

The importance of intraespecific variation in the taxonomy of marine nematodes: The case of *Terschellingia longispiculata* Wieser & Hopper 1967 (*Nematoda, Linhomoeidae*)*

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SUMMARY: In the present study, the priority of taxonomic characters of cephalic region of *Terschellingia longispiculata* over those of the tail and reproductive system is discussed. Four morphological varieties of the species are established based on variations of the tail and reproductive system. The problem of considering only changes in the posterior region for determination of some species is posed. From this, studies on important populations must be done for the establishment of new species based on one of these characters, but taken together with characters in other regions such as the cephalic.

Key words: Marine, Nematodes, Taxonomy, Intraespecific, Variability.

RESUMEN: En el presente trabajo se discute la prioridad de los caracteres taxonómicos de la región cefálica de *Terschellingia longispiculata* respecto a los del sistema reproductor y la cola. En base a la variabilidad de estos dos últimos, se establecen cuatro variedades morfológicas de la especie. Asimismo, se plantea el problema de considerar tan sólo la región caudal para la determinación de algunas especies, y la necesidad de trabajar con poblaciones importantes al establecer especies nuevas en base a estos caracteres siempre que exista una total semejanza respecto a los de otra región, como la cefálica.

Palabras clave: Nematodos, marinos, taxonomía, variabilidad intraespecífica.

INTRODUCTION

The most important taxonomic characters of marine nematodes are to be found in the cephalic region (stoma and sense organs), the reproductive system and the tail region. The species are determined by the overall assembly of these taxonomic characters. However, variations of the characters of only one region have frequently been used for species discrimination. This procedure can produce important error especially if the morphological variability of the other two regions is not significant. Problems rise when taxono-

mic criteria of a species must be established with different characters in only one of the body regions.

Linhomoeidae are characterized by great variability in the number of labial and cephalic setae, and in the bucal cavity shape (WIESER 1956, GERLACH 1963, HENDELBERG 1978). All these characters seem to be more important than those of the posterior regions. This study attempts to establish the taxonomic priority of cephalic characters of *Terschellingia longispiculata* WIESER & HOPPER 1967, over spicula shape and tail length. These shape and length variations produce four morphological variants in males of this species (two spicula shapes and two tail lengths), and two in females and juveniles (two tail lengths); the cephalic

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region (setae, bucal cavity and amphids) is more uniform. This variability is neither corroborated in the holotype description (WIESER & HOPPER, 1967), in Florida, nor in the citation of JUARIO (1975) in the North Sea.

MATERIAL AND METHODS

Specimens were collected from sandy and muddy shallow zones in Alfacs Bay (Ebre Delta, western Mediterranean). During July 1987, sediment samples were collected using plastic cores (0-4 cm and 4-8 cm depth), and preserved in buffered formalin (10 % v:v of a 40 % formaldehyde solution).

RESULTS

Description of varieties

VARIETY 1 (Fig. 1a, b, c). Simple arched spicules. Long tail.

Material studied (only males): 7.

Locality: Alfacs Bay (Ebre Delta, western Mediterranean), 0.5-6 m depth, sandy and muddy zones (22.52 %-97.50 % silt + clay), upper and lower layers of sediment. July 1987.

Measurements

Males: L = 2.5mm. a = 28.05 b = 12.34
c = 6.29.

Cephalic diameter 47.8 μ ; cephalic setae 7.4 μ ; bucal cavity diameter 8.8 μ ; amphids-anterior end 8.4 μ ; amphid length 9.13 μ ; amphid width 11 μ (23 % of corresponding body diameter); excretory pore-anterior end 121 μ ; oesophagus length 202.5 μ ; oesophagus bulb length 59.4 μ ; oesophagus bulb width 27 μ ; maximum diameter 89.1 μ ; spicule length 121 μ ; gubernaculum length 28.6 μ ; tail length 397 μ (5.75 anal diameters).

Description

Body large. Cuticle with fine and inconspicuous striations. Only one circle of six labial setae, like papillae; four long cephalic setae and two circles of four cervical setae. Bucal cavity small and narrow. Circular amphids (1/4 of cephalic diameter) less marked. Oesophagus thick and short, with a bulb. Excretory gland strongly marked, chitinized, with a external protuberance. Elongated and arched spicules (1.75

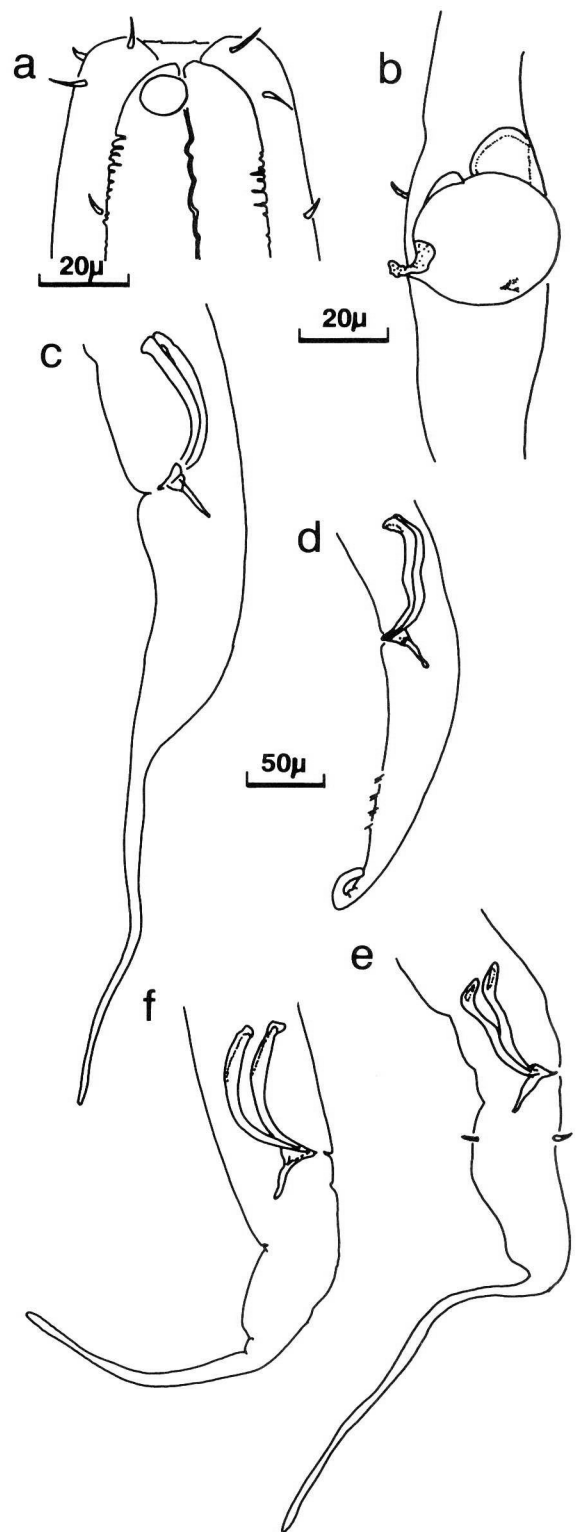


FIG. 1. — *Terschellingia longispiculata*
a: Variety 1, male, cephalic region.
b: Variety 4, male, excretory porus.
c: Variety 1, male, posterior end.
d: Variety 2, male, posterior end.
e: Variety 3, male, posterior end.
f: Variety 4, male, posterior end.

anal diameters). Gubernaculum with thin posterior apophysis. Without supplements. Tail filiform, with some terminal setae.

VARIETY 2 (Fig. 1d). Double arched spicules. Short tail.

Material studied (only males): 4.

Locality: Alfacs Bay (Ebre Delta, western Mediterranean) 0.5-2 m depth, sandy and muddy zones (22.52 %-45.20 % silt + clay), upper layer of sediment. July 1987.

Measurements

Males: $L = 2.12\text{mm}$. $a = 38.30$ $b = 10.90$
 $c = 10.19$.

Cephalic diameter 35.2μ ; cephalic setae 8.8μ ; amphid width 10.12μ (28.75 % of corresponding body diameter); excretory pore-anterior end 100μ ; oesophagus bulb length 59.4μ ; maximum diameter 55.35μ ; spicule length 100μ ; gubernaculum length 22.65μ ; tail length 208μ (4.54 anal diameters).

Description

Similar to Variety 1 except in: Double arched spicules. Apophysis of gubernaculum shorter than Var. 1. Tail conical with some setae and with a smooth distal enlargement.

VARIETY 3 (Fig. 1e). Double arched spicules. Long tail. Material studied (only males): 3.

Locality: Alfacs Bay (Ebre Delta, western Mediterranean), 0.5-6 m. depth, sandy and muddy zone (22.52 %-94.23 % silt + clay), upper layer of sediment. July 1987.

Measurements

Males: $L = 2.35\text{mm}$. $a = 34.81$ $b = 11.76$
 $c = 6.03$.

Cephalic diameter 36.52μ ; cephalic setae 8.8μ ; amphid width 11μ (38.12 % of corresponding body diameter); excretory pore-anterior end 98.55μ ; oesophagus length 200μ ; oesophagus bulb length 59.4μ ; maximum diameter 67.5μ ; spicule length 94.5μ ; gubernaculum length 33μ ; tail length 386.6μ (7.14 anal diameters).

Description

Similar to Variety 1 except in: Double arched spicules.

VARIETY 4 (Fig. 1f). Simple arched spicules. Short tail.

Material studied (only males): 4.

Locality: Alfacs Bay (Ebre Delta, western Mediterranean), 0.5-2 m. depth, sandy and muddy zone (22.52 %-97.9 % silt + clay), upper and lower layers of sediment. July 1987.

Measurements

Males: $L = 2.3\text{mm}$. $a = 25.90$ $b = 13.20$
 $c = 7.66$.

Cephalic diameter 42.9μ ; cephalic setae 8.8μ ; amphids-anterior end 6.38μ ; amphids width 11μ (25.6 % of corresponding body diameter); excretory pore-anterior end 89.1μ ; oesophagus length 174.15μ ; oesophagus bulb length 54μ ; maximum diameter 88.8μ ; spicule length 124.2μ ; gubernaculum length 29.7μ ; tail length 300μ (4.72 anal diameters).

Description

Very similar to Variety 1, but with a shorter conical and thin tail.

Females and juveniles

Two variants can be observed: tail short or long, with some intermediate lengths. Females vulva is 45-48 % of total body length.

Females: short tail, 10; long tail, 31.

Juveniles: short tail, 8; long tail, 15.

DISCUSSION

The taxonomic importance of the spicular system and tail and their variations in *Terschellingia longispiculata* have been considered to fall within the species, due to the uniformity of the cephalic region. Linhomoeidae present in this region a great variability in the presence of one or two labial setae circles (morphology of DE CONINCK 1942, 1965 and COOMANS 1979) and in cephalic and subcephalic setae. Because the cephalic structure is constant, all of the individuals studied seem to be of the same specie despite variations in the posterior end. The different tail length, especially in females and juveniles, show that tail variability is not extreme. Also, spicule only differs in the shape between the four male varieties (double or simple arched); spicule length and gubernaculum are similar. All varieties are present in different sedimentary environments in Alfacs Bay; the

four male varieties were found in a shallow water sample while in a muddy and deeper sample (2 meters) sited on the slope, only males of variety 2 and short tailed females and juveniles were found. Since all the varieties of *Terschellingia longispiculata* males were found in the same habitat, it can be concluded that changes in the tail region are not definitive in the taxonomy of this species. This case could be a problem when considering only changes in the posterior end region for determination of some species. From this, studies on important populations must be done to establishment of new species, based on one of these characters (tail variations and spicule) but combined with observations of characters in other regions such as the cephalic, because those changes could demonstrate intra-specific variability.

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REFERENCES

- COOMANS, A. — 1979. The anterior sensilia of Nematodes. *Revue Nématol.*, 2(2): 259-283.
- DE CONINCK, L. A. P. — 1942. De symmetrie-verhoudingen aan het vooreinde der vrijlevende nematoden. *Natuurw. Tijdschr.*, 24: 29-68.
- 1965. Classe des Nématodes. In: P. P. Grassé (ed.): *Traité de Zoologie*. Vol. 4 (2) Némathelminthes, pp. 1-217. Masson & cie., Paris.
- GERLACH, S. A. — 1963. Über freilebende Meeresnematoden. Revision der Linhomoeidae. *Zool. Jb. (Syst.)*, 90: 599-658.
- HENDELBERG, M. — 1978. Occurrence and taxonomical significance of additional cephalic setae in some Linhomoeidae (Nematoda). *Annales Soc. r. Zool. Belg.*, 108 (1-2): 57-64.
- JUARIO, J. V. — 1975. Nematode species composition and seasonal fluctuation of a sublittoral meiofauna community in the German Bight. *Veroff. Inst. Meeresforsch. Bremerh.* 15 (4): 283-337.
- WIESER, W. — 1956. Free living marine nematodes III. Axonolaimoidea and Monhysteroidea. (Reports 26). *Acta Univ. Lund (N.F.2)* 52 (13): 1-115.
- WIESER, W., B. HOPPER. — 1967. Marine Nematodes of the east coast of North America. I Florida. *Bull. Mus. Comp. Zool. Harv.* 135 (5): 239-344.
- Scient. ed. J. M. Gili.