From Hahin, French Polynesia. J) From Ben Tre, Viet Nam. K) Male, posterior end. L) Female, posterior end; from Pindaï, New Caledonia.

differs from this species and *H. brachyurus* by lacking lateral cuticular vulval flaps. However, paratypes of *H. promissus* that we examined clearly have vulval flaps. Therefore, we designate *H. promissus* a synonym of *H. brachyurus*.

Hemicriconemoides mangiferae Siddiqi, 1961
syn. *H. birchfieldi* Edward, Misra & Singh,
1965

H. aberrans Phukan & Sanwal, 1983 n. syn.
(Fig. 3)

Population from watermelon, Koumac, New Caledonia. Female (n = 3): L = 0.44–0.60 (0.515) mm; a = 13.7–17.7 (16.1); b = 4.5–5.1 (4.8); c = 20.6–22.3 (21.4); V = 92.4–92.7 (92.6); V' = 38–44 (41) μ m; R = 130–138 (134); Rex = 33; Rv = 10–12 (11); Ran = 7; Rvan = 5; VL/VB = 1.5–1.8 (1.6); stylet length = 83.5–86 (84.8) μ m.

Population from Diospyros sp., forêt du Col des Roussettes, New Caledonia. Female (n = 5): L = 0.46–0.56 (0.50; SD 0.042) mm; a = 16.3–18 (17.2; SD 0.9); b = 4–4.8 (4.4; SD 0.38); c = 22.9–29.6 (26.7; SD 2.7); V = 91.8–93.7 (93; SD 0.73); V' = 33–38 (35; SD 2.14) μ m; R = 120–159 (132; SD 15.0); Rex = 35–41 (38; SD 2.6); Rv = 10–12 (10; SD 0.9); Ran = 5–7 (5.4; SD 0.9); Rvan = 5; VL/VB = 1.4–1.5 (1.45; SD 0.04); stylet length = 65–73 (69.6; SD 2.6) μ m.

Population from Eugenia sp., forêt xerophile de Pindai, New Caledonia. Female (n = 6): L = 0.48–0.54 (0.50; SD 0.021) mm; a = 16.2–19.2 (17.1; SD 1.1); b = 3.9–4.6 (4.25; SD 0.29); c = 19.7–27 (23.8; SD 2.7); V = 92.4–93.9 (93; SD 0.53); V' = 33–37 (35; SD 1.81) μ m; R = 125–137 (132; SD 4.5); Rex = 33–38 (36; SD 1.8); Rv = 9–11 (10; SD 1.03); Ran = 5–7 (6; SD 0.8); Rvan = 4–5 (4.5; SD 0.5); VL/VB = 1.34–1.45 (1.39; SD 0.04); stylet length = 74–84 (80; SD 4.3) μ m.

Male (n = 3): L = 0.38–0.41 (0.39) mm; a = 23.9–24.1 (24); b = 3.3–3.5 (3.4); c = 15.3–19.3 (17.5); spicule length = 25.5–26.5 (26) μ m; gubernaculum length = 4.5–5.0 (4.8) μ m.

Population from coffee, Ben Tre, Viet Nam. Female (n = 8): L = 0.40–0.50 (0.46; SD

0.028); a = 13.5–16.9 (15; SD 1.3); b = 4.5–5 (4.7; SD 0.1); c = 16.5–28.8 (20.8; SD 2.58); V = 91.2–94.1 (92.6; SD 0.91); V' = 28–38 (34; SD 4.4); R = 116–136 (125; SD 6.6); Rex = 32–40 (34; SD 3.0); Rv = 8–13 (10; SD 1.7); Ran = 4–9 (6; SD 2.0); Rvan = 3–5 (4; SD 0.6); VL/VB = 1.22–1.62 (1.42; SD 0.14); stylet length = 62–65 (63; SD 1.7) μ m.

Population from watermelon, Hahin, French Polynesia. Female (n = 9): L = 0.47–0.61 (0.55; SD 0.046) mm; a = 16.8–21.1 (19; SD 1.63); b = 3.8–5.6 (4.6; SD 0.58); c = 15.7–21.5 (17.8; SD 2.35); V = 91.2–93.6 (92; SD 0.93); V' = 37–53 (44; SD 5.9) μ m; R = 145–156 (150; SD 4.5); Rex = 36–42 (39; SD 2.0); Rv = 4–6 (5; SD 1.0); Ran = 7–10 (8; SD 1.0); Rvan = 4–6 (5; SD 1.0); VL/VB = 1.72–2.35 (1.95; SD 0.25); stylet length = 72–80 (78; SD 3.0) μ m.

Female: Body curved ventrally. Cuticular sheath attached to body at anterior end and vulva, otherwise well separated; sometimes extends anteriorly beyond lip region (Fig. 3D). Lip region set off; two lip annules, the first equal to, or smaller than, the second. Body annules 3.4–4.0 μ m wide at midbody, smooth in population from Hahin (Fig. 3A, I), but usually irregular in other populations (Fig. 3J, L). Labial disc variably elevated. Stylet knobs usually anchor shaped with anteriorly directed processes, sometimes slightly rounded. Dorsal gland orifice 3–6 μ m posterior to stylet knobs. Excretory pore 110–150 μ m from head end. Hemizonid anterior to excretory pore, one annule long. Vulval sheath (flaps) absent. Spermatheca round, somewhat elongated, filled with sperm. Tail conoid, gradually tapering posteriorly (Fig. 3I) to bluntly conoid, rounded terminus (Fig. 3G, H, L).

Male: Head continuous with body, truncate. Stylet absent. Esophagus reduced, degenerate. Hemizonid 90–99 μ m from head end, two annules long. Excretory pore 95–110 μ m from head end. Lateral field with four incisures; outer two crenate; inner two irregular, sometimes indistinct. Spicules and gubernaculum, slightly curved ventrally. Tail tapering to bluntly rounded ter-

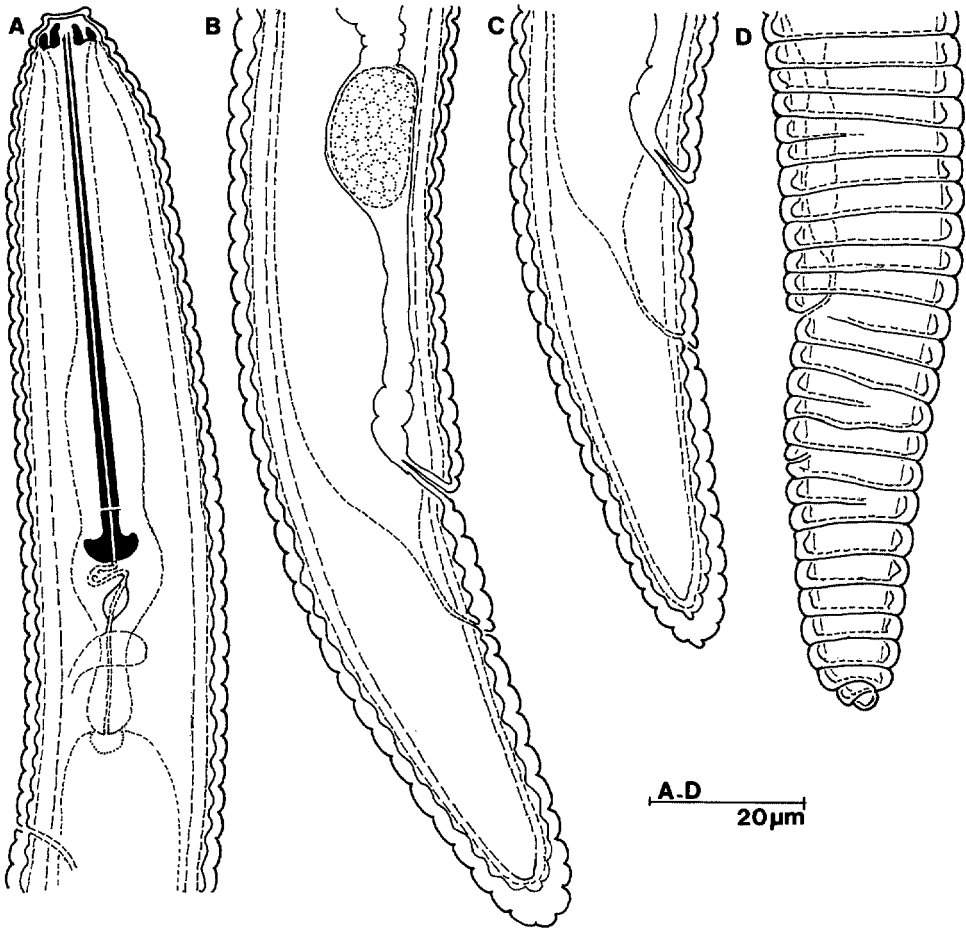


FIG. 4. *Hemicriconemoides kanayaensis* female. A) Anterior region. B–D) Posterior region.

minus. Caudal alae reduced, margins crenate.

Remarks

Hemicriconemoides mangiferae conforms with previous descriptions including variation in tail shape. Tails of females from Hahin population are pointed (Fig. 3I), from New Caledonia bluntly rounded (Fig. 3G, H, L), and those from Viet Nam are of intermediate shape (Fig. 3F, J).

Specimens from *Eugenia* sp., New Caledonia, are identical to *H. litchi* Edward & Misra, 1963 except for the male, which has four incisures. However, the number of incisures for the *H. litchi* male has never been verified by study of the paratypes or topotypes. Consequently, the synonymy of

H. litchi with *H. mangiferae* by Dasgupta, Raski & Van Gundy (2) is not accepted.

Hemicriconemoides kanayaensis
Nakasono & Ichinoe, 1961
(Fig. 4)

Population from tea, Sun and Moon Lake, Taiwan. Female (n = 10): L = 0.47–0.54 (0.51; SD 0.025) mm; a = 15.8–18.4 (17.3; SD 0.9); b = 4.4–5.3 (4.8; SD 0.3); c = 12–14.7 (12.9; SD 0.75); V = 86.4–89.2 (88.3; SD 0.86); V' = 51–65 (60; SD 5.7) μ m; R = 127–151 (145; SD 9.6); Rex = 31–38 (35; SD 2.3); Rv = 16–18 (17; SD 1.0); Ran = 8–11 (10; SD 1.0); Rvan = 6–7 (6.7; SD 0.5); VL/VB = 2.3–2.8 (2.6; SD 0.16); stylet length = 66–78 (75; SD 3.8) μ m.

Remarks

Specimens from Taiwan agree with those described by Nakasono and Ichinoe (7) and Dasgupta et al. (2), except for anastomosis of body annules, which is unknown in *H. kanayaensis*.

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