Two new species of free-living nematodes from Lake Baikal, Russia

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Summary. *Monhystera melnikae* sp.n. and *Boreolaimus communis* sp.n. were described from Lake Baikal (Russia, Siberia). *Monhystera melnikae* sp. n. is similar to *M. lemani Juget,* 1969 and *M. amabilis* Gagarin, 1997, but differs from *M. lemani* by having the longer tail, a different position of vulva, more posteriorly placed amphidial fovea and shorter spicules. From *M. amabilis* it differs by having a shorter body, the wider labial region, shorter outer labial setae and more posteriorly placed amphidial fovea. *Boreolaimus communis* sp.n. resembles *B. septemtrionalis* Andrássy, 1998 but differs by having a shorter tail, the shorter odontostyle, absence of 'saccate bodies' at the postanal region in females and presence of males.

Key words: Baikal, *Boreolaimus communis* sp. n., freshwater bodies, free-living nematodes, *Monhystera melnikae* sp. n., Siberia.

Lake Baikal is a unique freshwater body inhabited by endemic fauna. Some animal taxa including free-living nematodes underwent intensive speciation in this lake. On the presence of 57 nematode species from 23 genera has recently been reported (Gagarin, 2003; Shoshin, Tsalolikhin, 2001; Shoshina, 2003), but the data are far from final. In particular, only one species of the genus *Monhystera* Bastian, 1865 – *M. paludicola* de Man, 1881 (Tsalolikhin, 1980) - was described from Lake Baikal before our investigations. Later we found one more species of the genus *Monhystera* (Gagarin, Naumova, in preparation), and *M. melnikae* sp. n. is the third species which is described in the present work. Moreover, the representatives of the genus *Boreolaimus* Andrássy, 1998, previously found only in the Scandinavian Arctic water bodies (Andrássy, 1998), were found in Baikal for the first time.

Nematodes were collected by the researchers from the Limnological Institute of Siberian Branch of RAS (Irkutsk, Russia) in the coastal area of Baikal in 2000. The samples contained numerous free-living nematodes, including the two new species described here. The samples were fixed and mounted in glycerin-gelatine on permanent slides.

DESCRIPTION

Monhystera melnikae sp.n. (Fig.1)

Measurements: see Table 1.

Male. Comparatively small and thick nematodes. Cuticle smooth, 0.7-1.0 μm thick in mid-body. Somatic setae rare, 5-7 μm long. Crystalloid bodies absent. Lips relatively low. Inner labial sensillae low, papilliform. Outer labial sensillae and cephalic sensillae setiform. Outer labial setae 3.5-5.0 μm long (25-33 % of labial region width). Cephalic setae slightly shorter than outer labial setae. Labial region slightly flattened, 13-15 μm wide, 2.5-3.0 μm high, continuous with rest of the body. A ring of perioral platelets surrounds the 6.5-7.0 μm wide mouth opening. Cheilostoma wider than its length, with prominently refractive lining. Remainder of the stoma funnel-shaped. Amphidial fovea 5.5-6.5 μm in diameter, circular, anterior margin situated in 11-18 μm (0.9-1.3 labial region width) from anterior body end; *fusus amphidialis* unclear, more or less cylindrical, with slightly expanded base. Oesophagus muscular, cylindroid, slightly swollen proximally. Nerve ring situated at 48-52 % of oesophagus length from its anterior end. Cardia mushroom-shaped, 18-20 μm long, its width slightly larger than length; containing three large, 'petal'–shaped glands. Ventral gland cell, its canal, ampula and excretory pore not visible.

Testes simple, situated subventrally to the intestine. Spicules slender, ventrally curved, with rounded anterior ends, 1.6-2.0 times longer than cloacal body diameter. Gubernaculum 6-7 μm long, rectangular, without caudal apophysis. Precloacal supplementary structures absent. Tail slender,

gradually narrowing on ventral side. Caudal glands poorly discernible. Spinneret well developed, beak-like, 5-6 μm long.

Female. Similar to male in general morphology. Cuticle smooth, transverse striation absent. Somatic setae rare, 5-7 μm long. Crystalloid bodies and ocelli absent. Lips comparatively low. Inner labial sensillae papilliform. Outer labial sensillae and cephalic sensillae setiform. Outer labial setae 3-5 μm long (25-30 % of labial region width); cephalic setae slightly shorter. Labial region flattened, 12.0-14.5 μm wide, continuous with rest of the body. A ring of perioral platelets surrounds the mouth opening. Cheilostoma wider than its length, with prominently refractive lining. Esophastoma funnel-shaped. Amphidial fovea 4-5 μm in diameter, circular, anterior margin situated in 11-18 μm (1.0-1.4 labial region width) from anterior body end. Oesophagus muscular, cylindroid, slightly swollen proximally. Nerve ring at mid-oesophagus (50-53 %). Cardia with three large, 'petal'-forming glands. Renette, its canal, ampula and excretory pore not visible. Rectum length slightly larger than anal body diameter, lumen open. Small preanal glands present.

Reproductive system monodelphic, prodelphic; ovary relatively long, situated subventrally to the intestine. Germinal zone of oogonia arranged in one or two rows; growth zone with a single row of continuously enlarging oocytes. Oviduct short and conspicuous. Usually one egg in uterus, 45-48 (46) x 35-37 (36) μm in size. Vagina oblique, shorter than corresponding body diameter, with thick muscular walls. Vulva slightly posterior to mid-body, crescent-shaped, lips strongly protruded but not sclerotized. Post-vaginal gland cell absent. Tail slender, gradually narrowing, more or less dorsally curved. Three caudal glands weakly developed, poorly discernible, terminate in a common chamber opened through a beak-like spinneret.

Differential diagnosis. *Monhystera melnikae* sp.n. is characterised by its relatively short and stout body (L = 907-1139 μm, a = 19-32), the absence of crystalloid bodies and ocelli, rather short outer labial and cephalic setae, the amphidial fovea situated relatively far from an anterior body end, the absence of a post-vaginal gland cell, the presence of mature eggs in uterus, short spicules (47-52 μm long) and a rectangular gubernaculum without a caudal apophysis.

The new species is most similar to *M. lemani* Juget, 1969 and *M. amabilis* Gagarin, 1997 in the absence of ocelli, crystalloid bodies, a post-vaginal gland cell and a similar position of amphidial fovea. From *M. lemani* it differs by the longer tail (a = 4.7-6.0 *vs* a = 6.0-8.3 in *M. lemani*), the different position of a vulva (V = 57-64 % *vs* V = 65-70 % in

Table 1. Morphometrics of *Monhystera melnikae* sp.n. All measurements are in μm and the form: mean ± standard deviation (range)

Characteristics	Holotype ♂	Paratypes	
		10 ♂♂	10 ♀♀
L	983	1013±77 (907-1139)	1004±56 (923-1099)
a	24	27±3 (24-32)	23±2 (19-26)
b	4.8	5.3±0.3 (4.8-5.8)	5.4±0.2 (4.9-5.6)
c	4.7	5.2±0.3 (4.7-5.6)	5.6±0.3 (5.0-6.0)
c'	7.4	7.0±0.8 (5.9-8.3)	7.5±0.9 (6.5-9.5)
V, %	–	–	61±2 (57-64)
Labial region width	14	13.5±0.7 (13.0-15.0)	13.5±0.7 (12.0-14.5)
Length of outer labial sensillae	4.0	4.0±0.4 (3.5-5.0)	4.0±0.4 (3.0-5.0)
Amphidial fovea diameter	6.0	6.0±0.4 (5.5-6.5)	4.5±0.3 (4.0-5.0)
Distance from anterior body end to amphidial fovea	17	14±3 (11-16)	18±2 (11-18)
Oesophagus length	204	191±18 (160-214)	187±12 (173-204)
Distance from oesophagus base to vulva or cloaca	571	628±54 (555-714)	429±3.0 (392-479)
Vulva to anus distance	–	–	207±14 (173-224)
Tail length	208	194±15 (176-220)	181±14 (160-204)
Vulva to anus distance / tail length	–	–	1.16±0.8 (1.08-1.29)
Spicules length (along arc)	50	49±2 (47-52)	–

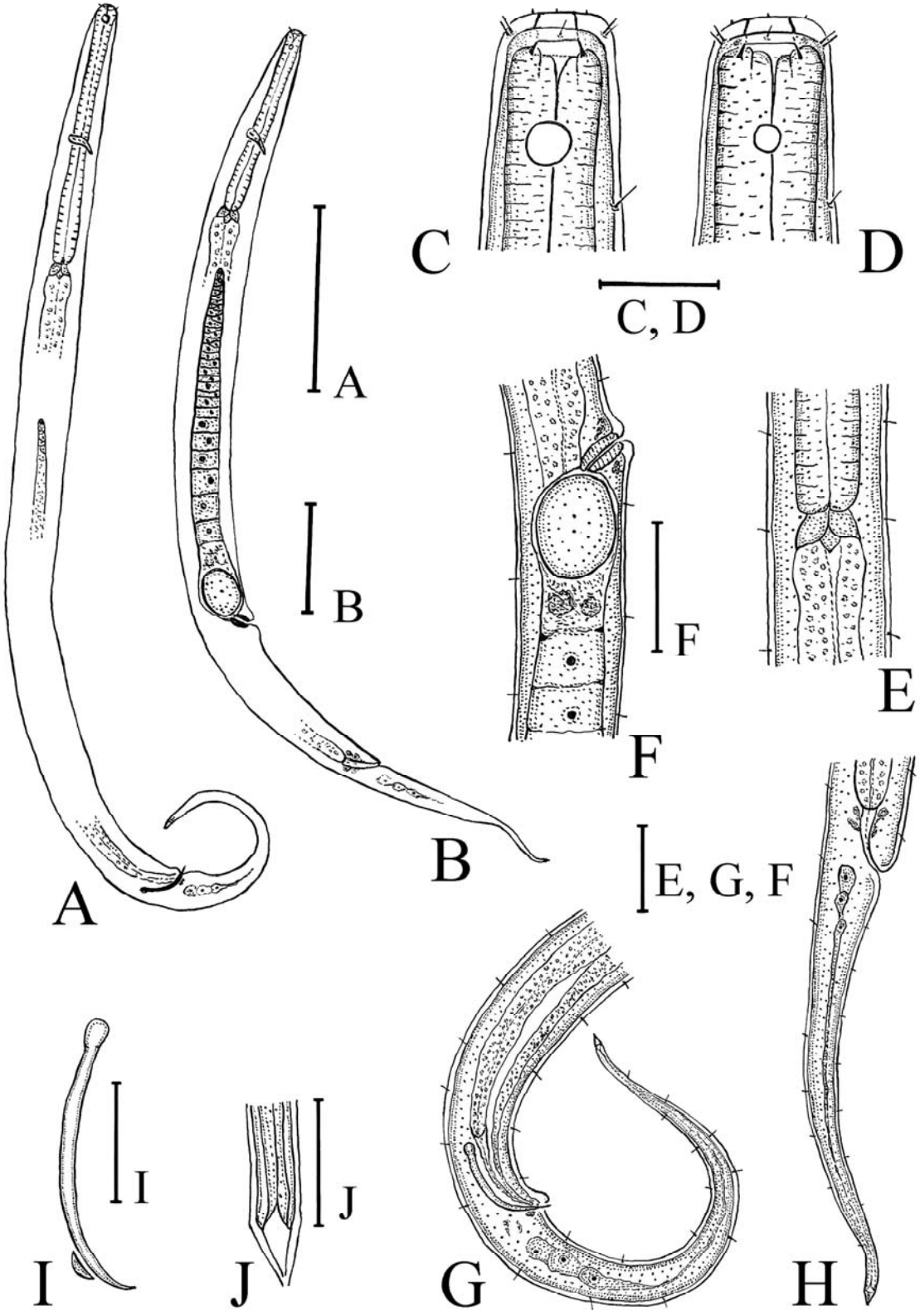

Fig. 1. *Monhystera melnikae* sp.n. A: Entire male; B: Entire female; C: Male head; D: Female head; E: Cardial region of male; F: Vulva region; G: Male tail; H: Female tail; I: Spicular apparatus; J: Tail terminus. Scale bars: A – 150 µm; B – 100 µm; C, D – 15 µm; E, F, G & H – 40 µm; I – 20 µm; J – 10 µm.

M. lemani), more posteriorly situated amphids (in 0.9-1.4 labial region diameters from anterior *vs* 0.83-0.87 labial region diameters) and shorter spicules (47-52 µm long *vs* 68-79 µm in *M. lemani* (Juget, 1969; Andrássy, 1984). From *M. amabilis* it differs by the shorter body (*L* = 907-1139 µm *vs L* = 1.3-1.7 µm in *M. amabilis*), wider labial region (12-15 µm *vs* 30-33 µm), shorter outer labial setae (3-5 µm or 25-33 % of labial region width *vs* 42-48 % or 42-48 %) and more posterior amphid position (in 0.9-1.4 labial region diameters from anterior *vs* 0.5-1.0 in *M. amabilis*) (Gagarin, 1997).

Type locality and habitat. Russia, Lake Baikal, Cape Berezovy; 3.3 m depth, silt-containing sediment. Collected 2 February 2000.

Type specimens. Holotype male, inventory slide number 74/III, deposited in the collection of the Institute of Inland Waters Biology, Russian Academy of Sciences (Borok, Yaroslavl Province, Russia). Paratypes: one female deposited in the collection of the Institute of Inland Waters Biology, Russian Academy of Sciences (Borok, Yaroslavl Province, Russia) and ten males and nine females deposited in the collection of the Limnological Institute, Siberian Branch of Russian Academy of Sciences (Russia, Irkutsk).

Etymology. *Monhystera melnikae* sp.n. is dedicated to Dr Melnik, Head of the laboratory of Limnological Institute, Siberian Branch of Russian Academy of Sciences.

Table 2. Morphometrics of *Boreolaimus communis* sp.n. All measurements are in µm and the form: mean ± standard deviation (range).

Characteristics	Holotype ♂	Paratypes	
		1 ♂	10 ♀♀
L	1576	1955	1662±140 (1508-2001)
a	36	33	40±2 (36-44)
b	4.7	5.8	4.6±0.5 (3.8-5.0)
c	19.7	25.7	14.1±1.2 (12.6-16.0)
c’	2.6	2.4	5.1±0.8 (3.8-6.4)
V, %	–	–	43±3 (40-51)
Labial region width	12	12	13.1±0.7 (12.0-13.5)
Odontostyle length	17.0	18.0	17.3±0.4 (17.0-18.7)
Odontophore length	11.0	12.0	12.0±0.3 (11-13.5)
Oesophagus length	336	339	363±53 (285-460)
Distance from oesophagus base to vulva or cloaca	1160	1540	346±48 (323-408)
Vulva to anus distance	–	–	835±101 (760-1071)
Mid-body diameter	44	54	42±4.0 (39-51)
Pre-rectum length	145	166	95±8 (78-103)
Rectum length	–	–	31±2 (28-34)
Tail length	80	76	118±10 (102-140)
Spicules length (along arc)	48	50	–
Number of supplements	11	10	–

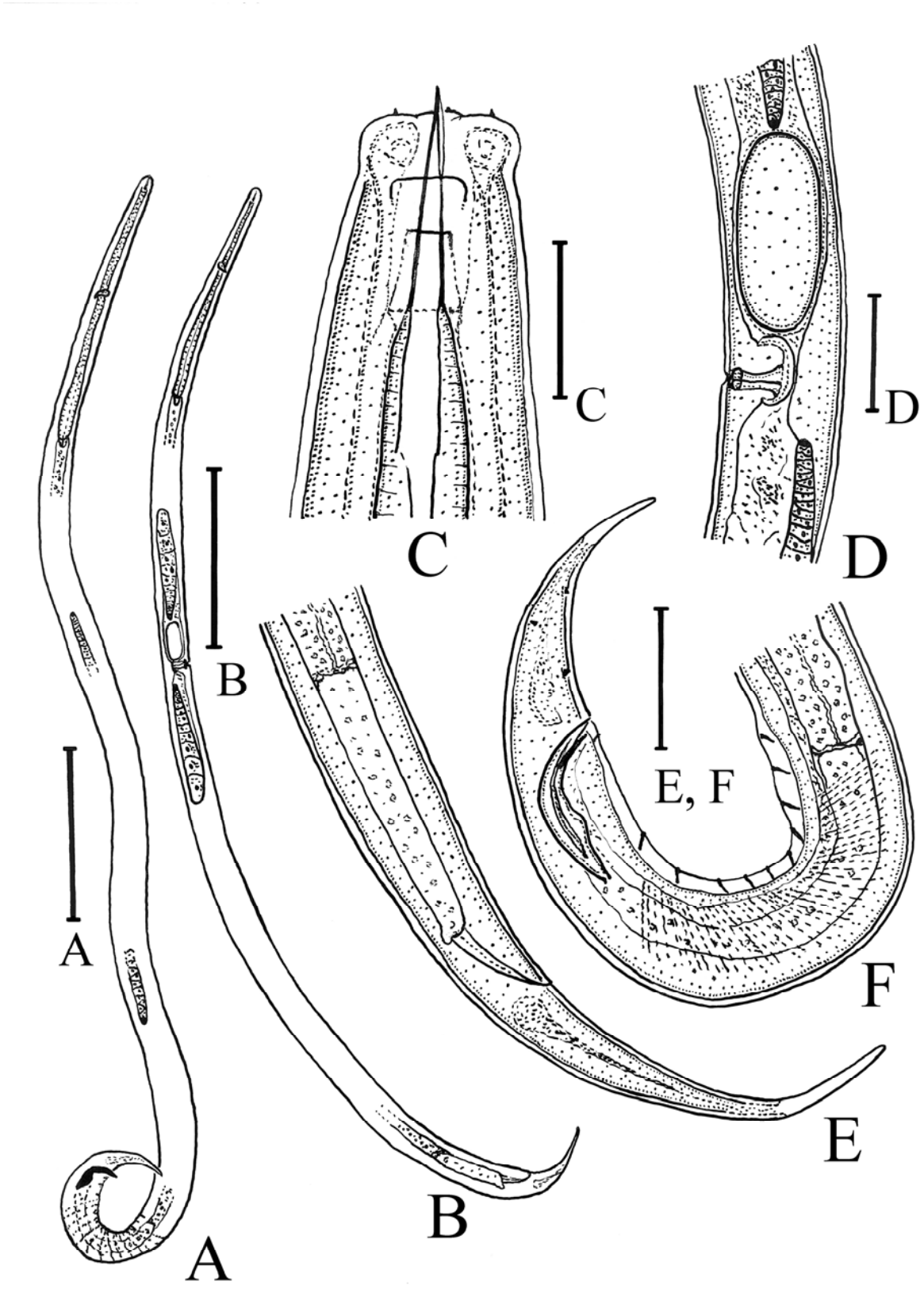

Fig. 2. *Boreolaimus communis* sp.n. A: Entire male; B: Entire female; C: Male head; D: Vulva region; E: Female tail; F: Male tail; Scale bars: B – 300 μm; A – 200 μm; D, E, F – 50 μm; C – 15 μm.

Boreolaimus communis sp.n.
(Fig.2)

Measurements: see Table 2.

Male. Body long and slender, 44-54 µm wide at mid-region. Cuticle smooth, without annulation and longitudinal ridges, 1.5-2.0 µm thick. Labial region off-set by depression, 12 µm wide; lips rounded, with small papillae. At level of oesophagus base, body 3.6 and 4.5 times wider than head. Amphidial fovea located at level of cephalic depression, 45-50 % of corresponding body diameter wide. Odontostyle straight, eight times as long as wide and 1.4-1.5 times as long as labial region width; aperture *ca* 33 % of total odontostyle length. Odontophore rod-like, wide, 0.6-0.7 odontostyle length long. Guiding sheath long, tubular, its anterior ring located behind spear aperture. Oesophagus muscular, expanding gradually to the base. Arrangement of esophageal gland nuclei: DS 42, 43 %; AS_2 34, 38 %; PS_1 69, 76 %; PS_2 71, 79 %. Cardia conoid, 15 and 16 µm long.

Genital system diorchic, with opposite testes. One precloacal supplement and a series of nine or ten regularly spaced ventromedian supplements present. Supplements small, widely spaced; the hindmost situated at level of spicules. Spicules relatively robust, curved ventrally and 1.6 times cloacal body diameter long. Lateral guiding pieces 17-18 µm long, spindle-shaped. Pre-rectum 4.6 and 5.2 times as long as cloacal body diameter, its proximity in the region of ventromedian supplements. Tail 2.4-2.6 times as cloacal diameter long, conoid, ventrally arcuate, with finely rounded tip. 'Empty' portion 28 or 30 µm long or 28 and 29 % of tail length. Caudal papillae in three pairs: two subventral and one subdorsal.

Female. General morphology similar to the males. Cuticle smooth, without annulation and longitudinal ridges. Labial region off-set by depression, 12.0-13.5 µm wide. Lips rounded, with small papillae. Amphidial fovea at level of cephalic depression, *ca* 50-55 % of corresponding body diameter wide. Odontostyle straight, 1.4-1.6 times as long as labial region width; aperture *ca* 33 % of the total odontostyle length. Odontophora rod-like, wide, 0.5-0.7 times odontostyle length. Guiding sheath long, tubular. Oesophagus muscular, expanding gradually to the base. Oesophageal gland nuclei indistinct, its arrangement (n=4): D 38-42 %, AS_2 41-44 %, PS_1 72-75 %, PS_2 74-77 %. Cardia conoid, 13-16 µm long. Pre-rectum long, 3.7-4.5 anal diameters long, with a short dorsal caudal sack. Rectum straight, 1.3-1.4 anal diameters long.

Reproductive system didelphic, amphidelphic. Vulva in shape of transverse slit. Vulva lips non-sclerotized and not protruding outside body contour. Ovaries relatively short, almost reaching vulva. Oocytes numerous, initially in two rows, then in single row. Oviduct and uterus relatively short. Uterus with small, spindle-shaped spermatozoa. One female with one mature egg, measuring 87 x 35 µm. Vagina extending over half of body diameter: *pars proximalis vaginae* 23-25 µm long, with weakly sigmoid contours; *pars refringens vaginae* consisting of rounded sclerotizations; *pars distalis vaginae* short. Tail long, 3.8-6.4 times as long as anal diameter, conoid, ventrally arcuate, with finely rounded tip. 'Empty' portion 40-52 µm long, 30-35 % of tail length. Caudal papillae absent.

Differential diagnosis. *Boreolaimus communis* sp.n. is characterised by its moderately long and slender body (L = 1576-2001 µm, a = 33-44), a short odontostyle and odontophore, non-sclerotised vulval lips, relatively small eggs, the long tail, the relatively long 'empty' portion of the body and the presence of males.

The new species is most similar to *B. septemtrionalis* Andrássy, 1998 but differs from it by the shorter female tail (c = 12.6-16.0 *vs* c = 10-12), the shorter odontostyle (17.0-18.7 µm long *vs* 24-28 µm long), the absence of 'saccate bodies' in the female tail and the presence of males.

Type locality and habitat. Russia, Lake Baikal, Cape Berezovy; 3.3 m depth, silt-containing sediment. Collected 2 February 2000.

Type specimens. Holotype male, inventory slide number 66/III, deposited in the collection of the Institute of Inland Waters Biology, Russian Academy of Sciences (Borok, Yaroslavl Region, Russia). Paratypes: one male and two females deposited in the collection of the Institute of Inland Waters Biology, Russian Academy of Sciences (Borok, Yaroslavl Region, Russia) and eight females in the collection of the Limnological Institute, Siberian Branch of Russian Academy of Science (Russia, Irkutsk).

Etymology. The species name is derived from the Latin word "*communis*' (common).

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Гагарин В. Г., Наумова Т. В. Два новых вида свободноживущих нематод из озера Байкал**,** Россия**.**

Резюме. Приводится описание *Monhystera melnikae* sp. n. и *Boreolaimus communis* sp. n. из оз. Байкал. Вид *Monhystera melnikae* sp. n. близок к *M. lemani Juget,* 1969 и *M. amabilis* Gagarin, 1997, но отличается от *M. lemani* большей длиной хвостового конца, иным расположением вульварного отверстия, смещенными кзади отверстиями амфидов и короткими спикулами. От *M. amabilis* этот вид отличается меньшей длиной тела, более широкой областью губ, короткими губными щетинками наружного круга и смещенными кзади отверстиями амфидов. *Boreolaimus communis* sp. n. близок к *B. septemtrionalis* Andrássy, 1998, от которого отличается меньшей длиной хвостового конца, коротким одонтостилем, отсутствием ‘мешковидных тел’ на постанальной части тела самок и наличием самцов.