

Redescription of *Criconema giardi* (Certes, 1889) Micoletzky, 1925, type species of the genus *Criconema* Hofmänner & Menzel, 1914 (Criconematidae: Nematoda)

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SUMMARY

A critical review of the publication in which Certes (1889) successively described *Dorylaimus giardi* and *Eubostrichus guernei* demonstrates that the latter species (now the type species of the genus *Criconema* Hofmänner & Menzel, 1914) has been described on juvenile forms pertaining to two different species. A difficult expedition by the senior author to the type locality of both Certes' species (Hoste Island, Tierra del Fuego, Chile) permitted sampling of a species of criconematid of which the females fit the original description and illustration of *Criconema giardi* (Certes, 1889) Micoletzky, 1925, the first criconematid ever described; the juveniles of this species agree morphologically with the first form of juvenile described by Certes under the name of *Eubostrichus guernei*. Consequently *Criconema guernei* (Certes, 1889) Menzel in Hofmänner & Menzel, 1914 becomes a junior synonym of *Criconema giardi* which must be considered the type species of the genus. A redescription of female, male and juveniles of *C. giardi* is given together with numerous illustration (drawings and SEM micrographs). A neotype is designated.

RÉSUMÉ

Redescription de *Criconema giardi* (Certes, 1889) Micoletzky, 1925,
espèce type du genre *Criconema* Hofmänner & Menzel, 1914
(Criconematidae: Nematoda)

Un examen critique de la publication de Certes (1889) dans laquelle sont successivement décrits *Dorylaimus giardi* et *Eubostrichus guernei*, a permis de démontrer que cette dernière espèce, devenue le type du genre *Criconema* Hofmänner & Menzel, 1914, avait été décrite sur des juvéniles appartenant à deux espèces différentes. Une difficile expédition du premier auteur au lieu type des deux espèces de Certes (Ile Hoste, Terre de Feu, Chili) a permis de prélever une espèce de Criconématide dont les femelles correspondent à la description et à l'illustration originales de *Criconema giardi* (Certes, 1889) Micoletzky, 1925, premier Criconématide jamais décrit; les juvéniles de cette espèce correspondent au premier type de juvéniles décrits par Certes (1889) sous le nom de *Eubostrichus guernei*. De ce fait *Criconema guernei* (Certes, 1889) Menzel in Hofmänner & Menzel, 1914 devient un synonyme mineur de *Criconema giardi* qui doit être considéré comme l'espèce type du genre. Une redescription des femelles, mâles juvéniles de *C. giardi* est donnée, accompagnée d'illustrations (dessins et photographies au microscope électronique à balayage). Un néotype est désigné.

In 1889, Certes described two nematodes under the names of *Dorylaimus giardi* and *Eubostrichus guernei*. Among various taxonomic avatars, of which the detail is given below, the latter species has been designed by Stiles and Hassall (1920) as the type species of the genus *Criconema* Hofmänner & Menzel, 1914 and subsequently of the family Criconematidae Taylor, 1936 and superfamily Criconematoidea Taylor, 1936, one of the most important groups of the plant-parasitic Tylenchida.

Due to the incomplete description and illustration of *C. guernei* which moreover applied at evidence to juvenile stages, and to the non-preservation of the type material, systematists have been obliged to make taxonomical acrobatics (see Mehta & Raski, 1971) to maintain the genus *Criconema* as a valid one, until it was declared *genus dubium* by Andrassy (1979).

In such a situation, sampling in the type locality for search and designation of a neotype appeared the

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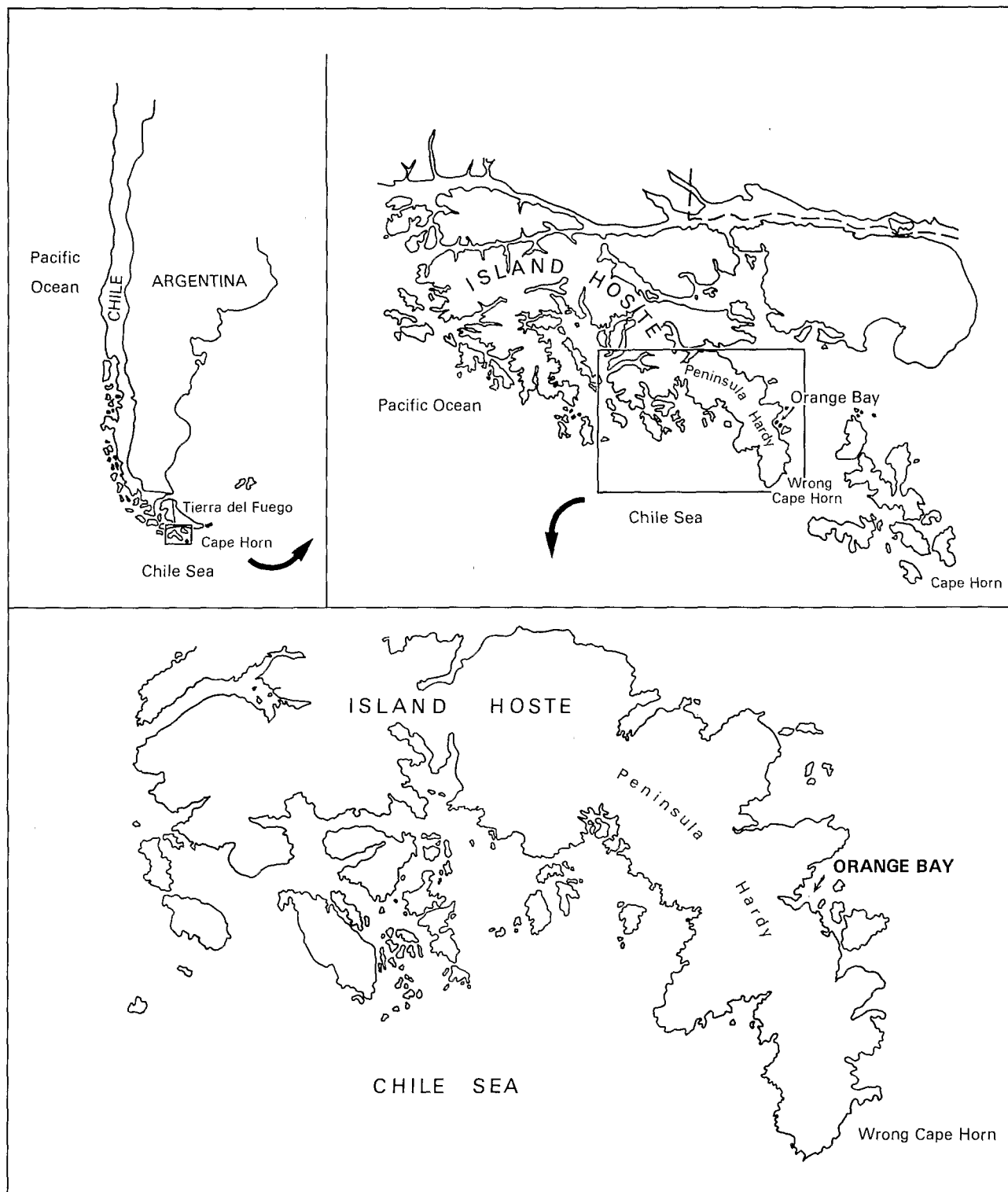


Fig. 1. Maps showing the location of the type locality of "*Dorylaimus*" *giardi* Certes, 1889 "*Eubostrichus*" *guernei* Certes, 1889 (Orange Bay, Hoste Island, Tierra del Fuego, Chile).

most logical and simple way to solve the problem. But here, this procedure, if logical, was not so simple, as explained now.

History of the samplings

ORIGINAL SAMPLING

In July 1882, an international scientific expedition established its base on Orange Bay of Hoste Island, the most southern island of Chilean part of Tierra del Fuego (Fig. 1). The main purpose of this expedition, which stayed nearly one year on the Island, was to observe a complete solar eclipse and passage of Venus, which occurred in December 1882. Not only astronomers were present, but also anthropologists, botanists, geologists, etc. which composed a team of about fifty scientists from the United Kingdom, U.S.A., Brazil and mainly France. Among the various activities of the team, one French naturalist, Dr Hyades, made 107 samplings of freshwater and marine sediments. Among them, only ten were well preserved regarding the biological material as they were fixed with osmic acid instead of alcohol and/or phenolic acid used for the others. These ten samples were later transmitted for study to various French specialists of botanical (algae) and zoological groups and more particularly to A. Certes, a well known protistologist. From this material, Certes (1889) described several new Protozoa, and, as said, two new nematodes.

RECENT SAMPLING

Many taxonomists working on criconematid nematodes thought and dreamed of the possibility to sample again on Hoste Island. But this Island is very remote and only accessible by warships using small landing boats for the last phase (the 1882 - 1883 expedition was under the control of the commander of the French warship "Romanche").

The senior author was fortunate enough to realize this in January 1983, exactly hundred years after the first expedition. Through the kind cooperation of the University of Chile, Servicio Agricola y Ganadero, and the Armada de Chile a voyage on the "Castor", a naval supply vessel, was made from Puerto Williams to Orange Bay, Hoste Island. After three nights and part of four days, arrival at Orange Bay was accomplished at 15.00 hours January 19 but high winds prevented disembarkation until 09.00 hours January 20. During three hours of collecting, three sites were visited within one kilometer of each other, all with fresh water streams and moist soil. Four samples were taken at each site, ten from soil and roots moistened by freshwater and two in ocean muds near shore (see Appendix for list of plants associated

with the freshwater-soil sites). By 12.00 hours fresh winds terminated the collections and the "Castor" returned to Puerto Williams. The following week preliminary sieving of the samples was completed at the Nematology Laboratory, University of Chile in Santiago. These samples contained specimens which permit a solution to the problem of Certes' two species.

Certes' species

Dorylaimus giardi

This species, the first Criconematid ever described *, received little attention. It was transferred to *Criconema* by Micoletzky (1925), regarded "as probably a *Hoplolaimus*" by Thorne and Swanger (1936) and as a *species inquirenda* by Andrassy (1960). It was not cited in Baker's (1962) list, nor in Goodey's (1963) book, nor in the revision of the genus *Criconema* by Mehta and Raski (1971), nor in the revision of the Criconematinae by Andrassy (1979).

What information on this species can be extracted from Certes' (1889) script? Original description is the following:

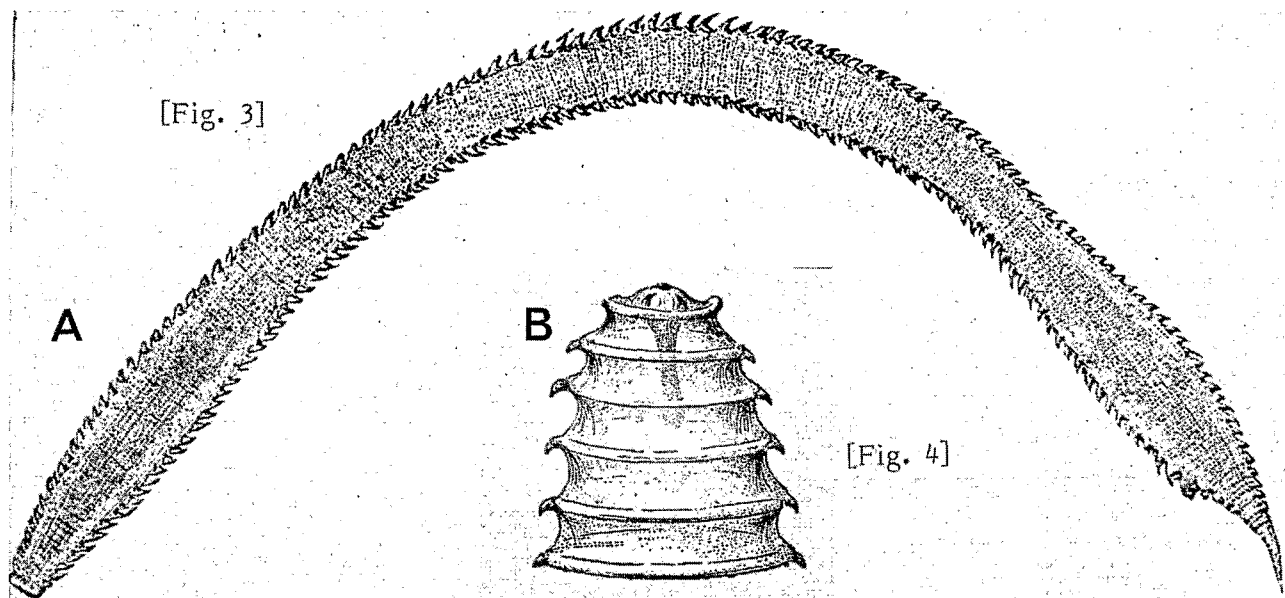
"The greatest species (fig. 3 ** above) is characterised by its numerous annules provided with spines, its genital papilla and its mamillate mouth (Fig. 4), armed with four symmetrical hooks. This mouth appears as borne by a protactile shaft. The muscular system, very developed, could not be studied due to the too great opaqueness of animals which have been fixed by osmic acid. The dimensions, variable according to whether the animal is more or less contracted, can reach nearly 1 mm long (0.80 mm) and 0.040 mm width."

From the original illustrations and text the following information can be derived:

The body is elongated, at maximum 0.80 mm; true length could be less than this figure as animals are said to be "more or less contracted" and judging from original Figure 3 the specimen is extended; body appears irregular in width (said to be 40 μ m) but most probably this is in artifact due to fixation or mounting. Number of annules (counted on orig. Fig. 3) is at least 114, not including the labial area, obscure in this figure, and the terminus for which annules, if present, were not drawn. These annules are said to be "provided with spines"; on the anterior part, in lateral view (orig. fig. 4), these spines are shorter than the annule height, but these annules,

* Due to page precedence, *D. giardi* was described before *Eubostrichus guernei*.

** Certes' (1889) original illustrations are reproduced on Fig. 2, p. 304.



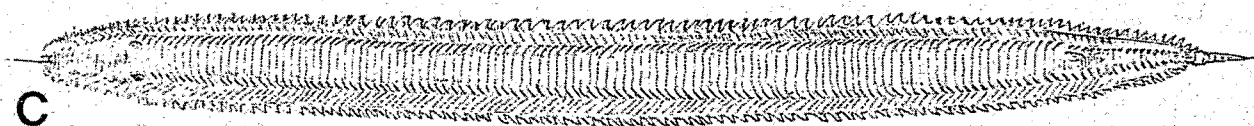
[Fig. 3]

A

B

[Fig. 4]

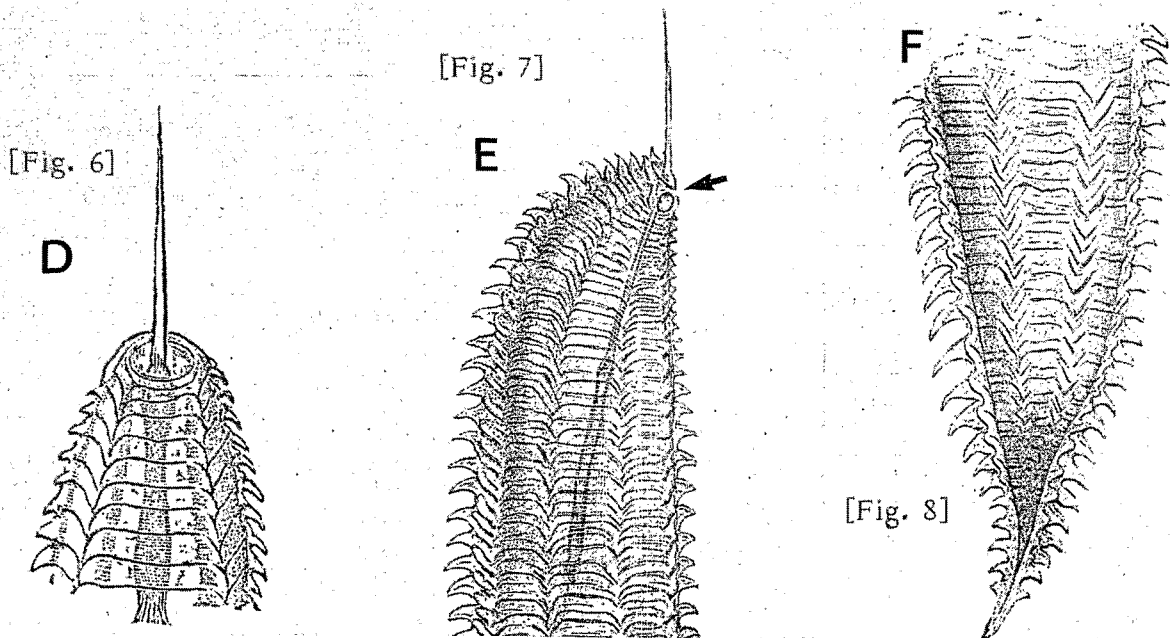
Nématode *Dorylaimus Giardi* n. sp. Certes.



C

[Fig. 5]

Nématode *Eubostrichus Guernei* n. sp. Certes.



[Fig. 6]

[Fig. 7]

[Fig. 8]

D

E

F

Fig. 2. Reproduction of Certes' (1889) original illustration. "*Dorylaimus*" *giardi* Certes, 1889. Female (orig. fig. 3) : Animal *in toto* ; B (orig. fig. 4) : Anterior end. "*Eubostrichus*" *guernei* Certes, 1889 : juvenile stage of *Criconema giardi* : C (orig. fig. 5) : Animal *in toto* ; D (orig. fig. 6) : Anterior end. "*Eubostrichus*" *guernei* : juvenile stage of an unnamed species. E (orig. fig. 7) : Anterior end ; F (orig. fig. 8) : Posterior end. (*Enlarged from original illustration.*)

as said above, appear distended. On orig. figure 3, also a lateral view, these spines are figured longer and rather strong on all the body except the postvulval part. Nothing is said, or drawn, concerning the number of rows of these spines, and on both original figures, spines are only illustrated on lateral edges : this suggests that even though long, these spines are probably discrete in thickness ; it is not even possible to exclude that these "spines" may represent the edge of a continuous serration or a thin margin of the *Bakernema* type. We are inclined towards this latter interpretation because Certes did not figure rows of "spines" in central part of the body, whereas he figured them concerning *Eubostrichus guernei* (see below). Anterior end appears flat and truncate on orig. figure 3, but orig. figure 4 permits a description of the lip area as domeshaped and followed by an annule ("head" annule) conspicuously narrower than the following one (or first body annule) ; the lip area ("mouth") is said to be "mamillate" which could correspond to the presence of the pseudolips ; the "four symmetrical hooks" of which two are drawn on orig. figure 4 can be interpreted as the arches of the labial framework (actually six) ; the "protractile shaft", figured too on orig. figure 4, is more difficult to interpret : it could be the anterior part of the stylet or, more probably, its tubular guide selectively stained by osmic acid. The "genital papilla", visible on orig. Figure 3, could be interpreted as prominently protruding vulval lips corresponding to a "closed" vulva. The postvulval part is conical — effiliated with an acute terminus on which annules are not, or at most modestly marked, and in any event devoid of spines.

Eubostrichus guernei

A full account on the taxonomic avatars and problems of identity of *Eubostrichus guernei* Certes, 1889 has been published by Andr assy (1979). Summarizing this, the various steps are the following : the genus *Eubostrichus* Greeff, 1869 corresponding to marine nematodes of the family Desmodoridae, at evidence *E. guernei* has been wrongly attributed to it as suspected by Richters (1904) and recognized by Southern (1914). Hofm anner and Menzel (1914) transferred *E. guernei* to the new genus *Criconema* Hofm anner & Menzel, 1914 for which they did not designate a type species *. This was done by Stiles

* In the same article, Hofm anner and Menzel (1914) gave data on a population of criconematid, recorded from moss (Jura, Swiss), they attributed to *C. guernei*. These specimens have been recognized as pertaining to a different species by Stefański (1924) and through various taxonomic avatars, constitute presently *Crossonema* (*Crossonema*) *menzeli* (Stefański, 1924) Mehta & Raski, 1971.

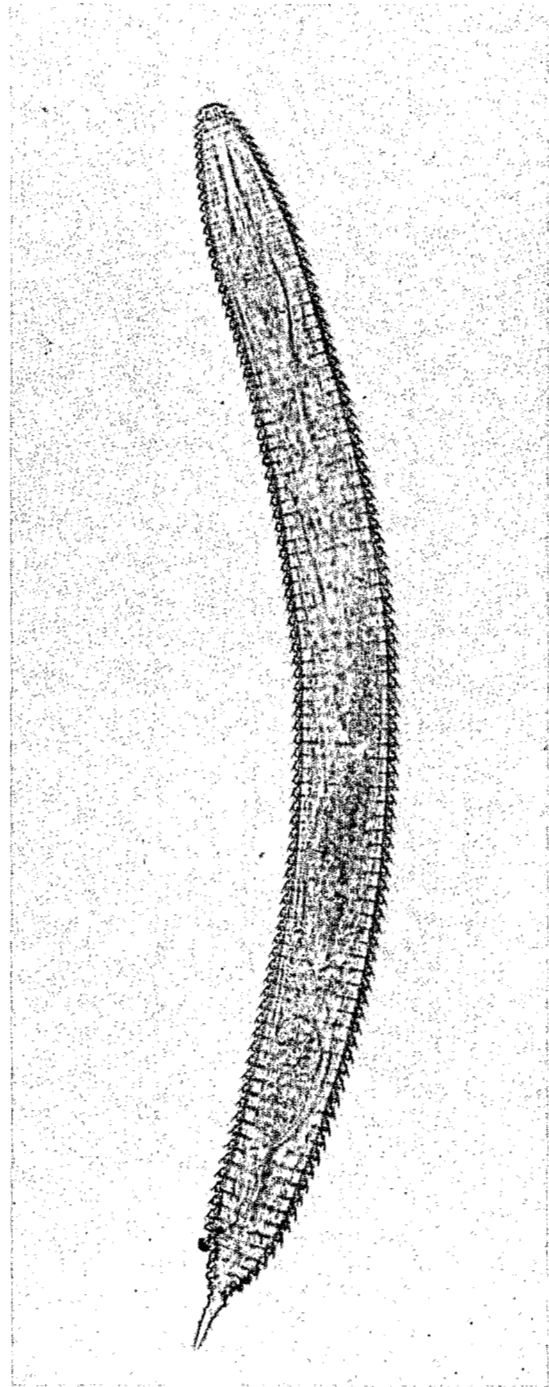


Fig. 3. *Criconema giardi* (Certes, 1889) Micoletzky, 1925. Microphotograph of neo-type female (compare with fig. 2 A).

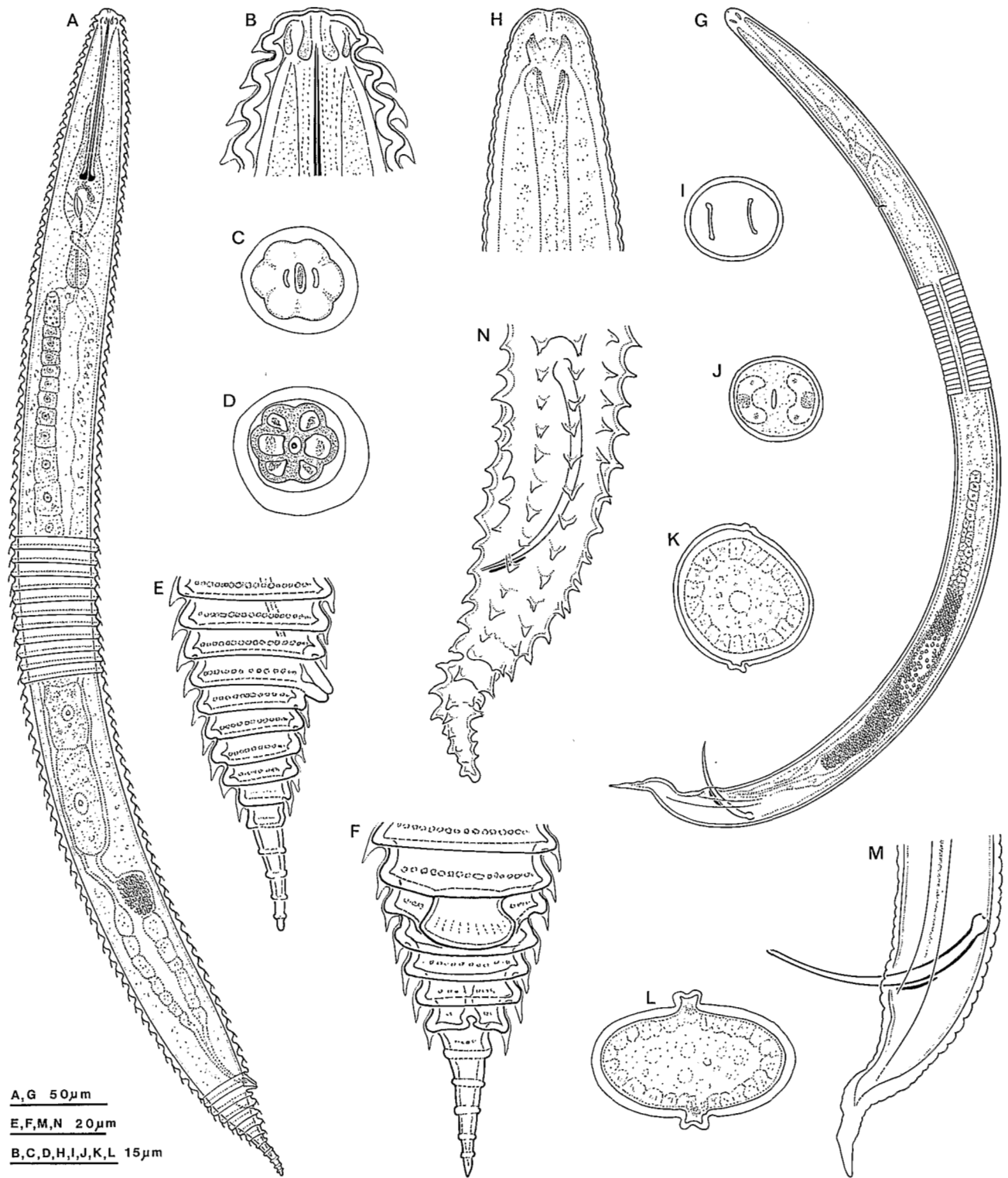


Fig. 4. *Criconema giardi* (Certes, 1889) Micoletzky, 1925 (neotype population). Female. A : Animal *in toto* ; B : Anterior part ; C : Anterior end (« en face » view) ; D : Transverse section, at level of the cephalic framework ; E : Post-vulvar part (lat.) ; F : post-vulvar part (ventrad). Male. G : Animal *in toto* ; H : Anterior end (lat.) ; I : Anterior end (« en face » view) ; J : Transverse section, at level of « buccal capsule » ; K : Transverse section, at level of oesophagus ; L : Transverse section, at mid-body ; M : Posterior part ; N : Posterior part of a male in molting J4.

and Hassal (1920) who designated *C. guernei* for that purpose. Then *C. guernei* followed the way of other species of the genus and was successively attributed to the genus *Hoplolaimus* by Menzel (1917), to *Iota* by Micoletzky (1925) and to *Ogma* by Schuurmans Stekhoven and Teunissen (1938). In the meantime Schneider (1923) described under the name of *Hoplolaimus guernei* a population of criconematids which obviously does not belong to this species.

As underlined by Andrassy (1979) the designation of *C. guernei* as type species was not a good decision. It was observed (Hofmänner & Menzel, 1914; De Grisse, 1969; Mehta & Raski, 1971) that the description of *C. guernei* most probably applied to a juvenile form. If this statement is correct, *C. guernei*, juvenile form, could pertain to one of several genera of Criconematidae, without permitting a safe attribution to one or the other. To save the genus *Criconema*, Mehta and Raski (1971) divided the genus into two subgenera: subg. *Criconema* with type and only species *Criconema (C.) guernei*, and subg. *Variasquamata* with type species *Criconema (Variasquamata) decalineatum* Chitwood, 1957, in which were grouped all the other species. This procedure was rejected by Andrassy (1979) who considered *C. guernei* a species *dubium* and consequently *Criconema* a genus *dubium*; logically, he reestablished the genus *Ogma* Southern, 1914 to contain species previously placed in *Criconema*.

The original description of "*Eubostrichus*" *guernei* Certes, 1889 is the following:

"The second species of nematode, half long (Fig. 5), is characterized by the ornamentation of the cuticle (Fig. 7 and 8) which appears close to the *Eubostrichus* described by M. Greeff, and by the sting with which the mouth is armed. This sting is borne on a long protactile shaft (Fig. 6 and 7). The tegument is composed of symmetrical annules with pointed out and pointed in angles, armed with spines in such a way that they form six parallel rows along the body. The maximal length appears to be 0.400 mm, the width varies from 0.020 to 0.040 mm and even 0.100 mm, following the length and the contraction of the animals examined. In Figure 5 the animal is seen « en face » [= ventrad], it is drawn laterad on the Figure 7 and 8. This is the cause of various appearances which, at first glance, may lead one to believe in the existence of two distinct species."

From this description and original Figures 5, 6, 7 and 8 the following information can be drawn:

The length of the animal is at most 0.40 mm, the body appears straight (orig. Fig. 5), slightly narrowing at anterior end and conical effilated at the posterior part. The width is said to be from 20 to 100 μm ;

this variation appears very wide even if the "length and the stage of contraction" of the specimens are taken into consideration; combining the maximal length (0.400 mm) with the maximal width (100 μm) results in an "a" coefficient of 4, which is impossible in such animals. The number of annules, counted on the edge of animals (orig. fig. 5), is about 110

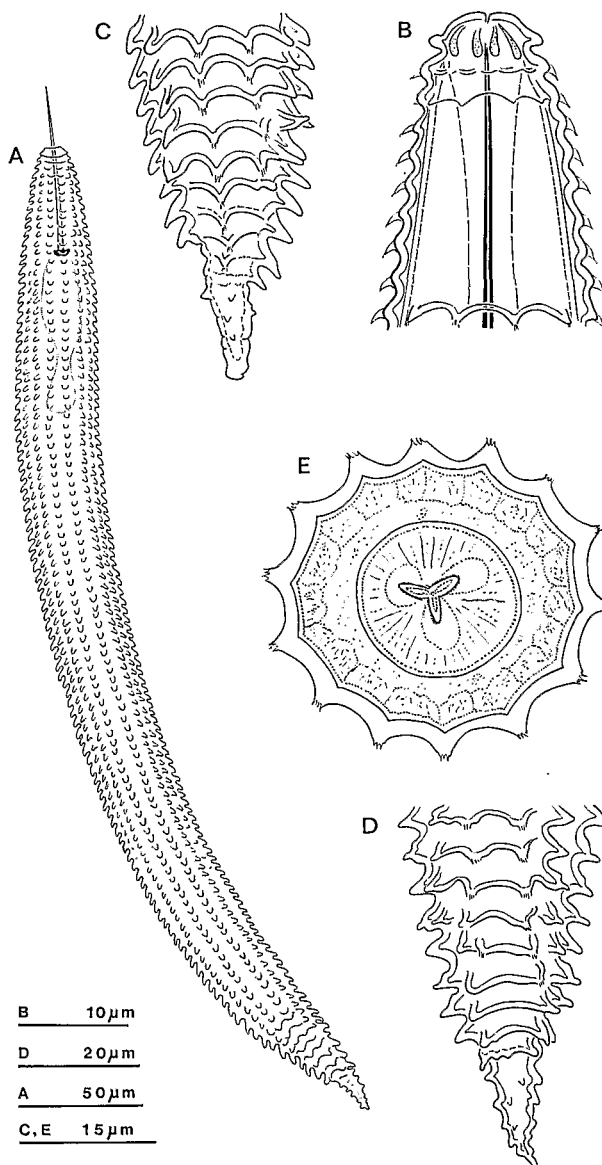


Fig. 5. *Criconema giardi* (Certes, 1889) Micoletzky, 1925 (neotype population). Juvenile. A: animal *in toto*; B: Anterior end; C, D: posterior part; E: transverse section, at level of oesophageal median bulb.

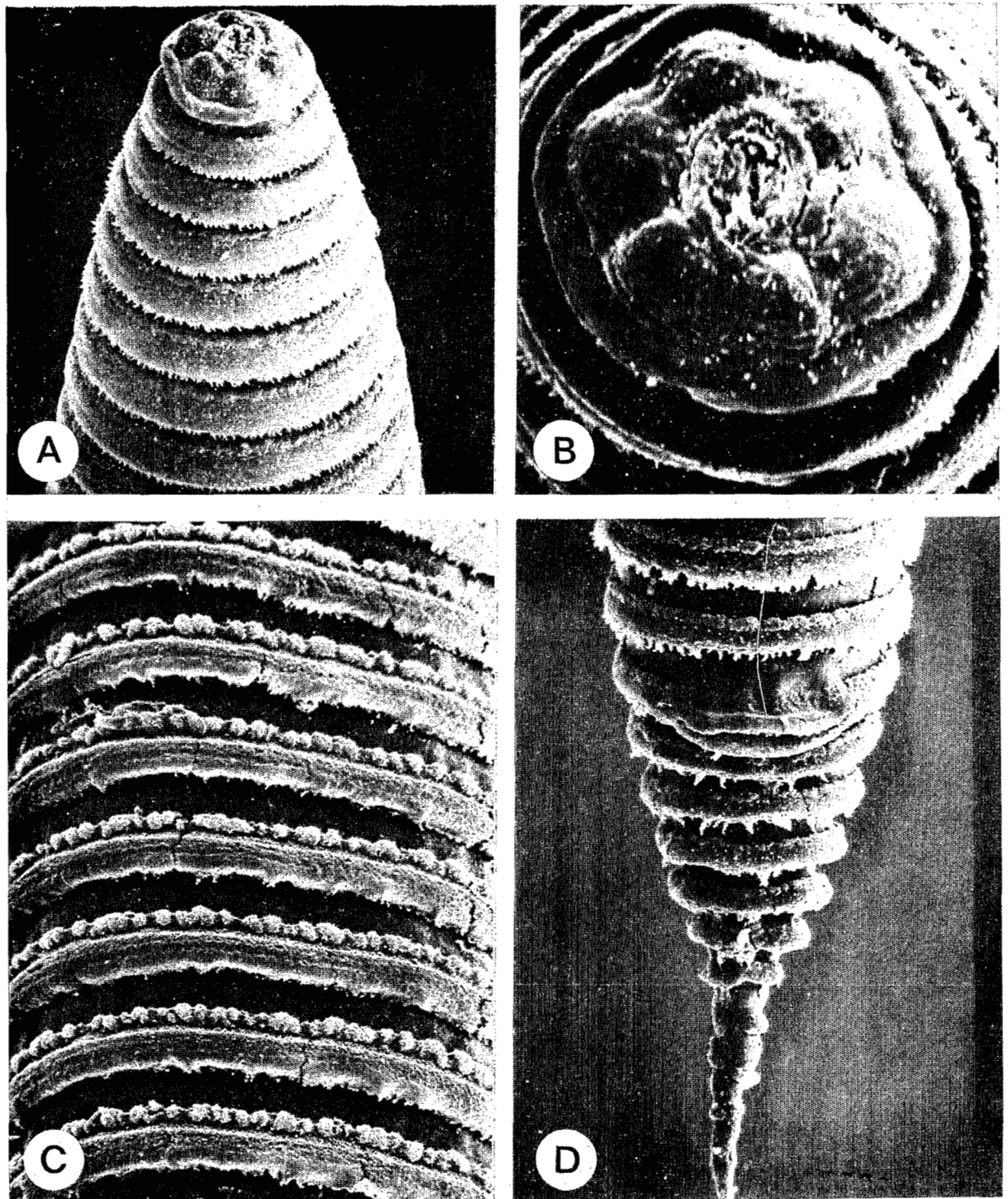


Fig. 6. *Criconema giardi* (Certes, 1889) Micoletzky, 1925. SEM graphs. Female. A : Anterior end ($\times 1\ 850$) ; B : Lip area, *en face* view ($\times 5\ 000$) ; C : annules at mid-body with head-like incrustations on anterior margins and film-like fringe on posterior margins ($\times 2\ 780$) ; D : Post-vulvar part, ventral view ($\times 1\ 750$).

(actual number cannot be more precise, as on anterior and posterior ends the annules are obscure). These annules are said to present "pointed out and pointed in angles provided with spines"; this can be interpreted as annules bearing more or less triangular shaped scales provided with one terminal spine; these spines are reported as "forming along the body six parallel rows". This point merits special attention: if we take this statement literally, we are obliged to consider this species as unique among all the Criconematinae as no other species presents such a low number of rows of scales and/or spines in adult females or juveniles, the minimum number being eight (the only exception is *Ogma minuta* Kirjanova, 1948 which is reported to bear four rows of spines, but this observation needs to be confirmed). Moreover, when looking at the surface of criconematid juveniles having ten or more rows of spines, it is very frequent that only two central rows and the edge rows appear very clearly, the intermediate ones needing a careful and progressive focussing to be distinguished. Thus, it appears quite evident that the actual number cannot be six as the animal being described « en face » (= ventral or dorsal) two other rows would exist on the symmetrical "side" and only one in each lateral "side"; so, the true number is, more evidently, at least eight, but can be greater for the reason given above. This hypothesis applies to original Figure 5. Original Figure 6 represents the same animal as in Figure 5 enlarged two times and restricted to the anterior part; this statement is based on the fact that the ratio "exserted part of the stylet divided by diameter of the first annule" is the same in both figures (3.6) and actual measurements twice in Figure 6 than in Figure 5. Also in this Figure 6 are drawn two dorsal (or ventral) rows of spines and one on each "lateral" edge.

Always considering only original Figure 5 and 6 it can be stated that they represent most probably a juvenile specimen (no evidence of a vulva), with body straight, having about 110 annules, each provided with at least eight rows of spines, scales or spiny scales, a first (head) annule devoid of spines or scales, a posterior extremity long-conical, the terminus being pointed, acute and devoid of ornamentation.

Certes stated that, to the opposite of original Figure 5 (and 6), the original Figures 7 and 8 represent the animal « de profil » (= lateral), and that it is "the cause of various appearances which, at first look, may lead one to believe in the existence of two distinct species". We estimate that this first look was the good one and that original Figure 7 and 8 represent a species different from what figured on Figure 5 and 6. The reasons for this statement are mainly based on the fact that in Figure 5 the

terminus is clearly devoid of spines or scales and clearly set off from the rest of the body. To the contrary, in Figure 8, the body ended in a conical shape narrowing regularly and provided with spines or scales nearly until its extremity. We estimate that these Figure 7 and 8 represent a molting juvenile as enlargement of Figure 7 shows two "first annules" at angle (see arrow) and as the exserted part of the stylet may reasonably be the molting cone of the stylet of preceeding stage, this being sustained by an unusual flexure, at level of the first annule.

Summarizing these observations and hypotheses, we estimate that Certes (1889) in describing *Eubostriachus guernei* was dealing with juveniles pertaining to two different species. According to this and to the rule of page precedence, *E. guernei* is represented only by the original Figure 5 and 6, and the second species, unknown and unnamed, by the Figure 7 and 8, the brief description applying to both the species.

From these data we can state that *E. guernei* has the following characters:

Juvenile. L = 0.4 mm (at most); R = about 110; rows of spines 8 or more; stylet long and thin; labial (= head) annule narrower than the following one and devoid of ornamentation; posterior part set off from the rest of the body, devoid of spines or scales.

Redescription of *Criconema giardi* (Certes, 1889) Micoletzky, 1925

Samples from Orange Bay contain, among other nematodes, populations of a Criconematid of which the females fit perfectly with what is known on *Criconema giardi*, and the juveniles with above reported data on *Criconema guernei*; males were also present. Consequently we estimate that *C. giardi* and *C. guernei* are conspecific, and we retain for this species the name of *Criconema giardi* following the rule of page precedence. As a consequence a neotype is designated.

MATERIAL AND METHODS

Preliminary sieving of the fresh-water soil was completed at the Nematology Laboratory, University of Chile in Santiago. After extraction the nematodes were killed with hot water and fixed with formalin calculated to be 4% (slightly higher than the usual 2.5% formalin because of the large organic matter fraction in the sievings. Further processing of the sieving by use of sugar-flotation technique was carried out at University of California Davis. The nematodes have been mounted in glycerin using Cobb's slow method.

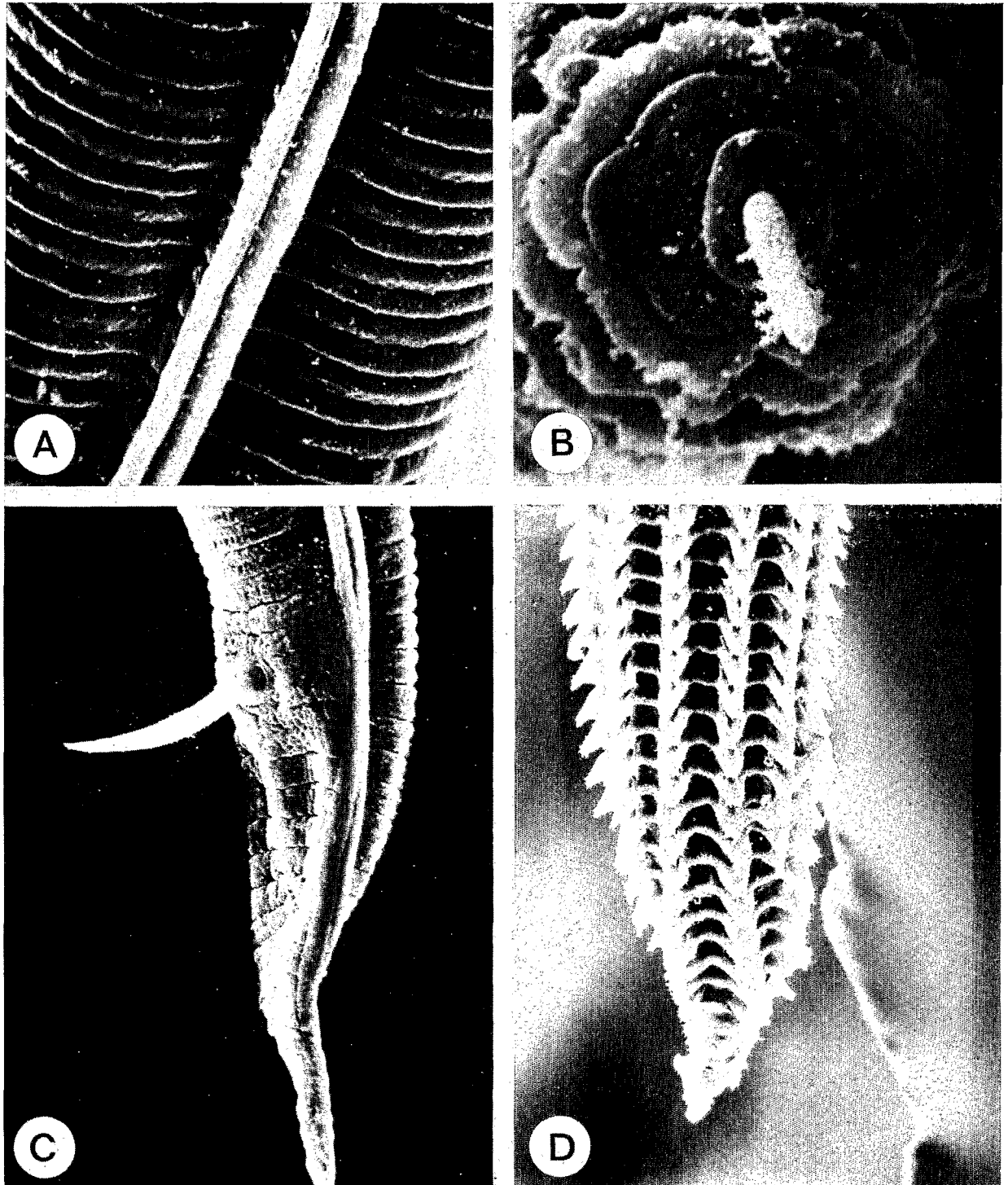


Fig. 7. *Criconema giardi* (Certes, 1889). Micoletzky, 1925. SEM graphs. Male. A : Lateral field at mid-body showing three strong lines or two band contiguous ($\times 5\,530$); C : Posterior part with spicules protruding ($\times 2\,575$). Juveniles. B : « En face » view of lip area with stylet protruding ; oral (labial ?) plate similar to adult female ($\times 7\,400$); D : posterior part ($\times 1\,850$).

For SEM pictures specimens were processed according to the procedures reported by Raski and Maggenti (1983) with one difference : the electron microscope used was one ISI model DS 130, not a Cambridge Mark II.

Criconema giardi

(Certes, 1889) Micoletzky, 1925

- = *Dorylaimus giardi* Certes, 1889
- = *Eubostrichus guernei* Certes, 1889, n. syn.
- = *Criconema guernei* (Certes, 1889) Menzel in Hofmänner & Menzel, 1914
- = *Hoplolaimus guernei* (Certes, 1889) Menzel, 1917
- = *Iota guernei* (Certes, 1889) Micoletzky, 1925
- = *Ogma guernei* (Certes, 1889) Schuurmans Stekhoven & Teunissen, 1938
- = *Hoplolaimus guernei* apud Schneider, 1923 (Fig. 3-7)

MENSURATIONS

Females (n = 10). L : 0.66 mm (0.56-0.76) ; a = 14.3 (12.3-17.9) ; b = 4.7 (3.9-5.4) ; c = 21.3 (16.5-26.2) ; V = 91.4 (90.4-92.6) ; R = 100 (95-105) ; R. ex = 31 (28-34) ; RV = 10-11 ; Ra : 5-7 ; stylet = 87 μ m (77-95) ; cone = 69 μ m (61-78).

Males (n = 11). L = 0.49 mm (0.46-0.61) ; a = 20.3 (19-22) ; b = ? ; c = 11 (10-13) ; spicules = 52 μ m (44-60) ; gubernaculum = 10 μ m (7-12)

Juveniles * (n = 12). L = 0.43 mm (0.37-0.54) ; a = 11.9 (9.0-14.1) ; b = 3.7 (3.2-4.3) ; c = ? ; stylet = 69.5 μ m (65-75) ; cone = 55 μ m (46-63) ; R = 107 (99-114).

Neotype (female). L = 0.61 mm ; a = 16.2 ; b = 4.5 ; c = 18.4 ; V = 92 ; R = 102 ; Rex = ? ; RV = 11 ; Ra = 7 ; stylet = 92 μ m ; cone = 67 μ m.

DESCRIPTION

Female : Habitus moderately elongated, nearly straight to slightly ventrally curved upon fixation. Body gradually narrowing at anterior part, which is domeshaped ; posterior part conical ending in a pointed terminus. Body annules retrorse, well detached, provided at posterior edge with a continuous thin fringe appearing as a transparent scale in lateral view ; anteriorly each annule bears an irregu-

lar line of small refractive dots. SEM pictures show that these dots correspond to an extracuticular incrustation deposited on the anterior margin of the annule ; the fringe appears at SEM like a curtain hanging from the posterior margin of these annules ; it is irregularly incised. Both "dots" and fringe constitute a continuous film-like, superficial structure all over the body. Lateral field not marked ; no anastomosis. First (= head) annule 15-18 μ m in diameter, narrower than the following one, non-retrorse and non-indented, separated from second annule (first body annule) by a constriction (collar) 11-13 μ m diam. Following annules enlarge progressively (2nd body annule = 19-23 μ m ; 3rd = 22-26 μ m ; 4th = 25-29 μ m ; 5th = 27-32 μ m ; 6th = 29-33 μ m ; 7th = 33-34 μ m ; not including the fringe). Lip area domeshaped in profile, largely protruding from first (head) annule ; on mounting in glycerine, the fringe appears to be present at posterior part of this annule and even the extracuticular incrustation to recover the lip area. But at SEM these structures are not visible on both first (head) annule and lip area ; at SEM, the lip area presents six rounded, convex pseudolips of which the lateral ones are more developed ; oval oral disc with a dorso-ventral elongated oral aperture ; amphidial slits obscure. Arches of the labial sclerotization well developed, reaching the anterior level of the first body annule. Stylet straight, thin ; basal knobs moderately developed, with short and smooth anterior process. Excretory pore at 182 μ m (161-198) from anterior end. Hemizonid and hemizonion not seen. vulval lips prominently protruding beyond line defined by fringe on annule, backwardly directed, simple (without indentation, lobation or spines) ; vulva closed ; vagina straight. Genital branch well developed on each female observed ; extremity of ovary reaching often the level of oesophago-intestinal junction or more ; spermatheca often obscured by the great development of ovocytes, ventral or latero-ventral, full of small, rounded spermatozoa. Postvulval part regularly conical ; last five or six annules fused to each other, non retrorse and without fringe and dots.

Male : Upon fixation habitus ventrally curved, mainly at posterior portion . Body relatively thick ; anterior part slightly narrowing towards a rounded anterior end ; posterior end pointed. Cuticle with distinct annulation, beginning at some distance from anterior end ; annules wide (3-3.5 μ m) but not deeply marked ; lateral field narrow (3-3.5 μ m or 12-18% of body diameter) appearing as two outer lines with a central irregular line composed of numerous refractive dots ; SEM photographs as well as transverse sections show three lines present, or, more properly, two bands separated by a shallow depres-

* Juveniles could pertain to two different stages (III and IV ?) but they could not be separated clearly into two groups using body and stylet lengths.

sion. Lip area rounded, not separated from the rest of body. SEM photo (not shown here) presents evidence of a round, flat, oral disc and slit-like amphid apertures; remnants of archs of the labial framework are clearly visible and delimit internally a more translucent anterior part (buccal capsule?). Oesophagus degenerate. No trace of stylet. Excretory pore ($n = 2$) situated 134, 142 μm from anterior end. Hemizonid 3, 4.5 μm wide at 13, 15 μm anterior to excretory pore. Hemizonion not seen. Spicules curved, thin at distal end, cephalated at proximal end; gubernaculum short, lamellate, nearly straight. Bursa thick, poorly developed; tail pointed, most often irregular and dorsally curved.

Juveniles: Habitus straight or slightly ventrally curved. Body stout, anterior portion slightly narrowing; posterior part gradually tapering to a conical terminus. Apart from the first (head) annule, and the most posterior ones, each annule bears roughly triangular scales, with rounded extremity provided with several very thin spines only visible by SEM; scales arranged in longitudinal rows of variable number (ten to fifteen). First (head) annule not retrorse, lobed, 12-13 μm diam., without scales, separated from second annule (or first body annule) by a weak collar (diam. = 10 μm); succeeding annules regularly increasing in diameter. Lip area domeshaped, but less prominent than in female; at SEM pseudolips appear as low whereas labial disc is more prominent; amphid aperture seems to be circular. Posterior part of body narrows gradually, number of scale rows diminishing; ultimate five to seven annules joined each other, bear only remnants of scales. Stylet of same structure as in female; procorpus and mediam bulb, fused, strongly developed. Excretory pore and anus not seen.

TYPE HABITAT AND LOCALITY

Moist soil under tundra (see Appendix for plants), Orange Bay, Hoste Island, Chile. Collected January 20, 1983 by D.J. Raski.

TYPE MATERIAL

Neotype: Female, Catalogue Slide Number 2037, University of California Nematode Collection, Davis.

Paraneotypes: 181 females, 27 males, 60 juveniles, same data as holotype deposited as follows: 136 females, 9 males, 42 juveniles, UCDNC. Five females, two males and two juveniles each: USDA Nematode Collection, Beltsville, Maryland; Nematology Department, Rothamsted Experimental Station, Harpenden, Herts., U.K.; Canadian National Collection of Nematodes, Ottawa, Canada; Agricultural University, Wageningen, The Netherlands; Common-

wealth Institute of Parasitology, St Albans, Herts., U.K.; National Nematode Collection, Indian Agricultural Research Institute, New Delhi, India; Muséum national d'Histoire naturelle, Laboratoire des Vers, Paris, France; Departamento de Vegetal Sanidad, University of Chile, Santiago, Chile; Instituut voor Dierkunde, Lab. voor Morfologie, Gent, Belgium; Rands Afrikaans University, Johannesburg, South Africa.

DIAGNOSIS

Criconema giardi is characterized by having female bearing about 100 annules recovered by film-like extra-cuticular layer especially visible projecting off posterior margin; also bearing small, bead-like, rounded, extracuticular formations on anterior margins of annules; terminus acute, devoid of such a film; no submedian lobes; pseudolips prominent. Juvenile with ten to fifteen rows of triangular scales bearing very delicate spines at extremity. Male with weakly developed bursa; lateral field with bands (three lines).

* *

The reestablishment of the species *Criconema giardi*, and of the genus *Criconema*, as valid taxa has an immediate consequence, in our opinion, of synonymizing *Nothocriconema* with *Criconema*. This and other more far-reaching changes and synonymies are treated in a second article (Raski & Luc, in press).

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Appendix

Vegetation of the samples in which *Criconema giardi* has been recorded

SAMPLE No. 1

Pernettya mucronata Gaudich. ex G. Don (Ericaceae)
Chiliotrichum diffusum P. Dusen (Compositae)
Nothofagus betuloides Blume (Fagaceae)

SAMPLE No. 3

Nothofagus betuloides Blume (Fagaceae)
Donatia fascicularis Forst. (Stylidiaceae)
Berberis ilicifolia Forst. (Berberidaceae)
Azorella sp. (Ombelliferaceae)

Chiliotrichum diffusum P. Dusen (Compositae)
Schoenus andinus H. Pfeiff (or *antarcticus* P. Dusen)
(Cyperaceae)

SAMPLE No. 4

Bolax caespitosa Hombr. et Jacquinet ex Decne
(Ombelliferaceae)
Nothofagus antarctica Oerst. (Fagaceae)
Embothrium coccineum Forst. (Proteaceae)
Nothofagus betuloides Blume (Fagaceae).

SAMPLE No. 5

Lebetanthus myzsinites Macl. (Epacridaceae)
Drimys winteri Forst. (Magnoliaceae).

SAMPLE No. 6

Sediments

SAMPLE No. 10

Astelia pumila R. Br. (Liliaceae)
Gunnera lobata Hooker (Haloragaceae)
Perezia magellanica Lag. (Compositae)
Mysteola nummularia Berg (Myrtaceae)
Marsippospermon grandiflorum Hooker (Juncaceae)

SAMPLE No. 11

Acaena pumila Vahl (Rosacées)
cf. Schizeilema ranunculus Domin. (Ombelliferafeae)
Gaultheria cf. antarctica Hooker (Ericaceae)
Myrteola nummularia Berg (Myrtaceae)
Berberis ilicifolia Forst. (Berberidaceae)
Gunnera lobata Hooker (Haloragaceae)
cf. Tetroncium magellanicus Willd. (Naiadaceae)
Caltha appendiculata Pers. (Renonculaceae)

SAMPLE No. 12

Pernettya mucronata Gaudich *ex.* G. Don (Ericaceae)
Empetrum rubrum Vahl (Empetraceae)
Nothofagus betuloides Blume (Fagaceae)
Berberis ilicifolia Forst., (Berberidaceae)
Cyperaceae

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