

Cestodes of Bats in Hungary

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ABSTRACT. Systematic and faunistic studies of the tapeworms found in 792 bats belonging to 19 species showed that 4 Cestode species are occurring in the bats indigenous in Hungary. Among the bats examined, 20% harboured tapeworms. The tapeworm *Myotolepis grisea* (Beneden, 1873) Tenora et Baruš, 1960 was found in *Myotis myotis*, *M. blythi oxygnathus*, *Eptesicus serotinus* and *Rhinolophus ferrumequinum*; *Vampirolepis acuta* (Rudolphi, 1819) nov. comb. occurred in *M. myotis*, *M. nattereri*, *Nyctalus noctula*, *E. serotinus* and *Plecotus austriacus*; *V. balsaci* (Joyeux et Baer, 1934) Spassky, 1954 was found in *M. myotis*, and *Vampirolepis baeri* sp. n., described by the authoress on the basis of specimens studied in Hungary and Switzerland, was found to be a parasite of *Nyctalus noctula*.

Tapeworms parasitizing in the bat species indigenous in Hungary had not previously been studied. In other parts of the Carpathian basin in bat hosts Slovakian authors (TENORA and BARUŠ, 1960; MITUCH, 1964) reported the occurrence of three tapeworm species: *Myotolepis grisea* (Beneden, 1873) Tenora et Baruš, 1960; *Vampirolepis balsaci* (Joyeux et Baer, 1934) Spassky, 1954; *V. ryšavýi* Tenora et Baruš, 1960. MATSKÁSI (1967, 1968, 1975) found 19 Trematode species, and MÉSZÁROS (1966, 1967, 1971) 16 Nematode species in bats in Hungary. The present studies were carried out to clarify the systematic position of the tapeworm parasites of bats indigenous in Hungary and to report the related faunistic data.

Material and Methods

A total of 792 bats were used for parasitological examinations in the Hungarian Natural History Museum, from 1965 to 1974. The capturing of the hosts, belonging to 19 species, were organized by Gy. TOPÁL, mammalogist, in 47 different localities of the country and conducted by the team of the Parasitological Collection (I. MATSKÁSI, F. MÉSZÁROS, Éva MURAI, I. SZABÓ, Etelka VAJDA), as well as by M. JANISCH, parasitologist and F. HAÁSZ, university student, assisting in the programme as external collaborators. The data of the hosts are shown in Table 1. Infection by tapeworms was demonstrated in 20% (159) of the captured bats, and the parasites recovered from them represented the following 4 species: *M. grisea* (Beneden, 1873) Tenora et Baruš, 1960; *V. balsaci* (Joyeux et Baer, 1934) Spassky, 1954; *V. acuta* (Rudolphi, 1819) n. comb.; *V. baeri* sp. n.

The bat Hymenolepidids found in the collection of the University of Neuchâtel, Switzerland, were resorted to for comparative studies in species identification. The authoress is indebted for the courtesy of the late Professor Jean G. BAER, deceased in 1975, and Professor Claude VAUCHER, for making possible the comparative studies.

Most bats were captured alive; the few shot by a rifle were autopsied immediately, to recover live parasites from the gut as far as possible. The tapeworms were fixed and stored in 70% ethanol, from 1969 in hot 5% formaline solution prepared in phys. saline. Hooks and eggs were examined in BERLESE solution, and some of the worms were prepared by staining with carmine in hydrochloric acid.

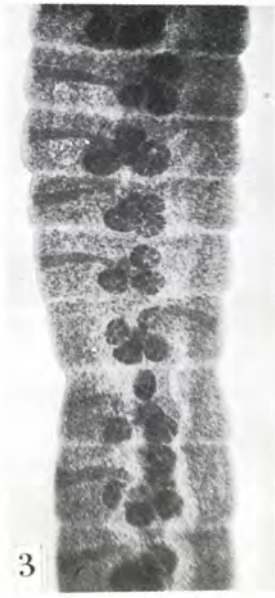
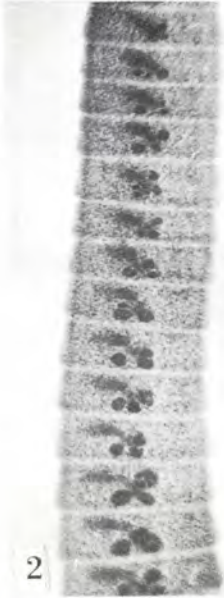
Table 1

Summary of tapeworm recoveries in bats in Hungary

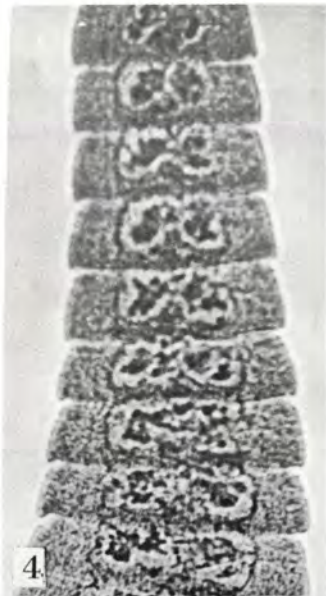
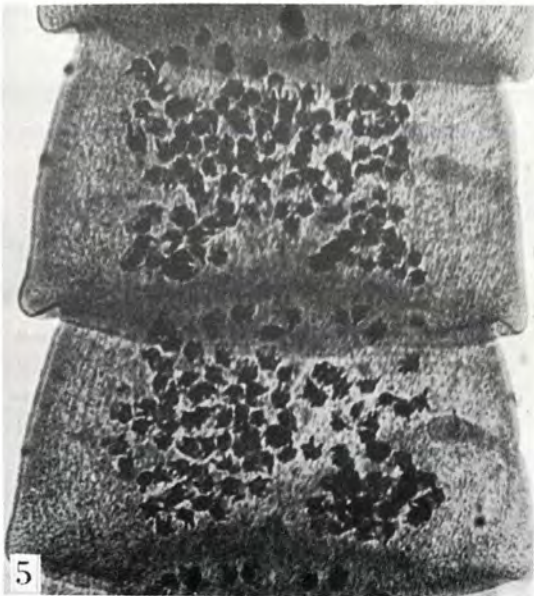
Bat species	Number of animals			Tapeworm species found							
	exam- ined	infes- ted	%	Myotolepis grisea		Vampirolepis balsaci		Vampirolepis baeri		Vampirolepis acuta	
				infes- ted	%	infes- ted	%	infes- ted	%	infes- ted	%
<i>Myotis myotis</i>	159	30	18.8	29	18.2	1	0.6	-	-	1	0.6
<i>M. blythi oxygnathus</i>	173	32	18.5	32	18.5	-	-	-	-	-	-
<i>M. daubentoni</i>	11	-	-	-	-	-	-	-	-	-	-
<i>M. dasycneme</i>	2	-	-	-	-	-	-	-	-	-	-
<i>M. bechsteini</i>	4	-	-	-	-	-	-	-	-	-	-
<i>M. nattereri</i>	19	1	5.2	1	5.2	-	-	-	-	1	5.2
<i>M. mystacinus</i>	1	-	-	-	-	-	-	-	-	-	-
<i>Nyctalus noctula</i>	93	44	53.0	-	-	-	-	7	8.4	40	48.2
<i>N. leisleri</i>	4	-	-	-	-	-	-	-	-	-	-
<i>Eptesicus serotinus</i>	36	30	83.3	21	58.3	-	-	-	-	25	69.4
<i>Miniopterus schreibersi</i>	88	-	-	-	-	-	-	-	-	-	-
<i>Vespertilio murinus</i>	1	-	-	-	-	-	-	-	-	-	-
<i>Plecotus auritus</i>	11	-	-	-	-	-	-	-	-	-	-
<i>P. austriacus</i>	19	1	5.2	-	-	-	-	-	-	1	5.2
<i>Barbastella barbastellus</i>	8	-	-	-	-	-	-	-	-	-	-
<i>Pipistrellus pipistrellus</i>	2	-	-	-	-	-	-	-	-	-	-
<i>Rhinolophus ferrumequinum</i>	101	21	20.7	21	20.7	-	-	-	-	-	-
<i>R. euryale</i>	9	-	-	-	-	-	-	-	-	-	-
<i>R. hipposideros</i>	61	-	-	-	-	-	-	-	-	-	-
Total	792	159		104		1		7		68	

Figs. 5-9: *Myotolepis grisea*:5= scolex; 6= young proglottids; 7= hermaphroditic proglottids; 8= mature proglottids;
9= proglottids containing eggs.

(Photo Murai)



2-5 ——— 200 μ



Systematics

The 4 Cestode species found in bats indigenous in Hungary belong to the family Hymenolepididae Railliet et Henry, 1909. With regard to SPASSKY's findings (1954), they can be classified into two genera, above all by differences in the structure of the scolex.

MYOTOLEPIS Spassky, 1954

Myotolepis grisea (Beneden, 1873) Tenora et Baruš, 1960.

Hosts: *Myotis myotis*, *M. blythi oxygnathus*, *M. nattereri*, *Eptesicus serotinus*, *Rhinolophus ferrumequinum*. - Localization: small intestine. - For habitats see Table 2. This species is the most frequent bat cestode in Hungary. It was found to occur in bats from 26 localities in the comitats Győr-Sopron, Vas, Zala, Veszprém, Somogy, Baranya, Bács-Kiskun, Pest, Nógrád, Heves, Borsod and Szabolcs-Szatmár. - Extensity and intensity differ between host species, being 18.2%, 1-83 specimens in *M. myotis*, 18.5%, 1-67 specimens in *M. blythi oxygnathus*, 5.2%, 2 specimens in *M. nattereri*, 58.3%, 1-61 specimens in *E. serotinus*, 20.7%, 1-65 specimens in *Rh. ferrumequinum*.

Description of *Myotolepis grisea* on the basis of our material

Small hymenolepidid. Specimens found during the summer period (July to September) containing mature eggs are 25-40 mm in length and 0.6 mm in maximum width.

The tapeworms recovered during the inactive period of the bats usually consist only of the scolex and of a few proglottids without genital organs. Such 2-5 mm long specimens show acraspedote edges, but the more developed or mature ones generally have proglottids 25-40 μ greater in distal than in proximal width, imparting slightly serrated contours to the strobile. This feature varies largely, depending on the degree of proglottid contraction.

The structure and measurements of the scolex can be regarded as constant within a narrow range of variations. It is either roundish or tapers slightly anteriorly, and is 190-230 μ long by 200 μ wide. It bears four round suckers, 70-80 μ in diameter, and an unarmed rostellum, 120-140 x 50-65 μ in size (Fig. 1). There is no invagination behind the scolex, and the 0.5 mm long cervical part is 150-200 μ in diameter.

The mature strobila consists of approx. 500 proglottids. These are trapezoid-shaped, widening slightly posteriorly, and are usually twice as wide as long (in a strongly contracted state the width is 4-5 times greater than the length). The young proglottids not showing genital organs measure 250 x 70 μ , the hermaphroditic proglottids 270-480 x 80-150 μ , and the mature ones 500-600 x 200-260 μ . The proglottid size is much smaller in specimens not containing ripe eggs. The pairs of excretory ducts pass at a distance of 70-90 μ from the edge of the strobila, and are 9-10 μ in diameter. The genital pores localize at one side of the strobila, in the upper third of the proglottid. A single genital pore may be exceptionally found contralaterally (Fig. 3). The cirrus sac extends up to the level of the excretory duct; its length varies between 40-50 μ (in young segments) and 90-100 μ (in mature segments), and its diameter is 30-45 μ . Both internal and external seminal vesicle are present; the former measures 30-45 x 45-60 μ , the latter is 35-40 μ in diameter. The gonads are centrally located in the proglottid (Figs. 2-3). The testes are round and 50-70 μ in diameter (in young proglottids the testes are 20-30 μ in diameter; in strongly contracted proglottids the testes assume an egg-shape and measure 40-90 μ). The ovary is small with irregular contours, 40 μ in diameter. The vitelline gland localizes beneath the ovary, either in central or slightly apolar position within the posterior field. The vagina opens behind the cirrus sac. The seminal receptacle is 40-50 μ in diameter, and 90 x 140 μ in maximal size. The uterus is an even sac-like structure, filling the entire medullary parenchyme within mature proglottids (Figs. 4-5). The eggs are spherical, 32-35 μ in diameter, the oncosphere is 22-32 μ in diameter, and the embryonal hooks are 15 μ long.

Remarks

The nomenclatural dispute about M. grisea (Beneden, 1873) Tenora et Baruš, 1960, was described in a report by TENORA and BARUŠ (1960). The present writer agrees with the position stated by these authors. The species name has been regularly used by European authors since its original description, only the generic name was occasionally altered according to the actual state of knowledge. Quite recently Russian authors (ANDREIKO and SKVORTZOV, 1967; ANDREIKO et al., 1969a) have also agreed with the re-classification of the species Hymenolepis grisea into the genus Mytolepis Spassky, 1954, but do not agree with the opinion of TENORA and BARUŠ (1960) that M. crimensis (Skarbilovitsch, 1964) Spassky, 1954, were a synonym of M. grisea (Beneden, 1873). The present writer had no opportunity to study either the specimens available in the USSR, or the type-specimen of M. crimensis. Her opinion that the dimensions of M. crimensis easily fit in with the range of measurements of M. grisea is based on the examination of approx. 1500 specimens of the latter species, recovered from five host species in 26 habitats in Hungary, and on comparative examinations on the specimens recovered from Rhinolophus ferrumequinum in France (JOYEUX's collection). M. grisea is widely spread in palaeartic bats. Hosts: Eptesicus serotinus, Vespertilio murinus, Myotis myotis, M. blythi oxygnathus, Rhinolophus ferrumequinum (BENEDEN, 1873; STILES and NOLAN, 1931; JOYEUX and BAER, 1936; SOLTYS, 1959; TENORA and BARUŠ, 1960; MITUCH, 1964; TIMON-DAVID, 1964; ANDREIKO and SKVORTZOV, 1967). In Myotis nattereri M. grisea was found for the first time during the recent examinations in Hungary.

VAMPIROLEPIS Spassky, 1954

Vampirolepis balsaci (Joyeux et Baer, 1934) Spassky, 1954

Host in Hungary: Myotis myotis. - Localization: small intestine. - Habitat: Cave Csörgőlyuk, Mátra Mountains; 6th March 1976. - Only a single destrobilated specimen was found.

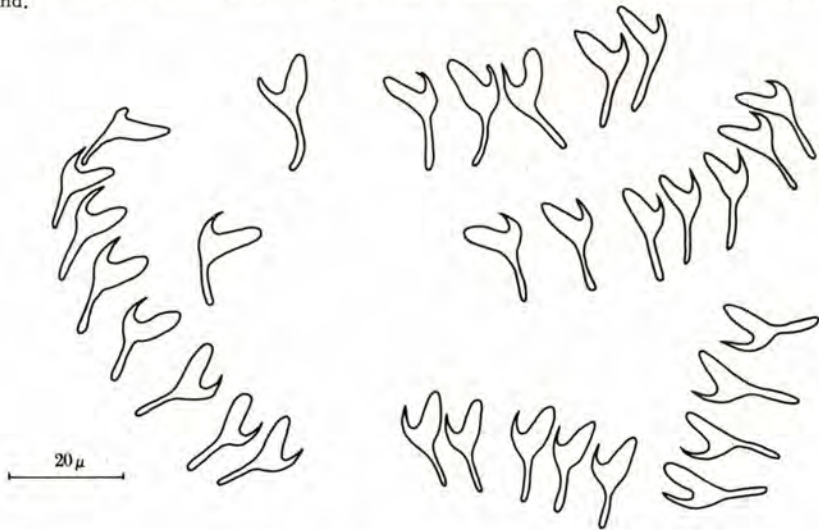


Fig. 6: Vampirolepis balsaci: configuration of the hook crown of the type specimen (fixed in BERLESE medium)

The species characters are described on the basis of the type-specimen available in the Neuchâtel University Collection (Host: *Myotis bechsteini*; locality: Buré d'Orval, France; August 1930, leg. H. BALSAC):

The strobila is 65 mm in length and 1.3 mm in maximal width. The proglottids are 2-3 times wider than long, and broaden slightly posteriorly. The diameters of scolex, the four suckers and rostellum are 180 μ , 70-80 μ and 80 μ , respectively. The crown comprises 30 hooks with prominent guards and a shorter blade. Hook length is 19 μ and the hooks base is 20 μ (Fig. 6). The pairs of longitudinal excretory ducts are 12, viz. 45 μ in diameter. The genital atrium is always unilateral and localizes at the half length of the proglottid. The three testicles, 80-110 μ in diameter, are arranged in a transverse row. The cirrus sac measures 85-120 x 35-45 μ , and either attains, or (in older proglottids) intersects the longitudinal excretory ducts. Internal and external seminal vesicle are both present; the former is 30-40 μ , the latter 50 μ in diameter. The ovary is a compact, ovoid or slightly lobular body, 175 x 80 μ in size, localizing somewhat aporally in the central field of the proglottid. The vitelline gland, 90 x 45 μ in size, is found behind the ovary. The vagina opens into the genital atrium behind the cirrus sac. The seminal receptacle is large, occupying almost half-width of the proglottid; it measures 180-260 x 60-90 μ . The uterus is saccular with several compartments, fills the entire medullary space. The eggs measure 45 x 33 μ ; the oncosphere is 28 x 22 μ in size; the embryonal hooks are 15 μ long.

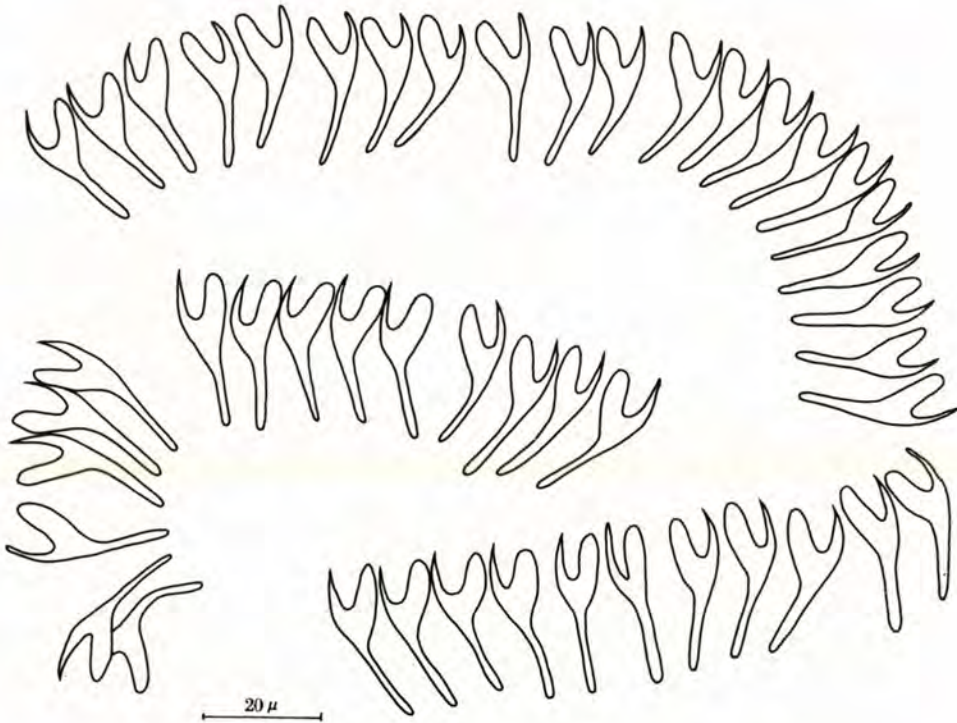


Fig. 7: *Vampirolepis baeri* sp. n.: configuration of the hook crown of Holotype specimen (fixed in BERLESE medium)

The single specimen found in Hungary evidently belongs to the species V. balsaci because, although only its scolex was available for evaluation, the quality and number of hooks borne by it corresponded in every respect with those characteristic of the type: the crown comprised 30 hooks, 18 μ long each, with a base length of 19 μ .

The known hosts of V. balsaci are *Myotis bechsteini*, *Eptesicus serotinus* (JOYEUX and BAER, 1936) and *Rhinolophus ferrumequinum* (TENORA and BARUŠ, 1960); *Myotis myotis* was first recorded a new host in the present studies.

Vampirolepis baeri sp. n.

Host: *Nyctalus noctula*. - Localization: small intestine. - Habitat: Hungary (8 PARATYPES): Városliget park Budapest (bats resident in trees), 14th September 1967 (Nos. 1943 and 1947); 10th January 1968 (2 specimens No. 2046); 22nd November 1968 (Nos. 2373 and 2375); Óbuda district, Budapest, 18th June 1970 (No. 2603); Szabadszállás, comitat Pest, 27th September 1967 (No. 1955). Switzerland: Col de Jaman (Gillieron) 17th September 1967, leg. W. AELLEN (Coll. Mus. Genève No. 3211 - HOLOTYPE -). - Extensity: 7 of 83 *N. noctula* (8.4%) were infected. In three cases V. baeri was found together with V. acuta in the small intestine. - Intensity: 2 specimens in one host, and 1-1 specimen in 6 hosts.

Description of Vampirolepis baeri sp. n.

Medium-sized hymenolepidid, 140 mm long, maximum width 3 mm (Holotype specimen); another specimen containing ripe eggs (Paratype No. 2603) was 78 mm long by 2 mm wide, and the dimensions of the other specimens (7 Paratypes) varied in the range of 25-55 mm x 1-2 mm. The proglottids are trapezoid; the young ones measure 90 x 290 - 130 x 400 μ , the mature ones 180 x 1400 - 250 x 2600 μ . The margins of the strobila are serrate. The genital pores are unilateral and localize nearby the upper third of the proglottid's length. Two excretory ducts, 12 viz. 30-50 μ in diameter, pass across the strobila.

The scolex is 200-210 μ in diameter, and 300 μ in length. It bears 4 suckers, 85-95 μ in diameter each. The rostellum is 100 μ in diameter, and carries a crown of 45-49 hooks. The hooks are of a characteristic shape, the blade being longer than the guard. They measure 24 μ at the base, and 26-27 μ in length (Figs. 7, 10 and 11). The rostellum may protrude above the surface level of the scolex in a length of 100-125 μ . It is retractable into a bulky rostellar sac, 120 x 200 μ in size (Figs. 8b and 10).

The three testes are arranged in a triangle, one being in poral and two in aporal position, either somewhat slanted or one above the other (Figs. 8a and 12). Testes measure 40 x 80 μ in young proglottids and 70 x 120 to 120 x 200 μ in hermaphroditic ones. The cirrus sac extends to the level of the excretory duct, and measures 130 x 40 to 200 x 60 μ , depending on the age of the proglottid. Internal and external seminal vesicle are both present, the former is 35 x 45 to 60 x 160 μ , the latter 50 x 100 to 100 x 200 μ in size. The ovary is lobular, located in the median line and measures 125 x 60 to 250 x 100 μ . The vitelline gland, located beneath the ovary in slightly aporal position, is 120 x 70 to 170 x 100 μ in size. The vagina opens into the genital atrium nearby the cirrus, forming an extraordinarily large seminal receptacle, which varies in size from 100 x 50 to 900 x 90 μ , depending on the age of the proglottid (Fig. 8a). The uterus is saccular and fills the entire medullary space of the mature proglottids, and has multiple compartments. Its development is shown in Figs. 13-15. The eggs are 50-54 μ in diameter, the hexacanth oncosphere is 30-36 μ long, and the embryonal hooks are 17-18 μ in the old proglottids.

The Holotype specimen of V. baeri is kept in the Institute of Zoology, University of Neuchâtel (Switzerland), the Paratype specimens are to be found in the Cestode Collection of the Hungarian Natural History Museum, Budapest.

The new species has been named *V. baeri* in memory of the late Professor Jean G. BAER, to whom the authoress owes many grateful thanks.

Differential diagnosis

The nearest relative of the new species is *V. spasskii* Andreiko, Skvortzov et Konov, 1969. They differ in the number and size of the hooks: *V. spasskii* has 35 hooks 28-31 μ in length, *V. baeri* sp.n. has 45-49 hooks 24 μ at the base and 26-27 μ in length. The following key is proposed for the differentiation of *V. baeri* sp.n. from other species of similar morphology (only species having hooks in the length range of 20-30 μ have been considered for differentiation):

- 1 (4) Blade of hooks shorter than guard (Figs. 22a and b)
- 2 (3) Testes arranged in a transverse row
 - a) Hooks 17.5-21 μ long, 26-30 in number

hidaensis Sawada, 1967

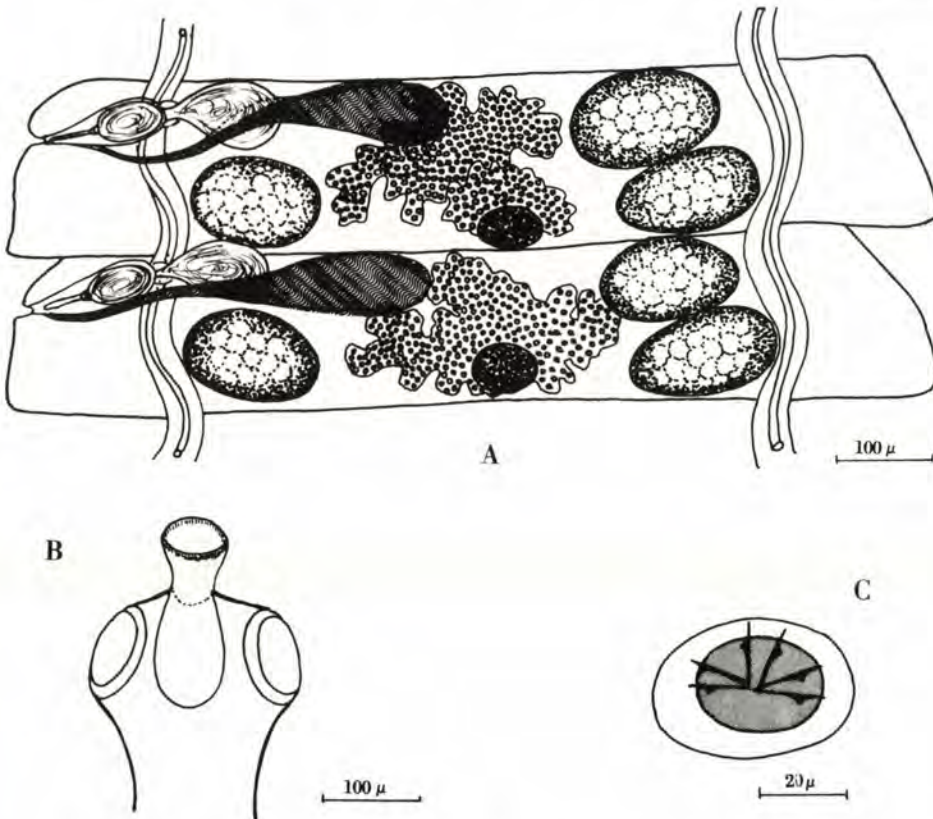


Fig. 8: *Vampirolepis baeri* sp.n.: A = hermaphroditic proglottids; B = scolex; C = egg (orig.)

- b) Hooks 19-22 μ long, 30 in number balsaci Joyeux and Baer, 1934
- c) Hooks 23-26 μ long, 44-46 in number decipiens Diesing, 1850
- 3 (2) Testes arranged in triangular pattern in young proglottids, and in a row in older hermaphroditic proglottids; hooks 26-30 μ long, 40 in number aelleni Mahon, 1954
- 4 (1) Guard of hooks shorter than blade, which extends beyond the former (Figs. 22b and c)
- 5 (6) Testes all in a row
- a) Hooks 21 μ long, 26-30 in number macrotesticulatus Sawada, 1970
- b) Hooks 21 μ long, 30 in number ogaensis Sawada, 1974
- c) Hooks 24.5 μ long, 23 in number iwatensis Sawada, 1975
- d) Hooks 26-29 μ long, 35-41 in number gertschi Macy, 1931
- e) Hooks 32 μ long, 22-26 in number isensis Sawada, 1966
- 6 (5) Testes in triangle
- a) Hooks 20 μ long, 20-23 in number syrdariensis Skarbilovitsch, 1946
- b) Hooks 20-23 μ long, 20-22 in number kerivoulae Hübscher, 1937
- c) Hooks 24 μ long, 16-18 in number sangroundi Baer, 1933
- d) Hooks 26-27 μ long, base 24 μ long, hook number 45-49 baeri sp. n.
- e) Hooks 28-31 μ long, 35-37 in number spasskii Andreiko, Skvortzov et Konovalov, 1969

The species included in the above key have wide host ranges, and their habitats lie in different areas of Europe, Asia, Africa and America. Scrutiny of the most prominent morphological features suggests that some of them are probably synonymous; e.g. V. macrotesticulatus Sawada, 1970 and V. ogaensis Sawada, 1974 show not only identical size and number of hooks, but also their host spectrum seems to be identical. Nevertheless, it would be difficult to state their identity on the basis of literary data only.

Vampirolepis acuta (Rudolphi, 1819) nov. comb.

Hosts: *Myotis myotis*, *M. nattereri*, *Nyctalus noctula*, *Eptesicus serotinus*, *Plecotus austriacus*. - Localization: small intestine. - Habitats: 18 collection sites (for details see Table 2) in comitats Győr-Sopron, Vas, Veszprém, Baranya, Bács-Kiskún, Pest, Nógrád and Szabolcs-Szatmár. - Extensity and intensity in various hosts: 3 specimens on a single occasion in *M. myotis*, 1 specimen on one occasion in *M. nattereri*, 1-35 specimens on 40 occasions (48.2%) in *N. noctula*, 1-112 specimens on 25 occasions (69.4%) in *E. serotinus*, 1 specimen in 1 *P. austriacus*.

The single V. acuta available in the JOYEUX collection at the University of Neuchâtel (host: *E. serotinus*; habitat: France, Buré d'Orval, March 1930) was a destrobilated "winter" specimen, so only its crown was of value for morphological evaluation by the present writer (Fig. 9).

Description of Vampirolepis acuta nov. comb. on the basis of our material

Hymenolepidid of medium size. Mature (egg-producing) strobilae are 45-60 mm in length and 1.1-1.6 mm in maximal width. The specimens collected during the inactive period of the bat hosts, in winter, consisted only of the scolex and a few young proglottids,

and were 2-5 mm long. The edges of the strobila are serrate, the genital pores unilateral, and located at half length of the proglottid, slightly laterally. Young proglottids measure 35-60 x 450-550 μ , the hermaphroditic proglottids 70-90 x 750-900 μ , the mature proglottids 180-220 x 960-1500 μ . There are two pairs of excretory ducts, 9-12 and 35-40 μ in diameter, respectively.

The scolex is 280-360 μ in diameter and 220-350 μ in length (Fig. 16). Its most prominent feature is the markedly developed rostellum, 120-140 μ in size, carrying a crown of 38-54 hooks. The shape of the hooks is characteristic: the well developed blade is protruding anteriorly beyond the guard. For this reason the length of the hooks (37-40 μ) is exceeding that of the base (34-37) by 1-3 μ (Figs. 9 and 17). The hooks easily became detached from the bulging rostellum at manipulation; this can account for the frequent underestimation of hook numbers. The rostellum is retractable into a rostellar sac, 160 x 120 μ in size. The 4 suckers are round, 80-110 μ in diameter. The slightly tapering neck region behind the scolex is 500 μ long and 200-250 μ wide.

The testes are arranged in a line; sometimes (in certain proglottids) they number 4 instead of 3, and in such cases the supernumerary testis is located at the aporal side in a slightly oblique position (Fig. 18). The testes measure 30-45 x 50-70 μ in young pro-

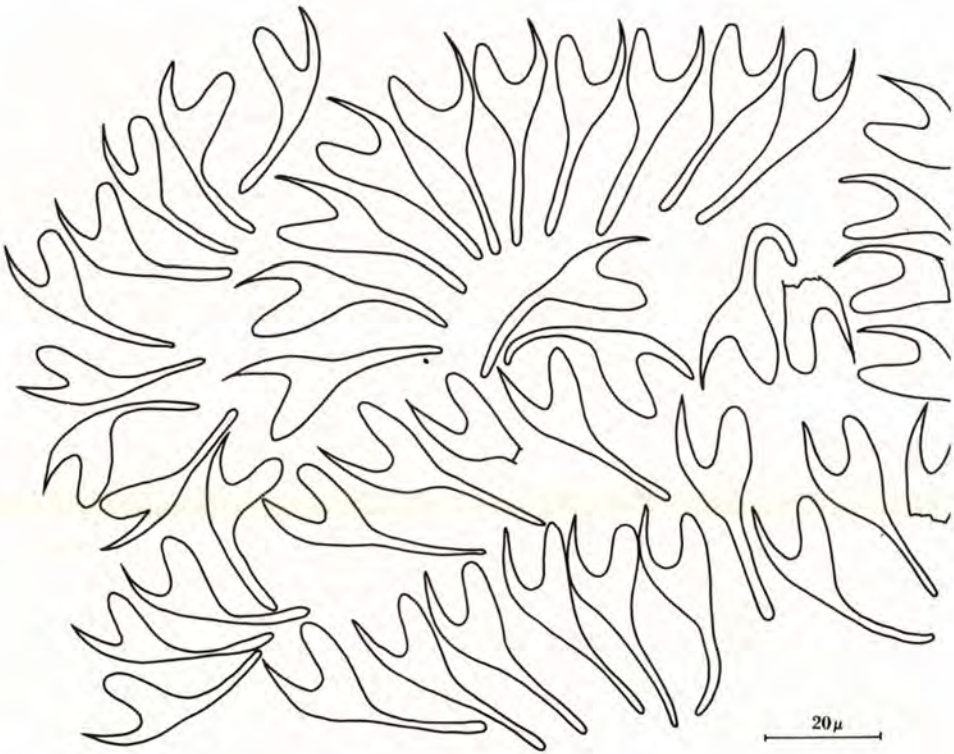


Fig. 9: *Vampirolepis acuta*: configuration of the hook crown of the specimen in the JOYEUX collection (fixed in BERLESE medium)

glottids and 60-110 x 100-135 μ in hermaphroditic ones. The cirrus sac either extends up to the level of the excretory duct or just intersects it, its sizes are ranging from 90 x 30 to 190 x 50 μ depending on the age of the proglottid. Internal and external seminal vesicle are both present, measuring 30 x 50 to 50 x 100 and 40 x 80 to 45 x 155 μ , respectively. The compact, elongated ovary is centrally placed, ranging in size from 35 x 180 to 70 x 320 μ . The vitelline gland is found either along the midline or slightly aporally beneath the ovary; it measures 25 x 50 to 30 x 90 μ . The vagina opens into the genital atrium behind the cirrus sac, forming there a bulky seminal receptacle. The latter extends over 40-45% of the proglottid's width and its dimensions are ranging from 55 x 110 - 180 x 340 μ (Fig. 19). The uterus fills the entire medullary parenchyme in the mature proglottid; it is saccular and divided into two compartments, similar in structure to the uterus of Hymenolepis fraterna (Stiles, 1906) (Figs. 20 and 21). The eggs are oval, 50 x 63 μ in size, the embryo measures 34 x 28 μ , and the embryonal hooks are 16-17 μ long.

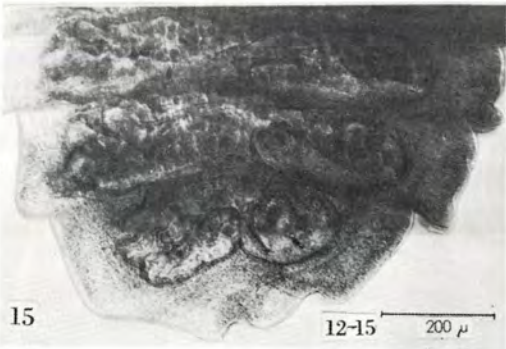
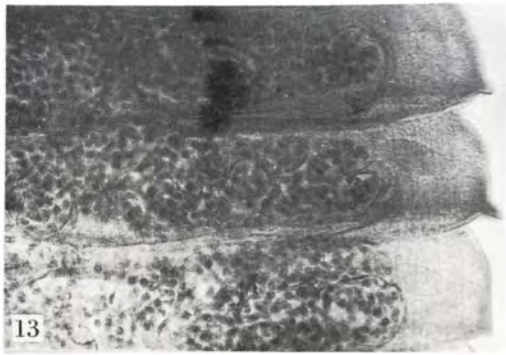
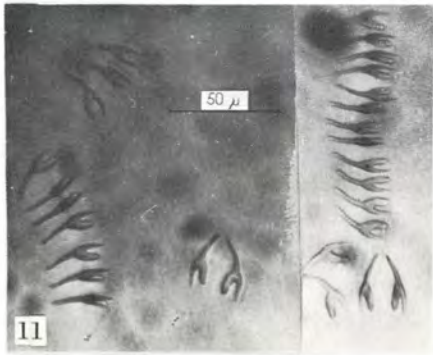
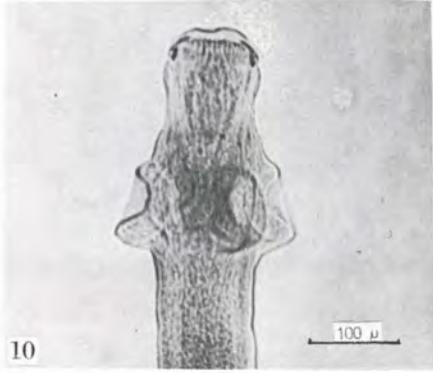
Remarks :

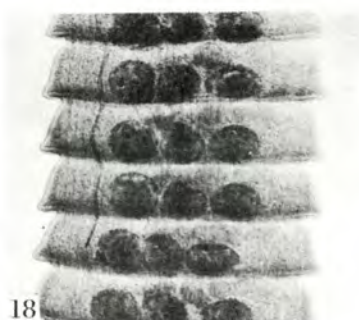
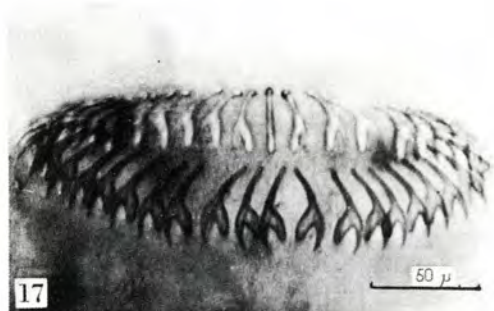
SPASSKY (1954) reclassified the species Hymenolepis acuta (Rudolphi, 1819) with the genus Staphylocystis Villot, 1877, and YAMAGUTI (1959) actually listed it with that genus in his catalogue. The species Dicranotaenia syrdariensis (Skarbilovitsch, 1946) was also classified into the above genus by the authors cited. The present writer holds the view that neither H. acuta, nor D. syrdariensis find their correct systematic position in the Staphylocystis genus, which comprises the hymenolepidid species parasitizing in shrews. In view of their main morphological features (crown of many fraternoid hooks on a well developed rostellum, two pairs of excretory ducts, presence of both internal and external seminal vesicle, bulky seminal receptacle, etc.) these species clearly belong to the genus Vampirolepis Spassky, 1954, and for this reason the present writer has reclassified them accordingly.

Several authors (BENEDEN, 1873; BLANCHARD, 1891; PARONA, 1893) concerned with bat parasites in the past century had demonstrated the occurrence of H. acuta in certain bats indigenous in Europe (M. nattereri, N. noctula, M. schreibersi, P. auritus, Vespertilio murinus, Pipistrellus pipistrellus), until early in this century LINSTOW (1904) presented a satisfactory redescription of the species characters (shape, 28-42 in number, 39 μ in length of hooks; three testes in one line, egg diameter 52 μ , embryo 26 x 31 μ in size). Two years later JANICKI (1906) described proglottids misjudged as of H. acuta from a Vespertilio lasiopterus host; his otherwise excellent description was based on a 30 mm long detail of strobila ("Mir lagen nur Bruchstücke vor" - "only fragments were available") devoid of scolex. He stated that the testes were not in a line, but one was poral, and two were aporal, the latter being one above the other. Reports on H. acuta have been scanty since JANICKI's exposition. JOYEUX and BAER (1936) dealt with the species in the volume "Cestodes" of the series "Faune de France", and since the JOYEUX collection comprised only a single destrobilated specimen recovered from an Eptesicus serotinus host in March, these authors obviously relied on JANICKI's (1906) description for the position of the testes, because they ordered H. acuta among the species with testes located in a triangular pattern. Ever since either the old data have been resorted to in the reports related to H. acuta (STILES and NOLAN, 1931; VIGUERAS, 1941; SOLTYS, 1959) or deficient data have been presented in support of its occurrence (e.g. CHIRIAC and BARBU, 1963). In the meantime several new species of hymenolepidid bat parasites, having three testes arranged in a line, and fraternoid hooks approx. 40 μ in length, have been described in different countries (V. ryšavýi Tenora et Baruš, 1960; V. roudabushi Macy et Rausch, 1946; V. skrjabinariana Skarbilovitsch, 1946). There are three species of similar morphology (V. christensoni Macy, 1931; V. multi-

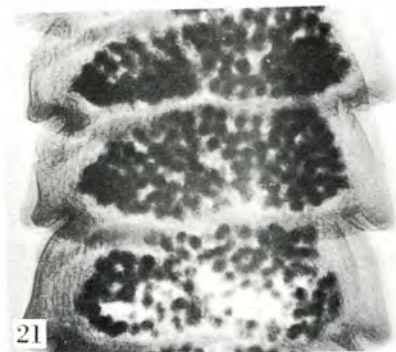
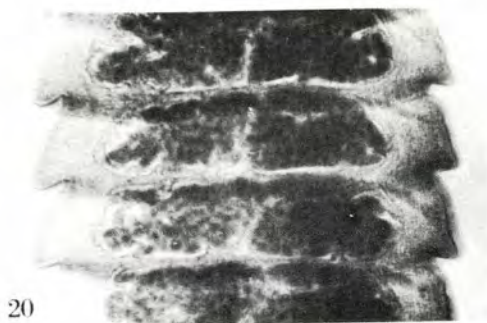
Figs. 10-15: Vampirolepis baeri sp. n.:

10= scolex; 11= hooks; 12= hermaphroditic proglottids; 13= genital atrium and uterus; 14= proglottids containing eggs; 15= terminal proglottids (No. 11 in BERLESE medium) (Photo Murai)





18-21 200 μ



hammatus Sawada, 1967; V. taruiensis Sawada, 1967) with hooks about 35 μ in length, of which V. ryšaví Tenora et Baruš, 1960 seems to be most closely related to V. acuta. The present writer classifies V. ryšaví as a synonym of V. acuta on agreement with the authors contributing the original description of the former.

Examinations of the hooks of approx. 530 V. acuta parasites recovered from 5 host species in Hungary, and of the crown of the specimen collected in France support the conclusion that this species is one of the most widely spread tapeworm parasites of bats not only in Hungary and Western Europe, but also in the greater part of the Palaearctic region, and probably of America, too. The variation spectrum of the species is wide enough to account for 4-5 μ differences in hook lengths of parasites recovered in same habitat and from the same host, yet V. acuta can be easily characterized and recognized in toto preparations and, naturally, also by hook morphology studied in BERLESE medium. It is the opinion of the present writer that the species V. christensoni Macy, 1931, found in Poland (SOŁTYS, 1959) and Roumania (CHIRIAC and BARBU, 1963), and probably also V. skrijabiniana (Skarbilovitsch, 1946) Spassky, 1954, very widely spread in the USSR, are identical with V. acuta nov. comb.

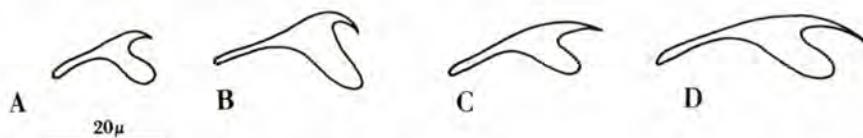


Fig. 22: Hook types in the genus Vampirolepis

Type 1: basis longer than length (A= V. balsaci; B= V. decipiens)

Type 2: basis shorter than length (C= V. baeri sp. n.; D= V. acuta)

SPASSKY (1954) created the genus Vampirolepis for the systematic classification of those hymenolepidid species which possess a crown consisting of more than 20 fraternoid hooks, parasitize bats and have the testes arranged in a line (SPASSKY's type VII). Since the subdivision into further genera of the species originally ordered into the genus Hymenolepis Weinland, 1858 was deemed necessary by the time, the generic name Vampirolepis has since been widely adopted in the literature. It should be mentioned, however, that the genus Rodentolepis, also created by SPASSKY in 1954, has no notable differentiating features from Vampirolepis in SPASSKY's description. According to SPASSKY, apart from fraternoid hooks Rodentolepis species may possess also coronuloid or other types of hooks in number attaining "generally several dozens", and testes arranged either all in a line, or in a triangular fashion (SPASSKY's type V). SPASSKY created the genus Rodentolepis for the hymenolepidids of rodents, which have the ecological peculiarity of being able to parasitize in a single host in both the larval and adult stage. The features common to both genera are nude suckers, two pairs of excretory ducts, absence of accessory copulation organs, presence of seminal receptacle and both internal and external seminal vesicle, spherical or oval shape of eggs, and characteristic size of the embryonal hook. x)

x) Owing to the similar features of the genera Rodentolepis and Vampirolepis and to such considerations as e.g. led SPASSKY to classify the species H. fraterna (Stiles, 1906) into the genus Vampirolepis, it has become a fairly frequent practice to order rodent parasites, too, into either the Rodentolepis or the Vampirolepis genus (e.g. NAMA and KICHI /1975/ described last year a H. fraterna-like hymenolepidid from the rat in the genus Vampirolepis).

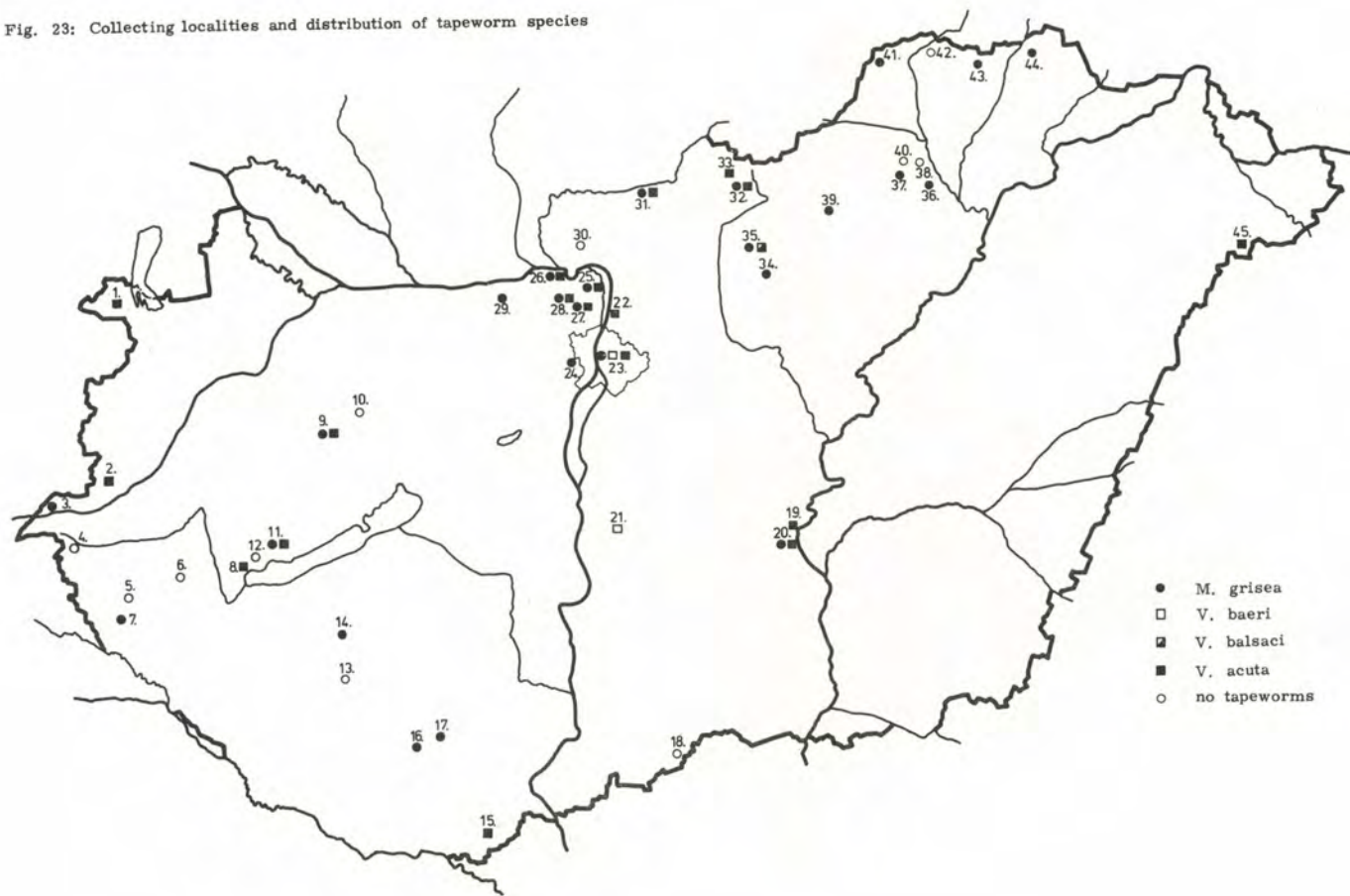
Figs. 16-21: Vampirolepis acuta;

16= scolex; 17= hook crown; 18= young proglottids; 19= hermaphroditic proglottids;

20= mature proglottids; 21= proglottids containing eggs (No. 17 in BERLESE medium)

(Photo Murai)

Fig. 23: Collecting localities and distribution of tapeworm species



One of the main characteristics of bat tapeworms is the quality (shape, size) and number of hooks.[†] Since hook shapes might well be utilized for taxonomic purposes, a detailed description thereof is forthcoming. The fraternoid hooks can be classified into two main types:

- a) handle long and thin, guard bulky, protrusive, blade does not reach to the most anterior point of the guard; hook length is either inferior to, or identical to, base length (Fig. 22a, b).
(e. g. *V. balsaci*, *V. decipiens*)
- b) handle long and thin, guard broad, blade well developed, longer than guard; accordingly hook length is exceeding base length (Fig. 22c, d).
(e. g. *V. acuta*, *V. baeri*)

Among the species classified into the genus *Vampirolepis* the hooks of *H. chiroptero-phila* Viguera, 1941 shown stout handle and less developed guard than the rest.

YAMAGUTI (1959) created a new genus named *Triodontolepis* for *H. miniopteri* Sandars, 1957 the hooks of which carrying strong side processes on the guards. In the meantime several other species, mostly parasites of shrews, have been classified into the genus *Triodontolepis* Yamaguti, 1959 (PROKOPIČ, 1975).

The position of the testes in the young hermaphroditic proglottids can be resorted to as a species character, but cannot be regarded as a generic feature. ANDREIKO and her coworkers (1969a) concluded from examinations on a large number of *V. skrbjabinariana* (Skarbilovitsch, 1946) that the linear arrangement of the testes is not a permanent feature of this species, because other arrangements, too, have not infrequently been seen. Accordingly, species characterized by triangular arrangement of the testes should also be placed within the genus *Vampirolepis* Spassky, 1954, erected for hook-bearing hymenolepidids of bats (e. g. *V. spasskii* Andreiko, Skvortzov et Konovalov, 1969).

Both SPASSKY (1954) and YAMAGUTI (1959) classified many bat parasites into the genus *Vampirolepis*, including several species characterized by triangular rather than linear arrangement of the testes (*V. sangroundi* Baer, 1933; *V. kerivoulae* Hübscher, 1937, etc., and even the species *H. grisea* (Rudolphi, 1819), known to an unarmed scolex). Attention to the *Rodentolepis-Vampirolepis* problem was also attracted by RYBICKA (1959). A further taxonomic difficulty has been presented by the inadequate definition of the genera *Dicranotaenia* and *Staphylocystis*. This and similar problems can explain that many species are still forced into artificial taxonomic categories. The elaboration of a systematic classification adequate to the natural system remains to be achieved by further investigations.

Faunistics

Data on the hosts examined and worm recoveries are seen in Table 2. The collecting localities and the distribution of the tapeworms found in the bats are shown in the map (Fig. 23). The relative incidence of tapeworm species in the five most frequent indigenous bat species is illustrated in Fig. 24.

According to the present studies *M. grisea* (Beneden, 1873) Tenora et Baruš, 1960 is the most common tapeworm of bats in Hungary. It occurred in all habitats in which a

[†] Hook quality can best be studied on scolices placed in BERLESE solution. My own investigations in Hungary and in the Collection of the University of Neuchâtel provided ample opportunity for obtaining sufficient experience in hook evaluation. The hooks depicted in Figs. 1, 2, 4 and 22 were all drawn with the same apparatus and at the same magnification, in order to reduce subjective error to a minimum.

Table 2

Occurrence of tapeworms in bats in Hungary

Abbreviations:

- a) *Myotolepis grisea* c) *Vampirolepis balacsi*
 b) *Vampirolepis baeri* d) *Vampirolepis acuta*

Serial No of localities Fig. 23	Hosts			R. ferrum-equinum			M. myotis			M. blythi oxygnathus			E. serotinus			N. noctula			Other bats			
	Localities and data of collecting	Number of		Number of		Number of		Number of		Number of		Number of		Bat species	Number of							
		examined	infested	worms found	examined	infested	worms found	examined	infested	worms found	examined	infested	worms found		examined	infested	worms found					
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX			
1	Comitat Győr-Sopron Sopron, Tómalom 22 Apr. 1971			-	-	-	-	-	-	-	-	-	3	1	1d		-	-	-			
2	Comitat Vas Nagykölked, church tower 15 Apr. 1968			-	-	2	0	-	-	-	-	-	-	-	-	<i>P. austriacus</i>	2	1	1d			
3	Szentgotthárd 25 Apr. 1968			-	-	11	1	1a	-	-	-	-	-	-	-		-	-	-			
4	Óriszentpéter 22 June 1967			-	-	4	0	-	-	-	-	-	-	-	-		-	-	-			
5	Comitat Zala Nova 10 May 1968			-	-	3	0	-	-	-	-	-	-	-	-		-	-	-			
6	Csatár 10 May 1968			-	-	9	0	-	-	-	-	-	-	-	-		-	-	-			
7	Páka, church 10 May 1968			-	-	2	1	1a	2	0	-	-	-	-	-		-	-	-			
8	Keszthely 30 March 1968			-	-	-	-	-	-	-	-	-	5	3	3d		-	-	-			
9	Comitat Veszprém Némethánya 28 Aug. 1963			-	-	-	-	-	-	-	1	1	1a, 1d	-	-		<i>M. nattereri</i>	1	0			
	2 June 1967			-	-	-	-	-	-	-	-	-	-	-	-		<i>P. pipistrellus</i>	2	0			
	12 Aug. 1973			-	-	-	-	-	-	-	1	1	1d	-	-		-	-	-			
10	Porva, Kiszépalma-pusztá 30 May 1965			-	-	-	-	-	-	-	-	-	-	-	-		<i>N. leisleri</i>	4	0			
11	Hegymagas 7 June 1968			-	-	-	-	-	-	-	3	2	2a, 2d	-	-		-	-	-			
12	Vállus 22 May 1969			-	-	2	0	-	-	-	-	-	-	-	-		-	-	-			
13	Comitat Somogy Kaposmérő 21 Febr. 1968			-	-	-	-	-	-	-	-	-	-	-	-		<i>P. austriacus</i>	4	0			
14	Somogyjád 7 Sept. 1967			-	-	2	1	1a	-	-	-	-	-	-	-		-	-	-			
15	Comitat Baranya Villány 25 May 1960			-	-	-	-	-	-	-	1	1	1d	-	-		-	-	-			
16	Abaliget cave 24 Febr. 1965			15	2	2a	-	-	10	0	-	-	-	-	-		<i>M. nattereri</i>	1	0			
	1 Febr. 1967			5	1	1a	-	-	7	1	1a	-	-	-	-		<i>M. daubentoni</i>	2	0			
	1 Febr. 1967			-	-	3	0	-	-	-	-	-	-	-	-		<i>R. hipposideros</i>	3	0			
17	Mánfa cave 21 Dec. 1967			1	1	1a	1	0	1	1	1a	-	-	-	-		<i>P. auritus</i>	2	0			
				-	-	-	-	-	-	-	-	-	-	-	-		<i>M. mystacinus</i>	1	0			
				-	-	-	-	-	-	-	-	-	-	-	-		<i>M. dasycneme</i>	2	0			
				-	-	-	-	-	-	-	-	-	-	-	-		<i>M. daubentoni</i>	5	0			
				-	-	-	-	-	-	-	-	-	-	-	-		<i>M. nattereri</i>	2	0			
				-	-	-	-	-	-	-	-	-	-	-	-		<i>M. bechsteini</i>	1	0			
				-	-	-	-	-	-	-	-	-	-	-	-		<i>P. auritus</i>	1	0			

(Table 2 - continued)

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX
Comitat Bács-Kiskun																			
18 Kunbaja 11 Febr. 1969	-	-		-	-		-	-		-	-		-	-		P. austriacus	1	0	
19 Tóserdő 6 June 1968	-	-		-	-		-	-		-	-		1	1	1d				
20 Alpár 5 June 1958	-	-		-	-		-	-		1	1	1a, 1d							
Comitat Pest																			
21 Szabadszállás 27 Sept. 1967	-	-		-	-		-	-		-	-		1	1	1b				
22 Felsőgöd 11 May 1967	-	-		-	-		-	-		-	-		3	1	1d				
23 Budapest 5 Jan. 1966	-	-		-	-		-	-		-	-		1	0					
Budapest Városliget 14 Sept. 1967	-	-		-	-		-	-		-	-		17	13	2b, 13d				
10 Jan. 1968	-	-		-	-		-	-		-	-		15	7	1b, 6d				
1 Apr. 1968	-	-		-	-		-	-		-	-		1	1	1d				
22 Nov. 1968	-	-		-	-		-	-		-	-		4	4	2b, 2d				
28 Dec. 1968	-	-		-	-		-	-		-	-		9	3	3d				
2 Apr. 1969	-	-		-	-		-	-		-	-		1	0					
18 Dec. 1969	-	-		-	-		-	-		-	-		4	2	2d				
20 Febr. 1974	-	-		-	-		-	-		-	-		1	1	1d				
Budapest Center 28 Jan. 1969	-	-		-	-		-	-		-	-		-	-		V. murinus	1	0	
Budapest, Szem- lőhegyi Cave 15 Febr. 1970	-	-		-	-		2	0		-	-		-	-					
Budapest, Pávilgyi Cave 12 Jan. 1967	-	-		2	0		9	3	3a	-	-		-	-		P. austriacus	1	0	
13 Jan. 1970	-	-		1	0		5	0		-	-		-	-		R. hipposideros	3	0	
28 Febr. 1970	-	-		-	-		3	0		-	-		-	-		R. hipposideros	1	0	
Budapest, Városmajor 19 Apr. 1968	-	-		-	-		-	-		-	-		1	0					
Budapest, Budafok 18 Okt. 1966	-	-		-	-		-	-		1	1	1a							
Budapest, Obuda 23 Apr. 1969	-	-		-	-		1	0		-	-		-	-					
14 June 1970	-	-		-	-		-	-		8	6	5a, 6d	3	3	1b, 3d	P. austriacus	3	0	
24 Solymár, Ördöglyuk Cave 7 Dec. 1965	-	-		1	0		7	1	1a	-	-		-	-		R. hipposideros	3	0	
23 Aug. 1973	-	-		-	-		-	-		-	-		-	-		M. bechsteini	1	0	
25 Píliszentlászló 19 May 1971	-	-		-	-		-	-		1	1	1a, 1d							
26 Pílismarót 9 June 1969	-	-		15	6	6a	-	-		-	-		-	-					
27 Píliszentkereszt Macska Cave 8 Dec. 1965	-	-		1	0		-	-		-	-		-	-					
28 Pílis Mount, Szoplaki Ördög- lyuk Cave 26 Jan. 1967	-	-		17	3	3a	52	7	7a	1	1	1a, 1d				M. schreibersi	2	0	
1 March 1974	-	-		-	-		-	-		-	-		1	0		H. barbastellus	3	0	
Pílis Mount, Leány Cave 16 Febr. 1966	4	0		14	1	1a	18	0		-	-		-	-		M. nattereri	1	0	
15 Febr. 1967	-	-		12	1	1a	1	0		-	-		-	-		R. hipposideros	5	0	
18 March 1971	-	-		1	0		-	-		1	1	1a				M. daubentoni	1	0	
																P. auritus	2	0	
																M. nattereri	2	0	
																P. auritus	2	0	
																M. nattereri	3	0	
																P. austriacus	1	0	
																P. auritus	2	0	

(Table 2 - continued)

	I	II	III	IV V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX
Milis Mount, Legény Cave 17 Febr. 1966	-	-		6 0		7 1		1a	-	-			7 1	1d	R. hipposideros M. nattereri M. schreibersi P. auritus	5 7 5 1	0 1 0 0	1a, 1d
15 Febr. 1967	-	-		1 0		-	-		5 5	5a, 4d		5 2	2d	M. nattereri P. austriacus	2 2	0 0		
Comitat Komárom																		
29 Gerecse Mount, Pisznice Cave 27 July 1967	-	-		10 1	1a	-	-		-	-		-	-		M. schreibersi R. euryale	4 6	0 0	
12 Dec. 1967	1 0			1 0		-	-		-	-		-	-		M. schreibersi B. barbastellus	1 1	0 0	
9 Apr. 1968	-	-		8 3	3a	-	-		-	-		-	-		M. schreibersi	5	0	
9 June 1969	-	-		1 0		-	-		-	-		-	-		R. euryale M. schreibersi	3 9	0 0	
Comitat Nógrád																		
30 Börzsöny Mount, Királyrét 26 Dec. 1965	-	-		-		-	-		-	-		-	-		P. auritus	1	0	
31 Balassagyarmat 9 July 1968	-	-		13 6	6a, 1d	1 1	1a		-	-		-	-					
11 July 1969	-	-		3 3	3a	3 0			-	-		-	-					
32 Salgótarján 17 Febr. 1969	-	-		-		-	-		1 1	1d		-	-					
33 Karancsalapúti 10 July 1968	-	-		-		-	-		3 3	3d		-	-					
Comitat Heves																		
34 Gyöngyös, Church 18 July 1967	-	-		-		7 4	4a		-	-		-	-					
35 Mátra Mount, Csörgőlyuk Cave 6 March 1967	-	-		4 1	1c	5 4	4a		-	-		-	-		R. hipposideros M. bechsteini M. nattereri	3 2 1	0 0 0	
Comitat Borsod- Abaúj-Zemplén																		
36 Görömbölytapolca 16 Febr. 1966	1 1	1a	1 0			-	-		-	-		-	-		P. austriacus	1	0	
37 Lillafüred István Cave 10 March 1965	26 6	6a	-	-		-	-		-	-		-	-		R. hipposideros B. barbastellus	23 1	0 0	
24 Febr. 1966	8 1	1a	-	-		-	-		-	-		-	-		M. schreibersi	23	0	
12 March 1967	1 0			-		1 0			-	-		-	-		M. schreibersi	28	0	
16 Febr. 1968	-	-		-		-	-		-	-		-	-		M. schreibersi	5	0	
Lillafüred Kecske Cave 25 Febr. 1966	1 1	1a	-	-		-	-		-	-		-	-		M. schreibersi	1	0	
Lillafüred Herman O. Cave 7 March 1967	1 1	1a	-	-		-	-		-	-		-	-		M. daubentoni P. austriacus M. schreibersi	1 2 2	0 0 0	
38 Királykúti szom- boly (Cave) 25 Febr. 1966	-	-		-		-	-		-	-		-	-		R. hipposideros	1	0	
39 Szarvaskő Ércbánya 25 July 1967	-	-		-		6 2	2a		-	-		-	-		M. schreibersi	3	0	
40 Bükk Mount, Szeleta Cave 23 Febr. 1966	-	-		-		-	-		-	-		-	-		P. austriacus	1	0	
8 March 1967	-	-		-		3 0			-	-		-	-		B. barbastellus	1	0	
41 Aggtelek Baradla Cave 16 Dec. 1966	3 2	2a	3 2	2a	3 1	1a			-	-		-	-		R. hipposideros P. austriacus	3 1	0 0	
10 March 1967	2 1	1a	4 0		6 3	3a			-	-		-	-		R. hipposideros	8	0	
42 Tornaszentandrás Osztramos Mount, 28 July 1970	2 0			-		-	-		1 0			-	-		R. hipposideros	1	0	
43 Szemere 15 Aug. 1971	-	-		-		1 0			2 2	2a		-	-		R. hipposideros	1	0	
44 Telkibánya Teréz-tó 20 Nov. 1967	12 2	2a	-	-	3 1	1a			-	-		-	-					
10 Febr. 1971	16 2	2a	1 0		9 2	2a			-	-		-	-		P. auritus B. barbastellus	1 1	0 0	
Comitat Szabolcs-Szatmár																		
45 Mérk 3 May 1968	-	-		-		-	-		5 3	3d		-	-					

sufficient number of bats were secured for parasitological sectioning, namely in 104 (33%) of 315 bats belonging to 4 species (*M. myotis*, *M. blythi oxygnathus*, *E. serotinus*, *R. ferrumequinum*). Both the extensity and intensity of *M. grisea* is considered to be high, the latter varying from 61 to 83 tapeworms in individual host species.

Vampirolepis acuta (Rudolphi, 1819) nov. comb. was found in five host species (*M. myotis*, *M. nattereri*, *N. noctula*, *E. serotinus*, *P. austriacus*). Of a total of 316 host specimens 68 (21.5%) were found to harbour *V. acuta*. Nevertheless, *V. acuta* does not

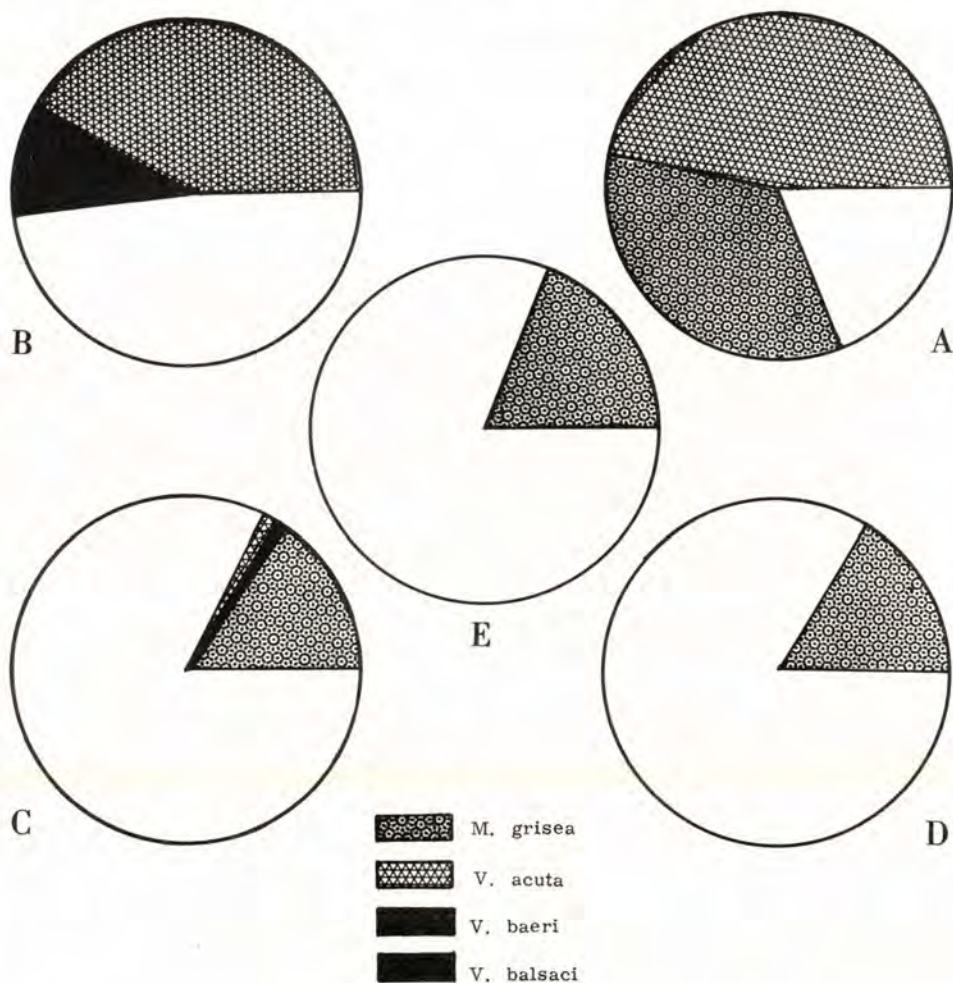


Fig. 24: Extensity of incidence of individual tapeworm species in the most frequent 5 bat species in Hungary. (A= *Eptesicus serotinus*, B= *Nyctalus noctula*, C= *Myotis myotis*, D= *M. blythi oxygnathus*, E= *Rhinolophus ferrumequinum*)

Table 3

Seasonal incidence of tapeworms in five most frequently occurring bat species

Bat species	Whole year			Winter			Spring			Summer			Autumn		
	exam- ined	infested No.	%	exam- ined	infested No.	%	exam- ined	infested No.	%	exam- ined	infested No.	%	exam- ined	infested No.	%
Myotis myotis	159	30	18.8	63	6	9.5	57	11	19.4	32	11	34.3	7	2	-
M. blythi oxygnathus	173	32	18.5	141	21	15.0	3	0	-	17	7	47.0	14	4	28.5
Nyctalus noctula	83	44	53.0	35	14	40.0	12	6	50.0	18	14	77.7	18	10	55.0
Eptesicus serotinus	36	30	83.3	8	8	-	19	14	73.0	8	7	-	1	1	-
Rhinolophus ferrum- equinum	101	21	20.7	82	16	19.5	0	0	-	2	0	-	17	5	29.3
Total	552	157	24.2	329	65	19.4	91	31	34.0	77	39	50.6	57	22	38.6

seem to be a common parasite of *M. myotis*, because it occurred only in 1 of 159 *M. myotis* examined. The same seems to be true, but cannot be stated with certainty for *M. nattereri* and *P. austriacus*, because of the relatively low number of animals (19 of each) examined. The extensity of *V. acuta* showed peak values in *N. noctula* and *E. serotinus* (48.2 and 69.4%, respectively); these two host species were massively infected both in winter and summer (Fig. 24). Occasionally the intensity of infection was also high, the maximum number amounting to 35 in *N. noctula* and 112 in *E. serotinus*.

V. balsaci was found in a single host only, which, however was disclosing *M. myotis* as a new host of this tapeworm species.

The new species *Vampirolepis baeri* sp.n., has so far been found in *N. noctula* from Budapest and Szabadszállás, Comitatus Pest. The intensity of *V. baeri* is very low (2 specimens), its extensity is 8.4%.

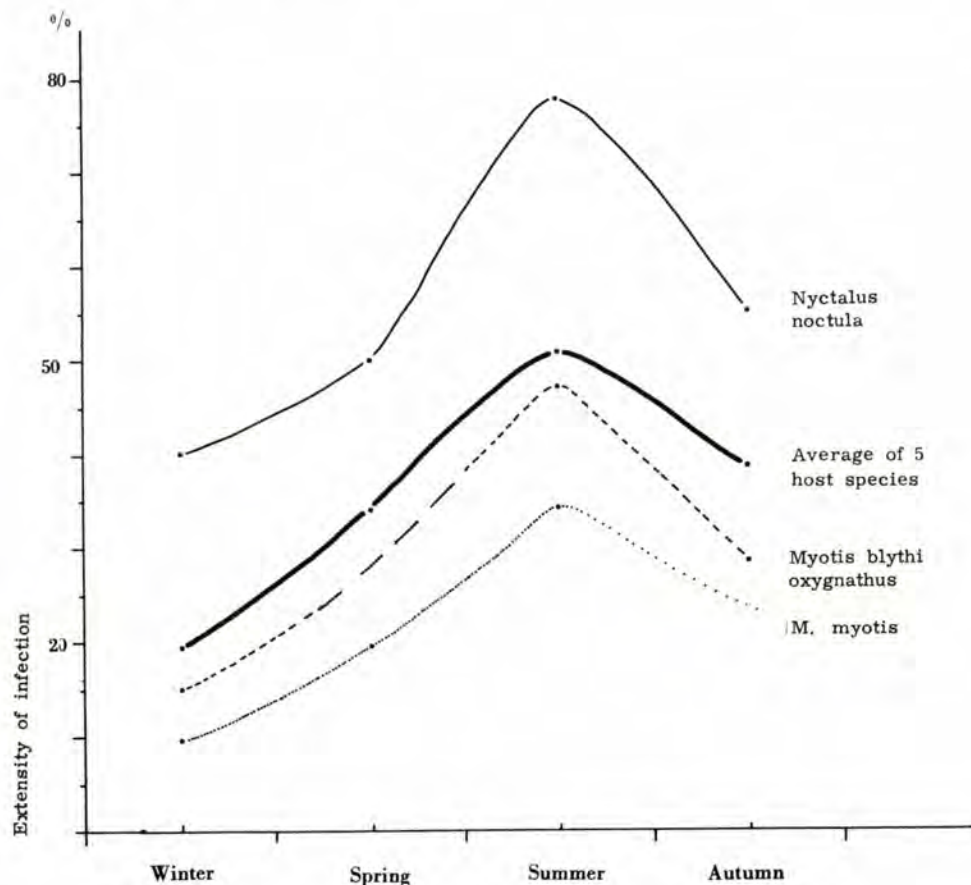


Fig. 25: Seasonal dynamics of tapeworm infection in the 5 most frequently occurring bat species in Hungary

Most bats examined in the present study was collected in caves during the inactive period, viz. in late autumn and winter. In summer collectings bats were either captured alive in lofts, church towers, trees, or shot by rifles, and occasionally carcasses submitted for examination to our Department were also used. Conform to expectations, the extensity of tapeworm infection was very high in the bats captured during summer. The available material was sufficient for the evaluation of the seasonal fluctuation of parasite invasion in the five host species (*M. myotis*, *M. blythi oxygnathus*, *N. noctula*, *E. serotinus*, *R. ferrumequinum*) available for examination in the greatest numbers (Table 3). In Fig. 25 the dynamics of the extensity of tapeworm infection showing a similar pattern in *N. noctula*, *M. myotis*, *M. blythi oxygnathus*, as well as in the average of the five host species is indicated. It is clearly seen that in the bats, the maximum incidence of tapeworm infection is during the summer period.

MURAI, É.: A magyarországi denevérek galandférgel

19 fajhoz tartozó 792 denevér galandférgelnek szisztematikai és faunisztikai vizsgálatának eredményeként a szerző 4 galandféreg-faj előfordulását mutatja ki Magyarországról. A vizsgált denevérek 20%-a volt galandférgelkel fertőzött. A *Myotolepis grisea* (Beneden, 1873) Tenora et Baruš, 1960 faj gazdái: *Myotis myotis*, *M. blythi oxygnathus*, *M. nattereri*, *Eptesicus serotinus* és *Rhinolophus ferrumequinum*; a *Vampirolepis acuta* (Rudolphi, 1819) nov. comb. a *M. myotis*, *M. nattereri*, *Nyctalus noctula*, *E. serotinus* és *Plecotus austriacus* parazitájája; a *V. balsaci* (Joyeux et Baer, 1934) Spassky, 1954 *M. myotis*-ből került elő; a *Vampirolepis baeri* sp. n. gazdája a *Nyctalus noctula*; ezt a fajt a szerző magyarországi és svájci féreg-egyedek alapján írta le. A *M. nattereri* a *M. grisea*, a *M. myotis* pedig a *V. balsaci* fajnak új gazdaállata.

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