Identification of copepod Lamproglena monodi parasite of Tilapia (Oreochromis niloticus) in the Senegal River Mauritania

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Abstract: Infectious diseases of fish are generally classified into three categories: parasitic, bacterial and viral or fungal; Copepods are parasites that cause very serious damage to fish farms in fish farming. The objective of this study is the identification of copepods infesting Tilapia fish in extensive culture in the experimental fish station of the Higher Institute of Technology Education (ISET) in Mauritania. Crustaceans were collected from the gills of tilapia (Oreochromis niloticus Linnaeus, 1758). It is a species of fish introduced in Mauritania, raised in an extensive breeding system. Mauritanian specimens had the same morphology as the species identified in Congo-Kinshasa (1944) and Egypt (2000). The copepod Lamproglena monodi Capart, 1944, parasitizing freshwater fish in Mauritania, was originally described as a parasite of several Cichlids in Africa; it is presented as a new copepod species parasitic fish in this region.

Keywords: Copepods; Lamproglena monodi; Tilapia; Aquaculture; Mauritania

1. Introduction

Fish consumption is becoming more and more important on a global scale, and because of this, fish farming is developing better and better in the world. Native to Africa, Tilapia, a fish that lives in fresh waters, which is also inhabiting in the basins of Niger, Volta and Senegal, Congo, is of great economic importance to these regions.

Parasites have a negative impact on farm yields and fish quality, thus to offer consumers farmed fish free of parasites is a real challenge. While the introduction of non-indigenous species into ecosystems can influence organic communities by altering species diversity[1]. Copepods are a common component of assemblages of ectoparasites of all kinds of fish, all environments and ecosystems[2].

In Mauritania, parasitic copepods are not well studied despite the fact that it represents a very serious damage according to the number of copepods collected during this study in Oreochromis niloticus, Linnaeus, 1758.

Lamproglena monodi has been described in the Democratic Republic of Congo as a parasite of the gills of Serranochromis thumbergi, Haplochromis macrops, Haplochromis eduardii, H. Moffati, of H. Serridenset of H. Fasciatus[3].

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This species has been described as a parasite of the gills of *Oreochromis* niloticus, *Sarotherodon* galilaeus and *Tilapia* zilli in Egypt[6].

Capart (1944) used the following diagnostic features to describe *L. monodi*: elongated body, longer than wide abdomen, Uniramous antenna, trisegmented, very broad and ornate basal segment, sturdy and truncated maxillary, sharp and curved claw, four pairs of legs biramous and a fifth pair of smaller and apparently atrophied legs, three segment abdomen poorly distinguished rami and forked caudal. Recently, this species has been described again by Ibraheem and Izawa.

2. Area, Materials and Methods

This study was carried out between December 2017 and December 2018, on 1000 specimens of Tilapia fish (*Oreochromis* niloticus) (44.4% males and 55.6% females).

The fish are caught in the experimental fish farm of the the Higher Institute of Technology Education (ISET), which is located on the banks of the Senegal River in the town of Rosso in the Trarza wilaya of southern Mauritania. It is located between latitude 16° 34'18.038''N and longitude 15° 48'36.906 'W (Figure 1). The climate in Rosso is desert. The average temperature is 27.7 °C. The average annual rainfall is 224 mm.

![Figure 1. Location of the study area, Rosso fish station.](image)

Just after capture, the fish were returned to the laboratory in a cooler to prevent spoilage and migration of the parasites. In the laboratory, the weight and size of the fish were measured and recorded both on a data sheet and the surface of fish. The body, the oral cavity, the nostrils, the branchial cavity, as well as any cavity capable of harboring parasites and communicating with the outside were well examined. The gills were taken, placed in petri dishes, numbered from left to right, and examined carefully; the copepods were fixed and stored in 70% alcohol for further study. For examination of morphology and anatomy, the copepods were examined under the light microscope and the binocular loupe[5].

The identification of parasites is done on the generic level by resting on morpho-anatomical criteria and on the level of the species based on morpho-anatomical and biometric criteria[6]. We calculated the prevalence (P%), mean parasite intensity (MPI), and mean abundance (Abm) of this parasite at this site, as defined by[7].

3. Results and discussion

The 2660 specimens of the copepods, collected on the gills of *Tilapia* (*Oreochromis* niloticus, Linnaeus, 1758) in Mauritania, Fish Stations of the ISET of Rosso-Mauritania in the wilaya of Trarza along the Senegal River, have the following epidemiological indices:
Table 1. Epidemiological Indices.

<table>
<thead>
<tr>
<th>Parasite</th>
<th>P %</th>
<th>IPM</th>
<th>Ahm</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>L. monodi</em></td>
<td>59.2%</td>
<td>4.49</td>
<td>2.66</td>
</tr>
</tbody>
</table>

Our results are consistent with those reported by Paperna[8] (the prevalence of *L. monodi* infestation ranges from 50 to 95% and the mean number of parasites per fish between 2 and 9. In our study, the abundance is 2.66 parasites per fish).

Morphological, anatomical and biometric criteria are presented in the following section.

4. Description

On the morphological and anatomical level, we compared our results with those found and already mentioned by Abdel-gaber and al. 2017 in Egypt[9] and by Capart (1944)[3]. Elongated body, with tri-segmented abdomen (Figures 2-3). Cephalothorax not broad, flat dorsal surface, ventral surface with two rounded lobes (Figures 4-5). The presence of a genital somite, separated from the body by a constriction. Orifices of oviducts inclined laterally (Figure 6-7).

The eggs are in single sequence, extending over twice the length of the abdomen, containing a sequence of 25 to 30 eggs (Figure 6).

Forked caudal ramus, fused with the abdomen; conical inner branch (D), and pointed outer branch (C) and longer than the inner branch (Figure 8).

Uniramous antenna, with three segments; segment of a broad base, segment gradually smaller, distal segment. Uniramous antennule, with two segments; segment of a very broad base and rounded distal segment (A).

Oral region on the anterior quarter of the cephalothorax. Robust, truncated maxillary ending in a sharp, curved claw (B). Maxilliped bisegmented of a very broad base with second segment turned towards the interior (E); Hexapods larger than endopods (Figure 4).

![Figure 2. Lamproglena monodi face dorsale](image1)

![Figure 3. Lamproglena monodi face ventrale](image2)

![Figure 4. Le céphalothoracique](image3)

A: segment distal arrondi B: griffe acérée et incurvée E: segment tourné

![Figure 5. Vue de dessous de la tête](image4)
In order to complete our study and meet the level of the species in the identification, we made measurements of some organs characteristic of the species.

The body is divided into three parts (cephalothorax, thorax and abdomen) and is approximately 3.3 mm long without sac of eggs, which is in the range mentioned by Abdel-gaber and al. 2017\(^9\) (body lying between 2.8-3.5). The cephalothorax occupies about 20% of the total body length and measures 0.8 mm in width in agreement with the results of Boungou and al. 2013 (0.6-0.9)\(^7\). The flat dorsal surface and ventral side are very small appendages that measure between 0.3 and 0.7 mm and end with hooks. The abdomen was characterized by segments, occupying 36% of the total body length, measuring 1.5 mm (1.4 - 1.6) and 0.6 mm (0.5 - 0.7) width.

This parasite has been reported in Africa: in the Nile system including Lake Victoria, Niger, Congo, Volta, and Zambezi\(^8\); in fish introduced in Brasil\(^10\).

5. Conclusion

In this work, the morphological, anatomical and biometric criteria of Tilapia parasitic copepods in Mauritania are very similar to those of *Lamproglena monodi* found in other parts of the world. However, the study confirmed the pathogenic capacity of the *L. monodi* parasite infecting Nile tilapia (*Oreochromis niloticus* Linnaeus, 1758) in Mauritania in the ISET fish lakes, which can lead to significant economic losses during the production process. Therefore, it is necessary to monitor the health status of fish in fish farms where stand and intimate contact of hosts actively promotes parasite dissemination and facilitates the invasion of secondary bacterial agents.

References


