



SHORT COMMUNICATION

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Occurrence of *Neoechinorhynchus* sp. in Infected Organs of Lizardfish (*Saurida undosquamis*) in Misurata, Libya

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Abstract

The present study provides important insights into the existence and frequency of the *Neoechinorhynchus* sp. in the marine fish species *Saurida undosquamis* in Libya. A total of 192 specimens of *Saurida undosquamis* from the local market of Misurata city in Libya were collected. This extensive collection made possible a thorough investigation of the parasite's presence in this particular fish species. According to the present study, the prevalence rate of acanthocephalan helminths in *Saurida undosquamis* was found to be low. Out of the 192 fish specimens that were examined, only one specimen was found to be infected with *Neoechinorhynchus* sp. with an infection rate of 0.52%. The infected fish had an average parasite density of 4, indicating that there were four individual parasites in the fish. These parasites were found in both the anterior and posterior intestines of the infected fish. The seasonal study also revealed that the infections occurred during the winter season. This study may mark the first instance of the presence of *Neoechinorhynchus* sp. in *Saurida undosquamis* found in the coastal Mediterranean Sea waters of Misurata, Libya. The identification of a previously unknown parasite species in a new host and location significantly enhances our understanding of parasite diversity in the region. The low infection rates observed in *Saurida undosquamis* suggest that this fish species may not be a suitable host for the acanthocephalan *Neoechinorhynchus* sp. Understanding host-parasite interactions and the factors affecting infection rates is essential for comprehending the ecology and dynamics of the parasite. By documenting the presence and characteristics of the *Neoechinorhynchus* sp. parasite in *Saurida undosquamis*, the present study fills a gap in the available scientific literature.

Keywords: Endoparasites; Lizardfish; Prevalence; Acanthocephalan; *Saurida undosquamis*; *Neoechinorhynchus*

Introduction

There are around 1,200 species in the acanthocephala group. These parasites live in the intestines of various vertebrates, except for elasmobranch fishes and are most commonly found in freshwater teleosts. A distinctive feature of acanthocephalans is their large, eversible, armed proboscis which they use to attach themselves to the host's intestinal wall. Like tapeworms, they lack a gut and absorb nutrients from the host's intestine through their body wall. Acanthocephalans have a body cavity that mainly contains their reproductive organs, and are dioecious. They use arthropods as intermediate hosts, with two larval stages occurring within them.

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The second larval stage, called cystacanth, is an encysted resting stage that infects the vertebrate host when the arthropod host is eaten. Some species also have a paratenic host, where no development occurs (Gibson, 2014).

Neoechinorhynchus Hamann, 1892 is a parasite of freshwater and brackish water fish, and freshwater turtles, with around 116 described species distributed worldwide. They are divided into two subgenera: *Neoechinorhynchus* and *Hebesoma* Van Cleave, 1928 (Amin, 2013; Smales, 2013). 49 species have been described from the Americas, with 33 from North America and 16 from Central and South America (Amin, 2002; Barger et al., 2004; Amin and Heckmann 2009; Pinacho-Pinacho et al., 2012, 2014). Traditional methods of identifying species of the genus *Neoechinorhynchus* include the shape of the proboscis, the number and size of hooks, the shape of the proboscis receptacle, and the shape of the anterior region of the trunk. However, some morphological traits can vary, making species differentiation challenging (Pinacho-Pinacho et al., 2015).

Acanthocephalans, known as thorny-headed worms, are a type of parasitic worm. They have a unique appearance, featuring a retractable proboscis armed with hooks that they use to attach to the intestinal walls of their hosts. Specifically, the study focuses on the identification and classification of Acanthocephalan species of *Neoechinorhynchus* found in the Misurata region of Libya. The insights gained from this study provide valuable information about the prevalence and mean intensity of this parasite in fish samples obtained from the local fish market.

Materials and Methods

This study involved the examination of 192 lizardfish, *Saurida undosquamis*, from June 2018 to May 2019. Fish were collected from the local market in Misurata, Libya, where 15 to 20 fish were obtained and transferred in an ice box to the laboratory of the Zoology Department, Faculty of Science. The examination of lizardfish was limited to internal parasites. The fish were dissected, and the whole body cavity, muscles, liver, and digestive system were carefully examined for the presence of helminths. The organs, such as the gills, liver, stomach, anterior intestines, and posterior intestines, were separated using dissecting scissors and forceps. They were placed in Petri dishes containing normal saline, and the fish contents were gently scraped using a scalpel and forceps. The Petri dishes were then thoroughly examined for the presence of nematodes by dissecting them with light microscopes. Acanthocephalans were isolated in sterile containers containing normal saline (Hoffman, 1967).

After collecting the acanthocephalans, they were identified by using a lens. They were then isolated in sterile containers containing normal saline and washed several times with normal saline to remove any attached mucus. The acanthocephalans were placed in lactophenol, and the retention period in lactophenol varied depending on the size of the worm. The major diagnostic features, such as the number and arrangement of hooks on the proboscis, were used to elucidate the structures. It was also necessary to know the host and location of the acanthocephalans. Finally, they were examined under a microscope to ensure that the internal organs were visible, loaded onto the slide using DPX, and labelled with all the details regarding each sample (Rasheed, 1989).

After mounting the worms, they were examined using a microscope (Buffalo, NY, 1420 U.S.A.) at 10X and 40X magnifications and drawn by sketching to facilitate identification and classification. The morphometric measurements of acanthocephalan worms included the anterior and posterior ends of the adults. All the morphological and morphometric features were identified using general keys, as illustrated by Yamaguti (1963).

Results

Based on the morphological and morphometric characteristics of *Neoechinorhynchus* sp., recent publications present diverse opinions regarding the classification and taxonomy of acanthocephalans. Keys were consulted to identify the present acanthocephalan: Phylum: Acanthocephalans, Class: Eoacanthocephala, Order: Neoechinorhynchida, Family:

Neoechinorhynchidae, Genus: *Neoechinorhynchus* (Hamann, 1905). One out of the examined fish was infected with acanthocephalan, *Neoechinorhynchus* sp. which represents only 0.52% of the total specimens. The acanthocephalans are characterized by a small body, measuring 173.79 μm in length, and a smooth tegument. Figure A1 and A2 illustrate the small body of a male *Neoechinorhynchus* with a smooth tegument that has a few zigzags. The body of this acanthocephalan was found to be 124.08 μm long. Figure A3 and A4 show a female *Neoechinorhynchus* with a smooth tegument and a few zigzags. The length of this acanthocephalan's body was measured to be 184.66 μm . The lengths of the eggs ranged from 38.61 to 42.40 μm , and the widths ranged from 13.39 to 15.94 μm .

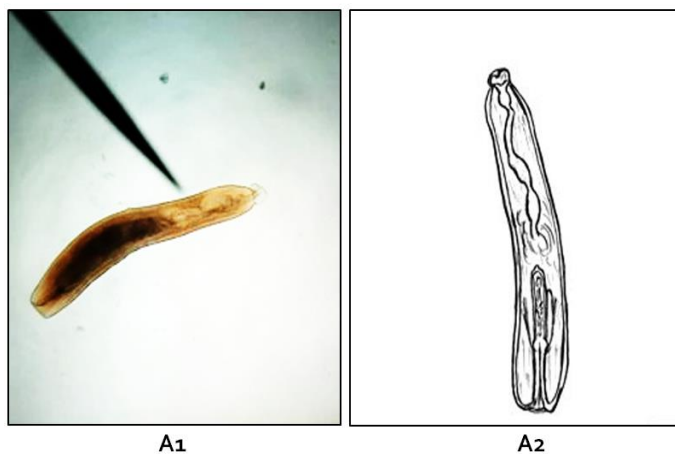


Fig. A1 and A2 show the general view of the adult male of *Neoechinorhynchus* sp. found in *Saurida undosquamis*

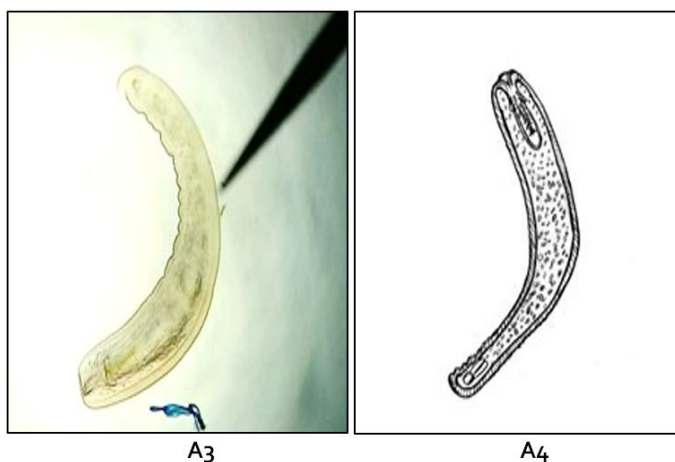


Fig. A3 and A4 show the general view of the adult female of *Neoechinorhynchus* sp. found in *Saurida undosquamis*

Discussion and Conclusion

Throughout our study, we experienced great difficulty in distinguishing between different types of parasitic worms based on their morphological and standard characteristics alone. This was particularly challenging due to the presence of only a few infections with acanthocephalans, as well as the lack of reliable studies in Libya that we could refer to for the classification of the types of worms isolated from *Saurida undosquamis* in Misurata.

Our study focused on examining the endo-helminthic parasitic infestation in 192 *Saurida undosquamis* fish from June 2018 to May 2019. We found that some of these fish were infected with acanthocephalans, including *Neoechinorhynchus* sp. However, these parasites did not demonstrate any pathognomonic clinical signs and the fish appeared to be in good health. Previous studies have examined the prevalence of infection rates of acanthocephalans species

from different organs of *Saurida undosquamis* (Al-Bassel and Hussein, 2012). In our study, we found that only 0.52% of the examined fishes were infected with *Neoechinorhynchus* sp., which were collected from the anterior and posterior intestines of the infected fish during the winter season. This suggests that *Saurida undosquamis* is not an appropriate host for this parasite.

Other studies have shown varying rates of infection with acanthocephalans in different organs of *Saurida undosquamis*. For instance, a study by Al-Bassel and Hussein (2012) found an infection rate of 27.2% in *Mugil Cephalus* from Fayoum in Egypt, but the species was the same as in our study. This finding differed from a study conducted by Abd-Elghany (2017) in Egypt, which demonstrated a 12.8% prevalence rate of Acanthocephalan, *Serrasentis sagittifer* from different organs of *Saurida undosquamis*, suggesting that this fish may not be a suitable host for this parasite. Al-Zubaidy (2012) from Yemen also found acanthocephalan infections in other fishes as well. The present study reports the presence of acanthocephalan *Neoechinorhynchus* sp. in *Saurida undosquamis* in Misurata, Libya.

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Author Contributions

KAE, LOE, KSMA, FMA, SEE, MMA and RSA conceived the concept, wrote and approved the manuscript.

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Ethics approval

Not applicable.



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