ANNAL. BIOL. TIHANY | 41 | 289–315 | HUNGARIA 1974

PRESENT AND PAST OCCURRENCE OF MEMBERS OF THE GENUS *FILINIA* BORY DE ST. VINCENT, 1826 (TESTUDINELLIDAE ROTATORIA) IN LAKE BALATON

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Recevied: 25th April, 1974

Introduction

Paleolimnological studies established that remains of pelagic organisms are very scarce in the quaternary sediments in Lake Balaton in comparison to those of benthic (substrate) forms. (SEBESTYÉN, 1969 : 234).

Because all members of the *Filinia* genus exhibit a pelagic mode of life, remains of *Filinia* resting eggs in the sediments suggest the presence of open water situation at periods corresponding to the layers from where the remains had been recovered. *Filinia* then could be added to the rather brief list of pelagic organisms which very likely inhabited the lake since the most remote past (*Bosmina longirostris*, copepods, *Botryococcus*, clathrate forms of *Pediastrum* etc.). (SEBESTYÉN, 1969 : 297).

This study investigates at the species level the connection between remains of *Filinia* resting eggs recovered from the sediments in this lake, amictic females occurring at our time, as well as the resting eggs found in both plankton and neuston samples.

In attempting to approach the problem some difficulties should be mentioned: although there are for over seven decades written records and publications on the presence of *Filinia* in Lake Balaton there exist no figures on the species mentioned. There are also no measurements of both the body proper and the body with appendages relative to specimens individually, except those included in this paper of the population No 423 (p. 306). In the earliest papers on the presence of *Filinia* in Lake Balaton there are, however, some general remarks on the body sizes of both "*Filinia terminalis* and *Filinia longiseta*" (NÁDAY, 1914; VARGA, 1932). These will be discussed in details in the following parts of this paper.

I. Recent material at hand

Data relative to *Filinia* in Lake Balaton of both published and unpublished sources are arranged in *Table I* as follows:

TABLE 1

Data on the occurrence of Filinia sp. in the plankton of Lake Balaton

Groups	Year of sampling	I	II	III	IV	V	VI	VII
I/1	1901 1902	Ø	K Ø	Ø	Ø	● ●		
	1925 1926		3° Ø		F_{10}° Ø	Ø		
	1927 1928				Ø			
I/2	1933	i	i	<3° ● Ø	10° Ø	16.5° Ø		
	1936	i2.4°	<2° >2° Ø		12° 12° Ø Ø	18.3°		
	1937	1°	0.3° Ø	4.5° 8.3° Ø Ø	9.4° 11.4° Ø Ø	16° 20° Ø Ø		
	1938	i 1.2°	2.4° Ø					
	1947						24° Ø	
	1949							
	1951	1.2° 2°	3° 5° Ø ●		13° ●			
	1954							
	1956	R. F. 1.4° 2° ●	Kö i	F. Kö i 2.5 ●	F. R. 3° i ●			
I/3	1957				10° Ø			

between 1901—1973 based on both published and unpublished sources

VIII	IX	X	XI	XII	References	Notes
					Entz, 1904 Náday, 1914	Sampling 1901—1902 V/5—20 *Filinia termin.*
					Hankó Kottász, 1933 Varga, 1932	Sampling 1925—1926 Middle of IV *Filinia* is frequent rotifera
					Varga, 1932	
					Kottász, 1933 (E—K—S 1937)	Tihany-Narrows: 1m: 2 sp. 2m: 3 sp. 10m: 0 sp. in March
			8° ●	1.6° ●		Nov.—Dec. situation in Varga's Ms
					Sebestyén—Török—Varga, 1951 Plankton records	III/25 *Filinia* 17.6% of rotifera
						scanning rotifers by Varga
					Sebestyén 1953 Plankton records	
			R			
22° Ø						II/24 thermal inversion Fil. 3m *(Fig. 3.)* IV/17 Fil. 19% of rotif. VIII. date by Tamás
			<0° Ø		Plankton records	XI/20 *Colacium* on Fil.
				2° ●	Sebestyén, 1958 Plankton records sketches notes	I/18 population No 423 *Fig. 2. Table 2. Codonella* II—III ice cover
			13° Ø	5° Ø	Plankton records	

Groups	Year of sampling	I	II	III	IV	V	VI	VII
	1958	±1° i ● R. F.	3.5° 2° i	i 3° +				
	1960			7° 9° Ø				
	1961			R. 11° ● ●	R. F. K. 8° 13° ● ●	16° 18° ●	20° 22°	25°
	1963							+
	1965						18° **0**	
I/4	1966					19° 21° ● **0**	23.5° **0**	
	1967				12° ●	19° **0**		
	1973			6° 9° ● ●	11° ●			
		3	6	8	12	7	3	0

Explanation of symbols:

——— = period of sampling series
Ø = *Filinia.*
● = *Filinia terminalis* PLATE.
0 = *Filinia longiseta*, no measurements.
K = *Kellicottia longispina*, frequent.

I. 1. *Net hauls for qualitative studies*

a) In the first list of rotifers in Lake Balaton no members of the genus *Filinia (Triarthra)* are mentioned (DADAY, 1897). DADAY's collections very likely took place during the warm water period (VARGA, 1932 : 26).

VIII	IX	X	XI	XII	References	Notes
					Plankton records	III/11: r.e. in plankton *Codonella lac.* ENTZ sen. end of III. i 10—12 cm in open water
					Plankton records	
19° 18°	22° 19°	14° 13°	12° 8° 4°		Plankton records	IV/18 rotifers abundant, *Kellicottia* with eggs
					SEBESTYÉN, 1965	neuston sample, several r.e. of *Filinia*
20° **0**					P.-ZÁNKAI—KERTÉSZ, 1967 P.-ZÁNKAI—PONYI, 1972	
	17° 18° **0**		6° **0**		P.-ZÁNKAI—PONYI, 1971—1972	
	18° **0**				P.-ZÁNKAI—PONYI, 1970—1971	
					SEBESTYÉN, in this paper	individual measurements *Fig. 2. Table 2.*
2	2	0	4	3		No of months with positive data for *Filinia*

R = rotifera, frequent.
F = FILINIA, frequent.
· = with eggs
+ = resting egg, recent (plankton, neuston).
W.t = water temperature C°.
i = ice.
Kö = Kisöböl bay, Tihany.

b) First occurrences of *Filinia (Triarthra)* are given by NÁDAY (1914), who analysed part of G. ENTZ jun.'s sample series collected June 1901—November 1902 off Balatonfüred and vicinity, at several locations in the NE and SW part of the lake as well as in Kis-Balaton. (Monthly sampling, in April 1902 four ones).

Only parts of this extensive collection have been analysed.

c) Collections by HANKÓ off Révfülöp at the SW part of the lake two–three times monthly, both days and nights. From these collections the occurrence of *Filinia longiseta* and *Filinia terminalis* PLATE are mentioned by KOTTÁSZ 1933, (see ENTZ et al., 1937, *Table 10* and VARGA, 1932 : 52, 56).

d) VARGA's collections very likely took place mostly off the Eastern shore of the Tihany peninsula, 1928—29. (Annual report of the Biol. Research Inst. for the same years.)

e) Intensive other studies by this author in various habitats of Lake Balaton did not mention *Filinia* with the exception of a summer collection in Kis-Balaton, a former SW part of the lake (see p. 305).

I. 2. *Quantitative plankton investigations throughout the year in the open water, off the eastern shore of the Tihany-Peninsula, net hauls added*

a) First quantitative sample-series taken by KOTTÁSZ, 1933 (ENTZ et al., 1937).

The adventages of the chosen location (marked A_0 in later studies for horizontal distribution of the components of the plankton, SEBESTYÉN, 1960) are threefold: it is approachable easily from the Tihany Biol. Institute. The water is well mixed here because of favorable water dynamics. The water column exceeds 3 m.

Samples of 5—5 l were taken with MEYER's bottle from four depths of the water column. From this material one liter had been analysed for both phyto- and zooplankton, following formalin fixation, natural sedimentation and concentration by VOLK's method. Net collection added. For more detail see KOTTÁSZ, 1933 (ENTZ et al., 1937 : 76).

b) Samplings for three successive years in the thirtieth. Two collections monthly at the former location. Methods as above (SEBESTYÉN et al., 1951b).

c) Sampling for three years, 1947, 1949, 1951. Same location, same method (SEBESTYÉN, 1953). (Biomass studies for Dinoflagellates and main groups of the zooplankton. SEBESTYÉN, for the rest of phytoplankton by TAMÁS.) At scanning the samples for the components of zooplankton, specimens of *Filinia* had been assigned to "other rotifers with rare occurrence". However, considering the aim of this paper the original general records have now been looked over with the following result: 1947: one occurrence, June, 1949: no occurrence. This year is distinguished for an unusally low water level (see SEBESTYÉN et al., 1951a).

The year 1951 includes some data of special interest relative to *Filinia* (See *Table I* in this paper and sketches. SEBESTYÉN, 1953). The aim of this paper was to study the changes in the population density of a large numbers of plankters (Zooplankton and Dinoflagellates) in connection with the rising trophy of the lake. This situation — according to numerical data — is more evident during the warm than in cold water season.

I. 3. *Analyses of net plankton hauls-including some qualitative data, 1951—1961, Measurements. Biomass studies.* (SEBESTYÉN, 1958; 1958 a).

I. 4. *Extensive qualitative and quantitative studies on plankton rotifers in Lake Balaton for three successive years: 1965—1967.*

For introduction: Literary survey on the rotifers recorded from Lake Balaton 1897—1960 (P.-ZÁNKAI, 1968).

Horizontal distribution of plankton rotifers in Lake Balaton based on analyses of net hauls 1965 (P.-ZÁNKAI and KERTÉSZ, 1967).

Three papers on horizontal distribution, quantitative bottle-sampling (Friedinger) and net hauls. Frequency in % of the various rotifer-members of the plankton. Data on presence of *Filinia* in the various parts of the lake.

for 1965 — P.-ZÁNKAI and PONYI, 1972; P.-ZÁNKAI and KERTÉSZ, 1967
1966 — P.-ZÁNKAI and PONYI, 1971; 1972
1967 — P.-ZÁNKAI and PONYI, 1970; 1971

Based upon both published and unpublished records, *Table I.* informs on the presence of *Filinia* sp in the plankton samples, Lake Balaton 1902—1973. Considering data from several whole years series it could be noted the followings:

a) the majority of the positive data for the presence of *Filinia* sp are from the first part of the year, especially, in February—May.

b) there are no positive data for *Filinia* (in the active state) from July and October.

c) considering all data, statements for a) and b) are equally valid.

d) there are three data from June, two-two ones from August and September. November—February ($t° < 10°$) four, three, three, six, respectively.

e) *Filinia* is present in the open water of the various parts of the lake.

II. Population dynamics: The life cycle of the population of *Filinia* in Lake Balaton

Basic information "The typical life history of the subclass Monogononta, which includes all the planktonic species (of rotifers) begins with the hatching from resting egg of a parthenogenetic or amictic female. This female produces a series of subitaneous eggs that develop without fertilization and produce further parthenogenetic females. When a considerable population has been built up and certain ecological conditions . . . have appearently been fulfilled, male-producing or mictic females may appear in the population . . . . The males which hatch from the characteristically small unfertilized micitic eggs . . . fertilize some of the mictic females which then produce large mictic resting eggs that undergo a prolonged diapause". The "hatching of the resting eggs (takes place) when conditions become suitable . . . in the environment". (HUTCHINSON, 1967; 507).

In attempting the reconstruction of the life-cycle of the *Filinia* population in Lake Balaton it seems that the pattern of all positive data in *Table I* being arranged according to the season (according to the water temperature) would suggest that it is rational to start with at the entering of the cold water season.

In advance we may call attention to the fact that both the freezing time and the length of the ice-cover vary in Lake Balaton annually.

It should also be considered that negative data on the occurrence of *Filinia* in the samples at the entrance of the cold water season might mean a very low population density and not necesserily a total absence of *Filinia* in the lake.

Having no data for October (see p. 291.) we may start with the November—December situation. There are positive data for

(A) November—December 1936—February—May 1937
(B) December 1956—April 1957
(C) November—December 1957—January—March 1958.

We deal now in detail with the situation 1956/57 and 1957/58: Previous situation: The ice-cover for the winter 1955/56 lasted for two months: February and March 1956, both December 1955, and January 1956, being ice-free. At the middle of January 1956 (w. t. 4 °C) occurrence of females with amictic eggs were frequent. This sample (No 423) gave sufficient material for biomass studies (SEBESTYÉN, 1958) (*Figs 1 a b, 2* in this study). Samples for both March and April as well as for December 1956, and for April 1957 were positive.

In November—December 1957 and January 1958 the water temperature gradually decreased (13°, 5°. ±1 °C respectively).

Rotifers in great abundance on 10 January, 1958.* No data for February. At the time of the March sampling there was ice in the neighbourhood of

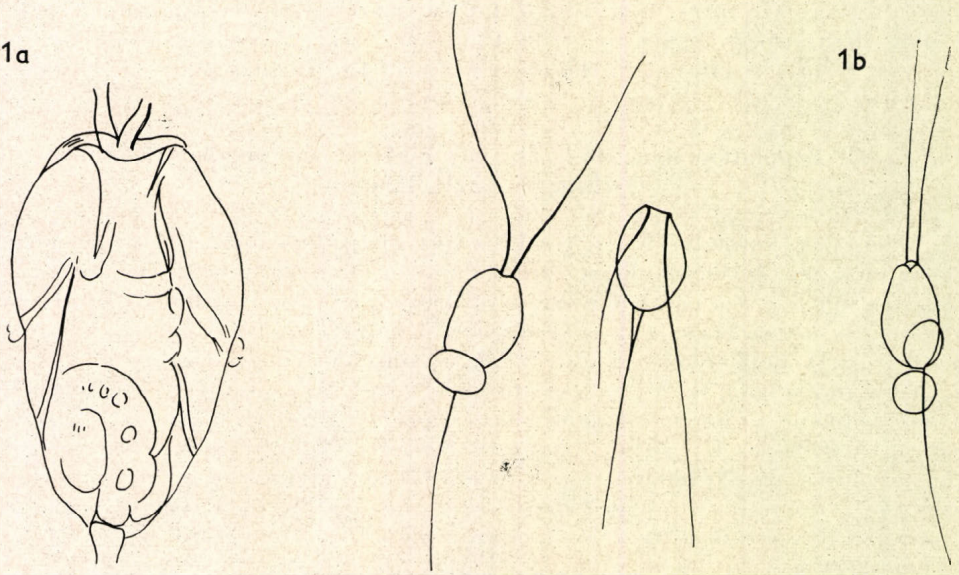


Fig. 1a. Filinia terminalis PLATE Lake Balaton 18. I. 1956 Population No 423. Size of body 172/98 μ Cam. luc
Fig. 1b. Specimens from population No 423. Cam. luc

* This sample contained several alive specimens of *Codonella lacustris* ENTZ sen. (Oligotricha, Ciliata), a plankter seldom encountered for in this location (sampling site A_0, see p. 293).

the sampling site (Kisöböl-bay). By the end of this month the ice-cover — in the open water measured 10—12 cm. There were two resting eggs of *Filinia* in the sample *(Fig 5 a b)*. Both were colourless and of a rather homogenous content (see p. 298). These two sample-series (B) (C) suggest the continuity of the population throughout winter, and at the same time throw light on the population dynamics of *Filinia*.

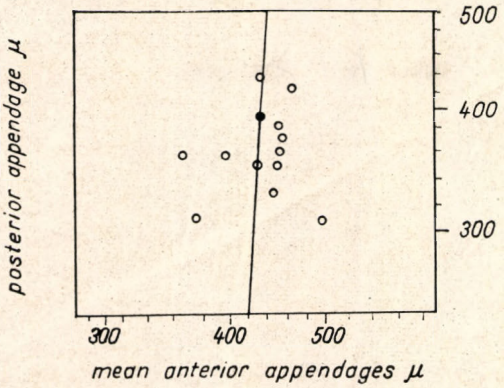


Fig. 2 Relationship of length of the posterior appendage to mean length of the anteriors in *Filinia terminalis* Population 423. Place of specimen March. 1973 in the diagram = *W* (A/P = 437/385 = 1. 13, 1 of body = 174 μ)

For the development of the population in the first part of the year situation in 1951 give a good example: At the time of the first sampling, in January there is no positive record of *Filinia* neither in net haul nor in the bottle samples (w. t.: surface = 1.2°, 2, m, = 2 °C.)

There is one in the first of February (w. t. 3 °C). At the end of this month sampling thermal conversion is noted (3.75°, 3.8°, 4.4 °C respectively 1,2,3 m depths). *Filinia* present in the 3 m deep layer *(Fig. 3)*. No record for March. At the middle of April (w. t. 13 °C) one the highest population density had been recorded: 8, 16, 12 specimens per liter from 1,2,3 m depths respectively, rotifers total 189 (SEBESTYÉN, 1953, *Table 3*). Frequency of *Filinia* in all rotifers 19%. These examples on the population dynamics of *Filinia* in Lake Balaton might be brought into harmony with the course of the water temperature in the environment in general. This comparison suggests that *Filinia* inhabiting Lake Balaton favours cold water season including the beginning of the warming up period. (See data at the end of *Table I*).

Data for high population density both rotifers in general and *Filinia* are included in *Table I*.

There are three data for occurrence in June: 1947, 1965 and 1966, w. t. 24°, 23.5°, 25.3° respectively. These specimens — very likely — representing such members of the population which could tolerate further rise of the temperature in the environment. They might be unfertilized females belonging to the generation whose active state of life ends at the same year. NIPKOV's following words should be considered: . . . the cold water form *Filinia terminalis* PLATE f. *maior* COLDITZ occurs scarcely in the warm water period in Lake Zürich (NIPKOV, 1961). See also COLDITZ 1914: 553 *Fig. 5*, and on the presence of *Filinia terminalis* PLATE "in Kis-Balaton (p. 305 in this paper)."

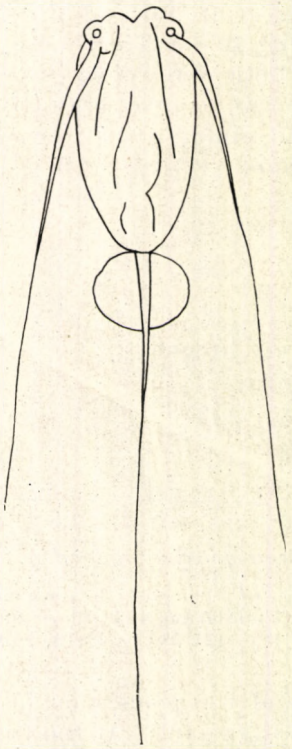


Fig. 3. Filinia sp. Lake Balaton 24. II. 1951. Population No 240/3 m

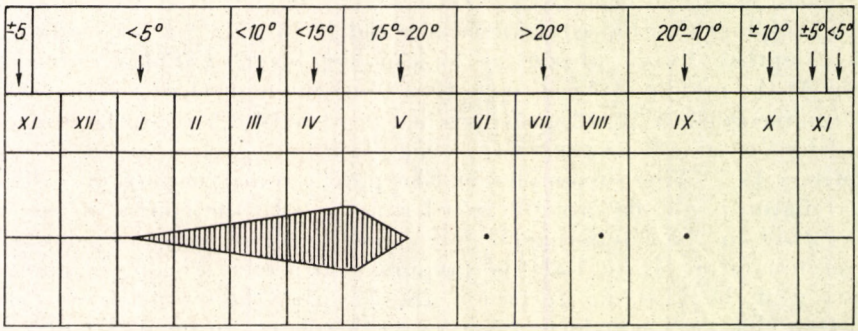


Fig. 4. Population dynamics of the cold water favoring *Filinia* in the shallow Lake Balaton in relation with the fluctuation of the water temperature, in general

There is but one record on the presence of *Filinia* resting eggs in plankton samples: 11. March 1958 *(Fig. 5 a b)* The sample originated from a fresh net-haul in the open water. Observations previous to preservation. (Looking through several hundred samples for several decades in Tihany, no similar objects have been observed before.) On the paper with the c. luc. sketches see the note: "ovoid-like objects filled with transparent colorless matter of a faint yellowish tint. On the surface four rows — in meridianlike arrangement — of

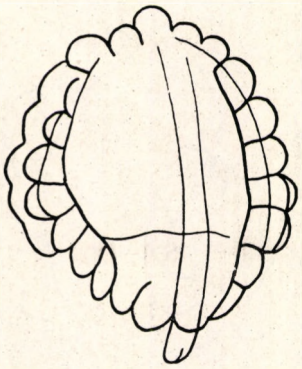


Fig. 5 a. Resting egg of *Filinia* from plankton Lake Balaton 11. II. 1958. Size, inner surface 93/68 μ.

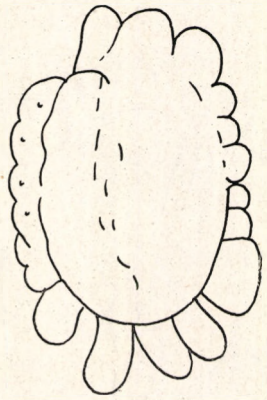


Fig. 5 b. Resting egg of *Filinia* from plankton. Size, inner surface 84/55 μ. For other data see *Fig. 5 a*

cellular structure." — Most of the other plankters present were yet alive: *Codonella lacustris* ENTZ sen. (c. luc. sketches), *Notholca foliacea*, *Keratella stipitata*, diatoms, colonies of *Gomphonema*.

Recalling n o w the previous situation as to this find *Filinia* present 4. November, 21. December 1957, 10. January 1958, w. t. decreasing, 13°, 5°, ±1° respectively. Considering the appearance of the eggs they are — very likely — liberated early, due to the unfavourable situations at the act of sampling.

Resting eggs occurred in a neuston sample, 26. July. 1963 *(Figs 6 a)* (SEBESTYÉN, 1965 p. 212, *Fig. 2.;* p. 226, *Table 4)*. Only this c. luc.-sketch was made, no measurements taken on the other six specimens found in the slides of this neuston sample, however they were considered as being similar objects.

Specimens, two of each, occurring in the August and September samples might belong to the new generation. They, very likely, came to being by early hatching. The hatching takes place in a prolonged period ("sporadic emergence" BOGOSLOVSKY, 1969 : 79).

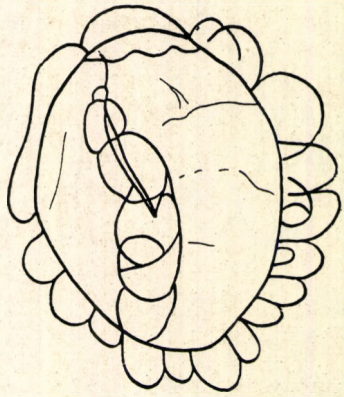


Fig. 6a. Resting egg of *Filinia* from neuston Tihany Kisöböl-bay 26. VII. 1963. Size, inner surface 93/82 μ. Cam.

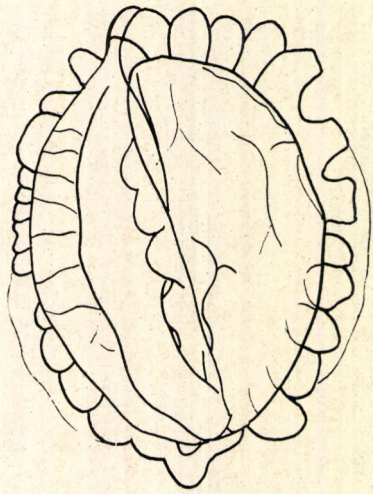


Fig. 6b. Remains of resting egg *Filinia* sp. Core IA-3. 135 cm in sediments. Size, inner surface 113/90 μ. Cam. luc

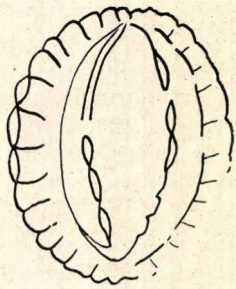


Fig. 6c. Remains of resting egg *Filinia* sp. ? Core IA-3 135 cm in sediments. Size, inner surface 102/86 μ. Free hand sketch

Interpreting the data on the occurrence of *Filinia* (amictic females, resting eggs) in Lake Balaton, the following statements could be taken relative to the life-cycle of the population in our lake:

a) The *Filinia* sp common in Lake Balaton favours cold water as environment. Scarce occurrences in the warm water season are noted.

b) Time for the appearance of the new generation are the two last months of the year.

c) The *Filinia* population is present continuously through the following winter.

d) The first part of the year is the time for the development of the population.

e) The bisexual phase of the life cycle of the population occur at the time of high population density resulting in the formation of resting eggs.

f) At the end of the bisexual phase of the life-cycle a sudden disappearance of *Filinia* from the plankton community takes place *(Fig. 4)*.

III. Resting eggs of *Filinia* in general and those from Lake Balaton: recent and quaternary remains. Morphology. Taxonomy

Filinia resting egg is not mentioned in D. G. FREY's (1964) comprehensive work on quaternary remains (FREY, 1964).

In the literature there are several figures illustrating the resting eggs of the *Filinia* genus: within the mother's body, liberated ones as well as quaternary remains. List of figures in the available literature:

WESENBERG-LUND, 1909, 1930, 1939: *Fig. 262*, p. 222 "*Triarthra* miktisches ♀ mit befruchteten Dauereier".

RYLOV, 1935: *Fig. 115*, resting egg of *Filinia longiseta* (very likely after WESENBERG-LUND, 1930). *Fig. 117: Filinia cornuta* (original?).

VOIGT, 1957: Tafel 90 "Dauerei, Tümpelform"

NIPKOV, 1961: 458, Abb. 5, *Fig. 2 a.* "*Filinia maior* COLDITZ, Tier mit Dauereier" from Lake Zürich. *2b:* "junges geschlüpftes Tier aus Dauerei".

SEBESTYÉN, 1965. *Fig. 2: Filinia* resting egg from neuston, Lake Balaton. *Fig. 3* quaternary remain, core Akali I, 135 cm, Lake Balaton.

BOGOSLOVSKY, 1967: *Fig. 1 c Filinia longiseta:* mictic female with developing resting egg. *Fig. 2: Filinia longiseta*, resting egg at various views (seven figures). *Fig. 3. Filinia passa*, resting eggs from various views (five figures). *Figs. 4 a b, Filinia terminalis* resting eggs (two figures).

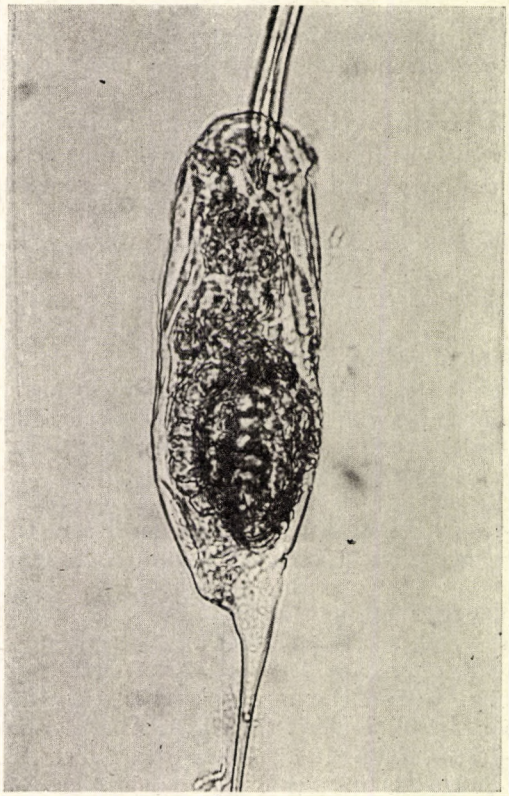
H. MÜLLER, 1970, *Filinia longiseta, Table 1. Figs 6—7:* Dauer-Ei 12.92 m. Otterstädter See, at two foci. (See also W. Koste, 1969).

RUTTNER-KOLISKO, 1972: *Fig. 23.* Fossile Dauerei aus subboreale Schicht des Otterstädter Sees, *Filinia.* (Photo H. MÜLLER, Hannover)

SEBESTYÉN, in this paper: see *Figures:* resting eggs of *Filinia* Lake Balaton. (SEBESTYÉN, 1969: 297, resting eggs of *Filinia* in the sediments of Lake Balaton, mentioned). *Microphotogram: Filinia pejleri* HUTCHINSON 1964, Lake Lenore Wash. USA.

Material from Lake Balaton:

R e c e n t: From plankton sample, 11.3. 1958 *(Figs. 5 a b)*
from neuston sample, 26.7. 1963 (SEBESTYÉN, 1965. *Fig. 2)*,
in this paper: *Fig. 6 a.*



Microphotogram: Filinia pejleri HUTCHINSON 1964. Mictic female with resting egg. Lake Lenore, Lower Grand Coulee Wash. USA. From material of Prof. W. T. EDMONDSON. (I. of body 239 μ, anterior appendage 641 μ, posterior appendage 396 μ, resting egg 116 μ). Photo I. Zs.-NAGY M. D. Tihany.

core Akali I-3 (ZÓLYOMI, 1953), ± 135 cm (SEBESTYÉN, 1965. *Fig. 3)*, in this paper *Fig. 6 b* and *Fig. 6 c* from the same layer. Later on several specimens came to light when analysing samples of core B 28 (ZÓLYOMI, 1953). Location of this core is at the middle of the profile Balatonboglár—Révfülöp, being about 30 Km distance of the core Akali I. (For location of the cores see SEBESTYÉN, 1968, *Fig. 1*).

Quaternary remains: in initial paleolimnological studies few resting eggs characteristic to the *Filinia* geus have been recorded:

Remains, core B 28:*

B 28, sample 1: surface layer, 1—3 cm, present age, culture phase
sample 20: 60 cm, Subatlantic present. IX ± 500 b. p.
sample 40: 123 cm, Subboreal VIII ± 1000 b. p.
sample 60: 170 cm, transition toward VIII. ± 2000 b. p.
sample 80: 208 cm, VI. Atlanticus ± 4000 b. p.
sample 100: 280 cm, V. Postglacial Corylus Phase ± 6000 b. p.
sample 120: 290 cm, III—IV. Border of the Pleistocene and Holocene. Younger tundra age. Early post glacial Pinus-Betule phase ± 8000 b. p.
sample 140: 330 cm. Late glacial tundra age. Initial period of the formation of Lake Balaton, Ia. (Low water period)

For further paleolimnological data of core B 28 see SEBESTYÉN 1969: 292—296.

No of sample	No of specimens
1	3
20	3
40	0
60	1
80	4
100	1
120	4

Since both samples from the late Glacial (samples 140 and 160) brought no result, sample 145 core B 24 (ZÓLYOMI) being equivalent as to age to layer 140, core B 28 (a qualitative sample) has been analysed with positive result.

Development of the resting eggs of several members of the *Filinia* genus have been studied in cultures (NIPKOV, 1961: *Filinia terminalis* PLATE f. *major*, COLDITZ) on material from Lake Zürich and (BOGOSLOVSKY, 1967; 1969, *Filinia longiseta*, *Filinia terminalis*, *Filinia passa*) on material from ponds near Moskow. The development of the resting eggs takes place within the body of the fertilized mictic females and liberated after the mothers 'death at the bottom of the water-body. According to NIPKOV " . . . die Dauereier werden vom Tier nicht aussen getragen . . . sondern direkt ins Wasser abgelegt, wo sie zu Boden sinken . . ." (NIPKOV, 1961: 416, see also 449.)

The *Filinia* resting egg in general is an oval shaped object, however, not a body of rotation, exhibiting on the shell both "bobbles" of various sizes arranged in rows and patterns of chitinous nature (BOGOSLOVSKY, 1967 : 46).

Both authors (mentioned above) emphasised that the size of the eggs as well as the development of the external structures are affected by the environmental situations as well as by the length of the resting period. There "are changes with age known from all resting eggs collected and stored for some time, regardless of the genus *(Brachionus, Hexarthra,* as well as *Filinia)*" (RUTTNER-KOLISKO, 1972). At the identification at the species level these circumstances should be considered. However, such specific characteristic as the marking of the opening of the shell ("vorgebildeter Sprengriss", NIPKOV p. 448) at hatching is always present. (BOGOSLOVSKY, 1967; 1969: Summary; *Figs. 6—7, Table 1.* H. MÜLLER, 1970).

It has to be kept in mind that environmental situations in Lake Balaton differ from those present in a pond as well as in a deep lake, like Lake Zürich where low temperature, darkness and calm rule in the bottom (NIPKOV, 1961: 399). In Lake Balaton having fossil material for several thousand years old, the fluctuations of the water-column during the geological ages should be considered and at the shallow state yet of large extent of a lake, the characteristic water dynamics etc.

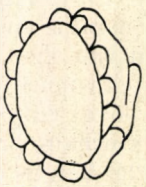
Technical difficulties occurred because measurements were taken only on 12 specimens and but a few had been depicted with the aid of c. luc. (Lack of such date are most regretful because suitable fossil material exists, the author, however, has not been in position to carry out reinvestigations.)

Figs. 6 c and *7 a b c* are free hand sketches made for the purpose to aid the refinding of the objects on the quantitative slides. Regretfully this could not have been carried out owing to the shrink of the closing matter. They mirror, however, in state of the sketches somewhat the general shape of

a

Fig.7 a. Remains of resting egg of *Filinia*. Sample 80. Core B 28. Width 55 μ. Free hand sketch

Fig. 7b. Remains of resting egg of *Filinia* sp. Sample 80. Core B 28. Size, full measure 97/64 μ. Free hand sketch



c

Fig. 7c. Remains of *Filinia* resting egg Sample 100. Core B 28. Full size 54/38 μ. Free hand sketch

the remain and, to a certain measure, might be considered when aiming identification. Only one specimen was pictured from the neuston sample with c. luc. aid *(Fig 6 a)*, (see p. 300).

IV. Taxonomic state of *Filinia* inhabiting Lake Balaton

Earliest records on the presence of members of *Filinia (Tristhra)* genus in Lake Balaton are based upon investigations in the following locations:

I/b Northwestern basin of the lake of Balatonfüred and vicinity (NÁDAY, 1914)
I/c Southwestern basin off Révfülöp (VARGA, 1932; KOTTÁSZ, 1933)
I/d off the Eastern shore of Tihany peninsula (VARGA, 1932)
(See Introduction and p. 289—295).

All these reports — mostly of faunistic nature — include valuable informations on the population-dynamics, size and comparisons made to other cold favouring rotifers as well as *Filinia* in other Hungarian waters.

It is known that although at the earlier part of this century authors made distinction between *Filinia longiseta* (EHRENBERG) and *Filinia terminalis* PLATE some of them, however, not at the species level. For identification at that time HARRING, 1913; HARRING and MAYER, 1913, and HUDSON and GOSSE, 1880 works were used (see References: NÁDAY, 1914 and VARGA, 1932). Both NÁDAY and VARGA report from Lake Balaton "*Filinia longiseta*" and "*Filinia terminalis*" in the cold water season regarding them for one species.

NÁDAY considers "*Filinia terminalis*" as a temporal variety of "*Filinia longiseta*" a winter-spring form, while "*Filinia terminalis*" a summer-fall form. Season for "*Filinia longiseta*" in the plankton 1/6, V/26, April being presumably the time for its most frequent occurrence. (p. 165). "*Filinia terminalis*" is most frequent in May (p. 167.). Kerekedi-öböl-bay, 1902" = a longhand note added by G. ENTZ jun. on the copy of NÁDAY's paper in the Tihany institute. (Free translation from the Hungarian by the present author).

For the length of the body NÁDAY gives 135—175 μ for "*longiseta*" and for the much smaller "*terminalis*" 70 μ with the remark that it may reach the length of "*Filinia longiseta*" (p. 168). In VARGA's estimation the Balaton specimens of "*longiseta*" exceed the body size of the same taxon inhabiting other Hungarian waters, and may measure 300 μ. (VARGA, 1932 : 56). Appendages on Balaton specimens vary (SEBESTYÉN et al., 1951 : 86).

In the plankton on Kis-Balaton* on a hot summer day, VARGA noted but "few specimens of *Filinia terminalis*-" a form being very common in Lake Balaton — not mentioning however, that it occurs there in the cold water season. The body size of Kis-Balaton specimens seems to be very much larger than those living in other water-bodies in Hungary" (VARGA, 1944—45 : 89). In some samples in the plankton-study I. 1. b VARGA reports only *Filinia terminalis* (SEBESTYÉN et al., 1951b). Present author has found similar situation in sample 423 (18. January 1956 group I. 3). Measurements on this population served for biomass studies (SEBESTYÉN, 1958). For the present paper individual measurements on the appendages on the same material (c. luc. drawings) were used for the ratio between the lengths of the posterior appendage and the mean of the anterior ones. Conclusion: this *Filinia* population is a homogenous one *(Fig. 2, Table 2)*. (See HUTCHINSON, 1964; PEJLER, 1957). Same form was found by the author in other samples in the last two decades (see *Table 1*) as well as in 1973 (see *Fig. 2*).

In the modern taxonomy *Filinia longiseta* (EHRBG.) and *Filinia terminalis* PLATE are considered as distinct species. "Both CARLIN (1943) and PEJLER (1957 a b) make excellent case regarding *terminalis* as distinct from *longiseta* . . ." (HUTCHINSON, 1964 : 3).

* Kis-Balaton at the SW end of Lake Balaton — formerly a part of it — is a huge reed stand. At the time of VARGA's sampling it included two small parts of pond nature. Overgrown with submerse vegetation, the surfaces, however, were free. These "ponds" could be reached — about 35 years ago — from Lake Balaton at the mouth of the river Zala by crossing the dam — which borders the lower reach of the river — on foot. VARGA's net — avoiding vegetation-caught hauls rich in rotifers of over hundred species including 42 free floating forms. Among the nine euplankters there were few specimens of "*Filinia terminalis* PLATE" (depth of water 40—60 cm, w. t. 22—27 °C, pH 9) (VARGA, 1944, 45 : 89).

TABLE 2

Individual measurements of Filinia terminalis PLATE *18. January 1956, Lake Balaton Population No. 423. See Fig. 2*

Mean value for the two anterior appendages (A) μ	Posterior appendage (P) μ	A/P	Length of body μ
360	360	1.00	150
375	315	1.19	150
400	360	1.11	170
425	425	1.00	145
427	350	1.22	160
448	385	1.16	
450	360	1.25	150
451	330	1.36	150
455	350	1.30	170
455	350	1.30	120
460	373	1.23	
465	420	1.10	
501	315	1.59	

Works used for identification at present in Europe (VOIGT, BARTOS, KUTIKOVA) distinct at the species level between *terminalis* PLATE and *maior* COLDITZ 1914, a form where the posterior appendage is inserted also terminally.* This form was found by COLDITZ in the Mansfelder-see, depth 7 m, as the only *Filinia* in the plankton there. He considered it as a true cold water form, missing only in a few summer months. Few specimens may be present scarcely in summer. The population density is the highest in early February. Tendency of the curve of the population-fluctuation rises from August on till the end of December (COLDITZ, 1914 : 553). For three decades this form was the only planktonic *Filinia* in Lake Zürich too (NIPKOV 1961). "*Filinia maior* COLDITZ" and "*Filinia terminalis* PLATE" are considered by PEJLER as synonyms (1957 : 31). (The taxonomic relation relative to these two taxa also, is in EDMONDSON's view a question which needs further critical study". (1959 : 441) " . . . how urgently a through revision of the genus *Filinia* is needed"-expressed by Frau Professor A. RUTTNER-KOLISKO "in a small paper on rotifers from Tanzania" (RUTTNER-KOLISKO in litt. March. 1974) See also her extensive study on Rotifers in Die Binnengewässer 26 : 1—212—214).

According to VOIGT (1957) *Filinia terminalis* does not occur in Central Europe.

For conclusion according to what has been said above we may assume that in the shallow Lake Balaton the *Filinia terminalis* which occurs in the cold water season, belongs to *Filinia terminalis* PLATE f. *maior* COLDITZ 1914 (PEJLER, 1957, p. 36).

This statement, however, does not explain NÁDAY's data on "*Filinia terminalis* PLATE" with a body size of 70 μ (see p. 305).

* *Filinia pejleri* HUTCHINSON 1964 the posterior appendage of which is inserted terminally " . . . requires a warm temperate climate" suggested by its distribution (HUTCHINSON, 1964: 6—8). See also Mph. on p. 302.

VARGA's statement regarding to the variability of the apical appendages of the *Filinia* population in Lake Balaton (see p. 305) is as yet an open question which needs further investigations on the Balaton material (see p. 27). In the available literature the only data which inform on the length of the appendages of *Filinia terminalis* f. *maior* — individuals of different ages from the same locality — are to be found in NIPKOV, 1961. Abb. 5 : 2 b p. 458.

V. Identification of the *Filinia* resting eggs from Lake Balaton

Main characteristics for the resting egg of *Filinia* are given by BOGOSLOVSKY (1967; 1969) and by NIPKOV (1961) — for some members of the *Filinia* genus, including both *Filinia "longiseta"* and *Filinia terminalis* — and for *Filinia terminalis maior* respectively which are of interest at present. BOGOSLOVSKY calls attention to the variability in the structure and pattern of the external layer of egg-shell, caused by environmental factors etc. (303). A comparison of figures regarding to *Filinia "longiseta"* by BOGOSLOVSKY (1967 : 12) and instructive microphotograms by MÜLLER (1970. *Figs 6—7*) supports the validity of BOGOSLOVSKY's statement (See also KUTIKOVA, 1970 : 108, 111).

NIPKOV gives a figure of the resting egg of *Filinia terminalis maior* as for the only member of this genus in Lake Zürich for nearly three decades (p. 458, Abb. 5 *Fig. 2 a)*. in this case the mere presence and the arrangements of the "bubbles" on the shell could be sufficient to identify at the species level.

Technical difficulties relative to the Balaton material are:
limited numbers of eggs observed (29 specimen);
limited number of c. luc. sketches;
lack of microphotograms.

List of resting eggs from Lake Balaton grouped according to the length of specimens l/w in μ):

\+ = full measure with bubbles x = full length, no figures
Ø = without bubbles

a) large size	97/64	sample 80	*Fig 7 b*	+	
	102/86	Akali I	*Fig 6 c*	Ø	
	113/90	Akali I	*Fig 6 b*	Ø	
b) medium size	93/68	plankton	*Fig 5 a*	Ø	
	84/55	plankton	*Fig 5 b*	Ø	
	93/82	neuston	*Fig 6 a*	Ø	
	87/58	sample 1		+	
	92/—	sample 20		x	
	92/—	sample 20		x	
	86/—	sample 80		x	
	/55	sample 80	*Fig 7 a*	+	
c) small size	54/38	sample 100	*Fig 7 c*	+	12 sp
d) neither measures nor figures					17 sp

(Those 17 specimens neither measured nor depicted — very likely — did not differ from those ones observed with more details).

Specimens figured in *6 a* and *6 b* are from recent neuston and from core Akali I, respectively. They seem to be alike judging from the rows of "bubbles"

and line running from the apical pole downward half length till the middle of the egg. This line is — presumably — on the other side of the shell. These two specimens belong very likely to the taxon inhabiting our lake at present, and did belong to the lake biota in the Subboreal, I. 1000 b. p.

Fig 6 c has been recovered from the same layer of Akali I where specimen *6 b* was found.

According to BOGOSLOVSKY resting egg of *Filinia terminalis* PLATE is the smallest one within the genus (55/37 μ). The remain of resting egg pictured in *Fig 7 c* measures 54/38 μ, being the smallest one of a *Filinia* resting egg recovered as far from the sediment of Lake Balaton (layer B 28, 280 cm depth. Post glacial *Corylus* phase, $\pm$ 6000 b. p.). Of course aggreement in size is not sufficient for identification. It recalls nevertheless the size (70 μ) given by NÁDAY for ♀ "*Filinia terminalis*" in Lake Balaton.

Resumé

Interpreting a series of data *(Table I)* regarding to *Filinia (Triarthra)* — both recent and remains (pp. 289—293, 302 in text) it could be established that members of this genus inhabit Lake Balaton since the border of Pleistocene and Holocene. There is positive data on the presence of *Filinia* remains below the peat.

Material at hand:

1. amictic females, 1902—1973 (plankton)
2. resting eggs, recent (plankton, neuston)
3. resting eggs: quaternary remains:

since Border of the Pleistocene and Holocene. Younger tundra age and early postglacial Pinus-Betula phase III—IV (sample 120, B 28 ZÓLYOMI) — very likely continuously — till Present age, culture phase (sample I B28 ZÓLYOMI).

Remain of resting egg found in age previous the marshy-medow condition (peat). First *Betula*-maximum Firbas Ib. (Sample 145 B24 ZÓLYOMI).

Qualitative investigation

In the early decades of this century studying tow-net hauls from NE and SW part of the lake and off the Eastern shore off the Tihany-peninsula (sampling by G. ENTZ jun., HANKÓ and VARGA respectively), analysed by NÁDAY (1914) and VARGA (1932) with the following results:

Both "*Filinia longiseta* (EHRBG)" and "*Filinia terminalis* PLATE" are present in Lake Balaton, considered however by these authors as one species. In NÁDAY's view *terminalis* could be a temporal variety of "*Filinia longiseta*".

Both "taxa" prefer cold environment.

Thanks to the suitable material these early authors got insight into the p o p u l a t i o n d y n a m i c s o f *Filinia* inhabiting Lake Balaton: appearance at 3 °C along with the rise of the temperature the increase of the population reaches a peak about 10°—20 °C, followed by a sudden decrease and disappearance from the plankton at 20 °C in May (VARGA, NÁDAY).

Length of the body for "*longiseta*" 135—175 μ, for "*terminalis*" 70 μ, which may reach the size of "*longiseta*" (NÁDAY). — Balaton specimens are larger then the "*longiseta*" in other water-bodies in Hungary, reaching 300 μ: (VARGA). The appendages vary in the Balaton population of *Filinia* (VARGA).

Population of *Filinia* at the height of the development might be subpressed by *Notholca (Kellicottia) longispina* (NÁDAY). Within the cold favouring rotifera only "*Notholca*" *longispina* develops a higher density (VARGA).

In Kis-Balaton, a former part of the lake, few specimens of *Filinia* "*terminalis*" were noted in a hot August day by VARGA with the remark that this form — being common in Lake Balaton — is over the size of specimens in other Hungarian waters.

Quantitative investigations

Data on quantitative bottle material (at suitable location, monthly samplings in four depths for a whole year) mirror the increase and decrease of the population density for the first part of the year (KOTTÁSZ, 1933; VARGA, 1932).

Scanning similar samples for three successive years in the thirtieth, presence of *Filinia* from the start of the cold water season (November—December 1936) could be established as well as the continuity of the population till May of the following year. (SEBESTYÉN et al., 1951a).

Following disturbances in lake-life in the middle of the forthieth caused by increasing anthropogenic influences, quantitative studies for 1947, 1949 and 1951 took place aiming an insight to decennial changes. Within this period conditions, following an ice-free winter (1950—1951) — a rare phenomenon in Lake Balaton — resulted in convincing data on the population dynamics of *Filinia:* January 1951 no positive result. One specimen on the first of February (w.t. 3 °C). At the end of this month thermal inversion noted (3.75°, 3.8°, 4.4 °C respectively 1, 2, 3 m depth). *Filinia* present in 3 m. No record for March. At the middle of April (w.t. 13 °C) one of the highest population density recorded: 8.16, 12 sp per liter from 1, 2, 3 m, respectively. Rotifers total for the four layer 189 sp, frequency of *Filinia* 19%. — No data for May.

Continuity of the *Filinia* population could be followed through 1956—1957—1958 with the exception of warm water months. Within this period sample No 423 (18. January, 1956) should be mentioned, for high population density, giving sufficient material for biomass studies (SEBESTYÉN, 1958).

Further investigations — individual measurements of body and appendages, c. luc. sketches on both alive and conserved material following PEJLER's (1957) and HUTCHINSON's (1964) method — showed that sample No 423 includes a homogenous population of *Filinia terminalis* PLATE, a taxon with

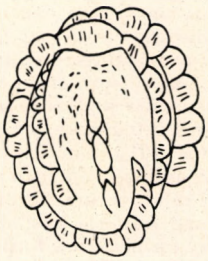


Fig. 8. Sketch of resting egg of *Filinia* Lunz, Untersee 3.5 m depth in sediments 1. II. 72. Prof. A. RUTTNER-KOLISKO

terminally inserted posterior appendage. (*Figs.* in this paper, and SEBESTYÉN, 1958, for biomass of the same taxon's population.) It seems this form is identical with the one observed by both COLDITZ (1914) and NIPKOV (1961) in Mansfelder-See respective in Zürich-See being the only planktonic *Filinia* at the time of these authors' studies: *Filinia terminalis* PLATE 1866 f. *maior* COLDITZ 1914.

Through horizontal studies the distribution of *Filinia* throughout the whole extent of the lake could be established (P.-ZÁNKAI and KERTÉSZ, 1967; P.-ZÁNKAI and PONYI, 1970; 1971; 1972).

In sample 11. March. 1958, resting eggs of *Filinia* (w.t. 3 °C, Kisöböl, ice.) were noted in a fresh net haul (see p. 297, Chapter II.).

In a neuston sample 26. July, 1963 several resting eggs were found (*Fig 6a*, p. 299).

Resting eggs in quaternary layers of the sediments

In the course of the author's paleolimnological studies on crustaceans 21 *Filinia* resting egg remains had been recovered. This quantity does not include the eggs from a plankton sample, 1958 and, seven found in a neuston sample, 1963 (see *Figs 5a b*, *6a*). Measurements and figures (c. luc. and free-hand sketches) were made some parts of the remains, but in some specimens only the presence and location of the find have been noted (see p. 302, 307).

Considering size as well as structure and pattern on the external cover of the shells and consulting related literature (BOGOSLOVSKY, NIPKOV, RUTT-

TABLE 3

Individual measurement of Filinia terminalis, Lunzer Untersee (Published by the kind consent of Prof. A. RUTTNER-KOLISKO, *28.3. 1974)***

	13.3. 1957 depth: 5 m										25.5. 1965, epilimnion				
body length μ	187	176	176	132	132	176	176	176	143	121	132	154	154	165	154
caudal seta μ	396	363	363	396	385	396	396	374	363	363	385	418	363	407	396
anterior setae μ	462	440	440	462	473	473	451	473	440	451	517	495	484	506	517
Insertion of caudal seta*	S	S	S	?	?	S	S	S	?	T	S	T	S	S	S

* S: subterminal = 10—20 μ distance from end of body.
T: terminal = 1—10 μ distance from end of body.

** "*Filinia terminalis* (formerly not distinguished from *Filinia longiseta*) was common in Luzern Untersee during decades, living at a depth of 3—5 m in summertime and in winter also in the upper layers (see measurements); since several years it has, however, disappeared and is now coming back slowly, the reason for it being unknown. In sediment cores I found resting eggs (see sketch) in 3.5 m and 7.35 m depths" (*Fig. 8* in this paper, O. SEBESTYÉN) . . . "In Luzern Obersee which is sharply stratified according to oxygen content. *F. terminalis* is restricted to the layer where O_2 drops to zero (8—11 m); it occurs there in abundance all the year round feeding on oligosaprobic nannoplankton and bacteria available in this stratum . . ." . . . "I hope that the chapter *Filinia* out of my key for plankton rotifers in 'Die Binnengewässer' illustrates my ideas about taxonomical series within a variable polytypical group." (A. RUTTNER-KOLISKO in litt.). See Die Binnengewässer 1972, 26/1: 212—214.

See also HUTCHINSON 1967: *Fig. 143* (added by the present author).

NER-KOLISKO) the author met difficulties when attempting identification at the species level of remains of resting eggs depicted in the figures mentioned above.

Conclusions

Both "*Filinia longiseta*" (EHRBG) and "*Filinia terminalis*" PLATE were recorded from Lake Balaton in the cold water season by NÁDAY (1914) and VARGA (1932) first, considering them as one species.

Regretfully neither figures nor measurements referring to single individuals on Balaton material have been published.

Modern taxonomy makes distinction between these two forms at the species level (RUTTNER-KOLISKO, 1972) based upon mainly on individual measurements of the appendages (PEJLER, 1957; HUTCHINSON, 1964).

Recent plankton studies both qualitative and quantitative approved the observations of these authors on population dynamics of *Filinia*(♀), adding also numerical data related to this phenomenon.

Scarce appearance of *Filinia* females during the warm water season —except July and October — were also noted. The finding resting egg — first in our lake — in plankton (1958) and neuston (1963) enabled more detailed information on the life-cycle (population dynamics) of *Filinia* inhabiting Lake Balaton.

Biomass studies had been made on population hauled about the middle of January 1956, on *Filinia terminalis* PLATE (SEBESTYÉN, 1958). Using data on measurements on both body and appendages individually for keys in the identification (PEJLER, 1957; HUTCHINSON, 1964) it became evident that population of *Filinia terminalis* in sample 423 is a homogenous one *(Fig. 2, Table 2)*. A comparison with other studies on material from lakes — having at the time of investigations but one planktonic *Filinia* (COLDITZ, 1914; NIPKOV, 1961) — suggests that the Balaton population of *Filinia terminalis* mentioned (No 423) belong — very likely — to *Filinia terminalis* PLATE 1886 f. *maior* COLDITZ 1914.

Through horizontal studies the distribution of *Filinia* throughout the whole extent of the lake could be established (P.-ZÁNKAI and PONYI). In these studies for the years 1965—1967 (I. 4.) no measurements were made in the identification at the species level. (P.-ZÁNKAI, p.c.)

Presence of resting egg remains of *Filinia* could also be established in quaternary layers: in the late Pleistocene and — very likely — throughout the Holocene as well as in surface layers. From these finds and because of the presence of *Filinia* both females and resting eggs in Lake Balaton, we might conclude that *Filinia* inhabit our lake — continuously — since the formation of Lake Balaton. (RÓNAI: 1969: 277). It proves that in the history of this waterbody there were always situations for life of free floating forms including those few whose presence had been already published (SEBESTYÉN, 1969). However we don't have as yet information what remains are included in the peat layer (20 cm. III. core B 28).

This study may remind to the importance of investigations in the cold water period in the open water of Lake Balaton, referring to NÁDAY's observations that time of the start of the sudden increase of crustacea-plankton

coincides with the time of the maximal density of cold water rotifera including *Filinia* and *Notholca** species (NÁDAY, 1914).

Detailed studies on the resting eggs, and analysis of the *Filinia* population in Lake Balaton at the time of maximal density are also needed by which distinction of different taxa might be revealed (see PEJLER, 1957 p. 34—35. *Figs. 103—105*, HUTCHINSON, 1964: *Fig. 2, 3, Table* p *7* and RUTTNER-KOLISKO, 1972 p: 212—214).

Abstract

Filinia (active state) inhabits the open water of Lake Balaton in the cold-water season (1902—1973). Neither figures nor measurements referring to single individual exists on Balaton *Filinia* with the exception of population No 423 (18. 1. 1956), which proved to be a homogenous one of the taxon *Filinia terminalis* PLATE 1866 f. *maior* COLDITZ 1914.

Resting eggs are known from both plankton and neuston. Remains from the sediments showing that *Filinia* inhabits Lake Balaton continuously since the initial period of the formation of Lake Balaton. This suggests that environmental conditions were always suitable for floating forms viz. plankton.

Attention is called 1. to investigate recent populations in Lake Balaton using modern key to clear up taxonomic relation on a broader basis (PEJLER, HUTCHINSON, RUTTNER-KOLISKO), 2. on the importance of the winter-plankton in this shallow and throughout the year well aerated lake by reinvestigating the observations of NÁDAY, the author first noting *Filinia* in this lake.

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* *Notholca longispina* syn. *Kellicottia longispina* KELLICOT based upon its present distribution was considered by VARGA (1954) a glacial relict in Lake Balaton (See also GREEN, 1972: 37).

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Acknowledgements: I wish to acknowledge the kind help of the following scientists Prof. A. RUTTNER-KOLISKO (Lunz) for the critical reading the manuscript, for the permission to publish the data used in *Table 3.* and parts of her letter 28.3. 1974, as well as for a sketch (see *Fig. 8.)* and for calling my attention to relating literature; professors W. T. EDMONDSON (Seattle, Wash.) and D. G. FREY Bloomington, Ind. for calling my attention to recent literature on *Filinia* resting egg. For a sample of *Filinia pejleri* from Lake Lenore, Wash. I am also grateful to Prof. EDMONDSON;

Doctors S. HERODEK, P. BIRÓ and J. OLÁH regarding to the calculation of the regressional coefficient *(Fig. 2)* DR. OLÁH was kind enough to translate from the Russian to Hungarian some parts of BOGOSLOVSKI's and KUTIKOVA's papers, mentioned in the References.

I am greatly indebted to Prof. J. SALÁNKI Director of the Biological Research Institute of the Hungarian Academy of Sciences for kindly providing technical help during the preparation of the manuscript and figures.

A *FILINIA* GENUSBA (TESTUDINELLIDAE, ROTATORIA) TARTOZÓ FAJOK ELŐFORDULÁSA A BALATON JELENÉBEN ÉS MÚLTJÁBAN

Sebestyén Olga

Összefoglalás

A századforduló kezdetétől hat évtizedre terjedő balatoni planktonminták részben publikált, részben kéziratos adataiból meg lehetett állapítani, hogy hidegvízkedvelő Monogononta kerekesféreg *(Filinia)* a hidegvíz beálltával (november—december) megjelenik a planktonban, majd, a felmelegedéssel párhuzamban rohamosan elszaporodva, a téli- koratavaszi planktonnak jelentős komponense lesz. A kb. 20 °C körüli vízben — május közepén — hirtelen eltűnik a nyíltvíz planktonjából. Az életpálya nyugvó szakaszát, úgylátszik, a vízfenéken tölti.

Tavunkból mindezideig a *Filinia* népesség életpályája aktív szakaszából parthenogenetikus ♀-ek vannak feljegyezve. A századforduló legelső éveiben Balatonfüred és környéke vizeiből, még a Lóczy-Balatonkutatás keretében gyűjtött hálómintákból van első ízben jelentve. A húszas évek közepén Révfülöp körüli vizekből, az akkori Zoológiai Állomás gyűjtéséből, majd néhány évvel ezután tihanyi vizekből — már a tihanyi Intézet keretében — lett ismert.

Mennyiségi kutatások a tó különböző mélységi rétegeiből ugyancsak Tihanyban kezdődtek az A_0 klasszikus gyűjtőhelyről egész éven át tartó, majd két ízben három-három éves minták alapján. E sorozatok elemzése adatokat szolgáltatott az életpálya mennyiségi változásokat is magában foglaló képének kialakításához. Ugyancsak Tihanyban a hatvanas évtized közepén három éven át a tó mélységi hossztengelyében és több keresztszelvényben gyűjtött adatokból — noha a hidegvíz idejét nélkülöző minták alapján — beigazolást nyert az a tény, hogy *Filinia* a terjedelmes tó nyíltvízi részében általában elterjedt.

Hímek előfordulásáról nincs feljegyzés, de megtermékenyített miktikus ♀-ekben fejlődő nyugvópeték mind plankton — mind neuston-mintákból előkerültek *(I. Táblázat)*.

Balatoni üledékek különböző rétegei *Filinia* nyugvópetéket is megőriztek, s nyilvánvaló,hogy *Filinia* a tó keletkezési idejétől fogva tagja tavunk biotájának. (Rónai 1969 : 277) Ez a megállapítás egyúttal arra is utal, hogy tavunk életében mindig voltak lebegő szervezetek megélhetésére alkalmas környezeti körülmények (talán a B 28 furat tőzegrétegének megfelelő időszaktól eltekintve).

Sajnos a balatoni „*Filinia longiseta*"-ról nincsenek sem rajzi bizonyítékok, sem egyéni méretfelvételek. A *Filinia terminalis* No 423. népességének modern módszerrel történt elemzése valamint a közkézen forgó határozó szakmunkák méret-adatai arra utalnak, hogy ez a taxon a *Filinia terminalis* Plate 1866 f. *maior* Colditz 1914-hez tartozik.

A *Filiniá*nál nagyobb népességben előforduló ugyancsak hidegvíz-kedvelő, de az egész évben előforduló *Kellicottia longispina* Kell.-ról — mai földrajzi elterjedése alapján — Varga L. kimutatta, hogy glaciális reliktum. A *Filiniá*ról közvetlenül beigazolódott a jégkorszaki eredet.

A balatoni adatok értelmezése mellett a megfelelő irodalmi felkészülést szükségessé tevő tanulmány rámutat nyitott taxonómiai problémára a téli plankton jelentőségével kapcsolatban is.