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**New and insufficiently known freshwater *Gastrotricha* from Poland**

[With 17 figures in text]

The present paper contains partial results of studies on freshwater *Gastrotricha* carried on in the years 1972–1975 in various regions of Poland. It comprises descriptions of four species new to science and five species described earlier, however, insufficiently known so far. Observations were carried out by means of a microscope PZO MB 30 supplied (since the end of 1974) with a phase-contrast device. Alive specimens were studied and drawn. When it was necessary scales were isolated with acetic acid and stained with haematoxylin. Because of the limited value and durability of mounts of the freshwater *Gastrotricha* as well as because of the fact that most studies were carried out in the field, the only documents of the investigations remain figures of individuals.

***Chaetonotus microchaetus* PREOBRAJENSKAJA, 1926**

**Material.** Wielkopolski National Park near Poznań, the pond Żabiak – in *Lemna* on the water surface, 29. V. 1974 – 2 specimens; Kopicie near Siedlce, a pond in the vicinity of the village – in a layer of silt by shore with dense higher plants, 11. VII. 1974 – 1 specimen.

Regularly five lobed head, similar as in *Ch. maximus* EHRENBERG or in *Ch. polyspinosus* GREUTER; the anterior lobe is distinctly the greatest one. Below the mouth there is a distinct hypostomium. By the habit and coverage of body this species is close to *Ch. polyspinosus*, it differs from the latter, however, by the greater number of spines on the posterior body end which distinguish

themselves by the greater length. In *Ch. microchaetus* the occurrence of these spines is not confined to the base segment of caudal appendages only as it takes place in *Ch. polyspinosus*. The spines are distributed in a few posterior transversal rows, while on the body sides they reach a bit farther anteriorly than they do so on the dorsum. The spines of the posterior extremity are thinner than those in *Ch. polyspinosus* and sharply ended.

The most essential difference, however, consists in covering of the ventral field between cilia bands. The most posterior pair of scales of this field, measuring 15  $\mu\text{m}$  in length, is similar in shape to the corresponding scales in *Ch. polyspinosus*. The scales have also an elongate keel of equal length. Anterior to them there are three oval scales 6.5  $\mu\text{m}$  long with a similar elongate keel arranged in a single transversal row. Anteriorly again there occur five longitudinal rows of alternating scales 4  $\mu\text{m}$  long and 6  $\mu\text{m}$  wide which are provided with short small spines 1.5  $\mu\text{m}$  long. Each of the rows is composed of 11 scales. Immediately in front of them there are 23 rectangular plates arranged one above another in a single longitudinal row. Seven of them occur in the intestine body section, while the remaining 16 plates fall to the pharyngeal section. Plates of the pharyngeal section are 2–2.5  $\mu\text{m}$  long and 6–8  $\mu\text{m}$  wide, whereas those of the intestinal section reach 2.5  $\mu\text{m}$  and 11  $\mu\text{m}$ , respectively.

The rest of body is covered with scales with oval anterior edge which are provided with spines and arranged in 34 longitudinal alternating rows as counted from one of cilia bands, through the animal back, to the other. There are 18 rows on the dorsal body side. Each row contains 35 scales.

Comparison of measurements:

	according to PREOBRAJEN- SKAJA (1926)	author's data	
body length	220–283 $\mu\text{m}$	192–197 $\mu\text{m}$	(2) <sup>1</sup>
pharynx length	—	60–63 $\mu\text{m}$	(2)
length of caudal appendages	33 $\mu\text{m}$	23 $\mu\text{m}$	(1)
length of adhesive tube	—	16.5 $\mu\text{m}$	(1)
head width	32 $\mu\text{m}$	31–33 $\mu\text{m}$	(2)
neck width	—	24 $\mu\text{m}$	(1)
length of spines of neck region	—	3.5 $\mu\text{m}$	(1)
length of spines of the middle of dorsal side	5 $\mu\text{m}$	4 $\mu\text{m}$	(1)

Specimens studied by the author are very similar to those described by PREOBRAJENSKAJA (1926), being, however, a little smaller, spines of the dorsal body side are distributed in greater distances from each other, and posterior spines are shorter.

<sup>1</sup> Data in brackets refer to the number of specimens for which the given character has been measured.

*Chaetonotus rafalskii* sp. n.<sup>1</sup>

Material. Wielkopolski National Park near Poznań, the pond Żabiak (locus typicus) — in silt accumulation near shore, 28. XII. 1972–15. III. 1973, 9. XII. 1973 — 15 specimens; Wólka Wytycka, community of Urszulin, Chełm voivodeship, wet alder swamp — in a layer of mud beneath decaying leaves, 11. IV. 1975 — 3 specimens.

Diagnosis. The species, belonging to the group of *Ch. maximus*, 280  $\mu\text{m}$  long, covered with 19 longitudinal rows of almost straight, relatively thick spines without a lateral denticle. There are 23–24 spines in each of the rows, their length growing toward the posterior body end. The most posterior spines reach the end of adhesive tubes. The most anterior spines are attached just behind the anterior head margin. Scales of the body trunk are provided with three distinct lobes sharply ended. The postero-lateral scale lobes disclose rows of red points when treated with haematoxylin. There occur end scales on the ventral field. The intestine section of the field between cilia bands carries seven longitudinal rows of spines which are 6  $\mu\text{m}$  long.

Description (figs. 1–3). The animal with a distinctly five lobed head which is wider than the neck. The neck section with parallel margins. The body trunk, which is distinctly wider than the other parts of body, ends with short caudal appendages. Base parts of the appendages are large and their adhesive tubes are straight and moderately thick. Tactile cilia occur in two pairs of tufts. The cilia of the anterior pair are much shorter from the posterior ones; a part of them are oriented directly forwards. There are two pairs of tactile bristles. Cilia bands get closer in the frontal body portion, yet, they do not connect. A cephalic shield, if it occurs at all, must be very small, since the first spines are placed just behind the anterior head edge. The back and body sides are densely covered with spines. They are distributed in 19 longitudinal rows, counted from one to the other cilia band. Eight rows fall to the dorsal side, each being composed of 23–24 spines. On the spines, which are relatively thick and only inconsiderably bent, any lateral denticle has not been observed. This result of observation was also confirmed in the phase-contrast microscope. The length of spines increases gradually from the anterior to posterior body end. The last pair of lateral spines and five spines situated above the caudal bifurcation are the longest spines of the body; none of them, however, protrudes beyond ends of the adhesive tubes. The scales, from which the body spines arise, are composed of three distinctly formed and sharply ended lobes. It is of uncommon interest that after having been treated with haematoxylin the postero-lateral lobes disclose rows of points stained red. This phenomenon, being repeatedly observed a few consecutive times, indicates heterogeneity in chemical composition of the scales in this species.

<sup>1</sup> The species named in honour of prof. dr. JAN RAFALSKI of the A. Mickiewicz University of Poznań, whom I am owing a debt of gratitude for having inspired my interest in *Gastrotricha* and for continuous help in my research.

The ventral field in between the cilia bands ends with a pair of scales with spines 12.5  $\mu\text{m}$  in length. Anterior to these scales there occur other scales with poorly visible edges which are arranged in seven longitudinal alternating rows. These scales, in turn, bear spines 6  $\mu\text{m}$  long. The pharyngeal section of the ventral field is devoid of spines. About seven small scales 3  $\mu\text{m}$  long provided with a thin straight spine are situated considerably distant one from another on the ventral side of base segment of caudal appendages.

The large mouth transforms into a moderately thick pharynx the width of which almost does not change along the organ. The intestine is thick, particularly in its anterior half. A small rectangular hypostomium is developed on the ventral body side just behind the mouth. In its anterior edge there is one, while in the posterior one two depressions.

#### Measurements:

body length	281 $\mu\text{m}$	(1)
pharynx length	68–76 $\mu\text{m}$	(3)
length of caudal appendages	28 $\mu\text{m}$	(1)
length of adhesive tube	13 $\mu\text{m}$	(1)
head width	46 $\mu\text{m}$	(1)
neck width	40 $\mu\text{m}$	(1)
length of head scale	6.5 $\mu\text{m}$	(1)
length of head spines	5–7.5 $\mu\text{m}$	(1)
length of scales of trunk of the body	11.5–15 $\mu\text{m}$	(2)
length of spines of the middle body trunk	17–20 $\mu\text{m}$	(2)
length of spines of the body end	29 $\mu\text{m}$	(1)

**Discussion.** The description presented above indicates that *Ch. rafalskii* sp. n. belongs to the species group of *Ch. maximus*. Amongst species of the group, *Ch. gastrocyaneus* BRUNSON has the biggest number of characters in common with the newly described taxon. The following characters are very similar in the both species: shape of scales, general body habit, length of spines in particular body sections, number and distribution of spines as well as relative length of caudal appendages. Spines of *Ch. gastrocyaneus*, however, are provided with a lateral denticle which has not been observed in *Ch. rafalskii*. Moreover, *Ch. gastrocyaneus* is larger than the compared new species, its head section is much shorter and its anterior head lobe is apparently bigger from the others, while in *Ch. rafalskii* all head lobes are approximately of the same size.

It is also worth of mention that *Ch. rafalskii* sp. n. has been encountered at the both stations within the period from December to the middle of April though the two water bodies were also sampled in other months.

#### *Chaetonotus magnus* sp. n.

**Material.** Wielkopolski National Park near Poznań, the lake Skrzyńka – in a layer of mud on a shore part of the lake adjacent to a transition peat bog, 11. VIII. 1975 – 3 mature specimens.

Diagnosis. A species of the species group of *Ch. maximus*, the length of which is 515–535  $\mu\text{m}$ , body covered with 30–32 longitudinal spine rows associated with scales, 19–23 spines in each row. All the scales characteristically constricted at  $\frac{2}{5}$  of their length and with a few transversal lines behind the

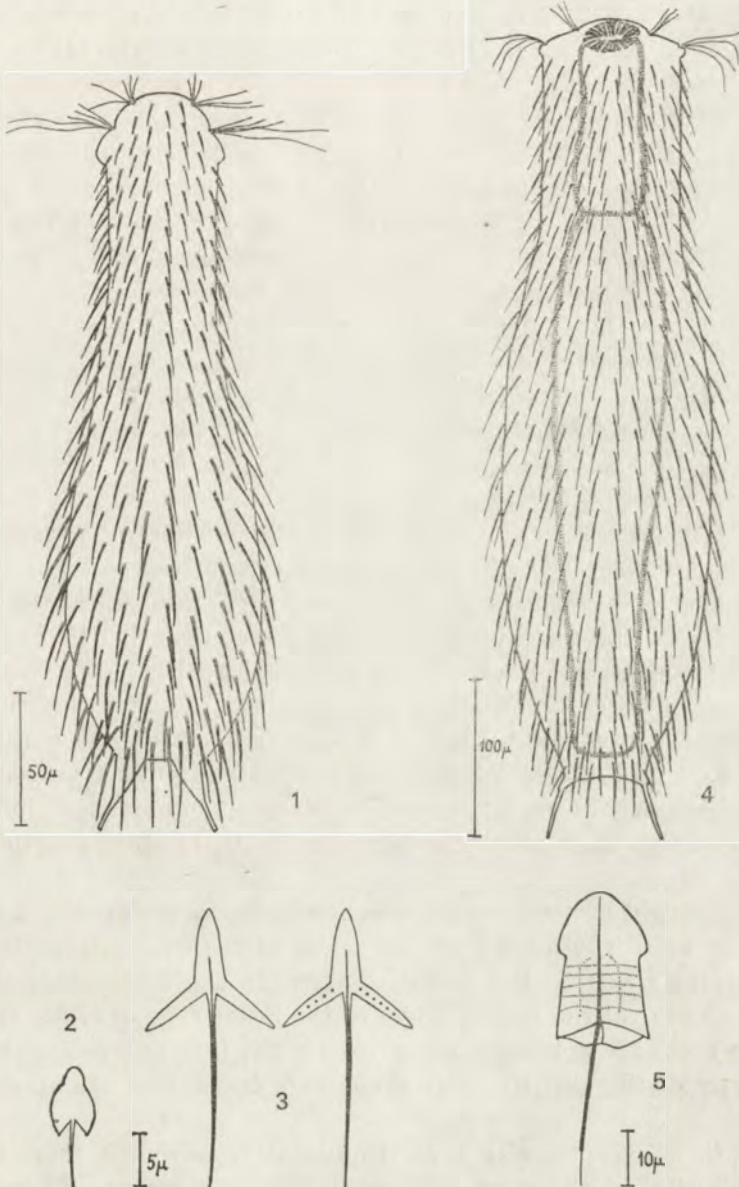


Fig. 1–5. 1–3 – *Chaetonotus rafalskii* sp. n.: 1 – dorsally viewed animal, 2 – spined scale of the head section, 3 – spined scales of the dorsal part of the body trunk (the right one stained with haematoxylin). 4–5 – *Chaetonotus magnus* sp. n.: 4 – dorsally viewed animal, 5 – spined scale of the dorsal body side.

constriction. All the spines with a well visible lateral denticle. The mouth, pharynx and particularly the intestine are exceptionally wide.

Description (fig. 4-5). An exceptionally big *Chaetonotus* resembling, at the first glance, *Ch. schultzei* METSCHNIKOFF. Longitudinal lines of the body contour are almost parallel; an inconsiderable dilatation of the trunk of body is visible in its middle part. Head lobes covered with respective cephalic shields form an almost straight margin. The largest is the frontal lobe, the hind lobes forming specific convexities are the smallest. The tail bifurcation is shaped as a large lacuna. Adhesive tubes constitute more than half length of caudal appendages; they are straight and with parallel walls. The head with two pairs of tufts of tactile cilia of which the posterior pair is composed of cilia a little longer. Ventral cilia bands run posteriorly as far as to the caudal bifurcation. Tactile bristles have not been observed. The whole dorsal and lateral surface of body is covered with scales carrying spines provided with the denticle. The first spines are situated immediately behind the posterior pair of the head lobes. Scales of the anterior spines are inconsiderably smaller from the other body scales; for example, in a specimen the scales of which reached 29  $\mu\text{m}$  in length, the scales of the head anterior part measured 21  $\mu\text{m}$ . The spines are distributed in 30-32 longitudinal rows, counting from one to another cilia bands. Each row consists of 19-23 spines. Scales edges of the cephalic and neck sections overlap considerably, while those of the trunk section overlap very little or does not at all. Shape of the scales, similar for various body parts, is very characteristic. In  $\frac{2}{5}$  of scale length there occurs a sharply cut constriction, then, posteriorly the scale gets larger stepwise. In the scale portion behind the constriction there are several transversal lines stretched from margin to margin. These lines, not observed on scales of other species, constitute probably minute thickenings or furrows. Often they are accompanied by a pair of thinner lines running parallel to the longitudinal axis of the scale. Spines are almost straight. A lateral denticle, or rather an abrupt decrease in spine thickness, occurs on spines of the head and neck regions in their middle parts, while in  $\frac{1}{3}$  of spine length on spines of the trunk region.

The ventral field in between the cilia bands carries scales with a thin spine in its posterior half. The most posterior scales of the field are similar in their shape and in their size to the dorsal ones, while the more anterior position of scales the more oval the scales. Edges of the latter type of scales are thinner and therefore these are not easily observable in the intestine region. End scales which normally distinguish by their shape and dimensions are absent in this species.

The mouth is exceptionally wide. Immediately behind it there is a thick transversal lamella on the ventral body side. The pharynx and intestine in particular are relatively very thick. Of three mature specimens observed by the author one, in its trunk section, carried a grown up egg more than 180  $\mu\text{m}$  long, its surface being clotted.

*Ch. magnus* sp. n. is very sluggish in its movements. Its body, in spite of strong cuticular cover, is sensitive to squashing and other mechanical treatment. It seems that the type of body cover characteristic of the genus *Chaetonotus* EHRENBERG is not sufficient to protect so voluminous animals.

#### Measurements:

body length	515–535 $\mu\text{m}$	(3)
pharynx length	98–106 $\mu\text{m}$	(3)
maximum pharynx width	53 $\mu\text{m}$	(1)
length of caudal appendages	64 $\mu\text{m}$	(1)
length of adhesive tube	41–45 $\mu\text{m}$	(3)
head width	82–93 $\mu\text{m}$	(2)
neck width	90 $\mu\text{m}$	(1)
width of the trunk of body	127 $\mu\text{m}$	(1)
mouth diameter	30 $\mu\text{m}$	(3)
length of the neck scale	21–23 $\mu\text{m}$	(3)
length of the trunk scale	23.5–29 $\mu\text{m}$	(3)
length of the neck spine	21–27 $\mu\text{m}$	(3)
length of the trunk spine	29–31 $\mu\text{m}$	(3)

Discussion. The size of animal, relatively large pharynx and limited differences in spine lengths of particular body regions would suggest an affinity of the described species with the species group of *Ch. simrothi*. The presence of spine lateral denticle, however, the feature unknown in any species of the species group mentioned is decisive for placing *Ch. magnus* in the group of *Ch. maximus*. It should be emphasized that the two species groups are rather closely related and the diagnostic characters cited so far require some supplement.

### *Chaetonotus bisacer* GREUTER, 1917

*Chaetonotus truncatus* SAITO, 1937, syn. n.

Material. Wielkopolski National Park near Poznań, the pond Żabiak – in a layer of mud, 2. VII. 1972 – 1 specimen; Krzywogoniec, community of Cekeyn, Bydgoszcz voivodeship, a peat hag – in mud deposits, 12. VIII. 1974 – 1 specimen; Okoninek, community of Cekeyn, Bydgoszcz voivodeship, a hag bog – in a layer of mud, 12. VIII. 1974 – 1 specimen; Siedlce, a peat hag by the fish ponds – in a layer of mud, 4. IV. 1974 – 1 specimen; Wólka Wytycka, community of Urszulin, Chełm voivodeship, a wet alder swamp – amongst decaying alder leaves, 16. VII. 1974, 14. IX. 1974 and 11. IV. 1975 – 5 specimens; Wytyczno, community of Urszulin, Chełm voivodeship, shore of the lake Wytyckie – in a layer of mud, 16. VII. 1974 – 2 specimens; Wytyczno, a puddle in the forest – amongst decaying leaves, 29. IV. 1974 – 3 specimens.

This species shows a considerable individual variability. The following characters were variable in the specimens observed by the author: the number of spines building up a transversal band in the middle body length, length of these spines, visibility of dorsal scales edges, mutual arrangement of the scales.

The number of "band" spines in 12 specimens, for which records were done, is as follows:

7 spines	— in 1 specimen,
9 spines	— in 6 specimens,
10 spines	— in 2 specimens,
16, 18, 20 spines	— in one specimen each.

Length of the band spines ranges between 26 and 40  $\mu\text{m}$  and seems to be dependent, to a larger extent, on the number of band spines than on the animal body length. The length of spines in a band consisting of 9 was 36–40  $\mu\text{m}$  (3 specimens measured), of 16 spines — 33  $\mu\text{m}$ , of 18–30  $\mu\text{m}$  and of 20 spines it was only 26  $\mu\text{m}$ . This very poor material points at a probable inversely proportional dependence between the spines length and their number in the band.

Edges of the dorsal scales are, as it was already mentioned, visible in particular specimen in variable degree. Thus, the following specimens were met with:

- some with only edges visible are the anterior ones, similarly as in GREUTER (1917) and REMANE (1927),
- some with all edges perceivable in all the scales with exception of those from which the spines of the band arise,
- some with edges of all scales visible, the band scales included.

Edges of scales were well visible in all animals with a higher number of the band spines as well as in several specimens carrying 9 spines.

Keeled scales, that occur anterior to the band in all the specimens studied, fit close to each other or overlapped, whereas in the section behind the band were either, fairly distant or adhered to each other, but never overlapped.

*Ch. bisacer* has been reported so far by GREUTER (1917) in Switzerland, REMANE (1927) in Germany, RUDESCU (1967) in Romania and ROSZCZAK (1968) in Poland. SAITO (1937) has described *Ch. truncatus* from Japan about which he writes the following: "Diese Art ähnelt noch stark *Chaetonotus bisacer*, durch Vorhandensein der grössten Mittelstacheln an der Dorsalseite; aber die letztere is verschieden von dieser Arten durch die Anordnung der 11 Stacheln in einer Reihe, und dass der Kopf breiter als Hals und Rumpf ist." Already REMANE (1927) and more recently ROSZCZAK (1968) proved that there are specimens of *Ch. bisacer* with 9 spines in the band; the author's observations confirm this. Body width is, in the author's opinion, a character of low utility because it is dependent on a physiological state of specimen and, moreover, it may increase as a result of even a gentle squeezing with a cover glass. In the author's opinion, the most essential difference between the descriptions of *Ch. bisacer* by GREUTER and REMANE and that by SAITO consists in the fact that the latter author observed and drew edges of all dorsal scales, while GREUTER and REMANE saw their anterior edges only, as far as spine scales of the band are concerned it may be stated that the two authors could not have observed. The above-mentioned differences in scale edges visibility of the species studied



by the present author as well as presumable differences in resolution of microscopes used by the three authors suggest that neither this difference may be considered significant. *Chaetonotus truncatus* SAITO, 1937 should be recognized then as a synonym of *Chaetonotus bisacer* GREUTER, 1917.

It is interesting that ROSZCZAK (1968) has found individuals of *Ch. bisacer* half that large as average specimens observed by the other authors, their relative dimensions being stable however.

Range of individual variability of *Gastrotricha* of the order *Chaetonotoidea* has been considered so far as small. The variability of *Ch. bisacer* discussed above dictates a revision of this view. The species requires, however, further investigations based on more abundant material.

Comparison of measurements and some other data:

	GREUTER (1917)	REMANE (1927)	SAITO (1937)	ROSZCZAK (1968)	author's own observations	
body length (with- out posterior spines)	157-195 $\mu\text{m}$	—	165-173 $\mu\text{m}$	85-94 $\mu\text{m}$	185-222 $\mu\text{m}$	(3)
pharynx length	44-57 $\mu\text{m}$	—	38 $\mu\text{m}$	22-24 $\mu\text{m}$	45-50 $\mu\text{m}$	(4)
length of caudal appendages	29 $\mu\text{m}$	—	17 $\mu\text{m}$	—	25-26 $\mu\text{m}$	(2)
head width	31-34 $\mu\text{m}$	—	30 $\mu\text{m}$	14-16 $\mu\text{m}$	31-37 $\mu\text{m}$	(4)
neck width	23-26 $\mu\text{m}$	—	29 $\mu\text{m}$	11-12 $\mu\text{m}$	27-29 $\mu\text{m}$	(2)
width of the trunk of body	30-32 $\mu\text{m}$	—	45 $\mu\text{m}$	18-20 $\mu\text{m}$	45 $\mu\text{m}$	(1)
length of the band spines	41 $\mu\text{m}$	—	19.5-21 $\mu\text{m}$	20-22 $\mu\text{m}$	26-40 $\mu\text{m}$	(6)
number of band spines	11	9	9	9	7-20	(12)
length of the first pair of lateral spines	25 $\mu\text{m}$	—	16 $\mu\text{m}$	—	—	
length of the second pair of lateral spines (at the base of caudal appendages)	50 $\mu\text{m}$	—	34 $\mu\text{m}$	19-22 $\mu\text{m}$	40 $\mu\text{m}$	(1)
number of scales in a longitudinal row anterior to the band	12-13 <sup>1</sup>	10	12 <sup>1</sup>	—	13	(1)
number of scales in a row behind the band	?	10	9 <sup>1</sup>	—	11	(1)

### *Ichthyidium bifurcatum* PREOBRAJENSKAJA, 1926

**Material.** Okoninek, community of Cekeyn, Bydgoszcz voivodeship, a peat hag — in *Lemna* aggregation on the water surface, 18. VIII. 1974 — 4 specimens.

The animal is clearly more slender than it was depicted by PREOBRAJENSKAJA (1926). It may be supposed that the specimen depicted and measured

<sup>1</sup> Estimated from the figure

by the cited author was squashed a little with cover glass what, given soft body walls of the animal, might have led to higher values of measurements.

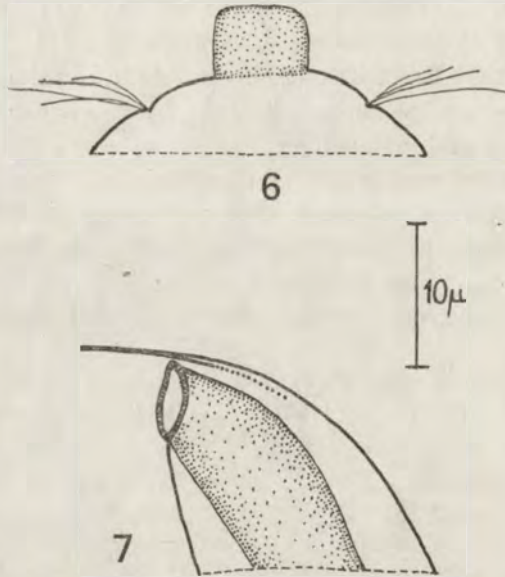


Fig. 6-7. *Ichthydium bifurcatum* PREOBRAJENSKAJA: 6 — anterior head part, dorsal view  
7 — anterior head part, lateral view.

The remaining details of body structure fit well the PREOBRAJENSKAJA's description. The bifurcation of any adhesive tube is visible only at a microscopic magnification of  $400\times$ . External parts of bifurcated tubes are somewhat longer than the internal ones, contrarily to the original description. Extremely characteristic is the presence of long cephalic shield protruding anteriorly a few micrometers beyond the frontal head edge. The protruding cephalic shield part is translucent and rectangular in shape. Its posterior edge is not visible, it was difficult to establish then how far the shield overlap the head. It should be emphasized that of all the *Gastrotricha* of the order *Chaetonotoida* it is only *Ichthydium rostrum* ROSZCZAK, 1968 in which a protrusive cephalic shield was ascertained. The cephalic shield of that species is, according its author, bill-like and its posterior edge was well visible against the head.

Specimens observed by the present author possessed two pairs of tactile bristles.

#### Comparison of measurements:

	according to PREOBRAJENSKAJA (1926)	author's own data	
body length	153 $\mu\text{m}$	127-142 $\mu\text{m}$	(3)
pharynx length	—	32-33 $\mu\text{m}$	(3)
length of caudal appendages	10 $\mu\text{m}$	10-11 $\mu\text{m}$	(2)
length of adhesive tube	—	3.5 $\mu\text{m}$	(1)
head width	31 $\mu\text{m}$	21-23 $\mu\text{m}$	(2)
neck width	29 $\mu\text{m}$	20 $\mu\text{m}$	(1)

*Heterolepidoderma longicaudata* sp. n.

Material. Siedlee, a peat hag nearby the fish ponds — in a layer of mud by the shore, 4. IV. 1974 — 1 mature specimen.

Diagnosis. A rather large *Heterolepidoderma* with five distinct lobes of head, with two pairs of tactile cilia tufts and bow-shaped long and parallel walled adhesive tubes which arise from the tapered caudal section of the body trunk. Scales arranged in 25 longitudinal rows comprising about 29 units each. Keeled scales of the head some 4 times smaller than those of the body trunk, oval, with an indentation in their posterior edges; those of the body trunk are ellipsoidal.

Description (fig. 8-9). The head relatively small with five distinctly separated lobes. The posterior lobes, which strongly jut, are the biggest. The neck section is deeply constricted on the level of the posterior widening of pharynx. The trunk of the body enlarges gradually as far as to  $\frac{2}{3}$  of its length

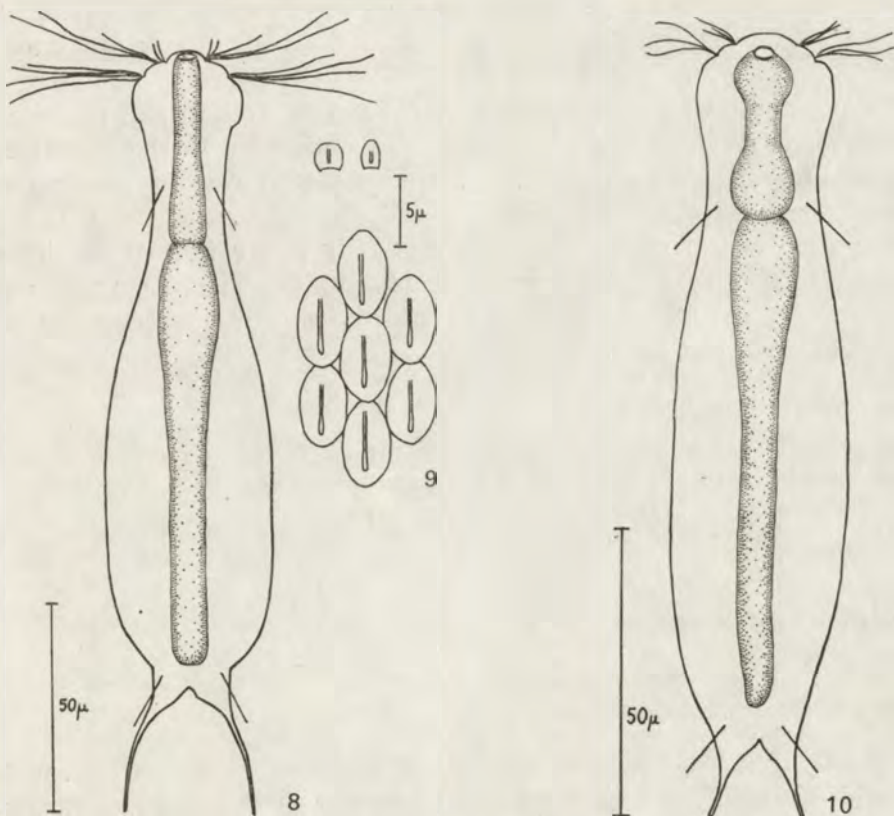


Fig. 8-10. 8-9 — *Heterolepidoderma longicaudata* sp. n.: 8 — dorsally viewed animal (keeled scales not marked), 9 — keeled scales of the head region (above) and the arrangement of keeled scales of the dorsal body side (below). 10 — *Aspidiophorus bibulbosus* sp. n., dorsally viewed animal (peduncular scales not marked).

and farther, it gets narrow rapidly. The base section of the caudal appendages has its margins running parallel, thus, resembling the respective section in *Chaetonotus heteracanthus* REMANE. Adhesive tubes are extremely long, bow-shaped inwards, equally narrow all their length. They resemble the respective organs in *Ichthyidium forficula* REMANE which are, however, a bit shorter in that species. The caudal appendages are always very distantly based.

There are two pairs of tactile cilia on the head, the cilia of the first one being shorter than the posterior ones. Among others, two short tactile cilia directed anteriorly stick from each tuft of the tactile cilia. On the levels of neck constriction and base section of the caudal appendages there are single pair of tactile bristles of the medium size. Cilia bands occur up to, at least, midpoint of the body length. In the head region they get considerably closer. Eye spots have not been observed.

Head lobes are covered with respective cephalic shields. The back and sides of the body are armoured with keeled scales. These are ordered in 25 longitudinal alternating rows if counted from one to another cilia band. Each row contains about 29 scales. Scales of the head are exceptionally small, almost oval, with a posterior indentation. Scales of the body trunk are circa four times bigger than the head ones and are ellipsoidal. Edges of successive scales in a row and of rows neighbouring to it contact or overlap slightly. Scales of the neck region are intermediate in their size and shape. In the posterior part of the field in between the cilia bands there is a pair of elongate terminal keeled scales.

The pharynx is narrow and gets gradually larger toward the intestine, it does not form, however, any oval thickening in its posterior part. The mouth is narrow. The intestine is dilatated anteriorly, walls of its remaining portion run parallel to each other.

#### Measurements:

body length	191 $\mu\text{m}$
pharynx length	43 $\mu\text{m}$
length of the caudal appendages	35 $\mu\text{m}$
length of an adhesive tube	25 $\mu\text{m}$
head width	26 $\mu\text{m}$
neck width	18 $\mu\text{m}$
length of the head scales	1.5 $\mu\text{m}$
length of the body trunk scales	6.5 $\mu\text{m}$
length of the first pair of tactile cilia	38 $\mu\text{m}$
length of the second pair of tactile cilia	45 $\mu\text{m}$

**Discussion.** The characters of body structure of the specimen found are considerably different from those of any other species of the genus, it was why the author has decided to describe the new species despite the scantity of the material collected. *H. longicaudata* sp. n. differs from all the species described of the genus *Heterolepidoderma* REMANE by the exceptionally long

and thin adhesive tubes. REMANE (1936), in his insufficient description of *H. fallax*, did not mention any characters of these organs. In any case, *H. longicaudata* may be distinguished from that species owing to the difference in size of the body trunk scales.

### *Aspidiophorus bibulbosus* sp. n.

Material. Świnoujście, Szczecin voivodeship, an old moat by the right bank of the river Świna – in a layer of mud, 13. IX. 1972 – 1 specimen; Wytyczno, community of Urszulin, Chełm voivodeship, the lake Wytyckie – on surface of a thick mud deposit in proximity of the shore, 16. VII. 1974 – 1 specimen; Wólka Wytycka, community of Urszulin, Chełm voivodeship (locus typicus) – in alder decaying leaves, 11. IV. 1975 – 1 specimen.

Diagnosis. An *Aspidiophorus* 136–145  $\mu\text{m}$  long, with a short pharynx 30–31  $\mu\text{m}$  long and with two distinct thickenings. Peduncular scales distributed in 45 longitudinal rows, 42 scales per row. The field in between cilia bands without terminal scales; in the intestinal section this carries peduncular scales, while in the neck section bare ones.

Description (fig. 10). The animal with a relatively small five lobed head of which the most anterior lobe is covered by a cephalic shield measuring 7  $\mu\text{m}$  in length. Caudal appendages are not great, they arise from a base which is much narrower than the body trunk. Adhesive tubes straight and moderately thick. Two pairs of tuft of tactile cilia are of a medium length. The cilia of the first pair may rigidly stick obliquely forward. Cilia bands run all the body along; they do not fuse in the head region. Two pairs of tactile bristles are always well visible. Dorsally and laterally the body is covered with peduncular scales arranged in 45 longitudinal alternating rows if counted from one to another cilia band. Twenty three rows of scales occur on the dorsal body side. Each contains 42 scales. Shape of the scales has not been ascertained because their margins were hardly visible. The ventral field in between the two cilia bands has 10 alternating rows of peduncular scales in its intestine section. However, the only visible (as spots) are the peduncula. The pharyngeal section of the field is bare. Terminal scales, which usually distinguish by their size and shape, are lacking.

The digestive system opens with an uncommonly narrow mouth. The pharynx is relatively short and shows two strong thickenings in the anterior and posterior parts. Its anterior dilatation was 11  $\mu\text{m}$  wide in two specimens measured, from Wólka Wytycka and from Świnoujście, the constricted central section was 6  $\mu\text{m}$  wide, while the posterior dilatation was 12  $\mu\text{m}$  wide. The pharynx of the species in question resembles that organ in *Chaetonotus ophiogaster* REMANE being, however, somewhat thicker. The intestine is dilated in its anterior portion only.

## Measurements:

body length	136–145 $\mu\text{m}$	(2)
pharynx length	30–31 $\mu\text{m}$	(3)
length of caudal appendages	14–17 $\mu\text{m}$	(2)
head width	25–28 $\mu\text{m}$	(2)
neck width	19–22 $\mu\text{m}$	(2)
body trunk width	31–33 $\mu\text{m}$	(2)
scale length	2–3 $\mu\text{m}$	(1)
length of the scale pedunculum	about 0.5 $\mu\text{m}$	(2)
mouth diameter	3 $\mu\text{m}$	(1)

**Discussion.** Despite the incompleteness of observations (there are considerable data lacks as to the shape of the peduncular scales, distribution of scales on base segments of the caudal appendages) it may be taken for granted that the form described here differs sufficiently to be deemed a new species. By the presence of two conspicuous thickenings of the pharynx it differs from the following species: *Aspidiophorus punctatus* GREUTER, *A. mediterraneus* REMANE, *A. marinus* REMANE, *A. squamulosus* ROSZCZAK, *A. heterodermus* SAITO, *A. silvaticus* VARGA and *Aspidiophorus* sp. 1 SUDZUKI. D'HONDT (1967) in his description of *A. paradoxus* VOIGT f. *microsquamatus* did not cite any detail as far as this feature is concerned; his form, however, is apparently greater than *A. bibulbosus* sp. n. and carries almost three times as many peduncular scales in a single longitudinal row as the new species. The pharynx shape of *A. bibulbosus* sp. n. resembles that of *A. paradoxus* VOIGT, *A. microsquamatus* SAITO and, in particular, that of *A. semirotundus* SAITO. *A. paradoxus* is, however, a species much bigger than the new one, and its scales are relatively larger and set on long peduncula. *A. microsquamatus* has, it is true, the two pharynx extremities distinctly thicker than its mid-section, the pharynx itself, however, is considerably narrower than that in *A. bibulbosus* sp. n. Beside that, scales of *A. microsquamatus* are distinctly smaller than in the species compared; decidedly different is also the body shape in the both forms. The pharynx shape of *A. semirotundus* is the most similar to the shape of same organ in *A. bibulbosus* sp. n. The sizes of scales are also close. Yet, this species is smaller (95  $\mu\text{m}$  in length), scales peduncula are longer, endings of adhesive tubes are evidently thicker. According to SAITO (1937), the ventral field in between cilia bands is covered with tiny keeled scales in *A. semirotundus*, there is also a pair of long spines on the field end. In *A. bibulbosus* sp. n. there are peduncula, that are indicative of the presence of tiny peduncular scales, and terminal scales or spines are absent.

***Polymerurus rhomboides* (STOKES, 1887)**

*Polymerurus oligotrichus* REMANE, 1927, **syn. n.**

**Material.** Wielkopolski National Park near Poznań, the pond Żabiak – in a layer of mud, 2. VII. 1972, 8. X. 1972, 28. XII. 1972, 2. II.–19. IV. 1973, 9. XII. 1973 – about

15 specimens; Rogalin, Poznań voivodeship, a pond on the Warta River flood terrace — in a layer of mud, 20. VII. 1972, 8. IX. 1972, 25. IX. 1972, 14. II. 1973 — 6 specimens; Krzywogoniec, community of Cekeyn, Bydgoszcz voivodeship, a peat-hag — in a layer of mud, 12. VIII. 1974 — 1 specimen; Okoninek, community of Cekeyn, Bydgoszcz voivodeship, a peat-hag — amongst *Lemna* sp. and *Stratiotes aloides*, 12. VIII. 1974 and 2.-4. VIII. 1975 — 7 specimens; Popów, community of Pęczniew, Sieradz voivodeship, old river beds on the right bank of the river Warta — in a layer of mud, 8.-17. VII. 1973 — 10 specimens; Warta, Sieradz voivodeship, a little pond on the right bank of the river Warta — in a layer of mud, 11. VII. 1973 — 1 specimen; Siedlce, a peat-hag by the fish ponds — in a layer of mud, 4. IV. 1974, 5. VI. 1974, 20. VII. 1974, 17. XI. 1974, 17. III. 1975 — about 10 specimens; Wytyczno, community of Urszulin, Chełm voivodeship, a shore of the lake Wytzyckie — in a layer of mud, 16. VII. 1974 — 1 specimen.

Body shape and proportions are as in figures by MARCOLONGO (1912) and ROSZCZAK (1968). Scales are arranged regularly in alternating rows. They are either fairly distant from each other (fig. 11) or, almost contact (fig. 12) or overlap (fig. 13). It should be pointed out that figs. 11-13 were based in specimens originating from a single sample taken in August of 1975 in Okoninek. Specimens from the other stations showed constant spans between the scales. More common is the scales arrangement depicted in fig. 13. The scales arrangement corresponding to fig. 11 was found in a specimens from Siedlce. There is an equilateral triangle visible in the anterior portion of scale. It is a very short pedunculum by means of which the scale is fixed to the body surface. The pedunculum is perceivable when the animal sides are observed at a great magnification (1500×). Also at this resolution, the author succeeded in observing in two specimens, a thin keel in a line of the scale longitudinal axis and on its upper surface. The keel begins in the anterior scale part, it becomes thicker and more conspicuous posteriorly and its ending protrudes a little beyond the hind scale margin. It is supposed, that the negative result of observation of other specimens, as far as the keel is concerned, was due to, either, its weaker development or, to the lower resolution of the microscope used. Therefore, in order to preserve comparability, the keels have been depicted in all the three figures.

Observations of cuticular elements of the body surface of *P. rhomboides* were carried on by the author on alive and killed specimens. Staining techniques were not applied. In certain specimens studying of dried up material proved to be more effective. In the all specimens, in which these elements were studied, the cilia bands of the ventral body side were present. Sometimes, however, the bands were confined to the pharynx region only. The specimens observed were rather sluggish or moderately fast in movements. In a part of individuals two pairs of tactile bristles were observed. The ventral body side covered with smaller scales of a character similar to those of the dorsal body side. There occurs a strong cuticular lamella beneath the mouth.

STOKES (1887) described *P. rhomboides* from North America. His description was accompanied by a schematical drawing of the scales arrangement (fig. 16). No interpretation of small triangles, marked on all scales, is supplied

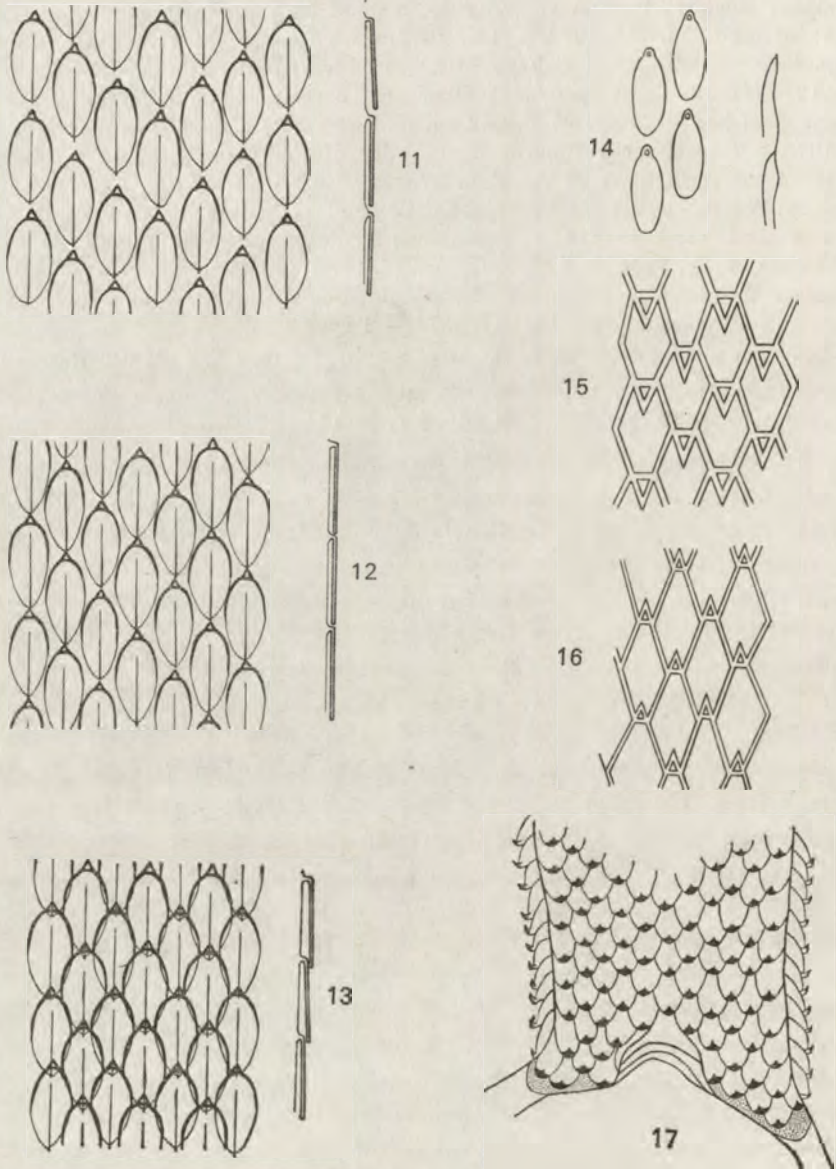


Fig. 11-17. *Polymerurus rhomboides* (STOKES). 11-13 - three types of the scales arrangements of the dorsal side of the body trunk dependent on the distances between particular scales (dorsal view - left, lateral view - right), 14 - "*P. oligotrichus*" REMANE. Shape and arrangement of the dorsal scales (dorsal view - left, lateral view - right) (according to REMANE 1927), 15 - scheme of the arrangement of scales of dorsal body side (according to VARGA 1959), 16 - scheme of the arrangement of scales of dorsal body side (according to STOKES 1887), 17 - posterior part of the body trunk, dorsal view (according to MARCO-LONGO 1912).



by STOKES. He only states, however, that they are situated in the posterior part of each scale. MARCOLONGO (1912) discovered this species in the crater lakes of Italy and supplemented the first description. He claims that the triangles are pointed ends of particular scales which are bent upwards, as explicitly expressed in a figure enclosed (fig. 17). ROSZCZAK (1968) discovered this species in Poland and explains, in a similar to MARCOLONGO way, their distribution and details of structure, a similar figure is also enclosed. VARGA (1959) reports *P. rhomboides* from Hungary, incorporating the MARCOLONGO's figure and the modified schematical figure of STOKES, in which the triangles mentioned are moved to the anterior part of scales (fig. 15). REMANE (1927) describes *P. oligotrichus* from Germany. The shape of head, body trunk, caudal appendages as well as that of scales is very similar to the shape of the same parts in *P. rhomboides*. According to REMANE, the features that are to justify the erecting of the new species are the different structure of a scale [the scale is attached to body with its anterior part by means of a short pedunculum (fig. 14), the posterior scale end does not show any swelling bent upwards], scales distribution (distances between scales), presence of scales on the ventral body side and a total lack of cilia on the same side.

The specimens observed by the present author correspond, as regards the scale structure, to a form described as *P. oligotrichus*. Similarly, as in the REMANE's description, scales occurred on the lateral body side. All the specimens studied by the present author had the cilia band developed. Given the proved identity of the description with the only difference between them in the mentioned character, it should be considered as an effect of individual variability. It should be also noticed that only those specimens, studied by the author, are identical with the REMANE's specimens in which the scales arrangement of the dorsal body side corresponds to fig. 11. The remaining individuals found in the author's samples differ from the description of *P. oligotrichus* by a small distance between the scales (as in fig. 12) or, by a clear overlapping of scales (as in fig. 13), the latter case was the most frequent occurrence in the author's material. From analysing this figure it should be concluded that a microscopic picture obtained from such a distribution of scales makes it impossible to ascertain whether the "triangle" lies in the anterior or posterior part of the scale. The problem may be only solved when scales are observed laterally. It should be emphasized, however, that the scale pedunculum is very short and could pass unobserved by MARCOLONGO and ROSZCZAK, and, that the end of one scale overlapping the anterior portion of another brought these authors, perhaps, about impression that there is a thickening. During initial period of his studies the author was also a victim of this impression. The diverse interpretation of details of the scale structure might be also caused by the use of microscopes of different resolution by the authors mentioned.

Comparing data of the successive authors concerning *P. rhomboides* with the description of *P. oligotrichus* and the present observations, a full

conformity of the following characters may be stated: presence of the triangular formation connected with all scales, presence of the strong cuticular lamella beneath the mouth, number of caudal appendages segments and particular body dimensions (see below). So, the main incompatibility of the descriptions may be reduced to an interpretation of the scale structure. It should be also noticed that no one of the authors had opportunity to study the two species. In Poland, even in one of its regions – in Wielkopolska, there were specimens, observed by two students with a time span of a few years, of which dimensions were almost identical; the specimens differed, however, according to these authors, by scales structure (ROSZCZAK 1968; the present author's sites in Wielkopolski National Park and in Rogalin). All these facts point at existence of one species only, named *Polymerurus rhomboides* (STOKES). The name *P. oligotrichus* should be considered as its synonym then.

The only essential difference left between the STOKES's description, data of REMANE and of the present author needs an explanation now. The first of the authors informs that the field in between the cilia bands is bare; REMANE maintains instead, which is also confirmed by the present observations, that it is covered with small scales. Since only inconsiderable variance in body cover is known in other species of the family *Chaetonotidae*, this difference would be hardly explainable in terms of individual variability. Though STOKES was an inquiring observer and, therefore, it is of little probability that he missed this well visible feature, a reexamination of North American population of *P. rhomboides* seems necessary.

#### Measurements and other data:

	STOKES (1887)	MARCOLONGO (1912)	REMANE (1927)	ROSZCZAK (1968)	author's data	
body length	about 295 $\mu\text{m}$	something below 400 $\mu\text{m}$	about 400 $\mu\text{m}$	375 $\mu\text{m}$	286–392 $\mu\text{m}$	(10)
pharynx length	$\frac{1}{6}$ of the body length	—	$\frac{1}{6}$ of the body length without the tail	58 $\mu\text{m}$	42–61 $\mu\text{m}$	(7)
length of caudal ap- pendages	$\frac{1}{3}$ – $\frac{1}{4}$ of the body length	110 $\mu\text{m}$ —	something more than $\frac{1}{3}$ of the body length	—	85–131 $\mu\text{m}$	(7)
scale length	5 $\mu\text{m}$	—	—	5 $\mu\text{m}$	6–8 $\mu\text{m}$	(3)
head width	36 $\mu\text{m}$	42 $\mu\text{m}$	—	43 $\mu\text{m}$	38–42 $\mu\text{m}$	(2)
segments number of the adhesive tubes	about 20	about 20	20–21	up to 20	18–23	(7)

*Polymerurus squammofurcatus* (PREOBRAJENSKAJA, 1926)

**Material.** Okoninek, community of Cekeyn, Bydgoszcz voivodeship, a peat-hag — in a thick layer of *Lemna* sp. and *Stratiotes aloides*, 12. VIII. 1974 — 1 specimen.

The head was built of three well developed lobes covered with scales. The neck much narrower than the head. The trunk of the body largest in the section behind the middle of the body length. A body constriction is visible between the trunk of body and the base part of the caudal appendages. Dorsal and lateral parts of the body densely covered with square scales with a short spine. Only the scales of the base part of caudal appendages devoid of spines. Each of the branches of caudal appendages carries 13 rectangular scales in a longitudinal row. These scales cover the external and a part of the dorsal surfaces of the branch, thus, not only the external one as shown in a figure by PREOBRAJENSKAJA. The neck region of the field in between the cilia bands covered with 18 rectangular scales situated in a longitudinal row. Width of all these scales corresponds, more or less, to the pharynx width in a given point, while their length is 5–6 times less. Solely the first of them (that closest to the anterior extremity of the body) is conspicuously larger and differs in shape from the others. Its shape corresponds to a half of circle with the anteriorly oriented bow. The anterior edge of this scale with a distinct indentation. The author could not draw precisely a picture of this well visible structure since the only specimen studied underwent an untimely destruction during the observation.

The specimen studied agree, in the main, with the original description of *P. squammofurcatus*. However, there are certain discrepancies which account for uncertainty as to identity of the two forms. The number of scales on the branches of caudal appendages is apparently lower in the specimen found in Poland than in that from Moscow. Though this difference may be due to the individual variability, neither the author of the original description nor RUDESCU (1967) who discovered *P. squammofurcatus* in Romania, have noticed any variability of this character. A certain difference is also constituted by a shift of the scale row from the external edge to the dorsal side of the caudal appendages branch. Moreover, the specimen found in Okoninek had a specific cover of the neck region of field in between the cilia bands. That is why it is difficult to establish with certainty whether the animal found belongs to *P. squammofurcatus*.

## REFERENCES

- GREUTER A. 1917. Beiträge zur Systematik der Gastrotrichen in der Schweiz. Rev. suisse Zool., Genève, 25: 37–76, 2 tt.
- HONDT J.-L. D'. 1967. Documents sur les Gastrotriches dulcicoles des eaux françaises. Ann. limnol., Toulouse, 3: 381–397, 1 t.

- MARCOLONGO J. 1912. Gastrotrichi del lago-stagno craterico di Astroni. Annu. Mus. zool., Napoli, N. S., 1, suppl. 2, 24 pp., 3 tt.
- PREOBRAJENSKAJA E. N. 1926. Zur Verbreitung der Gastrotrichen in den Gewässern der Umgebung zu Kossino. Arb. biol. Stat. Kossino, Moskva, 4: 3-14, 1 t.
- REMANE A. 1927. Beiträge zur Systematik der Süßwassergastrotrichen. Zool. Jb. Syst., Jena, 53: 269-320, 12 ff.
- REMANE A. 1936. *Gastrotricha*. In: BRONN's Klassen und Ordnungen des Tierreichs, 4. Leipzig, 242 pp., 209 ff.
- ROSZCZAK R. 1968. Brzuchorzęski (*Gastrotricha*) Środkowej Wielkopolski. Pr. Kom. biol. PTPN, Poznań, 32, 6, 92 pp., 56 ff.
- RUDESCU L. 1967. *Gastrotricha*. Fauna Republicii Socialiste România, 2, 3. București, 289 pp., 151 ff.
- SAITO J. 1937. Neue und bekannte Gastrotrichen der Umgebung von Hirosima (Japan). J. Sci. Hiroshima Univ., B, Hiroshima, 1: 245-265, 13 ff.
- STOKES A. C. 1887. Observations sur les *Chaetonotus*. J. Microgr., Paris, 11: 560-565, 2 tt.
- VARGA L. 1959. Csillóshasúak *Gastrotricha*. Magyarország Állatvilága, 3, 9. Budapest, 42 pp., 22 ff.

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#### STRESZCZENIE

[Tytuł: Nowe i niewystarczająco poznane brzuchorzęski (*Gastrotricha*) z Polski]

W niniejszej pracy zamieszczono opisy dziewięciu gatunków brzuchorzęsków słodkowodnych, stwierdzonych przez autora w trakcie badań prowadzonych w latach 1972-1975 w różnych regionach Polski.

Opisano cztery nowe gatunki: *Chaetonotus rafalskii* sp. n., *Ch. magnus* sp. n., *Heterolepidoderma longicaudata* sp. n., *Aspidiophorus bibulbosus* sp. n. Oba nowe gatunki z rodzaju *Chaetonotus* należą do grupy *Ch. maximus*.

Wykazano dużą zmienność osobniczą gatunku *Ch. bisacer* GREUTER. Pozwala ona zaliczyć do tego gatunku egzemplarze zgodne z opisem *Ch. truncatus* SAITO (syn. n.). Za synonim *Polymerurus rhomboides* (STOKES) uznano *P. oligotrichus* REMANE na podstawie spostrzeżenia, że interpretowana w różny sposób struktura tarczki odpowiada w istocie jednemu typowi ich budowy.

Dokonano redeskrypcji gatunków *Chaetonotus microchaetus* PREOBRAJENSKAJA i *Ichthyidium bifurcatum* PREOBRAJENSKAJA, znanych dotąd tylko z jednego stanowiska pod Moskwą. Opisano ponadto okaz należący prawdopodobnie do gatunku *Polymerurus squammosfurcatus* (PREOBRAJENSKAJA).

## РЕЗЮМЕ

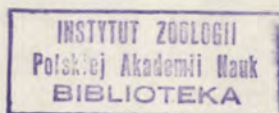
[Заглавие: Новые и недостаточно изученные гастротрихи (*Gastrotricha*) из Польши]

В работе рассмотрены 9 видов пресноводных гастротрихий, констатированных автором во время исследований, проведенных в 1972–1975 гг. в различных регионах Польши.

Описаны 4 новых вида: *Chaetonotus rafalskii* sp. n., *Ch. magnus* sp. n., *Heterolepidoderma longicaudata* sp. n., *Aspidiophorus bibulbosus* sp. n. Оба новые вида из рода *Chaetonotus* относятся к группе *Ch. maximus*.

Констатирована большая индивидуальная изменчивость вида *Ch. bisacer* GREUTER, которая позволит причислить к нему также экземпляры, описание которых соответствует *Ch. truncatus* SAITO (syn. n.). *Polymerurus oligotrichus* REMANE автор считает синонимом *P. rhomboides* (STOKES), согласно наблюдениям, что структура щитков соответствует в действительности одному типу их строения.

Произведено переписание видов *Chaetonotus microchaetus* ПРЕОБРАЖЕНСКАЯ и *Ichthyidium bifurcatum* ПРЕОБРАЖЕНСКАЯ, известных до сего времени только из единственного местонахождения под Москвой. Писан также экземпляр, принадлежащий, по-видимому, к виду *Polymerurus squammofurcatus* (ПРЕОБРАЖЕНСКАЯ).



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