The occurrence of Trematodes Infection in Cantang Grouper (Epinephelus fuscoguttatus lanceolatus) at Lamong Bay, Surabaya, Indonesia

Retno Desy Tri Lestari¹, Sri Subekti ², ³, ⁴ and Gunanti Mahasri³

¹Aquaculture Study Program, Faculty of Fisheries and Marine, Universitas Airlangga, Surabaya 60115, Indonesia

²Department of Marine, Faculty of Fisheries and Marine Universitas Airlangga, Surabaya 60115, Indonesia

³Department of Fish Health and Aquaculture Management, Faculty of Fisheries and Marine Universitas Airlangga, Surabaya 60115, Indonesia

⁴Entomology Study Group of Institute of Tropical Diseases, Universitas Airlangga, Surabaya 60115, Indonesia

*Corresponding author, Email address: ssbendryman@yahoo.com

Abstract

Cantang grouper (Epinephelus fuscoguttatus lanceolatus) is a type of marine fish resulted from the engineering of grouper hybridization between female tiger grouper (Epinephelus fuscoguttatus) and male kertang grouper (Epinephelus lanceolatus). The aim of this research was to know the occurrence of trematodes infested in Cantang grouper fish (E. fuscoguttatus lanceolatus) at floating net cages, Lamong Bay, Surabaya, Indonesia. The results showed that 100 samples taken from three floating net units, the total prevalence of ectoparasites in Cantang grouper was 38%. There were 4% infested with Benedenia epinepheli, 3% were infested with Neobenedenia girellae and 26% infested with Pseudorhabdosynochus epinepheli. While infestation of 5% was mixed of Benedenia epinepheli and Pseudorhabdosynochus epinepheli.

1. Introduction
Grouper fish is one of the commercial marine fish that is now widely cultivated and is an export commodity. Ministry of Marine Affairs and Fisheries stated that grouper fish production in 2009 to 2013 in Indonesia has increased, respectively 8.791 tons, 10.398 tons, 10.580 tons, 11.950 and 18.864 tons (Ministry of Maritime Affairs and Fisheries, 2012).

Grouper fish farming in Surabaya is located in a coastal area of Lamong Bay which cultivated Cantang grouper (Epinephelus fuscoguttatus lanceolatus) in floating net cage. This farming is cultivation started in December 2014. This grouper fish (E. fuscoguttatus lanceolatus) is a type of fish resulted of grouper hybridization engineering between female tiger grouper (E. fuscoguttatus) and male Kertang grouper (E. lanceolatus) fish (Center of Brackishwater, 2012).

The morphology of this fish is similar to the two parent species, while it grows better than the tiger grouper and the Kertang grouper itself. The results of seawater monitoring in Lamong Bay Surabaya, Indonesia in 2014 showed that the sea water quality was below the seawater quality standard for biota; it also showed the existence of pollution. Water quality parameters in unstable cultivation conditions caused stress on fish and increase of fish susceptibility to disease. Therefore, this study was to know the occurrence of trematode infestation especially ectoparasites worms in Cantang grouper fish (E. fuscoguttatus lanceolatus) at floating net cages, Lamong Bay Surabaya, Indonesia.
2. Materials and Methods

2.1 Place and Time of Research

Life specimens of Cantang grouper fish were taken from floating net cages at Lamong Bay Surabaya, Indonesia.

2.2 Tools and Materials

Tools that used in this study are a digital camera, cool box, microscope which's completed by optilab, microscope equipped with Lucida camera, and surgical scissors.

The materials used in this study were Cantang grouper (E. fuscoguttatus-lanceolatus).

2.3 Procedures

The sample was taken from Floating Net Cages at Lamong Bay, Surabaya. The samples used in this study were 100 groupers (three months old with a length of 15-20 cm). The fish were examined for ectoparasites under a dissecting microscope. The semichoen-acetic carmine method was applied for parasitic staining referred to Kuhlmann’s modification. The illustrations used a binocular microscope equipped with Lucida camera. The identifications key of trematodes was according to Kabata (1985), Margolis & Kabata (1984) and Ogawa, Bondad-Reantaso, Fukudome & Wakabayashi (1995b).

2.4 Research Parameters

The main parameter of this study is the occurrence of trematodes infestation especially ectoparasites in Cantang grouper fish (E. fuscoguttatus lanceolatus).
2.5 Data Analysis

Analysis and presentation of the data used analyzed descriptively. Data of ectoparasites' identification were shown in the figures, while prevalence data was presented in the table.

3. Result and Discussion

3.1 Identification of Trematodes

The identification of trematodes in Cantang grouper (E. fuscoguttatus lanceolatus) on floating net cages at Lamong Bay Surabaya, Indonesia was that three species of trematodes were Benedenia epinepheli, Neobenedenia girellae, and Pseudorhabdosynochus epinepheli. The three species of trematodes can be seen in figure 3.1 to figure 3.3.

![Figure 3.1](image)

**Figure 3.1** A. *Benedenia epinepheli* with a binocular microscope and B. *Benedenia epinepheli* with a binocular microscope equipped with Lucida camera.

Description: 1) Accessory sclerite, 2) Anterior hamuli, 3) Posterior hamuli.

a) Anterior attachment organ b) Pharynx, c) Testis, d) Ophisthaphor
Figure 3.2 A. *Neobenedenia girellae* with a binocular microscope and B. *Neobenedenia girellae* with a binocular microscope with Lucida camera.

Description: 1) Accessory sclerite, 2) Anterior hamuli, 3) Posterior hamuli.

a) Anterior attachment organ b) Eye spots, c) Pharynx, d) Testes,

e) Ophisthaphor

Figure 3.3 A. *Pseudorhabdosynochus epinepheli* with a binocular microscope and B. *Neobenedenia girellae* with a binocular microscope with Lucida camera.

Description: a) Pharynx, b) Copulatory organ, c) Eye spots, d) Squamodisc, e) Anchors
Benedenia epinepheli

This parasite was found in the body surface and skin of Cantang grouper fish. *Benedenia epinepheli* was found on the surface of Cantang grouper fish. This was in accordance with Jithendran, Vijayan, Alavandi & Kailasam (2005) that *B. epinepheli* infested the fins and skin of groupers (*Epinephelus tauvina*) in Chennai, India. This parasite belongs to *Benedenia epinepheli*, Family Capsalidae, Order Monophiscotylea, Subclass Monogenea, Class Trematoda. Identification of worms is based on morphological features. Dorso-laterally flat, a pair of attachment organs, two pairs of eyespots, opisthaptor in posterior body and wavy shape of the pharynx were presented in this parasite. This is in accordance with the statement of Morsy, K., Abdel-Monem, S., Abdel-Ghaffar, F., Bashtar, A. R. A. R., Ghamdi, A. A. & Abdel-Gaber, R. (2011) that two pairs of eyespots on the anterior portion of the body were observed in *Benedenia*. The anterior part is smaller than the posterior part. In the posterior part of the body is equipped with hooks of opisthaptor. This opisthaptor is ovoid, not insulated, shaped like a plate and equipped with three pairs of large hooks and 14 pieces of small hooks on the edge of opisthaptor. The measurement result showed that the parasite's opisthaptor was 0.6-0.72 mm in diameter. The length and width of anterior attachment organs were 0.14-0.22 mm and 0.11-0.23 mm, respectively. The body of the parasite was flat and 2-3 mm in size. The opisthaptor was equipped with a pair of accessory sclerites with a length of 0.08-0.12 mm and two pairs of hamuli including anterior hamuli of 0.09-1 mm in size and posterior hamuli of 0.05-0.08 mm in size. The length and width of *Benedenia epinepheli* pharynx were 0.13-0.36 mm and 0.15-0.26 mm, respectively. The length and width of testes were 0.18-0.24 mm and 0.2-0.33 mm. From the above description, this ectoparasite belongs to the species of *Benedenia epinepheli*. 
corresponding to the description of *B. epinepheli* from the Japanese marine fish by Ogawa, Bondad & Wakabayashi (1995a). On their report states that the length and width of *Benedenia epinepheli* were 1.5-3 mm and 0.8-1.6 mm. Moreover, they reported that opisthaptor of *B. epinepheli* collected from the Japanese marine fish was 0.4-0.75 mm in diameter, and it is accessory sclerites were 0.04-0.09 mm, anterior hamuli were 0.06-1 mm and posterior hamuli were 0.04-0.07 mm.

*Neobenedenia girellae*

This parasite belongs to a class Trematoda subclasses Monogenea, order Monophiscotylea, family Capsalidae, genus *Neobenedenia* and species *N. girellae*. *Neobenedenia girellae* was found to attach to the fins and skin of Cantang grouper fish. The length and width of these parasites were 4.7-4.9 mm and 1.9-2.0 mm. Ophisthapthor was 1.1-1.3 mm in size and was equipped with a pair of 0.22-0.25 mm accessory sclerites, two pairs of 0.29-0.38 mm anterior hamuli in length and 0.1-0.15 mm posterior hamuli in length.

A pair of anterior attachment organs and two sets of eyes were observed in *N. girellae*. The posterior portion of the eye was greater than that of the anterior part. A pair of tests was found in the middle of the body. This description is consistent with the statement of Ogawa, Bondad-Reantaso, Fukudome & Wakabayashi (1995b) who discovered *N. girellae* from cultured marine fishes of Japan.

*Pseudorhabdosynochus epinepheli*

The length and width of this parasite were 266.2 μm and 59.64 μm. Its pharynx was 20.55-20.81 μm in diameter. Dorsal and ventral squamodisc have length and width 23.4 μm and 30.74 μm. The body is an elongated shape. Two pairs of anchors were in the posterior part of the parasite. Squamodisc was found in which this parasite used to
attach the host. Squamodisc is one of Family Diplectanidae characteristics, therefore this parasite belonged to Family Diplectanidae in accordance with Rohde (2005).

Characteristics of copulatory organ morphology were possessed in accordance with the description expressed by Wu, X. Y., Li, A. X., Zhu, X. Q. & Xie, M. Q. (2005). Images of copulatory organs drawn using by the binocular microscope equipped with a Lucida camera. This parasite belongs to a Class Trematoda, Subclass Monogenea, Order Monophiscotylea, Family Diplectanidae, genus *Pseudorhabdosynochus*, and species *Pseudorhabdosynochus epinepheli*. These parasites were found on the surface of a grouper fish and their opisthaptor with three pairs of hooks were observed on the posterior body. The result showed that the opisthaptor was 0.6-0.72 mm in diameter. The length and width of anterior attachment organs were 0.14-0.22 mm and 0.11-0.23 mm, respectively. The body of this parasite was not segmented, flat and 2-3 mm in size. The opisthaptor is equipped with a pair of accessory sclerites with a length of 0.08-0.12 mm and two pairs of hamuli including anterior hamuli of 0.09-1 mm in size and posterior hamuli of 0.05-0.08 mm in size.

### 3.2 Prevalence of Cantang grouper infected Trematodes

The prevalence rate of trematode infection in Cantang grouper fish cultivated at floating net cages, Lamong Bay Surabaya was 38.0% which the prevalence in individual floating net cage 1, 2 and 3 was 27.5%, 46.7% and 43.3 %, respectively (Table 1).

The presence of trematode infection at floating net cages cultivation could be caused by poor maintenance of fish and uncontrolled water quality depending on the season. According to characteristics described by Kabata (1985), these trematodes were in Subclass Monogenea. A direct life cycle was observed in these parasites. If the monogenean lives in the environment that the appropriate host also lives, the parasite
will stick and properly develop. This is in accordance with the statement of Kennedy (1975) that the important factor is the presence of host contact with parasites, if the host conditions are suitable then the parasite can survive. Another suspected factor is host resistance decrease caused by fish stress due to disturbing currents and water circulation that is disrupted due to dirty nets and water circulation.

**Table 1.** Prevalence of Cantang grouper infected by *Benedenia epinepheli*, *Neobenedenia girellae*, and *Pseudorhabdosynochus epinepheli* at floating net cages of Lamong Bay, Surabaya.

| Floating net cages | Total of samples | Prevalence of Trematodes | Total | Percentage (%) |
|--------------------|-----------------|--------------------------|-------|----------------|
|                    |                 | a   | b   | c  | ac |       |       |
| 1                  | 40              | 1   | 0   | 9  | 1  | 11   | 27.5  |
| 2                  | 30              | 2   | 2   | 8  | 2  | 14   | 46.7  |
| 3                  | 30              | 1   | 1   | 9  | 2  | 13   | 43.3  |
| Total              | 100             | 4   | 3   | 26 | 5  | 38   | 38.0  |

Information: a. Single infection of *Benedenia epinepheli*,

b. Single Infection of *Neobenedenia girellae*,

c. Single infection of *Pseudorhabdosynochus epinepheli*,

ac. Mixed infection of *Benedenia epinepheli* dan *Pseudorhabdosynochus epinepheli*
4. Conclusion

The occurrence of trematodes infestation in Cantang grouper fish (*E. fuscoguttatus lanceolatus*) at floating net cages, Lamong Bay, Surabaya, Indonesia were *Benedenia epinepheli, Neobenedenia girellae* and *Pseudorhabdosynochus epinepheli* and the prevalence of Trematodes worms in cantang grouper was 38%.

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