Ditylenchus longicauda sp. n. a primitive ditylench

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SUMMARY

Ditylenchus longicauda sp. n. can be differentiated from all *Ditylenchus* species except *D. lutonensis* by its smaller anterior stylet part and its long tail. Both characters mentioned are considered to be primitive. Another primitive character is the presence of an arcuate anal slit. *D. lutonensis* has a long overlapping œsophageal lobe, *D. longicauda* sp. n. an abutting bulb.

RÉSUMÉ

Ditylenchus longicauda *sp. n., un Ditylenchide primitif*

Ditylenchus longicauda sp. n. peut être différencié de toutes les autres espèces du genre, excepté *D. lutonensis*, par la partie antérieure du stylet, courte, et la queue, longue. Ces deux caractères sont considérés comme primitifs. La présence d'une fente anale arquée représente un autre caractère primitif. *D. lutonensis* possède un lobe œsophagien recouvrant longuement la partie antérieure de l'intestin, tandis que, chez *D. longicauda* sp. n., les glandes œsophagiennes constituent un bulbe.

In material from Korea one of the authors (Y.E.C.) found a species that seemed to be intermediate between *Ditylenchus* and *Tylenchus/Filenchus*. A thorough study with the light microscope and the scanning electron microscope revealed that the species represented an unknown *Ditylenchus* species that apparently shows some primitive characters.

Techniques used are described in Rashid, Geraert and Sharma (1987).

Ditylenchus longicauda sp. n.

MEASUREMENTS

Female (paratypes; n = 10). L = 1.22 mm ± 0.14 (1 — 1.42); a = 49.9 ± 4.5 (42 — 57); b = 8.2 ± 0.9 (6.5 — 9.1); c = 9.3 ± 1.1 (8 — 11.7); c' = 8.3 ± 1.0 (7 — 11); V = 78.0 ± 1.4 (76.5 — 80.5); V' = 88.0 ± 1.1 (86.5 — 90); spear = 9.3 µm ± 0.5 (9 — 10); œs. = 148.5 µm ± 8.2 (130-165); MB = 41.1 % ± 2.9 (38 — 45); tail = 132.9 µm ± 15.7 (95 — 155).

Male (paratypes; n = 4). L = 1.06 mm + 0.03 (1.02 — 1.10); a = 53.5 ± 7.8 (45 — 61); b = 7.5 ± 0.9 (6.6 — 8.3); c = 7.9 ± 0.5 (7.5 — 8.6); c' = 9.5 ± 0.5 (8.9 — 10); T = 55.8 % ± 8.3 (47 — 64); spear = 9.5 — 10 µm; œs. = 142.7 µm ± 12.1 (130 — 154); MB = 40.8 % ± 1.1 (39.5 — 41.5); tail = 133.8 µm ± 6.3 (125 — 140); spicules = 19 — 23 µm; gubernaculum = 7 — 8 µm.

Holotype (female). L = 1.37 mm; a = 55; b = 9.1; c = 9.1; c' = 9.3; V = 79.5; V' = 89.5; spear = 10 µm; œs. = 151 µm; MB = 37 %; vulva/anus = 130 µm; tail = 150 µm; tail/v-an. = 1.15; annuli = 1.7 µm; lat. field = 7.5 µm; post-vulval sac = 45 µm.

DESCRIPTION

Body posture after fixation and processing to glycerine straight to slightly curved; tail tip always bent. Rather large and slim tylench with posterior vulva and long tail.

Cuticular annulation and lateral field weakly expressed, annuli 1.3-1.7 µm wide; lateral field with six lines, 5.5-8 µm wide. With the light microscope the six lines can hardly be seen, they seem almost equidistant. Of the specimens studied with S.E.M. only two showed a distinct lateral field : in the anterior œsophageal region four lines are found, the two inner ones split before the deirid. The two pairs of inner lines run rather irregularly but are usually closer to each other, in between they show areolation (Fig. 2 D). Posterior to the anus the two inner pairs again merge and the lateral field stops at two to three times anal body width posterior to the anus.

Head low, truncated, not offset, 2-3 µm high and 5.5-7.5 µm wide at the base; frame work not sclerotized. Head annuli indistinct under the light microscope. The several en-face views obtained with S.E.M. show the front devoid of cuticular lines; in the centre a very small (less than 0.1 µm) circular oral opening is surrounded

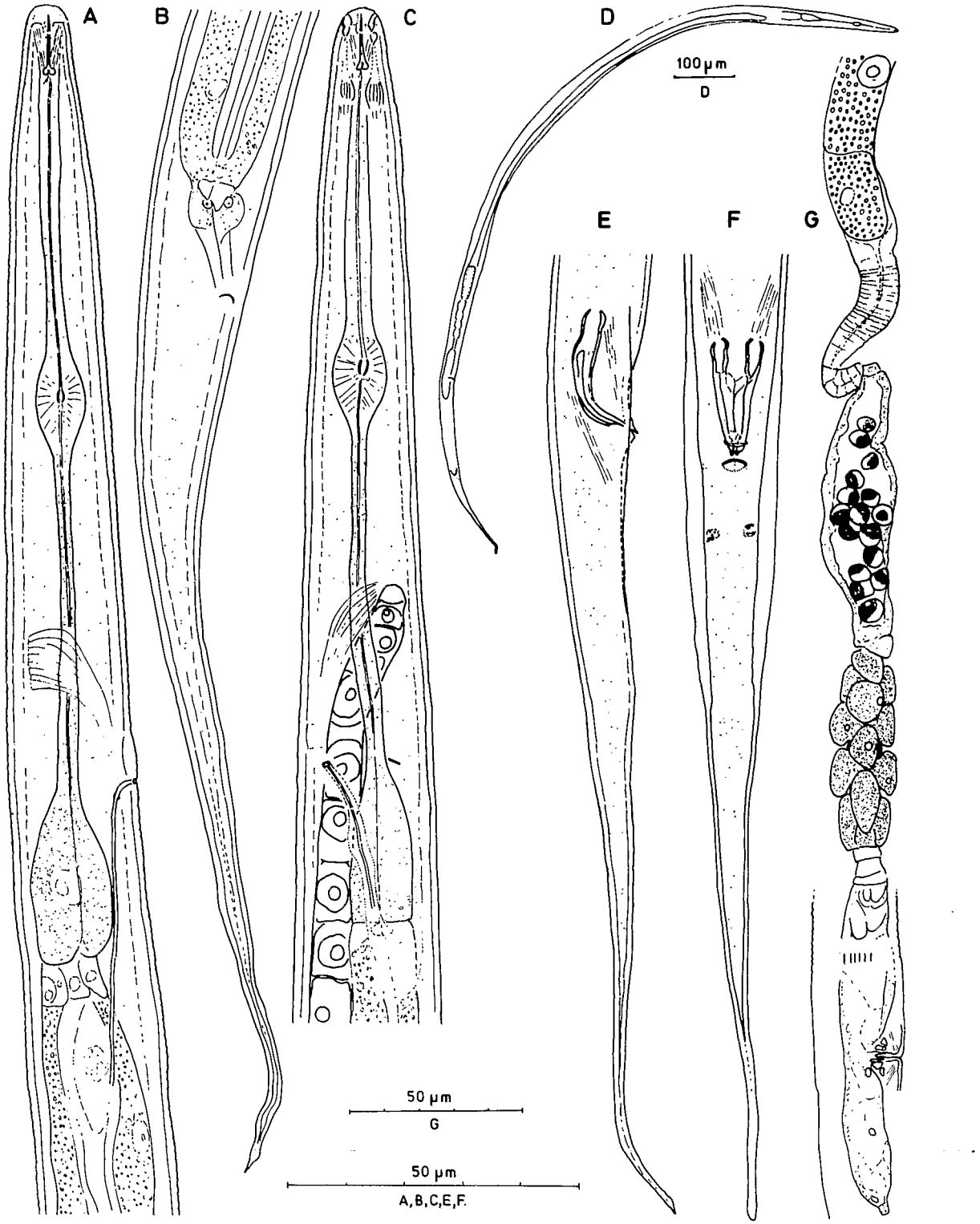

Fig. 1. *Ditylenchus longicauda.* A, C : Female, anterior region, A : Lateral view, C : Latero-ventral view showing sclerotized fovea, tip of ovary next to isthmus, excretory system and deirid; B : Female tail in latero-ventral position showing arcuate anal slit; D : female, entire view; E, F : Male, posterior region, E : Lateral view, F : Ventral view (tail ventrally curved); G : Female reproductive system, showing lateral field and annuli.

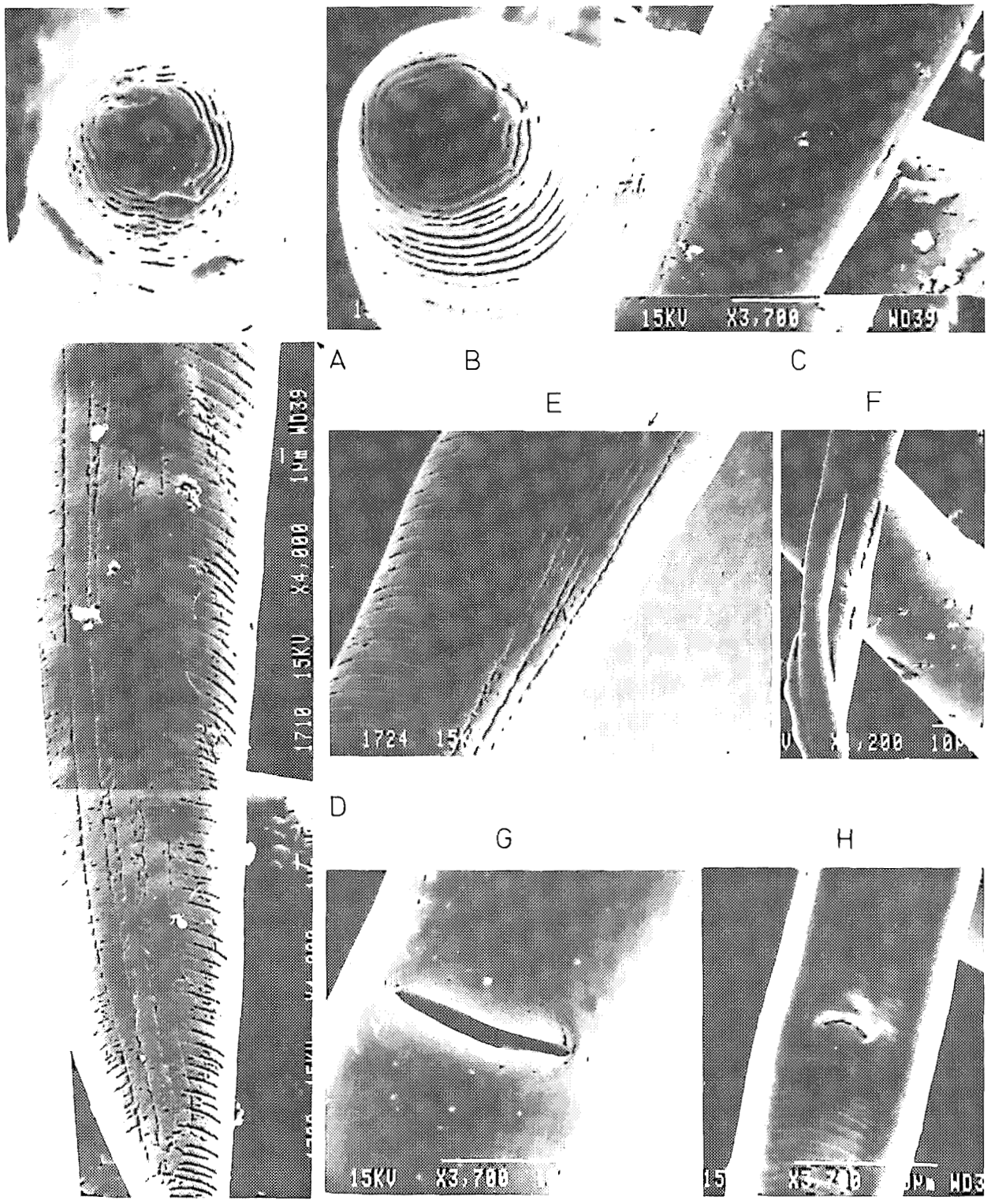

Fig. 2. *Ditylenchus longicauda.* A, B : Female, head, end-on view, A : Showing clearly the six pits around the oral opening, B : Showing clearly the amphidial slits; C : Female, arcuate anal slit; D : Lateral field at anal level (slit visible ar right side); E : Lateral field anterior to deirid (arrow); F : Male, bursa; G : Female : vulva, ventral view; H : Male, cloacal opening, ventral view.

by six small pits; at the lateral side of the head near the front edge the head annuli are interrupted by small, oblique amphidial slits. No sexual dimorphism in the head region. Amphidial slit difficult to observe with light microscope but amphidial fovea in head often slightly sclerotized; amphidial fusus a few micrometer posterior to stylet knobs.

Stylet delicate, knobs rounded, well developed, variable (2-2.5 µm wide); conical part of stylet about one third stylet length. Dorsal œsophageal gland opening close to spear knobs.

Œsophagus with subcylindrical procorpus, slightly sloping towards median bulb; median bulb oval (15-19 µm long and 7-10 µm wide) with central sclerotized thickenings of the lumen. Terminal bulb pyriform, offset (25-31 µm long and 10.5-15 µm wide); large dorsal gland nucleus often distinct; subventral gland nuclei not seen.

Nerve ring surrounds isthmus; hemizonid from 0 to 7 µm anterior to excretory pore. Excretory pore opposite posterior half of isthmus or terminal bulb; excretory canal well sclerotized (except for the last 5 µm leading to the pore), runs posteriorly over the anterior intestine where the unicellular gland is probably situated (a large granular nucleus was sometimes found : Fig. 1 A).

The first intestinal cells are polyedral and hyaline, they are followed by elongated, granulated cells (probably arranged per pairs); posterior to the hyaline cells the intestinal lumen is at first often spacious to become rather small till the end of the intestine. Toward the lumen the cells show an about 1 µm thick microvilli layer. Rectum about as long as anal body diameter; semicircular anal opening a large, arcuate slit.

The female reproductive system has all the characteristics of the *Ditylenchus* system : the posterior vulva is a 12-14 µm wide, simple, transverse slit; the vagina shows inner epiptygmata; the spacious postvulval uterine sac is 32-45 µm long (i.e. 1.4-1.8 vulval body diameter); towards the anterior the prevulval uterine sac is followed by a sphincter, a quadricolumellar uterus, an elongated spermatheca in line (with large sperm cells), an oviduct and an ovary [G1 = 59.7 % ± 8.5 (48-71)]. Eggs measurements : length 57-73 µm, width 19-24 µm.

Tail elongated, conical; regularly tapering towards a variable tip (pointed, finely rounded) that is variously bent (mostly dorsally).

Male reproductive system : spicules short, wide, bent; rather large, open terminus; gubernaculum simple, bent, situated inside at about mid-body; cloacal lips slightly projecting, anterior lip pointed. Caudal alae not projecting over the cloacal lips; in lateral view the alae are elongated, starting from the anterior end of the spicules to about two cloacal body diameters posterior to the cloaca (total length 51-68 µm). Cloacal aperture a posteriorly bent, simple slit.

Type specimens

Holotype and four paratypes female in slide 841, collection of the Museum voor Dierkunde, Rijksuniversiteit Gent, Belgium; two female and two male paratypes in slide 842, same collection; paratypes have been deposited in U.S.D.A. Nematode Collection, Beltsville, U.S.A., in Landbouwhogeschool, Wageningen, The Netherlands and in College of Agriculture, Kuyngpook National University, Daegu 635, Korea.

Type habitat and locality

Rice field in Yyga-myŏn, Talsŏng-gun, Kyongsanbuk-doje, Korea. Collected by Y. E. Choi, April 20, 1986.

Diagnosis

Anguinidae. Vermiform, medium sized with elongated tail. Head flat, not sclerotized, not offset. Stylet short, knobbed; anterior part about one third stylet length. Median bulb muscular, terminal bulb short, offset. First intestinal cells hyaline. Female reproductive system prodelph outstretched; postvulval uterine sac well developed, uterus with four rows of four cells; spermatheca in line, elongated with large sperm. In the male there is a non projecting, elongated bursa. The female anal opening is an arcuate slit.

Differences with related species

Of all *Ditylenchus* species only *D. lutonensis* (Siddiqi, 1980) Fortuner, 1982 shows the following characters in common with *D. longicauda* sp. n. : small anterior stylet part, six lines in lateral field, long tail. *D. lutonensis* has, however a long, overlapping œsophageal lobe.

Discussion on primitivity

Siddiqi (1980) pointed out that one of the main differences between aphelenchs and tylenchs was the shape of the anal opening : in aphelenchs it is « a conspicuous, transverse, arcuate, backwardly directed slit » whereas in tylenchs it is " always a round to transverse oval pore ". An arcuate slit is also found in other nematode groups (a.o. Rhabditida and Diplogasterida) and is considered as primitive. *Ditylenchus* is the first genus of Tylenchina to be discovered with an arcuate slit (other species not checked).

It shares several of the ancestral characters given for the " prototylenchid " by Luc *et al.* (1987) : " female and male vermiform, closely resembling each other; no sexual dimorphism; body short to medium size; tail elongated to filiform; lip area not offset; labial framework weakly developed; stylet thin, short, with small basal knobs; œsophagus with dorsal œsophageal gland orifice close to stylet base, median bulb fusiform with small valve; œsophageal glands short and abutting;

cellular intestine; deirids present; caudal alae leptoderan, small; amphimictic reproduction ".

Two other characteristics, found in some Tylenchidae genera (Geraert & Raski, 1987) and present in *Ditylenchus longicauda* sp. n., indicate primitivity : *i*) the amphidial slit on the lateral side of the head; *ii*) the shortness of the anterior stylet part.

Apparently in the Tylenchidae as well as in the Anguinidae a similar evolution has taken place with a movement of the amphidial opening (becoming smaller) towards the mouth opening and a longer part of the stylet covered by the stomatal wall (i.e. anterior stylet part becoming relatively longer). Both are probably the result of the same process of invagination.

The absence of phasmids, the absence of a well developed posterior genital tract, the absence of a central œsophago-intestinal valve (= " cardia ") are characters of the family Anguinidae; they are probably derived characters.

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