

# *Pratylenchus morettoi* n. sp. (Nemata : Pratylenchidae)

Michel LUC\*, James G. BALDWIN\*\* and Arnold H. BELL\*\*

\*Muséum national d'Histoire naturelle, Laboratoire des Vers, 61, rue de Buffon, 75005 Paris, France and

\*\* Department of Nematology, University of California, Riverside, Ca 92521, USA.

## SUMMARY

A description and illustrations are given for *Pratylenchus morettoi* n. sp. The new species differs from all other species in the genus mainly by a thin, well marked projection at the tail extremity. Some of the characteristics of *P. morettoi* n. sp. resemble those in the genus *Hirschmanniella*. The authors discuss the validity of mono - vs didelphy as a generic character within the Pratylenchidae.

## RÉSUMÉ

*Pratylenchus morettoi* n. sp. (Nemata : Pratylenchidae)

*Pratylenchus morettoi* n. sp. est décrit et figuré. Cette nouvelle espèce diffère essentiellement de toutes les espèces déjà décrites dans le genre par la présence à l'extrémité de la queue d'un mucron fin et bien détaché. Certains des caractères de *P. morettoi* n. sp. le rapprochent du genre *Hirschmanniella*. Les auteurs discutent la validité de la monodelphie opposée à la didelphie en tant que caractère générique chez les Pratylenchidae.

In the spring 1973, A. Moretto collected nematodes from wet soil and roots of common spike-rush (*Eleocharis palustris* R. & S.) in a vernal pond near Farmington, San Joaquin Co, California, USA. Four species of Pratylenchidae were present : *Hirschmanniella gracilis* (de Man, 1880) Luc & Goodey, 1964, *Pratylenchus thornei* Sher & Allen, 1953, *P. allenii* Ferris, 1961 and a forth species, possibly representing a new taxon. Specimens of the latter were transmitted to the late Prof. S. A. Sher.

Sher first considered this nematode as a new species of *Pratylenchus* and he published a SEM picture of its face as *Pratylenchus* sp. (Sher & Bell, 1975). Although he did not publish a description of this taxon, his notes show he considered that it could represent a new genus intermediate between *Pratylenchus* Filipjev, 1936 and *Hirschmanniella* Luc & Goodey, 1964.

Sher's opinion was not wrong, since the species shares some characters with both genera. However, after examining the original and some additional material, we believe, for reasons given herein, that this new species can be accommodated in the genus *Pratylenchus*.

Subsequent samplings by A. Moretto at the same place demonstrated that *Plagiobothrys stipitatus* var.

*micranthus*, *Machaerocarpus californicus* and an unidentified grass are also hosts for *P. morettoi* n. sp.

A population from *P. stipitatus* has been chosen as type population, since specimens were most numerous on this host.

Specimens have been killed by gentle heating, fixed using FA 4 : 10 and mounted in dehydrated glycerin according Cobb's slow method.

Specimens were prepared for scanning electron microscopy (SEM) by fixing in 5 % formalin and infiltrating with glycerin as previously described by Sher and Bell (1975). Nematodes were coated with about 0.02 µm gold with a Jeol J-4 vacuum evaporator and examined with a Jeol JSM-35C SEM operated at 5 KV.

## *Pratylenchus morettoi* n. sp.

= *Pratylenchus* sp. apud Sher & Bell, 1975  
(Fig. 1 & 2)

## MEASUREMENTS

Female (n = 36) : L = 0.56-0.93 mm (0.74 ± 0.09);  
a = 26-40 (34 ± 3.22); b = 5.3-7.4 (6.6 ± 0.48); b' =  
3.7-4.8 (4.1 ± 0.29); tail = 46-62 µm (59 ± 1.25); c =  
13-19 (15.2 ± 1.47); c' = 2.8-4.5 (3.6 ± 0.44); V =  
73-80 (76 ± 1.50); stylet = 14-19 µm (16.5 ± 1.34).

\*Nematologist of ORSTOM.

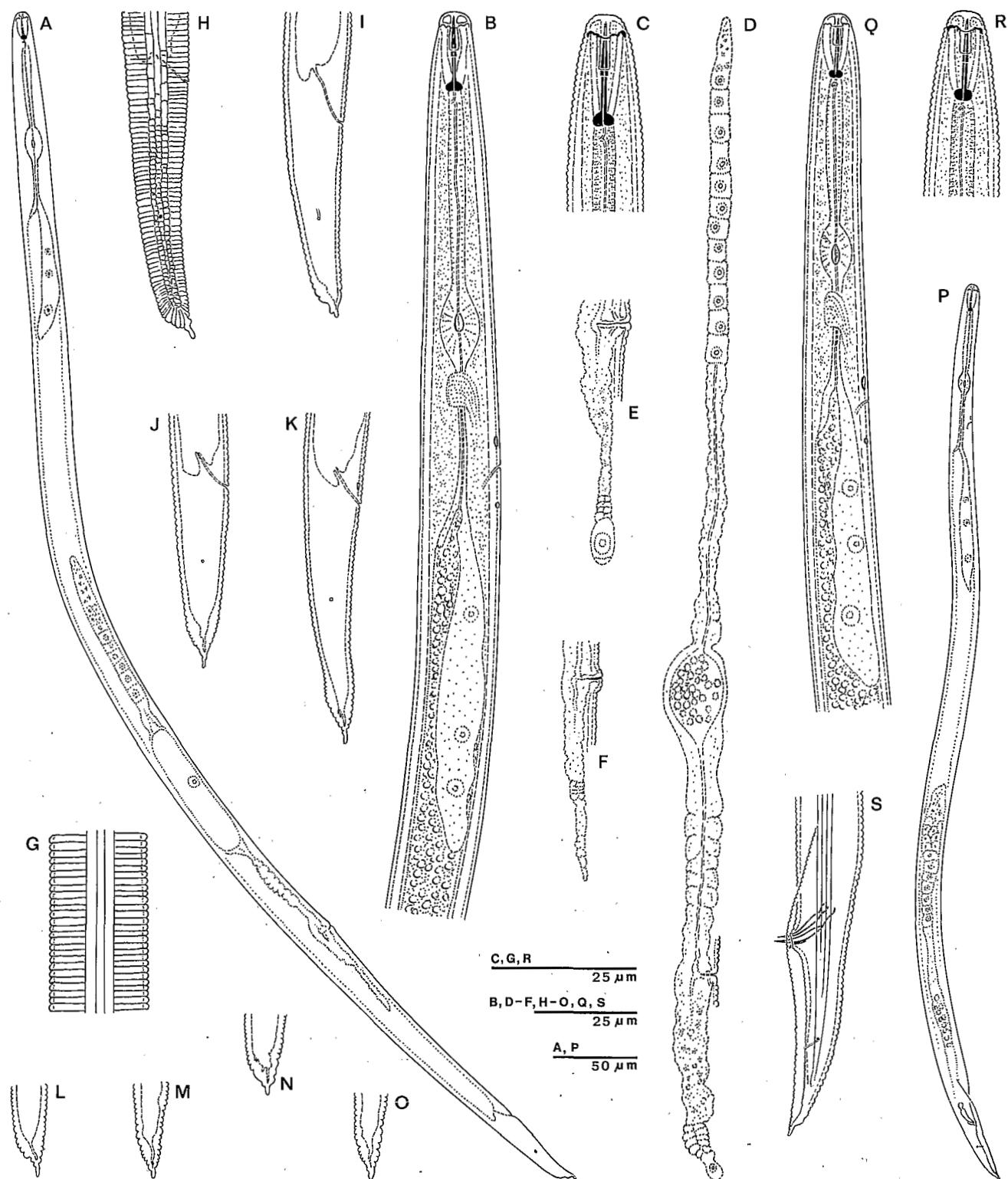


Fig. 1. *Pratylenchus morettoi* n. sp. A-O : Female. A : Animal *in toto*; B : Oesophageal portion; C : Anterior end; D : Genital tract; E, F : Posterior genital branch; G : Lateral field and annulation at mid-body; H-K : Tail; L-O : Tail extremity. P-S : Male. P : Animal *in toto*; Q : Oesophageal portion; R : Anterior end; S : Tail and spicular apparatus.

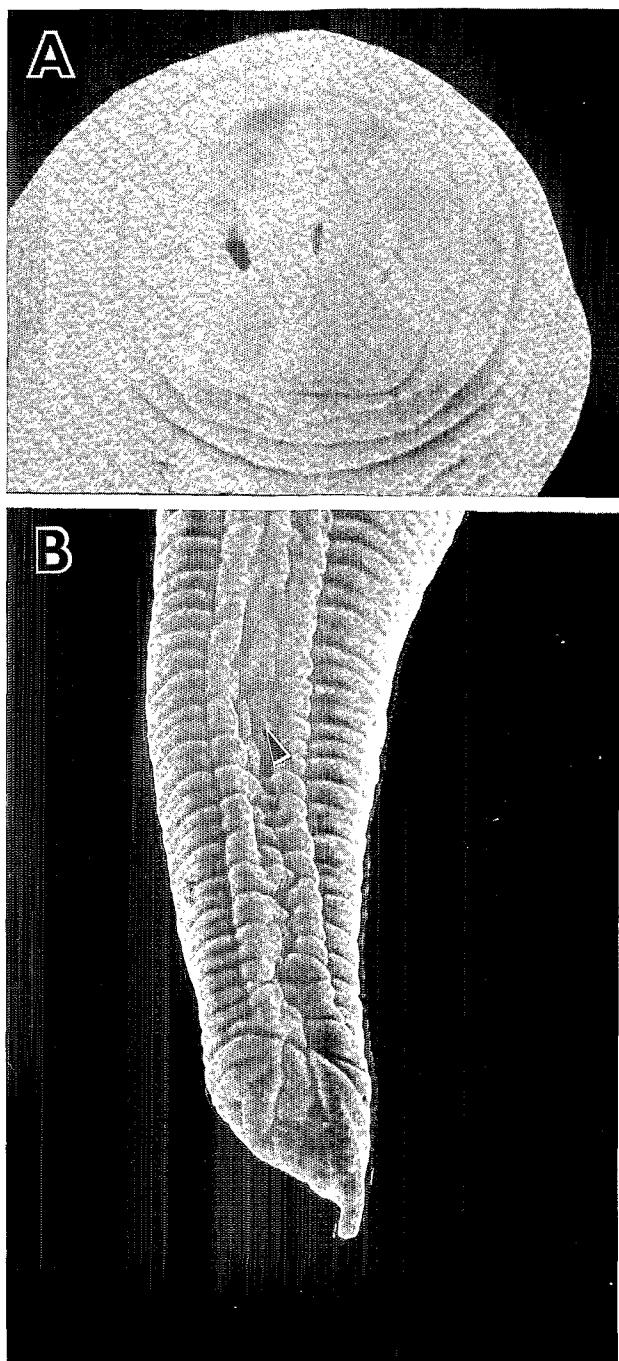


Fig. 2. *Pratylenchus morettoi* n. sp. SEM micrographs. Female. A : En face view of the lip area ( $7500 \times$ ). B : Tail ( $2800 \times$ ; arrow indicates the phasmid aperture).

*Male* ( $n = 22$ ) : L = 0.51-0.68 mm ( $0.60 \pm 0.04$ ); a = 30-38 ( $34.7 \pm 1.98$ ); b = 5.1-6.5 ( $5.8 \pm 0.43$ ); b' = 3.2-4.1 ( $3.7 \pm 0.24$ ); tail = 38-43  $\mu\text{m}$  ( $40 \pm 1.02$ ); c = 14-17 ( $15.8 \pm 1.05$ ); c' = 2.7-3.6 ( $3.1 \pm 0.28$ ); stylet = 13-17.5  $\mu\text{m}$  ( $14.5 \pm 0.94$ ); spicules = 15-21  $\mu\text{m}$  ( $18.5 \pm 1.37$ ); gubernaculum = 4-6.5  $\mu\text{m}$  ( $5 \pm 0.70$ ).

*Holotype* (female) : L = 0.72 mm; a = 35.1; b = 6.2; b' = 5.2; tail = 46  $\mu\text{m}$ ; c = 15.6; c' = 3.4; V = 75.6; stylet = 16  $\mu\text{m}$ .

#### DESCRIPTION

*Female* : On specimens killed by gentle heating, habitus slightly and regularly ventrally curved. Body thin, elongated, slightly tapering at anterior extremity; posterior extremity long conical. Cuticle thin ( $0.5 \mu\text{m}$ ; transverse striation narrow ( $1.1 \mu\text{m}$  at mid-body)). Lateral field composed of four equidistant lines, 6-9  $\mu\text{m}$  wide at mid-body, not areolated except at its anterior part and on the tail. Labial area dome-shaped, with three or four annules, not separated from the rest of the body. SEM : face plain; labial sectors fused together and fused with the labial disc; amphidial aperture a large slit; oral aperture ovate, surrounded by six pits (apertures of the inner labial sensillae). Cephalids not seen. Stylet straight; basal knobs rounded or slightly sloping backward. Dorsal oesophageal gland opening at 3-4  $\mu\text{m}$  from base of stylet. Procorpus long and thin; median bulb well marked, ovate, occupying about half of the corresponding body diameter, with prominent valve; isthmus long and thin; oesophageal glands online, elongated, with long ventral overlapping intestine; oesophageal glands nuclei line-up, the posterior (dorsal gland) somewhat larger. Intestine without fasciculi, forming a very short post-anal sac. Nerve ring encircling the anterior half of the isthmus. Excretory pore at 95-128  $\mu\text{m}$  from anterior end. Hemizonid flat, 3-4  $\mu\text{m}$  long, 2-5  $\mu\text{m}$  anterior to excretory pore. Hemizonion lenticular, 1.5-2  $\mu\text{m}$  wide, 11-19  $\mu\text{m}$  posterior to excretory pore. Vulva plain; vulval lips slightly protruding; no lateral flaps, no epiptygma. Anterior genital branch straight; ovary with oocytes in one row; spermatheca rounded, in-line with genital tract, thick walled, containing globular spermatozoa 2  $\mu\text{m}$  in diameter; columnar uterus of medium length. Posterior genital branch reduced, 46-74  $\mu\text{m}$  (59) long and degenerated, in which only the columnar part of the uterus can be recognized; in some cases, a cell with a prominent nucleus (remnant of the cap cell of the ovary?) is present at the distal end. Tail long conical; extremity variable, from more or less pointed to stout, but always showing a terminal projection and a terminal thickening of the cuticle; lateral field areolated on the posterior two thirds of the tail, the four lines nearly reaching the tail extremity. Phasmids punctiform, 17.5-35  $\mu\text{m}$  (26.5) posterior to anus or at 37-54 % (46) of the tail length. Caudalids rarely seen, 1.5-2  $\mu\text{m}$  long, 2-3  $\mu\text{m}$  anterior to anus.

*Male* : Similar to female except for smaller body and stylet length. No secondary sexual dimorphism visible in labial area or oesophagus. Spicules curved, cephalated; gubernaculum thin, anteriorly recurved, slightly projecting from cloaca. Caudal alae well developed, crenate, enveloping tail extremity. Tail conical, extremity pointed. Phasmids 12-23 µm (17) posterior to anus, or 30-56 % (43) of tail length, located in a notch on the edge of the caudal alae.

#### TYPE HOST AND LOCALITY

Roots and surrounding soil of *Plagiobothrys stipitatus* var. *micranthus*, vernal pond near Farmington, San Joaquin Co., California, USA (coll. & leg. : A. Moretto).

#### TYPE SPECIMENS

*Holotype* (female) deposited in the collection (UCRNC) of the Department of Nematology, University of California, Riverside, USA.

*Paratypes* distributed in the following collections : Muséum national d'Histoire naturelle, Laboratoire des Vers, Paris, France : six females, three males; USDA Nematology Investigations Beltsville, Maryland, USA : three females, two males; Rothamsted Experimental Station, Harpenden, U.K. : three females, two males; Landbouwhogeschool, Laboratorium voor Nematologie, Wageningen, Nederland : three females, two males. Remaining type material in the UCRNC, Department of Nematology, University of California, Riverside, USA.

#### DIAGNOSIS AND RELATIONSHIPS

*Pratylenchus morettoi* n. sp. differs from the 61 known species in the genus by the thin, well marked projection at the tail terminus.

Some *Pratylenchus* species, such as *P. « irregularis »* Loof, 1960 (now considered as a junior synonym of *P. pratensis* (de Man, 1880) Filipjev, 1936), *P. goodeyi* Sher & Allen, 1953 and *P. ventroprojectus* Bernard, 1984, have a tail terminus which is not regularly rounded but which have a ventral or median projection, although the projection is short and stout, and not well marked.

In addition to the above mentioned characters, *P. morettoi* n. sp. has other characters which are not common in the genus : body thin and elongate, lip area domeshaped, long oesophageal overlap with the intestine, tail elongate and more conical than cylindrical.

#### REMARKS

The characters mentioned above, and namely the thin projection at the tail terminus, bear strong resemblance to those of the genus *Hirschmanniella*. The face pattern,

as observed using SEM, fits both *Hirschmanniella* and *Pratylenchus* species of Group I as defined by Corbett and Clark (1983).

Could, therefore, *P. morettoi* n. sp. be considered as a monodelphic *Hirschmanniella*? The answer requires further considerations.

In the family Pratylenchidae and in the great majority of the families in Tylenchina, the presence of one vs. two functional female genital branches has been generally considered as a generic character of primary importance. Andrassy (1976) went further as he retained in Pratylenchidae only the genera where the sole anterior female genital branch is normally developed and functional, thus raising the character monodelphy vs. didelphy at the family level. Andrassy grouped the genera with two equally developed genital branches in Hoplolaimidae *sensu* Andrassy, 1976.

The females of all the species in the various monodelphic genera of Pratylenchidae show a remnant of the posterior genital branch, varying from a short, simple post-uterine sac, as in *Pratylenchus thornei* Sher & Allen, 1953 (see Fortuner, 1977), to a longer organ in which some structures can be recognized, as in *P. coffeae* (Zimmermann, 1898) Filipjev & Schuurmans Stekhoven, 1941 (see Siddiqi, 1972). Most evidently *P. morettoi* n. sp. pertains to this latter type. Studies made in the genus *Pratylenchus* on the development of the female reproductive system (Dickerson, 1962; Roman & Hirschmann, 1969) have shown that this development begins as didelphic, but growth and differentiation of the posterior branch is stopped before the third moult. In addition, studies on the cell lineage (Sternberg & Horvitz, 1981; Horvitz & Sternberg, 1982) revealed a short evolutionary distance between mono- and didelphy, since the acquisition of a single cell death could transform a didelphic to a monodelphic species. Horvitz and Sternberg (1982) concluded that « derivation of monodelphy from didelphy has probably appeared repeatedly during evolution and hence is a poor taxonomic indicator ».

We agree with these conclusions, and *P. morettoi* n. sp. could have been considered to be a monodelphic *Hirschmanniella*, if the following characters had not also been taken into consideration : i) caudal alae enveloping tail extremity vs. subterminal in *Hirschmanniella*; ii) phasmids located at midtail vs. in the posterior third (some species of *Hirschmanniella* have phasmids anteriorly situated; we were unable to obtain material for examination); iii) body length less than 1 mm.

Thus, we consider the new species to more properly be placed in the genus *Pratylenchus*, even though it represents a link between the two genera.

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## REFERENCES

- ANDRÄSSY, I. (1976). *Evolution as a basis for the systematization of the nematodes*. London, Pitman Publ., 288 p.
- CORBETT, D. C. M. & CLARK, S.A. (1983). Surface features in the taxonomy of *Pratylenchus* species. *Revue Nématol.*, 6 : 85-98.
- DICKERSON, O. J. (1962). Gonad development in *Pratylenchus crenatus* Loof and observations on the female genital structures of *P. penetrans*. *Proc. helminth. Soc. Wash.*, 29 : 173-176.
- FORTUNER, R. (1977). *Pratylenchus thornei*. *C.I.H. Descr. Pl.-paras. Nematodes*, Set 7, № 93 : 3 p.
- HORVITZ, R. H. & STEINBERG, P. W. (1982). Nematode postembryonic cell lineages. *J. Nematol.*, 14 : 240-248.
- ROMAN, J. & HIRSCHMANN, H. (1969). Embryogenesis and postembryogenesis in species of *Pratylenchus* (Nematoda : Tylenchidae). *Proc. helminth. Soc. Wash.*, 36 : 164-174.
- SHER, S. A.. & BELL, A. H. (1975). Scanning electron microscopy of the anterior region of some species of Tylenchoidea (Tylenchina : Nematoda). *J. Nematol.*, 7 : 69-83.
- SIDDIQI, M. R. (1972). *Pratylenchus coffeae*. *C.I.H. Descr. Pl.-paras. Nematodes*, Set 1, № 6, 3 p.
- STERNBERG, P. W. & HORVITZ, R. H. (1982). Gonadal cell lineages of the nematode *Panagrellus redivivus* and implications for the evolution by modification of the cell lineage. *Developm. Biol.*, 88 : 147-168.

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