

**The Lesser Mole Rat (*Spalax leucodon* Nordm.) as a New Host  
of *Moniliformis moniliformis* (Bremser, 1811) Meyer, 1933  
(Acanthocephala, Moniliformidae)**

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The research staff of the Hungarian Natural History Museum are presently conducting investigations on the life history and population of the lesser mole rat (*Spalax leucodon* Nordmann, 1840) whose numbers are markedly decreasing owing to the expansion of large-scale agricultural practice. The parasites of the species are also being studied. For this purpose, nine specimens of the rodent have been made available, four of which proved to be infected by parasites. Besides Nematodes, two individuals also harboured Acanthocephalids.

No literature reporting Acanthocephalid parasites of *Spalax* species could be found.

The Museum staff collect the host chiefly in the neighbourhood of the village of Hajdubagos, in the county of Hajdu-Bihar. The two specimens, infected by Acanthocephalid parasites as well as the Nematode *Heligmosomum spalacis* Kirs., which is new to our fauna (MÉSZÁROS, 1968), also came from this locality (collected by SZUNYOGHY, 24 May, 1967). With respect to longitudinal measurement, the 135 specimens, of diverse developmental stages but belonging to a single species, were distributed as follows:

In the small intestine of one of the lesser mole rats, one immature, 38 mm long, female Acanthocephalid was found. In the other specimen were found 102 juvenile parasites of 1 to 40 mm in length, and 32 mature ones whose distribution as to sex and size is given below 18 male specimens:

18 male specimens:

40 mm - 11 individuals  
43 mm - 2 individuals  
45 mm - 2 individuals  
48 mm - 2 individuals  
50 mm - 1 individual

14 female specimens:

59 mm - 1 individual  
63 mm - 1 individual  
65 mm - 2 individuals  
67 mm - 2 individuals  
70 mm - 2 individuals  
72 mm - 2 individuals  
77 mm - 1 individual  
78 mm - 3 individuals

The specimens were conserved in 70 per cent alcohol and cleared in lactic acid and lactophenol. The eggs were examined in Berlese solution as well as in glycerine, and the hooks in glycerine. Permanent mounts were stained by lactic acid carmine, cleared in clove oil, and embedded in Canada balsam.

The parasites represent the species Moniliformis moniliformis (Bremser, 1811) Meyer, 1933. No Acanthocephalid parasites having previously been found in either the lesser mole rat or any other *Spalax* species (MEYER, 1953; BABOS, 1955; PETROTSCHENKO, 1958; ANDREYKO, 1963; CHIRIAC et HAMAR, 1966; EDELENYI, 1966), *Spalax leucodon* is a new reported host for Moniliformis moniliformis.

On the basis of the available specimens, Moniliformis moniliformis (Bremser, 1811) Meyer, 1933, can be described as follows:

Order: Oligacanthorhynchida Petrotschenko, 1956  
Family: Moniliformidae Van Cleave, 1924  
Genus: Moniliformis Travassos, 1915

The parasite is a large-sized Acanthocephalid with a filiform and pseudo-segmented body (Fig. 1). The body wall is thin numerous lacunae. The proboscis is cylindrical, slightly tapering at the

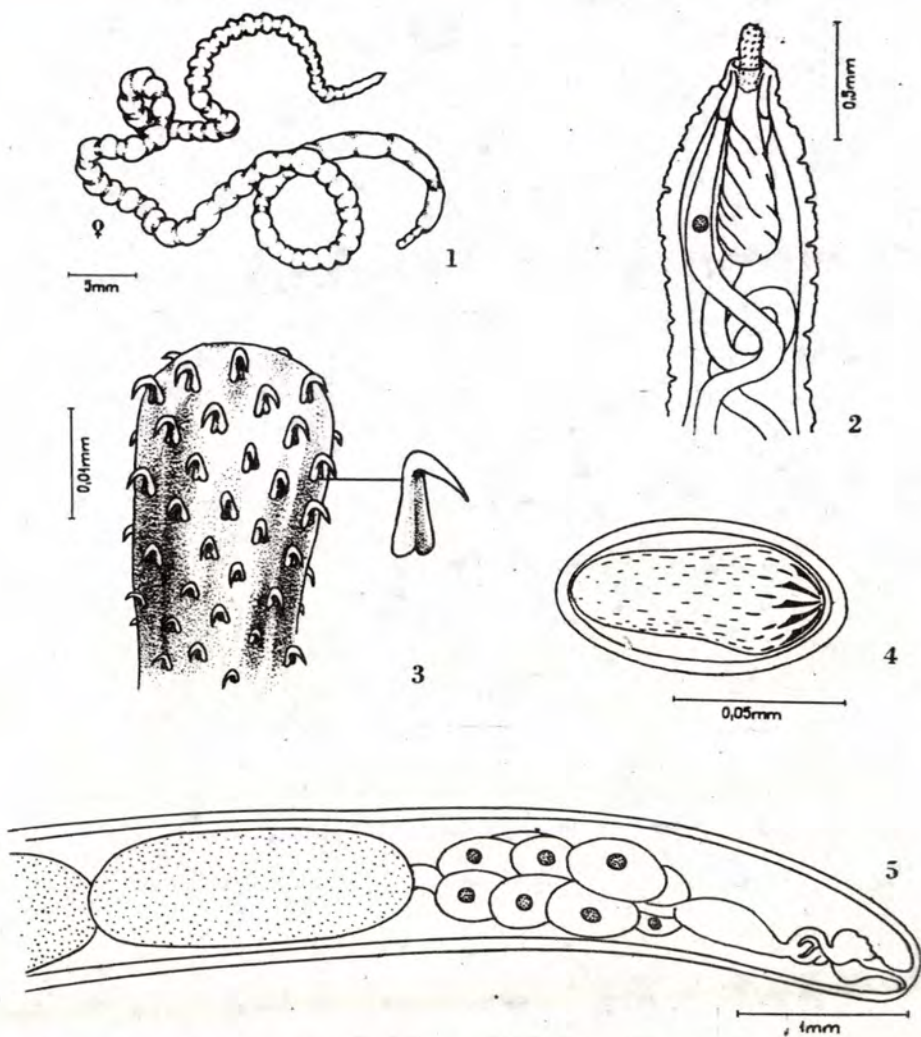


Fig. 1: Habit of Moniliformis moniliformis (Bremser, 1811) Meyer, 1933; Fig. 2: anterior section of body; Fig. 3: proboscis; Fig. 4: mature egg; Fig. 5: posterior section of body with cement glands and testes.

1. ábra: Moniliformis moniliformis (Bremser, 1811) Meyer, 1933 habitusképe; 2. ábra: a féreg elülső vége; 3. ábra: ormánya; 4. ábra: érett pete; 5. ábra: ♂ hátulsó testvége cementmirigyekkel és herékkel.

base, 0.350 to 0.500 mm in length, and never less than 0.220 mm even in juvenile specimens. The apical width of the proboscis is 0.140 to 0.170 mm, and at the base is 0.120 to 0.150 mm. There are twelve uneven rows of hooks, having 8 hooks per row, seldom 7 or 9. The root of the apical hooks is massive and slightly bifurcated. The hooks gradually decrease in size toward the base, noticeably so beyond the fifth row of hooks (Fig. 3). The root of the lower hooks is simple. The barb length is 0.025 mm (average of second row of hooks), and the height of hooks 0.028 mm. In the fifth row, these values decrease to 0.018-0.020 mm. The shape and dimensions of the hooks are constant, the above values occurring even in immature specimens. The proboscis sheath is a double-walled muscular organ with a distinct spiral pattern on its external surface; 0.500 to 0.840 mm (Fig. 2). Lemnisci are ribbon-shaped, 4 to 14 mm long, 0.070 to 0.080 mm broad, and loosely intertwined in the body cavity (Fig. 2).

Males are 40 to 50 mm long, with a trunk width of about 1 mm. Annulation is less conspicuous on males than on females, pseudo-segmentation being hardly discernible on juvenile males. The anterior and posterior ends of the body are not annulate, and the posterior fourth curves in. The male sexual organs are situated in the posterior third of the trunk (Fig. 5), the testes being large, oval, adjacent, and having a combined size of 4 to 5 mm. Eight cement glands are present, the diameter of one gland being 0.300 mm.

Females are 59 to 210 mm long, the greatest width of body being at its posterior third: 2 to 3 mm. Pseudo-segmentation is conspicuous even in immature specimens. An immense number of eggs is present; their sheaths thin, and weakly resistant (Fig. 4). Dimensions of mature eggs found in the *Spalax* specimens are 0.088 by 0.050 mm, while those found in *Citellus* specimens, used for comparison, are 0.100 by 0.067 mm (in a 111 mm long female). The length of immature eggs in juvenile females is 0.040 mm. Dimensions of embryos are 0.070 by 0.031 mm, embryonal hooks being 0.010 to 0.012 mm long.

M. moniliformis (Bremser, 1811) Meyer, 1933, is a cosmopolitan spe-

cies. The known hosts are diverse rodents, further hedgehogs and polecats. Under laboratory conditions, it develops in foxes and also in man (PETROTSCHENKO, 1958).

Localization: small intestine.

Postembrional development takes place in Tenebrionid and Blattid species.

PETROTSCHENKO (1958) distinguishes three subspecies of M. moniliformis (Bremser, 1811) Meyer, 1933, according to differences in body measurements, proboscis length, configuration of hooks, and number of hook rows and hooks per rows (M. moniliformis moniliformis Meyer, 1933; M. moniliformis siciliensis Petrotschenko, 1958; M. moniliformis aegyptiacus Petrotschenko, 1958). Of these, two - namely the nominate form and ssp. siciliensis -, occur in Europe.

On morphological characteristics, the specimens collected from the small intestine of the lesser mole rat most closely resemble the nominate form, M. moniliformis moniliformis Meyer, 1933 (MEYER, 1933; VAN CLEAVE, 1953; BABOS, 1955; PETROTSCHENKO, 1958), but their body length is comparable to that of M. moniliformis siciliensis Petrotschenko, 1958 (Table 1.). However, they cannot be assigned to that category, since the proboscis of ssp. siciliensis bears 14 rows of hooks, whereas my specimens exhibit merely 12 rows of hooks.

To decide whether the small measurements are due to the great population density or actually represent features characteristic of a new subspecies, I endeavoured to obtain comparative material from small mammals of the same locality. Accordingly, I have examined 17 Moniliformis specimens found in the small intestine of 6 gophers (Citellus citellus L.) infected with Acanthocephalids (collected by MÉSZÁROS, 28 September, 1966, and MATSKÁSI et SZABÓ, 5 July, 1968). Their measurements (in mm) are as follows:

Five immature males: 12- to 22

Two immature females: 12-60

Four mature males: 28-31

Six mature females: 87, 103, 111, 130, 185, 210.

Table 1.: Measurements (in mm) of Moniliformis moniliformis (Bremer, 1811) Meyer, 1933 specimens found in Spalax leucodon and Citellus citellus collated with the published data

Published data - Irodalmi adatok

	Meyer, 1933	Van Cleave, 1953	Babos, 1955	Petrotschenko, 1958	
				M.monili. monilif.	M.monili. sicilien.
body dimensions	♀ 115-270	-	♀ 115-270 ♂ 45-60	♀ 131 ♂ 82	♀ 70-80 ♂ 40-50
mean body length	♀ -320 ♂ -145	-	-	-	-
length of proboscis	-	0.500- 0.640	0.390- 0.450	0.360- 0.400	0.425- 0.450
mean proboscis length	0.358	-	-	-	-
apical breadth of proboscis	0.170	0.150- 0.240	0.170	0.160	0.176- 0.190
basal breadth of proboscis	0.125	-	-	0.140	-
mean of hooks in row 2	-	0.02- 0.03	-	<u>0.020-022</u> <u>0.026-029</u>	-
mean of hooks in row 5	-	-	-	-	-
number of hook rows	12	12-14	-	12	14
number of hooks per row	7-8	10-11 (9-12)	-	7-8	8 (7)
length of lemniscus	-	4-7.5	10	11.5	10
dimensions of eggs	<u>0.067</u> <u>0.032</u>	<u>0.090-125</u> <u>0.050-062</u>	<u>0.067-070</u> <u>0.032</u>	<u>0.067</u> <u>0.032</u>	<u>0.085</u> <u>0.045</u>
dimensions of embryo	<u>0.052</u> <u>0.020</u>			<u>0.052</u> <u>0.020</u>	

1. táblázat: *Spalax leucodon*-ban és *Citellus citellus*-ban talált *Moniliformis moniliformis* (Bremser, 1811) Meyer, 1933 példányok méretadatai (mm-ben) összevetve a vonatkozó irodalmi adatokkal

Author's data - A szerző adatai

host - gazda <i>Spalax leucodon</i>		host - gazda <i>Citellus citellus</i>		
♀	♂	♀	♂	
59-78	40-50	87-210	28-34	testméret
70	42	138	31	testhossz átlaga
0.340- 0.384	0.358- 0.503	0.373- 0.600	0.260- 0.497	ormány hossza
0.364	0.449	0.496	0.414	ormányhossz átlaga
0.154	0.147	0.165	0.155	ormány apicalis széless.
0.125	0.124	0.140	0.130	ormány basalis széless.
$\frac{0.025}{0.028}$	$\frac{0.024}{0.027}$	$\frac{0.025}{0.029}$	$\frac{0.025}{0.026}$	a 2.horog átlagos mérete
$\frac{0.019}{0.019}$	$\frac{0.018}{0.018}$	$\frac{0.019}{0.018}$	$\frac{0.015}{0.017}$	az 5.horog átlagos mérete
12	12	12	12	horogscrok száma
8	8	8	8	horgok száma soronként
4	4-5.2	10-14	5-7	lemniscus hossza
$\frac{0.088}{0.050}$		$\frac{0.100}{0.067}$		pete mérete
$\frac{0.070}{0.031}$		$\frac{0.067}{0.038}$		embrió mérete

I have thoroughly examined the dimensions of the proboscis, the hooks, the lemmisci, the proboscis sheath, the testes, the eggs, the embryo and the embryonal hooks, of all mature M. moniliformis specimens found in both the lesser mole rats and the gophers. The mean values, as well as data recorded in the literature are summarized in the Table.

The Moniliformis specimens obtained from gophers attain the measurements reported in the literature, while, in certain other respects, they agree with the individuals found in the lesser mole rats. I found no constant feature by which the material examined could be distinguished from the nominate form, hence I relegate it to M. m. moniliformis Meyer, 1933, as interpreted by PETROTSCHENKO (1958). Further investigations, extending over our entire faunal area, may, however, reveal additional or diverging results.

#### S u m m a r y

In the small intestine of two lesser mole rats (Spalax leucodon Nordm.), 135 Acanthocephalid specimens representing Moniliformis moniliformis (Bremser, 1811) Meyer, 1933, were found. Spalax leucodon is a new host for the parasite, and this is the first record of the occurrence of this parasite in the rodent. To clarify the subspecific classification of the parasites, the author examined 17 Moniliformis parasites from gophers (Citellus citellus L.), collected in the same locality. The specimens examined proved to belong to the nominate form of the species, namely to M. m. moniliformis Meyer, 1933.

#### MURAI, É.: A Moniliformis moniliformis (Bremser, 1811) Meyer, 1933 (Acanthocephala, Moniliformidae) új gazdaállata a földikutya (Spalax leucodon Nordm.)

A Természettudományi Múzeum kutatói rendszeresen vizsgálják a földikutya (Spalax leucodon Nordm., 1840) életmódját, biológiai és populációs viszonyait, s ujabban parazitáltságát is. A Hajdu-



Bihar-megyei Hajdubagos község környékéről származó 9 földikutya példány helmintológiai vizsgálata során 4 példányban találtak Nematodákat s ezek közül kettőben Acanthocephalákat is.

A földikutyában vagy más Spalax-fajban élő Acanthocephala élősködőről e dolgozat közül első ízben adatot. A talált Acanthocephala példányok a Moniliformis moniliformis (Bremser, 1811) Meyer, 1933 fajhoz tartoznak. E fajnak a földikutya új gazdája.

Annak eldöntésére, hogy a földikutya Moniliformis élősködője melyik alfajhoz sorolható, a szerző azonos lelőhelyről származó ürgek (Citellus citellus L.) Moniliformis élősködőit is vizsgálta. Az összehasonlító vizsgálat alapján a földikutyából származó anyagot a PETROTSCHENKO (1958) értelmezése szerinti Moniliformis moniliformis moniliformis Meyer, 1933 alfajhoz sorolja, de megjegyzi, hogy e kérdésben egész faunaterületünkre kiterjedő vizsgálat még új eredményt hozhat. Az e problémára utaló vizsgálati és irodalmi adatokat a szerző táblázatban foglalta össze.

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