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The Current Situation on Prevailing Parasitic Diseases in *Epinephelus tauvina* (Greasy Grouper)

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ABSTRACT

This survey was applied to 50 marine fish samples of the greasy grouper *Epinephelus tauvina* collected randomly from Safaga City in the Red Sea province. Infected fish showed no obvious clinical abnormalities except attachment of isopod to the skin. Internally, some fishes showed paraniza in the buccal cavity and gills. Other fishes showed dark grayish encapsulated plerocercoid or larvae of philometra in the abdominal cavity and internal organs. The infection rate and intensity of isopods, Praniza larvae, *Philometra* spp., and *Trypanorhyncha* sp. from *Epinephelus tauvina* were 4% & 1/fish, 28% & 3-7/fish, 32% & >20/fish, and 23% & 3-9/fish, respectively. Abundant mixed parasitic infections implicating Argathona isopods, Praniza larvae of Gnathiids, Philometrid nematodes, and Trypanorhynch larval cestodes, were frequently seen. A morphological description of the structure and characteristics of each isolate was performed. Isolated parasites were identified using optical and electron microscopy to analyze the specimens' morphology. The histopathological alterations in tissues of naturally infected fishes induced by isolated parasites on different organs were described.

INTRODUCTION

The hammour fish (grouper) is an important source of essential nutrients for humans, providing high levels of protein, healthy fats, vitamins and minerals **(Lobna & Abdullah, 2022)**. Compared to freshwater fish, marine fish are richer in iron, zinc, and vitamin A **(Refat *et al.*, 2023)**. Marine parasites play a significant role ecologically and economically in both wild and farmed fish. Consequently, there is growing interest in the parasitic isopod family Cymothoidae **(Khalaf-Allah & Yousef, 2019; Aneesh *et al.*, 2021),** even though many species and genera are frequently misclassified or lost. Cymothoid species are protandric hermaphrodites that parasitize a variety of fish species,

feeding on their blood, flesh, and mucus. These isopods can be found on the fish's body surface, fins, mouth, gill chambers, or even within the flesh, having a deleterious impact on fish populations.

Infected fish in captivity may experience inhibited growth, anemia, and even death in smaller fish, resulting in significant economic losses **(Aneesh *et al.*, 2018; Rashid *et al.*, 2021)**. Paraniza larvae, found on the gills, fins, and tongue, can cause damage such as fusion of gill lamellae, mechanical injury to the gill epithelium, and necrosis. Severe infestations can lead to the loss of gill function, affecting the fish's survival **(Hassan, 2018)**. Philometrid nematodes (Philometridae) are known worldwide and include many species, in marine, fresh, and brackish-water fishes. They can play a significant role in the economy through infection of body cavities and various organs such as musculature, subcutaneous tissues, mouth tissues, and ocular orbits. Moreover, they can also affect fins, gill covers, swim bladder, gill arteries, and body cavity. The importance of *Philometra* spp. parasitizing marine fishes has increased because these pathogenic parasites may cause serious damage to infected fishes or, when parasitic in gonads, significantly decrease fish reproduction and may even cause death to their fish hosts **(Quiazon *et al.*, 2008; Moravec, 2023)**.

Larval tapeworms of the Trypanorhyncha family encyst in the coelomic cavity and musculature of teleost fish serve as intermediate hosts. Meanwhile, the adult cestodes are found in the stomach and intestines of fish and marine invertebrates **(Santoro *et al.*, 2020)**. The presence of plerocercoids in fish flesh or body cavities creates issues, as it lowers the market value of the fish by making it unappealing to consumers. Additionally, Trypanorhyncha larvae in the musculature may release toxins that can affect humans who accidentally consume raw, undercooked, or poorly preserved fish, leading to allergic reactions **(Morsy *et al.*, 2022).**

This research aimed to gather comprehensive information on the prevalence of common parasitic diseases affecting *Epinephelus tauvina* from Safaga City. It also sought to examine the clinical symptoms and post-mortem lesions associated with the infection. Additionally, the study aimed to confirm the identification through scanning electron microscopy and to highlight the histopathological changes in fish naturally infected with parasites.

MATERIALS AND METHODS

1. Sampling: Naturally infected fish

A total of 50 healthy marine fish samples of *Epinephelus tauvina* (Greasy grouper) were randomly collected from Safaga City in the Red Sea province between June 2022 and March 2023. The fish ranged in size from 35 to 42cm in length and weighed between 550 and 1250 grams. They were then promptly transported to the laboratory of the Ismailia branch of the Animal Health Research Institute.

2. Clinical picture

Clinical and postmortem examinations were made externally and internally on the life or freshly dead fish for detection of any clinical abnormalities **(Noga, 2010)**.

3. Parasitological examination

The fish were examined both macroscopically and microscopically to detect parasites. Isopod specimens were studied using a dissecting stereomicroscope and light microscopy after being cleaned with a warm saline solution. The specimens were then preserved in 70% ethyl alcohol. Identification was carried out using modern classification keys based on morphological characteristics, following the guidelines of **Aneesh (2014)**. Paraniza larvae were collected from the gills, and mouth of fish, then washed several times with physiological saline to be free from mucus. The larvae were preserved in 70% ethyl alcohol and were then dissected and mounted in lactophenol as temporary slide preparations fixed using the techniques described by **Lucky (1977)**.

The recovered nematodes were rinsed in physiological saline for light microscopic examination (LM) and were then cleared in glycerin. The larvae collected from each site were washed in physiological saline, relaxed, and fixed in a hot alcohol-glycerin solution (5%) until the alcohol evaporated, leaving the specimen in almost pure glycerin. The specimens were then cleared in lactophenol, mounted in glycerin gelatin according to the method of **Meyer and Olsen (1992)**, left to dry, and examined microscopically. Nematode identification was carried out following the method of **Ramachandran (1973)**.

The capsulated plerocerci were extracted from the infected organs, and the walls of the parasite blastocysts were opened to remove the juvenile scolices. The specimens were rinsed in saline solution and fixed in 10% buffered formalin. They were then stained with acetic carmine, dehydrated, and mounted in Canada balsam. The collected cestodes were identified using the identification key provided by **Yamaguti (1959, 1961)**.

4. Scanning electron microscopy

The specimens were cleaned after being rinsed in tap water. They were fixed in equal volumes of 4% glutaraldehyde and 0.2% cacodylate for two hours and processed as described by **Eissa *et al.* (2022)**, and then examined using a scanning electron microscopy (JSM-IT100 InTouchScope™ Scanning Electron Microscope, JOEL, Damansara, Selangor, Malaysia).

5. Histopathological analysis

For the histopathological study, the fish were euthanized, and tissue specimens of liver, spleen, and skin were excised, rinsed in normal saline, and fixed in formalin buffer 10% for 24h. After fixation, the tissues were dehydrated in alcohol series of ascending concentration (70, 80, 90, and 100%, respectively), cleared with xylol, embedded in paraffin, blocked, cut/sectioned at 5µm sections, The tissue sections were stained with hematoxylin-eosin (H&E) according to the method described by **Bernet *et al.* (1999)**.

RESULTS

1. Clinical findings

The naturally infected marine fish exhibited no visible clinical abnormalities externally, except for the presence of isopod infections, which could be seen with the naked eye attached to the skin, causing abrasions and small wounds (Fig. 1A, B). Internally, Paraniza larvae appeared as small black or grey dots attached to the gills or in the buccal cavity, accompanied by excessive mucus secretion, which sometimes caused lamellae adhesion (Fig. 1C, D). Endoparasites were found in the body cavity and internal organs of *Epinephelus tauvina,* including reddish to black, comma-shaped nematodes (Fig. 2B, C, D) and some grayish to black encapsulated plerocercoid larvae in the branchial cavity and internal organs (Fig. 2A, B, D). Infected fish with nematodes displayed orange, brownish, or black spots on the mesentery, mesenteric fat, and internal organs such as the liver, intestine, and gonads, either sporadically or in clusters forming patches (Fig. 2E).

2. Parasitological findings

2.1. Morphological description of the collected isopod

Argathona spp. (Family Corallanidae, *Argathona Stebbing*, 1905) were found attached to the skin resulting in abrasions with small wounds, with a prevalence rate of 4%. Corallanidae with antennule peduncle biarticulate, basal article not expanded. With prominent frontal lamina, lateral margins clypeus backwardly produced, labrum is encompassing, narrow cutting edge mandible, large palp, and molar process was observed. Maxillule with exopod was terminated in an unguis-like point, endopod with truncate lobe. Maxilla consisted of a single simple lobe. Maxilliped has 5-articulate palp, showing all degrees of fusion between articles 2 and 3. Pereopods 1-3 with dactyls sub-prehensile without digitiform processes, pereopods 4-7 ambulatory. All Pleopods were similar (Figs. 3A, B, C & 4).

2.2. Morphological description of Praniza larva, Family Gnathiidae

The larvae were found in the buccal cavity and gills, occurring in 14 out of 50 cases (28%). The body is elongated and divided into three sections: the cephalosome,

pereon, and pleon. The cephalosome contains the antennae and mouthparts, the pereon has six pairs of pereopods, and the pleon features pleopods (Fig. 3D)

2.3. Morphological description of the collected nematode

Philometra spp. (Family: Philometridea, Baylis & Daubney, 1926) were scattered, and heavy infections were distributed and embedded in mesenteric tissue of the abdomen and internal organs such as the liver and stomach with a prevalence of 32%.

Philometra spp. are characterized by a filiform body, round and smooth cephalic end smoothed cuticle, long esophagus, and tapering posterior end (Figs. 5A, B, C, D & 6)

2.4. Morphological description of the collected cestode

Encapsulated plerocercoid *Trypanorhyncha* spp.

Blastocysts were observed in the branchial and the abdominal cavity, surrounded and adhered to the peritoneum, mesenteric fat, and abdominal organs with a prevalence rate of 23%. Internally numerous multifocal to coalescing parasitic cysts were attached or deeply embedded within the peritoneum and adhered to the serosal surfaces of the abdominal organs and gills, often extending into the muscularis. These cysts were irregular, circular to oval with a narrowed end, variably sized grayish to black in color, larvae-filled, with small amounts of serous fluid. Concurrently, numerous multifocal to coalescing dark nodules were embedded within the fibrous tissue and adhered to the serosal surfaces of the celomic organs. The plerocercus was enclosed within an oval-shaped blastocyst (Figs. 6: E, F & G, 7). The scolex was found inside the blastocyst with four long cylindrical tentacles with coiled tentacle sheaths. Four symmetrically arranged bulbs were observed at the end of a scolex.

Table 1. The prevalence of parasitic infection in examined *Epinephelus tauvina*

Parasites	Prevalence	Site of Infection	Intensity of infection	Mixed infection			
				N	C	I	P
Isopods (I)	4 %	Skin	1	+/-	/+-	_	+/-
Praniza larvae (P)	28 %	Buccal cavity, gills	3-7	+/-	+/-	+	_-
Nematodes(Philometra) N	32 %	Mesentry, liver, stomach, abdominal cavity	Heavy infection	+	+	+	+
Cestodes(Trypanorhyncha) (C)	23 %	Branchial cavity, abdominal cavity	3-9	+/-	_	+	+

+ present with, - not present alone , +/- with or without

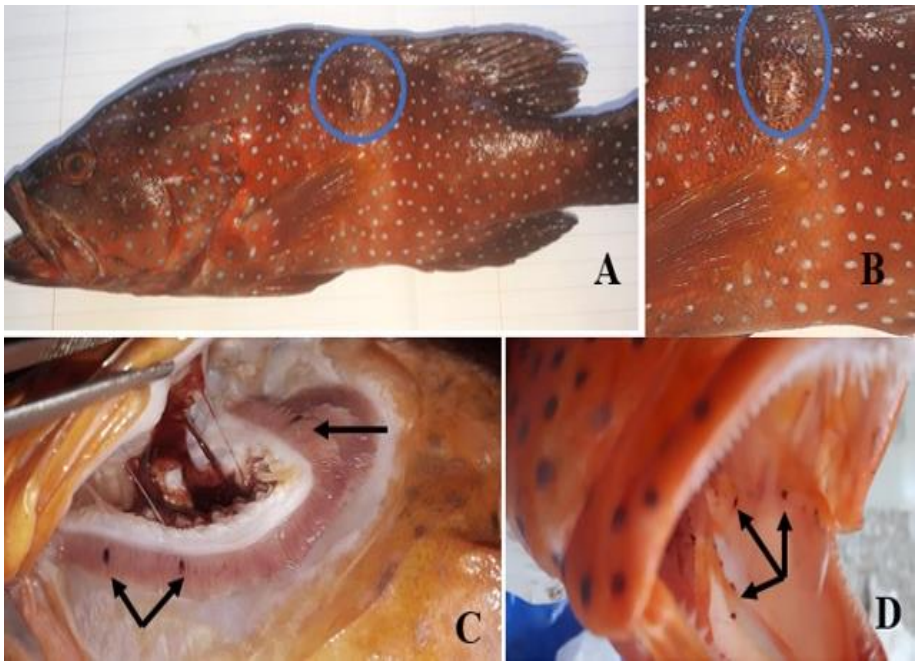

Fig. 1. A. *Epinephelus tauvina* showing *Argathona* isopod attached to the skin. **B:** Higher magnification of the isopod attached to the body surface. **C:** Infested gills showing numbers of Praniza larvae appear as black dots with excessive mucous. **D:** Paraniza larva in buccal cavity (arrow)

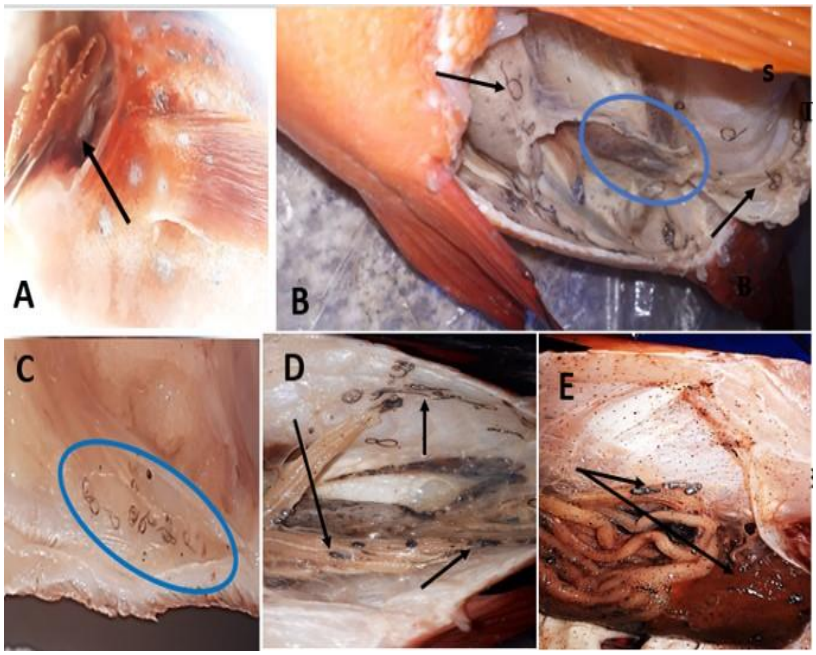

Fig. 2. A. *Epinephelus tauvina* infected with plerocercoids in the branchial cavity (arrow) **B:** infected fish showing dark grayish Encapsulated plerocercoid and blackish philometra in the abdominal cavity**. C:** Numerous nematodes in abdominal muscles. **D:** Nematodes & plerocercoid in abdominal cavity. **E:** Greasy grouper fish showed orangish, brownish-to-black spots on the mesentery and internal organs

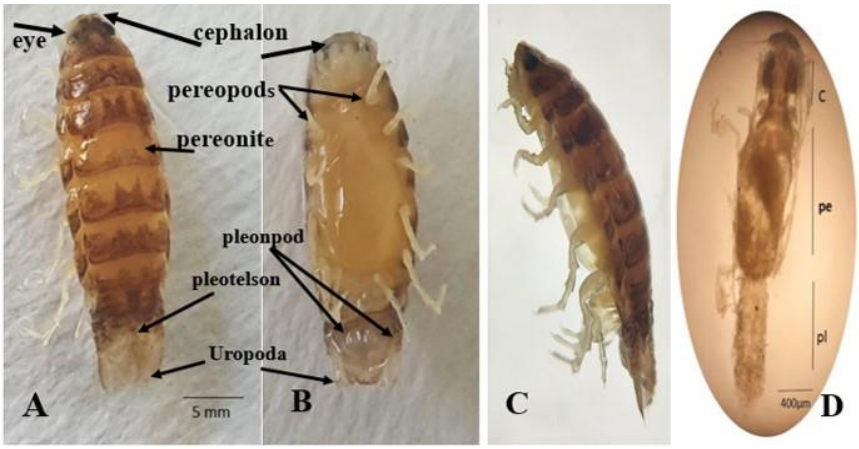

Fig. 3. A, B. Dorsal and ventral surface of *Argathona* spp. **C:** dorsal and ventral view. **D:** LM for praniza larva of Gnathia species

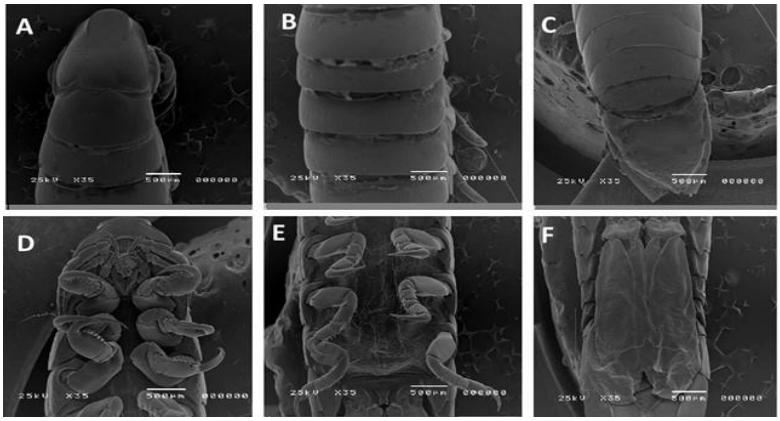

Fig. 4. Scanning electron microscopy of *Argathona* spp. **A, B, C:** dorsal surface. **D, E, F:** ventral surface

Fig. 5. A, B. LM of whole *Philometra* spp., **C:** anterior end, **D:** posterior end of the body. **E:** LM **of** Plerocercus within the blastocyst. **F:** Scolex of the plerocercus. **G:** Postbulbosa of the plerocercus. **BS:** blastocysts, **S**: Scolex, **T:** tentacles, **B:** bulbs, **PB:** postbulbosa

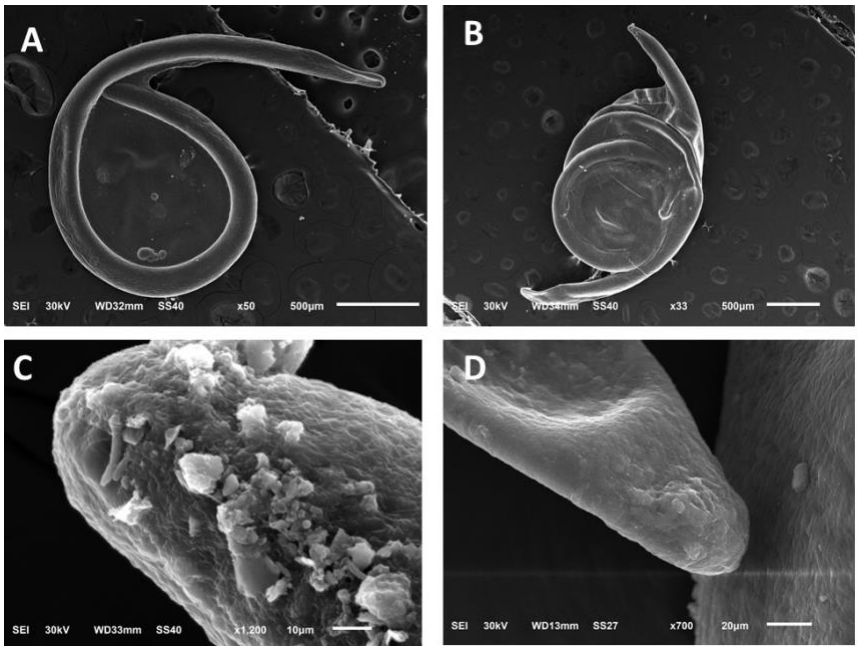

Fig. 6. A, B: Scanning electron micrographs of *Philometra* spp. from grouper fishes, *Epinephelus tauvina.* **C:** Anterior end. **D:** Posterior end of body

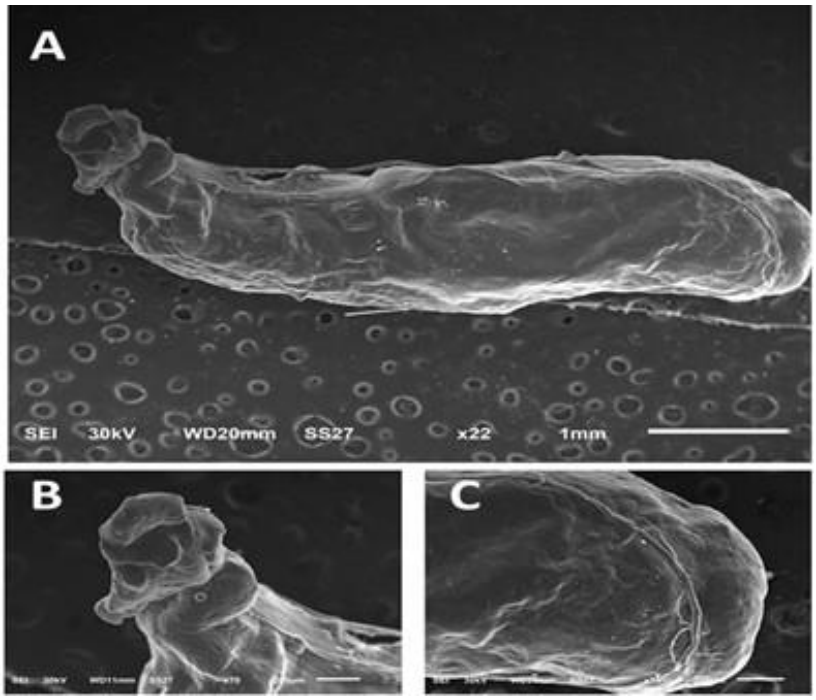

Fig. 7. A, B. Scanning electron micrographs of a plerocercoid within the blastocyst **B:** Anterior part. **C:** Posterior part

3. Histopathological results

Histopathological examination of the infected liver showed multiple parasitic cysts embedded in hepatic parenchyma. The cyst may be viable or destructed. The viable cyst was formed from scolex, internal structure, cuticle, and cyst membrane with comparatively thick fibrous capsule. Some degenerated cysts were detected, revealing distorted parasitic elements, and parts of the cyst membrane, with reactive fibrous capsule, sanguineous exudate, and inflammatory cells.

Portal aggregation of inflammatory cells and Periportal fibrosis were also observed. Severe congestion of hepatic vessels, and severe fatty and hydropic degeneration were detected with multifocal areas of necrosis, leukocytic infiltration, and a local extensive area of hemorrhage (Fig. 8).

Although, the infected spleen of *Epinephelus tauvina* revealed long thin nematode worms embedded in splenic tissue. Splenic tissue showed a multifocal area of severe lymphoid depletion, with a well-distinct melanomacrohage center (MMC) in response to parasitic infection. The spleen also showed multiple granulomas. Granuloma showed aggregation of many macrophages and lymphocytes, the whole granuloma encapsulated with a delicate layer of fibrous connective tissue, replacing and displacing a large area of the splenic parenchyma. (Fig. 9).

Histopathological observations of the skin of infected fish indicated that the parasites were present in the superficial layers as well as in the deeper layers of the epidermis. Skin tissue showed aberrant conditions including erosion, destruction, separation, dislocation, and shrinkage. In the dermis, collagen fibers were separated from each other with severe leucocytic infiltration and multifocal area of hemorrhage. At higher magnification, the morphology and architecture of the skin appear altered with erosion. The infected skin showed severe damage to both epidermis and dermis. (Fig. 10).

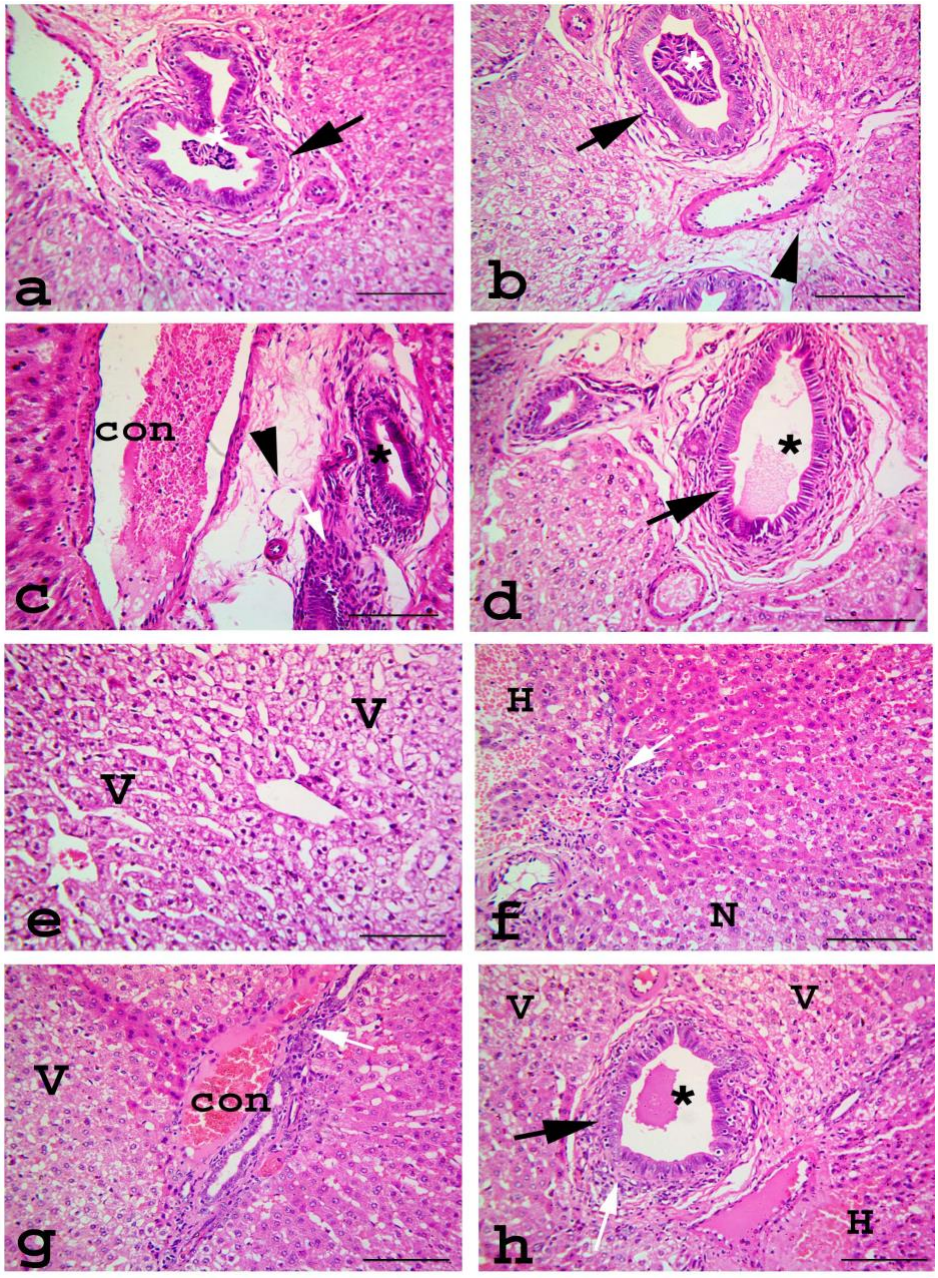

Fig. 8. Photomicrograph of hepatic tissue of *Epinephelus tauvina*, infected with plerocercoids **(a-b)** showed viable parasitic cyst (white asterisks) with thick fibrous capsule (black arrow) and vacuolation of hepatocytes (V). **(c-d)** showed degenerated parasitic cysts (black asterisks), severe congestion of portal vessels (cong), sanguineous exudate (arrowhead), and severe inflammatory cells (white arrow). **(e)** showed severe vacuolation of hepatic cells(V). **(f)** showed areas of necrosis (N), severe hemorrhage (H), and vacuolation of hepatic cells(V). **(g)** showed congestion of portal vessels (cong), vacuolation of hepatic cells(V), and leukocytic infiltration in the portal area (white arrow). **(h)** showed degenerated parasitic cysts (black asterisks), hemorrhage (H), and vacuolation of hepatic cells(V). Hematoxylin and eosin.X40. bar = 100µm

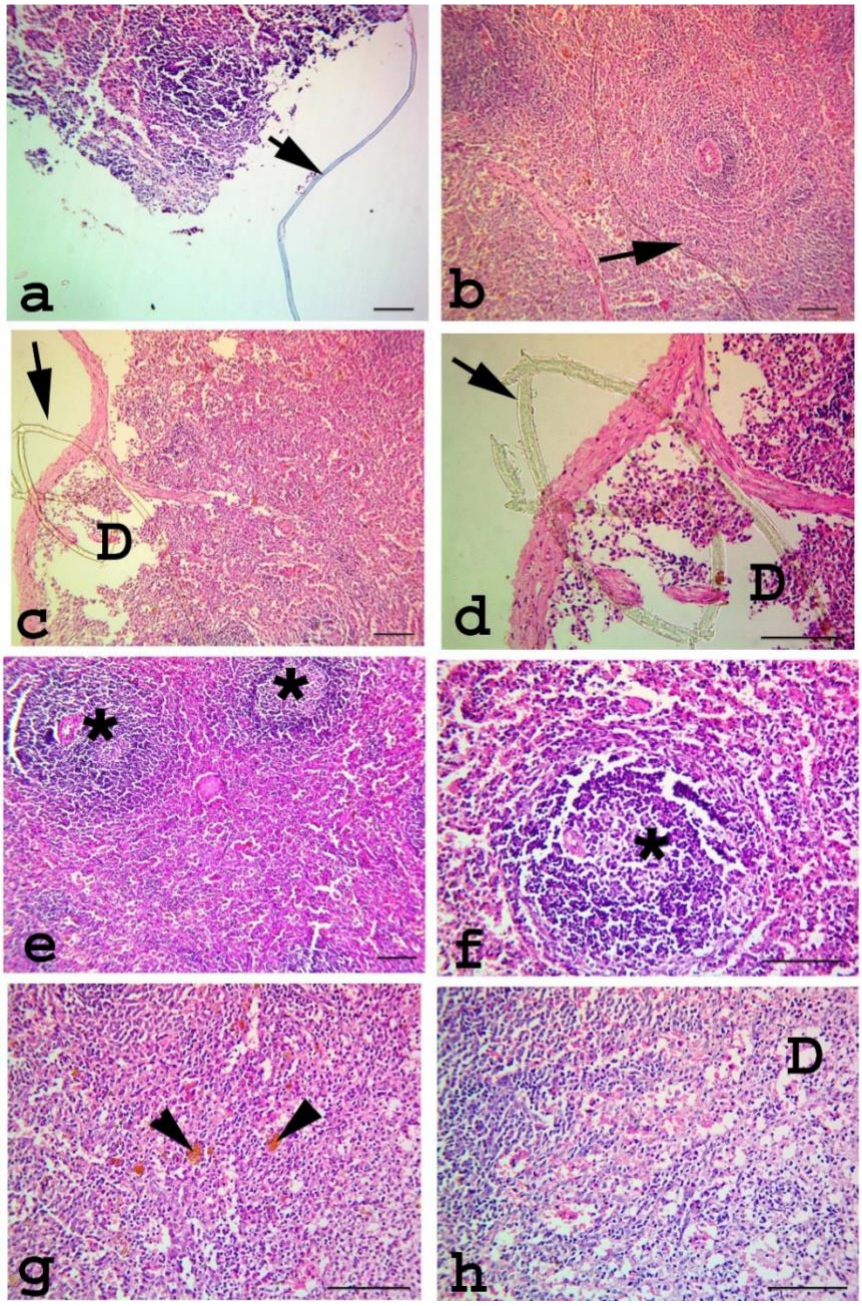

Fig. 9. Photomicrograph of splenic tissue of *Epinephelus tauvina*, infected with philometra **(a-d)** showed a long nematode embedded in splenic parenchyma (black arrow) with severe lymphoid depletion (D). **(e-f)** showed multiple granulomas embedded in splenic parenchyma (black asterisks). **(g)** showed prominent melanomacrohage centers (arrowhead). **(h)** showed lymphoid depletion (D). Hematoxylin and eosin. bar = 100µm

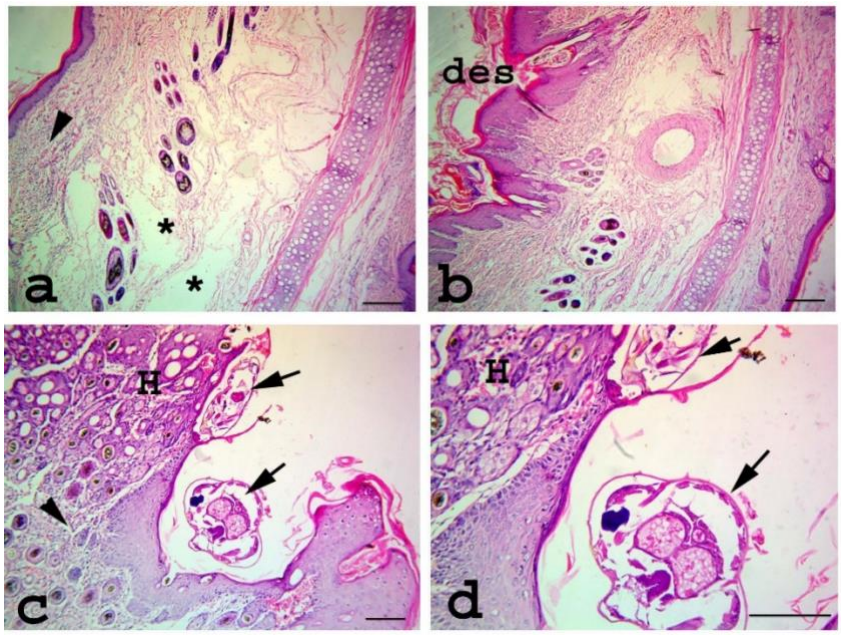

Fig. 10. Photomicrograph of skin of *Epinephelus tauvina*. infected with isopods. **a:** showed widely separated collagen fibers of the dermis from each other (black asterisk), with severe leucocytic infiltration (arrowhead). **b:** showed severe destruction of superficial and deep layers of the epidermis (des). **c-d:** Protozoans were found at the surface as well as penetrated in the deeper layers of the epidermis (black arrow), with an area of hemorrhage(H) and leucocytic infiltration (arrowhead). Hematoxylin and eosin. bar - 100µm

DISCUSSION

A variety of parasite species affect marine fish, they are present in several kinds of tissues and organs, resulting in severe economic losses **(Tadros *et al.*, 2020)**. In the present study, a total of four different parasite species (*Argathona* sp., Praniza larvae, *Philometra* sp., and *Trypanorhyncha* sp.) were found, no gross lesions were revealed externally, except for isopod infestations, which can be visibly spotted on the skin, leading to abrasions and tiny wounds. This result was similar to those reported by **Purivirojkul and Songsuk (2020)** and **Abdulmohsen *et al.* (2024)**, who found small white isopods attached externally to the skin, and mouth cavities. The postmortem findings are similar to that recorded by **Lamie and Abdel-Mawla (2015)**, who found praniza larvae as small black or grey dots attached to gills or on the buccal cavity with excessive mucus secretion which leads to adhesion of lamellae in some cases. Additionally, the current results match those of **Purivirojkul and Songsuk (2020)**, who isolated the praniza stage from 15 species of fishes in the Gulf of Thailand (*Epinephelus areolatus, E. coioides, E. erythrurus* and *E. quoyanus*).

The endoparasitic nematodes, Philomitra were detected in *Epinephelus tauvina* as a reddish to black color coma-shape. These results are congruent with those of **Abo-Esa**

and Abdel-Mawla (2012), who recovered the reddish *Philometra* sp. from the ovaries of *Lethrinus lentijan*, and **Moravec and Bakenhaster (2021)**, who isolated 2 types of *Philometra* from *Tylosurus crocodilus.* The orange, brownish, and black spots on mesentery, mesenteric fat and internal organs such as the liver, intestine, and gonads, sporadic or in clusters making patches observed in this study in case of infection by *Philometra* or mixed with plerocercoid as a result of an allergic reaction of fish. These findings are agreeable with the findings of **Adel (2013)**, who observed granulomatous reaction by the host tissue against the parasite, mononuclear inflammatory cells, and eosinophilic granular cell infiltration, together with necrosis of the pancreatic tissue, which affect fish marketability. A similar study was performed by **Attia *et al.* (2021)**, who recorded granulomatous reaction in the skeletal muscles of orange-spotted grouper *(Epinephelus coioides)* infected with Hufmanela spp. The inflammatory response appeared as a chronic inflammatory reaction in the form of granuloma formation between the muscular tissue in some fish species infected with the nematodes parasite .

Meanwhile, encapsulated plerocercoids were detected as a grayish-to-black color. This result concurs with that obtained by **Abo-Esa and Badawy (2006)**, **Al-Zubaidy and Mhaisen (2011)**, **Abo-Esa and Abdel-Mawla (2013)**, **Abdel-Mawla *et al.* (2015)**, **Abd El Maged *et al.* (2021)** and **Morsy *et al.* (2022)**. Trypanorhycha larvae infect a diverse range of marine invertebrates mostly using fish as intermediate or paratenic hosts. The infected fish may represent marketing problems for commercially exploited species causing economic losses only a few cases of accidental human infections by trypanorhynchs have been reported when eating raw or poorly cooked fish containing plerocercoid, causing allergic reactions **(Abdelsalam *et al.*, 2016; Kuraiem *et al.*, 2016)**.

In the examined fish, the prevalence rate of isopods was 4%, which is similar to the results obtained by **Eissa *et al.* (2020)**, who reported a prevalence of 4.54% in marine fish infected in the Suez Canal, Ismailia province. However, this rate is lower than that recorded by **El-Lamie and Abdel-Mawla (2015)**, who found a prevalence of 10.7% in the skin of *Mugil capitus*, and by **Zayed *et al.* (2023)**, who reported 16.1% in various fish species from the Egyptian waters of Alexandria. Similarly, **Abdulmohsen *et al.* (2024)** isolated isopods with a prevalence of 16% from *Epinephelus chlorostigma* in Suez Governorate. Conversely, our result is higher than the prevalence recorded by **Purivirojkul and Songsuk (2020)**, who found *Argathona macronema* on the skin of *Epinephelus coioides* with a prevalence of 1.48%. However, it remains lower than the prevalence of *Argathona rhinoceros*, which was recorded at 7.41% in the nasal and branchial cavities of the same fish. Variations in fish species, parasite types, and the sampling locations may explain these discrepancies.

Meanwhile, the prevalence of *Gnathia* sp. (praniza larvae) was 28%. This result closely aligned with the findings of **El-Shaer and Sallam (2023)**, who reported a

prevalence of 32% in *Mullus surmulatus*, and those of **Zayed *et al.* (2023)**, who recorded 27.1% in *Scomberomorus commerson*. However, it differed from the findings of **El-Lamie and Abdel-Mawla (2015)**, who detected a prevalence of 10% in *Siganus revulatus* and 50% in *Scarus* sp.

In cases of heavy infestation, praniza larvae may cause severe economic losses in cultured fish due to their impact on vital respiratory organs and their high saturation with blood. This can lead to hypoxia as a result of gill function loss. Additionally, *Hemogregarine bigeminal*, a protozoan blood parasite in fish, can be transmitted by praniza larvae **(Hassan, 2018)**.

The prevalence of *Philometra* spp. in *Epinephelus tauvina* was 32%, which closely matches the finding of **Abo-Esa and Abdel-Mawla (2012)**, who reported a prevalence of 34.2% in *Lethrinus lentijan* from the Red Sea. However, this result differed from the findings of **Moravec and Bakenhaster (2021)**, who isolated two species—*Philometra barracudia notabilis* and *Philometra consimilis*—with prevalence rates of 20 and 80%, respectively, from *Tylosurus crocodilus* on the Atlantic coast of Florida.

The prevalence observed in this study is also lower than the 50% prevalence recorded in the ovaries of *Epinephelus* spp. but higher than the 20% recorded in the ovaries of *Saurus tumbil* from the Red Sea **(Tantawy & Abo-Esa, 2007)**. Furthermore, it exceeds the rates reported by **Mohamed *et al.* (2010)** from *Epinephelus tauvina*, *Lethrinus nebulosus*, and *Epinephelus chlorostigma* in the Arabian Gulf (24.13, 21.87, and 20%, respectively) and **Moravec *et al.* (2021)**, who recorded 5% in the ovaries of *Lutjanus lutjanus* and 3% in the ovaries of *Platycephalus indicus*. These variations may be attributed to differences in climatic conditions, host species, fish size, and sampling periods.

Regarding the prevalence of *Trypanorhyncha* sp. (23%), the results are similar to those obtained by **Al-Zubaidy and Mhaisen (2011)**, who reported a prevalence of 24.3% in the body cavity of certain Red Sea fish, as well as **Abo-Esa and Abdel-Mawla (2013)**, who recorded 20% in *Trachurus indicus*, and **Abdel-Mawla *et al.* (2017)**, who observed 24% in *Sphyraena jello* and 28% in *Trachurus indicus*. However, the prevalence in this study is lower than that reported by **Abo-Esa and Badawy (2006)** for *Hamour* fish (66.6%) and **Abo-Esa and Abdel-Mawla (2013)** for *Saurida undosquamis*(70%) and *Sardinella* sp. (40%). It is also lower than the findings of **Mahmoud *et al.* (2015)**, who recorded prevalence rates of 46%, 44%, and 36% in *Epinephelus gigas*, *Sciaena umbra*, and *Scomber* spp., respectively. Additionally, it is lower than the rates reported by **Abdel-Mawla *et al.* (2017)** for *Scomberomorus commerson* (30%), **Morsy *et al.* (2022)** for *Epinephelus haifensis* (76.5%) and **Abd El Maged *et al.* (2021)**, who recorded 44% in the grouper fish. These differences may be ascribed to variations in the localities where the fish specimens were collected, the species examined, and the types of parasites detected.

CONCLUSION

The current study highlights the clinical picture, morphological features, and the associated pathological impact of the parasites infecting the greasy grouper from Safaga City in the Red Sea province. Although, the previous results indicated that the infected *Epinephelus tauvina* had no pathognomonic clinical abnormalities, except isopoda. The highest infectation was *Philometra* spp., followed by praniza larvae, *Trypanorhycha* and isopod Argathona. Moreover, the infected fish are marketing repulsive with economic losses. Confirmed identification was done using optical and electron microscopy to analyze the specimens' morphology. The histopathological alterations in tissues were described in the skin, liver, and spleen.

ETHICAL APPROVAL

This study was approved by the Ethics Committee of Suez Canal University. All animal experiments were conducted following the guidelines of the Guide for the Care and Use of Laboratory Animals, Faculty of Veterinary Medicine Science, Suez Canal University, Egypt (Approval No. 2022050).

REFERENCES

Abdulmohsen, M.; Abdel-Mawla, H.I.; El-Lamie, M.M.; Kamel, M.S.; Abdel-Raheem, M.S.; El-Ghareeb, R.W.; Meligy, M.A. and Abouelhassan, E.M. (2024). new occurrence of *Cirolana capricornica* (Isopoda: Cirolanidae) from *Epinephelus chlorostigma* in Suez Governorate, Egypt. Veterinary World, EISSN: 2231-0916. Available at www.veterinaryworld.org/Vol.17/January-2024/17.pdf

Abdelsalam, M.; Abdel-Gaber, R.; Mahmoud, M.A.; Mahdy, O.A.; Khafaga, N.I.M. and Warda, M. (2016). Morphological, molecular, and pathological appraisal of *Callitetrarhynchus gracilis plerocerci* (Lacistorhynchidae) infecting Atlantic little tunny (*Euthynnus alletteratus*) in Southeastern Mediterranean. Journal of Advanced Research, 7: 317–326.

Abd EL Maged, R.R.; Abo-Esa, J.F.K. and El Moghazi, D.F. (2021). Identification of Selected Cestodes Affecting Some Marine Fish. Egyptian Journal of Animal Health 1, 3(2021), 21-29

Abdel-Mawla, H. ; El-Lamie, M. and Dessouki, A. A. (2015). Investigation on ectoparasitic crustacean diseases in some Red Sea fishes and their associated pathological lesions. BVMJ. 28(1): 301-309.

Abo-Esa, J.F.K. and Badawy, G.A. (2006). Internal helminth parasitosis as defect Biomarkers of environmental pollution in Epinephelus spp (Hamour) marine fish. J. Egypt Vet. Med. Asso., 66 (3): 227-238.

Abo-Esa, F. K. Jihan and Abdel-Mawla, I. Heba (2012). Studies on prevailing parasitic infections in some marine fishes from Red Sea, Suez Governorate. Egyptian Journal for Aquaculture 2 (2).

Abo-Esa, J.F.K. and Abdel-Mawla, H.I. (2013). Larval cestodiasis in some Marine Fishes with reference to the molecular identification and its effects on public health. Egy. J. aquac., 3 (1):1-12 ISSN: 2090-7877.

Adel, A.H. (2013). Anatomy and Histology of the digestive system of the carnivorous fish, the brown-spotted Grouper, *Epinephelus chlorostigma* (Pisces; Serranidae) from the Red Sea. Life Sci J 10(2):2149–2164.

Al-Zubaidy, A.B. and Mhaisen, F.T. (2011). Larval tapeworms (Cestoda: Trypanorhyncha) from some Red Sea fishes, Yemen. Mesopot. J. Mar. Sci., 2011, 26 (1): 1 – 14.

Aneesh, P.T.; Sudha, K.; Helna, A.K.; Anilkumar, G. and Trilles, J.P. (2014). Multiple parasitic crustacean infestation on belonid fish *Strongylura strongylura*. ZooKeys.; 457:339.

Aneesh, P.T.; Helna, A.K.; Sudha, K. and Anilkumar, G. (2018). *Agarna malayi* Tiwari 1952 (Crustacea: Isopoda: Cymothoidae) parasitizing the marine fish, *Tenualosa toli* (Clupeidae) from India: redescription/description, life cycle and pattern of parasitic occurrence. Zoological Studies, 57: 25.

Aneesh, P.T.; Hadfield, K.A.; Smith, N.J. and Biju Kumar, A. (2021). Morphological description and molecular characterization of a new species of Anilocra Leach, 1818 (Crustacea: Isopoda: Cymothoidae) from India. International Journal for Parasitology: Parasites and Wildlife, 14: 321–328.

Attia, M. M.; Mahmoud, A.M. and Ibrahim, M.M. (2021). Morphological and pathological appraisal of Huffmanela sp. (Nematoda: Trichosomoididae) infecting orange-spotted grouper (*Epinephelus coioides*, Hamilton, 1822) at Jubail Province, Saudi Arabia: a case report; J Parasit Dis. https://doi.org/10.1007/s12639-021-01394-x

Bernet, D.; Schmidt, H.; Meier, W.; Burkhardt-Olm, P. and Wahi, T. (1999). Histopathology in fish: Proposal for a protocol to assess aquatic pollution. J. Fish Disease, 22: 2534.

Eissa, I. A. M.; Ismail, M. M. l. ; Abd El-Wahab, M. M. ; Dessouki, A. A.; Abdel-Mawla, H. I. and Qorany, R. A. (2020). Mixed parasitic infestation in *Dicentrarchus labrax*,

Dicentrarchus punctatus and *Sparus aurata* in Suez Canal. Int. J. of Fish. and Aquat. Res., ISSN: 2456-7248; RJIF 5.44.

Eissa, I.A.M.; Ismail, M.M.; El Hadedy, F.A.R.A.M. and Abou Elhassan, E.M. (2022). Light and Scanning Electron Microscopic Studies on Caligus spp. in Mugilid fish. Egyptian Veterinary Medical Society of Parasitology Journal (EVMSPJ), 18(1): 35-44.

El-Shaer, W. and Sallam, N. H. (2023). Parasites Causing Respiratory Manifestations in *Mullus surmulatus* Fish from Safaga at Red Sea Governorate. Egyptian Journal of Aquatic Biology & Fisheries, 27(5): 171 – 184.

El-Lamie, M. and Abdel-Mawla, H. (2015). Isopods infestation in relation to vibriosis of some marine fishes. Egy. J. Aquac., 5(2):13-30 (2015) ISSN: 2090-7877.

Hassan, A. M. (2018). Diversity of metazoan parasites of two reef-associated fish species from Qatar (*Acanthopagrus Bifasciatus* and *Pomacanthus Maculosus*). Thesis the Faculty of the C. A. S. Qatar Uni.

Khalaf-Allah, H.M.M. and Yousef, O.E. (2019). Infestation Study of *Livoneca redmanii* (Isopoda, Cymothoidae) on Solea solea in Lake Qarun, Egypt. Journal of the Egyptian Society of Parasitology, 49(1): 105- 114.

Kuraiem, B.P.; Knoff, M.; Felizardo, N.N.; Gomes, D.C. and São Clemente, S.C. (2016). *Callitetrarhynchus Speciosus* (Linton, 1897) Carvajal & Rego, 1985 Trypanorhyncha (Cestoda) Parasitizing *Priacanthus Arenatus* (Cuvier, 1829) (Osteichthyes, Priacanthidae) From Rio De Janeiro Coast, Brazil. Neotropical Helminthology. 10(1): 33-40.

Lobna, S. M. Abd Elmeged and Abdullah, A.A. Alghamdi (2022). The effect of consuming different proportions of hummer fish on biochemical and histopathological changes of hyper-glycemic rats, Saudi Journal of Biological Science (Saudi J Bio Sci) 2022 Jan; 29(1): 140–147.

Lucky, Z. (1977). Using of PAS stain. J. Fish Dis. 13(5): 3-5.

Mahmoud, E.N.; Alhindy, M.K. and Fahmy, M.M. (2015). Trypanorhynch Cestodes Infecting Mediterranean Sea Fishes, Egypt: *Callitetrarhynchus gracilis* Larvae (Pintner, 1931) as a Bio-indicator of Heavy Metals Pollution. Oceanography 3: 133.

Meyer, C. M. and Olsen, W. O. (1992). Essentials of parasitology. W. M. C. Brown Co. Publishers, USA: P. 288.

Mohamed, A. H.; Hassan, M. A. and Mahmoud, M. A. (2010). Infestation of Some Marine Fish Species with Red Worm *Philometra.* Arab Gulf Journal of Scientific Research, 28 (3): 137- 146

Moravec, F. (2023). Philometrid Nematodes Parasitic in Fishes. Academi

Moravec, F.; Mizher, A. J. and Ali, H.A. (2021). Records of two gonad-infecting species of Philometra (Nematoda: Philometridae) from marine fishes off Iraq, including the description of *Philometra parabrevicollis n.* sp. from the bigeye snapper *Lutjanus lutjanus* Bloch (Pisces, Lutjanidae). Syst Parasitol 98:443–453

Moravec, F. and **Bakenhaster, M. D.** (2021). Two new species of philometrid nematodes (Philometridae), *Barracudia notabilis* n. sp. and *Philometra consimilis* n. sp., from the ovary of the hound needlefish *Tylosurus crocodilus* (Belonidae) off Florida, USA. HELMINTHOLOGIA, 58, 3: 271 – 280.

Morsy, K.; Bashtar, A.R.; Abdel–Ghaffar, F.; Al Quraishy, S.; Al Ghamdi, A, and Mostafa, N. (2022)**.** First identification of four trypanorhynchid cestodes: *Callitetrarhynchus speciouses*, Pseudogrillotia sp. (Lacistorhynchidae), *Kotorella pronosoma* and *Nybelinia bisulcate* Braz J Vet Parasitol; 31(2): e003022 14/14 (Tentaculariidae) from Sparidae and Mullidae fish. Parasitol Res 2013; 112(7): 2523-2532. http://dx.doi.org/10.1007/s00436-013-3419-y. PMid:23624547

Noga, E. J. (2010). Fish disease: diagnosis and treatment. 2. Iowa: Wiley

Quiazon, K. M. A.; Yoshinaga, T. and Ogawa, K. (2008)**.** *Philometra sawara* sp. n. and a redescription of *Philometra sciaenae* Yamaguti,1941 and *Philometra nemipteri* Luo, 2001 (Nematoda: Philometridae): a morphological and molecular approach. Folia Parasitol., 55: 277– 290.

Ramachandran, P. (1973). *Philometra saltatrix* sp n., infecting the gonads of the common bluefish *Pomatomus saltatrix* (L.) off the New England coast of the United States. Zoologischer Anzeiger,191:325-328.

Rashed, M. A.; Sabreen, E. Fadl and Asmaa, M. Elnady (2021)**.** Effect of isopoda on the health status of gilthead seabream (*Sparus aurata*) Egyptian Journal of Animal Health, 1, 1 (2021), 34-43.

Refat, M.A.; Abdul Wahab, M.d.; Muhammad, Arifur, Rahman; Nahiduzzaman, M.d. and Abdullah-Al Mamun. (2023). Nutritional value of the marine fish in Bangladesh and their potential to address malnutrition: A review. Heliyon Feb; 9(2):e13385.

Santoro, M.; Iaccarino, D. and Bellisario, B. (2020). Host biological factors and geographic locality influence predictors of parasite communities in sympatric sparid fishes off the southern Italian coast. Sci Rep; 10(1): 13283.

Tadros, W.A. S.; K El-Gayar, A. and Abouelhassan, E.M. (2020). Prevalence of ecto-and endoparasites of the Sea bass Dicentrachus Labrax in Port Said Governorate, Egypt. Egyptian Journal of Aquatic Biology and Fisheries, 24(7-Special issue), 629-643.

Tantawy, E. A. A. and Abo-Esa, F. K. (2007). Some studies on Philometrid nematodes infected some marine water with relation to its public health importance. Egypt, J. Comp. Path., 20 (1): 44-52.

Tayel, S.I.; Mahmoud, S.A.; Ahmed, N.A.M. and Abdel Rahman, A.S.A. (2018). Pathological impacts of environmental toxins on *Oreochromis niloticus* fish inhabiting the water of Damietta Branch of the River Nile, Egypt. Egyptian Journal of Aquatic Biology, 22 (5): 309- 321.

Purivirojkul, W. and Songsuk, A. (2020). New Records of Fish Parasitic Isopods (Crustacea: Isopoda) from the Gulf of Thailand. Animals 2020, 10(12), 2298

Yamaguti, S. (1959). Systema Helminthum. Vol. 11. The Cestodes of Vertebrates. Interscience Publishers Ltd New York, 860 s.

Yamaguti, S. (1961). Systema Helminthum. Vol. 111. The Nematodes of Vertebrates. Interscience Publishers, New York, pp.384 – 385

Zayed, O.E.; Hellal, A.M.; Zeina, A.F. and Tayel, S.I. (2023). Prevalence of parasitic isopods (Cymothoidae and Gnathiidae) on *Actinopterygii fishes* from the Alexandria coast off the Mediterranean Sea, Egypt Egyptian Journal of Aquatic Biology & Fisheries. Vol. 27(4): 847 – 866