First record of *Ceratothoa collaris* (Schioedte and Meinert, 1883) parasite on *Boops boops* (Linnaeus, 1758) from north-western coast of Libya

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Abstract

The presence study revealed the presence of ***Ceratothoa collaris*** (Schioedte and Meinert, 1883) in the north-western coast of Libya (coast of Tripoli), which is not considered one of the normal habitats (outside its known geographical range) of this parasite (western costs of Africa from Senegal to Tunisia. the results of this study also revealed that the rate of infection of 111 ***Boops boops*** (study sample)with ***Ceratothoa collaris*** isopod parasite was low (2.7 %) compared to other studies was conducted in the normal habitats of this parasite.

Keywords: *Ceratothoa collaris*, *Boops boops*, north-western coast of Libya.

1- Introduction

Fish parasites and disease currently one of the most important problems confronted by the fishery biologists, Isopoda crustaceans are part of the greatest fish ectoparasite group, Isopoda cause significant economic losses to fisheries by killing, stunting, or damaging these fishes [1, 17, 18, 22]. They can also kill or impair immature fishes so that they do not survive [21]. ***C. collaris*** is an ectoparasite of fish and is classified in the family Cymothoidae (Leach, 1818). Members of the isopod fish parasitic family Cymothoidae are among the largest fish parasites and are highly host specific it is infest the skin, buccal cavity, or gill chamber of their hosts, this family has a global distribution [9, 14, 20, 21], they parasitize numerous marine species of commercial importance including members of the families Sparidae, Mugilidae, Atherinidae, Serranidae, Caragidae, Sciaenidae, Embiotocidae, Bothidae, Clupeidae, Pleuronectidae, Scombridae and Haemulidae [3].

The Sparidae is a family of the order Perciformes and including The Bogue genus, The genus *Boops* is represented by two species, worldwide: *Boops boops* (Linnaeus, 1758) and *Boops lineatus* (Boulenger, 1892), *Boops boops* is a demersal or semi-benthic species inhabiting inshore waters above various bottoms (sand, mud, rocks or posidonia beds) in the whole Mediterranean, eastern and western Atlantic and moves in aggregations, ascending to the surface mainly at night, it is consumes seaweed, small crustaceans (commonly isopods, amphipods and decapods), sponges [6, 7]. Bogue fish were known to be host of six parasitic isopod species *Ceratothoa oestroides* (Risso, 1826), *Ceratothoa capri* (Trilles, 1964), *Emethaaudouini* (Milne-Edwards, 1840), *Anilocra physodes* (Linnaeus, 1758), *Ceratothoa parallela* (Otto, 1828), *Anilocra frontalis* Milne-Edwards [11]. Interactions of marine fishes with parasitic isopods are very rare studied in Libya, the aim of this study is a recording of crustacean isopods in the common species of Bougue (*Boops boops*) in Libya coast.

2- Materials and methods

The study was conducted in the north-western coasts of Libya (Tripoli coast). A total of 111 Bougue fish (*Boops boops*, Linnaeus, 1758) were collected freshly from the Tripoli fish-landing center during July, 2022, Bougue fishes were caught by the surrounding nets (Lambara) from the coast of Tripoli (information from the fisherman). All fish specimens were immediately transported in a cool box to the fish laboratory of the Zoology department, Faculty of Science, Tripoli University and they were immediately examined. A total length (TL) of Bogue fish was measured to the nearest 0.1 centimeter and Total weighed (TW) to the nearest 1gram, then the body surface, fins, buccal cavity and gill chambers of each fish were examined. Isopods were removed from the Bogue fish and immediately preserved in 70% ethanol, in individual vials for each isopod parasite. Specimens of isopods were examined under a (Stereomicroscope) and the illustrations were obtained with the a BenQ Digital camera. The isopod parasite were classified using the description and classification keys found in the following references [3, 8, 10, 12, 13, 21], and the Bougue fishes were also classified by [15].

3-Results

3- 1- Inventory of parasites collected:

A total of 111 Bougue fish were collected freshly from the main center of Tripoli fish market , The average length of Bougue fishes was 15.64 cm and the average weight was 43.8 gram, three samples from 111 fish specimens (2.7 %) were infected with adult ovigerous females of genus Ceratothoa, this parasites were found in the buccal cavity of Bougue specimens, The collected parasites were identified as ***Ceratothoa collaris*** (Schioedte and Meinert, 1883).

3- 2- Taxonomy of Isopod parasites collected:

Three individuals of genus Ceratothoa were identified in one Family, as follows:

Order: Isopoda

Suborder: Cymothoida Wägele, 1989

Superfamily: Cymothooidea Leach, 1814

Family: Cymothoidae Leach, 1814

Subfamily: Ceratothoinae Dana, 1852

Genus: *Ceratothoa* Dana, 1852

***Ceratothoa collaris* (Schioedte and Meinert, 1883)**

3- 3- Material examined:

Three ovigerous females of ***Ceratothoa collaris*** (Schioedte and Meinert, 1883) were collected from the buccal cavity of Three Bouge fish specimens from the north-western of Libya (Figure 1), two ***C. collaris*** parasite were attaching to the bottom of buccal cavity, and one were attaching to the roof of buccal cavity (Figure 2). Length and weight of infected fish was (26.4 gr, 14.6 cm), (29.0 gr, 15.8 cm), (33.1 gr, 16.3 cm). Body size of the three ***C. collaris*** parasites was ranged from 19 - 29 mm in length, and from 6 - 11 mm in wide.

Fig. (1): *Ceratothoa collaris in* buccal cavity of ***Boops boops***

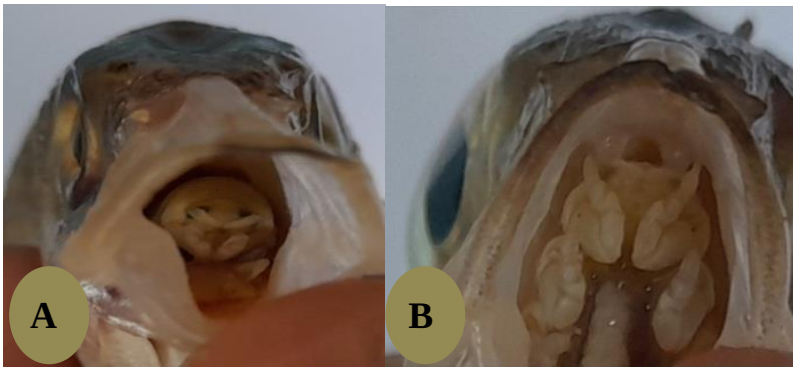

Fig. (2): *Ceratothoa collaris* attaching to the bottom (A), and roof (B) of buccal cavity of *Boops boops*

3- 4- Remarks:

Ceratothoa collaris was first collected by Lucas in the Mediterranean (Algeria, Alger) but misidentified as ***Ceratothoa oestroides* (Lucas, 1849)**. Schioedte and Meinert (1883) later briefly described this species from a single specimen (ovigerous female) collected by Lucas [3].

Originally divided into three forms, ***Meinertia collaris*** forma typical, ***M. collaris*** forma Africana and ***M. collaris*** forma globuligera were distinguished by Monod (1924 a, b) according to some morphological differences of the Cephalon and antennae but without any other descriptions of the species main features [8, 19]. The present study indicated its parasite for the first record from northwestern of Libya.

3- 5- Description of the parasite collected:

Three isopod parasites (***C. collaris***) were collected are similar in morphology and the following description is for all of them:

- They are ovigerous females and they have stout body (Figure 3).

Fig. (3): ***Dorsal view and ventral view of Ceratothoa collaris***

- Cephalon nearly triangular and anterior margin acute in dorsal view, moderately immersed in pereonite 1, eyes distinct but often partly hidden by antennae.
- Antennule slightly stouter and shorter to antenna and both with seven articles, extending generally beyond posterior margin of eyes. First four articles of antennule and antenna wider than other (Figure 4).
- Pereonite 1 moderately produced on antero-lateral sides and antero-lateral angles extended to posterior margins of eyes (the location shown by the arrow in Figur 4).

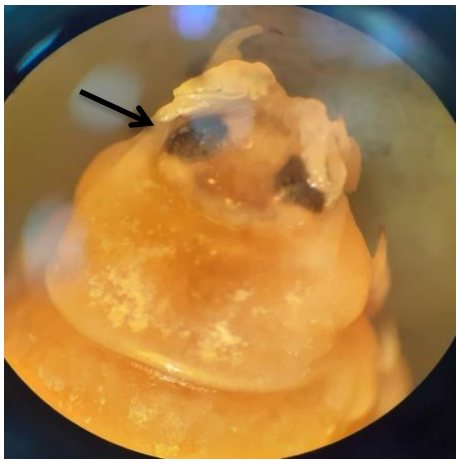

Fig. (4): Cephalon*, eyes*, Antenna, Antennule, *and* Pleonite 1 of *Ceratothoa collaris*

- All pleonites visible, becoming wider towards posterior side and sub-equal in length, pleonites 1 and 2 distinctly less wide than others. Pleonite 1 the least wider and pleonite 5 wider than preceding pleonites (Figure 5).

Fig. (5): Pleonites 1- 7 of *Ceratothoa collaris*

- Pereonites 5 to 7 distinctly shorter, progressive more rounded and concave posteriorly.
- Pleotelson wider than pereonite 7 .
- Pereopods gradually increasing in size, all without spines and all pereopods from 1 to 6 almost similar to each other. Pereopod 7 distinct with a carina very expanded on basis and a distinctive lope produced on merus (Figure 6), this form is one of the most characteristic of this species.

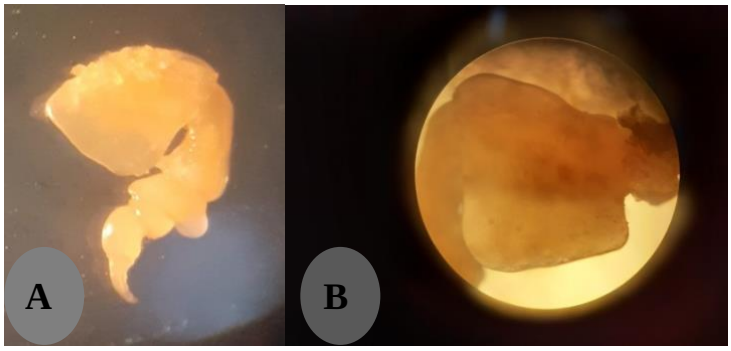

Fig. (6): A (Pereopod I), B (Pereopod VII) of *Ceratothoa collaris*

- Pleopods simple and not distinctly visible in dorsal view.
- Uropods often varying in shape and less extended along the pleotelson**.**
- Mandible palp without setae and third article distinctly smaller than others (Figure 7).
- Maxillule with three terminal spines.

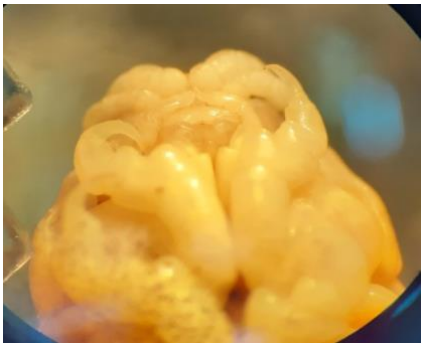

Fig. (7): Cephalon ventral view of *Ceratothoa collaris*

3- 6- Hosts:

C. collaris was previously collected on various fish but especially on Sparidae and Occasionally on Centracanthidae, Sciaenidae and Chondrichthyes, it was recently reported from Moronidae and Serranidae [19].

3- 7- Distribution:

C. collaris is uncommon species compared with other of the same genus, its known geographical range, which was restricted to north-western African coasts (from Senegal to Tunisia) [3, 9]. Many specimens of this parasite has been recently extended to the Levantine basin (along the Lebanon coast) [3], and this parasite also reported in Tyrrhenian sea [4]. ***C. collaris*** species is common in Tunisia and Mauritania, this has not been uncommon in the north or north-western Mediterranean countries despite many recent studies there, it has been found in southern areas of the Mediterranean, but never from Libya and Egypt [5, 19], but now the results of this study have proven the presence of this isopod parasite on the north-western costs of Libya.

3- 8- Holotype:

Holotype of ***Ceratothoa collaris*** in Museum National of Histoire Naturally, Paris (MNHN-Is 40), female (length = 38 mm) Algeria [19] .

4- Discussion:

The presence study is the first record of parasitism by the isopod parasite ***Ceratothoa collaris*** on the host fish ***Boops boops*** in the north-western cost of Libya. According to some previous studies this parasite has limited distribution areas coasts of the eastern Mediterranean (the coasts of Lebanon) [3], the coasts of the northern Mediterranean (Tyrrherian sea) [4], the coasts of the southern Mediterranean (from Morocco to Tunisia), and the north-eastern coasts of the Atlantic Ocean (from Senegal to Mauritania) [3, 19], and the presence study revealed a presence of this parasite in the north-western coasts of Libya (Tripoli coast).

Most of the previous studies revealed that the ***C. collaris*** parasite is uncommon compared to other species of the same genus [16]. This study showed that the infection rate by ***C. collaris*** among the study specimen (Bougue fishes) was low 2.7 % compared to the prevalence rate of other studies conducted in the normal geographical range of this parasite, for example, the prevalence rate of infection with ***C. collaris*** in a study conducted in Algeria equal to 33.3 % [16], this can be explained by the lack of studied

samples on the Libyan coasts, or because the coasts extending from Tunisia to Senegal are considered the normal habitat of ***C. collaris*** parasite.

5- References:

1- Al-Zubaidy A. B.; Mhaisen. F. T. 2013. The first record of three Cymothoid Isopods from Red Sea fishes, Yemeni. International Journal of Marine Science. Vol. 3, No. 21, 166 – 172.

2- Bariche. M; Trilles. J. P. (2008). Ceratothoa collaris (Isopoda: Cymothoidae) new to the eastern Mediterranean, with a redescription and comments on its distribution and host specificity. Marine Biological. 88(1), 85 – 93.

3- Brusca. R. C; Iverson. E. W. (1985). A Guide to the Marine Isopod. Crustacea of Pacific Costa Rica. Biologia Tropical. 33(supl. 1): 1 – 77.

4- Bouguerche. C; Tazerouti. F; Gey. D; Justine. J. (2021). Triple barcoding for a hyperparasite its parasitic host and the host itself: a study of Cyclocotyla bellones (Monogenea) on Ceratothoa parallela (Isopoda) on Boops boops (Teleostei). PARASITE. 28, 49.

5- Casteilo. J; Bitar. G; Zibrowius. H. (2020). Isopoda (Crustacea) from the Levantine sea with comments on the biogeography of Mediterranean isopods. Mediterranean Marine Science. 21(2) 308 – 339.

6- Cengiz. O. (2022). Some biological aspects of bogue (Boops boops, Linnaeus, 1758) from Saros Bay (Northern Aegean sea, Turkey). Western Philippines University. 14(1).

7- El-Maremie. H; El. Mor. M. (2015). Feeding Habits of the Bogue, Boops boops (Linnaeus, 1758) (Teleostei: Sparidae) in Benghazi coast, Eastern Libya. Journal of Life Sciences. (9): 189- 196.

8- Hadfield. K. A. (2012). The biodiversity and systematics of marine fish parasitic isopods of the family Cymothoidae from southern Africa. Publication of University of Johannesburg.

9- Hadfied. K. A; Bruce. N. L; Smit. N. J. (2016). Redescription of poorly known species of Ceratothoa Dana, 1852 (Crustacea, Isopoda, Cymothoidae), based on original type material. Zookeys. 592: 39 – 91 (2016).

10- Hadfielid. K. A; Bruce. N. L; Smit. N. J. (2014). Review of the fish parasitic genus Certothoa Dana, 1852 (Crustacea, Isopoda, Cymothoidae) from South Africa, including the description of two species. Zookeys. 400: 1 – 42.

11- Innal. D; Kirkim. F. (2012). Parasitic Isopods of Bogue {Boops boops (Linnaeus, 1758)} from the Antalya Gulf, Turkey. Research Article, B- A 16.

12- Kensley. B; Schotte. M. (1989). Marine Isopod Crustaceans.

13- Martin. M. B. (2015). Taxonomy and phylogeny of the buccal attaching Cymothoidae (Crustacea: Isopoda) of Australia. Publication of University of Tasmania, Launceston.

14- Purivirojkul. W. Songsuk. A. (2020). New Records of fish parasitic Isopods (Crustacea: Isopoda) from the Gulf of Thailand Animals. 10, 2298.

15- Qasim. A. S; Abdullah. A. R; Turki. A. A; Bin-Musa. M. N. (2009). Guide to bony fishes in Libyan waters. Publications of the Marine Biology Research Center, Tripoli, Libya.
16- Ramadane. Z; Trilles. J. (2008). Cymothoidae and Aegidae (Crustacea, Isopoda) from Algeria. VERSITA. 53(2), 173 – 178.
17- Ribeiro. F. B; Huber. A. F; Araujo. P. B. (2021). Redescription of the fish-parasitic isopod Cymothoa ianuarii (Schioedte and Meinert, 1884) and further records of *C. excise* (Perty, 1833) and *C. oestrum* (Linnaeus, 1758) Isopoda: Cymothoida: Cymothoidae from Brazil. Papeis Avulsos de Zoologia. V. 61: e 20216109.
18- Santos. E. F; Oliveira. M. R; Chellappa. S. (2010). First record of Cymothoa spinipalpa (Isopoda: Cymothoidae) parasitizing the marine fish Atlantic bumper, Chloroscombrus chrysurus (Osteichthyes: Carangidae) from Brazil. Marine Biological Record, Vol. 3.
19- T. Horton. (2000). Ceratothoa Steindachneri (Isopoda: Cymothoidae) new to British waters with a key to north-east Atlantic and Mediterranean Ceratothoa. Journal of the Marine Biological Association of the united kingdom. 80, 1041 – 1052.
20- Welicky. R. L; Smit. N. J. (2019). Redescription and molecular characterization of the fish ectoparasite Anilocra capensis Leach, 1818 (Isopoda: Cymothoidae), with description of six new species of Anilocra Leach, 1818 from Africa. Parasites and Vectors. 12: 387.
21- Williams. E. H; Williams. L. B. (1996). Parasites of offshore big game fishes. Puerto Rico Department of Natural and Environmental Resources.
22- Zelika. M; Srdan. V. (2008). Ceratothoa oestroides (Risso, 1826) in Bougue (Boops boops L.) and Picarel (Spicara smaris L.) from the Velebit channel in the Northern Adriatic. Veterinarski Arhiv 78 (4), 363-367.