Morphological study of *Serrasentis sagittifer* parasitic infecting the, fishes *Mullus barbatus* (Mullidae) from A-khoms coast, Libya

∗.Abdusalam saleh Abusdel ∗∗.Atia Ramadan Elkilany ∗.Milud asaid alshaafai

∗.Najwa abdalgader algaw

Abstract: A total of 120 marine fish as (*Mullus barbatus*) were collected from The Mediterranean Sea during the period from June 2021 to December 2021; they were dissected and examined to identify parasitic acanthocephali. Only 29 samples (24.16%) were infected with *Serrasentis sagittifer* from the family Rhadinorhynchidae.

Infested fishes illustrate no pathognomonic signs except abdominal distension, whereas the infection was recorded in the intestines, appendix and external surfaces of some internal organs of infected fish. Seasonally, the infection frequency increased to 55.17% during the summer season and decreased to 31.03 and 13.80 % during Autumn and winter respectively.

Light microscopic and scanning electron microscopic examination revealed that the adult worm was elongated (wide anterior and narrow posterior ends) and measured 5.8–9.7 $(6.9 \pm 0.2) \times 0.52–0.69$ (0.58 ± 0.02) mm for male and 10.1–11.3 $(10) \times 0.68–0.83$ (0.72 ± 0.01) mm for female. The Proboscis was long of 0.89–1.3 mm (1.1 ± 0.2) for male and 1.11–1.19 mm (1.17 ± 0.02) for female. It was covered with many identical thorns arranged lengthwise as 9–11 Rows, each equipped with 15-18 spines. The body was supported by numerous vertebral ridges (16–20). Therefore, according to the morphological [iii]documents, the current parasite is classified as *Serrasentis sagittifer* and belongs to the class Palaeacanthocephala and the family Rhadinorhynchidae with a new host record from the Mediterranean Sea bream *Mullus barbtus*.

Keywords: Acanthocephalans; *Serrasentis sagittifer*; *Mullus barbtus*; alkuoms Coast; Libya; marine fish.

دراسة مورفولوجية لطفيلي *serrasentis sagittifer* الذي يصيب أسماك Mullidae (*Mullus barbatus*) من ساحل الخمس بليبيا

المستخلص: أجريت هذه الدراسة على 120 سمكة من أسماك الترليا الحمراء (*Mullus barbatus*) من منطقة الخمس ليبيا لساحل الجنوبي للبحر الأبيض المتوسط خلال الفترة من يونيو 2021 إلى ديسمبر 2021؛ تم تشريح وفحص العينات للبحث عن الديدان مشوكة الرأس الطفيلية. حيث تم العثور على 29 عينة (24.16٪) فقط مصابة بشكل طبيعي بـ *Serrasentis sagittifer* التي تنتمي إلى عائلة Rhadinorhynchidae.حيث لم يلاحظ علامات مرضية للأسماك المصابة باستثناء انتفاخ البطن وقد سجلت الإصابة في الأمعاء البوابية والأسطح الخارجية لبعض الأعضاء الداخلية للأسماك المصابة. موسمياً، ارتفع معدل انتشار العدوى إلى 55.17٪ خلال فصل الصيف وانخفض إلى 31.03 و13.80٪ خلال الخريف والشتاء على التوالي.

كشف الفحص المجهري للضوء والمسح الإلكتروني أن الدودة البالغة كانت ممدودة (مع نهايات خلفية أمامية وضيقة عريضة) وقياسها 5.8–9.7 (6.9 ± 0.2) × 0.52–0.69 (0.58 ± 0.02) مم للذكور و10.1–11.3 (10.8) ± 0.2) × 0.68–0.83 (0.72 ± 0.01) ملم للإناث. كان الخرطوم طويلًا واسطوانيًا بطول 0.89–1.3 ملم (1.1 ± 0.2) للذكور و1.11–1.19 ملم (1.17 ± 0.02) للإناث. كانت مغطاة بالعديد من الأشواك المنتظمة المرتبة طوليًا في 9–11 صفًا مجهزة كل منها بـ 15–18 عمودًا. كانت الأشواك مثلثة الشكل، على شكل

∗ Biology Department Fac. Sciences El mergib Univ., Libya asabusdel@elmergib.edu.ly
∗∗ Biology Department Fac. Education El mergib Univ., Libya arelkilany@elmergib.edu.ly
∗ Biology Department Fac. Sciences El mergib Univ., Libya milud@elmergib.edu.ly
* Biology Department Fac. Sciences El mergib Univ., Libya naalgaw@elmergib.edu.lu

سهم، قوية؛ انخفض حجمها من القمة إلى قاعدة خرطوم. يتبع الخرطوم منطقة عنق قصيرة غير شوكية متبوعة ومدعومًا بأمشاط متعددة من الأشواك (16–20) على سطحه البطني. تدعمها المعطيات المورفولوجية ووجود جذع العمود الفقري مرتبة ضمن صفوف (شبيهة بالمشط) ووجود أربع غدد أسمنتية في الذكور. لذلك، وفقًا لسجلات الشكل المورفولوجي، يتم تصنيف الطفيل الحالي على أنه *Serrasentis sagittifer* الذي ينتمي إلى فئة Palaeacanthocephala وعائلة Rhadinorhynchidae مع سجل مضيف جديد من اسماك *Mullus barbtus* في البحر الأبيض المتوسط ليبيا.

Introduction

The Mediterranean Sea has a very rich and varied fish fauna. It is one of the major centers of global marine biodiversity, Marine fishes are considered as one of the most important sources of animal protein in Libya.

Knowledge of fish parasites is of particular interest, not only for fish health but also for understanding ecological problems. The parasites play important role in the lives of their hosts (**Dogiel, 1964**), and they have been proposed as excellent indicators of the biodiversity both on host species and at the ecosystem level (**Chambers and Dick, 2005**).

Acanthocephalans are a group of Endoparasites helminthe found commonly in both marine and freshwater fishes. They are characterized by complex life cycle including arthropods as intermediate hosts and vertebrates as definitive or paratenic hosts. They cause pathological conditions in many fish (**Nickol, 2006**). Attachment by the armed the proboscis may cause mechanical damage which affects the architecture of the intestinal tissues. Heavy infections may cause obstruction of the intestines and invasion or migration of the helmet parasites to uncommon locations (**Sanil *et al*., 2010 and Sakthivel *et al*., 2014**).

Acanthocephalan fish parasites live as adults in the intestine or as larvae in fish tissue. All acanthocephalans use arthropods as intermediate hosts and vertebrates as definitive hosts. Acanthocephalan larvae that develop into adults only when ingested by appropriate definitive hosts. (**Tingbao and Xianghua, 2001**).

Materials and Methods

120 fish specimens of *Mullus barbatus* (Mullidae) were collected from the Mediterranean Sea, Libya during the period from July to December 2021. helminths were isolated from the Intestine, pyloric ceca, body cavity, mesenteries and external surfaces of internal organs of the fishes transfer done to a clean 0.9 % saline solution by using a brush or small pipettes and wash several times to remove any mucous or debris which is usually adhere to body surface. (**Gibson, 1985),** Then fixed in 10% formalin.

After fixation, the collected samples were washed in distilled water for 15 minutes. This should be carried out to remove the excess stain by placing the stained helminth into a dilute solution of acid alcohol (0.5 ml in 1000 ml alcohol). Following the upper procedure, it was followed by dehydration in an ascending series of ethanol, 10%,20%,30%,40, 50%,60%, 70%, 90%, 95% and absolute ethanol, leaving the parasites for 2-5 minutes in each grade. The samples were then cleared in xylene mounted in Canada balsam, covered with cover glass and left to dry in. The prevalence morphometric measurements (**Bush et al 1997**) minimum and maximum values were given, followed in parentheses by the arithmetic mean ± SD.

For scanning electron microscopy, the samples were fixed in 3% buffered glutaraldehyde, and dehydrated in an ascending alcohol series. After passing through an ascending series of the Genosolv-D, they were processed “Bomer-900” with Freon 13 and sputter coated with gold–palladium in a Technics Hummer V and examined with an Etec Autoscan at 25 kV

Result

In present study, an acanthocephalan parasite was recovered from the intestine of *Mullus barbatus* captured from marine fishes the Mediterranean Sea in al- khoms Libyan coasts. The parasite was observed attached to the wall of the host intestine by an armed proboscis equipped by recurve hooks.

Clinical findings

Infested fishes showed no pathognomonic signs except abdominal distension and Infection was reported in the intestine, pylorus of the appendix, and on the external surfaces of some internal organs of infected fish. Twenty nine out of 120 fish specimens (24.16%) infected, seasonally the it has risen of infection increased to 55.17 % during summer season and decreased to 31.03 and 13.80 % during Autumn and winter respectively. The average parasite presence was 3 to 7 parasites per infected fish. The recovered helminthe were creamy white, elongated with narrow posterior end.

scanning electron and Light microscopy showed that the parasite had distinctive rows of spines (combs) on the ventral surface and measured 5.8 to 9.7 $(6.9 \pm 0.2) \times 0.52–0.69$ (0.58 ± 0.02) mm for male While female and 10.1–11.3 $(10) \times 0.68–0.83$ (0.72 ± 0.01) mm. Width at the base of proboscis was 0.10±0.02 (0.08-0.12) mm. Proboscis club-shaped with a broad anterior end, equipped by longitudinal rows of hooks, each with 15-19 of curved hooks. Trunk was spines anteriorly; spines arranged in 9-11 collar rows, each was equipped with 15-18 spines. Whited showed that the parasite isolated is belonged to be *Serrasentis sagittife*. These postmortem findings are similar to that recorded by **Abdel-Mawla and AboEsa (2011) and Salah Eldeen *et al*, (2014).**

Serrasentis sagittifer

Description (Based on 7 Specimens): helminthe were creamy white, elongated, and curved with slight tegument annulations and a narrow posterior end. It was characterized by the presence of distinctive rows of spines (combs) on the ventral surface of the trunk. And measured 5.8–9.7 $(6.9 \pm 0.2) \times 0.52–0.69$ (0.58 ± 0.02) mm for male and 10.1–11.3 $(10) \times 0.68–0.83$ (0.72 ± 0.01) mm for female. Proboscis was long and cylindrical with a length of 0.89–1.3 mm (1.1 ± 0.2) for male and 1.11–1.19 mm (1.17 ± 0.02) or female It was covered with numerous uniform spines arranged longitudinally as 9 to11 rows each equipped by 15 to18 spines. **Table 1**.

Taxonomic Summary

Parasitological finding:

Phylum: Acanthocephala

Family: Rhadinorhynchidae Travassos (1923)

Subfamily: Serrasentinae

Species: *Serrasentis sagittifer* **Fig. 1, 2**

Type Host: Red porgy *Mullus barbatus* (Mullidae)

Infection Site: pyloric ceca, Intestine, body cavity, mesenteries and external surfaces of internal organs.

Locality: EL-koms coasts, the Mediterranean Sea, Libya.

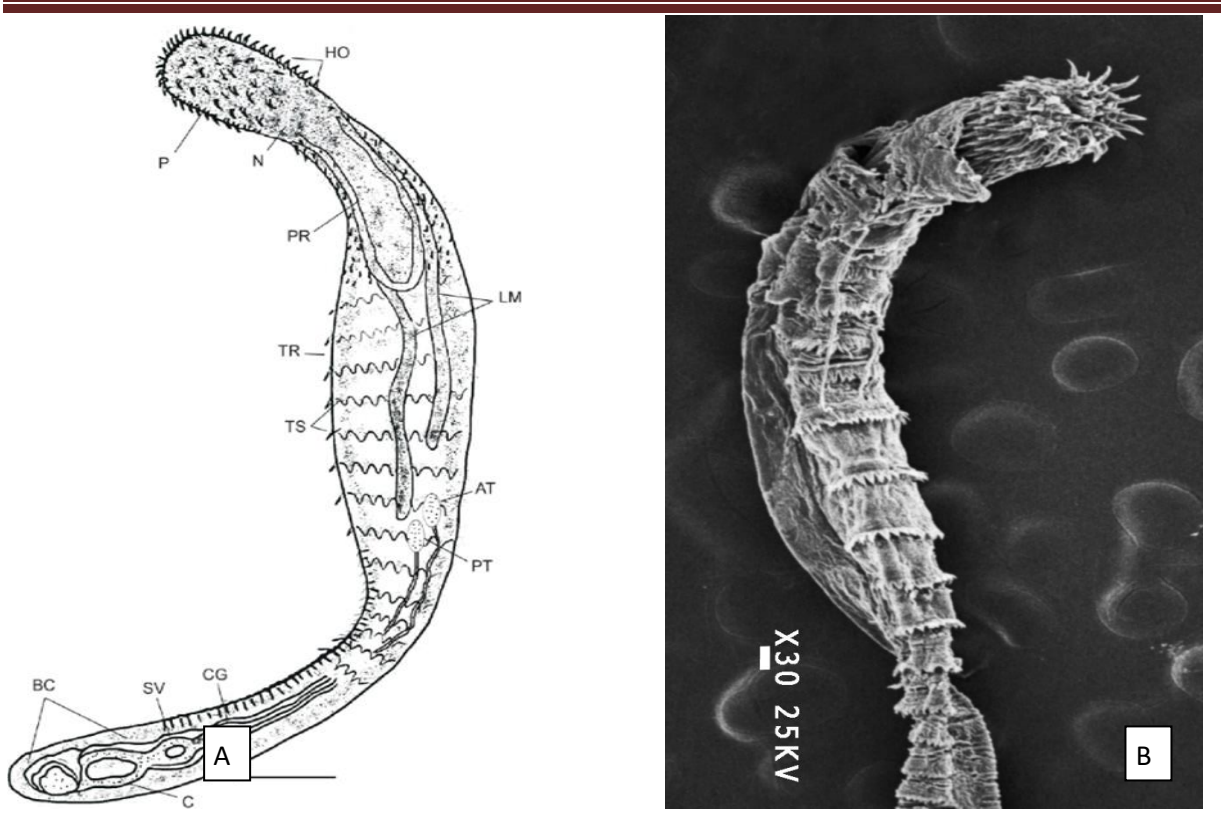

Fig.1 A: *Serrasentis sagittifer* (male), lateral view, P, proboscis; pr, proboscis receptacle; N, neck; HO, hooks; L, lemnisci; TS, trunk spines; T, trunk; AT, anterior testis, BC, bursa copulatrix; PT, posterior testis; CG, cement gland, SV, seminal vesicle, C, cirrus; bar, 100µm. **B**: showing scanning Electron: Proboscis and multiple rows of Proboscis hooks at, 25 kV.

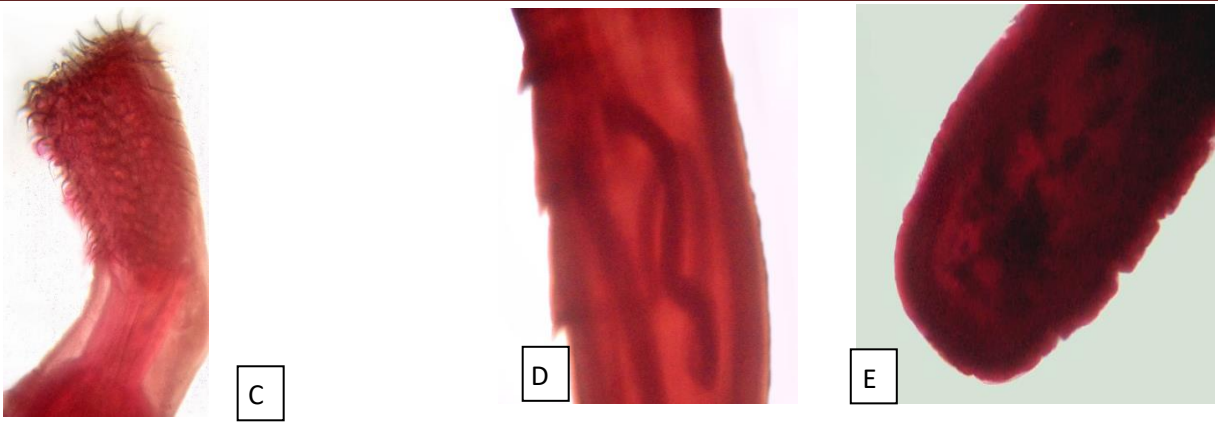

Figure 2. Photomicrographs of *Serrasentis sagittifer* larva.

A and B: Whole mount of juvenile

C: The body

D: trunk spines

E: Posterior end

Table 1: Comparative data (mm) of males and Females *Serrasentis sagittifer* recorded in the present study and those of other previous studies.

pecies	*Serrasentis sagittifer*	*Serrasentis sagittifer*	*Serrasentis sagittifer*	*Serrasentis sagittifer*
Referance	AL- Zubaidy and Mhaisen(2012)	Abdel-Ghaffar et al.(2014)	Saed et al, (2018)	Present study
Host	*Thunnus tonggol Sphyraena barracuda Pomadasys argenteus and Lutjanus gibbus*	*Sparus aurata*	*Saurida undosquamis*	*Mullus barbatus*
Body Length	7.5-9.0	6.9-8.6	3.33-3.58	**males** 5.8–9.7 mm
Body width	0.62-0.75	0.57-0.73	0.08-0.12	0.52–0.69 mm
Proboscis length	1.0-1.3	0.97-1.6	0.71-0.77	0.89–1.3 mm
Number of rows	22	9-11	15-19	9–11
Number of spines	16	15-18	15-18	15–18
Body Length	-			**Females** 10.1–11.3 mm
Body width	-			0.68–0.83 mm
Proboscis length	-			1.11–1.19 mm
Number of rows	-			9–11
Number of spines	-			15–18
Locarion	Red Sea, Yemeni coastal waters	Coasts of the Red Sea at Hurghada City, Egypt	Coasts of the Red Sea at Hurghada City, Egypt	Coasts of the Mediterranean Sea at AL.kuoms City, Libya

Discussion

in the current study, *Serrasentis sagttifer* were collected from the intestine, pyloric caeca and peritoneal cavity of *Mullus barbatus*. The total prevalence of Serrasentis *sagittifer* in the *Mullus barbatus* fishes were 24.16%. Meanwhile, the obtained result was different from that reported by **(Abdou and Mahfouz 2006)** which was 33% acanthocephala from *Siganus luridus* **(Salah Eldeen *et al.*, 2014)**, 38% clerocollum sp from *Siganus revulatus*. The spread of Acanthocephala (Echinorhynchus sp and *Serrasentis sagttifer*) from *Mulloides flavolineatus* was 23.3% which was nearly similar to the results reported by **(El-Ashram and Shager 2008),** 25% *Serrasentis sagttifer* from *Scombermorus maculates* and **(Al Zubaidy and Mhaisen 2012)** 24% from *Pomadasys argenteus* fish. (**Abo-Esa 2007**) wsa 35% *S. sagttifer* from *Mullus barbatus*. Moreover, **(El-Ashram and Shager 2008)** showed 25% *S. sagttifer* from *Scombermorus maculates* and lower than that investigated by **Abdel-Ghaffar *et al.*, (2014)** which showed a higher percentage (57.14%) of *S. sagittifer* from *Sparus aurata* at the coasts of the Red Sea and lower than that investigated by (**Kassem *et. al.*, 2023**) showed a higher percentage (48.5%) and (**Faisal et. al., 2020**) showed the total prevalence of *Serrasentis sagittifer* (100%). This variation in prevalence may be Attributed to the unequal samples, difference of fish species, species of parasites and different sites from which samples collected as well.

In the meantime, a higher percentage than what was obtained by **Al-Zubaidy and Mhaisen (2012)** who reported an overall prevalence of 13.1% in some marine fishes and **Bayoumy et al, (2008)** 16.2% *Echinorhynchus gadi* from *Mullus surmuletus*, (**Abdel-Mawla and El-Ekiaby 2012**) 7% from Seabass fish and **Debenedetti et al, (2013)** 3% parasite *Echynorhynchus gadi* from *Mullus barbatus* , While recording **Öztürk and Yeşil (2017)** 1.21% parasites Acanthocephaloides from Red Mullet.

This morphological description agrees with that described by **Al-Zubaidy and Mhaisen (2012)**, **Barton and Smales 2015 and Abdel-Mawla and El-Lamie 2018)**.

To conclude, the *S. sagittifer* in the present study, morphologically resembles those previously recorded from various regions of the world **AL-zubaidy & mhaisen,**

(2012); Abdel Ghaffar *et al.*, (2014); Mohamadain & Adel (2015); Çelik and Oguz, 2021 and Kassem *et al*, (2023).

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