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DESCRIPTION OF SOME PRATYLENCHIDAE (NEMATA) FROM ARGENTINA

by

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Summary. Morphological and morphometric characteristics of *Hirschmanniella oryzae*, *Pratylenchus andinus*, *P. crenatus*, *P. neglectus* and *P. penetrans* are given. A Scanning Electron Microscopy study was carried out for the first three species. *H. oryzae*, *P. andinus* and *P. crenatus* are new records for Argentina.

The family Pratylenchidae contains genera with several species of economic importance.

Pratylenchus species parasitize higher plants, they are predominantly migratory endoparasites of roots and may be involved in disease complexes on a wide range of hosts. Most of the better known species are cosmopolitan or have a wide distribution due to their transport in plant material (Loof, 1991). *Hirschmanniella* is common in moist habitats as a motile root endoparasite of gramineae; in South America it has been reported from Venezuela and Brazil. Within the genus *Pratylenchus* twelve species are reported from Argentina, eight of them, namely *P. agilis*, *P. delattrei*, *P. brachyurus*, *P. goodeyi*, *P. neglectus*, *P. penetrans*, *P. pratensis*, *P. zaeae* are restricted in distribution and host range (Moreno, 1964; Vega and Galmarini, 1970; Costilla *et al.*, 1976; Doucet and Racca, 1988; Hijano, 1991; Costilla, 1992; Chaves and Torres, 1993). There are morphometric and morphological descriptions of populations of *P. hexincisus*, *P. scribneri*, *P. thornei* and *P. vulnus* (Doucet, 1988, Dou-

cet and Lax, 1998) and *P. zaeae* (Troccoli *et al.*, 1996).

The present paper reports on the morphology and morphometrics of some Pratylenchidae; Scanning Electron Microscopy descriptions of *P. andinus*, *P. crenatus* and *H. oryzae*, which are new records for Argentina are presented.

Materials and methods

Soil samples were collected from natural grassland in the province of Buenos Aires and from cultivated and uncultivated soil in the provinces of Buenos Aires and Rio Gallegos. Samples were extracted by centrifugal flotation; nematodes were fixed with hot FG 4:1. Specimens processed for observation in the Scanning Electron Microscope (SEM), were first preserved in glycerine and then transferred to absolute alcohol through a series of ethanol concentrations of 30, 50, 75, 95 and 100% ethanol. The standard critical point drying procedure was used

with CO₂ as a drying liquid. SEM examination was done on JEOL MS840 at 10 KV.

Measurements and descriptions

HIRSCHMANNIELLA ORYZAE

(Soltwedel, 1889) Luc et Goodey, 1964

(Fig. 1)

Female (n=5): L=1186 µm (775-1570); a=46 (45-60); b=12 (9-15); c=16 (15-17); c'=4.5 (3.4-4.9); stylet=17.5 µm (16-19); MB=69 (60-73); V=55% (52-59); V'=61 (56-70); V-A=420 (219-585); tail=86 µm (82-93).

Male (n=2): L=1028 µm (980-1080); a=50 (47-54); b=3.1 (2.8-3.4); c=14.6 (14.4-14.8); c'=5 (4.7-5.3); stylet=18.5 µm (18.5-19.5); tail=70 µm (66-75); spicules=21 µm (19-23); gubernaculum=7.2 µm (6-8.5).

Female: head bearing five annuli as seen in face view by SEM, (Fig. 1B). Labial plate rounded and smooth, 10 µm diameter, oral aperture surrounded by two invaginations of the labial walls, these possibly representing the position of the inner labial papilla, as well as four small depressions marking the position of the subcuticular nerve endings. Amphidial aperture slit like, 1.2 µm long (Fig. 1A). The orifice of the dorsal oesophageal gland located at 3-4 µm from the stylet base. Excretory pore 115 µm (104-130) from the anterior end. Vulva slit like at mid-body (Fig. 1C). Intestine slightly overlapping rectum. Muscles bands supporting the intestine were observed in all of the specimens. Spermatheca rounded with rounded sperm cells. Lateral field starts at 12-13 annuli from the anterior end with one inner line, after about 30 annuli two inner lines appear, at mid-body four lines and two at the tail. Lateral field incompletely areolated at mid-body and completely areolate at tail (Fig. 1D-F). Tail tapering before the end, with rounded terminus, and a sharply offset, ventral mucro (Fig. 1F). Phasmid on the 20th annuli from the posterior end.

Male: stylet slightly longer than in the female; bursa starts anterior to the spicule head, unequally extended anterior and posterior to the cloaca.

Remarks. Species of *Hirschmanniella* are often difficult to identify because many of them are very similar. Head shape and stylet length are considered prime characters in *Hirschmanniella* species descriptions. Other important characters are body length, occurrence of males and presence of the ventrosubterminal notch on the tail. This population fits in the main characters of the type description of *H. oryzae* given by Luc and Goodey (1964). However, areolation of the lateral field and number of annuli posterior to the phasmid show some differences with the type population, as follow:

– lateral field with incomplete areolation at midbody and complete areolation in the posterior end (Fig. 1D and F) versus lateral field usually not areolated; occasionally incomplete areolation, in the posterior region;

– phasmid 20-21 annuli from the posterior end (Fig. 1F) versus phasmid 12-17 annuli from the posterior end (type population).

These differences are considered as intraspecific variation by Loof (1991).

Habitat and locality. Rhizosphere of *Agropyron elongatum* (Host) Beauv, *Distichlis scoparia* (Kunth) Arech, and *D. spicata* (L) Greene, and other Gramineae not identified in natural grassland, Balcarce, province of Buenos Aires.

PRATYLENCHUS ANDINUS

Lordello, Zamith et Boock, 1961

(Fig. 2)

Female (n=8): L=436 µm (381-479); a=28 (25.4-32); b=5 (4.2-6.1); c=19.6 (18-21); V=80.5% (78-83); stylet=16.5 µm (16-17); tail=21 µm (19-24); number tail annuli=20 (19-22).

Male not found.

Female: head low and slightly offset, with three lip annuli (Fig. 2B). Oral aperture oval,

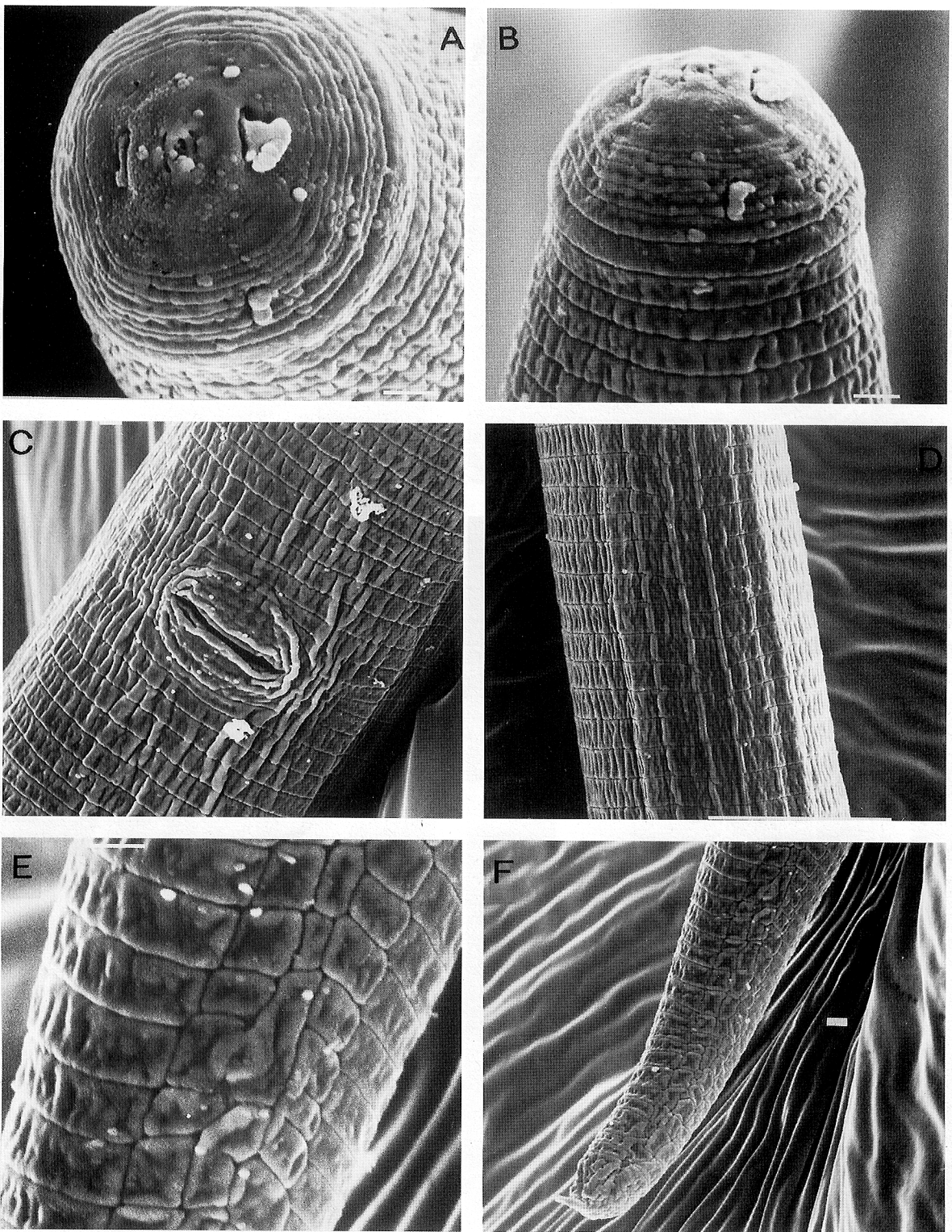


Fig. 1 - *Hirschmanniella oryzae*: A, head en face view; B, anterior end; C, vulval view; D, lateral field at mid-body; E and F, tail tip (A-C, E, F: scale bar=1 μm ; D: scale bar=10 μm).

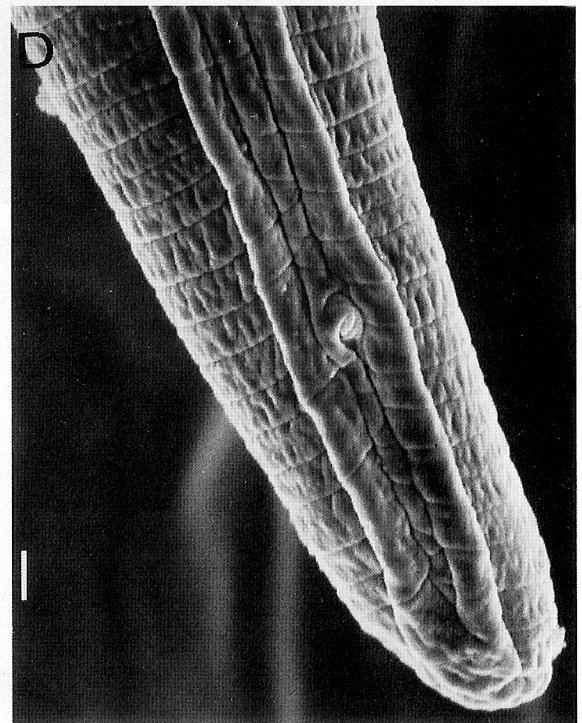
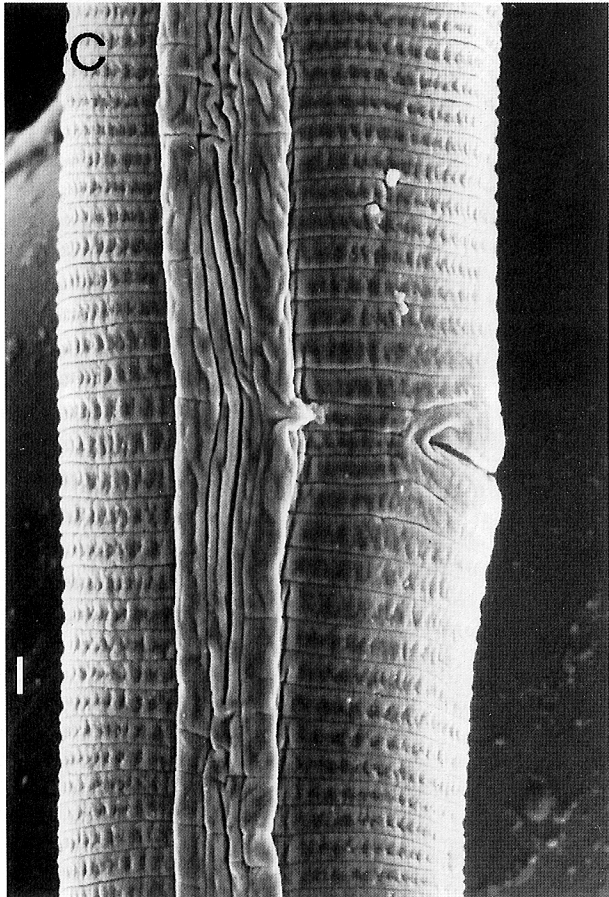
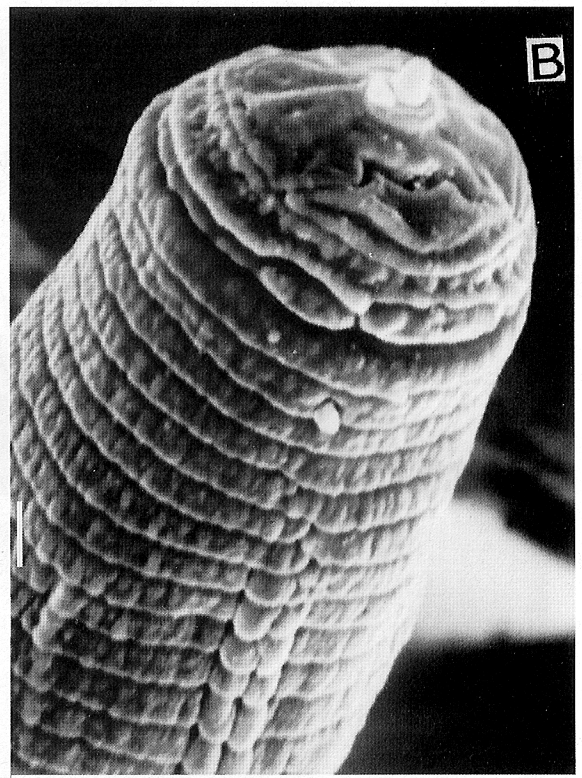
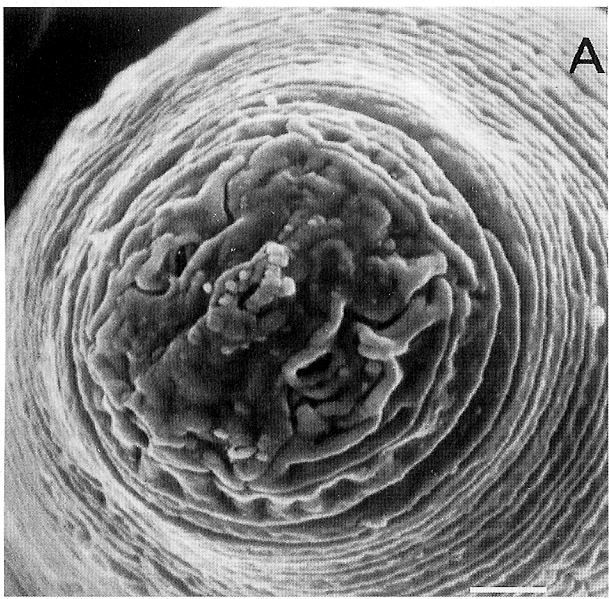


Fig. 2 - *Pratylenchus andinus*. A, head en face view; B, anterior end; C, lateral field at vulva; D, lateral field at mid-body; E, tail tip. (Scale bar=1 μ m).

labial plate fused with first head annulus, submedian segments wider than lateral segments in face view by SEM. Amphidial aperture oval and on the lateral segment (Fig. 2 A and B). Dorsal gland opening about 3 μm behind stylet knobs. Excretory pore 69 μm (59-82) from the anterior end. Spermatheca rounded and empty. Post uterine sac 20.6 μm (18-23), undifferentiated. Lateral field with four lines in the anterior and posterior part of the body but in the vulvar region the inner lines are interrupted with oblique striae and more inner lines irregularly arranged (Fig. 2C). The outer lines irregularly areolated (Fig. 2 C and D). Tail tip rounded and smooth.

Remarks. This population of *P. andinus* resembles the Bolivian population described by Corbett and Clark (1983) in face view seen by SEM, with a distinctive dumb-bell shaped pattern of the submedian segments and slightly smaller lateral segments (Fig. 2A), rounded and smooth tail tip (Fig. 2D). Corbett (1983) described the lateral field with four clear lines, outer lines irregularly crenate sparsely areolate on tail; in the Argentinian population by SEM, the four incisures are clear near the phasmid (Fig. 2D) but in the vulvar region they are interrupted with oblique striae and more inner lines irregularly arranged (Fig. 2C).

Habitat and locality. *P. andinus* was found together with *P. crenatus* in soil around *A. elongatum*, *D. scoparia* and *D. spicata* and others Gramineae not identified in natural grassland, Balcarce, province of Buenos Aires.

PRATYLENCHUS CRENATUS

Loof, 1960. (Fig. 3)

Female (n=7): L=445 μm (403-472); a=28 (25-32), b=6.5 (6-7); c=17 (17-24); c'=2.2 (1.6-2.9); V=83% (82-84); stylet=15 μm (14-16); oesophagus=70 μm (57-78); tail=23 μm (19-26); number tail annuli=20 (19-21).

Male not found.

Female. SEM shows a dome shaped head set off from the body, bearing three lip annuli (Fig. 3B). Six inner labial sensilla slightly demarcated behind the oral disc. Amphidial opening slightly dorsal, cephalic sensilla demarcated by small depression (Fig. 3A). Dorsal gland opening about 3 μm behind stylet base. Excretory pore at 63 μm (44-70) from the anterior end. Spermatheca empty. Post uterine sac 23 μm (10-28) long and differentiated, about 1.5 times body width and about 46% of the vulva-anus distance. Lateral field with four lines, the inner ones slant or interrupted as seen by light microscopy. SEM shows lateral field with five lines and oblique striae or incomplete lines in the middle band. The lateral field is completely areolated and continues to the tail tip (Fig. 3B-D). Tail narrowed in the second and swollen in the last third of the tail, tail terminus crenate (Fig. 3D).

Remarks. Measurements of this population are similar to the *P. crenatus* population described by Loof (1960) except for total length that is considered as intraspecific variation. SEM observations are also comparable to those reported by Corbett and Clark (1983) except for the lateral field. The en face view shows a plain undivided face with no division between sub-median and lateral segments (Fig. 3A). Tail tip with coarse crenations running all along it (Fig. 3D).

P. crenatus is characterised by six incisures in the lateral field (Loof, 1991). In the Argentinian population the lateral field shows five incisures, irregularly interrupted with complete areolation at mid-body (Fig. 3C) and four incisures at tail (Fig. 3D).

P. penetrans occasionally presents five incisures in the prevulvar region (Loof, 1991) but it differs completely in en face view with our population. This characteristic also resembles *P. sefaensis* and *P. hexincisus* from which it differs in the number of tail annuli and vulva position and having a smooth tail, respectively.

The characteristics of the lateral field vary greatly, possibly depending on the age of the specimens examined (Loof, 1991). Corbett and

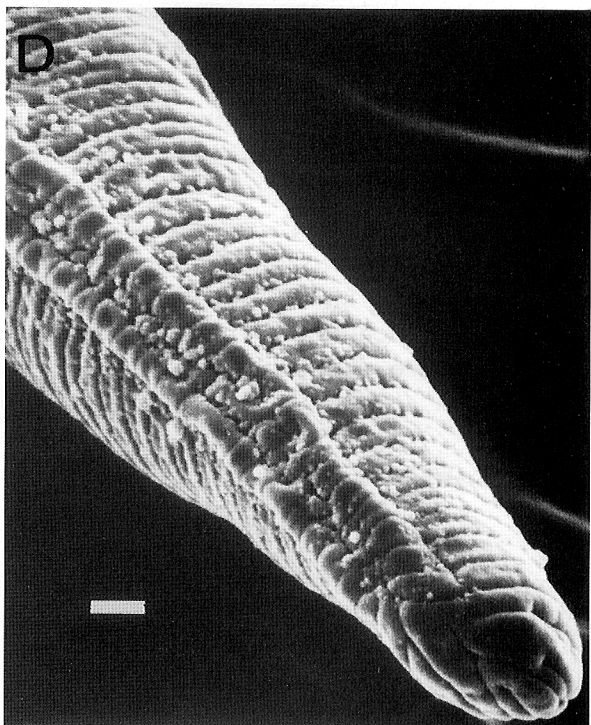
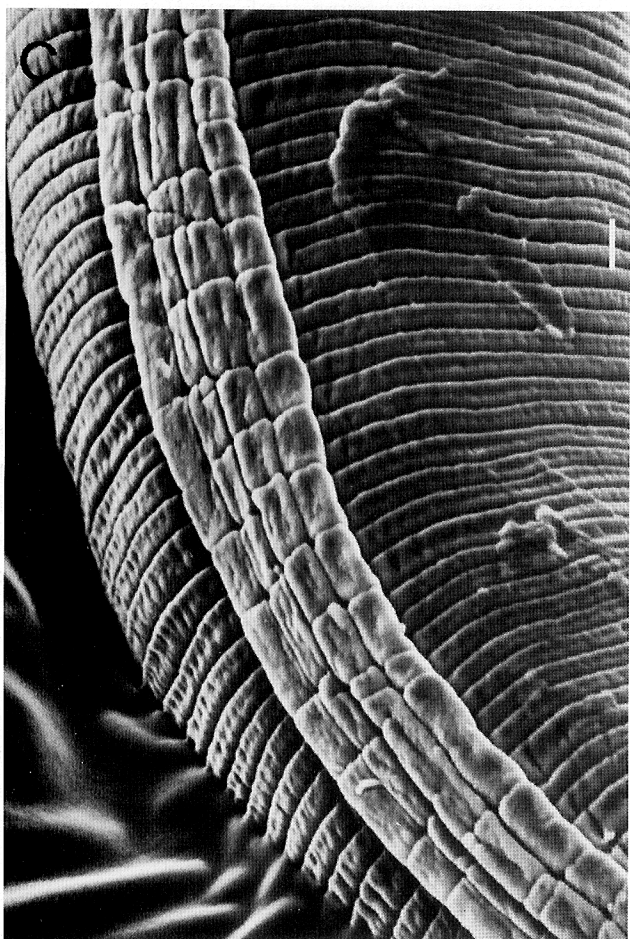
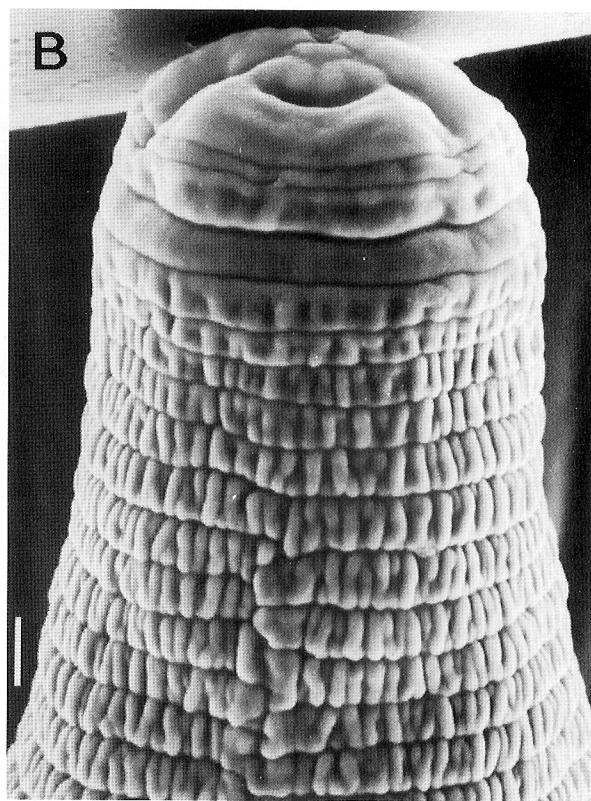
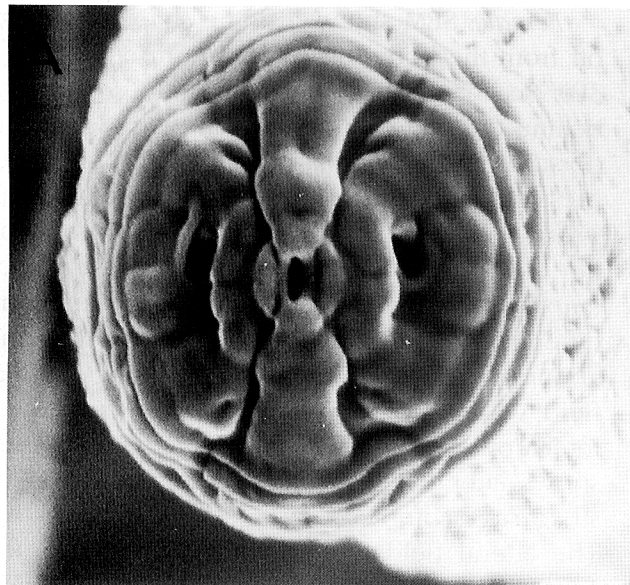


Fig. 3 - *P. crenatus*. A, en face view; B, anterior end; C, head in lateral view; D and E, lateral field; F, tail end (Scale bar=1 μ m).

Clark (1983) considered the lateral field as too variable to be used as a good taxonomic character in differentiating species of *Pratylenchus*.

Habitat and locality. The same as *P. andinus*.

PRATYLENCHUS NEGLECTUS

(Rensch, 1924) Filipjev et

Schuurmans Stekhoven, 1941. (Fig. 4 A-K)

Female, population from Rio Gallegos (n=8): L=400 μ m (380-450); a=24 (22-28); b=5 (4.5-6); c=19 (16-22); c'=2.1 (1.7-2.4); V=81% (80-83); stylet=15.5 μ m (15-16); tail=21 μ m (19-24); number tail annuli=17 (15-18).

Female, population from Quequén (n=8): L=400 μ m (330-420); a=23 (20-27); b=5.5 (5-6); c=20 (18-23); c'=1.8 (1.4-2.2); V=81% (80-85); stylet=15.5 μ m (15-16); tail=19 μ m (17-22); number tail annuli=16 (14-22).

Head with two annuli, some specimens have two annuli on one side and three on the other side (Fig. 4B). Dorsal oesophageal gland orifice obscure, 2-2.5 μ m from base stylet knobs. Excretory pore at 77 μ m (72-86) from head. Length of anterior ovary, 166 μ m (96-214). Spermatheca empty, rounded, indistinct in some specimens (Fig. 4C-E). Post uterine sac undifferentiated, 12 μ m (10-18) long. Lateral field marked by four distinct incisures sometimes areolated. Some specimens have a fifth incisure beginning at the base of oesophageal gland or at mid-body and running to the vulva; these additional incisures may be interrupted. In the anterior part of the body or in the vulvar region the lateral field also has oblique lines (Fig. 4F-H). Tail terminus rounded or truncated, tail tip smooth (Fig. 4I-K).

Male not found.

Remarks. The Rio Gallegos and Quequén populations correspond to the description given by Sher and Allen (1953) for *P. minyus* (synonymised with *P. neglectus*), and by Loof (1978). Vega and Galmarini (1970) described a population of *P. neglectus* from soil of horticultural

crops in Mendoza, with body and stylet length larger than in Argentinian populations. This variability could be related to the effect of the host plant on the nematode length; also specimens extracted from roots are longer (and stouter) than specimens extracted from soil (Loof, 1991).

Habitat and localities. Found in stubble field at Rio Gallegos, province of Santa Cruz, and in *Solanum tuberosum* L. field at Quequén, province of Buenos Aires.

PRATYLENCHUS PENETRANS

(Cobb, 1917) Filipjev et

Schuurmans Stekhoven, 1941. (Fig. 4 a-h)

Population from Dolores. Female (n=10): L=500 μ m (400-550); a=26 (21-30); b=6.4 (5-6.7); c=18 (16-21); c'=2.2 (1.4-2.7); V=80% (72-84); stylet=15 μ m (14-16); oesophagus=79 μ m (72-86); tail=26 μ m (17-30); number tail annuli=19 (13-28).

Male (n=6): L=440 μ m (400-500); a=25 (24-28); b=5.7 (5-6); c=19 (17-23); c'=2.1 (1.7-2.3); stylet=14 μ m (14-16); oesophagus=76 μ m (69-85); spicules=15 μ m (14-17), gubernaculum=4.5 μ m (4-4.5).

Population from Saladillo. Female (n=11): L=490 μ m (420-580); a=27 (24-32), b=6.7 (5.5-7.5); c=20 (18-24); c'=2.2 (1.9-2.8); V=80% (78-82); stylet=15 μ m (14-15); oesophagus=77 μ m (72-82); tail=25 μ m (20-29); number tail annuli=20 (18-24).

Male (n=4): L=410 μ m (360-470); a=25 (23-28), b=5.5 (5-6); c=17.5 (17-18); c'=2.3 (2.2-2.5); stylet=14 μ m (14-15); spicules=(14-17); gubernaculum=4.5 μ m (4.5-5).

Female head with three annuli, sometimes three and two annuli on each side. Excretory pore at 78 μ m (71-87) from head; hemizonid immediately anterior to excretory pore, 2-3 annuli wide. Ovary outstretched (one ovary reflexed at tip), 172 μ m (132-207) long. Spermatheca empty or filled with sperm, rounded when full and more or less rounded when empty.

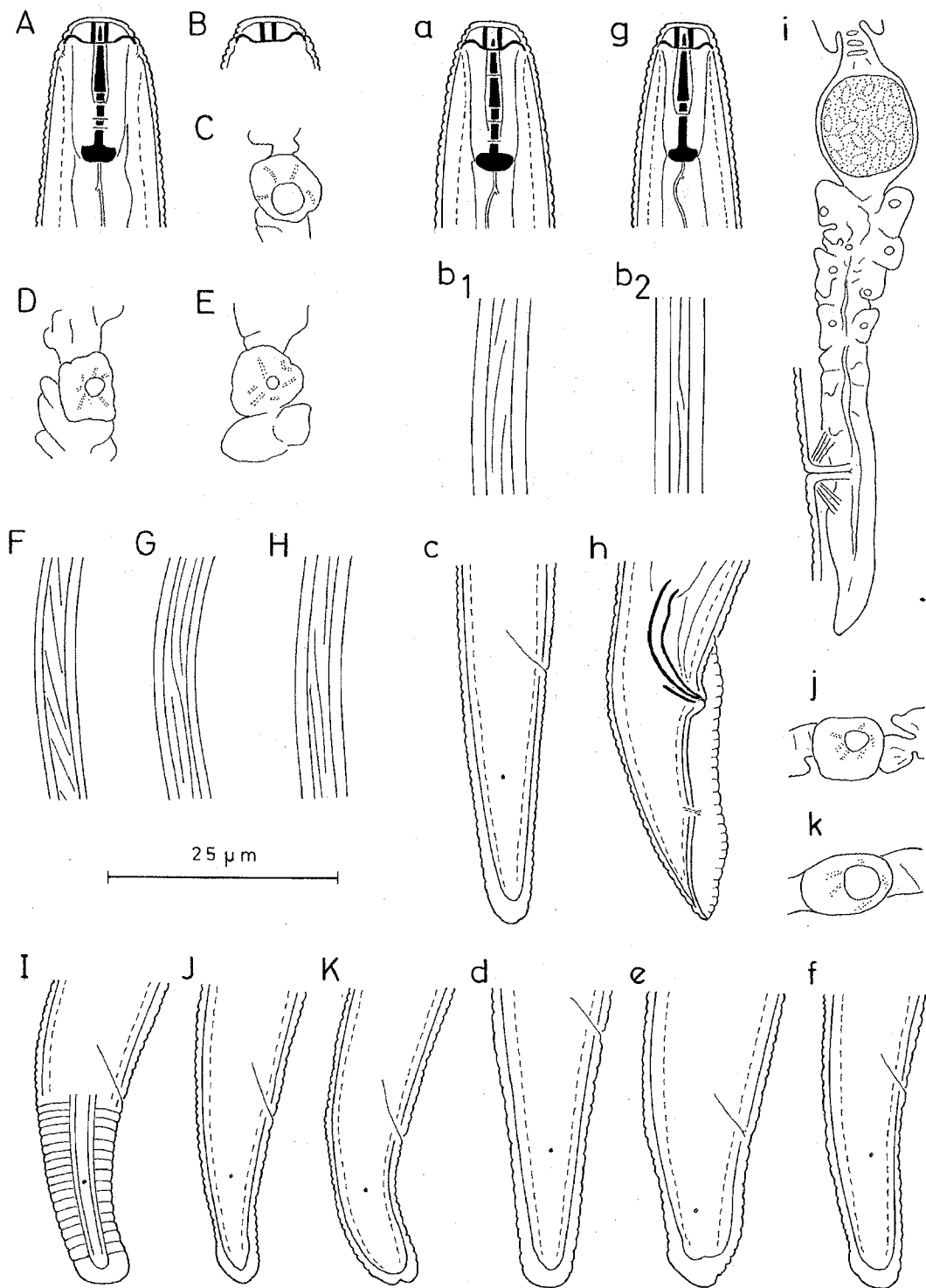


Fig. 4 - *P. neglectus* female: A, anterior region; B, head region showing two annuli on one side and three annuli on the other side; C-E, spermatheca shapes; F-H, lateral lines with additional incisures; I-K, tails. a-k. *P. penetrans* female: a, anterior region; b1 and b2, lateral lines with additional incisures; c-f, tails; i-k, spermatheca shape, filled with sperm (i); j and k empty; g, male anterior end; h, male tail.

Distance between vulva and spermatheca 63% (32-102) of that between vulva and anus. Post uterine sac undifferentiated, 22 μm (18-28) long. Lateral field with distinct four incisures; sometimes with five incisures or oblique lines (Fig. 4 b1-b2). Tail end rounded to obliquely truncated; tail tip smooth (Fig. 4 c-f). Phasmid located half way along tail.

Male similar to female in general form. Four lateral lines without additional oblique lines. Excretory pore at 65 μm (53-78) from head. Spicules slender, gubernaculum simple. Bursa crenate, enveloping the tail tip (Fig. 4h).

Remarks. The *P. penetrans* population from Dolores agrees with the description given by Corbett (1973) and Loof (1991). Argentinian populations have smooth tail tip. Tarte and Mai (1976) demonstrated that *P. penetrans* can have from distinctly annulated to non-annulated tail terminus; the wide range of tail shapes and annulation obtained in greenhouse cultures of *P. penetrans* (= *P. pratensis*) tend to invalidate the value of this character. We agree with Frederick and Tarjan (1989) who recognize the conspecificity of *P. penetrans* with *P. pratensis* and therefore the record of *P. pratensis* in sugar cane fields in Argentina (Costilla, 1976) must be regarded as *P. penetrans*. This is a first description of *P. penetrans* from Argentina.

Habitat and locality. Found in soil around *Daucus carota* L. at Dolores, and around root of *Zea mays* L. at Saladillo, province of Buenos Aires.

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