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Parasitology

HAEMOBAPHES DISPHAEROCEPHALUS SP.N. (COPEPODA: LERNAEOCERIDAE)
FROM THE GILL CAVITY OF *THALEICHTHYS PACIFICUS*
(RICHARDSON, 1836) (OSMERIDAE)

HAEMOBAPHES DISPHAEROCEPHALUS SP.N (COPEPODA: LERNAEOCERIDAE)
Z JAMY SKRZELOW *EJTHALEICHTHYS PACIFICUS*
(RICHARDSON, 1836) (OSMERIDAE)

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A description of a new parasitic copepod species, *Haemobaphes disphaerocephalus* sp. n., of the family *Lernaeoceridae* is presented. The parasite lives in the gill cavity of *Thaleichthys pacificus* (Rich.) (*Osmeridae*), which occurs over the Oregon-Washington shelf in the Pacific Ocean.

INTRODUCTION

In the course of a parasitological examination of fishes caught by the Polish fishing boat "Humbak" over the Oregon-Washington shelf from 2 Sept. to 7 Oct. 1973 several parasitic copepods of the genus *Haemobaphes* Steenstrup et Lütken, 1861, (*Lernaeoceridae*) were found in the gill cavity of fishes belonging to *Thaleichthys pacificus* of the family *Osmeridae*.

The frequency of this parasite is low, only 3 copepods were found in 215 fishes, 17–19 cm in overall length, and thus their infestation was 1.4 per cent. The parasites occurred singly on these fishes.

The specimens found differ distinctly from the species known up to now, which justifies the erection of a new species, *Haemobaphes disphaerocephalus* sp. n., the description of which is given below.

MATERIAL

Three specimens of adult females with egg sacs; one of these specimens damaged, with its head and part of the neck missing.

One of the undamaged specimens is kept as the holotype in the authoress's collection and was used as the model for a free-hand drawing of the whole body and the cephalic part of the parasite. The head appendages and swimming legs were drawn using a camera lucida, after they had been removed from the other specimen. I failed to remove the mandible and first maxilla undamaged and, consequently, the description of these organs has been omitted.

The nomenclature used by Gooding and Humes (1963) in their description of *Haemobaphes cyclopterina* has been adopted for the present study.

DESCRIPTION OF PARASITE

Localization of parasites on the fish

Haemobaphes disphaerocephalus, like other species of this genus, lives attached to the gill arch between two rows of gill lamellae, which at the place of attachment of the parasite undergo atrophy, over a considerable space filled with the parasite body. As in *H. diceraus*, the neck extends in the afferent gill artery, reaches the arterial trunk, along which it tends to the arterial bulb of the fish heart (Grabda J. 1975).

Only the posterior part of the parasite body, composed of the big genital segment with egg sacs and the abdomen, hangs down into the gill cavity.

All the specimens were found on the first gill arches.

Morphology of parasite

The following division of the parasite body into four sections has been adopted in accordance with the nomenclature used by Gooding and Humes (1963): the anterior section (*prosoma*) consists of the cephalic part (*cephalosoma*) and three thoracic segments with swimming legs, the second section is composed of the elongated thin thoracic part, the so-called "neck", the third section is made up of a swollen body part or, more exactly, the genital segment with its egg sacs, and finally the postgenital segment (*abdomen*) constitutes the fourth section (Fig. 1).

Dimensions

The external portion of the parasite body is the strongly swollen genital segment, 6–6.5 mm long, 2–3 mm in diameter at the anterior end where it is the thickest to taper slightly backwards. Its posterior part is bent dorsal at a right angle. The surface of the genital segment is smooth, devoid of swellings typical of other species of the genus *Haemobaphes*. Two egg sacs, in the form of tightly coiled spirals, hang from the genital segment. They are 5–6 mm in length and about 1 mm in thickness.

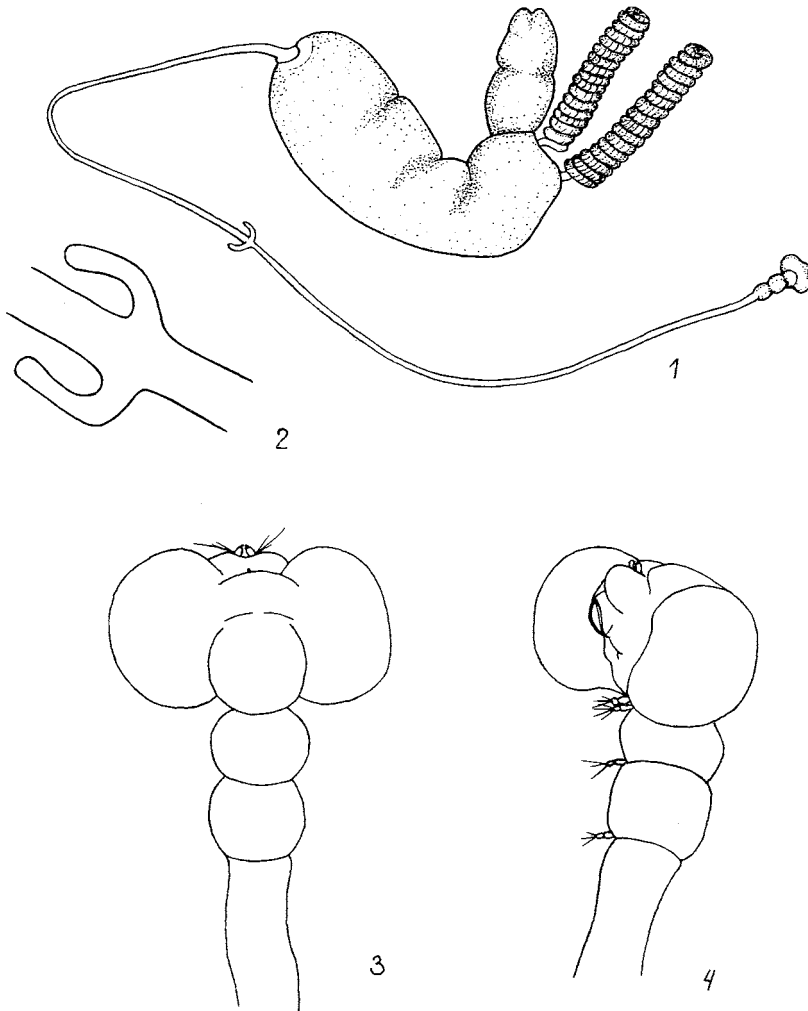


Fig. 1-4. *Haemobaphes disphaerocephalus* sp. n.

1. A total view of the parasite, 2. Anchoring cylindrical processes on the parasite's neck,
3. A dorsal view of the prosoma, 4. A side view of the prosoma

The cylindrical postgenital part, 4-5 mm long and about 1.5 mm in diameter, has no swellings, either. In the middle of this section of body there is a constriction, at its end a distinct depression. No traces of the furca have been found.

The "neck", about 0.3 mm across, set at the anterior end of the genital segment, extends forward along the gill arch, then bends towards the ventral side and turns caudally, entering the arterial trunk, in which it runs to the arterial bulb. On the "neck", some distance behind the bend, there are two bluntly ending processes, directed backwards, with which the parasite is anchored inside the arterial trunk (Fig. 2). The total



Fig. 5–7 Head appendages of *H. disphaerocephalus* sp. n., 5. The 1st antenna terminal segment, 6. The 2nd antenna, 7. The 2nd maxilla

length of the "neck" is 22–29 mm, of which the part from the genital segment to the bend measures 5–9 mm and that behind the bend, including the cephalic part, 17–20 mm.

Prosoma

The anterior section of body consists of a "head" and three thoracic segments, sharply separated from the "neck".

On either side of the head there is a swelling (Fig. 3 and 4), nearly spherical in outline (hence the name of the species: *disphaerocephalus*). On the ventral side of the head the buccal tube and mouth appendages are hidden by verrucous eminences. Above them are antennae I and II, typical of *Haemobaphes* as regards structure. Antenna I, not very distinctly segmented, is 4-jointed. On the terminal joint of this antenna (Fig. 5) there are 11 plumose setae, differing in length, and a big sense organ (*aesthete*), analogous to that described in *H. cyclopterina* by Gooding and Humes (1963). Antenna II consists of two

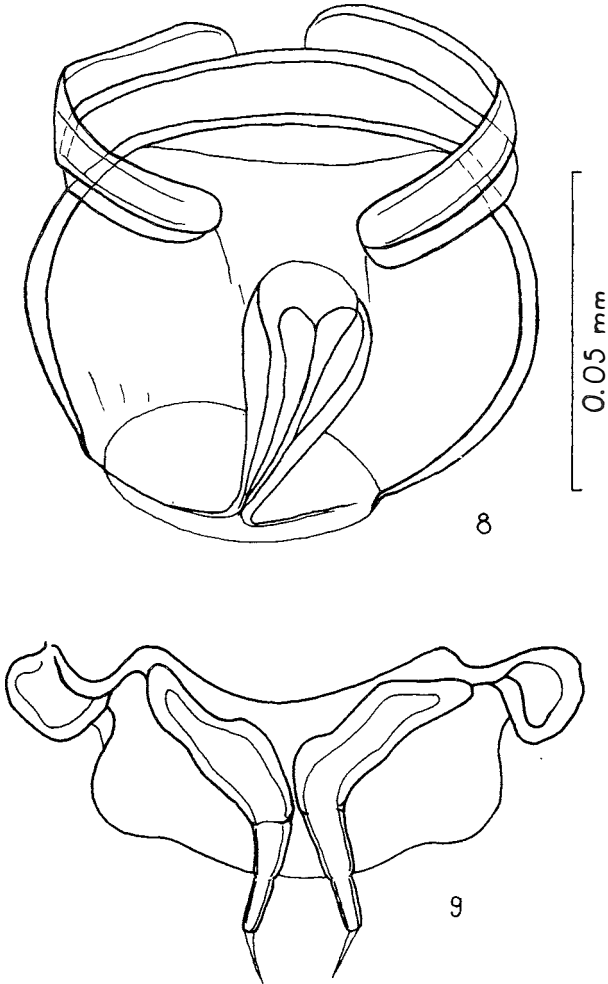


Fig. 8–9. The mouth region of *H. disphaerocephalus* sp. n.,

8. A buccal tube with a mid-anterior plaque, 9. A buccal cone with intrabuccal stylets

Table 1

Arrangement of setae and spines on the swimming legs
of *Haemobaphes disphaerocephalus* n. sp.

	Protopod				Endopod				Exopod			
	segment 1		segment 2		segment 1		segment 2		segment 1		segment 2	
	setae	spines	setae*) inn. out.	spines	setae	spines inn. out.	setae	spines	setae inn. out.	spines inn. out.	setae	spines inn. out.
leg. I	—	—	1, 1	—	—	1, —	7	—	1, —	—, 1	6	—, 1
leg. II	—	—	—, 1	—	—	1, —	7	—	1, —	—, 1	7	—
leg. III	—	—	—, 1	—					—	—	5	—, 1
leg. IV	—	—	—, 1	—					—	—	4	—, 1

*)

inn. — inner side
out. — outer side

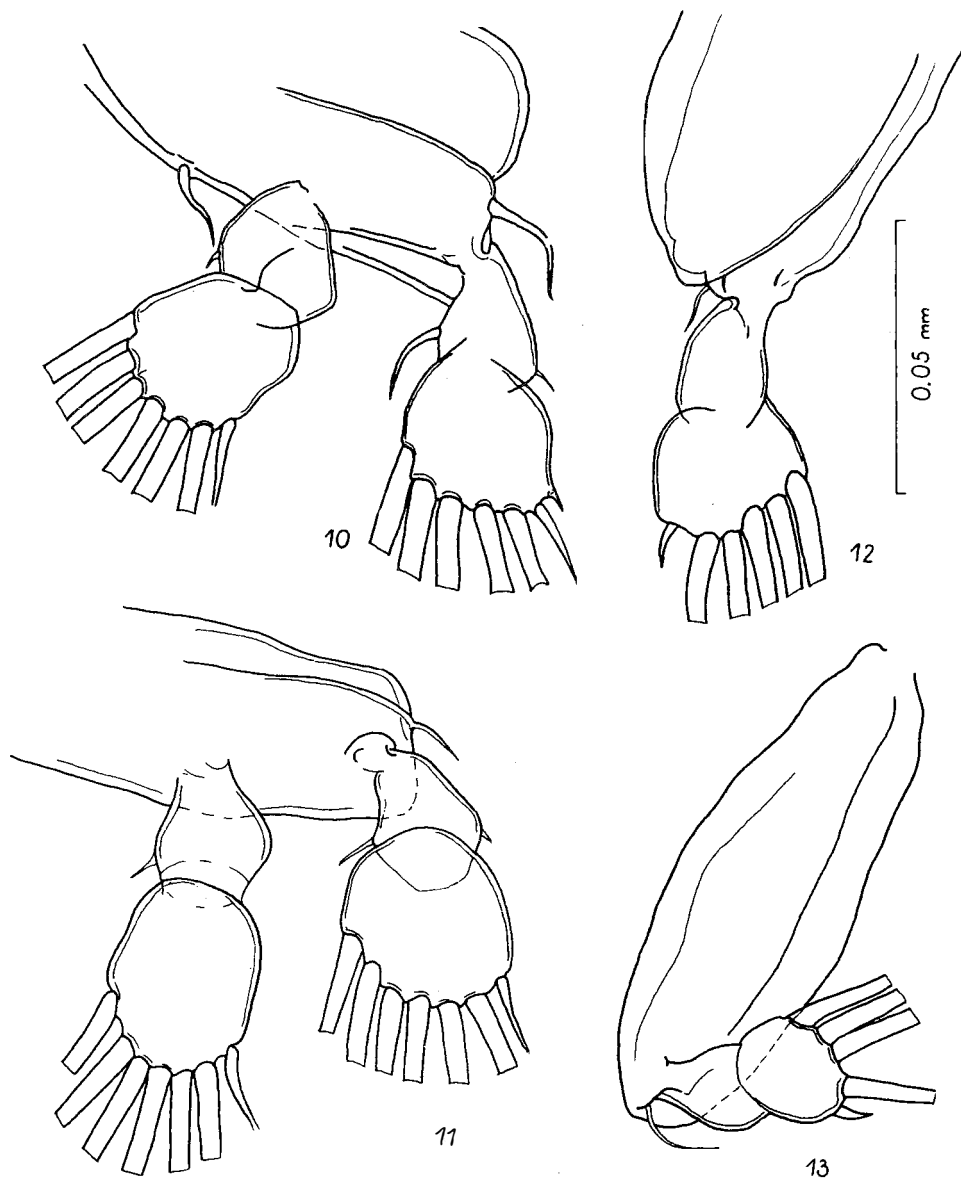


Fig. 10–13. Swimming legs of *H. disphaerocephalus* sp. n.,
10. Leg I, 11. Leg II, 12. Leg III, 13. Leg IV

huge joints, of which the distal one is furnished with a hook, articulating with it and bending into a trough-shaped groove in its terminal margin. On the ventral side of this joint there is a big blunt spine (Fig. 6). These antennae constitute the proper prehensile

organ of the parasite. On the dorsal side of the head there is an eyespot at the level of the antennae.

The mouth opening (Figs. 8 and 9) is surrounded by the buccal tube, which, at the base, encircles the buccal cone with intrabuccal stylets and a mid-anterior plaque in an analogous way to that in *H. cyclopterina* (Gooding and Humes, 1963). Since only one specimen of the species under study was dissected, not all the mouth appendages could be isolated undamaged. This is why, as has been mentioned above, neither the drawings nor descriptions of the mandible and maxilla I are given. Maxilla II is 3-jointed and situated at the sides of the buccal cone. It ends in a big blunt hook, articulating with the terminal joint. On the ventral side of the last joint there are cushion-like thickenings covered with very fine hairs, very much like those described in *Haemobaphes* sp. by Kabata (1967) (Fig. 7).

The swimming legs are grouped on the ventral side of the *prosoma*. The first two pairs are situated very close to each other at the border-line between the cephalic part and the first thoracic segment. Pairs III and IV are placed respectively on the second and third thoracic segment. The first two pairs are biramous and the further two pairs have only the exopodite. The protopodites of all the pairs are 2-jointed. The legs of each pair are joined together by the coxal plate. Both the exo- and endopodites of all pairs are 2-jointed (Figs. 10–13). The armature of legs is presented in Table 1.

A comparison of the structure of limbs of *H. disphaerocephalus* with that of other species shows a close analogy with *H. diceraus* (own material), *H. cyclopterina* (Gooding and Humes, 1963), *H. ambiguus* (Delamare Deboutteville et Nunes-Ruivo, 1955) and *Haemobaphes* sp. (Kabata, 1967). There are no detailed data concerning the remaining species.

DISCUSSION

The genus *Haemobaphes* Steenstrup et Lütken, 1861 contains five species described up to now: *H. cyclopterina* (type species), *H. ambiguus*, *H. diceraus*, *H. enodis* and *H. intermedius*. Lists of hosts and authors and the geographical distribution are given in Table 2.

H. disphaerocephalus is therefore the sixth species described. All these species have appendages of the structure typical of the genus, without any features specific to particular species. Thus the determination of species is based on the general structure of the body of the adult female (in most cases males are not known).

According to Delamare Deboutteville and Nunes-Ruivo (1955), the taxonomic characters are the presence and number of swellings on the genital segment and abdomen and the number and shape of processes on the "neck", whereas in Kabata's (1967) opinion, the specific differences can be seen, above all, in the structure of the cephalic part (*cephalosoma*) and lateral processes of the neck.

Some characters of the species under study bring it close to *H. diceraus* and *H. enodis*. Like *H. diceraus*, it has a very long and thin neck, considerably exceeding the remaining portion of the body in length, and two cylindrical anchoring processes, which are simple

Table 2

Hosts and distribution of known species
of *Haemobaphes* Steenstrup et Lütken, 1861

Parasite	Host	Record	Authority
<i>H. cycloptera</i> (Fabricius, 1780)	Numerous marine fishes belonging to the orders: <i>Perciformes</i> , <i>Clupeiformes</i> , <i>Gadiformes</i> , and <i>Pleuronectiformes</i> .	Circumpolar distribution	Detailed list of hosts, records and authority is given by Gooding and Humes (1963)
<i>H. ambiguus</i> T. Scott, 1900	<i>Callionymus maculatus</i> Raf. <i>Callionymus belenus</i> Risso.	Solway Firth, Firth of Clyde, Scotland and England. Sète, Banyul-sur-Mer, France.	Scott and Scott (1912) in Yamaguti (1963) Delamare Deboutteville et Nunes-Ruivo (1955)
<i>H. diceraus</i> Wilson, 1917	<i>Chaeturichthys scistiis</i> <i>Cymatogaster aggregata</i> Gibb. <i>Theragra chalcogramma</i> (Pall.)	Hokodate, Japan Nanaimo, B.C., Canada North Pacific	Wilson (1917) Kabata (1967) J. Grabda (in press)
<i>H. disphaerocephalus</i> n. sp.	<i>Thaleichthys pacificus</i> (Richard.)	Pacific, shelf Oregon – Washington	present author
<i>H. enodis</i> Wilson, 1917	<i>Lycodapus fierasfer</i>	California	Wilson (1917)
<i>H. intermedius</i> Kabata, 1967	<i>Oligocottus maculosus</i> Girard <i>Artemius harringtoni</i> (Starks)	Nanaimo Departure Bay Nanaimo and Bowen Is., Georgia Strait.	Wilson (1912) Kabata (1967)

in structure, without ramifications. On the other hand, the species examined differs markedly in its smaller dimensions, the lack of swellings on the genital and postgenital segments and the presence of two spherical swellings on the head from *H. diceraus*, which has two pairs of swellings on the posterior part of body and two anterior head swellings, which give the parasite a "horny" appearance.

In its rather weakly marked sigmoid curve of the posterior part of body and the smooth genital and postgenital segments devoid of swellings *H. disphaerocephalus* resembles *H. enodis*, from which it however differs clearly in the lack of numerous swellings on the head and free thoracic segments.

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HAEMOBAPHES DISPHAEROCEPHALUS SP.N. (COPEPODA: LERNAEOCERIDAE)
Z JAMY SKRZELOWEJ *THALEICHTHYS PACIFICUS* (RICHARDSON, 1836) (OSMERIDAE)

Streszczenie

Opisano nowy gatunek pasożytniczego widłonoga *Haemobaphes disphaerocephalus* sp. n. z rodziny *Lernaecoceridae*. Trzy egzemplarze tego gatunku znaleziono w jamie skrzelowej pacyficznych ryb *Thaleichthys pacificus* (Rich.), odłowionych na szelfie Oregon-Washington. Ekstensywność inwazji wynosiła 1,4% badanych ryb.

Przeprowadzono analizę morfologiczną znalezionych okazów i stwierdzono, że budowa przydatków ciała nie odgrywa roli w taksonomii gatunków z rodzaju *Haemobaphes*. Natomiast jako cechy specyficzne, wyróżniające nowy gatunek, przyjęto obecność dwu kulistych wypukłości po bokach głowy (stąd nazwa gatunkowa "*disphaerocephalus*") oraz brak wzgórków na segmencie płciowym i postgenitalnym pasożyta.

Я. Грабда

HAEMOBAPHES DISPHAEROCEPHALUS SP.N. (COPEPODA: LERNAEOCERIDAE)
ИЗ ЖАБЕРНОЙ ПОЛОСТИ *THALEICHTHYS PACIFICUS*
(РИЧАРДСОН, 1836) (OSMERIDAE)

Резюме

Описан новый вид паразитирующего веслоногого рачка *Haemobaphes disphaerocephalus* sp. n. из семейства *Lernaecoceridae*. Три экземпляра этого вида

были обнаружены в жаберной полости тихоокеанской рыбы *Thaleichthys pacificus* (Ричардсон), выловленной в районе шельфа Орегон-Вашингтон. Экстенсивность инвазии составляла 1,4% исследуемой рыбы.

Проведен морфологический анализ обнаруженных экземпляров и установлено, что строение придатков тела не играет какой-либо значительной роли в таксономии видов из рода *Наемобарфес*. За специфические признаки, характеризующие этот вид, было принято наличие двух шаровидных бугров по бокам головы (отсюда название вида "*disphaerоcephalus*") и отсутствие бугров на половом и постгенетальном сегменте паразита.

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