

***Tylenchocriconema alleni* n.g. n.sp. from Guatemala**
(*Tylenchocriconematidae* n. fam.; *Tylenchocriconematoidea*
n. superfam.; Nematoda)

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Abstract: *Tylenchocriconema alleni* n.g. n.sp. is described from soil about roots of a bromeliad from Guatemala City, Guatemala. It has characteristics of both the Tylenchoidea and Criconematoidea. *Tylenchocriconematidae*, n. fam., and *Tylenchocriconematoidea*, n. superfam., are proposed to express the relationship of this species to other taxa. *Tylenchulidae* and *Paratylenchidae* are considered closely related, and *Tylenchulidoidea*, n. rank, is proposed to indicate their relationship. *Key Words:* taxonomy, nematode.

An unusual nematode species was collected from soil about the roots of an unidentified bromeliad shipped to California in May, 1974. The plants were sampled by K. F. Sims, San Diego County Department of Agriculture, under the State of California quarantine regulations. The shipment had been sent by the Tropimaya Nursery, Guatemala City, Guatemala, but the exact origin of the plants has not been determined.

Specimens were separated from the soil by a combined gravity-screening and mist-extraction technique, killed by gentle heat and fixed in 5% formaldehyde. The specimens then were passed through FAA., 2.5% glycerine in 30% alcohol, and 5% glycerine in 30% alcohol. They were allowed to dehydrate from the last solution to glycerine then mounted in dehydrated glycerine. The collection included 95 females, 13 males, and 8 juveniles.

The species appears to be related to the Criconematoidea by virtue of its procorpus merging with an enlarged metacarpus of the female, and a degenerate esophagus of the male. The long caudal alae in males, elongate isthmus in females, and fine body annulation in both males and females also indicate relationship with the Tylenchoidea. It is, therefore, our conclusion that this species represents a new superfamily which is intermediate between and relates to both the Tylenchoidea and the Criconematoidea. The proposed classification is as follows:

Tylenchocriconematoidea n. superfam.

Diagnosis: *Tylenchina*. Both sexes

vermiform. Marked sexual dimorphism. Male stylet lacking, esophagus degenerate. Caudal alae well-developed, extending to tip of tail. Male head asymmetrical, inclined ventrad. Procorpus of female enlarges gradually to large muscular metacarpus followed by long, slender isthmus and elongate posterior bulb with enclosed glands. Body annules fine; cuticle almost smooth in outline.

Type family: *Tylenchocriconematidae* n. fam.

Diagnosis: *Tylenchocriconematoidea*. This is a monotypic genus, family, and superfamily, with family characteristics as in the superfamily.

Type genus: *Tylenchocriconema* n.g.

Tylenchocriconema n.g.
Tylenchocriconematidae. Female with truncate head, weak cephalic framework, lips, or submedian lobes set off by slight constriction close to anterior end. Stylet well-developed, prorhabdion longer than base and knobs. Intestine distinct, rectum weakly developed, anus obscure. Vulva in posterior fourth quarter of body with monodelphic, prodelphic ovary. Tail long, slender, with acute terminus. Male shorter and more slender than female, with asymmetrical head directed ventrad with four, small, rounded lips or submedian lobes. Single testis outstretched. Spicules curved; gubernaculum simple, rod-shaped. Tail narrows markedly behind cloaca and becomes long and slender, ending in acute terminus.

Type species: *Tylenchocriconema alleni* n.sp.

Tylenchocriconema alleni n.sp.

[Fig. 1(A to O)]

Twenty-seven female paratypes: L = .68 mm (.50-.83); a = 53 (40-70); b = 5.6 (4.8-6.2);

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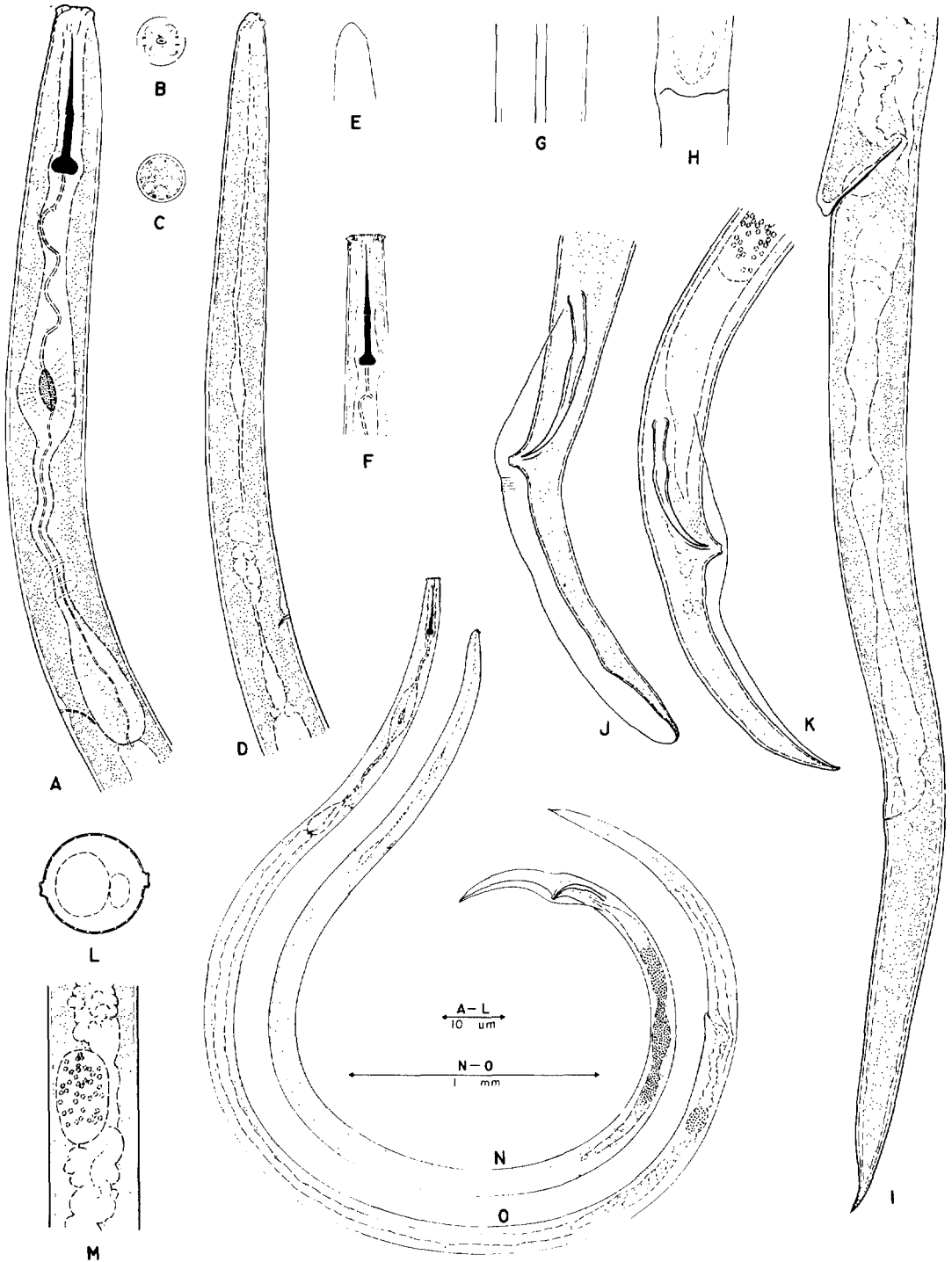


FIG. 1-(A to O). *Tylenchocriconema alleni* n.g. n.sp. A) Female, anterior end; B) Female head, *en face* view; C) Female head, transverse section posterior to (B); D) Male, anterior end; E) Male, anterior end of head at focus deeper than (D); F) Juvenile (female?), anterior end; G) Female, lateral fields; H) Vulva in ventral view; I) Female tail; J-K) Male tails; L) Female transverse section at mid-body; M) Female in region of spermatheca; N) Male, full length; O) Female, full length.

c = 15 (10-26); V = ²⁴⁽¹⁵⁻³⁷⁾ 79 (78-81); stylet = 23 μ m (20-29); prorhabdion = 15 μ m (13-19); excretory pore = 113 μ m (86-142).

Thirteen male paratypes: L = .57 mm (.42-.65); a = 50 (42-63); b = 5.6 (4.8-6.2); c = 12 (11-13); spicules = 24.5 μ m (22-28); gubernaculum = 4.7 μ m (4-6); excretory pore = 96 μ m (71-103); T = 24 (19-44).

Female (holotype): L = .73 mm; a = 55; b = 6.2; c = 12; V = ¹²79; stylet = 23 μ m; prorhabdion = 15 μ m; excretory pore = 111 μ m. Body slender, narrows only slightly toward anterior end which is truncate. Lips shallow, set off by slight constriction. Amphidial pores ovate, near oral aperture (Fig. 1-B). Four small, separate, submedian, rounded lips with prominent papillary innervations. Cephalic framework weakly developed; tip of stylet in guiding apparatus, which appears as slender, dark rods. Stylet very slender, especially in anterior portion; knobs well-developed, posteriorly directed. Dorsal esophageal gland orifice approximately 6 μ m posterior to knobs (5 μ m in some paratypes). Procorpus not set off, widens gradually to large metacarpus (in some paratypes procorpus longer and of uniform diameter for as much as 30 μ m posterior to stylet knobs, but in all paratypes procorpus widens gradually to large metacarpus). Valve in metacarpus large, ovate. Isthmus long, slender, widening gradually to form ovate, posterior bulb with glands enclosed. Lumen of esophagus prominently cuticularized near end of posterior bulb; esophageal-intestinal valve small, rounded. Excretory pore inconspicuous, at same level as the 6- μ m long hemizonid. Deirids not observed. Ovary single, outstretched anteriorly; spermatheca an ovate projection, approximately 7 \times 14 μ m, on right latero-ventral side at anterior end of uterus. Vagina heavily cuticularized, oblique, directed anteriorly at about 45-degree angle from transverse plane. Posterior wall of vagina slightly swollen, but no evidence of posterior ovary or reduced post-uterine sac. Several well-developed muscles at right angles to vagina (Fig. 1-I). Body enlarges slightly in region of vulva. Anterior lip of vulva projects posteriorly as overlapping cuticular flap [Fig. 1-(H to I)].

Body abruptly narrows immediately posterior to vulva, tapers gradually up to last 10 μ m, then more abruptly ending with an acute terminus. Body slightly swollen at anal

opening. Rectum weak, anal opening obscure. Phasmids not observed. Body annules average about 0.6 μ m in width, cuticle almost smooth in appearance. Lateral field a narrow, projecting band about 1.3 μ m wide, occupying approximately 11% of body width, and appears as two distinct lines in lateral view. In transverse section (Fig. 1-L), band projects beyond contour of body outline. Lateral field extends anteriorly beyond level of metacarpus, posteriorly near terminus.

Male (allotype): L = .47 mm; a = 47; b = ?; c = 12; spicules = 23 μ m; gubernaculum = 4 μ m; excretory pore = 74 μ m; T = 25. Body slender, an open 'C' shape after fixing; narrows gradually anteriorly to slender, finely rounded, asymmetrical head. Anterior end turned about 30 degrees ventrad with four small rounded lips or submedian lobes on the oblique surface. Cephalic framework indistinct; stylet lacking. Esophagus degenerate, but outlines of metacarpus and posterior bulb partially visible. Excretory pore immediately posterior to hemizonid. Testis single, outstretched. Spicules curved; head (capitulum) and shaft (calomus) comprising 36% of spicule length (35-40% in other paratypes). Gubernaculum simple, rod-shaped. Prominently protruding anal sheath. Body narrows abruptly posterior to cloacal opening, then curves ventrad forming slender tail with an acute terminus. One specimen (Fig. 1-J) was observed to recurve dorsad posterior to cloacal opening. Caudal alae begin at level of anterior end of retracted spicules, curve out (with rounded outline) at level of anal sheath, then narrows to terminus. Caudal alae with fine transverse striae, crenate margin. Lateral field similar to that of female. Phasmids not seen. Body annules fine; cuticle appears smooth in outline.

Eight juveniles (probably second-stage): L = .44 mm (.36-.52); a = 40 (29-50); b = 4.5 (4.1-5.0); c = ?; stylet = 18 μ m (16-19); prorhabdion = 12 μ m (11-12); excretory pore = 89 μ m (77-104). Body-shape and head end similar to adult female. Lips slightly smaller, shallower, more pointed dorsally and ventrally than in adult female (Fig. 1-F). Tail evenly conoid to an acute terminus, but not as slender as adult female at posterior 10-12 μ m. Lateral field as in adult female, but narrower. Developing gonad 17 μ m (12-23) long, about 109 μ m (97-118) from terminus.

Holotype: Female, collected by K. F. Sims, San Diego County Department of

Agriculture, slide number 1386, University of California Nematode Survey Collection, Davis, California.

Allotype: Male, same data as holotype, slide number 1387, University of California Nematode Survey Collection, Davis, California.

Paratypes: 97 females, 13 males, 8 juveniles same data as holotype, deposited as follows: 77 females, 6 males, 8 juveniles, University of California Nematode Survey Collection, Davis; 2 females, 1 male, California State Department of Food and Agriculture, Sacramento; and 3 females, 1 male each at the following: University of California Nematode Survey Collection, Riverside, California; United States Department of Agriculture Nematode Collection, Beltsville, Maryland; National Nematode Collection, IARI, New Delhi, India; Nematology Department, Rothamsted Experimental Station, Harpenden, England; Plantenziektenkundige Dienst, Wageningen, The Netherlands; Entomology Research Institute, Canadian Department of Agriculture, Ottawa, Canada.

Type habitat: Soil about the roots of a bromeliad, specific identification unknown.

Type locality: Guatemala City, Guatemala.

Diagnosis: *Tylenchocriconema* is a monotypic genus with no other known species closely related to it. Thus the diagnosis of the genus covers the species.

This species is named in honor of the late M. W. Allen in recognition of his long and distinguished service to Nematology, and his many outstanding contributions to the science of taxonomy.

DISCUSSION

The above proposal for a new taxon of superfamily rank for *T. alleni* conflicts with the classification proposed by Allen and Sher (1) and De Coninck (2) who consider only two superfamilies, the Tylenchoidea and the Aphelenchoidea, in the Order Tylenchida. The new taxon fits more readily in the classifications of Geraert (3), Golden (4), Jairajpuri and Siddiqi (5), Paramonov (6), and Siddiqi (7) who include as many as five superfamilies in a suborder Tylenchina. The latter is preferred here because a single superfamily for all the tylenchs is too limiting and does not permit indication of relationships between the many diverse families now in that group.

Tylenchocriconema alleni is of further

significance because it presents a different perspective on the relationships of Tylenchulidae and Paratylenchidae. Tylenchulidae has been accepted as a separate family in the Tylenchoidea (1, 2) and as a family of the Criconematoidea (3, 4). Paratylenchidae is considered a subfamily of Criconematidae (1, 2) and as a family in the Criconematoidea (3, 4). The principal characteristic relating Tylenchulidae and Paratylenchidae to the Criconematoidea is the procorpus which gradually enlarges into the metacorpus. Also important, is the strong sexual dimorphism with degenerate esophagus of the males and the small set-off posterior bulb of the females.

In fact, the fine annulation of both these groups, and the nature of the isthmus of the female esophagus (longer, and more slender and distinct than in the typical criconematids) distinguish them from most or all of the criconematids. The discovery of *T. alleni* lends further support to the importance of these differences as indicators of another phylogenetic relationship, and suggests that a separate superfamily would best represent their relationship in the Tylenchina. Therefore, the following changes are proposed:

Superfamily Tylenchulidoidea n. rank.

Diagnosis: Tylenchina. Small nematodes less than 0.6 mm in length with marked sexual dimorphism. Males usually without stylet, rarely with weak stylet; esophagus degenerate. In most genera, females become swollen on maturity. Female stylet mostly small, but long and slender in some groups. Body cuticle with fine annules. Procorpus enlarges without constriction and merges with large, oval metacorpus containing elongate thickenings of lumen (valvular apparatus). Isthmus distinct, slender with set-off posterior bulb. Vulva posterior with monodelphic, prodelphic gonad. Caudal alae absent or weakly developed.

Type family: Tylenchulidae (Skarbilovich, 1947) Kirjanova, 1955.

Other family: Paratylenchidae (Thorne, 1949) Raski, 1962.

Removal of Tylenchulidae and Paratylenchidae from Criconematoidea requires the diagnosis of that taxon be emended as follows:

Superfamily Criconematoidea (Taylor, 1936)
Geraert, 1966

Diagnosis (emended): Tylenchina. Both sexes generally small vermiform nematodes. Sexual dimorphism present. Stylet long and robust. Body cuticle with prominent annules, often retrorse, with or without scales or spines. Cuticular sheath present in adult females in some taxa. Esophagus criconematoid (i.e., procorpus enlarges without constriction and fuses with metacarpus). Metacarpus large with heavy valvular apparatus. Isthmus short, narrow, leading to small basal bulb enclosing esophageal glands. Vulva posterior with monodelphic, prodelphic gonad. Males, if known, lacking stylet and with degenerate esophagus. Caudal alae present or absent.

Type family: Criconematidae (Taylor, 1936) Thorne, 1949.

*Key to the Superfamilies of
Suborder Tylenchina*

(Based on key proposed by Golden (4) with modifications to reflect changes made here)

1. Head with setae Atylenchoidea.
Head without setae 2.
2. Valvular median esophageal bulb absent (esophagus neotylenchoid)..... Neotylenchoidea.
Valvular median esophageal bulb present. 3.
3. Procorpus well-defined, not merging with metacarpus (tylenchoid)..... 4.
Procorpus enlarges gradually to merge with large metacarpus (criconematoid). 5.
4. Both sexes active, vermiform nematodes, free-living, ectoparasites or migratory parasites, usually with only reduced or no sexual dimorphism; eggs deposited outside body not in gelatinous matrix; caudal alae present, often large Tylenchoidea.
Females inactive, swollen, sessile, attached to or within plant roots, with pronounced sexual dimorphism; eggs may be retained in body or often deposited in gelatinous matrix; males vermiform, with small caudal alae, more often without Heteroderoida.
5. Females with coarse body annules, often retrorse or with ornamentation; isthmus short Criconematoidea.
Females with fine body annules; isthmus long, slender 6.
6. Caudal alae well-developed, extending to terminus Tylenchocriconematoidea.

Caudal alae lacking or very reduced Tylenchulidoidea.

*Key to the Families of the
Superfamily Tylenchulidoidea*

1. Stylet of female well-developed, variable, mostly longer than 15 μm ; prorhabdion greater than 50% of stylet length; female body vermiform, slender, less frequently plump to obese Paratylenchidae.
Stylet of female well-developed, mostly short averaging about 15 μm ; prorhabdion approximately 50% of stylet length; female body subspherical, saccate, or elongate-saccate Tylenchulidae.

Key to the Genera of Family Paratylenchidae

1. Head sclerotization strongly developed, less so in males *Paratylenchoides*.
Head sclerotization lightly developed .. 2.
2. Female obese, with cuticular ornamentations and very short, blunt tail..... *Cacopaurus*.
Female slender to plump or obese, without cuticular ornamentations; tail short and conical to elongate 3.
3. Female stylet 38 μm or less; excretory pore always near nerve ring or posterior to it; females slender *Paratylenchus*.
Female stylet 40 μm or more; excretory pore typically anterior to nerve ring; many females plump to obese *Gracilacus*.

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