

# Fresh-water Nematodes from the Himalayas (Nepal)

By

I. ANDRÁSSY\*

**Abstract.** Twenty-six fresh-water nematodes of the Himalayas (Nepal) collected in 1964 by H. LÖFFLER are enumerated, most of them found at heights of 4500–5500 m. Of them 22 species proved to be new to the fauna of the Himalayas, and 3 new to science. *Prodorylaimium alpinum* n. sp. can be easily distinguished from the other members of the genus by the great number of supplementary organs. *Dorylaimus conurus* n. sp. is characterized by its unusually short tail. *Labronema loeffleri* n. sp. can be separated from all the other representatives of the genus by its large body and long spear. Keys to the species of *Prodorylaimium* and *Labronema* are also added.

In the course of a scientific expedition to the Himalayas (Nepal), Dr. H. LÖFFLER collected in July-August, 1964 a number of fresh-water samples for zoological investigations. A part of the samples contained several nematode specimens that have been sent to the present author for examination. Most of these nematode samples (25 in number) were collected in the Khumbu Himal Region, Eastern Nepal, south-west of the Mt. Everest, between 4500 and 5500 m, 3 samples were collected in the Rolwaling Himal Region, Eastern Nepal, south of the Mt. Gauri Shankar, between 3250 and 4100 m and one sample was taken at Pokhara, Central Nepal, at 900 m. The author is much indebted to Dr. H. LÖFFLER (Zoological Institute at the University of Vienna) for allowing him to study this valuable material.

Four papers have been published until now containing data on the nematode fauna of Nepal. First was GADEA's article (1961) which recorded 7 nematode species from a moss sample collected at Kathmandu, Central Nepal, at an altitude of 1600–1800 m. All the enumerated species were common nematodes of wide distribution: *Monhystera similis*, *Plectus cirratus*, *Teratocephalus terrestris*, *Rhabditis producta*, *Tylenchus filiformis*, *Tripylia intermedia* and *Tripylia setifera*. Also from the vicinity of Kathmandu, SIDDIQI (1964) described two new soil inhabiting species of the genus *Belondira*: *nepalensis* and *neortha*. Unfortunately, SIDDIQI has not mentioned anything about the height of his collectings.

\* Dr. István Andrassy, ELTE Állattrendszertani és Ökológiai Tanszék (Zoosystematical and Ecological Institute of the Eötvös Loránd University), 1088 Budapest, VIII. Puskin u. 3.

Most of the data concerning the nematode fauna of the Himalayas can be found in the paper of ZULLINI (1973). He examined 22 soil and fresh-water samples from different regions of Nepal and from heights between 1690 and 6100 m (mostly 4000 to 5000 m). He listed 22 nematodes, of which, however, only 10 were determined to species. They were: *Plectus cirratus*, *Achromadora terricola*, *Ethmolaimus pratensis*, *Mononchus truncatus*, *Clarkus papillatus*, *Prionchulus punctatus*, *Eudorylaimus holdemani*, *Labronema ferox*, *Enchodelus hopenorus* and *Enchodelus nepalensis*. At the greatest height the following species were observed: *Eudorylaimus holdemani* (5700 m), *Enchodelus nepalensis* (5500 and 5250 m), *Mononchus papillatus* and *Labronema ferox* (5250 m).

Furthermore, to the papers listed above we should add the article of AMATYA and SHRESTHA (1969) that gives account of a preliminary survey on plant-parasitic nematodes in Nepal. Unfortunately, this paper was unavailable for the present author.

### The examined material

A total of 29 nematode samples have been collected by Dr. LÖFFLER, all from fresh-water biotopes, namely lakes, rivers, pools and mosses. The localities of samples including nematodes are given in the following (Fig. 1):

#### A) Khumbu Himal, 4500 – 5500 m

1. Lake Tshola Tsho, the greatest lake in the research area, about 1.5 km long, 4500 m. — *Tripyla glomerans*, *Tobrilus aequisetata*, *Mononchus truncatus*, *Dorylaimus conurus*, *Labronema loeffleri*.
2. Mouth of a creek on the northern side of Tshola Tsho, 4500 m. — *Nyggolaimus hartingii*.
3. Mouth of an other creek on the western side of Tshola Tsho, 4500 m. — *Afro-dorylaimus beaumonti*, *Eudorylaimus uniformis*.
4. Lower Dzonglha Lake, 4850 m. — *Tobrilus aequisetata*, *Dorylaimus afghanicus*, *Labronema loeffleri*.
5. Upper Dzonglha Lake, 4850 m. — *Tobrilus aequisetata*, *Dorylaimus afghanicus*, *Labronema loeffleri*.
6. Pool in the Dzonglha Lakes region, 4850 m. — *Tobrilus aequisetata*, *Dorylaimus conurus*.
7. Northern Dzonglha Lakes: Lower Lake, 5080 m. — *Prismatolaimus intermedius*, *Mononchus truncatus*.
8. Northern Dzonglha Lakes: Upper Lake, 5080 m. — *Prismatolaimus dolichurus*, *Tobrilus aequisetata*.
9. Western Lobuche Lake, 5180 m. — *Monhystera pseudobulbosa*, *Plectus parietinus*, *Achromadora terricola*, *Tobrilus aequisetata*, *Prionchulus longus*, *Labronema loeffleri*.



Fig. 1. The collecting area of the Khumbu Himal Region of the Himalayas, between 4500 and 5500 m. (1-25: localities of the nematode samples)

10. Pool at 5000 m, below the Western Lobuche Lake. — *Plectus cirratus*, *Dorylaimus afghanicus*.
11. Upper Lobuche Lake, 4950 m. — *Cylindrolaimus bambus*, *Afrodorylaimus beaumonti*, *Nyggolaimus hartingii*, *Labronema loeffleri*, *Paractinolaimus macrolaimus*, *Tylencholaimellus polonicus*.
12. Lower Khumbu Lake ("Bluke Lake"), 5050 m. — *Plectus parietinus*, *Labronema loeffleri*.
13. Upper Khumbu Lake, 5200 m. — *Monhystera filiformis*, *Plectus cirratus*, *Tobrilus aequisetata*, *Mononchus truncatus*, *Nyggolaimus hartingii*, *Dorylaimus afghanicus*, *Afrodorylaimus beaumonti*, *Labronema loeffleri*.
14. Gorak Shep Lake, 5180 m. — *Labronema loeffleri*.
15. Southern Kongma La Lake, 5400 m. — *Tobrilus aequisetata*, *Mononchus truncatus*, *Prionchulus longus*, *Afrodorylaimus beaumonti*, *Labronema loeffleri*.
16. Pool above the Southern Kongma La Lake, 5450 m. — *Labronema loeffleri*, *Paractinolaimus macrolaimus*.
17. Brook between the Great and the Southern Kongma La Lakes, 5400 m. — *Monhystera pseudobulbosa*, *Achromadora terricola*, *Tobrilus aequisetata*, *Prionchulus longus*.
18. Puddle between the glacier and the Great Kongma La Lake, 5500 m. — *Plectus parietinus*.
19. Central Kongma La Lake, 5400 m. — *Tobrilus aequisetata*.
20. Stair Glacier at the Central Kongma La Lake, moss, 5450 m. — *Prionchulus longus*.
21. Northern Kongma La Lake, 5450 m. — *Nyggolaimus hartingii*, *Labronema loeffleri*.
22. A small lake south of the Kongma La Lakes, 5500 m. — *Tobrilus aequisetata*, *Nyggolaimus hartingii*, *Eudorylaimus uniformis*.
23. Eastern Nuptse Lake, 5350 m. — *Monhystera filiformis*, *Monhystera pseudobulbosa*, *Achromadora terricola*, *Prismatolaimus dolichurus*, *Prionchulus longus*.
24. Western Nuptse Lake, 5350 m. — *Monhystera filiformis*.
25. Northern Nuptse Lake, 5500 m. — *Tobrilus aequisetata*, *Nyggolaimus hartingii*.

*B) Rolwaling Himal, 3250–4100 m*

26. Rolwaling Valley, pool at 3250 m, south of the Mt. Gauri Shankar. — *Neoactinolaimus duplicidentatus*.

27. Rolwaling Valley, brook at Beding, 4000 m. — *Monhystera filiformis*, *Achromadora terricola*, *Ethmolaimus pratensis*, *Prodorylaimium alpinum*, *Proleptochus saccatus*.
28. Rolwaling Valley, brook at 4100 m. — *Paractinolaimus macrolaimus*.

C) Pokhara, 900 m

29. Pokhara Lake, 900 m. — *Aphanolaimus aquaticus*, *Mononchus truncatus*, *Mylonchulus polonicus*.

**List of the species**

Of the 26 nematode species found in the present material 8 belonged to the subclass Torquentia and 18 to the subclass Penetrantia. The subclass Secernentia was not represented.

Subclass TORQUENTIA

1. *Monhystera filiformis* BASTIAN, 1865

Cosmopolitan species, occurring both in terrestrial and aquatic habitats. Found in samples 13 (9 ♀, 1 juv.), 23 (1 ♀, 1 juv.), 24 (1 ♀, 1 juv.) and 27 (1 ♀, 1 ♂). The greatest altitude of its occurrence was 5350 m.

2. *Monhystera pseudobulbosa* DADAY, 1896

A rare species recorded hitherto from Europe (Czechoslovakia, Germany, Switzerland, Greenland) and Asia (Far Eastern Russia). Amphids are large, 1/3 of the corresponding body diameter and lie far back, about 2.5 times head diameter behind head. Tail nearly twice as long as distance between vulva and anus, and 12 times longer than width of anal body region.

*Monhystera multisetosa* var. *hallensis* PAETZOLD, 1958 = *Monhystera hallensis* PAETZOLD, 1958 (MEYL, 1961) is identical with *M. pseudobulbosa* (head slightly widened, cephalic setae 1/3 of head diameter, amphids 1/3 as wide as corresponding body diameter and lying back, tail 10–12 times longer than width of anal body region, etc.).

Found in samples 9 (3 ♀), 17 (3 ♀) and 23 (15 ♀), between 5200 and 5400 m.

3. *Aphanolaimus aquaticus* DADAY, 1897

One female and one male from sample 29 (900 m). In Europe widely distributed, but recorded also from Africa and the Americas. It is new for Asia.

#### 4. *Cylindrolaimus bambus* ANDRÁSSY, 1968

♀: L = 0.58 mm; a = 33; b = 5.4; c = 7.5; V = 53%.

Stoma 11  $\mu$  long, 1/9 of total length of oesophagus. The species can be distinguished by its small body, the relatively short stoma, the oesophagus protruding tong-like into intestine, the large amphids and the paired female gonads.

*Cylindrolaimus bambus* was described from Paraguay and found also in Italy. Present locality: 11 (2 ♀).

#### 5. *Plectus parietinus* BASTIAN, 1865

Cosmopolitan, distributed in every continent, common both in terrestrial and in aquatic biotopes. Found in samples 9 (1 ♀), 12 (1 ♀), 13 (2 ♀, 3 juv.) and 18 (1 ♀, 1 juv.), between 5050 and 5500 m.

#### 6. *Plectus cirratus* BASTIAN, 1865

As for the mode of life and the distribution it is similar to the foregoing species. It has been recorded from Nepal by GADEA (1961) and ZULLINI (1973.) In the present material only a single female was discovered: 10.

#### 7. *Ethmolaimus pratensis* DE MAN, 1880

A true aquatic nematode inhabiting fresh and brackish waters. Except Australia and the Antarctica it occurs in every continent; ZULLINI (1973) recorded it also from Nepal. In the present material a single specimen was found on the locality 27 (1 ♀).

#### 8. *Achromadora terricola* (DE MAN, 1880) MICOLETZKY, 1925

Cuticle heavily dotted; amphids large, 1/3 as wide as corresponding body diameter. Rectum long, proximally swollen.

In Europe widely distributed and common both in soil and in fresh-water biotopes, also known from Asia and America. ZULLINI (1973) has recorded it from Nepal. In the recent material it has been observed in four samples: 9 (2 ♀), 17 (1 ♀), 23 (2 ♀) and 27 (3 ♀). The highest point of its occurrence was 5400 m.

### Subclass PENETRANTIA

#### 9. *Prismatolaimus dolichurus* DE MAN, 1880

Very common in soil and fresh-water habitats and especially in ground water biotopes. It has been recorded from different countries of Europe, Asia, Africa and America (North and South). In the Nepalese material I have found it twice: 8 (4 ♀) and 23 (2 ♀).

10. *Prismatolaimus intermedius* (BÜTSCHLI, 1873) DE MAN, 1880

Like its sister species, *P. intermedius* is also a cosmopolitan nematode. Two females and four juveniles were collected at the locality No. 7, at 5080 m.

11. *Tripyla glomerans* BASTIAN, 1865

Also a widely distributed species. It resembles *T. cornuta* SKWARRA, 1921, can be, however, distinguished from it by the shape of tail and spicules. (In my paper 1967 I gave comparative descriptions about both species.) Found in the sample No. 1 (3 ♀, 3 ♂, 6 juv.), at a height of 4500 m.

12. *Tobrilus aequisetata* (SCHNEIDER, 1925) ANDRÁSSY, 1959

A rare representative of the widely distributed genus, recorded hitherto only from Germany and Italy. It was all the more surprising that this nematode has proved to be the most abundant species of the recent material: it occurred in 12 samples, i.e. 41 per cent of total number of samples. Its distribution showed the following picture: 1 (1 ♀), 4 (4 ♀), 5 (2 ♀), 6 (23 ♀, 12 ♂, 14 juv.), 8 (3 ♀, 3 ♂, 6 juv.), 9 (3 ♀, 1 juv.), 13 (4 ♀, 4 juv.), 15 (1 ♀, 7 juv.), 17 (10 ♀, 3 juv.), 19 (1 ♀, 1 juv.), 22 (3 ♀, 1 juv.), 25 (1 ♀). Between 4500 and 5400 m it was common at every altitude.

13. *Mononchus truncatus* BASTIAN, 1865

One of the most frequent fresh-water nematodes, a true cosmopolite. Also ZULINI (1973) mentioned it from Nepal. The present distribution: 1 (1 ♀, 6 juv.), 7 (4 ♀, 3 juv.), 13 (5 ♀, 4 juv.), 15 (2 ♀) and 29 (1 ♀).

14. *Prionchulus longus* (THORNE, 1929) ANDRÁSSY, 1958

♂: L = 2,04 mm; a = 30; b = 3.4; c = 12.5; V = 63%.

This species has been recorded until now from the United States, Canada and Italy. Its present occurrence in Nepal is: 9 (2 ♀), 15 (1 juv.), 17 (1 ♀), 20 (2 ♀, 2 juv.) and 23 (1 ♀, 3 juv.). The greatest altitude for it was 5400 m.

15. *Mylonchulus polonicus* (STEFANSKI, 1915) ANDRÁSSY, 1958

Found only in sample 29 (3 ♀, 4 juv.). A widely distributed species, known from Europe, Asia, Africa and America.

16. *Nygolaimus hartingii* (DE MAN, 1880) THORNE, 1929

Except Australia and the Antarctica it is distributed in all continents. Recent occurrences: 2 (1 juv.), 11 (1 juv.), 13 (17 ♀, 1 ♂, 8 juv.), 21 (1 ♀), 22 (1 ♀), and 25 (2 ♀).

17. *Prodorylaimium alpinum* n. sp.

(Fig. 2 A-B)

♂: L = 1,1 mm; a = 35; b = 4.3; c = 8.7.

Cuticle thin,  $1.5 \mu$ , at level with the spear thinner than this latter, finely striated on both ends of body. Head  $12 \mu$  wide, hardly set off, lips not separated; body on proximal end of oesophagus 2.6 times wider than head. Amphids half as wide as the corresponding neck diameter, almost quadrate.

Spear  $16 \mu$  long and  $2 \mu$  broad, 1.3 times as long as head diameter, its aperture  $1/3$  of the length of spear. Oesophagus enlarged in the middle (in 51 per

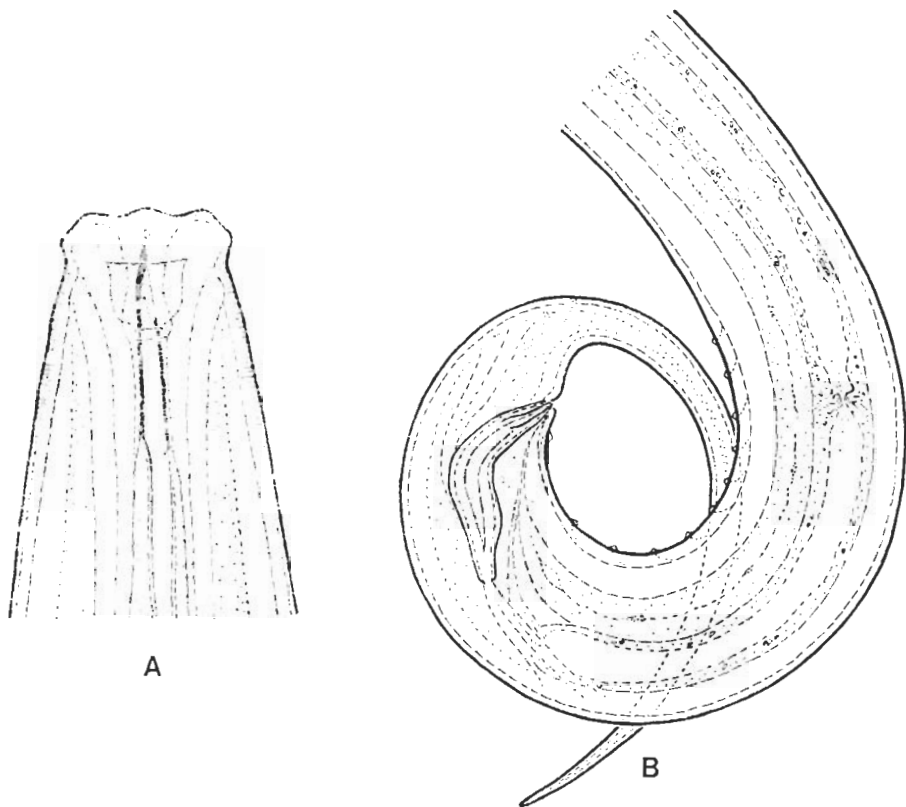


Fig. 2. *Prodorylaimium alpinum* n. sp. A: Anterior end (1600 $\times$ ); B: Posterior end of body, male (700 $\times$ )



cent of its total length), nuclei small, not conspicuous. Proximal end of oesophagus penetrating a little into the lumen of intestine. Cardia enlarged, triangular. Prerectum beginning within the range of supplementary organs.

Sperms  $4.5 \mu$  long,  $1/7$  as long as width of body at the same level, spindle-shaped. Spicules typical *Dorylaimus*-like,  $40 \mu$  long. Supplements 10, widely spaced, beginning within the level of spicules. There are 38 pairs of sublateral copulatory muscle bundles.

Tail 6 times as long as anal body diameter, only with 2 pairs of small sublateral papillae.

**Diagnosis:** A relatively small *Prodorylaimium* species with thin cuticle, practically not with offset head, short and weakly cuticularized spear, near middle enlarged oesophagus and 10 supplements beginning opposite the spicules.

Female unknown.

Two species of the genus *Prodorylaimium* have been described until now: *P. brigdammense* (DE MAN, 1876) ANDRÁSSY, 1969 and *P. stenosoma* (DE MAN, 1876) ANDRÁSSY, 1972. The new species can be easily separated from them by the supplements beginning at level with the spicules. Besides, it differs from *brigdammense* by the shorter tail (8–9 times longer than anal body diameter at *brigdammense*), and the greater number of supplements (6–8 at *brigdammense*) from *stenosoma* by the much shorter body (*stenosoma* 2 mm long or more), the shorter spear ( $20 \mu$  long at *stenosoma* and 1.7–1.8 times longer than head diameter, respectively) and the greater number of supplements (6–7 at *stenosoma*).

**Holotype:** ♂ on the slide Nr. N–7789 in the collection of the author.

**Type habitat and locality:** Detritus from a brook at Beding, Rolwaling Valley, East Nepal, at 4000 m altitude.

### Key to the species of *Prodorylaimium*

- 1 Supplements 10, beginning at level with the spicules. – ♀ unknown. ♂: L = 1.1 mm; a = 35; b = 4.3; c = 8.7. . . . . **alpinum** n. sp.
- Supplements 6–8, beginning before the spicules. . . . . 2
- 2 Spear 1.7–1.8 times as long as width of head; supplements beginning just before the spicules; body 2 mm or longer. – ♀: L = 1.8–2.5 mm; a = 38–50; b = 5.2–6.3; c = 4.7–6.5; V = 39–42%. ♂: L = 1.9–2.5 mm, a = 43–48; b = 5.8–6.7; c = 6–7. . . . . **stenosoma** (DE MAN)
- Spear 1.3 times as long as width of head; supplements beginning well before the spicules; body about 1.5 mm. – ♀: L = 1.5–1.7 mm; a = 38–43; b = 4.7–5.2; c = 4.5–4.8; V = 38–41%. ♂: L = 1.2–1.5 mm; a = 35–38; b = 3.9–4.8; c = 5.5–6.5. . . . . **brigdammense** (DE MAN)

### 18. *Dorylaimus afghanicus* ANDRÁSSY, 1960

I have described this species from Afghanistan and found it later in South Africa. The recent specimens agree well the original description, only the vulva lies somewhat more back, at 45% of total length of body.

Occurrences in Nepal: 4 (3 ♀, 2 ♂, 21 juv.), 5 (3 ♀, 3 juv.), 10 (4 ♀, 7 ♂, 3 juv.) and 13 (2 ♂, 1 juv.). The greatest height it was found was 5200 m.

### 19. *Dorylaimus conurus* n. sp.

(Fig. 3 A-C and 4 A-D)

♀: L = 4.5–5.2 mm; a = 44–50; b = 4.6–4.8; c = 37–44; V = 47–51%.  
♂: L = 3.6–4.6 mm; a = 44–48; b = 3.8–4.2; c = 85–94.

Cuticle moderately thick, 3–3.5  $\mu$ , at level with the spear much thinner than this latter, bearing 33–34 longitudinal ridges. Head 18–20  $\mu$  wide, slightly set off, lips hardly separated; body at proximal end of oesophagus 5.3–6 times wider than head. Amphids half as wide as corresponding neck diameter.

Spear 53–55  $\mu$  long and 2.7–3 times longer than the width of head, with an aperture somewhat longer than 1/3 of the spear length. Mantel of spear not quite closed dorsally. Guiding ring double. Oesophagus widened in 46–50 per cent of its length. Prerectum 4.8–6 times as long as anal body diameter, rectum 1.5 times as long as the mentioned diameter. Distance between oesophagus and vulva 1.2–1.4 times longer than the oesophagus.

Vulval lips hardly cuticularized, vagina strong, nearly 1/2 of the corresponding body width. Ovaries each 6–8 times as long as mid-body diameter. Only one female had a single egg (126  $\times$  43  $\mu$ ) in the uterus. On both sides of the vulva, 1–1.5 body diameters from it, each a small papilla. Distance between vulva and anus 19–21 times as long as tail.

Tail of very characteristic shape: almost uniformly conoid, not consisting of an anterior conical and a posterior filiform part like in other members of the genus; it is very short, only 2.3–3 times longer than the anal diameter of body. Its tip is sharply pointed and bent somewhat dorsally.

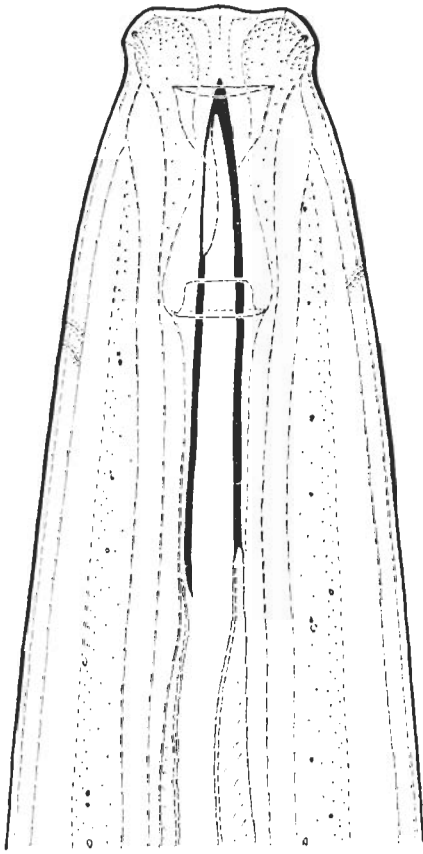
Sperms of plum-stone shape, 8  $\mu$  long, 1/10–1/11 of corresponding body width. Spicules 92–98  $\mu$  long, prerectum beginning well before spicules. Supplements 26 to 36 (26, 26, 30, 31, 33, 33 and 36, on the examined male specimens), contiguous, beginning about two spicule lengths before cloacal opening. Copulatory swelling („Kopulationshöcker“) weak. 14–18 pairs of small papillae between the anus and the foremost supplement. Tail of male bluntly rounded, as long as anal body diameter or a little shorter, ornamented by 11 pairs of small postanal papillae.

**Diagnosis:** A large *Dorylaimus* species with relatively thin cuticle, 33–34 longitudinal ridges, hardly offset head, long spear, oesophagus widened before or at its middle, strong vagina, small sperms, supplements of medium number and strikingly short tail on female.

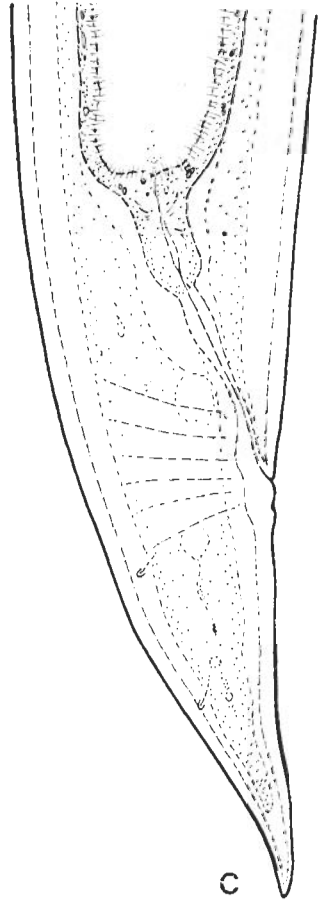
The shortness of tail is a very constant and important character for the females of this new species; it has the shortest tail among the representatives of the genus *Dorylaimus*. Besides, the thin cuticle – much thinner than the spear – is also characteristic for *Dorylaimus conurus* n. sp.

**Holotype:** ♀ on slide N-7686. Allotype: ♂ on slide N-7680; both in the collection of the author. Paratypes (9 ♀, 11 ♂ and 11 juv.) also in the author's collection. One female paratype deposited in the collection of Dr. P. A. A. Loof (Wageningen, Holland).

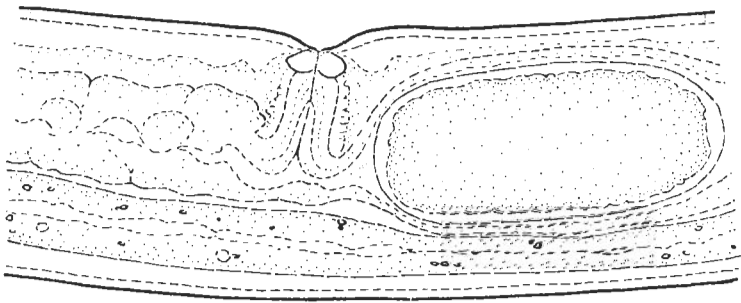
**Type habitat and locality:** Detritus from the Tshola Tsho Lake, Khumbu Himal Region of Nepal, 4500 m. Other locality: Pool in the Dzonglha Lakes Region, Khumbu Himal, Nepal, 4850 m.



A



C



B

Fig. 3. *Dorylaimus conurus* n. sp. A: Anterior end (800 $\times$ ); B: Vulva region (350 $\times$ ); C: Tail of a female (350 $\times$ )

20. *Afrodorylaimus beaumonti* (ALTHERR, 1952) ANDRÁSSY, 1969

♀: L = 2.0 mm; a = 46; b = 4.5; c = 7.5; V = 50%.

♂: L = 1.8 mm; a = 45; b = 4.0; c = 56.

Cuticle 2  $\mu$  thick, much thinner than spear. Head 12–14  $\mu$  wide, body on proximal end of oesophagus 3.2–3.4 times as wide as head. Spear 26–29  $\mu$  long, 2–2.2 times longer than diameter of head. Prerectum 3 times longer than anal body diameter. Tail of 10–11 anal body widths.

Sperms 3  $\mu$ , spicules 54–56  $\mu$  long. 11–14 supplements and 7–8 pairs of small preanal papillae. Tail of male strongly curved ventrally. (Fig. 5 A–E.)

The present specimens agree well with the description of ALTHERR (1952) with the single exception that the tail is curved. No doubt however that the Nepalese animals do belong to ALTHERR's species. KLEYNHANS described in 1970 an other *Afrodorylaimus* species, *A. bizanae* which resembled *A. beaumonti* very much but had a shorter spear (1.7 times as long as head diameter) and spicules of other shape. Nevertheless it might well be that *bizanae* is a synonym of *beaumonti*.

The species described from Switzerland has been observed now for the second time. It was found in Nepal on four localities: 3 (1 ♀, 2 juv.), 11 (19 ♀, 8 ♂, 20 juv.), 13 (3 ♀) and 15 (1 ♀). The greatest altitude for it was at 5400 m.

21. *Eudorylaimus uniformis* (THORNE, 1929) ANDRÁSSY, 1959

Known from Switzerland, Romania and the United States. It is characteristic for this "carteri-like" species that the supplements are of great number (17–18 on the present males) and begin opposite the spicules. Present in two samples: 3 (1 ♀, 2 ♂) and 22 (1 ♀, 2 juv.), the latter originating from 5500 m.

22. *Labronema loeffleri* n. sp.

(Fig. 6 A–E)

♀: L = 3.6–5.5 mm; a = 33–43; b = 4.2–5.0; c = 83–104; V = 46–50%.

♂: L = 3.3–5.0 mm; a = 35–42; b = 4.0–4.6; c = 90–96.

Cuticle on mid-body 5–5.5  $\mu$  thick, at level the spear thinner than this latter. It is finely radially striated and dotted on surface. These small dots are not arranged in rows and are especially visible on the posterior region of body.

Head 30–33  $\mu$  wide, conspicuously set off, lips hardly separated. Body at proximal end of oesophagus 3.1–3.3 times wider than head. Amphids nearly half as wide as corresponding body diameter.

Spear 52–57  $\mu$  long, 1.7–1.8 times longer than width of head, with aperture of 1/3 length of spear. Guiding ring simple but massive. Oesophagus enlarged at 48–50 per cent of its length, also in the anterior part thick, muscular. Excretory pore discernible, 6–7 times head diameter behind frontal end. Oeso-

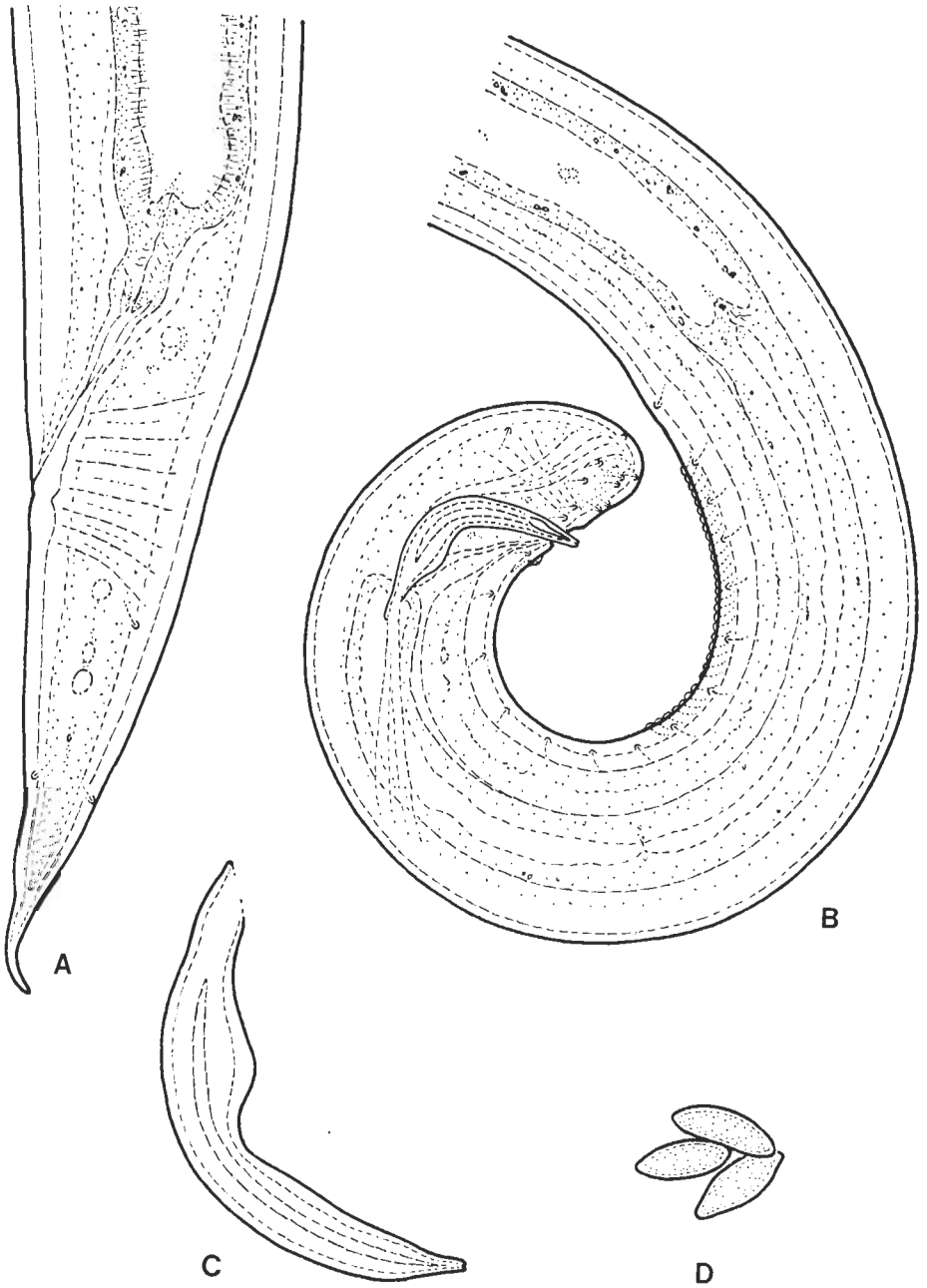


Fig. 4. *Dorylaimus conurus* n. sp. A: Tail of a female (350 $\times$ ); B: Posterior end of body, male (350 $\times$ )  
C: Spicule (800 $\times$ ); D: Sperms (1250 $\times$ )

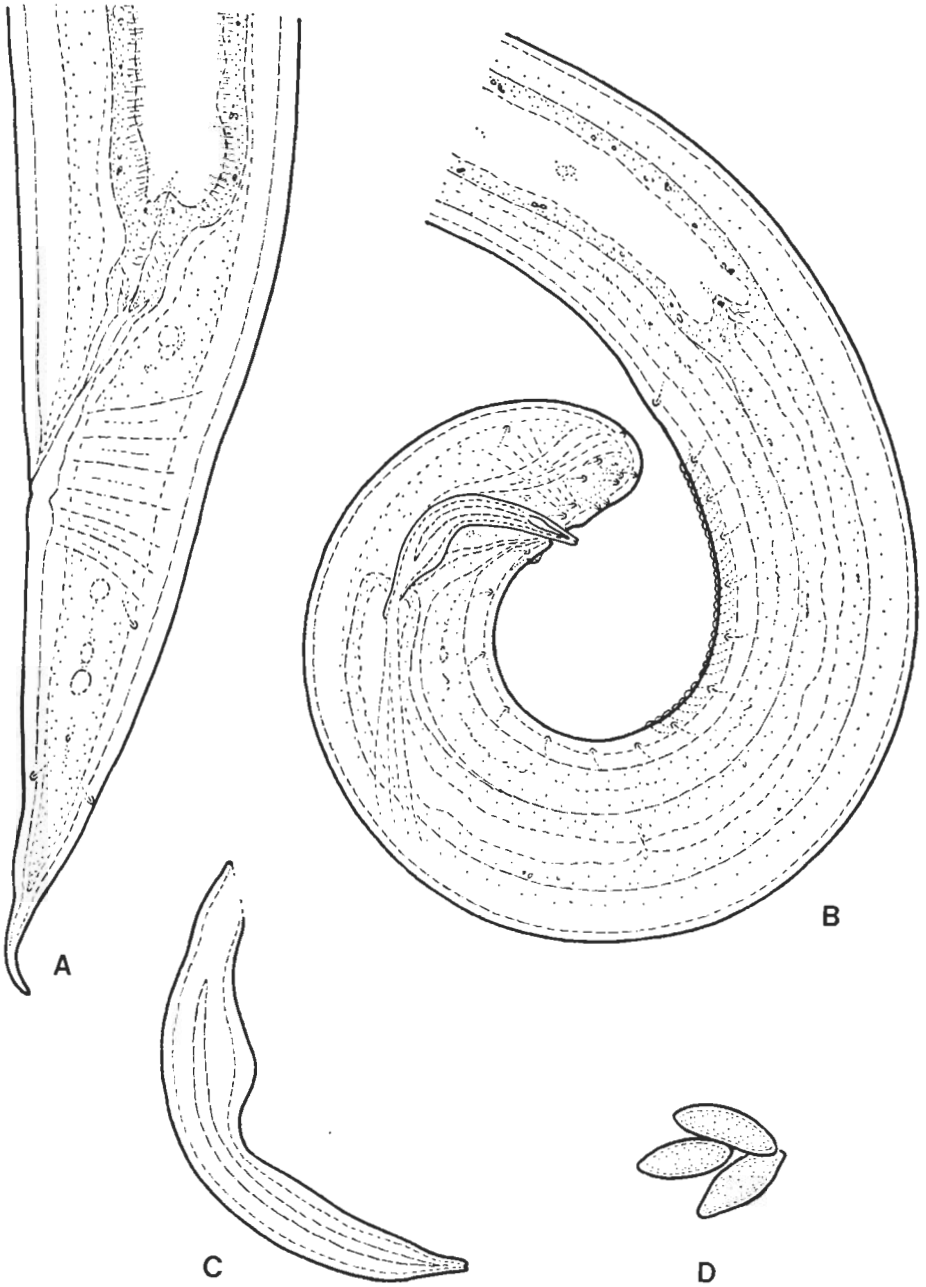


Fig. 4. *Dorylaimus conurus* n. sp. A: Tail of a female (350 $\times$ ); B: Posterior end of body, male (350 $\times$ ); C: Spicule (800 $\times$ ); D: Sperms (1250 $\times$ )

phageal nuclei small. Cardia tongue-shaped. Prerectum 2–3 times, rectum 1.5–1.7 times as long as anal body diameter.

Distance between posterior end of oesophagus and vulva 1–1.3 times as long as the oesophagus; distance between vulva and anus 1.9–2.1 times longer than distance between proximal terminus of oesophagus and vulva. Vulva longitudinal, its lips well cuticularized, vagina 54–58  $\mu$  long, half of corresponding body diameter. Each gonads 5–6 times as long as width of mid-body. Only one egg was found in the uterus (150  $\times$  55  $\mu$ ). Tail of female shorter than anal body diameter, rounded.

Sperms small and present in great number, spindle-shaped. Spicules 118–126  $\mu$  long, broadly cephalated proximally. Supplements 21–27 (21 at one ♂, 22 at two ♀, 23 at 3 ♂, 24 at 3 ♂, 25 at 3 ♂, 26 at 2 ♂ and 27 at one ♂). Tail of male similar to that of female, bearing 12 pairs of small papillae.

**Diagnosis:** A large *Labronema* species with radially striated and superficially dotted cuticle, wide and offset head, long spear, oesophagus widened at middle region, strong vagina, thick-shelled eggs, more than 20 supplements and rounded tail.

*Labronema loeffleri* n. sp. can be separated from all the other species of the genus by its large body and the long spear.

**Holotype:** ♀ on slide N–7726. Allotype: ♂ on slide N–7719. Holo-, allo- and paratypes all in the collection of the author.

**Type habitat and locality:** Detritus from the Upper Lobuche Lake, Khumbu Himal Region of Nepal, 4950 m (22 ♀, 16 ♂ and 25 juv.). Further localities: 1 (2 ♀, 1 juv.), 4 (1 ♀, 1 juv.), 5 (1 ♀), 9 (3 ♀, 3 ♂, 6 juv.), 12 (1 ♂), 13 (4 ♀, 5 ♂, 4 juv.), 14 (1 ♀, 1 ♂), 15 (1 ♀), 16 (3 ♀) and 21 (1 ♀, 2 juv.). After *Tobrilus aequiseti*, *Labronema loeffleri* proved to be the second most frequent species of the examined material.

### Key to the species of *Labronema*

- |   |  |   |
|---|--|---|
| 1 | Body very large, 3 mm or more. . . . .   | 2   |
| – | Body smaller, 1–2.5 mm. . . . .  | 11  |
| 2 | Tail of female with subdigitate terminus. . . . .  | 3   |
| – | Tail of female broadly rounded, not subdigitate. . . . .   | 4   |
| 3 | Tail of female longer than anal body diameter; 20 supplements present. – ♀: L = 3.45 mm, a = 26; b = 4.8; c = 43; V = 51%. ♂: L = 3.3–3.4 mm; a = 23–27; b = 4–5.2. Spear = 26 $\mu$ . . . . . | <i>estonicum</i> KRALL, 1957;                   |
| – | Tail of female shorter than anal body diameter; 24–30 supplements present. – ♀: L = 3.6 mm; a = 31; b = 5.6; c = 83; V = 47%. ♂: L = 3.5 mm; a = 30; b = 5.6; c = 90. . . . .                  | <i>varicaudatum</i> (THORNE, 1929) THORNE, 1939 |
| 4 | Spear as long as head width, aperture occupying half its length. – ♀: L = 3.0–3.6 mm; a = 35; b = 4.1; c = 100; V = 50%. ♂: L = 3.0–3.5 mm; a = 43; b = 4.0–5.2; c = 100. . . . .              | <i>ferox</i> THORNE, 1939                       |
| – | Spear conspicuously longer than head width, aperture occupying less than half its length. . . . .  | 5   |
| 5 | Very large species, mostly over 4 mm (to 5.5 mm); head strongly set off. . . . .   | 6   |
| – | Smaller species, under 4 mm; head not or only slightly set off. . . . .  | 7   |

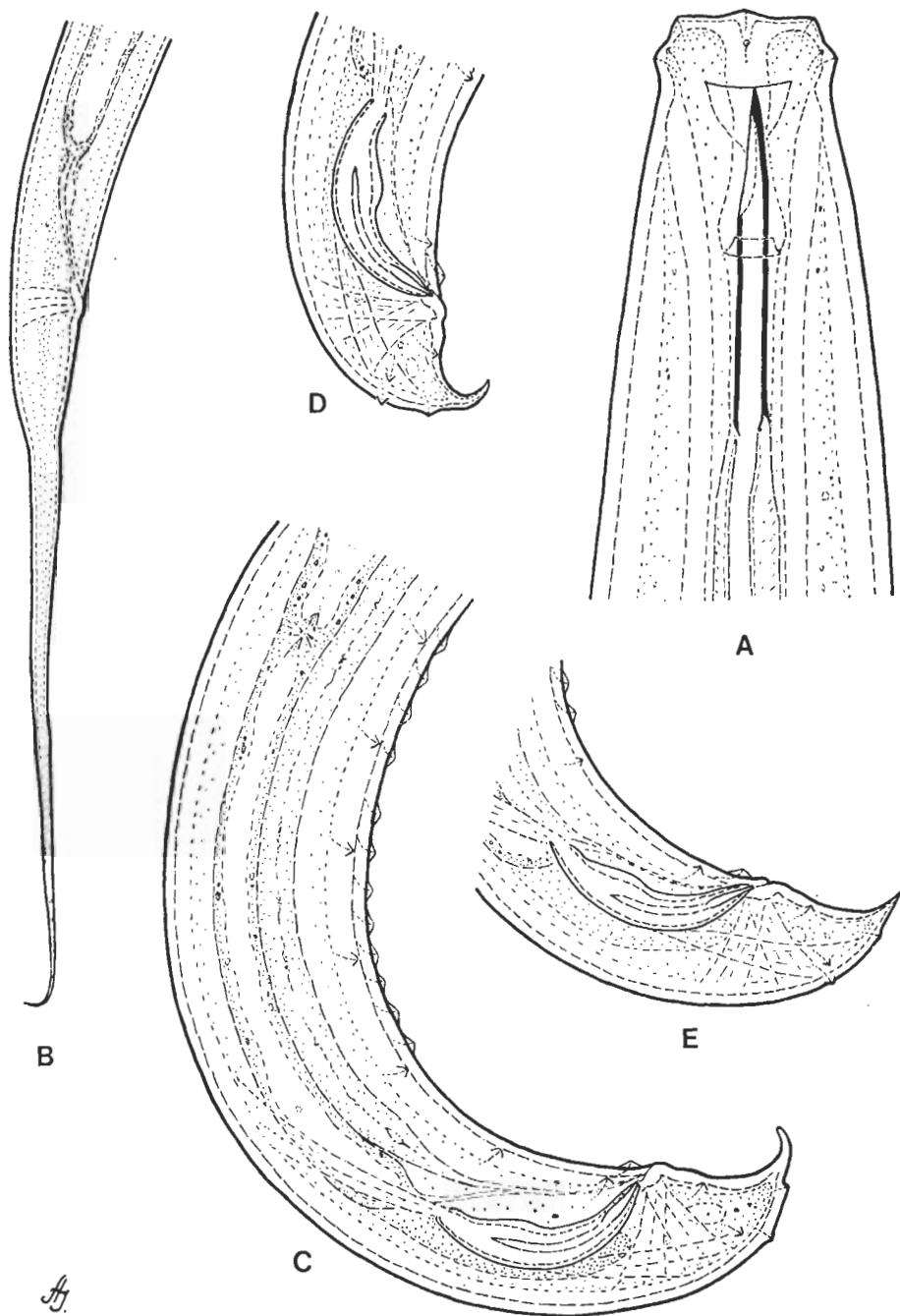
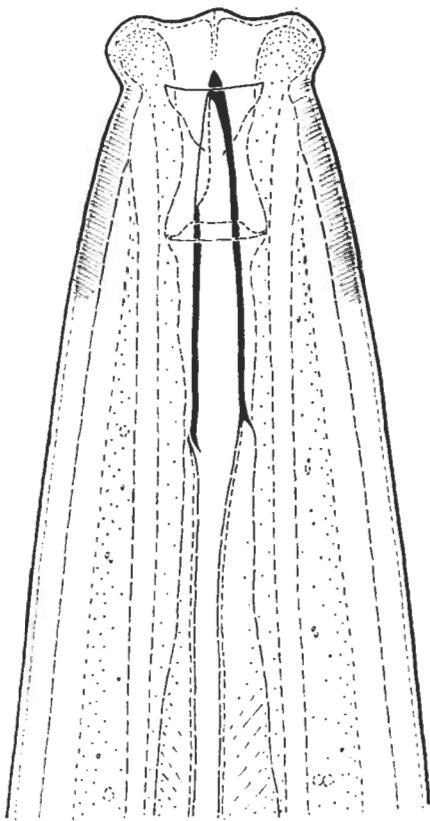


Fig. 5. *Afrodorylaimus beaumonti* (ALTHERR, 1952) ANDRÁSSY, 1969. A: Anterior end (1600 $\times$ ); B: Tail of female (350 $\times$ ); C-D-E: Posterior end of different males (550 $\times$ )

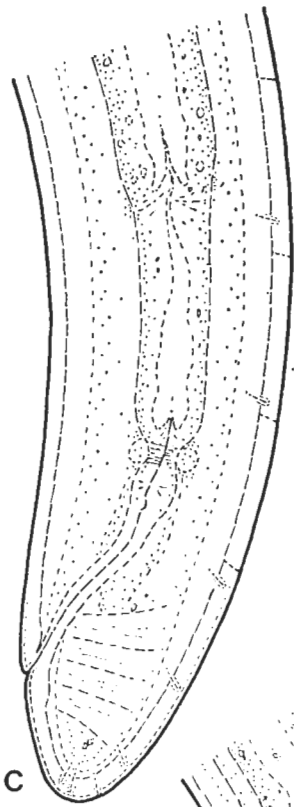


- 6 Spear nearly twice as long as head diameter; rectum 1.5 times anal body diameters or more. — ♀: L = 3.6–5.5 mm; a = 33–43; b = 4.2–5.0; c = 83–104; V = 46–50%. ♂: L = 3.3–5.0 mm; a = 35–42; b = 4.0–4.6; c = 90–96. Spear = 52–57  $\mu$ . . . . . **loeffleri** n. sp.
- Spear 1.5 times as long as head diameter; rectum as long as anal body diameter. — ♀: L = 4.7–4.9 mm; a = 25–27; b = 4.1–4.6; c = 92–100; V = 50%; spear = 60  $\mu$ . ♂ unknown. . . . . **magnum** ALTHERR, 1972
- 7 Aperture occupying 1/4 length of spear or less. . . . . 8
- Aperture occupying 1/3 length of spear or more. . . . . 9
- 8 Body slender (a = 40 or more); supplements 18. — ♀: L = 3.5 mm; a = 43; b = 5; c = 100 V = 51%. ♂: L = 2.5–3.2 mm. . . . . **corii** (LIEBERMANN, 1928) ANDRÁSSY, 1960
- Body more robust (a = 30 or less); supplements 24. — ♀: L = 3.3 mm; a = 26; b = 4; c = 77; V = 50%. ♂: L = 3.3 mm; a = 35; b = 4.3; c = 77. . . . . **hyalinum** (THORNE & SWANGER, 1936) THORNE, 1939\*
- 9 Spear 30–34  $\mu$  long. — ♀: L = 3.0–3.7 mm; a = 37–44; b = 3.8–4.9; c = 90–127; V = 51–54%; spear = 30–34  $\mu$ . ♂ unknown. . . . . **thornei** FERRIS, 1968
- Spear 40  $\mu$  or longer . . . . . 10
- 10 Supplements 15, spaced. — ♀ unknown. ♂: L = 3.4 mm; a = 45; b = 4.7; c = 110; spear = 39  $\mu$  . . . . . **fluviatile** ALTHERR, 1958
- Supplements about 30, contiguous. — ♀ (immature): a = 30; b = 4.0–5.2; c = 58–77; V = 48–52%. ♂: L = 3.0–3.7 mm; a = 37–44; b = 3.8–4.9; c = 90–127. Spear = 45  $\mu$ . . . . . **stechlinense** ALTHERR, 1968
- 11 Tail of female conoid or subdigitate. . . . . 12
- Tail of female bluntly rounded. . . . . 15
- 12 Aperture unusually short, only 1/5–1/6 of spear length; spear much thinner than adjacent cuticle; cuticle waved at the vulva. — ♀: L = 2.4 mm; a = 28; b = 36; c = 50; V = 54%. ♂ unknown. . . . . **fimbriatum** THORNE, 1939
- Aperture 1/3 of spear length or longer; spear as wide as adjacent cuticle; cuticle not waved at the vulva. . . . . 13
- 13 Vulva at 2/3 length of body; head broad. — ♀: L = 1.1–1.5 mm; a = 30–34; b = 3.3–4.1 c = 43–56; V = 60%. ♂: L = 1.5 mm; a = 33; b = 4.3; c = 54–60. Spear = 21–23  $\mu$ . . . . . **mauritiense** WILLIAMS, 1959
- Vulva at half length of body; head narrow. . . . . 14
- 14 Body length about 2.5 mm. — ♀: L = 2.3 mm; a = 30; b = 4.1; c = 56; V = 53%. ♂: L = 2.3 mm; a = 34; b = 4.3; c = 51. Spear = 18  $\mu$ . . . . . **rapax** THORNE, 1974
- Body length under 1.5 mm. — ♀: L = 1.0–1.2 mm; a = 19–26; b = 3.4–4.3; c = 28–43; V = 52%. ♂ unknown. Spear = 18–19  $\mu$ . . . . . **eudorylaimoides** GERAERT, 1962
- 15 Small species, about 1 mm. . . . . 16
- Larger species, 2 mm or more. . . . . 18
- 16 Spear 1.5 times longer than width of head. — ♀: L = 1.2 mm; a = 30; b = 3.7; c = 66; V = 69%. ♂: L = 1.5 mm; a = 35; b = 3.3; c = 69. . . . . **ruttneri** (SCHNEIDER, 1937) THORNE, 1939
- Spear as long as width of head. . . . . 17
- 17 Vulva at 60 per cent of body length. — ♀: L = 1.2 mm; a = 28; b = 4.1; c = 49; V = 60%; ♂: L = 1.4 mm; a = 28; b = 4.4; c = 44. Spear = 12  $\mu$ . . . . . **octodurensis** ALTHERR, 1950
- Vulva near 50 per cent of body length. — ♀: L = 0.9–1.2 mm; a = 18–23; b = 3.6–4.1; c = 54–66; V = 53%. ♂ unknown. . . . . **pygmaeum** ALTHERR, 1963\*\*

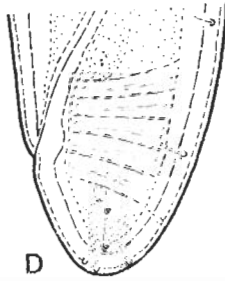
\* *Labronema uniforme* Thorne, 1939 cannot be separated from *L. hyalinum* after the description.  
 \*\* It might be synonym with *L. octodurensis*.



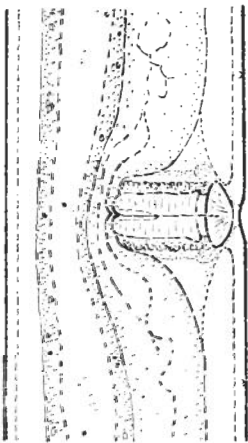
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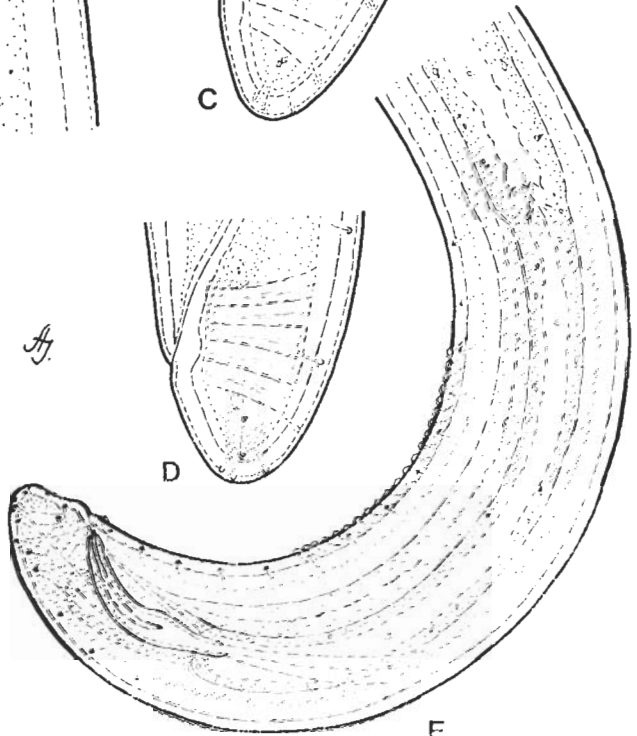
C



D



B



E

Fig. 6. *Labronema loeffleri* n. sp. A: Anterior end (800 $\times$ ); B: Vulva region (350 $\times$ ); C-D: Tail females (350 $\times$ ); E: Posterior end of male (200 $\times$ )

- 18 Spear much thinner than adjacent cuticle; vulva at 60 per cent of body length. — ♀: L = 2.0 mm; a = 33; b = 4.2; c = 72; V = 60%. ♂: L = 1.8 mm; a = 34; b = 4.2; c = 67. Spear = 27–30  $\mu$ . . . . . *chilense* ANDRÁSSY, 1967\*
- Spear as wide as adjacent cuticle; vulva near 50 per cent of body length. . . . . 19
- 19 Head not separated from neck. — ♀: L = 2.4 mm; a = 21; b = 4.3; c = 100; V = 47%. ♂: L = 2.4 mm; a = 31; b = 4.3; c = 100. . . . . *pacificum* (Cobb, 1906) THORNE, 1939
- Head set off . . . . . 20
- 20 Head about 1/2 as high as wide. — ♀: L = 2.5 mm; a = 43; b = 4.4; c = 88–99; V = 47–54%; ♂: L = 2.0 mm; a = 40; b = 3.8; c = 90. . . . . *czernovitzense* (MICOLETZKY, 1922) THORNE, 1939
- Head about 1/3 as high as wide. (On the basis of their descriptions the following five species cannot be separated. *L. goodeyi* is the single species of them at which the both sexes are known; *alticola* was described after male, *obesum*, *paesleri* and *virgo* after female specimens. — a) ♀ unknown. ♂: L = 2.4 mm; a = 45–50; b = 4.7–5.3; c = 130–180. . . . . *alticola* (MENZEL in HOFMÄNNER & MENZEL, 1914) THORNE, 1939
- b) ♀: L = 2.3–2.9 mm; a = 26–35; b = 3.8–4.5; c = 68–120; V = 49–55%. ♂: L = 2.4–2.5 mm; a = 30–36; b = 3.9–4.1; c = 85–89. Spear = 30  $\mu$ . . . . . *goodeyi* ALTHERR & DELAMARE DEBOUTTEVILLE, 1972
- c) ♀: L = 2.2 mm; a = 25; b = 4.1; c = 60; V = 53%. ♂ unknown. Spear = 33  $\mu$ . . . . . *obesum* THORNE, 1974
- d) ♀: L = 2.0 mm; a = 39.5; b = 4.2; c = 76; V = 52%. ♂ unknown. Spear = 24  $\mu$ . . . . . *paesleri* PAETZOLD, 1955
- e) ♀: L = 1.6–2.0 mm; a = 30–38; b = 4.0–5.2; c = 61–72; V = 49–52%. ♂ unknown. Spear = 26–27  $\mu$ . . . . . *virgo* MOINTEIRO, 1970

### 23. *Paractinolaimus macrolaimus* (DE MAN, 1880) ANDRÁSSY, 1964

A widely distributed species, known in most diverse localities of Europe, Asia, Africa and America. In Nepal it was found in three samples: 11 (5 ♀, 10 juv.), 16 (9 ♀, 9 ♂, 9 juv.) and 28 (1 juv.).

### 24. *Neoactinolaimus duplicidentatus* (ANDRÁSSY, 1962) ANDRÁSSY, 1970

This species is fairly common in Africa. In Europe it has been observed in Russia and Hungary. In Nepal, I have found it in one sample only: 26 (8 ♀, 3 ♂, 8 juv.); this was its first and till now the single occurrence in Asia.

### 25. *Proleptonchus saccatus* (CLARK, 1962) ANDRÁSSY, 1963

This rare nematode has been recorded hitherto from New Zealand, Congo Republic and Angola. In the present material I observed a single female in the sample No. 27.

### 26. *Tylencholaimellus polonicus* SZCZYGIEL, 1962

Body 1.1 mm. Especially the thickness of the cuticle is characteristic for this species: it is much thicker than the spear at level with latter. *T. polonicus*

\* Syn. *L. rikia* Yeates, 1976 (n. syn.) and *L. hyalinum* ♀ apud Williams, 1959 (n. syn.).

was described from Poland and has not been newly recorded until now. Occurrence in Nepal: 11 (2 ♀).

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