ECTOPARASITIC THERMOPHILOUS CRUSTACEAN AT FISH SPECIES FROM PREAJBA VALLEY RESERVOIRS (DOLJ, ROMANIA)

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Abstract. Argulosis is the most frequent parasitic diseases, specific to many freshwater fish species in the world. Argulidae family with *Argulus* genus comprises about 150 currently known species, which parasitize fish gills and skin. At the same time, they are hematophagous crustaceans having the body well adapted for the parasitic life. This study is based on the material collected from sporadic seasonal fishing conducted in the ten reservoirs located along the Preajba River, from the spring to the autumn of 2009.

Keywords: *Argulus foliaceus*, *Perca fluviatilis*, *Cyprinus carpio*, lakes, the Preajba Valley, Romania.

Rezumat. Crustaceu termofil ectoparazit la specii de peşti din lacurile de pe Valea Preajba (Dolj, România). Arguloza este cea mai frecventă crustaceoză, comună multor specii de peşti de apă dulce de pe glob. Familia Argulidae cu genul *Argulus* cuprinde aproximativ 150 de specii cunoscute în prezent, parazitând atât tegumentul cât şi branhiile peştilor. Totodată acestea sunt crustacee hematofage, având corpul bine adaptat la viaţa parazitară. Prezentul studiu se bazează pe colectarea materialului piscicol prin pescuiri sezoniere sporadice din cele zece lacuri de baraj situate de-a lungul râului Valea Preajba, în intervalul primăvară-toamnă 2009.

Cuvinte cheie: *Argulus foliaceus*, *Perca fluviatilis*, *Cyprinus carpio*, lacuri, Valea Preajba, România.

INTRODUCTION

The lacustrine complex Preajba-Făcăi is located in Dolj County, 6 km southeast of Craiova, in Preajba and Făcăi settlements. Designated a natural protected area of national interest (according to Law 5/2000, Government Decision no. 57/2007, Law no. 49/2011), it is located on the Preajba Valley and the Ciliboaica Valley, covering a total surface of 28 ha (Figs. 1, 2). The Preajba River represents the main water stream the springs of which are in the neighbourhood of Cârcea settlement. The river receives Craiovița canal 1,200 metres before the confluence with the Jiu River and succeeds to cross the left-side terraces of the Jiu on an east-west direction (Fig. 1).

Figure 1. Location of the reservoirs located along the Preajba Valley (original).

By sporadic seasonal fishing in the ten reservoirs located along the Preajba Valley River, from the spring to the autumn of 2009, there were sampled and examined 42 specimens of fish representing 10 species; the parasite was identified only at two of them. Popularly called "fish louse", the crustacean is hematophagous with a body well-adapted to parasitic life. It is gray-greenish, with a length of up to 7 mm, consisting of a convex dorsal cephalothorax, slightly concave ventrally, posteriorly covered by a shell and short abdomen divided into two lobes ending with a fork which, together with the segments V, VI, form the caudal fin.

Figure 2. Numbering of the reservoirs located along the Preajba Valley
(GIS processing after the orthophotoplan, 1:5,000, 2009) (original).

MATERIAL AND METHODS

The collecting of the fish material was achieved by sporadic seasonal fishing, from the spring to the autumn of 2009, in the ten small reservoirs located along the Preajba Valley River (GOGA, 2012; GOGA & CODREANU BĂLCESCU, 2011, 2013; GOGA & TÎMBURESCU, 2011, 2012, 2013, 2015; GOGA et al., 2015; IONUŞ et al., 2014). Using three monofilament nets with a length of 100 m and a mesh size between 4.5 and 6 cm, they were collected 42 fish that were transported in a plastic container to the parasitology laboratory of the Sanitary Veterinary Directorate Dolj. The fish were examined microscopically (objective 2x, 20x, 10x/22) and stereomicroscopically (obiective 3,2x) aiming at identifying any pathological formations. By removing the parasites from the skin and gill with a glass slide, there were made native preparations that were examined with the optical microscope. By successive washings of the infested areas with distilled water, the crustaceans were collected in a Petri dish and visualized under the stereomicroscope through transparency. Parasites were photographed and preserved in formaldehyde 4%.

RESULTS AND DISCUSSIONS

According to the achieved research, it was reported only one species of the genus *Argulus*, namely *A. foliaceus*. Of the 42 analysed fish specimens belonging to 10 species, parasites were identified only in case of two species, namely: *Perca fluviatilis* and *Cyprinus carpio*, sampled in summer and autumn; the etiologic agent was the crustacean *Argulus foliaceus*. At the time of sampling, fish did not show any signs of disease nor mortality. An adult specimen was accidentally identified in the water sample used to transport the fish to the laboratory, but also on the body surface, where injuries caused by the buccal apparatus appeared as small necrotic ulcerations. The action of the parasite on the host consists in injuries of the gill epithelium and destruction of the mucus present on the surface of the skin. Mature adult females leave the host fish depositing the eggs protected by a gelatinous layer on macrophytic vegetation in water or on hard substrates (in our case, the walls of the surface weirs). On a Petri dish, in distilled water (Fig. 3), the crustacean was examined by an Olympus stereomicroscope through transparency with the objectives 2x, 3.2x; 10X/ 22 Eyepiece WHSZ, and by the optical microscope Olympus BX 43, as a fresh slide preparation with the objectives 2x, 10x; 10x / 22 Eyepiece WHN, depending on the size of the sample. There were analysed the characteristics of the abdominal lobes (degree of division and their appearance). The parasite was observed both ventrally and dorsally, mainly the abdominal lobes for determining the species; in this case, the lobes are rounded and less divided, which led to the identification of the aforementioned species (Figs. 4-9). The specialized literature mentions the water temperature and pH as influence factors in the development of the parasite. As a thermophilous species, water samples were collected and measured at the point of collection. At a water temperature of 28°C and a maximum pH 8, the crustacean develops quite rapidly, but, in case temperature decreases below 16°C, both adults and larvae slow down their metamorphosis (YILDIZI & KUMANTAS, 2002). Over time, the water qualitative aspects were influenced by the poor management of the maintenance works related to colmatage and limitation of the expansion of macrophyte vegetation. Most often the primary factor in the transmission of diseases from sick to healthy but highly sensitive fish is represented by water and the substrate of these reservoirs, where parasites find adequate conditions of conservation and optimum climate for propagation. However, we can say that water plays a very important role as the primary source of infection and the poor reporting of these parasites in lakes was due to the lack of organized sports fishing, replaced by recreational fishing, practiced sporadically in the recent years.

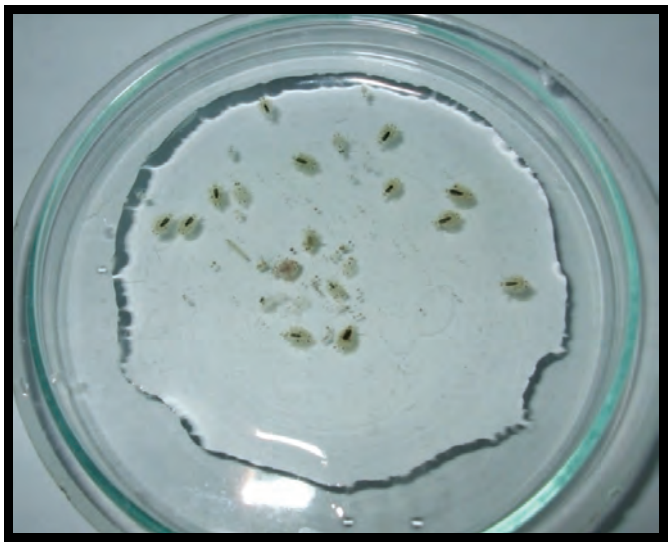

Figure 3. Sample with *A. foliaceus* (original).

Figure 4. *Argulus foliaceus* – ventral image (original).

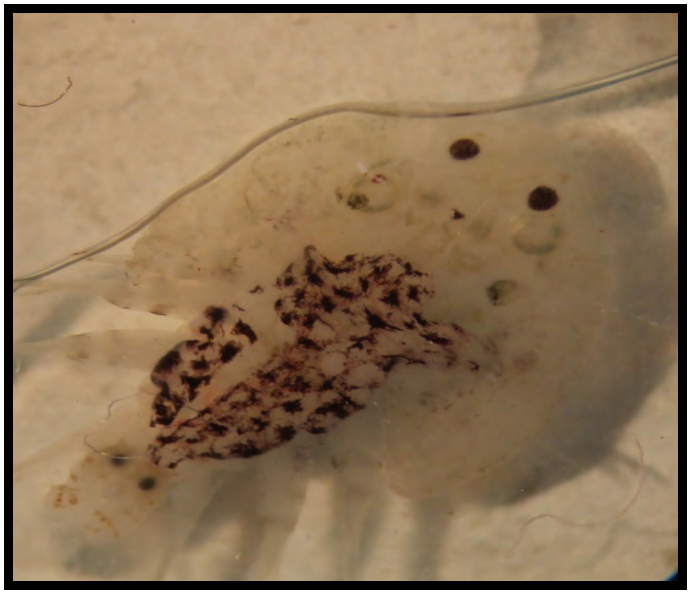

Figure 5. *Argulus foliaceus* - dorsal image (original).

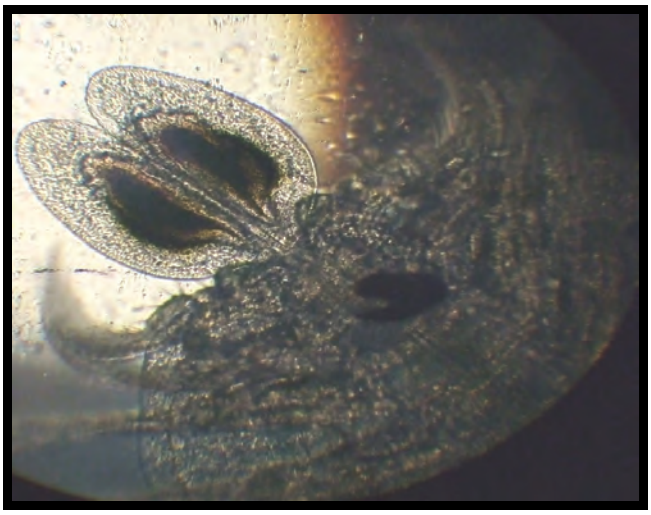

Figure 6. Oval abdominal lobes slightly rounded (original).

Figure 7. Imagine obtained after examining the ventral side of the crustacean (original).

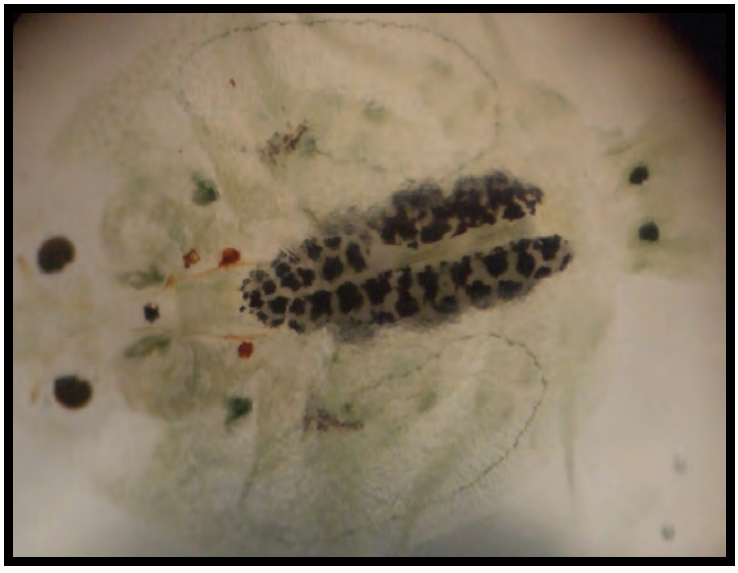

Figure 8. Imagine obtained after examining the dorsal side of the parasite (original).

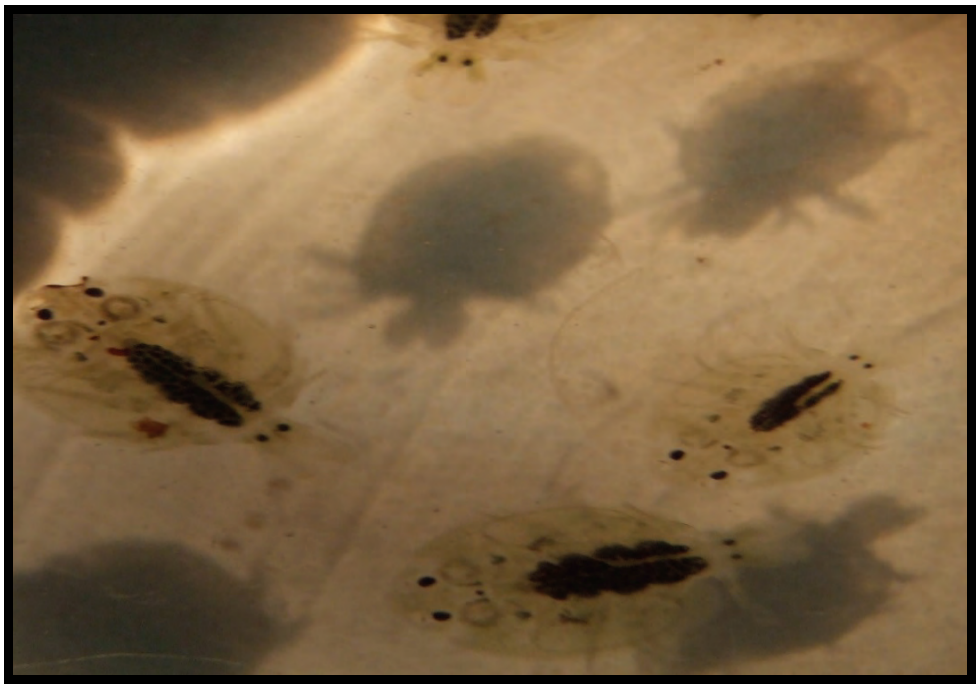

Figure 9. Imagine obtained from the stereomicroscope (original).

Being a common parasite of freshwater fish, it has been reported in the Danube Delta at Mila 23 at species such as *Rutilus rutilus* (roach), *Aspius aspius* (asp), *Tinca tinca* (tench), *Abramis brama* (bream), *Cyprinus carpio* (carp), *Esox lucius* (pike), *Perca fluviatilis* (perch) and *Lepomis gibbosus* (pumpkinseed), at *Scardinius erythrophthalmus* (rudd) at Greaca, and at Călăraşi, 1-3 specimens per host, at the species: *Leuciscus idus* (ide), *Silurus glanis* (Wels catfish) and *Sander lucioperca* (zander) (MUNTEANU & BOGATU, 2008). With a wide range of distribution, *A. foliaceus* Linnaeus, 1758 is a parasite that is found in many species of fish from different families. The parasite was mentioned for the first time in Romania by Borcea in 1915, at *Silurus glanis*, *Esox lucius*, *Cyprinus carpio*, *Abramis brama* and *Perca fluviatilis*; in 1937, Dumitriu mentioned it at *Esox lucius*, *Tinca tinca* and *Carassius gibelio*; in 1948, I. Rădulescu mentioned it at *Carassius gibelio*, *C. carpio* and *Gasterosteus aculeatus aculeatus* (ROMAN, 1955). In Banat hydrography, COJOCARU (2006) identified two species of *Argulus*: *A. foliaceus* and *A. coregoni* at *Cyprinus carpio* and *Alburnus alburnus*; the species *A. coregoni* has never been reported in Romania before this date. Even if this parasitosis evolved subclinically, without causing mortality, there were proposed prevention and treatment measures, such as installing wooden panels in water for the parasite to lay eggs; according to the specialized literature, Trichlorfon treatment at a dose of 1 g / 6 m^3 of water can be used to fight against the parasite.

CONCLUSIONS

- The macroscopic and microscopic examinations led to the identification of the crustacean *Argulus foliaceus* L, 1758 at *Perca fluviatilis* L, 1758 and *Cyprinus carpio* L. 1758.
- In terms of location, ectoparasites have a high intensity of more than twenty individuals per host fish, with localization at the level of the caudal peduncle, eyes and fins.
- The development of the parasites was favoured by different factors, such as water quality and temperature, but also by the receptivity of fish that suffered skin lesions and lost their scales after capture and release of small unimportant fish.
- To prevent egg deposition, it is recommended to remove the submerged vegetation from the substrate or introduce wood beams as artificial substrate for deposition or to completely drain the basins and let them get dry for 24 hours to destroy eggs, larvae and adults.
- Another measure to fight against this parasitosis is the removal of dead fish from lakes and increase of the water levels to lower temperature and stop the evolution of the parasite.
- Besides preventive measures, in order to control this parasitosis, it is also recommended to avoid populating these basins with infected fish and to regularly drain them to prevent the development of new parasites.

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