MEIOFAUNA MARINA

Biodiversity, morphology and ecology
of small benthic organisms

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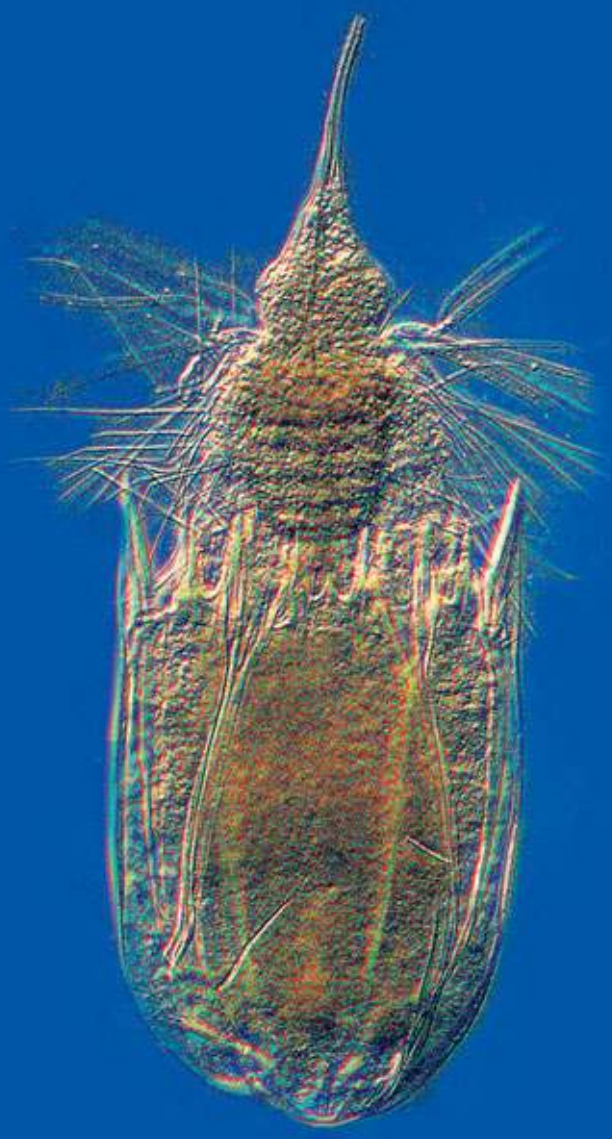

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Brackish-Water Gastrotricha of the Polish Baltic Coast

William D. Hummon*

Abstract

Collections were made from Wolin National Park (sandy littoral) in western Poland. Four species were found: *Turbanella cornuta*, *Xenotrichula intermedia* (= *X. beauchampi*), *X. velox*, and *Halichaetonotus polonense* n. sp., bringing to six the number of species known from western Poland. I also contend that the genus *Metadasydytes* and species *M. quadrimaculatus*, described by Roszczak (1971) is not a gastrotrich but the larva of a polychaete, probably *Polydora ciliata*.

Keywords: Poland, Baltic Sea, meiofauna, new species, mistaken identity

Introduction

In 1939 Roszczak published a paper on the gastrotrichs of the Hel Peninsula in Eastern Poland; 11 species of marine-type meiofauna, including three new species, were treated, along with three species of freshwater-type meiofauna. Nearly four decades later, in 1975, a more extensive geographical paper, covering the entire Polish Baltic coast, was published by Kisielewski. In it, he treated 10 species of marine-type meiofauna, including three new species; all 10 of these species were found on the Hel Peninsula, though none of the species found by Roszczak recurred. Despite a salinity of 7 ‰, no more than one-fifth sea water, 21 of the known species either have marine representatives or are more closely related to marine than to fresh-water gastrotrichs; the other three are typically freshwater gastrotrichs, one or more of which are occasionally reported from brackish or estuarine conditions. Kisielewski listed four species for the Wolin National Park in western Poland: *Turbanella cornuta* Remane, 1925; *Paradasys subterraneus* Remane, 1934; *Xenotrichula intermedia* Remane, 1934 (as *X. beauchampi* Lévi, 1950); and *Halichaetonotus balticus* (Kisielewski, 1975). From a modest collection of material, made in the national park during late summer 1985, I have found the widespread *T. cornuta*, *X. intermedia*, *X. velox* Remane, 1927, and a new, smaller species of *Halichaetonotus*, *H. polonense* n. sp.

Materials and Methods

All material from Wolin National Park (Fig. 1) collected in August 1984 was taken by means of a 2.2 cm diameter core tube from a transect extending from just below low water to the wind-swept upper swash zone, down at least to ground-water depths. Sediments were muddy sand, grading with depth to sandy mud, into muddy clay.

* Department of Biological Sciences, Ohio University, Athens, OH 45701 USA; e-mail: hummon@ohio.edu

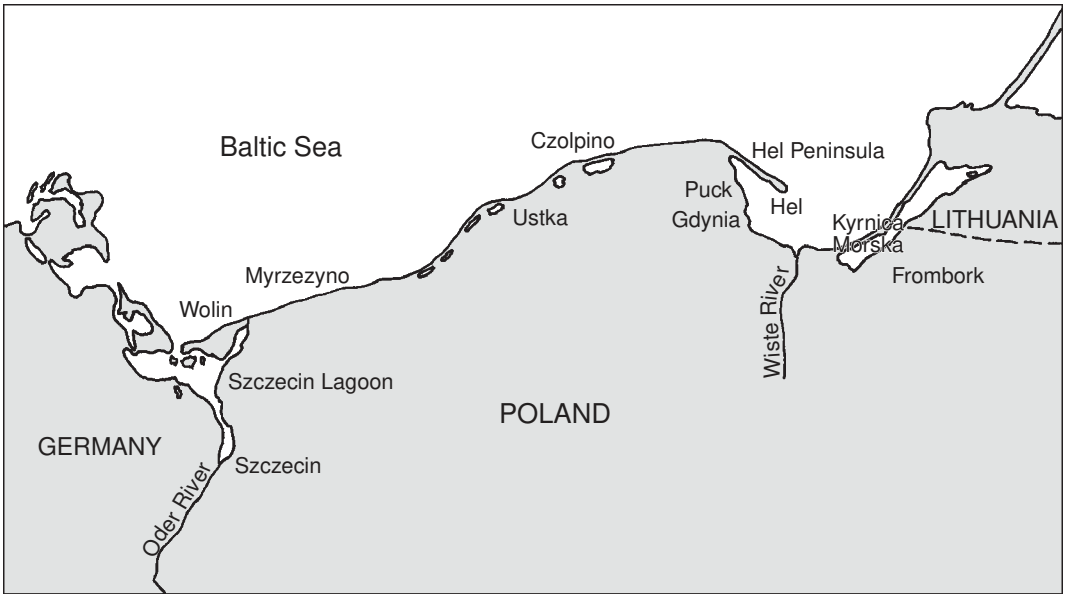

Fig. 1. Map of the Baltic coast of Poland coast. The site of this collection was Wolin National Park; other gastrotrichs have been collected from Wolin, Myrzezyno, Ustna, Czolpino, Puck, the Hel Peninsula and Kyrnica Morska. *"Metadasydytes"* was collected from Frombork.

Samples were placed in 50 ml jars, narcotized for 10 minutes with 2 % $MgCl_2$ and preserved with 10 % neutralized formalin. Jars were returned to the US and gastrotrichs extracted from sediments by decantation. Fixed specimens, *T. cornuta* showing perhaps 5-10 % shrinkage, but otherwise in remarkably good condition, were observed with a Wild M-5 stereo-microscope at 18 to 20× magnification. Individual specimens were placed on a slide, using a mouth pipette, covered with 18 mm^2 cover slip, having posts of modeling clay under its corners, and studied with differential interference contrast (DIC) optics using a Nikon LabPhot 2 compound microscope. Drawings were made with the aid of a drawing tube, measurements using an ocular micrometer. Symbols/conventions: see Figure legends; PhJIn indicates the pharyngeo-intestinal junction; U units are as percentages of Lt.

Taxonomic Results

Order Macrodasyida Remane, 1925
[Rao & Clausen, 1970]
Family Turbanellidae Remane, 1926
Turbanella Schultze, 1853

***Turbanella cornuta* Remane, 1925**
Fig. 2, Table 1

Description. Morphometry changes with body length, Lt 160 to 820 µm, LPh 80 to 240 µm (TbA 2 to 10; TbL 4 to 50; TbD 4 to 34; TbP 2 to 11 per side); nonetheless, both subadults and adults can be identified by the distinct cones that exceed the greatest trunk width, a head that is narrowest immediately behind the cones, and a trunk that narrows gradually over its rear half. TbA are borne on fleshy hands, tubes being added medially; TbL are more or less regularly distributed from just behind the cones to the final narrowing of the trunk onto the caudum, being inserted from dorsolaterally to ventrolaterally, tubes being added among established tubes along most of the body length, except for the very foremost and hindmost; TbD roughly two-thirds as many as TbL, with a similar distribution, but in a single

column, tubes being added in a similar manner; TbP are borne on the trailing edges of the paired caudal lobes, tubes being added medially; paired "cirrata" tubes occur just behind the PhJIn. Ventral ciliation includes paired longitudinal tracts that meet both fore and aft.

Distribution. *T. cornuta* is probably the most widely distributed marine gastrotrich in the northern hemisphere, having been reported from the Atlantic NE, Mediterranean, Atlantic NW, Caribbean, Pacific NE, and Pacific NW regions. Along the Polish littoral coastline, it is known from seven of nine locations sampled by Kisielewski (1975): Czolpino, Hel N, Hel S, Krynica Morskei N, Mrzezyno, Utska, Wolin, but not at Chalpowo, Krynica Morskei S, nor from any of the stations sampled by Roszczak (1939).

Remarks. Metric and meristic characters were noted for four of ten specimens seen at Wolin National Park (Table 1) during this study, with an illustration of the smallest of these specimens (Fig. 2). The largest specimen was a subadult of Lt = 463 µm (TbA = 5; TbL = 22; TbD = 14; TbP = 5 per side), compared with the largest mature adult found by Kisielewski (1975) at Lt = 705 µm (TbA = 5; TbL = unknown; TbD = unknown; TbP = 9 per side). The scale-bar shown by Kisielewski in Fig. 9 must apply only to the mature specimen (Fig. 9b,c), since the bar is only one-third the value-for-size that would be appropriate for the juvenile (Fig. 9a), as is indicated most notably by the pharynx length. The resulting specifications for the juvenile would be: Lt = 200 µm, LPh = 84 µm (TbA = 2; TbL = 4; TbD = 1 or 2; TbP = 2 per side).

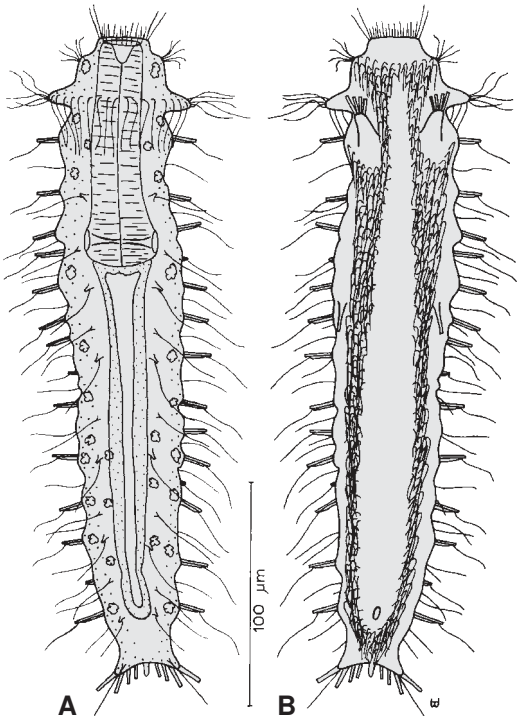

Fig. 2. *Turbanella cornuta*, subadult (Lt = 292 µm). **A.** dorsal. **B.** ventral.

Table 1. Morphometric features of *Turbanella cornuta*. – **Lt**, total length in µm; **LPh**, length of pharynx (tip of head to pharyngo-intestinal junction); **LIn**, length of (stomach) intestine; **LLb**, length of caudal lobe (obliquely from medial separation to tip of longest adhesive tube); **WHd**, width of head without/with lateral cones; **WNk**, narrowest trunk width following the head; **WTr**, broadest trunk width in the intestinal region; **WLbBs**, width of trunk at the separation of the caudal lobes; **TbA**, number of anterior adhesive tubes per side; **TbD/L**, number of dorsal and lateral adhesive tubes per side; **TbP**, number of posterior adhesive tubes per side. *, The specimen of Fig. 2.

Lt	*292	338	400	463
LPh	90	108	123	128
LIn	180	187	247	297
LLb	12	18	22	19
WHd	40/55	45/56	43/54	41/52
WNk	40	40	38	37
WTr	50	40	46	43
WCdBs	18	18	19	19
TbA	4	4	5	5
TbD/L	6/14	9/14	12/18	14/22
TbP	4	4	5	5

Order Chaetonotida Remane, 1925
[Rao & Clausen, 1970]
Family Xenotrichulidae Remane, 1927
Xenotrichula Remane, 1927

***Xenotrichula intermedia* Remane, 1934**
Fig. 3, Table 2

Description. Morphometry changes with body length, Lt 90 to 235 µm, LPh 37 to 60 µm; nonetheless, both subadults and adults can be identified by a well-defined neck located at about the level of the PhJIn, a trunk that is broader than the head, and a furca whose scaled portions are less

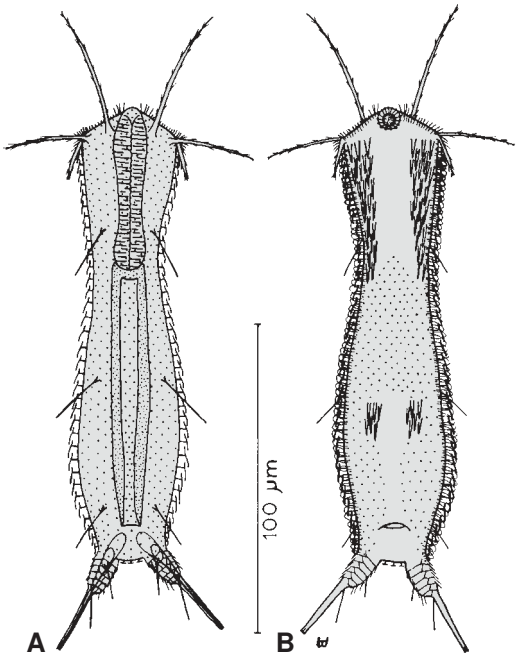

Fig. 3. *Xenotrichula intermedia*, subadult (Lt = 172 µm). **A.** dorsal. **B.** ventral.

than half the overall length. Ventral cirri, all of a similar size, occur in paired longitudinal tracts that continue just past the PhJIn, along with a patch of five per side in the mid-trunk region; dorsal head cirri are three per side, the longest projecting dorsally, the next projecting dorsolaterally, and the shortest trailing from the lateral most part of the head.

Distribution. *X. intermedia* is the most widely-distributed xenotrichulid species in the northern hemisphere, having been reported from the Atlantic NE, Mediterranean, Atlantic NW, Caribbean, and Indian Ocean regions. Along the Polish littoral coastline, it is known from seven of nine locations sampled by Kisielewski (1975): Chalpowo, Czolpino, Hel N, Krynica Morska N, Krynica Morska S, Mrzezyno, Wolin, but not at Hel S, Rewa, nor from any of the stations sampled by Roszczak (1939).

Remarks. We have Ruppert (1979) to thank for the recognition that *X. beauchampi* Lévi, 1950 was in fact a junior synonym for Remane's incompletely described species of 1934, *X. intermedia*. Metric characters were noted for 18 of 31 specimens seen at Wolin National Park during this study (Table 2), with an illustration of a middle-sized specimen (Fig. 3) that had several diatoms in its gut. Egg size in mature specimens: 39 ± 3.5 × 13 ± 2.1 (max. 47 × 18) µm.

Xenotrichula velox Remane, 1927
Fig. 4, Table 3

Description. Morphometry changes with body length, Lt 120 to 275 µm, LPh 40 to 60 µm; nonetheless, both subadults and adults can be identified by paired posteriolaterally directed, finger-like tentacles, a long neck that ends in the fore-gut region, a trunk that is broader than the head, a median bulge of the furcal base, and an elongate furca whose scaled portions are about

Table 2. Morphometric features of *Xenotrichula intermedia*. – Abbreviations see Table 1, with metrics ± standard error of the mean in µm; **LFrSc**, length of scaled part of the furcal branch; **LFrBr**, length of entire furcal branch; **WFrBs**, width of trunk at the separation of the furcal branches; **WFrTp**, width at the tips of the furcal branches. *, Includes the specimen of Fig. 3.

Size range	110-119	120-139	140-159	160-179	180-199	200-219
Number	1	3	6	4	3	1
Lt	114	129±4.6	147±2.4	*166±2.2	192±4.5	215
LPh	42	42±0.6	45±1.0	50±1.2	52±0.3	52
LIn	42	47±3.6	57±2.9	76±3.2	88±2.4	110
LFrSc	13	11±0.7	13±0.8	14±0.5	16±1.0	20
LFrBr	30	32±0.8	33±1.1	35±0.9	39±1.2	38
WHd	25	26±1.7	28±0.9	30±1.8	32±1.2	33
WNk	13	15±0.0	18±0.7	19±0.6	21±0.7	22
WTr	23	22±1.2	31±2.5	36±2.0	39±3.6	37
WFrBs	14	15±0.3	17±1.0	19±0.8	21±0.3	21
WFrTp	40	32±2.6	38±0.9	43±5.1	42±4.6	35
No. with eggs	–	–	1	2	1	–

three-fourths of the overall length. Ventral cirri, all of a similar size, occur in paired longitudinal tracts that continue to the PhJIn, along with a patch of five per side in the forward mid-trunk region; dorsal head cirri are two per side, of similar size, one projecting dorsally and the other projecting dorsolaterally.

Distribution. *X. velox* is the second most widely-distributed xenotrichulid in northern Europe, having been reported from throughout the Atlantic NE and the western most portion of the Mediterranean. It was known from four locations in eastern Poland: Chalpowo, Czolpino, and both the north and south sides of the Hel Peninsula (Kisielewski 1975), but not from any of the stations sampled by Roszczak (1939). It is now also known from western Poland at Wolin Park.

Remarks. Metric characters were noted for 13 of 25 specimens seen at Wolin Park (Table 3) during this study, with an illustration of the largest specimen (Fig. 4). Egg size in mature specimens: 41 ± 4.3 × 19 ± 2.9 (max. 58 × 30) µm.

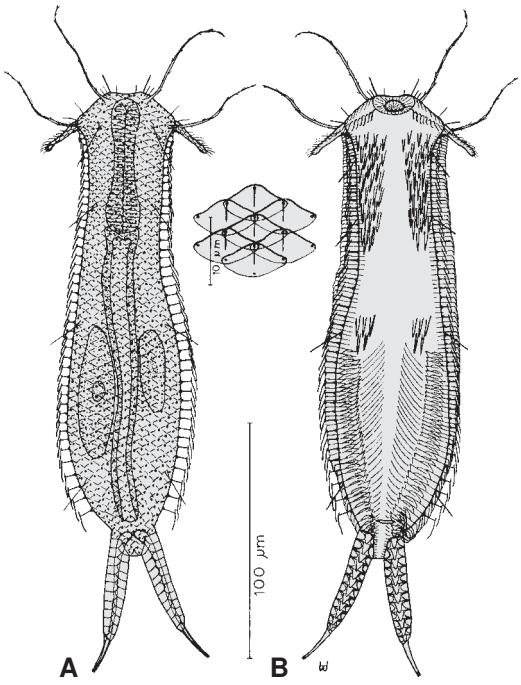

Fig. 4. *Xenotrichula velox*, adult (Lt = 243 µm). **A.** dorsal. **B.** ventral.

Family Chaetonotidae Ehrenberg, 1930
Halichaetonotus Remane, 1936 [Schrom, 1972]

***Halichaetonotus polonense* n. sp.**
Fig. 5, Table 4

Description. Adult Lt 120-127 µm; L to PhJIn 35-36 µm at U28, based on metric characters for 11 of 41 specimens seen during this study (Table 4), with an illustration of one of the larger specimens (Fig. 5). Body medium, ten-pin shaped; head lobes weakly differentiated; neck narrowest just behind the PhJIn; trunk width greater than head, widest just over half way down its length; furca medium (L = 26 µm); basal four tenths of its length being thickened, scaled, and showing on its upper medial edge a hook-shaped medial

Table 3. Morphometric features of *Xenotrichula velox*. – Abbreviations see Tables 1 and 2, with metrics ± standard error of the mean in µm; **LTn**, length of tentacles. *, Includes the specimen of Fig. 4.

Size range	155-169	170-184	185-199	200-214	215-229	230-244
Number	1	3	1	2	3	3
Lt	155	179±2.1	195	207±4.5	224±1.9	*237±3.2
LTn	15	15±0.7	16	14±1.0	17±0.5	17±0.9
LPh	47	53±0.6	55	56±0.5	53±1.5	56±2.9
LIn	55	71±2.0	86	91±4.0	100±3.7	115±7.3
LFrSc	33	38±1.2	40	39±0.5	41±0.6	43±2.1
LFrBr	51	54±1.2	57	54±0.0	58±1.7	62±1.7
WHd	35	37±0.3	41	40±1.5	41±1.5	41±0.7
WNk	35	24±1.5	26	26±0.5	27±1.5	29±1.0
WTr	29	35±1.9	50	44±4.0	44±1.7	47±1.5
WFrBs	13	16±0.6	18	19±1.5	19±1.2	20±0.3
WFrTp	28	28±4.9	46	43±9.1	29±1.7	44±3.8
No. with eggs	–	–	–	2	3	5

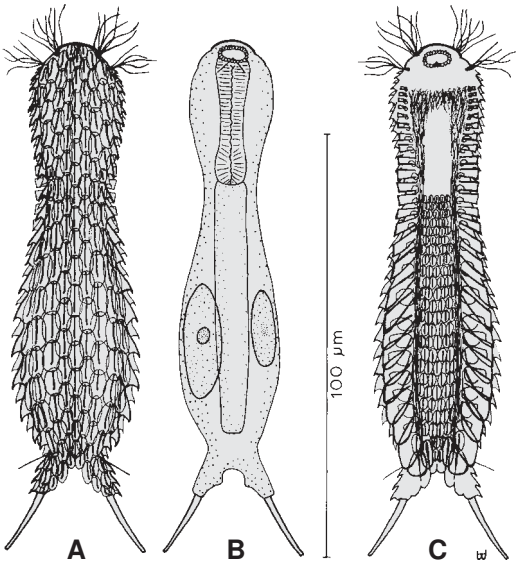

Fig. 5. *Halichaetonotus polonense*, n. sp., adult (Lt = 120 µm). **A.** left. **B.** optical section. **C.** ventral.

process; apical four tenths of its length narrows quickly to a thin, cylindrical, naked adhesive tube that bends slightly outward over its length; tips are usually spread rather widely. Widths of head/neck/trunk/furcal base/tips, and their locations along the body length are: 20/14/25/14/33 µm at U11/U31/U63/U83/U100.

Cuticular armature. Cephalion erect; hypostomion unknown. Dorsal surface covered with nine longitudinal columns, each with 17-18 overlapping elongate-oval scales (L = 5-7 µm on head, ca. 5 µm on neck, 7-8 µm on mid-trunk); all scales bear a strong longitudinal keel that terminates in a short sharp spine, which surpasses and lifts free of the scale. Ventrolaterally on either side, from U09 to U81, is a longitudinal column of 26 round to pear-shaped scales, which bear hydrofoil lamellae that increase in size toward the rear, progressing from laterally directed rectangular lamellae to more posteriorly directed ovoid lamellae which are slightly overlapping and reaching 11 µm in length. Ventral interciliary field has four to five longitudinal columns of small, elongate-oval, keeled scales that run from the neck to the base of the caudum; lateral to these, beneath the furcal base, on either side lie three scales forming a trianguloid pattern, each with a keeled spine, the medial most being elongate-oval (L = 7 µm), a second being oval and smaller (L = 5 µm) that lies forward and lateral, and a third polygonally-oval and intermediate in size that lies beneath the furcal branch.

Ciliature. Two pairs of sensory ciliary tufts arise on the head, one ventrally lateral to the mouth, the other dorsally at the edges of the cephalion. Posterior sensory bristles insert on the furcal base at U81. Ventral ciliature, with a transverse connection behind the mouth, runs in two longitudinal bands from head to terminal scales.

Digestive tract. Mouth subterminal; pharynx with swellings fore and aft, bearing an inverted V-shaped inner structure behind the mouth; intestine sub-rectangular, anus ventral at U77.

Reproductive tract. Probably in parthenogenic phase; egg size: 26 ± 2.1 × 9 ± 1.1 µm (max. seen 32 × 12 µm).

Table 4. Morphometric features of *Halichaetonotus polonense* n. sp. – Abbreviations see Tables 1 and 2, with metrics ± standard error of the mean in µm. *, Includes the specimen of Fig. 5.

Size range	90-99	100-119	120-129
Number	1	1	9
Lt	98	120	*124±0.8
LPh	35	35	35±0.8
LIn	34	59	61±1.1
LFrSc	8	8	10±0.2
LFrBr	28	20	27±0.7
WHd	17	20	21±0.5
WNk	12	12	12±0.4
WTr	18	23	23±1.4
WFrBs	12	13	13±0.4
WFrTp	–	33	35±2.0
No. with eggs	–	2	3

Ecology. Sparse in frequency of occurrence, rare in abundance; littoral at 0-15 cm in fine to medium sand, MLW to MTL.

Geographical distribution. ANE-Europe: Poland (Wolin National Park 53°57'N/14°28'E).

Discussion. Unfortunately, no type specimen was able to be saved for this species.

Etymology. The species is described from fixed material, and is named after the country in which it was found.

Taxonomic affinities. Body shape, dorsal scalation, and conformation of ventrolateral hydrofoil

spines of *Halichaetonotus polonense* n. sp. most closely resembles those of *H. balticus* Kisielewski, 1975, but *H. polonense* has scales on the proximal part of the furcal branches and has hydrofoil scales that differ in shape and orientation, while extending further forward and rearward along the body, than *H. balticus*, which lacks scales proximally on the furcal bases and has knife-shaped laterally directed hydrofoil lamellae.

No family designated
Metadasydytes Roszczak, 1971

***Metadasydytes quadrimaculatus* Roszczak, 1971**
Fig. 6

The genus and species described by Roszczak (1971) from Frombork, in the Vistula Lagoon, opposite from Krynica Morska S, appears to be a polychaete larva and not a gastrotrich, despite its acceptance and assignment to the family Dasydytidae by Schwank (1990: 50). This species (Fig. 7a) should be a junior synonym for a 3-setiger hatchling polychaete larva, probably *Polydora ciliata* (Johnston). This latter interpretation was suggested in a letter from me to Prof. Roszczak, dated May 1977, following consultation with Drs. S. Gerlach, W. Westheide and O. Giere, but no reply was received.

P. ciliata is the only wide-spread polychaete that hatches as a 3-setiger larva (Fig. 6b,c), and which has two pairs of eye-spots (Wilson 1928; see also Thorson 1946 and Hannerz 1956). *P. hoplura* looks similar at the 3-setiger stage, but does not hatch until the 12 setiger stage; other prospective candidates lack the two pairs of eye-spots. As can be seen in Fig. 6, while neither the size nor the morphological characters offer a complete correspondence, they are very close. The vestibule opening at the base of the head actually contains the mouth and should have been ciliated within; instead, the mouth was interpreted as being terminal and no mention was made of luminal ciliation. Transverse ciliary tracts on either side of the head represent the polychaete trochal cilia. While *Polydora redeki* may be the only species in this genus that has been found in the upper Baltic as of this time (Eliason & Haahtela 1969), it is otherwise known only from the Channel and North Sea coasts of northwest Europe.

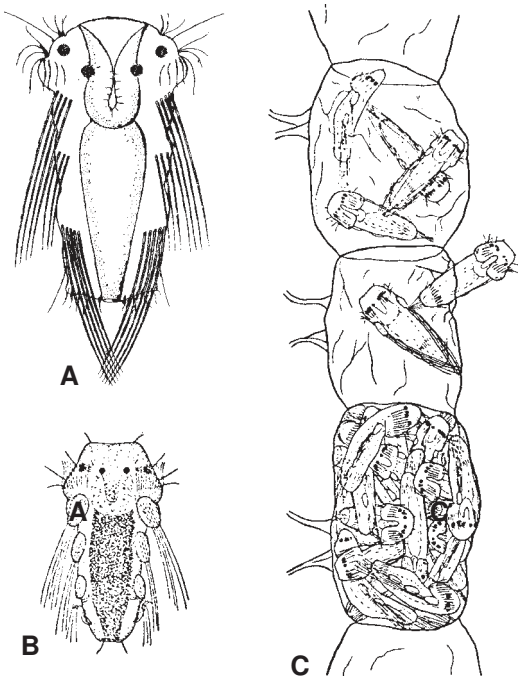

Fig. 6. A. *Metadasydytes quadrimaculatus* (Lt = 330 µm), from Roszczak, 1971. **B.** *Polydora ciliata* 3-setiger larval hatchling (Lt = 256 µm). **C.** *P. ciliata* larvae hatching from a chain of egg sacs, both from Wilson, 1928, Plate II.4. and Text-Fig. 1.

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MEIOFAUNA MARINA

Biodiversity, morphology and ecology of small benthic organisms

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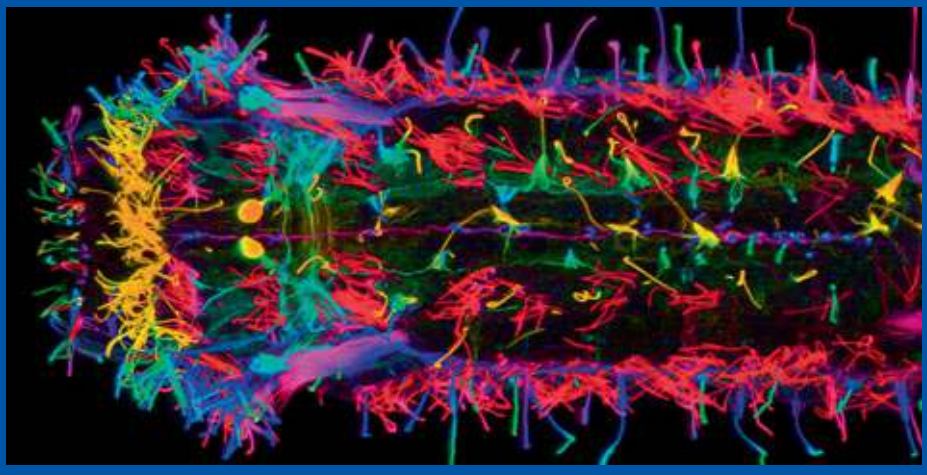

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