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REVISION OF THE GENUS *LEPTOSOMATUM* BASTIAN, 1865 (NEMATODA: LEPTOSOMATIDAE)

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Abstract.—The available type-material of the species of *Leptosomatum*, has been studied and compared with the type-species of the genera *Leptosomatides* (*L. euxinus* Filipjev, 1918) and *Syringonomus* (*S. typicus* Hope and Murphy, 1959).

The character complex present in *L. elongatum*, the type-species of *Leptosomatum*, sharply distinguishes the species of *Leptosomatum* from the genus *Leptosomatides*, hitherto regarded as being related to *Leptosomatum*. Females of *Leptosomatides* can be distinguished from those of *Leptosomatum* by the presence of a strongly muscularized vagina wall, here termed the vaginal ovejector. The main distinguishing character is the presence of a sexual dimorphism in the amphids of *Leptosomatum*, which is absent in *Leptosomatides*.

The species of *Leptosomatum* can be grouped into three complexes: a) The monotypic complex *L. kerguelense* Platonova, 1958 (new synonyms: *L. clavatum* Platonova, 1958 partim, *L. crassicutis* Platonova, 1958, and *L. arcticum* sensu Mawson, 1958) characterized by the presence of a cephalic capsule in both sexes. b) The *L. bacillatum*-complex composed of *L. bacillatum* (Eberth, 1863) (new synonyms: *L. elongatum* Bastian, 1865, *L. filipjevi* Schuurmans Stekhoven, 1950, and *L. tuapsense* Sergeeva, 1973), *L. sachalinense* Platonova, 1978 (new synonym: *L. diversum* Platonova, 1978), *L. acephalatum* Chitwood, 1936 and probably *L. clavatum* Platonova, 1958 partim and *L. sundaense* n.sp. for *L. sabangense* sensu Micoletzky, 1930 nec Steiner, 1915. This complex is characterized by the presence of a cephalic capsule in juveniles and females, but not in males. c) The *L. punctatum*-complex with *L. punctatum* (Eberth, 1863) (new synonyms: *L. longisetosum* Schuurmans Stekhoven, 1943 and (?) *Stenolaimus macrosoma* Marion, 1870), and *L. keiense* Micoletzky, 1930. In this complex the cephalic capsule is absent in juveniles and adults.

More information is needed regarding the species *L. abyssale* Allgén, 1951; *L. bathybium* Allgén, 1954; *L. behringicum* Filipjev, 1916; *L. breviceps* Platonova, 1967; *L. groenlandicum* Allgén, 1954; *L. indicum* Stewart, 1914; *L. pedroense* Allgén, 1947; *L. sabangense* Steiner, 1915; *L. tetrophthalmum* Ssaweljev, 1912 and *L. sundaense* new name; pro *L. sabangense* sensu Micoletzky, 1930, they are considered species inquirendae.

Leptosomatum ranjhai Timm, 1960, and *L. micoletzkyi* Inglis, 1970, do not belong to *Leptosomatum* and are, for the moment, considered species incertae sedis.

L. caecum Ditlevsen, 1923 belongs to *Pseudocella*.

L. arcticum Filipjev, 1916; *L. elongatum* sensu Platonova, 1967; *L. gracile* sensu Allgén, 1954; *L. grebnickii* Filipjev, 1916 and *L. tetrophthalmum* sensu Platonova, 1967 are transferred to *Leptosomatides* Filipjev, 1918.

The genus *Leptosomatum* Bastian, 1865, which contains large-sized marine nematodes, was last revised by Filipjev (1918). Platonova (1976) published a key

Table 1.—Differential characteristics of type-species of *Leptosomatum* and *Leptosomatides*.

	<i>Leptosomatum elongatum</i>	<i>Leptosomatides euxinus</i>
Cephalic capsule	reduced in male; poorly developed in female. Posterior suture invisible	present; posterior suture visible
Sexual dimorphism in amphids	present	absent
Renette	restricted to females	wanting
Vulvar glands in lateral hypodermal chord	absent	present
Intra-cuticular vulvar granula	absent	present
Vaginal ovejector	absent	present
Atrophy of digestive system and muscles in males	present	absent
Ventromedian precloacal papillae	absent	present
Specialized subventral pre- and postcloacal sensilla	absent	present
Spicules	short and slender	robust
Gubernaculum	dorsal wall of spicule pouches slightly cuticularized	complex; crura and cuneus present
Copulatory musculature	not extensive	strongly developed
Metanemes	loxometanemes	ortho- and loxometanemes

came clearer. The turgor disappeared, resulting in longitudinal cuticular folds at both body ends.

The Separation of *Leptosomatum* and *Leptosomatides*

Leptosomatides euxinus Filipjev, 1918, and *Leptosomatum elongatum* Bastian, 1865, are the type-species of their genera. *Leptosomatum elongatum* sensu de Man, 1893 is without doubt identical with *L. elongatum* Bastian, 1865. Both type-species have been studied and compared. The two genera can be distinguished by the characters listed in Table 1.

One may wonder why Filipjev (1918) hesitated to transfer *L-um arcticum*² and *L-um grebnickii*, both described by him in 1916, to *Leptosomatides*. This may be explained in the following way. In 1912 Ssaweljev gave a poor description of a female, which read as follows:

“23. *Leptosomatum tetrophthalmum* n.sp. ♀—12.7; a = 60; b = 7; c = 75. Der Bau des Kopfendes ähnlich wie bei *Leptosomatum elongatum* Bastian, 1865 (de Man, 1893). Hinter den rotbraunen, kegelförmigen mit lichtbrechenden Körperchen versehenen Augen noch ein Paar heller Pigmentflecke, ähnlich wie bei den Enoplusarten. Nervenring am Ende des vorderen Oesophagusdrittels, Vulva am Ende des zweiten Körperdrittels. Querfasernschicht der Cutis am Vorderende zu sehen. Palaffjord, Mogilnojesees.”

² *L-um* and *L-ides* are used in this section as abbreviations for *Leptosomatum* and *Leptosomatides* respectively.

No original material of Ssaweljev (1912) is present in the collection of the Zoological Institute in Leningrad but it is plausible that Filipjev saw this female (Platonova pers. comm.). In the collection, a slide is present (number 5267 dated 12-IX-1915), from the same locality identified by Filipjev as *L-um tetrophthalmum* Ssaweljev, 1912. Beside this specimen, some females are present, labelled *L-um tetrophthalmum* dated 22-IX-1925, and females, without additional eye pigment, labelled as *L-um elongatum* Bastian, 1865; both identified by Filipjev and published by Platonova (1967).

All these specimens resemble *L-ides euxines* closely in the structure of the vulvar region. Assuming that the ovejector was characteristic for the type-species of *Leptosomatium*, Filipjev could not use it, to separate the two genera.

Re-study of *elongatum* sensu Platonova, 1967 (sensu Filipjev), revealed that Filipjev was in error regarding the identity of *L-um elongatum* sensu Bastian, 1865 and de Man, 1893. *L-um elongatum* sensu Filipjev and Platonova has all the characters diagnostic for females of the genus *Leptosomatides* as have *L-um tetrophthalmum*, *L-um arcticum* and *L-um grebnickii*. These characters are absent in *L-um elongatum* sensu de Man, 1893.

This means that *L-um tetrophthalmum* sensu Platonova, 1967; *L-um elongatum* sensu Platonova, 1967 nec Bastian, 1865; *L-um arcticum* Filipjev, 1916 nec Mawson, 1958 and *L-um grebnickii* Filipjev, 1916 belong to *Leptosomatides*. They will be discussed in another paper. *L-um arcticum* sensu Mawson, 1958 will be discussed under *L. kerguelense*.

No syntypes of *L-um tetrophthalmum* Ssaweljev, 1912, are present; it must be considered a species inquirenda.

Morphological Observations

In *L. bacillatum*, a cephalic capsule is present in females but not in males. De Man (1893) and Timm (1953) gave attention to this capsule in *L. elongatum* and the closely related *L. acephalatum* respectively. I will show that the reported difference between these two species, in structure of the cephalic capsule, does not really exist.

The supposed difference in head structure between *L. elongatum* sensu de Man, 1893 and *L. elongatum* subsp. *acephalatum* Chitwood, 1936 was the main reason for Timm (1953:230) to raise the latter to species level. For females of *L. acephalatum* Timm described "six pairs of fine sclerotized pieces, symmetrically arranged around the 'cap' of oesophageal tissue," which was presumed to be homologous to "un système de deux lignes chitineuses et très minces . . . et qui font défaut dans la région dorsale" as described by de Man (1893) in *L. elongatum*. This comparison is the result of an incorrect interpretation of de Man's paper; neither de Man's nor Timm's passage concerns the cephalic capsule.

De Man in fact described the anterior end of the ventrosublateral pharyngeal glands. He described the cephalic capsule as "une sorte de charpente chitineuse, radiairement symétrique et située à la périphérie, à laquelle s'insère évidemment l'extrémité antérieure de l'oesophage."

In whole mounts, the cephalic capsules seems to be a refractive structure that quickly disappears out of focus and, therefore, Mawson (1958) described sclerotized pieces in what she considers to be *L. arcticum* and Timm (1960) described

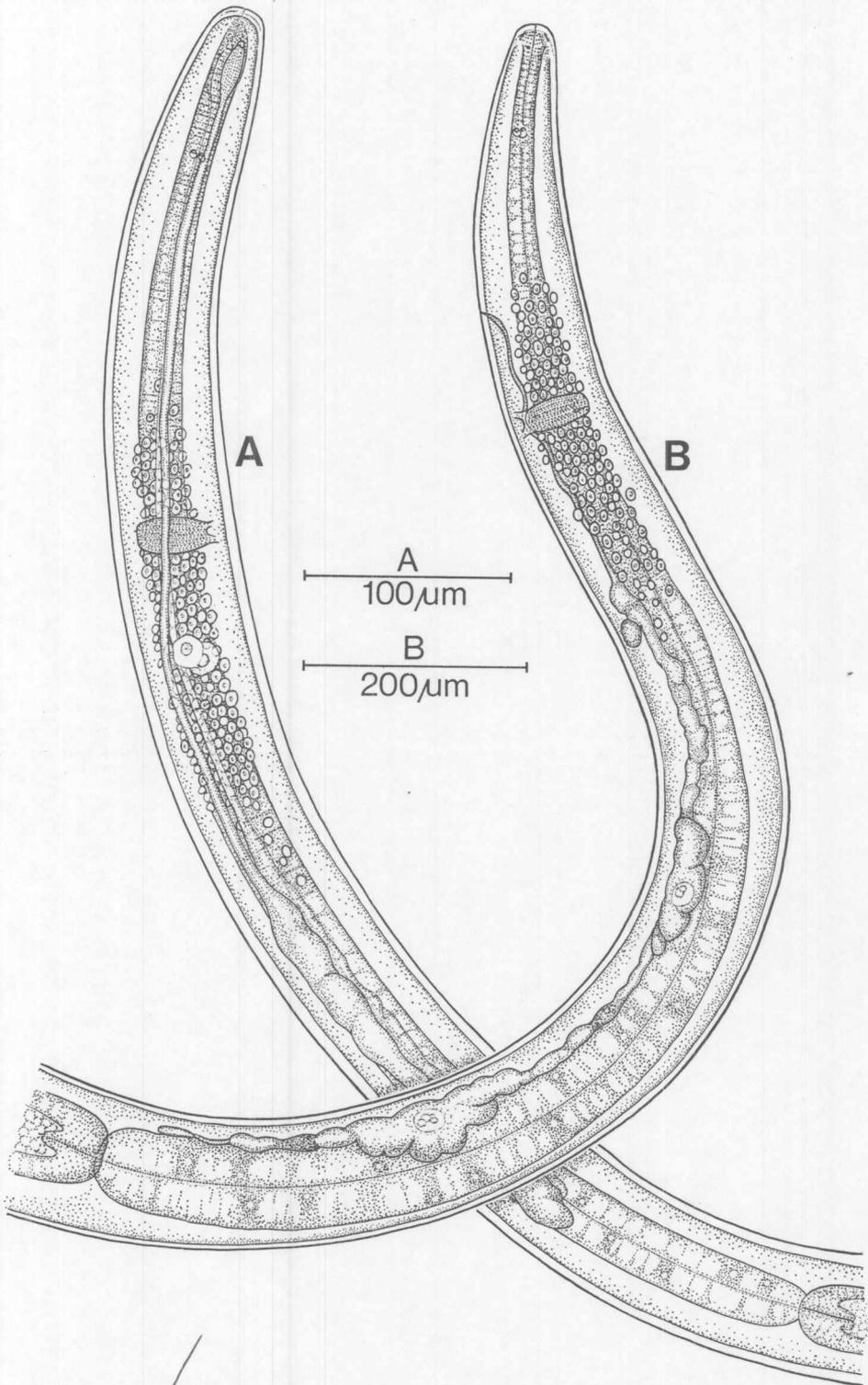


Fig. 9. *L. bacillatum* from Texel. A, Anterior end of male; B, Anterior end of female.

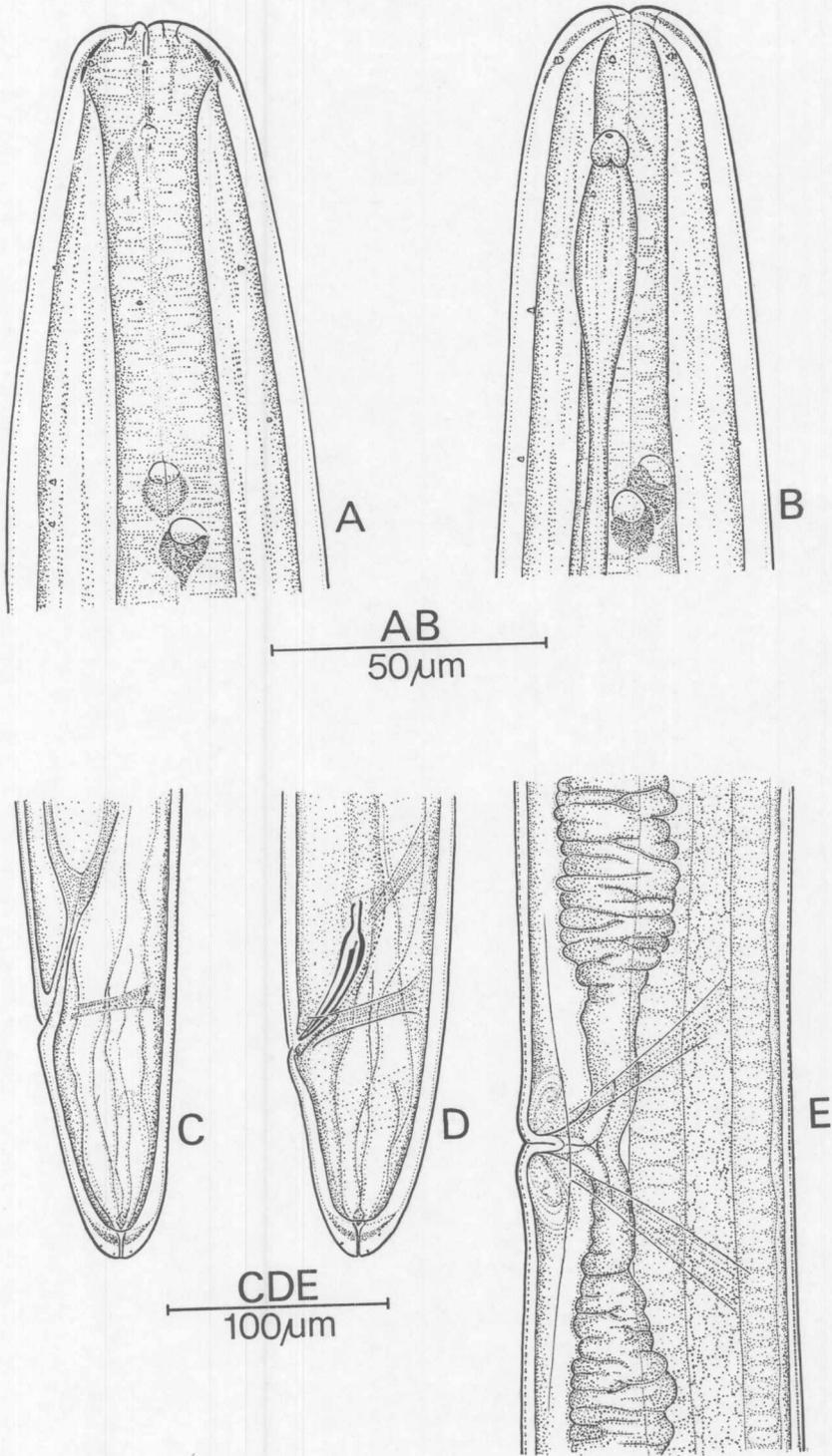


Fig. 10. *L. bacillatum*. A, Head of female, 102; B, Head of male, 76101; C, Posterior end female, 76102; D, Posterior end male, 76101; E, Vulvar region, (Burghsluis).

Pas SA 207 26 Prof. 240m. fond à Lophohelia. Dollfus. *Leptosomatum caecum* n.sp. Hj. Dntl."; the other without indication n.sp. I have added 1342 and 1343 respectively. The dimensions of the specimens (for the abbreviations see p. 852) were as follows:

S	SN	L	DNR	PL	CL	NW	PW	MW	AW	V%
F	1342	9950	416	1528	90	88	104	132	90	60
F	1343	9660	370	1340	85	82	99	143	85	63

Each specimen has little optical contrast, but slide 1343 shows, more or less, the contours of the cephalic capsule, which resembles that of *Pseudocella* and is herewith designated as lectotype; the other female, slide 1342, is too hyaline to observe the capsule.

Ditlevsen (1923) incorrectly interpreted the position of the amphids; although rather hyaline, they are slightly perceptible and situated as usual in the lateral lacunae. I did not depict them. The cephalic setae, of which 10 are present, reach a length of 9–10 μm . The cervical setae do not exceed 6 μm ; their position on the left and right body halves is not alike. The lateral vulvar glands are present; the vaginal ovejector seems to be absent as are the pre- and postvulvar sensilla and groups of setae near the caudal pore. The caudal glands are short and restricted to the tail as depicted by Ditlevsen. In the lateral epidermal chord, big vacuoles or glands can be seen with a diameter of 40 μm . The cuticle thickness varies from 6 μm at the pharyngeal base to 9 μm near the anal opening.

Although Filipjev probably did not examine these specimens, he suggests in a footnote (1927:94) that *L. caecum* might belong to *Pseudocella*, with which I agree.

The transferring of *L. caecum* to *Pseudocella* makes *P. caeca* (Ditlevsen, 1923) a secondary homonym to *P. coeca* (Ssaeljev, 1912) according to art. 58 sub 1 of the Code. If not a synonym of one of the other nominal species in *Pseudocella*, *L. caeca* must be renamed; I propose to postpone this decision until a revision of *Pseudocella*.

Leptosomatum clavatum Platonova, 1958

Leptosomatum kerguelense Platonova, 1958:60–61, partim.

Diagnosis.—Cephalic and cervical sensilla papilliform. Cephalic capsule in female 10 μm long. Ocelli far posterior. Ratio "c" less than in *L. bacillatum* of comparable size. Male unknown.

Distribution.—Kerguelen and Macquarie islands.

Discussion.—The identity of this species, which was found at the Kerguelen Islands, is fixed by the designation of the lectotype in 1968 (see discussion of *L. kerguelense*). Only females and juveniles are known. They differ from *L. kerguelense* by the ocelli being situated far posterior at about 1.5 corresponding body diameters from the anterior end (in the type, which is severely flattened, the pre-ocellar length hardly exceeds the corresponding body diameter), a more slender body, longer tail (T/ABW = 1.5), and the caudal pore being situated terminally.

Slides 5836, 6013, 7346, 7365, 7369, 7371, 7372 and 7377 belong to *L. clavatum* (lectotype 5835). Because type-material of the Zoological Institute in Leningrad is not loaned, I was not able to measure the specimens in detail. The

Table 2.—Dimensions of *L. clavatum*. DF, distance to fovea; C, cuticle thickness at pharynx base. For other abbreviations see p. 852.

Sn	L	DF	DL	C	PL	CL	a	b	c	V%	Labelled as:
5835	14,420	28	109	2	1909	187	67	7.6	77	60	Allotype <i>L. clavatum</i>
5836	12,430	29	118	8	1726	129	52	7.2	96	61	Allotype <i>L. kerguelense</i>
6013	10,860	24	126	10	1411	145	46	7.7	75	59	Paratype <i>L. kerguelense</i>

measurements are presented in Table 2. Although slide 5835 is labelled as "allotype" it represents the lectotype because Platonova (1968) designated this slide as holotype.

New record

1. Macquarie Islands (54°32'S, 158°59'E); 15 Feb 1967. 3 juv., 11 ♀ and 1 ♂; 112–124 m. Collection Smithsonian Institution, Washington, D.C.

Remarks.—On morphological grounds, as far as is known, the population from the Macquarie Is. cannot be distinguished from *L. bacillatum*. It deviates by the body proportions i.e., the placement of the ocelli, ratio "c" and, to a lesser degree, the body width. The cephalic capsule comes to 10 μ m, the amphidial aperture to 3 μ m, the fovea to 4 μ m, and the lens diameter varies from 6 to 9 μ m.

In this population, mixed with *L. kerguelense* and *L. sp. A* (see p. 846), one male was present that also might belong to the latter. It resembles the male of *L. bacillatum*. The spiculum length is 78 μ m, the gubernaculum 19 μ m, and the lens diameter is 9 μ m in dorsoventral view. The anterior part of the single male is twisted; dimensions of the amphids cannot be given. No figures are given since the females differ only in the above-mentioned characteristics. The redescription of the lectotype and information regarding the male are wanting.

Leptosomatum groenlandicum Allgén, 1954

Fig. 15

The male specimen, on which the description was based, was placed at my disposal by the Swedish Museum of Natural History. It is labelled: RMeV Sthlm. 37.299 East Greenland King Osc.fj.N-37. The nematode, mounted in glycerin-gelatin, was remounted because air had penetrated under the coverglass.

This male was curved in the shape of a "c." The length of 14.544 mm given by Allgén (1954), is the straight distance between the extremities. The length along the body axis came to 17.5 mm. The nerve ring is situated 580 μ m from the anterior end; the lengths of pharynx and tail are 2950 and 270 μ m respectively. Ocelli are absent. The shortness of the gonads is remarkable; the anterior reaching a length of 478 μ m, the posterior 488 μ m. The junction of these gonads is situated 10.3 mm from the anterior end. The spicula are 160 μ m long; they are ensheathed by a gubernaculum that is characterized by a dorsal outgrowth with a membranous appearance. Ten cephalic setae are present; the lateral setae are broadened. Six rows of cervical setae are visible extending to the level of the nerve ring. Subdorsal of the cloacal aperture, 4 setae could be seen. The cuticle is thick, lunula absent, and the caudal glands could hardly be observed.

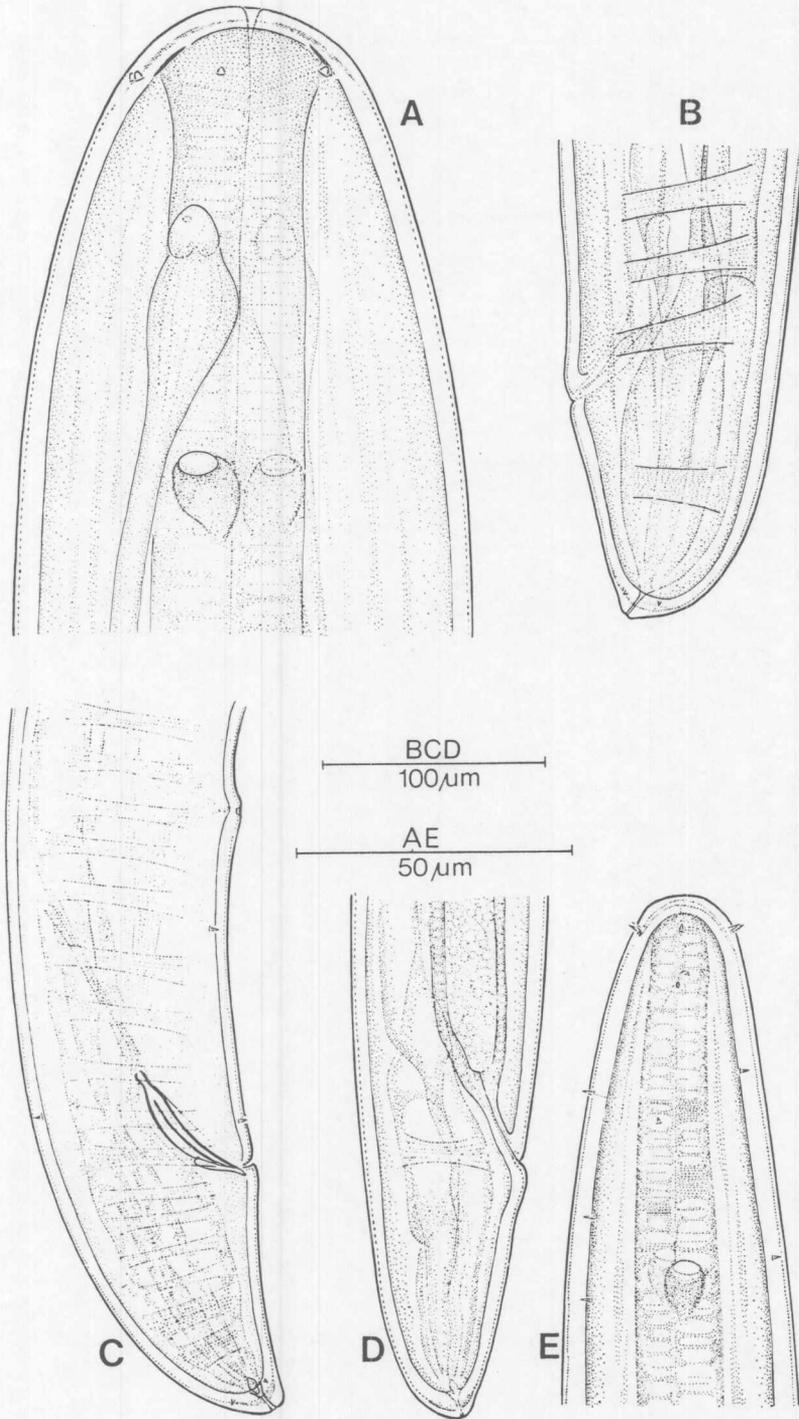
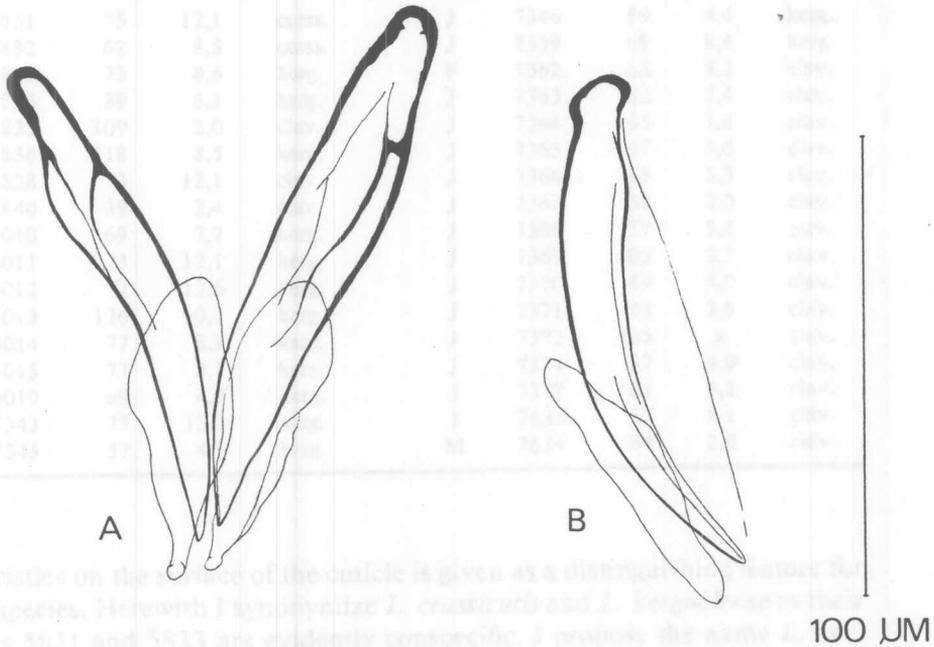


Fig. 17. *Leptosomatum kerguelense* (76056): A, Head; B, Caudal end. (C-E) *L. punctatum*: C, Caudal end of male, 1286-6; D, Caudal end of female, 1286-5; E, Anterior end of female, 76037.

Table 3.—Sex (♀ or ♂), Stage, Slide number (SN), Pre-ocular body length (PBL), Cuticle thickness (Cut) and species assigned to *Kerguelen* (Platonova 1958) or *Proceros* (1968).

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Fig. 18. Spicules *L. kerguelense*. A, Holotype; B, Paratype.

Distribution.—A subantarctic species: South Georgia, Kerguelen Islands, Heard Island, Crozet Islands, and Macquarie Islands.

Synonymy.—The three species from the Kerguelen Islands (Platonova 1958) were described from the remainder of an alcohol collection from which the macrofauna was removed. This fixation caused some particular effects of which the swelling and loosening of the cuticle are the most striking. The specimens are mounted in glycerin-gelatin, flattened, and as stated by Platonova (1958) in mediocre condition. In 1968 the species were redescribed, depicted (some shifting had taken place) and holotypes (=lectotypes) were designated.

Both papers are rather confusing; regarding *L. clavatum* for example, the lectotype (slide 5835) is called holotype and labelled as allotype. Slide 5835 does not correspond with the formula: the ratios as given in the description are also at variance with both the formula and the type. The lectotype fits neither the description nor the figures. The male on slide 7633, labelled as holotype, does not belong to the syntype and more juveniles are designated as paratypes than originally belonged to the syntypes.

In the description of *L. crassicutis* attention is given to the aberrant construction of the cephalic capsule. This feature, however, is an artifact due to the swelling of the cuticle, which can be confirmed by observing the cuticular pores, forming little holes in the cuticle surface and cones on the epidermis.

The cuticle thickness is stated to be a differentiating character for *L. crassicutis*. I have measured the cuticle at the level of the pharyngeal-intestinal junction, as did Platonova, and the pre-ocular body length. The data are given in Table 3. The cuticle thickness, which is heavily influenced by the fixative (or post-mortem fixation?), cannot be maintained as a diagnostic character for *L. crassicutis*. The

Table 3.—Sex (S) or stage, Slide number (SN), Pre-ocellar body length (OL), Cuticula thickness (Cut.) and species assigned to Kerguelen population described by Platonova (1958).

S	SN	OL	Cut.	Spec.	S	SN	OL	Cut.	Spec.
M	5831	75	12,1	crass.	J	7346	89	4,4	kerg.
F	5832	62	8,5	crass.	J	7359	69	8,4	kerg.
M	5833	73	8,5	kerg.	F	7362	65	3,2	clav.
F	5834	89	6,1	kerg.	J	7363	32	2,4	clav.
F	5835	109	2,0	clav.	J	7364	65	1,6	clav.
F	5836	118	8,5	kerg.	J	7365	97	4,0	clav.
F	5838	73	12,1	clav.	J	7366	65	5,3	clav.
F	5840	69	2,4	clav.	J	7367	32	2,0	clav.
M	6010	69	7,7	kerg.	J	7368	57	5,7	clav.
M	6011	73	12,1	kerg.	J	7369	105	5,7	clav.
F	6012	77	12,6	kerg.	J	7370	69	4,0	clav.
F	6013	126	10,1	kerg.	J	7371	93	3,6	clav.
M	6014	77	8,9	kerg.	J	7372	105	x	clav.
F	6015	77	8,1	kerg.	J	7374	57	4,0	clav.
F	6019	69	4,9	kerg.	J	7377	81	3,2	clav.
M	7343	77	13,0	kerg.	J	7633	57	8,1	clav.
J	7345	57	4,9	kerg.	M	7634	64	2,0	clav.

lack of bristles on the surface of the cuticle is given as a distinguishing feature for all three species. Herewith I synonymize *L. crassicutis* and *L. kerguelense* as their lectotypes 5831 and 5833 are evidently conspecific. I propose the name *L. kerguelense* Platonova, 1958; Recommendation 24a is not followed because the description of *L. crassicutis*, which is based on artifacts, would only lead to confusion. The type (5833) corresponds with the formula and description; the figure, however, is of one of the paratypes as the lectotype is mounted dorso-ventrally. The spicula of holo- and paratype are depicted in Fig. 18. The caudal glands, as depicted for *L. kerguelense* by Platonova, are much longer; they overlap the intestine as is usual in *Leptosomatium*.

Measuring the syntypes, another feature was found that was not previously recorded. Two types of juveniles and females occur; the first belongs to *L. kerguelense*, the other resembles *L. bacillatum*. These latter specimens are characterized by, among other features, ocelli situated far posteriorly. To this species belong slides 7346 and 5835, both labelled *L. clavatum* and slides 7365, 7369, 7371, 7372, 7377, 6013 and 5836 labelled *L. kerguelense*. Slide 5835 is the lectotype of *L. clavatum*, and 5836 the lecto-allotype of *L. kerguelense*. The lectotype of *L. clavatum* does not agree in every respect with the description of 1958. The measurements of the lectotype and discussion of its status are given in the paragraph of *L. clavatum*.

Leptosomatium arcticum sensu Mawson, 1958; nec Filipjev, 1916 is also indistinguishable to *L. kerguelense*. Mawson's material was not available for this study. Based on the description, there is no need to assign this species to *Leptosomatides* because structure of the gubernaculum is as in other species of *Leptosomatium*. The only difference from *L. kerguelense* is that the spiculum/gubernaculum ratio is not identical. This might be caused by artifacts or the gubernaculum may be obscured by the opaqueness of the surrounding tissue.

New records

1. South Georgia (53°52'S, 37°37'W). 3 ♂, 2 ♀, 1 juv. Coll. 7 Feb 1966 at a depth of 97–101 m. Collection Smithsonian Institution, Washington, D.C.
2. Macquarie Islands (54°32'S, 158°59'E). 5 Feb 1967. One pre-adult ♀. 112–124 m. Collection Smithsonian Institution, Washington, D.C.

The above-mentioned specimens of the first population are in a poor condition which may be caused by a post-mortem fixation, but they clearly belong to *L. kerguelense*. The cephalic capsule in male and female measure 4 and 6 μm respectively. The amphidial fovea has a diameter of 5 μm in the female and 11 μm in the male. The construction of these amphids is identical to that in *L. bacillatum*; only slightly more robust. The tail is obtuse, caudal glands are long, and the caudal pore is shifted ventrally. Although this species is easily recognizable, a redescription from well preserved material is desirable.

Leptosomatum micoletzkyi Inglis, 1971

Remarks.—This species, described from one male, is distinguished from the species of *Leptosomatum* by the amphids, which lie at more than one cephalic diameter from the anterior end; the presence of subventral precloacal setae, and the absence of the lunula (?). Sexual dimorphism, comparable with *Leptosomatum*, seems to be absent. The spicules are slightly sinuous and end distally in blunt tips. The gubernaculum enfolds the spicules near their distal ends; proximally it forms large membranes.

The male, which was not available, does not fit any nominal genus. At present it would lead to confusion to erect a new genus for this species and I consider *L. micoletzkyi* Inglis, 1971, a species incertae sedis until the female is described.

Leptosomatum pedroense Allgén, 1947

Allgén (1947) described this species from a juvenile which was not available for this study. The length of this juvenile is 7120 μm with a ratio "a" of 29.06. This means that the diameter of this specimen is 240 μm , leading to the assumption that this juvenile is extremely flattened. This is supported by the figure of the tail. Being based on a juvenile and described insufficiently, *L. pedroense* Allgén, 1947, must be considered a species inquirenda.

Leptosomatum punctatum (Eberth, 1863) Bastian, 1865

Fig. 17c–e

Phanoglene punctata Eberth, 1863:20.

? *Stenolaimus macrosoma* Marion, 1870:17–18.—1870a:10.

Leptosomatum longisetosum Schuurmans Stekhoven, 1943a:4.

Diagnosis.—Cephalic, cervical and body sensilla setiform; cephalic capsule absent in juveniles and adults. Ventromedian precloacal supplement present. Caudal pore ventral to terminus. Ocelli relatively far posterior. Lens 6–7 μm . Copulatory musculature relatively strongly developed.

Distribution.—Mediterranean, Black Sea, and Red Sea.

Synonymy.—Filipjev (1918) synonymized *S. macrosoma* Marion, 1870, with *L. bacillatum* (Eberth, 1863) because of Marion's statement (1870:17), "Elle ne