

# ***Mesocriconema hymenophorum* sp. n. (Nematoda: Criconematidae) from forest soil in Germany**

Wim M. Wouts\* and Dieter Sturhan\*\*

\*Landcare Research, Private Bag 92 170, Auckland, New Zealand,

\*\*Biologische Bundesanstalt, Institut für Nematologie und Wirbeltierkunde, Toppheideweg 88, D-48161 Münster, Germany.

Accepted for publication 25 December 1998

**Summary.** Specimens of *Mesocriconema hymenophorum* sp. n. were recovered from soil collected in a mixed forest in Germany, in which spruce was predominant. The species is characterised by a distinct hyaline sheet around the body, as also occurs with *M. axeste*, *M. basili* and *M. longistyletum*. The new species differs from *M. axeste* and *M. basili* by having a longer stylet in females (94-105  $\mu\text{m}$  vs 51-60  $\mu\text{m}$  and 68-74  $\mu\text{m}$ , respectively), and from *M. longistyletum* by the relatively small, vs very large, submedian lobes in the lip region and the straight, vs sigmoid, vagina.

**Key words:** Criconematidae, description, Germany, *Mesocriconema hymenophorum* sp. n., Nematoda, new species, pine-wood.

Examination of Criconematidae in the German Nematode Collection, Biologische Bundesanstalt, Münster, revealed a previously undescribed *Mesocriconema* species. This new species is characterised by a distinct hyaline sheet around its body, as has been reported to occur with species in the genera *Bakernema* (Wu, 1964), *Criconema* (Siddiqi, 1986; Loof *et al.*, 1997) and *Mesocriconema* (Siddiqi, 1986). Within the genus *Mesocriconema* the phenomenon has been reported for *M. axeste* (Fassuliotis & Williamson, 1959) Loof & de Grisse, 1989, *M. basili* (Jairajpuri, 1964) Loof & de Grisse, 1989 and *M. longistyletum* (de Grisse & Maas, 1970) Loof & de Grisse, 1989. The new species, which differs morphologically from these, is here described and illustrated.

## **MATERIALS AND METHODS**

The nematodes had been extracted from a soil sample using a sieving-decanting-Baermann funnel method, fixed in TAF and processed to dehydrated glycerine through a slow evaporation method. All measurements are presented in micrometers and for each character the mean, standard error and range are given, unless otherwise indicated. In reporting the characters typical for the Criconematidae the following conventions have been used: PV = length of the postvulval part of the body; VB = body width at level of vulva; PV/VB = length of postvulval part of body/body width at vulva; R = total number of

body annules; Rex = number of the annule, counted from the anterior end, containing the excretory pore; RV = number of the annule, counted from the tail end, on which the vulva is situated; Ran = number of the annule, counted from the tail end, containing the anus; RVan = number of annules between the vulva and anus.

## **DESCRIPTION**

### ***Mesocriconema hymenophorum* sp. n. (Fig. 1)**

**Holotype female.** L = 0.60 mm; diameter at midbody = 59  $\mu\text{m}$ ; body diameter at level of anus = 32  $\mu\text{m}$ ; length of stylet = 104  $\mu\text{m}$ ; length of stylet shaft = 25  $\mu\text{m}$ ; height of stylet base = 5  $\mu\text{m}$ ; width of stylet base = 14  $\mu\text{m}$ ; width of lip cap = 7  $\mu\text{m}$ ; width of first lip annule = 19  $\mu\text{m}$ ; length of oesophagus = 164  $\mu\text{m}$ ; width of median bulb = 28  $\mu\text{m}$ ; width of basal bulb of oesophagus = 15  $\mu\text{m}$ ; distance of excretory pore from anterior end = 164  $\mu\text{m}$ ; length of tail = 27  $\mu\text{m}$ ; average length of body annules at midbody = 11  $\mu\text{m}$ ; PV = 40  $\mu\text{m}$ ; VB = 40  $\mu\text{m}$ ; PV/VB = 1; R = 56; Rex = 17; RV = 6; Ran = 4; RVan = 2; a = 10.2; b = 3.68; c = 22.4; V = 93.

**Females** (5 paratypes plus holotype): L = 0.55±0.064 (0.55-0.61) mm; diameter at midbody = 56±4.6 (48-60)  $\mu\text{m}$ ; diameter at level of anus = 32.7±1.75 (30-35)  $\mu\text{m}$ ; length of stylet = 100±4.3 (94-105)  $\mu\text{m}$ ; length of stylet shaft = 25±1.0 (23-26)  $\mu\text{m}$ ;

height of stylet base =  $4.8 \pm 0.41$  (4-5)  $\mu\text{m}$ ; width of stylet base =  $13.7 \pm 0.82$  (13-15)  $\mu\text{m}$ ; width of lip cap =  $6.8 \pm 0.41$  (6-7)  $\mu\text{m}$ ; width of first lip annule =  $18.0 \pm 1.55$  (16-20)  $\mu\text{m}$ ; length of oesophagus =  $160 \pm 13.3$  (145-180)  $\mu\text{m}$ ; width of median bulb =  $26.8 \pm 2.1$  (23-29)  $\mu\text{m}$ ; width of basal bulb =  $15.2 \pm 1.17$  (13-16)  $\mu\text{m}$ ; distance of excretory pore from anterior end =  $149 \pm 13.9$  (128-165)  $\mu\text{m}$ ; length of tail =  $26.7 \pm 3.6$  (20-30)  $\mu\text{m}$ ; PV =  $43.2 \pm 3.13$  (40-48)  $\mu\text{m}$ ; VB =  $40 \pm 2.6$  (35-42)  $\mu\text{m}$ ; PV/VB =  $1.1 \pm 0.1$  (1.00-1.23); R =  $57 \pm 1.8$  (54-59); Rex =  $16.5 \pm 1.05$  (15-18); RV = 6; Ran = 4; RVan = 2; a =  $9.8 \pm 0.58$  (8.7-10.2); b =  $3.46 \pm 0.24$  (3.1-3.7); c =  $20.8 \pm 2.2$  (18.0-23.0); V =  $92 \pm 1.1$  (91-93).

**Males** (n = 8): L =  $0.60 \pm 0.035$  (0.54-0.64) mm; diameter at midbody =  $26.5 \pm 1.20$  (25-28)  $\mu\text{m}$ ; width of base of head =  $16.4 \pm 1.92$  (14-20)  $\mu\text{m}$ ; diameter at level of anus =  $23.9 \pm 1.64$  (22-26)  $\mu\text{m}$ ; distance of excretory pore from anterior end =  $137 \pm 7.2$  (128-150)  $\mu\text{m}$ ; length of spicules =  $53 \pm 2.5$  (50-58)  $\mu\text{m}$ ; length of gubernaculum =  $12.4 \pm 0.92$  (11-13)  $\mu\text{m}$ ; length of tail =  $40.6 \pm 3.38$  (36-45)  $\mu\text{m}$ ; Rex =  $35.5 \pm 1.7$  (34-39); a =  $22.7 \pm 1.8$  (20.4-24.8); c =  $14.9 \pm 1.37$  (12.9-17.2).

**4th stage juvenile** (n = 1): L = 385  $\mu\text{m}$ ; greatest body diameter = 35  $\mu\text{m}$ ; length of stylet = 76  $\mu\text{m}$ ; length of stylet shaft = 18  $\mu\text{m}$ ; height of stylet knobs = 4  $\mu\text{m}$ ; width of stylet knobs = 10  $\mu\text{m}$ ; width of head = 13  $\mu\text{m}$ ; length of oesophagus = 115  $\mu\text{m}$ ; a = 11; b = 3.35.

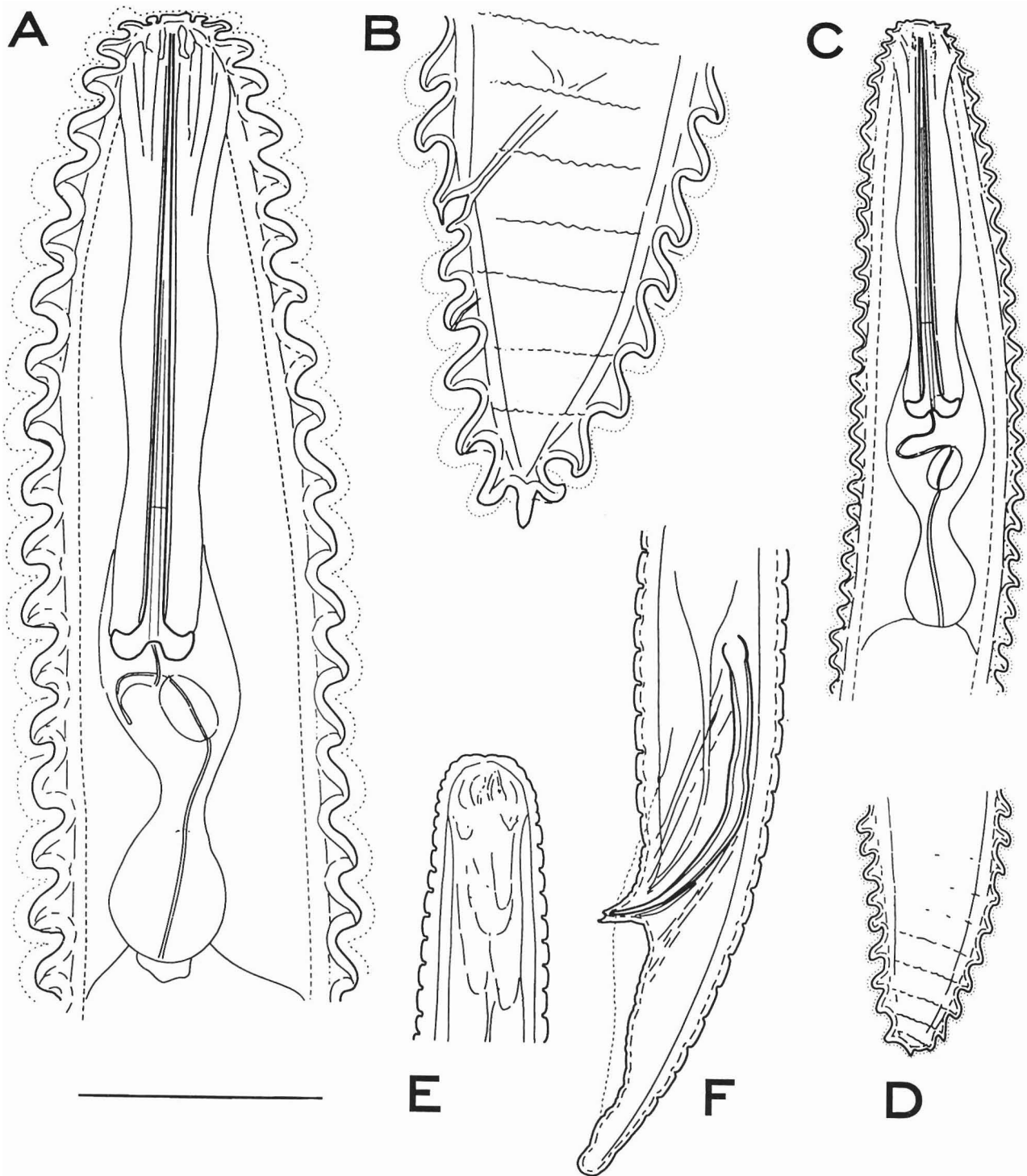
**3rd stage juveniles** (n = 5): L =  $263 \pm 5.2$  (260-272)  $\mu\text{m}$ ; greatest body diameter =  $28.6 \pm 1.14$  (27-30)  $\mu\text{m}$ ; length of stylet =  $63.4 \pm 2.4$  (60-66)  $\mu\text{m}$ ; length of stylet shaft = 15  $\mu\text{m}$ ; height of stylet knobs =  $3.6 \pm 0.55$  (3-4)  $\mu\text{m}$ ; width of stylet knobs =  $8.8 \pm 0.45$  (8-9)  $\mu\text{m}$ ; width of head =  $9.8 \pm 0.84$  (9-11)  $\mu\text{m}$ ; length of oesophagus =  $101 \pm 2.6$  (97-104)  $\mu\text{m}$ ; R =  $64.6 \pm 1.8$  (62-67); a =  $9.2 \pm 0.5$  (8.67-9.78); b =  $2.62 \pm 0.05$  (2.55-2.68).

**Female.** Body gently curved ventrad, rarely straight, tapering anteriorly from base of stylet and posteriorly from about one body width anterior to vulva. Lateral field absent. Labial region elevated above first lip ring, lip cap flat, surrounded by four distinct, about 2  $\mu\text{m}$  wide, submedian lobes. First head annule thin with edges turned laterally or posteriorly, rarely anteriorly, finely crenate, not set off from rest of body. Second head annule and body annules similar in size, retrorse. Average width of body annules at midbody 10.7 (9.5-11)  $\mu\text{m}$ . On anterior part of body posterior edge of annules smooth, from midbody gradually becoming crenate, distinctly crenate in postvulval region. Anastomosis of annules

observed only in cephalic region of one female. Body, including lip region, surrounded by a 2-3  $\mu\text{m}$  thick hyaline sheet. Stylet and shaft of the stylet long and robust, rigid, stylet knobs very wide, broadly anchor shaped, deeply concave posteriorly. Excretory pore clearly visible in all specimens, located on the anterior face of annule. Spermatheca ventral, spherical to oval, offset, filled with sperm about 2  $\mu\text{m}$  in size. Vulva open. Vulval opening at the lateral sides covered with long thorn-like extension of the anterior vulval lip. These extensions make the anterior lip distinctly larger than the posterior vulval lip. Vulva not protruding from body outline. Vagina almost straight. Anus located on posterior side of top of second annule posterior to vulva. Tail annules not distinct from body annules. Tail terminus conical, generally not retracted. Tail annules few, even when fully extended, giving the tail a blunt contour.

**Male.** Body anteriorly almost straight to slightly curved, tapering anteriorly from midbody and posteriorly from level of anterior end of spicules, tail curved ventrad. Hyaline layer lacking. Body annules distinct, generally widest (5-6.5  $\mu\text{m}$ ) dorsally on posterior half of body; on ventral side of tail generally irregular and narrower. Head dome shaped, with 6-8 annules, truncate anteriorly, in many of the specimens set off by a distinct groove, wider than high, annulation narrower than on rest of body. Four curved, 6-8  $\mu\text{m}$  long structures, resembling sclerotisation, distinguish the head. Stylet lacking. Oesophagus vestigial, its junction with the intestine obscure. Excretory pore distinct in all specimens, usually located between annules. Hemizonid one or two annules anterior to excretory pore, observed in few specimens only. Spicules paired, slender, distinctly cephalate proximally, pointed distally, generally straight anteriorly, strongly curved posteriorly. Gubernaculum gently curved. Testis filled with sperm, not extended beyond midbody. Caudal alae present, developing from ventral incisure of the lateral field at level of anterior end of spicules and extending to tail terminus, smooth. Lateral field 6-8  $\mu\text{m}$  wide at midbody (25-30% of corresponding body width), protruding from body contour, with 4 equidistant incisures. Tail short with conical terminus, terminus blunt. Anus large, cloacal tube distinctly protruding, with fine, short anterior and long posterior process.

**Juvenile.** One of the six juveniles present was significantly larger than the others. This specimen is considered a fourth stage juvenile while the others are considered third stage juveniles. Their dimensions are presented separately. In general morphology and number of body annules the two stages are identical. Body gently curved ventrad, tapering anteriorly from



**Fig. 1.** *Mesocriconema hymenophorum* sp. n. A, B: Female. A: Oesophageal region; B: Posterior area. C, D: Juvenile. C: Oesophageal region; D: Posterior region. E, F, Male. E: Anterior region; F: Posterior region. Scale bar - 40  $\mu$ m.

base of stylet and posteriorly over a similar length. Head truncate. Lip region slightly elevated, with lip cap and very small labial lobes. Lateral edge of first lip annule crenate, thin, turned anteriad. Body an-

nules retrorse on posterior part of body, posterior edge of body annules crenate, more distinct posteriorly, especially obvious on fourth stage juvenile. Whole body covered with transparent sheet which

may be somewhat detached anteriorly and posteriorly. Stylet slender, somewhat curved in most specimens, knobs robust, wide, anchor-shaped. Oesophagus typical for the family. Excretory pore and anus not observed. Last tail annules not extended, tail blunt.

**Type material.** Holotype and 79 paratypes from type locality, coll. D. Sturhan, 24 September, 1982, distributed as follows: German Nematode Collection, Biologische Bundesanstalt, Münster (holotype, 3 female, 41 male and 6 juvenile paratypes on slides DNST 27/15/1-8); Nematode Collection, Agricultural University, Wageningen, the Netherlands (1 female, 12 male paratypes); Nematology Department, University of California, Davis, U.S.A. (1 female, 15 male paratypes).

**Type locality and hosts.** Germany, Elmstein, Pfälzer Wald, 1 km NW of village (UTM grid MV 26); *Picea abies* (L.) forest on slope, with young *Fagus sylvatica* L., *Vaccinium myrtillus* L. and grasses; loamy sand. *Mesocriconema xenoplax* (Raski, 1952) Loof, 1989 present in same soil sample.

**Differential diagnosis.** *Mesocriconema hymenophorum* sp. n. is a typical *Mesocriconema* in that it has distinct submedian lobes in the labial region, an open vulva, and in the juveniles the posterior edges of the annules are without ornamentation. *Mesocriconema hymenophorum* sp. n. is characterised by the presence of a thin cuticular sheet which surrounds the female body. It shares this character with *M. axeste*, *M. basili* and *M. longistyletum*. It can be easily distinguished from *M. axeste* and *M. basili* by the long stylet (94-105  $\mu\text{m}$  vs 51-60  $\mu\text{m}$  and 68-74  $\mu\text{m}$ ), but is very similar to *M. longistyletum*. It differs from *M. longistyletum* by the relatively small, vs very large,

submedian lobes; a straight, vs. sigmoid, vagina; a postvulval region longer than the body width at the level of the vulva ( $VL/VB > 1$  vs  $VL/VB < 1$ ); longer tail ( $c = 21$  vs 42); crenate, vs smooth, posterior edge of the annules on the posterior part of the body; and a distinctly lobed, vs smooth, anterior vulval lip. *Mesocriconema hymenophorum* also closely resembles *M. incrassatum* Raski & Golden, 1965 in the configuration of the lip region, stylet length, robust stylet knobs, position of the vulva, number of annules on the body and in the postvulval area, and the shape of the tail. It differs from this species by the presence of a cuticular sheet, crenate (vs smooth) edges of the posterior body annules, and pronounced lateral lobes of the anterior vulval lip which almost completely cover the vulval opening (vs smooth).

## ACKNOWLEDGEMENTS

Funding for this work was provided by the Alexander von Humboldt Foundation, the New Zealand/Federal Republic of Germany Scientific and Technological Cooperative Agreement Programme, and the N.Z. Foundation for Research, Science and Technology under contract nos C09617 and C09812

## REFERENCES

- Loof, P.A.A., Wouts, W.M. & Yeates, G.W. 1997. Criconematidae (Nematoda: Tylenchida) from the New Zealand region: genera *Mesocriconema*, *Criconema*, *Discocriconemella* and *Hemicriconemoides*. *New Zealand Journal of Zoology* 24: 123-151.
- Siddiqi, M.R. 1986. *Tylenchida. Parasites of Plants and Insects*. Wallingford, U.K., CAB International. 645 pp.
- Wu, L.Y. 1964. *Criconema bakeri* n. sp. (Criconematidae: Nematoda). *Canadian Journal of Zoology* 42: 53-57.

---

Wouts W.M., Sturhan D. *Mesocriconema hymenophorum* sp. n. (Nematoda: Criconematidae) из лесных почв Германии.

**Резюме.** Представители нового вида *Mesocriconema hymenophorum* sp. n. были обнаружены в Германии в пробах почвы из смешанного леса с преобладанием ели. Новый вид характеризуется явственным гиалиновым покровом по всему телу, который был ранее описан также у *M. axeste*, *M. basili* и *M. longistyletum*. Новый вид отличается от *M. axeste*, *M. basili* наличием более длинного стилета у самок (соответственно, 94-105 мкм против 51-60 мкм и 68-74 мкм) и от *M. longistyletum* сравнительно меньшими субмедиальными долями губной области, а также - прямой не сигмовидной вагиной.

---