

THE NEMATODES OF LAKE BALATON. II. THE NEMATODES OF THE OPEN WATER MUD IN THE KESZTHELY BAY

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The first data concerning the Nematoda-fauna of Lake Balaton were first published at the end of the last century, in the comprehensive work titled „Resultate der Wissenschaftlichen Erforschung des Balatonsees (DADAY 1897). This was the first and for a long time afterwards the sole work which gave a systematic and summary report on the nematodes of the lake, and it was only at the beginning of the thirties that however MESCHKAT (1934) in his extensive study on the Phragmitetum of Lake Balaton, established the important role of nematodes in the structure of the coatings of the reed.

BÉLA ENTZ (1954) found, by sifting through 0.1 mm mesh sieves sediment samples material for mudliving animals collected by an EKMAN—BIRGE dredge, that Nematodes occurred in 41 individual percentage numbers of the animals found in the samples (about 2 per cent in weight). The inference was that these animals play a significant role in the mud of the open waters (eprofundal).

Table 1
Some data of the collecting conditions

Date	Water temperature in C°	Depth of water	Remarks
1966 V. 17.	19	270	strong waves
VI. 14.	23	296	
VII. 26.	19.5	297	
VIII. 23.	22	287	
IX. 21.	17	274	strong waves
X. 18.	16	280	
XI. 15.	4	241	
1967 IV. 11.	12	282	medium waves
V. 16.	19	268	
VI. 20.	20	271	
VII. 17.	20	268	
VIII. 15.	20	244	
IX. 19.	16.5	255	
X. 17.	16	266	

The changes in the life of our lake made it necessary to attempt a new assessment of the mud fauna. The aim of our investigations was a survey of the qualitative and quantitative conditions of the nematodes in the sediment of the Keszthely Bay, with, as far as possible, observations on their spatial and temporal distributions.

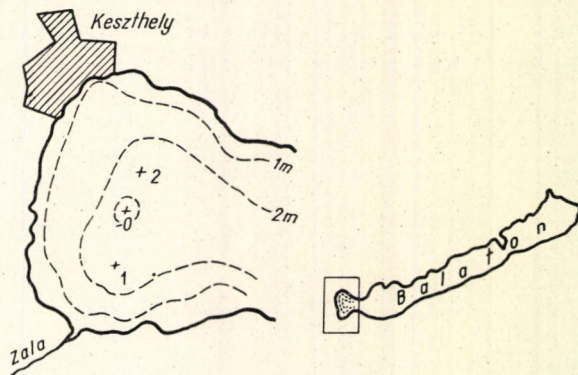


Fig. 1. Sampling points in the Keszthely Bay (1, 0, 2)

1. ábra. Gyűjtőhelyek a Keszthelyi-öbölben
1, 0, 2 a mintavétel helye

Collecting and methods

Material was collected monthly, from May till November, 1966, and from April till October, 1967, in three points of the Keszthely Bay, from the bottom mud of the open water at nearly 3 m depths (Fig. 1). Three samples were taken at one point each, and the samples combined and treated as a single one. Thus one sample derived from about 40 cm². Table I shows some date of the conditions of collecting. The samples were taken from the upper 1–2 cm layer of the mud by a modified Craib apparatus, suitable for both qualitative and quantitative studies (PONYI, BIRÓ and P.-ZÁNKAI 1967). The mud sample was filled up to 400 ml and, after a thorough shaking, 120 ml placed in a No. 25 plankton net; then the mud and other ingredients of a colloidal order of magnitude eliminated by filtered tap-water, added continuously and in a fine stream to the sample. The clear and transparent sample was poured into a Petri dish, and the living nematodes selected from among the detritus particles under a $\times 10$ magnification.

Results and discussion

1. *Nematodes new for the fauna of the lake*

DADAY* reported 28 nematodes from the lake, while MESCHKAT only 1, thus a total of 29 species became known from the Balaton. Of the species

* DADAY (1897) listed 36 nematode species from the entire lake. Since 1897, several species have been synonymized; some described ones are not generally accepted (spec. inqu.) (ANDRÁSSY, 1958, A. MEYL, 1960, Soós, 1940).

listed by these authors we have found 8, and 9 further ones new for the lake (Table 2).

Paraphanolaimus behningi is known from merely some few localities in Europe. Though already shown from Hungary, the hitherto unknown male sex was now also found (Fig. 2). The spicules of the 26 collected male specimens are long, curved, the gubernaculum short, the number of the well developed, tubiform, praeanal organs is 11–16, but mostly 13. The tail of the male specimens is similar in length and shape to that of the females.

♂ L = 0.9–1.2 mm, a = 29–35, b = 4.0–4.5, c = 5.4–8.1

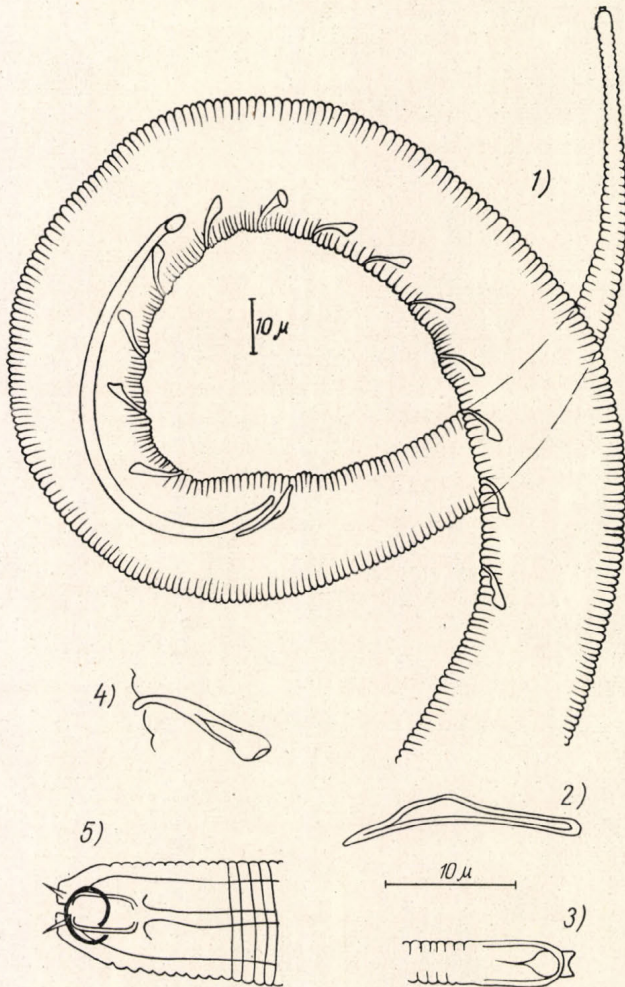


Fig. 2. *Paraphanolaimus behningi*, male

1. Caudal section, 2. Gubernaculum, 3. Caudal end with anal tube, 4. Praeanal papilla, 5. Cephalic extremity

2. ábra. Hím *Paraphanolaimus behningi*

1. Az állat caudalis része; 2. Gubernaculum; 3. Farokvég a kivezetőcsővel; 4. Praeanal papilla; 5. Állat feje

Table 2
Qualitative and quantitative distribution of Nematodes in the Keszthely Bay during the months April — November in
1966—1967
The data refer to 1 m²

Species	Date													
	1966							1967						
	V.	VI.	VII.	VIII.	IX.	X.	XI.	IV.	V.	VI.	VII.	VIII.	XI.	X.
<i>Aphanolaimus aquaticus</i> DADAY						31				30				29
<i>Ethmolaimus pratensis</i> de MAN										62				
<i>Hemicycliophora aquatica</i> (MIC.) LOOS														28
<i>Ironus colourus</i> STEINER													31	
<i>Ironus tenuicaudatus</i> de MAN	394	576	485	758	184	243	667	787	1031	574	395	910	788	1275
<i>Mesodorylaimus</i> sp. juv.				34				61					30	
<i>Monhystera macramphs</i> FILIPJEV	93	34		90	33		93	179					91	
<i>Monhystera paludicola</i> de MAN	757	606	29	122	393	273	971	2243	35	59		60	123	31
<i>Monhystera stagnalis</i> BASTIAN		64	61		30		30	62	33					
<i>Neochromadora izhorica</i> (FIL.) W. SCHNEIDER					120									
<i>Paraphanolaimus behningi</i> MICOLETZKY	32	242	668	397	333	576	364	363	280	455	664	270	271	516
<i>Paraplectonema pedunculatum</i> (HOFM.) STRAND	362	151	332	2907	819	212	427	362	272	421	241	755	1578	61
<i>Plectus</i> sp.										31		32		
<i>Punctodora dudichi</i> ANDRÁSSY				32										
<i>Theristus setosus</i> (BÜTS.) FILIPJEV	213	121			28	153	1151	1517	700	211	124	61	303	154
<i>Tobrilus gracilis</i> (BAST.) ANDRÁSSY	152	62		65	34		93	392	89	33		92	214	
<i>Tripyla glomerans</i> BASTIAN									64					

Neochromadora izhorica lives in brack-waters (mixohaline), occurring occasionally also in fresh water. The specimens found now, one male and three females, are new for the fauna of Hungary.

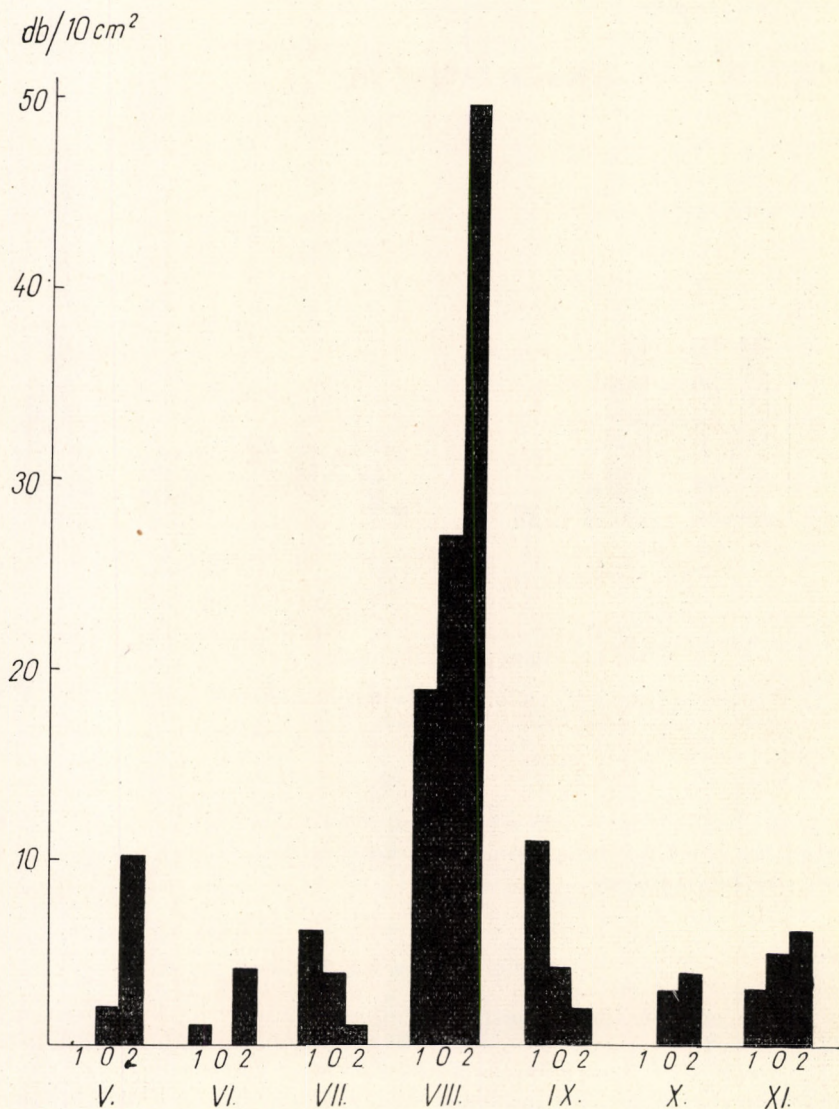


Fig. 3. The occurrence of *Paraplectonema pedunculatum* in the Keszthely Bay In May—November, 1966; Sampling point 1, 0, 2

3. ábra. *Paraplectonema pedunculatum* előfordulása a Keszthelyi-öbölben 1966 V.—XI. hónapjaiban
1, 0, 2 a gyűjtőhelyek

Paraplectonema pedunculatum is characteristically aquatic, inhabiting mainly standing or slowly streaming waters. Rare in Europe, but rather frequent in the Keszthely Bay. New for the fauna of the Balaton.

Monhystera paludicola and *M. macramphis*, as well as *Ethmolaimus pratensis*, can be usually found in every aquatic habitat; all are new for the mud fauna of the Balaton.

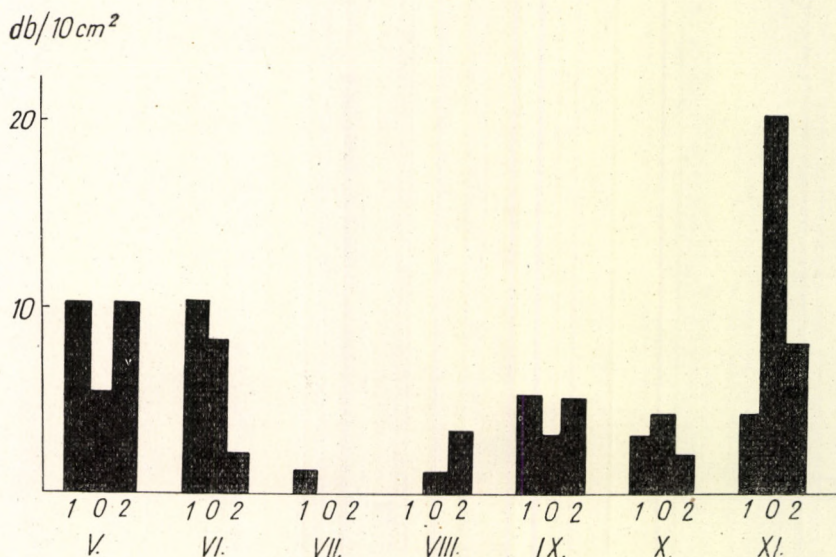


Fig. 4. The occurrence of *Monhystera paludicola* in the Keszthely Bay, in May–November, 1966; Sampling points 1, 0, 2

4. ábra. *Monhystera paludicola* előfordulása a Keszthelyi-öbölben 1966. V.–XI. hónapjaiban
1, 0, 2 a gyűjtőhelyek

Hemicycliophora aquatica and *Punctodora dudichi* ANDRÁSSY, 1966, are reported for the first time from the lake, whereas *Ironus colourus* STEINER, is new also for Hungary.

2. Quantitative conditions

Ironus attains the highest individual numbers in the Keszthely Bay (Table 2). On the basis of the quantitative data obtained during the two years research work, this species shows a more or less even occurrence. No unequivocal seasonal changes can be demonstrated, though its location in the three points of the bay is rather varying. Some calculations have been made to see whether a significant difference as to individual numbers exists between the several collecting localities, per months or years. No such were found; indeed, a correspondence above 50 per cent could be established ($P > 0.5$). In the survey period, the main occurrence of *Ironus tenuicaudatus* was 58 ind/dm².

Paraplectonema pedunculatum occupies quantitatively the second place with reference to the survey period. Its nearly uniform and even occurrence was severely interrupted in August, 1966. A significant difference can be shown between the months July, August, and September (Fig. 3). The number of *Paraplectonema* specimens again increased at the end of summer in 1967, though at a smaller rate. Owing to this great change in numbers, no satisfactory average can be given for the entirety of the research period.

The quantity of *Paraphanolaïmus behningi* was practically the same or nearly the same in both years, though its occurrence in the 3 survey points of the Keszthely Bay was uneven. No differences as to months or years could be shown. The occurrence main was 31 ind/dm² during the research period.

The occurrence data of *Monhystera paludicola* refer to a greater frequency in colder waters. According to the observations in 1966, the species appears in greater numbers during autumn and in the spring, its occurrence being meagre in summer (Fig. 4). The data of 1967 show a similar tendency.

The occurrence of *Theristus setosus* resembles that of *Monhystera*. It inhabits rather cold waters.

Summary

The author investigated the open water mud of the Keszthely Bay in the Balaton, in the months May—September, 1966, and April—October, 1967. It was demonstrated that about 90 per cent of the Nematode population are represented by 5 species (*Ironus tenuicaudatus*, *Paraplectonema pedunculatum*, *Paraphanolaïmus behningi*, *Monhystera paludicola*, and *Theristus setosus*). The hitherto unknown male of *Paraphanolaïmus behningi* was discovered. *Paraplectonema pedunculatum*, being rare all over Europe, was observed in great numbers. *Neochromadora izhorica* and *Ironus colourus* is reported as new for the fauna of Hungary.

REFERENCES

- ANDRÁSSY, I. (1954): Über einige von Daday beschriebene Nematodenarten. — *Zool. Anz.* **152**, 138—144.
- ANDRÁSSY, I. (1958): Szabadonélő Fonálférgek (*Nematoda libera*). In: *Magyarország Állatvilága* **3**, 1—362.
- ANDRÁSSY, I. (1964): Ein Versuchsschlüssel zur Bestimmung der Tobrilus-Arten (Nematoda). — *Ann. Univ. Sci. Bp. Sect. Biol.* **7**, 1—18.
- ANDRÁSSY, I. (1967): Nematoden aus interstitiellen Biotopen Skandinaviens, gesammelt von P. H. ENCKELL (Lund). 1. Nematoden aus der Uferregion des Vättern- und Torneträsk-Sees (Schweden). — *Opusc. Zool. Bp.* **7**, 3—36.
- DADAY, J. (1894): Újabb adatok a Balaton mikrofaunájának ismeretéhez. — *Mathem. Term. Tud. Ért.* **12**, 122—145.
- DADAY J. (1897): Balaton faunája IV. Fonálférgek (Nematoda). — *A Balaton Tudományos Tanulmányozásának Eredményei* **2**, Bp. 75—109.
- DADAY, J. (1897): Die freilebende Süßwasser-Nematoden Ungarns. — *Zool. Jahrb. Syst.* **10**, 91—134.
- ENTZ B. (1954): A Balaton termelésbiológiai problémái. — *MTA Biol. és Orvos Tud. Oszt. Közlem.* **5**, 433—448.
- MESCHKAT, A. (1934): Der Bewuchs in den Röhrichte des Plattensees. — *Arch. f. Hydrobiol.* **27**, 436—517.

- MEYL, A. (1960): Freilebende Nematoden. In: *Die Tierwelt Mitteleuropas*. 5.a. 1—164.
 PONYI J., BIRÓ K., P.-ZÁNKAI N. (1967): A Balaton iszaplakó állatainak gyűjtéstechnikája és problémái. — *Állatt. Közl.* **59**, 129—134.
 Soós A. (1940): Magyarország szabadon élő fonálférgeinek jegyzéke. — *Ann. Hist. Nat. Mus. Hung.* **33**, 79—97.

A BALATON NEMATODÁI II. A KESZTHELYI-ÖBÖL NYILTVÍZI ISZAPJÁNAK NEMATODÁI

Összefoglalás

Biró Kálmán

A szerző 1966. V.—XI. és 1967. IV.—X. hónapban vizsgálta a Balaton Keszthelyi-öblének nyíltvízi iszapját. Kimutatta, hogy 5 faj (*Ironus tenuicaudatus*, *Paraplectonema pedunculatum*, *Paraphanolaimus behningi*, *Monhystera paludicola*, *Theristus setosus*) adja a Nematoda-állomány mintegy 90%-át. Megtalálta a *Paraphanolaimus behningi* eddig ismeretlen hímét. Megfigyelte az Európa-szerte ritka *Paraplectonema pedunculata*-t nagy számban. Feljegyezte a Magyar Faunára új fajként a *Neochromadora izhorica*-t.

НЕМАТОДЫ ОЗЕРА БАЛАТОН. II. НЕМАТОДЫ ИЛИ ОТКРЫТОЙ ЧАСТИ КЕСТХЕЙСКОГО ЗАЛИВА

К. Биро

Ил открытой части Кестхейского залива озера Балатон исследовали с мая по ноябрь 1966 г. и с апреля по октябрь 1967 г. Установлено, что 90% нематод представлено пятью видами: (*Ironus tenuicaudatus*, *Paraplectonema pedunculatum*, *Paraphanolaimus behningi*, *Monhystera paludicola*, *Theristus setosus*). Обнаружен ненаходимый до сих пор самец *Paraphanolaimus behningi*. В большом количестве найден *Paraplectonema pedunculata*, который редко встречается в Европе. Описан новый для фауны Венгрии вид *Neochromadora izhorica*.