

Lenonchium fimbricaudatum n. sp. from South Africa, with a key to the species of *Lenonchium* (Nematoda : Nordiidae)

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SUMMARY

Lenonchium fimbricaudatum n. sp. was collected from wet sand on the banks of the Sabie River in the Kruger National Park, South Africa. It resembles *L. longidens* (Furstenberg & Heyns, 1966) Jairajpuri, 1967 but differs from that species mainly in the possession of a hyaline tail tip, occupying 18-30 % of the tail length. Furthermore, the tail and spicules are shorter in *L. fimbricaudatum* n. sp. than in *L. longidens* and the nerve ring is more anteriorly situated. Some interesting morphological features of *L. fimbricaudatum* n. sp., i.a. the structure of the supplements and the tail tip with four mucro's are presented on scanning electron micrographs. As a result of the present study, we regard *L. denticaudatum* (Imamura, 1931) Siddiqi, 1969 as a valid species. A dichotomous key is given for the five recognised species of *Lenonchium*.

RÉSUMÉ

Lenonchium fimbricaudatum n. sp. provenant d'Afrique du Sud et clé des espèces du genre *Lenonchium* (Nematoda : Nordiidae)

Lenonchium fimbricaudatum n. sp. a été collecté dans le sable humide, au bord de la rivière Sabie, Parc National Kruger, Afrique du Sud. Il ressemble à *L. longidens* (Furstenberg & Heyns, 1966) Jairajpuri, 1967 dont il diffère par la présence d'une extrémité hyaline occupant 18 à 30 % de la longueur de la queue. De plus, la queue et les spicules sont plus courts chez *Lenonchium fimbricaudatum* n. sp. que chez *L. longidens* et l'anneau nerveux y est situé plus antérieurement. Quelques caractères morphologiques particuliers de *Lenonchium fimbricaudatum* n. sp. — structure des suppléments; extrémité caudale comportant quatre mucrons — sont illustrés au MEB. La présente étude conduit à considérer *L. denticaudatum* (Imamura, 1931) Siddiqi, 1969 comme une espèce valide. Une clé dichotomique des cinq espèces reconnues de *Lenonchium* est proposée.

The genus *Lenonchium* was proposed by Siddiqi (1965) to receive a new species of Dorylaimidae, *Lenonchium oryzae*, which has a linear odontostyle with small aperture, a rod-like odontophore with slightly swollen base, filiform tails in both sexes, a transverse vulva and an amphidelphic reproductive system. Jairajpuri (1967) gave additional data on *L. oryzae*, and transferred *Dorylaimoides longidens* Furstenberg & Heyns, 1966 to *Lenonchium*. *Dorylaimus denticaudatus* Imamura, 1931 was later also transferred to this genus by Siddiqi (1969). Ahmad and Jairajpuri (1988) emended the diagnosis of the genus *Lenonchium* and added a new species, *L. macrorodum*. They regarded *L. denticaudatum* as a *species inquirenda* and considered its position in *Lenonchium* as doubtful. We tend to disagree with this viewpoint as some unusual features described by Imamura (1931) — i.a. caudal glands and "sharp points" on the tail terminus — agree well with features found in the new species herein described as *Lenonchium fimbricaudatum* n. sp.. The genus *Lenonchium* is therefore represented at the moment by five species: *L. oryzae*, *L. longidens*, *L. macrorodum*, *L. denticaudatum* and *L. fimbricaudatum*.

Specimens were extracted by a modified sieving-sedimentation method (Loubser, 1985), killed by gentle

heat, fixed in FAA, processed into glycerine by Thorne's slow method and mounted on Cobb double coverslip slides. All descriptions, measurements and drawings were made with the aid of a Zeiss Standard 18 research microscope equipped with a drawing tube. The body and all curved structures were measured along the median line.

For SEM study mounted nematodes were slowly hydrated to distilled water and post-fixed in 1 % osmium tetroxide. They were critical point dried, sputter coated with gold (30 nm) and viewed with an ISI SS 60 scanning electronmicroscope at 6 kV.

Lenonchium fimbricaudatum n. sp. (Figs 1 & 2)

MEASUREMENTS

See Table 1.

DESCRIPTION

Female : Body moderately curved ventrad when heat-relaxed. Cuticle finely striated, subcuticle slightly

Table 1

Morphometrical data of *Lenonchium fimbriicaudatum* n. sp.

	Holotype	Paratypes (♀) n = 25	Standard Deviation	Paratypes (♂) n = 8	Standard Deviation
L (mm)	6.2	5.6 (4.9-6.7)	0.5	5.7 (4.8-6.5)	0.6
a	103.4	91.1 (76.5-111.3)	9.1	91.3 (79.3-105.9)	10.6
b	11.8	11.1 (9.6-12.0)	0.8	11.6 (9.5-13)	1.2
c	28	28.4 (23.7-36.6)	3.2	34.2 (24-38.3)	4.7
c'	5.6	5 (3.9-6.1)	0.6	3.8 (3.3-4.4)	0.4
Tail length (µm)	220	200 (170-237)	20.7	169.6 (147.5-198)	20.2
Oesophagus length (µm)	520	502.5 (445-555)	26.3	496 (430-555)	49.2
Anterior to nerve ring (µm)	140	134.6 (123-141.5)	8.5	140.8 (133-147)	5.1
Head height (µm)	6.0	6.6 (6-8)	0.7	6.4 (5.5-7)	0.6
Head width (µm)	14	14.4 (13.1-16)	0.7	14.6 (13-16)	1.0
Odontostyle length (µm)	30	30.9 (29-33.5)	1.0	31.1 (30-34)	1.6
Odontophore length (µm)	30	30.4 (28-33)	1.8	29.9 (26.5-32)	1.6
Total spear length (µm)	60.5	61.3 (54.5-64.5)	2.0	60.5 (56.5-64)	2.3
Anterior to guide ring (µm)	19	17.6 (15.8-19.5)	1.1	17.6 (17-20)	1.1
Thickness of cuticle (µm)	2.4	2.3 (2-3)	0.4	2.2 (2-2.5)	0.2
V (%)	48.4	45.0 (41.8-48.1)	1.9		
OV ₁ (%)	28.6	25.2 (20.1-32.4)	3.9		
OV ₂ (%)	61.7	63.8 (56.2-69.3)	4.0		
T (%)				34.4 (30.8-37.8)	2.6
Spicules length (µm)				73.6 (69-76)	2.4
Lateral guiding pieces length (µm)				16.4 (11.5-20.5)	2.6
Number of supplements				24 (21-26)	1.7

loose. Cuticle with minute radial striae, becoming more prominent towards tail region. Radial dots prominent, arranged in fine rows in anterior region, becoming randomly spaced posteriorly. Lip region slightly offset unevenly striated. Cephalic papillae morphologically different from labial papillae. Lip region about 6.6 µm high and 14.4 µm wide. Amphid aperture a wide slit; amphid stirrup-shaped, no supportive structures evident. Odontostyle 29-33.5 µm long, slightly curved with small aperture. Odontophore equal to or slightly less than odontostyle in length (28-33 µm). Guiding ring single, appearing double when stylet is extended, about 17.6 µm from anterior end. Oesophagus with swelling around posterior half of odontophore, followed by a constriction, then widening again. Basal expansion occupying about 60 % of total oesophagus length. The approximate positions of the oesophageal gland nuclei as percentage of oesophagus length, are the following : DN = 43 %; S₁N₁ = 58 %; S₁N₂ = 64 %; S₂N₁ & S₂N₂ = 82 %. Gland orifices obscure. Nerve ring about 134 µm or three body widths from anterior end. Hemizonid-like structure opposite nerve ring on ventral side of body. Small tube in same vicinity (vestigial excretory pore or extremely prominent ventral pore?). Cardia about 21 µm long and 15 µm wide. Prerectum about 115 µm or three anal body widths long. Rectum about

one anal body width long, obscured by five to six rectal glands. Tail approximately 200 µm or five anal body widths long, filiform, striated to very tip. Tail tip appearing jagged under light microscope, but in SEM micrograph seen to have four fingerlike projections or mucro's. Glandular cells, resembling caudal glands, present in tail. Ducts of these glands terminating halfway down tail length. Hyaline portion in tail tip occupying about 18-30 % of tail length. Reproductive system didelphic, amphidelphic. Uterus well-developed, usually packed with spermatozoa, especially in proximal half. Sphincter six to eight body widths from vulva. Ovaries well-developed, reflexed for about nine body widths. From one to four eggs in each uterus, eggs 104-142 µm in length with shell 4-7 µm thick. Vulva seems to be a short, longitudinal oval aperture with heavily sclerotized lips and with small punctations covering the sclerotized region.

Male : Description as for female with the following differences. Ventral curvature of body more pronounced in posterior half, especially in tail region. Tail 145.5-198 µm long, shorter than that of female. Hyaline tip of tail occupying 25-30 % of tail length. Three to five ejaculatory glands observed in tail region. Prerectum about 124 µm or three anal body widths long. Reproductive system diorchic, one testis anteriorly directed, the

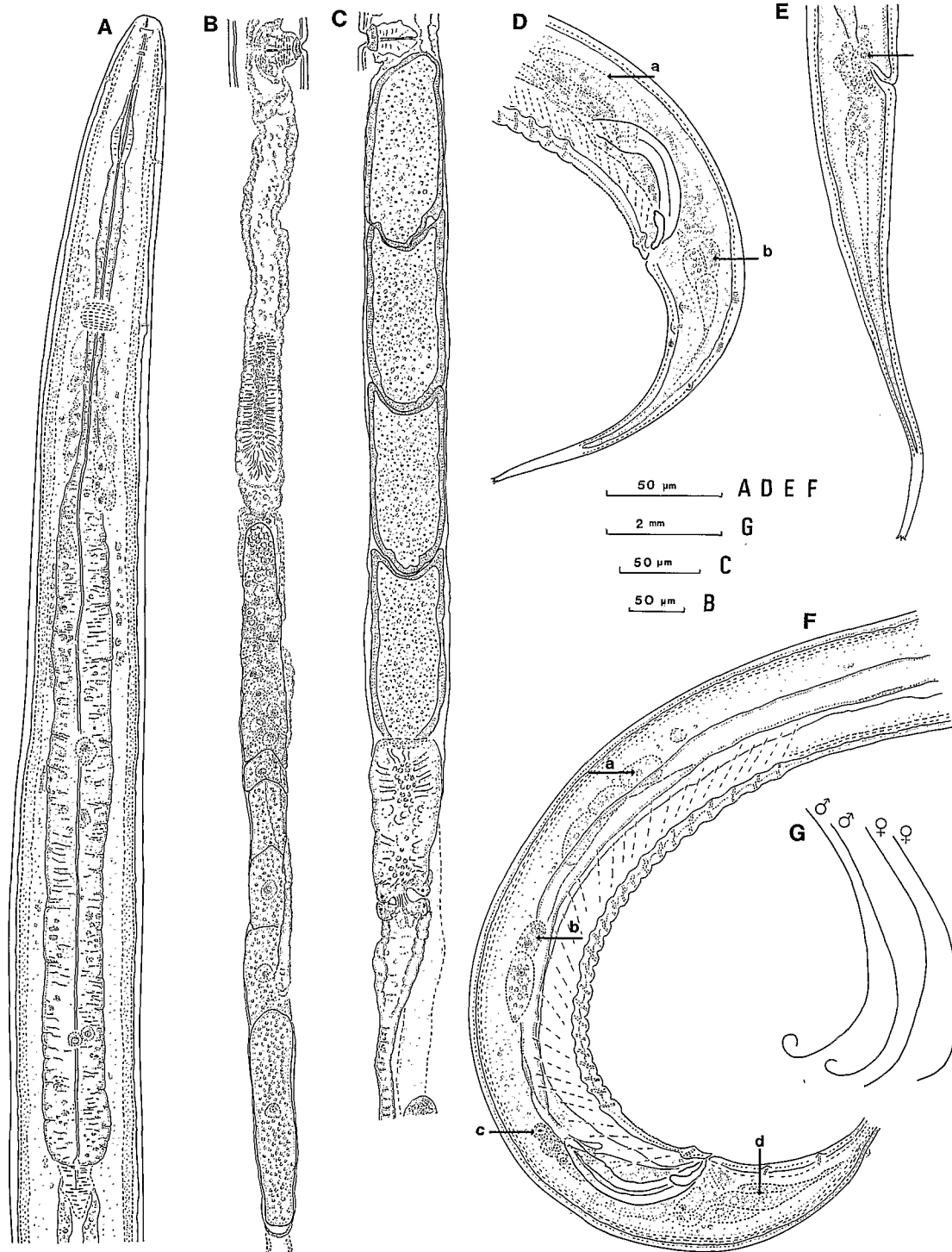


Fig. 1. *Lenonchium fimbriicaudatum* n. sp. A : Anterior region of female; B : Female reproductive system; C : Female reproductive system with four eggs; D : Male tail (arrow a indicates rectal glands; arrow b indicates cells resembling caudal glands); E : Female tail (arrow indicates rectal glands); F : Male tail (arrow a and b indicate ejaculatory glands; arrow c, rectal glands; arrow d, cells resembling caudal glands); G : Heat-relaxed body posture.

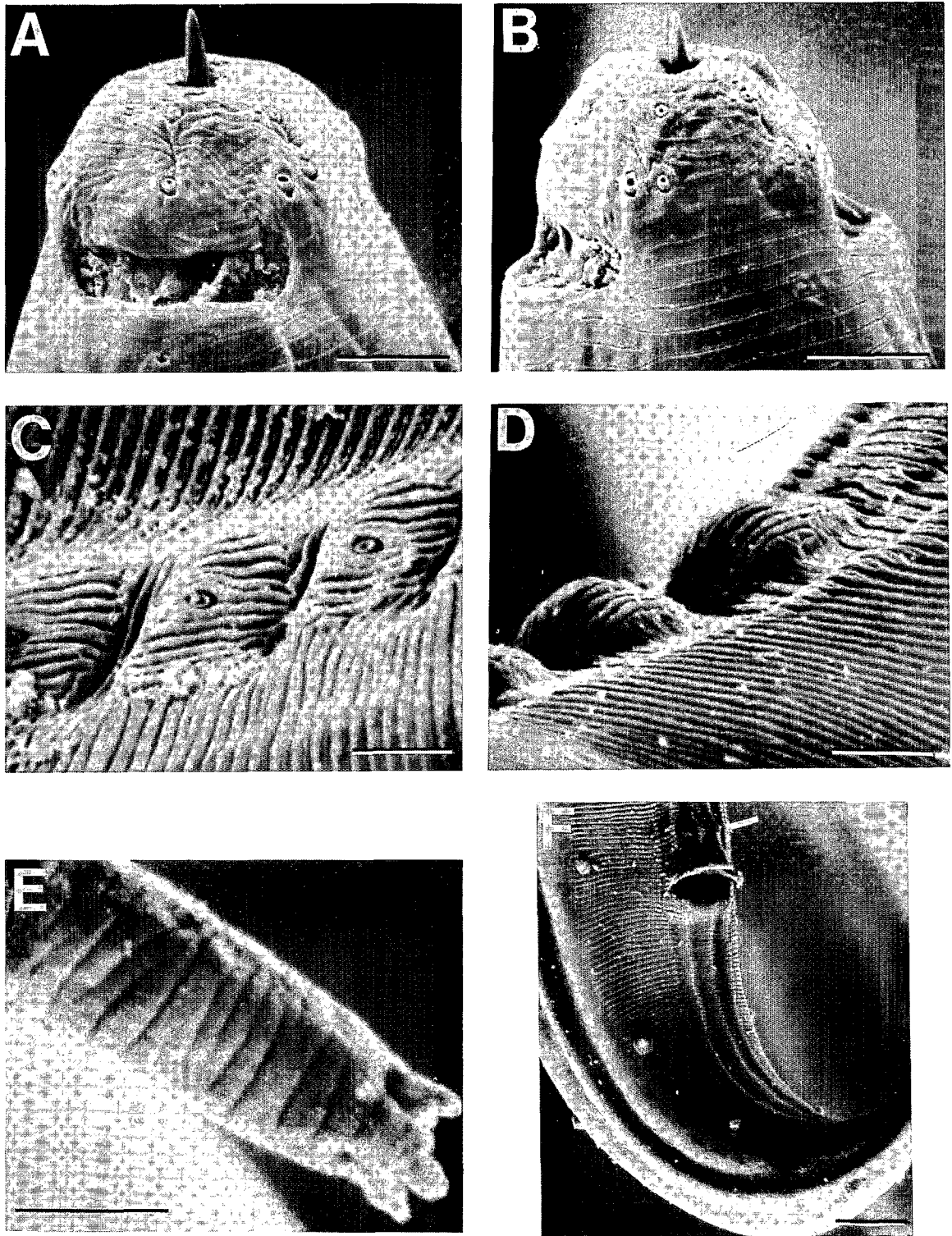


Fig. 2. *Lenonchium fimbricaudatum* n. sp. A : Head of female (lateral view); B : Head of male (ventral view); C : Supplements; D : Supplements (side view); E : Tail tip of female; F : Male tail - region of cloacal opening (arrow indicates adanal pair of supplements). (Bar equivalents : A, B, F = 5 μ m; C, D = 1 μ m; E = 0.1 μ m.)

other reflexed backwards with common spermoduct. Spermoduct lateral to intestine, no muscular ejaculatory duct present. Spermoduct seems to merge with the intestine about 46 µm anterior to cloacal opening. Three to four rectal glands can be observed in the region of the spicules. The course of their ducts could not be followed in any of the specimens. The body musculature in the anal region is very pronounced in all males and many organs are obscured by them. Three pairs of prominent caudal papillae observed on either side of tail posterior of anus. The three pairs of papillae are respectively at the following approximate distances posterior of cloacal opening : first subventral pair at 6-15 µm; second subventral pair at 25-34 µm and subdorsal pair at 31-54 µm. One subventral papilla present on either side just anterior of cloacal opening. Supplements consisting of an adanal pair, 4-10 µm anterior of cloacal opening, and 21-26 ventromedian ones in a contiguous series ending 45-55 µm from the adanal pair. Adanal pair consisting of simple, elevated papillae while the ventromedian supplements each consists of an elevated papilla surrounded by longitudinal ridges. The supplements are situated in a differentiated area with prominent striae extending from the anteriormost supplement, beyond the cloacal opening for 20 % of the tail length. [This area may be the same as that mentioned by Imamura (1931) in *L. denticaudatus* as "a peculiar postanal ventromedian cuticular rib, which is about as long as the central thickening of the spicules."] Spicules 69-76 µm long, well developed. Lateral guiding pieces also well-developed, 11-20 µm long.

TYPE HABITAT AND LOCALITY

Wet sand on banks of Sabie River, about 10 km from Skukuza Rest Camp, under *Phragmites* species. Collected on 3 September 1989 by J. Heyns in the Kruger National Park, Transvaal, South Africa.

TYPE SPECIMENS

Holotype : Female on slide RAU 5101. *Paratypes* : 18 females on slides RAU 5101-RAU 5106, RAU 5109, RAU 5110 and RAU 5112 and three males on slides RAU 5110 and RAU 5111. In addition specimens are deposited in the nematode collections of the following institutions : two females, one male and one juvenile on slide No. 24769 in the National Collection of the Plant Protection Research Institute (PPRI), Pretoria; one female, two males and two juveniles in the Instituut voor Dierkunde, Rijksuniversiteit Gent, Gent, Belgium; two females, one male and one juvenile in the Muséum national d'Histoire naturelle, Paris, France and two females and two males in the USDA, Beltsville, Md, USA.

DIAGNOSIS AND RELATIONSHIPS

Lenonchium fimbricaudatum has a linear odontostyle, a rod-like odontophore with a slightly swollen base and a long, filiform tail with hyaline portion and four finger-like projections or mucro's on the tail tip. The vulva is a longitudinal opening with sclerotized lips.

L. fimbricaudatum n. sp. is very similar to *L. longidens*, from which it differs in the following :

Female : Presence of a hyaline tail tip in *L. fimbricaudatum* against the absence of a hyaline tail tip in *L. longidens*, the shorter tail length (*L. fimbricaudatum* : 170-237 µm, compared to *L. longidens* : 230-270 µm) and the slightly shorter body length (*L. fimbricaudatum* : 4.9-6.7 mm, compared to *L. longidens* : 5.4-7.1 mm) *L. fimbricaudatum* can be distinguished from *L. oryzae*, *L. macrodorum* and *L. denticaudatum* mainly by its great body length (*L. fimbricaudatum* : 4.8-6.7 mm against *L. oryzae* : 2.2-2.9 mm, *L. macrodorum* : 2.5-3.3 mm and *L. denticaudatum* : 2.5-3.7 mm) and the presence of a large hyaline area in the tail tip.

Male : Presence of a hyaline tail tip in *L. fimbricaudatum* against no hyaline tail tip in *L. longidens*, the shorter tail length (*L. fimbricaudatum* : 147.5-198 µm compared to *L. longidens* : about 240 µm); the spicule length (*L. fimbricaudatum* : 69-76 µm against *L. longidens* : 82-97 µm) and the slightly shorter body length (*L. fimbricaudatum* : 4.8-6.5 mm against *L. longidens* : 5.3-7.1 mm).

Discussion

Examination of type specimens of *L. longidens* revealed the presence of four pairs of caudal papillae on the male tail, situated from 3 µm anterior of cloacal opening to about 54 µm posterior of the cloacal opening. It is interesting to note that what Furstenberg and Heyns (1966) interpreted as broken tails, are in fact the four projections of the tail tip, giving the impression under the light microscope, of a jagged, broken-off tip. The occurrence of a longitudinal vulva is apparently limited to the South African species, *L. longidens* and *L. fimbricaudatum*, being transverse in the other *Lenonchium* species.

L. fimbricaudatum is a typical member of the genus *Lenonchium*, bringing the number of species in this genus to five. The use of the SEM in this study lead to a better understanding of some features of *Lenonchium*, especially the morphology of the head, the cuticle, the supplements and the tail tip. This is also the first time that rectal and possibly caudal glands are described in this genus.

Key to species of *Lenonchium*

1. Body length greater than 4 mm 2
- Body length less than 4 mm 3

2. Tail with hyaline tip *L. fimbriicaudatum* n. sp.
Tail without hyaline tip *L. longidens*
3. Number of ventromedian supplements seventeen or less
..... *L. denticaudatum*
Number of ventromedian supplements more than seven-
teen 4
4. Odontostyle length less than 20 μm *L. oryzae*
Odontostyle length more than 30 μm *L. macrodorum*

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