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## **CRICONEMELLA ROSMARINI SP. N. (CRICONEMATIDAE: TYLENCHIDA) FROM SPAIN**

by  
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**Summary.** Specimens identified as *Criconemella rosmarini* sp. n. were found in soil samples from around the roots of *Rosmarinus officinalis* L. during a survey of several plant communities in the Sierra de Cazorla, Jaén. The species can be distinguished by the presence in the female of a fringe of short spine-like processes on each body annule, numerous anastomoses of annules along the body, stylet 61-76  $\mu\text{m}$  long and a convex-conoid postvulval region of body with VL/VB of 0.9-1.4. The systematic position of *Criconemella* is discussed.

A new plant-parasitic nematode species belonging to the genus *Criconemella* De Grisse and Loof, 1965, collected from several samples of soil taken around roots of *Rosmarinus officinalis* L. in a mountainous area in Southeastern Spain, is described and illustrated. In the identification of specimens we have accepted the taxonomy of the genus *Criconemella* as in Siddiqi (1986) and have discussed the significance of cuticular ornamentation of the female in this genus.

### **Materials and methods**

Specimens were killed by applying gentle heat, fixed in 4% formaldehyde solution and mounted in dehydrated glycerine (Seinhorst, 1962). SEM micrographs were taken with a Zeiss DSM 950 scanning electron microscope at 15 kV, using specimens that were already processed to glycerine, and later processed and coated with a thin layer of gold.

*Criconemella rosmarini* sp. n.  
(Table I; Figs. 1 and 2)

**Holotype female:** L=345  $\mu\text{m}$ ; a=8.0; b=3.4; c=17.2; c'=0.7; V=91; stylet=70  $\mu\text{m}$ ; conus=56  $\mu\text{m}$ ; m=80; S=2.0; R (dorsal)=113; R (ventral)=98; Rst=27; Rex=35; Roes=38; RV=11; RVan=4; Ran=7; RB=3.9; VL/VB=0.9

**Female:** Body stout, ventrally curved. Lip region truncate-rounded, the first annule not retrorse, bears

about 25-28 crenations, 7.5-9.5  $\mu\text{m}$  in diameter. Second annule slightly wider than the first. Cephalic annules continuous with the contour of body annules. SEM photographs show oral plate without submedian lobes (Fig. 2A).

Body annules pointed, retrorse, with a continuous fringe of short, rounded spines numbering 86-94 at mid-body, some being bifurcated in posterior region (distinguishable only with SEM). Numerous (usually 28-30) anastomoses along the body; total number of body annules 113-128 on dorsal side, 98-116 on ventral side.

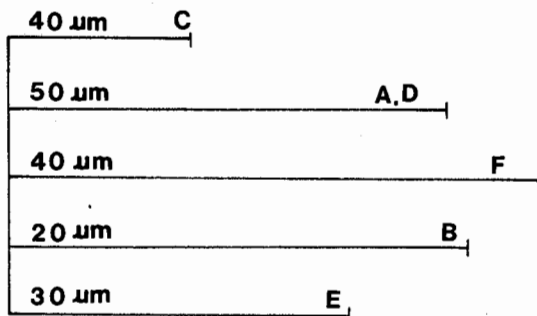
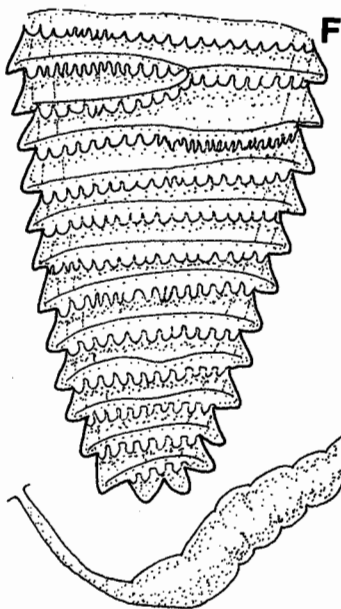
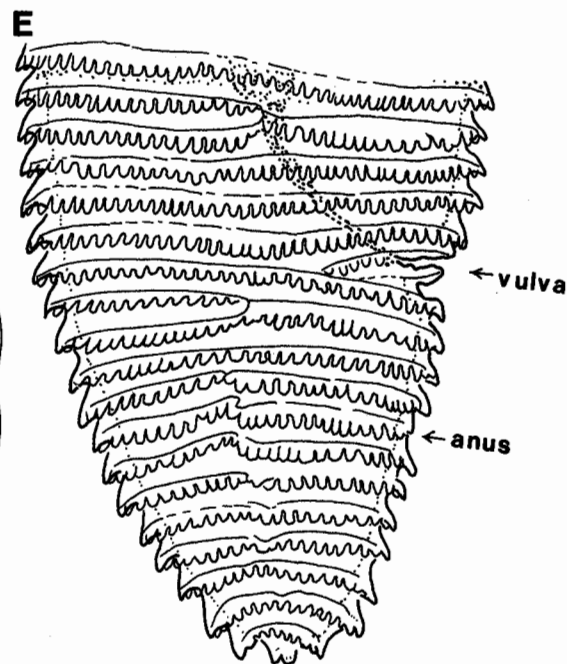
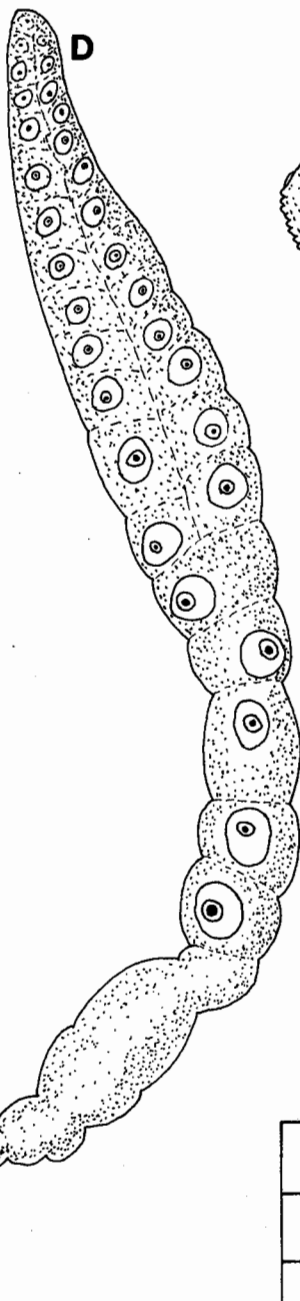
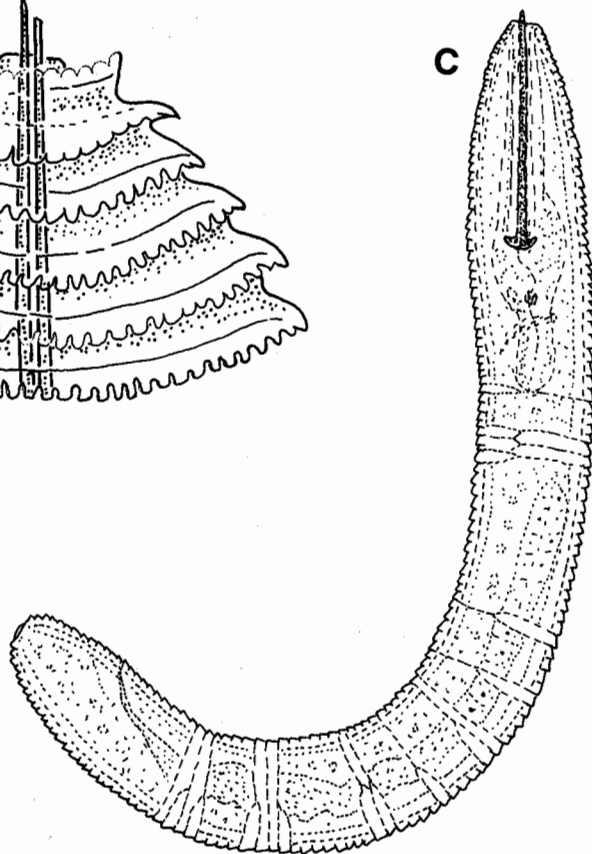
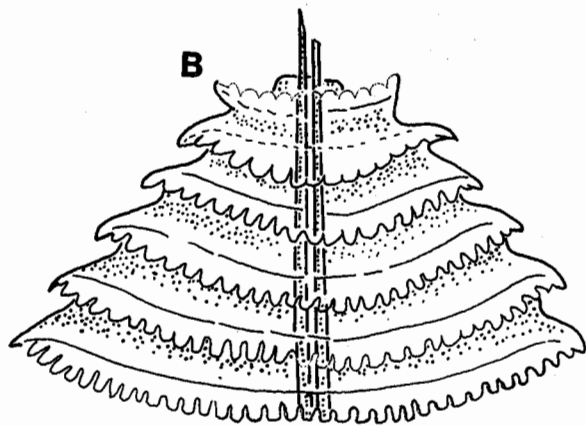
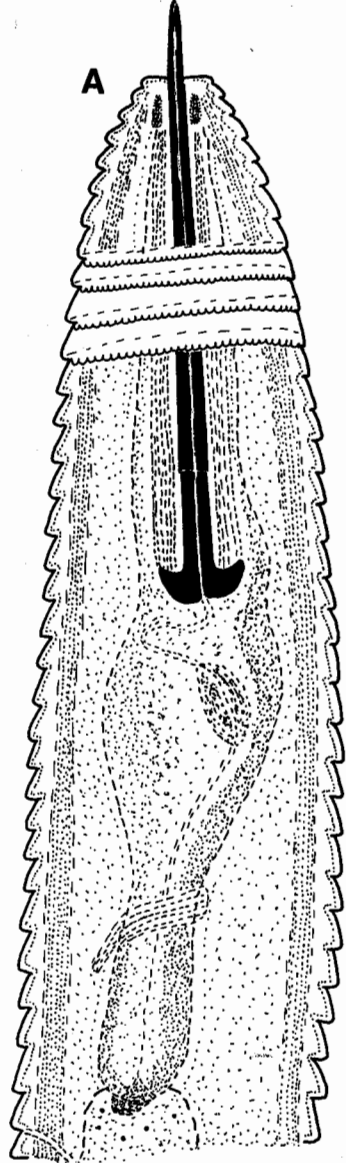
Stylet well developed, occupying nearly 20% of body length. Stylet knobs anchor shaped,  $8 \pm 0.8 \mu\text{m}$  (7.5-9.5) across. Oesophagus typical of the genus. Excretory pore posteriad to oesophago-intestinal junction, at 32-38 annules from head end.

Postvulval region of body dorsally convex-conoid. Vulva 9-14 annules from terminus; vulval lips rounded. Vagina ventrally curvate. Uterus without a distinct spermatheca, lacking sperm. Ovary with a single row of oocytes, except two in the multiplication zone. Tail convex-conoid, with 6-10 annules.

**Male:** not found.

**Juveniles:** Similar to female, except in shorter body length, shorter stylet, higher number of annules which have crenate margins and the tail of younger stages being more conoid. See Table II for measurements.

**Type habitat and locality:** Specimens were collected from soil around the roots of rosemary (*Rosmarinus*



*officinalis* L.) from Arroyo Frío, in Sierra de Cazorra, Jaén, Spain.

**Type specimens:** Holotype, 10 female and 8 juvenile paratypes in the collection of the Instituto «López-Neyra» de Parasitología (C.S.I.C.), Granada, Spain; 2 female and 4 juvenile paratypes at C.I.P., St. Albans, Herts., England and 2 female and 2 juvenile paratypes at Instituto de Edafología y Biología Vegetal (C.S.I.C.), Madrid, Spain.

**Diagnosis:** The major distinguishing characteristics of *Criconemella rosmarini* sp. n. are the presence in the female of 98-116 annules (in ventral side of body) each with a fringe of short spine-like processes, the numerous anastomoses along the body, stylet 61-76  $\mu\text{m}$  long and a convex-conoid postvulval region of body with VL/VB=0.9-1.4.

**Relationship and discussion:** At low magnification, *Criconemella rosmarini* females appear to have crenate annules, but at higher magnification each annular margin shows a fringe of small blunt spine-like processes formed by deep incision or crenation. Because of these processes, it was first thought that the species belonged to the genus *Crossonema*. However, the subsequent finding of juveniles having crenate annules lacking spines or scales led us to assign it to the genus *Criconemella*. Among *Crossonema* spp., *C. (Neocrossonema) aquitanense* (Fies, 1968) shows a somewhat similar fringe in SEM as published by Baujard and Luc (1985). The new species, however, differs from this and other species of *Crossonema* in the shape of the head and body annules, less pronounced cuticular processes, non-pointed vulval lips and most importantly in the juveniles lacking cuticular spines or scales. Siddiqi (1986, pp. 78, 354) attached utmost importance to this last character of the juvenile cuticle in distinguishing subfamilies and understanding the phylogenetic relationship of the family Criconematidae.

Within the genus *Criconemella*, the cuticular ornamentation of *C. rosmarini* is very similar to that of *C. avicenniae* Nicholas et Steward, 1984. Nicholas and Steward (1984) commented upon Luc and Raski's (1981) action of combining the species of the genera *Xenocriconemella*, *Macroposthonia/Criconemoides* within an enlarged genus *Criconemella* thus «The emended definition in our view is so imprecise and the number of species and synonyms so large that differential diagnosis becomes extremely uncertain. In our view such a large genus with wider and less precise limits is less useful than one with more clearly defined limits, even if some degree of overlap with other genera remains». They upheld the definition of *Criconemella*

as given by Loof and De Grisse (1974) and added, «The generic characters are small size, 100-200 crenate annuli, pseudolabia without submedian lobes, borne on a single head annulus that is not differentiated from the body contour». We agree with them and with the action of Siddiqi (1986) in restricting the definition

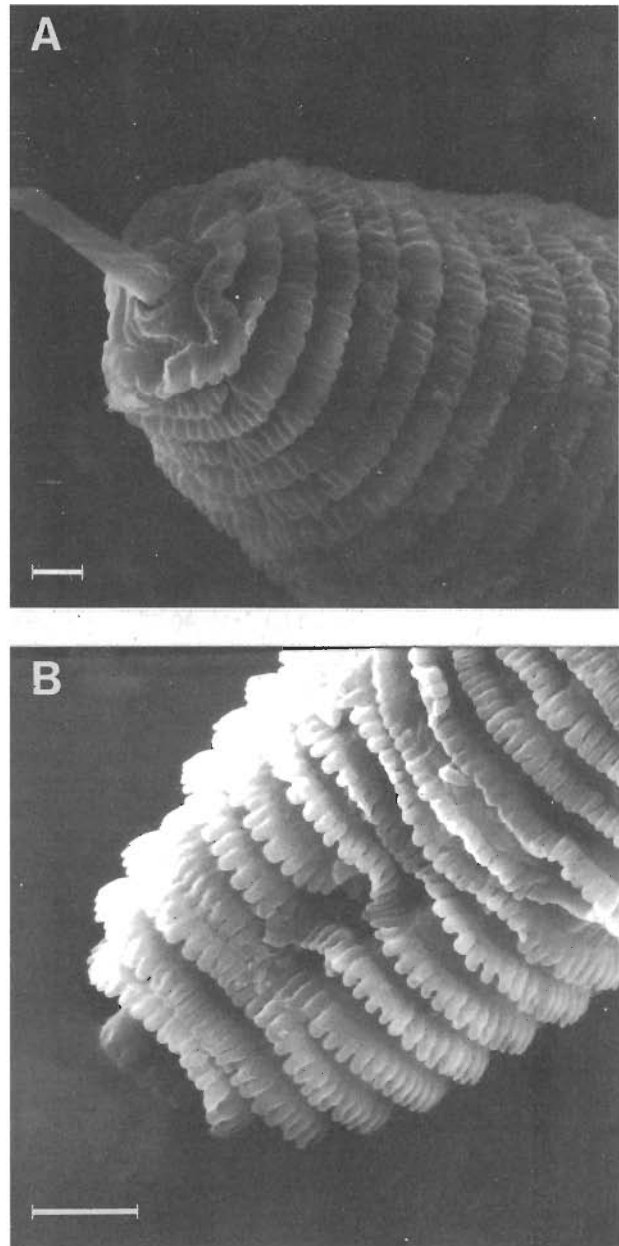


Fig. 2 - *Criconemella rosmarini* sp. n., female SEM micrographs: A, head end (scale bar=2  $\mu\text{m}$ ); B, tail region (scale bar=5  $\mu\text{m}$ ).

Fig. 1 - (front page) *Criconemella rosmarini* sp. n., female: A, oesophageal region; B, anterior end; C, whole body; D, reproductive system; E, posterior end, juvenile; F, tail region.

of *Criconemella*. The genus *Macroposthonia*, with over 85 species, should stand apart from *Criconemella* on the basis of having 4 submedian lobes in the lip region, a derived character (=synapomorphy) for the genus within the Macroposthoniina.

Nearly all the known species of *Criconemella sensu stricto* have females with crenate annules, and in some of these the crenation may be deep to form a fringe of spine-like processes. The type species, *C. parva* (Raski, 1952) De Grisse and Loof, 1965 was originally described from Nevada, USA by Raski (1952) as having no cuticular markings on juvenile annules, and female body annules were illustrated as having smooth margins.

TABLE I - Morphometric data of *Criconemella rosmarini* sp. n., females (measurements in  $\mu\text{m}$ ).

	n=15 females		
	$\bar{X} \pm \text{DS}$	Extr. Val.	CV %
L	377 $\pm$ 55.0	297-482	14.6
a	10.6 $\pm$ 1.7	8.0-14.2	8.7
b	3.7 $\pm$ 0.3	3.1-4.2	8.7
b <sub>1</sub>	4.5 $\pm$ 0.6	3.9-5.6	12.9
V	90 $\pm$ 1.8	87-93	2.0
G <sub>1</sub>	58 $\pm$ 11.1	40-77	19.0
c	17.6 $\pm$ 3.1	13.2-22.4	17.6
c'	0.9 $\pm$ 0.1	0.7-1.2	16.8
stylet	67 $\pm$ 3.5	61-76	5.2
m	81 $\pm$ 2.3	75-78	2.9
S	2.0 $\pm$ 0.1	1.8-2.2	5.9
conus	54 $\pm$ 3.0	50-61	5.5
R (ventral)	105 $\pm$ 6.1	98-116	5.8
R (dorsal)	122 $\pm$ 4.7	113-128	3.9
Rst	22 $\pm$ 3.1	18-27	13.8
Rex	35 $\pm$ 2.3	32-38	6.5
Roes	34 $\pm$ 2.8	29-38	8.1
RB	3.7 $\pm$ 0.5	2.4-4.0	13.0
RV	11.8 $\pm$ 1.3	9-14	10.7
RVan	4 $\pm$ 0.8	3-6	21.1
Ran	8 $\pm$ 1.3	6-10	16.4
VL/VB	1.1 $\pm$ 0.2	0.9-1.4	16.5
oesophagus	102 $\pm$ 11.8	70-121	11.5
nervous ring	85 $\pm$ 2.8	83-87	3.3
excretory pore	115 $\pm$ 10.5	102-125	9.2
max. body width	36 $\pm$ 2.8	31-43	7.9
anal body width	26 $\pm$ 1.8	23-29	7.0
tail	22 $\pm$ 4.0	17-32	18.1

*Neocriconema adamsi* Diab and Jenkins (1965), a species also described from USA and later synonymized with *C. parva*, was reported to have crenate annules in both juveniles and females. This species differed from *C. parva* in several other respects, viz., in the female having a stylet 48 (40-52)  $\mu\text{m}$  long, R=186 (170-194); Rex=60-68 versus stylet 38-41  $\mu\text{m}$  long, R=142-156, Rex=46-49 in *C. parva*. In this regard, it is interesting to see a SEM picture of *C. parva* in Siddiqi (1986) which was supplied by Dr. P.A.A. Loof through the courtesy of TFDL, Wageningen, The Netherlands. In this, the head annules and the body annules immediately behind the head are smooth but there is an indication of crenation on the following annules.

Female body annules are crenate in a number of other criconematid genera including *Macroposthonia*, *Criconemoides* and *Discocriconemella*. We, therefore, do not consider the character of cuticular ornamentation, both crenation as well as the presence of fringes of spine-like processes on female annules, as a generic character. It was used to diagnose the genus *Neocriconema* by Diab and Jenkins (1965) and *Mesocriconema* by Andrassy (1965) which later proved to be heterogeneous groups and were synonymised as *Discocriconemella* and *Macroposthonia*, respectively.

TABLE II - Morphometric data of *Criconemella rosmarini* sp. n., juveniles (measurements in  $\mu\text{m}$ ).

	n=8 females		
	$\bar{X} \pm \text{DS}$	Extr. Val.	CV %
L	326 $\pm$ 18.1	293-348	5.6
a	10.9 $\pm$ 1.3	9.1-12.5	11.5
b	3.8 $\pm$ 0.2	3.3-4.0	6.2
c	19.1 $\pm$ 2.3	15-21.1	12.0
c'	0.9 $\pm$ 0.05	0.9-1.0	5.6
stylet	45 $\pm$ 2.4	42-50	5.5
m	80 $\pm$ 2.7	77-84	3.4
S	1.6 $\pm$ 0.1	1.5-1.7	4.6
conus	37 $\pm$ 2.4	33-40	6.6
R (ventral)	111 $\pm$ 3.3	107-116	3.0
R (dorsal)	131 $\pm$ 5.7	124-139	4.4
Rst	21 $\pm$ 0.9	20-22	4.4
Rex	38	—	—
Roes	35 $\pm$ 1.8	32-37	5.2
RB	3.2 $\pm$ 0.1	3.1-3.3	2.8
Ran	7.6 $\pm$ 0.5	7-8	6.8
oesophagus	87 $\pm$ 3.8	82-94	4.3
max. body width	30 $\pm$ 2.9	27-33	9.6
anal body width	18 $\pm$ 1.8	16-21	9.8
tail	17 $\pm$ 1.7	16-21	9.7

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