

Californidorus pinguicaudatus n.gen., n.sp. from California (Nematoda : Longidoridae)

Robert T. ROBBINS and Adam C. WEINER

Laboratory Services, Division of Plant Industry, California Department of Food and Agriculture,
1220 N Street, Sacramento, California 95814, U.S.A.

SUMMARY

Californidorus pinguicaudatus n. gen., n. sp. from soil about roots of bamboo from the coastal region of Central California is described. The enlarged basal portion of the esophagus of *C. pinguicaudatus* n. gen., n. sp. is longer proportionally ($\approx 40\%$) than that reported for *Longidorus*, *Paralongidorus*, *Xiphinema*, and *Xiphidorus* ($\approx 20-30\%$). The two subventral esophageal glands and nuclei are located much further posteriorly ($\approx 80\%$) than reported for other Longidoridae ($\approx 45-60\%$). The female has only a posterior genital branch. No male was found. Californidorinae n. subfam. is proposed. The subfamily Xiphineminae is rejected.

RÉSUMÉ

Californidorus pinguicaudatus n. gen., n. sp., de Californie (Nematoda : Longidoridae)

L'auteur décrit et figure *Californidorus pinguicaudatus* n. gen., n. sp. découvert dans le sol au voisinage des racines de bambou en Californie centrale. La partie basale élargie de l'œsophage de *C. pinguicaudatus* n. gen., n. sp. est proportionnellement plus longue ($\approx 40\%$) que celle décrite chez *Longidorus*, *Paralongidorus*, *Xiphinema* et *Xiphidorus* ($\approx 20-30\%$). Les deux glandes œsophagiennes subventrales et leurs noyaux sont situés beaucoup plus postérieurement ($\approx 80\%$) que chez les autres Longidoridae ($\approx 45-60\%$). La femelle n'a qu'une branche génitale postérieure. Le mâle n'a pas été observé. Californidorinae n. subfam. est proposée et la sous-famille des Xiphineminae rejetée.

In April 1964, specimens of an unusual nematode species were collected from soil about the roots of an unidentified bamboo species growing beside Portergulch Road, near Soquel in Santa Cruz County, California. The sample (California Department of Food and Agriculture number N-4359-64) was collected by the junior author. This nematode represents a new genus and species of Longidoridae described herein.

Materials and methods

Specimens were separated from the soil by the combined gravity sieving-Baermann funnel

techniques. The specimens were heat killed (alcohol flame) in a drop of water on a glass slide; fixed in 2-4% formaldehyde and processed to glycerine by the slow evaporation-desiccation technique. The collection included 30 females, 48 juveniles, and fourteen molting specimens.

Californidorus n. gen.

DIAGNOSIS

Longidoridae (as reported by Hooper and Southey, 1973). Enlarged posterior basal portion of esophagus about 40% of total

esophagus length. Posterior subventral glands and nuclei (PSVGN) evident and located at approximately 80% of the enlarged basal portion of the esophagus. No anterior subventral glands and nuclei (ASVGN) observed. Vulva 30-40%. Anterior genital branch lacking, posterior genital branch normal.

Type species: Californidorus pinguicaudatus n. gen., n. sp.

Californidorus n. gen. can be distinguished from its closest relatives: *Xiphinema*, *Xiphidorus*, *Longidorus*, and *Paralongidorus*, by the proportionally longer basal portion of the esophagus and the presence of PSVGN and absence of ASVGN.

***Californidorus pinguicaudatus* n. gen., n. sp.**
(Fig. 1 and 2)

MEASUREMENTS

Females (n=29): L=2.09 mm (1.88-2.28); a=40 (36-45); b=4.1 (3.4-4.4); c=74 (66-81); c'=.72 (.67-.81); V=34¹⁶ (30-37¹²⁻²⁷); odontostyle=100 μ m (96-104); odontophore=88 μ m

(84-93); distance from anterior end to guide ring=38 μ m (35-40); tail=28 μ m (25-30).

Holotype. Female: L=2.07 mm; a=41; b=4.0; c=74; c'=.74; V=33¹⁶; odontostyle=101 μ m; odontophore=88 μ m; distance from anterior end to guide ring=38 μ m; tail=28 μ m.

Juveniles (n=26): See Table 1.

DESCRIPTION

Female: Smaller, more robust than most Longidoridae. Body ventrally curved open "C" when killed by gentle heat. Lip region 13 μ m (12-14) wide, rounded, offset, 1/2 as high as wide. Amphidial openings wide slit-like (about 70% of lip width) located at lip constriction, amphidial pouches inverted-stirrup (goblet) shaped. Guide ring single about three lip widths from anterior end. Neck width at guide ring about two lip widths. Ventral and dorsal body pores in neck region. Lateral body pores along entire body length. Stylet robust, in two parts; odontostyle base forked at junction with odontophore; base of odontophore expanded, slightly sclerotized. Hemizonid at level of odontophore base, 169 μ m (161-180) from anterior end. Nerve ring 230 μ m (217-238) from anterior end. Hemi-

Table 1
Biometrics of *Californidorus pinguicaudatus* n. gen., n. sp. juveniles.

Stage	L2	L3	L4
n	2	12	12
L (mm)	1.06 (1.03-1.10)	1.38 (1.12-1.54)	1.71 (1.46-1.94)
a	38.5 (37-40)	40 (36-45)	43 (37-45)
b	3.25 (3.2-3.3)	3.5 (3.1-3.8)	3.7 (3.2-4.0)
Tail (μ m)	30 (30-30)	28 (24-30)	29 (25-30)
c	35.5 (34-37)	50 (39-56)	60 (56-69)
c'	1.5 (1.4-1.6)	1.1 (0.9-1.4)	0.9 (0.8-1.0)
Odontostyle (μ m)	49 (48-50)	69 (62-72)	86 (82-89)
Odontophore (μ m)	60.5 (60-61)	70 (68-73)	81 (78-83)
Replacement odontostyle (μ m)	69 (67-71)	84 (80-90)	100 (97-103)
Distance from anterior end to guide ring (μ m)	21 (21-21)	26 (26-27)	32 (31-33)

zonion at level of nerve ring. Expanded basal portion of esophagus (differentiated by and measured from the first visibly larger esophageal platelets) 41% (39-43%) of total esophagus length, 209 μm (192-221) in length, 25 μm (24-27) in width. Dorsal gland orifice (DO) 18 μm (11-22) posterior from anterior end of basal esophageal expansion. Dorsal gland nucleus (DN) located well posterior (11-17) to DO, at 29 μm (27-37) from anterior end of expanded basal region of esophagus. Nuclei of subventral glands (SVN) smaller than DN and located at approximately 80% of the length of the enlarged basal portion of the esophagus: nearest SVN 166 μm (155-179), farthest 169 μm (158-182). Vulva a transverse slit. Normally, the anterior genital branch is very short, not differentiated, 21 μm (14-33) in distance from terminus to vagina. One abnormal female has a reduced anterior genital tube (120 μm in length). Posterior genital branch with sphincter separating uterus from spermatheca; junction of spermatheca-oviduct 111 μm (85-155) from vagina; reflexed at oviduct-ovary junction (left or right). Tail expanded, bluntly rounded.

Juveniles: Closely resemble females except for smaller size and degree of development of reproductive system.

Males: None observed.

Type Habitat, Host and Locality: Soil from about roots of unidentified bamboo species growing beside Portergulch Road, near Soquel, Santa Cruz County, California.

Holotype. Female: Collected April 1964 by A. C. Weiner. Deposited on slide number UCNC 1592 University of California Nematode Collection, Davis, California.

Paratypes: 29 Females, 48 juveniles, 14 molting specimens. Same data as holotype. Paratypes deposited as follows: 6 females, 6 juveniles, 4 molting specimens, University of California Nematode Collection, Davis, California, U.S.A.; 3 females, 3 juveniles, 2 molting specimens, USDA Nematode Collection, Beltsville, Maryland, U.S.A.; 2 females, 2 juveniles, Nematology Department, Rothamsted Experimental Station, Harpenden, England; 2 females, 2 juveniles, Laboratorium voor Nematologie, Wageningen, The Netherlands; 2 females, 2 juveniles, Laboratoire des Vers, Muséum national

d'Histoire naturelle, 43 rue Cuvier, Paris, France; remaining specimens in the California Department of Food and Agriculture Nematode Collection, Sacramento, U.S.A.

DIAGNOSIS

As *Californidorus pinguicaudatus* n. gen., n. sp. is monotypic, see the genus diagnosis.

Discussion

Californidorus n. gen. fits the definition of Longidoridae, as reported by Hooper and Southey (1973). It does not fit the definition of Xiphineminae Dalmaso, 1969 or Longidorinae Thorne, 1935 and is not intermediate to them. There is considerable overlap of subfamily characters of the Xiphineminae and Longidorinae which leads to confusion. The most striking example of a nematode with characters of both subfamilies is *Xiphidorus yepesara* Monteiro, 1976. This nematode has Xiphineminae characters of guide ring near odontostyle base, forked junction of odontostyle-odontophore and a flanged, refractive odontophore; Longidorinae characters of pore-like amphid opening, bilobed amphid pouches and a typical Longidorinae esophageal gland nuclei pattern. The following Longidoridae have been recognized as having characters either intermediate to both subfamilies or being placed in one subfamily and having at least one character of the other subfamily: *Xiphinema sandellum* Heyns, 1965; *Paralongidorus xiphinemoides* Heyns, 1965; *P. citri* (Siddiqi, 1959) Siddiqi, Hooper & Khan, 1963; and *Longidorus siddiqii* (Siddiqi, 1959) Aboul-Eid, 1970. The following characters have been found to be either intermediate or present in both subfamilies; pore-like or slit-like amphid openings, amphidial pouch shape, position of guide ring to odontostyle, odontostyle-odontophore junction forked or plain, degree of swelling and/or refractiveness of base of odontophore, and typical subfamily esophageal gland nuclei patterns. These overlapping and/or intermediate characters commonly used to differentiate the two subfamilies are not

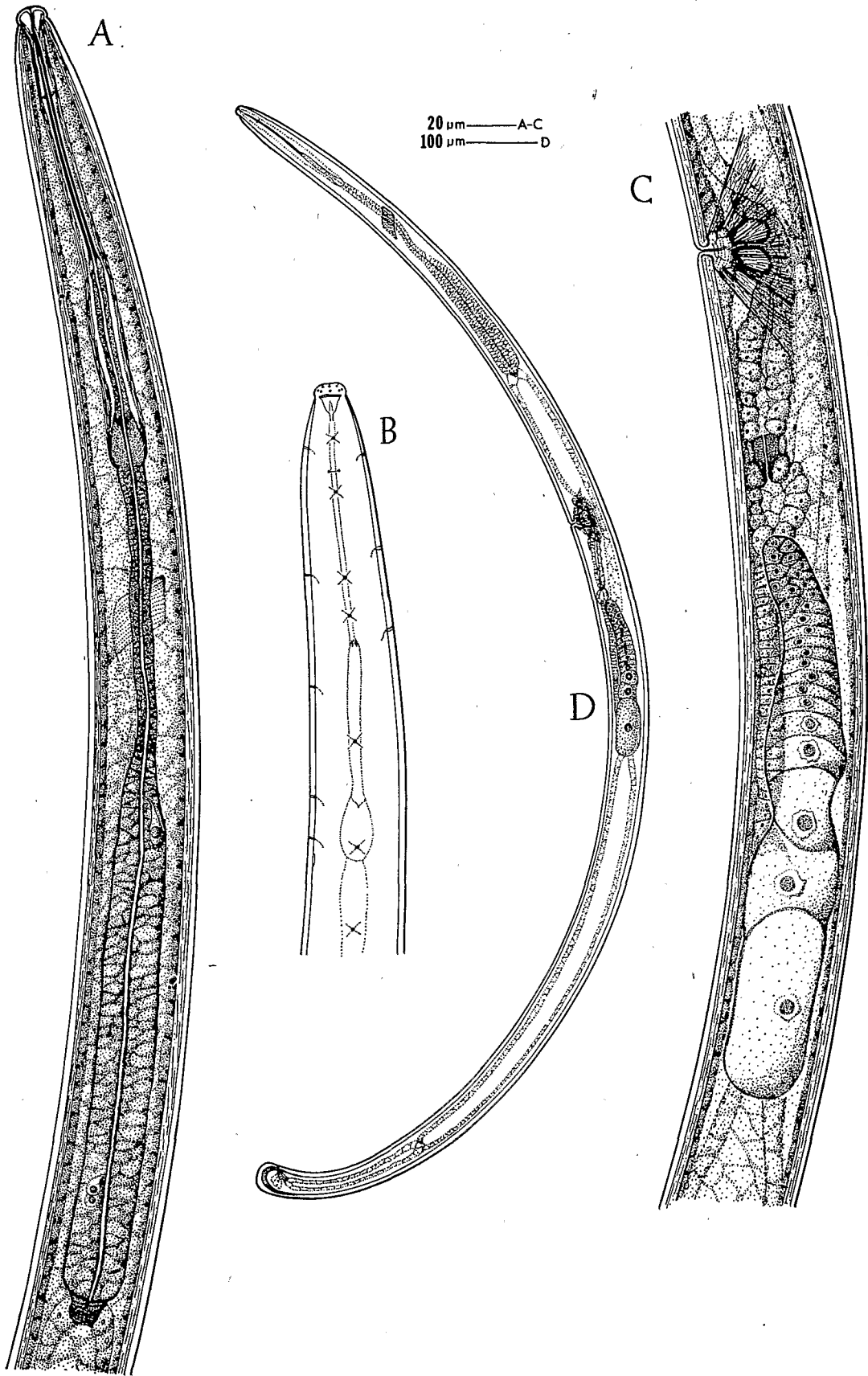


Fig. 1. Lateral views of female *Californidorus pinguicaudatus* n. gen., n. sp. A-B : Anterior region ; C : Vulval region ; D : Full length.

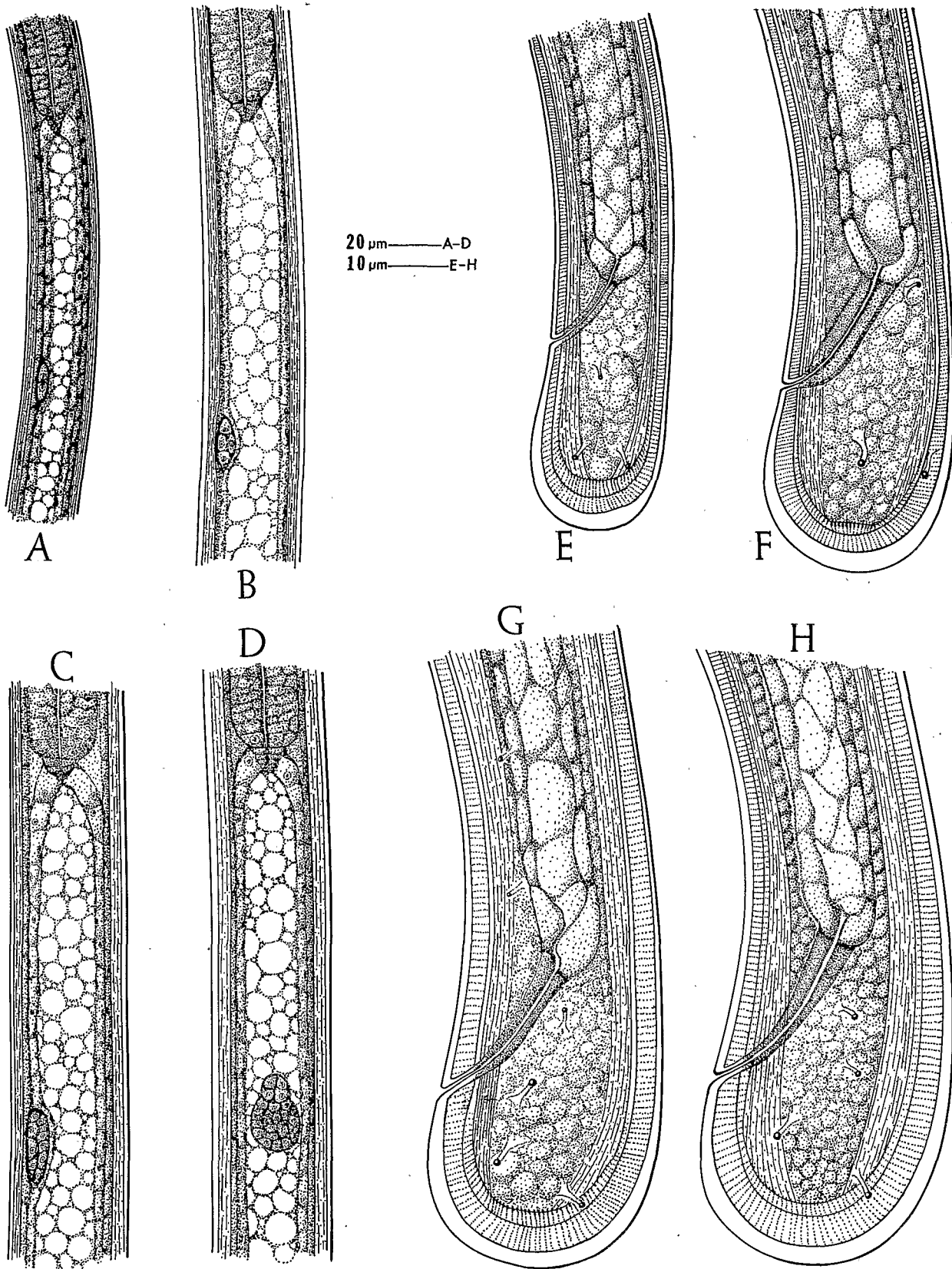


Fig. 2. *Californidorus pinguicaudatus* n. gen., n. sp. A-D : Genital primordia of juveniles ; A : Second-stage, lateral ; B : Third-stage, lateral ; C-D : Fourth-stage, lateral and ventral respectively ; E-H : Tails ; E : Second-stage ; F : Third-stage ; G : Fourth-stage ; H : Female.

definitive and Xiphineminae is therefore rejected.

Longidorinae Thorne, 1935 is here defined as follows : Longidoridae : Expanded posterior portion of esophagus about 1/5 to 1/3 of total esophagus length with two centrally located (45-60%) subventral glands and nuclei. Included in the Longidorinae are *Xiphinema*, *Xiphidorus*, *Longidorus*, *Paralongidorus* and the intermediate species previously mentioned.

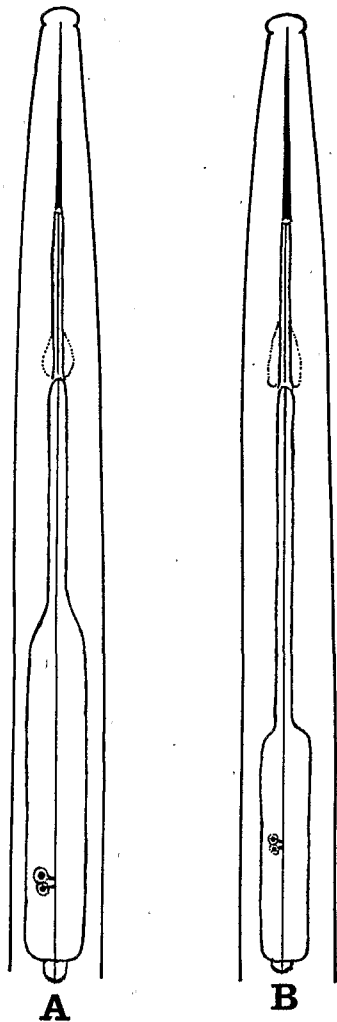


Fig. 3. Diagrams of Longidoridae esophagus types depicting the proportional length of the enlarged basal portion of the esophagus to the entire esophagus length and the position of the subventral glands and nuclei. A : Californidorinae ; B : Longidorinae.

In the species of *Xiphinema*, *Longidorus* and *Paralongidorus* studied by Loof and Coomans (1972) and *Xiphidorus yepesara* Monteiro, 1976 the ASVGN are located at about 50% of the expanded esophagus base and are always present. Both articles report posterior orifices (lacking glands and nuclei) at about 80%. Species descriptions, redescriptions and illustrations of *Xiphinema arcum*, *X. basiri* (Indian population), *X. chambersi*, *X. cubense*, *X. diversicaudatum*, *X. index*, *X. vitis*, *X. yapoense*, *Longidorus pisi*, *L. reneyii*, *Paralongidorus droseri*, *P. maximus*, *P. similis* and *P. spiralis* indicate the presence of PSVGN. Loof and Yassin (1970) did not observe PSVGN in *X. basiri* specimens from Sudan. Allen (1960) reports that the presence of PSVGN in *X. index* is likely to be an error. We did not observe PSVGN in numerous specimens of *X. chambersi*, *X. diversicaudatum*, *X. index* or *P. maximus*. ASVGN are always present in the Longidorinae (*Xiphinema*, *Xiphidorus*, *Longidorus* and *Paralongidorus*) while PSVGN are generally not present, but may be present occasionally. Thus, the presence of only the PSVGN in *Californidorus pinguicaudatus* is interpreted by the authors as a phylogenetically significant occurrence in the evolution of the Longidoridae.

The proportionally longer expanded basal portion of the esophagus of *C. pinguicaudatus* (39-43%) represents a less derived, or more primitive, state than the shorter expanded esophagus base (18-31%) of the Longidorinae.

The lack of ASVGN and the proportionately longer enlarged esophagus base are considered profound, therefore, a new subfamily is proposed as follows :

Subfamily : **Californidorinae** n. subfam.

DIAGNOSIS

Longidoridae : Enlarged posterior portion of esophagus about 40% of total esophagus length. PSVGN apparent and located at approximately 80% of the enlarged basal portion of the esophagus.

Type genus: Californidorus n. gen.

Californidorinae can be distinguished from its closest relatives, the Longidorinae, as follows : the enlarged basal portion of the esophagus is longer proportionally to the total esophagus length (39-43% vs. 18-31%); PSVGN are present, the ASVGN of Longidorinae are absent (Fig. 3).

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