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Original article

Description of the Parasitic Nematodes (*Contracaecum multipapillatum*) that Infect the Intestines of (*Mullus Surmuletus*) Fish in the Marine Waters of Sirte-Libya

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Abstract
Fish are an important food source for humans and are rich in protein, vitamins, and minerals, a number of research studies indicate that a number of parasitic injuries, including nematodes, have been recorded in different species of fish. This study aims to extract and describe the parasitic nematode *Contracaecum multipapillatum*, which infects *Mullus surmuletus*. In this study, (60) samples of *Mullus surmuletus* fish were collected from the seashore of the city of Sirte, located in northern Libya and on the coast of the Mediterranean Sea, 400 km east of the capital, Tripoli. The fish were collected from April to June 2022. The fish collected in the samples were transported to the Zoology Laboratory –Science Faculty –Sirte University. The fish samples were examined with the naked eye, then each sample was dissected and examined internally with a magnifying glass, and the digestive system was extracted, distributed, and examined in Petri dishes. The parasitic worms were extracted with a fine brush, described, and the male and female species were identified. The number of infected fish was also recorded. In this study, it was found that (15) *Mullus surmuletus* fish out of (60) fish were infected with nematodes *Contracaecum multipapillatum* extracted from the intestine of *Mullus surmuletus* fish.
Keywords. *Contracaecum multipapillatum, Fish nematode,* Gubernaculum*, Mullus surmuletus.*

Introduction

Fish meat has high nutritional value for humans, as it is an important source of protein. Fish is also economically important for countries [1]. Fish has a high nutritional value and is very important for human health. It contains a high percentage of proteins, vitamins, and minerals that are important for humans [2]. Parasites are important in the ecosystem as well as in explaining the environmental trends of their hosts, and they also indicate the health of the host and its environment [3]. Fish parasites play an important role in identifying the locations of fish, their behavior, migration, and life cycles, as well as the environment of the place contaminated with parasites. Fish are considered an important host for many parasites [4]. Fish parasites harm the fish stocks of countries. Attention has also been paid to parasitic infections in humans and animals, of which fish are a major cause [5].

Crustaceans are intermediate hosts for many parasites, and crustaceans are an important food source for many fish. Therefore, fish become infected with parasites when they feed on crustaceans, especially when the number of crustaceans increases [6]. Nematode parasites are among the most common parasites of fish. Knowing and describing them plays an important role in combating them, especially in the field of fish farming [7]. Zoonotic nematodes have a significant negative impact on host health and are a concern for many countries [8]. Nematodes are internal parasites that infect many living organisms, including marine mammals and seabirds.

Fish are infected with many species of nematodes, and there are four main species of nematode parasites: *Anisakis*, *Pseudoterranova*, *Contracaecum,* and *Hysterothylacium* [9]. Humans are hosts to many zoonotic nematodes that negatively impact human health through disease or allergic response [10]. This study aims to determine the extent of contamination of the fish (*Mullus surmuletus*) with the parasite (*Contracaecum multipapillatum*) in the marine waters of Sirte, Libya, as well as to isolate and describe this parasite.

Methods

Several 60 samples of *Mullus surpentulus* fish were collected from the seashore of the city of Sirte- Libya, which is located 400 Km east of the capital, Tripoli, during the period from April to June 2022. These fish are called red mullet, and they live near the sandy or muddy bottom covered with grass up to a depth of 100 M. They feed on benthic animals such as crustaceans, polychaetes, molluscs, and fish. They reproduce during the summer.

Fish are considered benthic fish and are found during the period from April to June 2022. The samples were transferred to the Zoology Laboratory- Faculty of Science – University of Sirte. Various measurements were taken for each sample and recorded, and an external examination was performed for each sample. After that, the dissection process was carried out in the well-known scientific method by starting the dissection from the anus using dissecting scissors and moving the dissection forward and then upward along the nostrils. The sample was then opened, and the internal viscera were removed, separated, and each part was placed in a Petri dish containing a saline solution at a concentration of 5%. Each organ was inserted into a

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Petri dish to extract its contents. It was examined with the naked eye under appropriate lighting as well as under an ordinary light microscope. The nematodes that were seen were taken out with a fine brush and placed on a glass slide, and a drop of lactophenol solution was added to it, and examined under a regular light microscope. Different areas, and with different magnification powers, were taken under a regular light microscope.

Results

Contracaecum multipapillatum was extracted from the intestines of (15) infected fish out of (60) fish that were dissected. *Contracaecum multipapillatum* are brown, thread-like parasitic worm with a circular anterior end and a pointed posterior region. The whole body is surrounded by transverse striation. The mouth is located in the head region, at the anterior end of the body. The mouth is surrounded by three lips, which are a large dorsal lip and two subventral lips (Figure 1). The esophagus is shaped like an inverted S and is divided into two parts. The muscular anterior and glandular posterior, and the glandular esophagus opens into the intestinal caecum. The nerve ring is located in the area of the pharynx connected with the muscular esophagus (Figure 1 and Figure 2). The excretory pore is located at the anterior end, and the anus is located at the posterior end of the worm's body.

The female of Contracaecum multipapillatum

Is larger than the male, it's the tail terminates in a straight part. The Vulva leads to a muscular vagina, which opens into the uterus (Figure 2 and Figure 3).

The male of Contracaecum multipapillatum

The male is shorter than the female and is distinguished by a posterior end that is twisted towards the ventral region of the body. Two spicules called copulatory spicules emerge from the caudal region of the male and emerge from a pouch called the gubernaculum located at the end of the caudal region of the male. There are numerous pairs of pedunculated papillae (preanal papillae, postanal papillae, adanal papillae) (Figure 4).

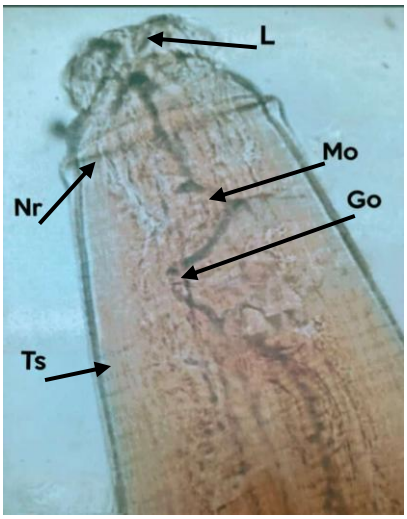

Figure. 1. Anterior region of C.multipapillatum. Mo: Muscular esophagus, Go: Glandular esophagus, L: Lip, Nr: Nerve ring, Ts: Transverse striation.

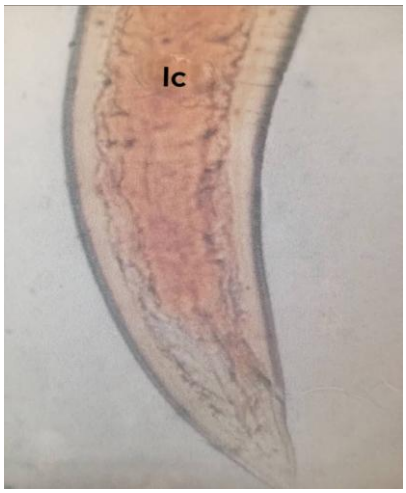

Figure 2. Posterior region of the female of C. multipapillatum. Ic: Intestinal caecum

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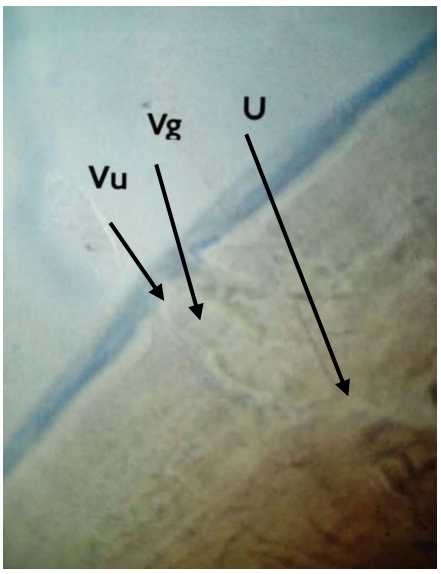

Figure 3. Median region of the female. U Uterus, Vg; Vagina, Vu: Vulva.

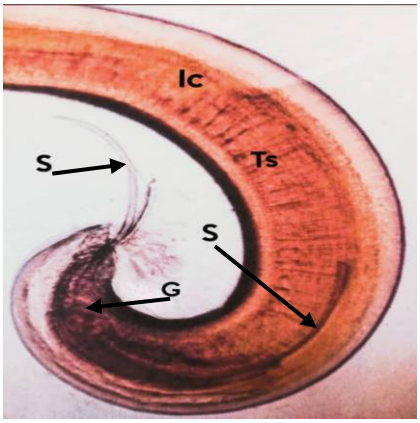

Figure 4. Posterior region of the male of C. multipapillatum. IC: Intestinal caecum, S: Spine, G: Gubernaculum

Discussion

A total of 60 *Mullus surmuletus* fish were collected, and after a laboratory study, 15 of them were found to be infected with *Contracaecum multipapillatum*. The parasitic nematode *C.osculatum* was extracted from the liver of cod fish from the Baltic Sea, and this species of fish is considered a vector host for this parasite, the infection rates of which have increased recently [11]. One *contacaecum* larva was extracted from the abdominal cavity of both fish *Jordan himri* and *Jordan barbell*, and the rest of the fish species examined were negative [1]. In a study on parasites that infect salmon, the results showed that salmon livers were infected with the parasite *C.osculatum* at an infection rate of 13%, after examining 120 samples of these fish [12]. *C.eudolphi* was extracted from all samples of *Phalacrocorax carbo* with an infection rate of 100% represented by the larvae and adult stages of this parasite [13]. The genus *Contracaecum* includes many parasitic species that parasitize many aquatic organisms, such as birds and aquatic mammals that feed on fish. Therefore, these parasitic species belonging to this genus have two hosts in their life cycle [14]. *Contracaecum spp*. Causes intestinal damage to sea lions as this parasite penetrates the host's stomach and causes ulcers and inflammation in the intestines [15]. *C. multipapillatum* was extracted from the intestines of the *Mullus surmuletus* fish. The number of infected fish was 11 out of a total of 50 fish examined [16]. *C.multipapillatum* was extracted from samples of Tilapia and *Clarias gariepinus* in Minia, Egypt. The infection rate of these two fish species was 5% and 20%, respectively [17]. *C. synpapillus* is characterized by its large size and the presence of spicules, and the presence of fused caudal papillae at the cloaca in the male and by the uterine bulb and position of the vulva in the female [18]. *C. multipapillatum* larva penetrates the intestines of fish, then surrounds itself with a coating inside the intestine, grows, and develops [19].

Conclusion

The nematodes were extracted by picking them up with a fine brush, where they were placed on a glass slide with the addition of a drop of Lactophenol was examined under an ordinary light microscope, and the extracted nematode samples were kept in small, tightly closed tubes containing70% ethanol. This study

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aims to determine the extent of contamination of *Mullus surmuletus* fish with parasitic nematodes of the *Contracaecum multipapillatum* in the marine waters of Sirte, Libya. In this study, it was found that (15) *Mullus surmuletus* fish out of (60) fish were infected with nematodes *Contracaecum multipapillatum* extracted from the intestine of *Mullus surmuletus* fish.

Conflict of interest. Nil

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