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Histopathological alterations and condition factor deterioration accompanied by isopod infestation in *Tilapia zilli*, *Mugil capito* and *Solea aegyptiaca* from Lake Qaroun

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ABSTRACT

This study was carried out to identify isopod species implicated in the outbreak that had affected commercially important fishes of Lake Qaroun. The study also aims to determine its deleterious effects on infested fish and its possible role in the severe drop in lake fisheries production. *Renocila thresherorum* (Crustacea: Isopoda: Cymothoidae) was the only isopod species isolated from the fishes in the lake. The overall prevalence was 38% as 37.14, 25.7 and 53.3% of the examined *Tilapia zilli* (Gervais, 1848), *Mugil capito* (Cuvier, 1829) and *Solea aegyptiaca* (Chabanaud, 1927), respectively, they were found to be infested; while the recorded intensity was 1.23 for *T. zilli* and 1 for both *M. capito* and *S. aegyptiaca*. The main clinical sign noticed was a unilateral or bilateral bulged operculum, with the presence of a large sized isopod female which reached up to 23 mm in length in gill chamber, pale atrophied and eroded gill filament. The condition factor of infested fish significantly decreased in comparison with that of non-infested fish. Various degrees of degenerative pathological lesions including destruction, detachment, hyperplasia and fusion of the primary and secondary gill lamellae were observed in infested fish gills. The current research proved the deleterious effect of *R. thresherorum* on Lake Qaroun fishes based on clinical finding, condition factor calculation and histopathological examination.

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Introduction

Isopods are dorsoventrally compressed parasitic crustaceans that infest a wide range of marine and freshwater fishes and invertebrates (Bruce, 2004; Ravichandran et al., 2010). The term isopod is derived from the great similarity between their legs (iso means identical or similar and pods means legs). Out of 95 isopod families, constituting of more than 5700 different species, about 450 species are associated with fish infestation (Williams and Bunkley-Williams, 1996; Smit et al., 2014). Cymothoidae is a large isopod family that has 40 genera and about 380 species (Ahyong et al., 2011); they are obligate parasites that affect a wide variety of fish species. Isopods infestation is a direct cause of huge economic losses in commercially important fish species including body weight loss, direct mortality, particularly in small fish, and loss of fecundity (Rajkumar et al. 2005; Youssef et al. 2014; Chinabut, 2002; Praveenraj et al., 2017; Kumar et al., 2012).

Lake Qaroun is an enclosed inland lake located in Fayoum governorate, Egypt, it occupies about 23,000 ha. The Lake's salinity ranges between 30 and 40 ‰ in winter and 38–42‰ in summer season (Azab et al., 2015; Abdelaziz et al., 2017). Lake fisheries' production severely dropped from 4518 ton in 2014 to 1124 ton in 2015 (GAFRD, 2016 & GAFRD (2017)); this huge negative change was attributed to isopod invasion of affecting commercially important fish, including *Tilapia zilli*, *Mugil capito*, *Solea aegyptiaca* and *Dicentrarchus labrax*.

The present study aims to identify the parasitic isopods infesting Lake Qaroun fishes and to determine their role in disease pathology and their effects on fish health status represented in condition factor.

Materials and methods

Study area: fish samples were collected from Lake Qaroun located in Fayoum governorate, central Egypt. The lake lies between latitudes 30°41'–30°82' east and longitudes 29°44' – 29°51' north.

Fish specimens: A total number of 100 fish were collected alive as a sample [35 *Tilapia zilli* (family: Cichlidae), 35 *Mugil capito*

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(family: Mugilidae) and 30 *Solea aegyptiaca* (family: Soleidae)]. Samples were collected during May 2015 by gill nets and trawling (mesh size of used net was 22 mm from knot to knot). After that they were transported immediately to fish diseases lab, Shakshuk station, National Institute of Oceanography and Fishery (NIOF).

Collected specimens ranged between 10 and 18, 14.5–16 and 14–17 cm in total length, 8.3–10.1, 29.7–35.3 and 29–37 g in weight for *T. zilli*, *M. capito* and *S. aegyptiaca*, respectively Table 1.

Clinical examination: was performed as described by Noga (2010) for the determination of any external abnormalities on infested fish.

Condition factor (K): Ten infested and 10 non-infested fish from each species (except *M. capito* 9 infest fish) were used for condition factor calculation using the following formula: $K = 100 W/L^3$ (Sutton et al., 2000), in which W is fish weight in grams and L is fish total length in centimeter.

Parasitological examination: isopod samples were recovered from the branchial cavity of infested fish then fixed in AFA (alcohol formalin acetic acid) as described by Woodland, (2006). Fixed isopods were measured and classified based on their morphological features as recorded by Williams and Williams (1980), Brusca (1981) and Bruce (2004).

Table 1

Body weight and total length of non-infested and *Renocila thresherorum* infested fish.

Fish species	Item	Non-Infested	Infested	No. of Samples
<i>Tilapia zilli</i>	Weight	12.95 ± 2.12	14.68 ± 2.55	10
	Length	9.16 ± 0.61	9.26 ± 0.6	10
<i>Mugil capito</i>	Weight	32.39 ± 2.17	31.67 ± 2.14	9
	Length	15.37 ± 0.62	14.47 ± 0.9	9
<i>Solea aegyptiaca</i>	Weight	34.07 ± 2.49	31.71 ± 2.43	10
	Length	15.35 ± 0.74	16.64 ± 0.97	10

Values are mean ± standard deviation



Fig. 1. (a) *Tilapia zilli* infested with *Renocila thresherorum* (white arrow) with unilateral bulged operculum. (b) *T. zilli* with bilateral bulged operculum (infestation of both gill chambers). (c) *T. zilli* with marked gill cover erosions (arrow) and shortening of some primary gill lamellae (star). (d) *Solea aegyptiaca* infested with *R. thresherorum* (arrow) in dorsal gill chamber. (e) *Mugil capito* showing necrosis in primary gill lamellae (arrow) with presence of large *R. thresherorum* female in branchial chamber. (f) *M. capito* infested with *R. thresherorum* male (arrow) in branchial chamber.

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