

Some aspects of branchial parasitism in *Leuciscus cephalus* (Teleostei, Cyprinidae): first record of *Lamproglena compacta* (Cyclopoida, Lernaeidae) in Romania

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Abstract. The present paper records for the first time the presence of the crustacean copepod *Lamproglena compacta* in the branchial microhabitat of the cyprinid species *Leuciscus cephalus* that belongs to a lotic Romanian ecosystem. Also, we discuss the affinity for fixing site on gill filaments, the observations being sustained by the *t* Student statistic test.

Key Words: branchial microhabitat, spatial distribution, *Leuciscus cephalus*, *Lamproglena compacta*, first mention.

Résumé. Dans ce travail, on signale pour la première fois la présence du crustacé copépode *Lamproglena compacta* dans le microhabitat branchial du cyprinide *Leuciscus cephalus*, provenu d'un écosystème de type lotique roumain. On parle aussi de l'affinité de fixation de ces parasites sur les filaments branchiaux des hôtes, les observations étant soutenues par l'application du test statistique *t* Student.

Mots clés: microhabitat branchial, répartition spatiale, *Leuciscus cephalus*, *Lamproglena compacta*, première mention.

Rezumat. Lucrarea de față semnalează pentru prima dată prezența crustaceului copepod *Lamproglena compacta* în microhabitatul branhiial al cyprinidului *Leuciscus cephalus* provenit dintr-un ecosistem de tip lotic românesc. De asemenea, este discutată afinitatea de fixare a acestor paraziți de filamentele branhiiale ale gazdelor, observațiile fiind susținute prin aplicarea testului statistic *t* Student.

Cuvinte cheie: microhabitat branhiial, distribuție spațială, *Leuciscus cephalus*, *Lamproglena compacta*, prima menționare.

Introduction. The genus *Lamproglena*, comprising over 40 species, parasitize freshwater cyprinids, but can also occur in *Esox lucius* Linnaeus. In literature, this crustacean has been identified in Asia, Africa and Europe (Gussev 1987; Pazooki et al 2007; Stavrescu-Bedivan et al 2008).

We have scant information about *Lamproglena compacta* Markewitsch, 1936; Gussev's key to freshwater fish copepod parasites (1987), edited in Russian, offers poor zoogeographic information: "[..] it occurs on the gills of rudd and Aral barbell, Samarkand crap, Turkestan bream, in Aral and Caspian Sea Basins".

For the host *Leuciscus cephalus* (Pisces, Osteichthyes) from Romanian ecosystems, only the monogenean species such as *Dactylogyrus cornu* and *D. vranoviensis* have been recorded until now (Aioanei 1999).

Since Angelescu (1974), who found *Lamproglena pulchella* in a single *Chondrostoma nasus* specimen from the Iron Gates reservoir, no other species belonging to this copepod genus has been reported from Romanian fauna until now.

Materials and Method. In November 2006, 43 chub specimens (*Leuciscus cephalus*) were sampled by electrofishing from the Someș Basin (near Ilva Mică locality). After

capture, fish were placed into 5% formaldehyde and transported to the laboratory for analysis. With the aid of a binocular microscope, we collected from the branchial gills 89 adult copepods belonging to *Lamproglena compacta*. The parasite species was determined with a phase contrast microscope, as described in Gussev (1987). Measurements and photographs were made with a trinocular microscope Novex Holland, as shown in Figures 1-4.

Each branchial arch consists of two hemibranches: external and internal. In order to analyse the spatial distribution of *Lamproglena compacta* specimens at the branchial microhabitat level the branchial arches were numbered from 1 to 4, in an antero-posterior way and divided into three zones: dorsal, median and ventral (see Table 1).

The parasite preferences for the above mentioned sites were noted on topographic worksheets. The conclusions were drawn using the *t* Student statistic test and a soft published online by Kirkman (1996).



Figure 1. *Lamproglena compacta*, general aspect of the body; maxilla, indicated by the arrow (one division= 36μ).



Figure 2. Cephalotorax in adult *Lamproglena compacta*: maxillae (arrow) and maxilliped (square)(one division= 14.4μ).

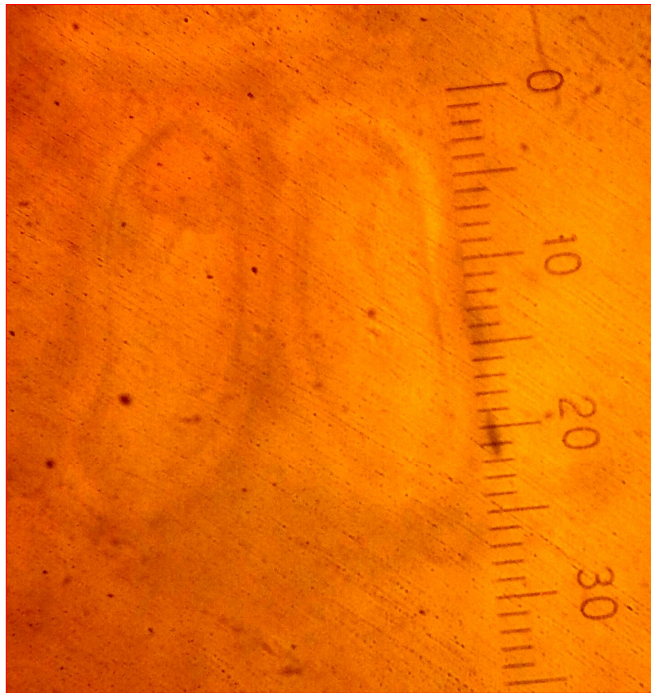


Figure 3. The length of genital openings in adult *L. compacta* (one division=3.6 μ).



Figure 4. Abdomen with the two cerci (square) in adult *L. compacta* (one division=3.6 μ).

Results and Discussion. From the ecological point of view, the aim of this work was to analyse the spatial distribution for the *Lamproglena compacta* specimens at the branchial microhabitat level. From a total of 89 adult copepods collected, 49 were found in the right branchial cavity and 40 in the left one.

By a simple comparison of the mean number of parasites from both cavities, the *t* Student statistic test for unpaired data showed no significant difference between the left and right copepods fixing preferences (as we expected). Thus, we can discuss about an equal global parasite charge in the two host branchial cavities ($p=0.56$, at significance level $\alpha=0.05$).

In order to indicate a possible simmetry of infection with *Lamproglena compacta*, we used the same statistic test, although for paired data in this case. Thus, we compared the parasite number from the two types of hemibranchs (external and internal) from the right branchial cavity and from the left one, on each fish host specimen level. Because the comparison between variables series for each type of hemibranchs showed a non-significant "p" in both cases (0.256 and 0.710), the null hypothesis (the means for the two data sets are not significantly different) was accepted ($\alpha=0.05$).

On the other hand, the data analysis by paired Student's *t* test indicated a significant difference between the two type of hemibranchs ($p=0.000<0.05$). Therefore, we can say that the parasite charge for the internal hemibranch is obviously higher than the external hemibranch charge (see Table 1).

The most numerous adult parasites were found on the: first branchial arch, ventral zone, internal hemibranch (see also Table 1).

Table 1
Spatial distribution of *Lamproglena compacta* on *Leuciscus cephalus* microhabitat level

	A1			A2			A3			A4			Total
	Z1	Z2	Z3	Z1	Z2	Z3	Z1	Z2	Z3	Z1	Z2	Z3	
<i>H.I.</i>	1	2	31	8	3	13	4	2	6	0	5	5	80
<i>H.E.</i>	0	0	2	0	1	4	0	1	1	0	0	0	9
<i>Total</i>	1	2	33	8	4	17	4	3	7	0	5	5	89

H.I.- internal hemibranch; H.E.- external hemibranch; Z1, Z2, Z3 - dorsal, median and ventral zones of branchial arch; A1-A4 -branchial arches.

Conclusions. Most morphological characters described in Gussev's key (1987) are found again in our images, these representing the first photographs made until now on *Lamproglena compacta* Marckewitsch, 1936, a cyprind copepod parasite from the Romanian fauna.

Future research and new correlations with other scientific data from literature could establish detailed conclusions regarding the fixing preferences of this species on a certain host site and about the factors involved.

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Received: 13 November 2008. Accepted: 15 December 2008. Published: 30 December 2008.

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How to cite this article:

Stavrescu-Bedivan M.-M., Aioanei F. T., 2008 Some aspects of branchial parasitism in *Leuciscus cephalus* (Teleostei, Cyprinidae): first record of *Lamproglena compacta* (Cyclopoida, Lernaeidae) in Romania. *AAFL Bioflux* 1(2):111-115.

Printed version: ISSN 1844-8143

Online version: ISSN 1844-9166 available at: <http://www.bioflux.com.ro/docs/vol1/2008.2.111-115.pdf>

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