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Type of helminth parasite in Snakehead fish (*Channa striata*) from Seuneubok Cina, Indra Makmur, Aceh Timur, Indonesia

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Abstract. Snakehead fish (*Channa striata*) is one of the freshwater fish in tropical regions such as Asia and Africa, and has high nutrition but is difficult to cultivate. In Indonesia, Snakehead fish are found in paddy fields, swamps and ditches, making them susceptible to parasites. Constraints in Snakehead fish cultivation are caused by the nature of the fish as a predatory, lack of the availability of food and environmental conditions that can affect the growth of the fish. The former paddy fields in Seuneubok Cina of Indra Makmur, Aceh Timur, Indonesia, is found many Snakehead fish. This research aims to determine the types of parasites that infect Snakehead fish. The Snakehead fish was taken using electrofishing gear with purposive sampling method, then dissected and identified the endoparasites which contained in the fish intestines. The research results found three genus of parasites: *Pallisentis*, *Procamallanus* and *Camallanus*.

Keywords: *Channa striata, camallanus, endoparasit, pallisentis, procamallanus*

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1. Introduction

Fish in swamp waters can be grouped into two groups, white color fish (Whitefishes) and black color fish (Blackfishes). One example of swamp fish is Snakehead fish. Snakehead fish is one of the endemic swamp fish species whose presence is decreasing. Snakehead fish (*Channa striata*) is a swamp fish that has not been widely cultivated. Snakehead fish cultivating has not given a maximum result, because these fish are predatory, lack of suitable feed

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availablity and environmental conditions that must be in accordance with the growth of this fish. Snakehead fish is found in paddy fields or rainfed (Amilhat, E. and Lorenzen, 2005), swamps and ditches. Such environmental conditions causing Snakehead fish to be susceptible to ectoparasites such as *Argulus nobilis* as the main species of ectoparasites in *channa striata* fish (Rajiv, Ravi, and Zahaya. 2011).

Fish disease is mostly caused by contamination from outside (external) or environmental changes (Khan, 2012), both infectious and non-infectious. Worm infections often become disease agents in the gills, digestive tract, and fish muscles. *Channa striata* has been widely investigated in Bangladesh (Bashirullah, A.K.M. 1973; Ahmed, 1981; Arthur, and Ahmed, 2002; Ghani, and Bhuiyan 2011), Nigeria (Esther, Daniel, and Chris, 2015) and India (Bhattacharya, 2007). Snakehead fish are in great demand and consumed by humans as a source of protein, because the levels of protein found in the fish such as albumin and zinc are quite high (Mustafa, Widodo, and Kristianto, 2012). Albumin is useful for the formation of new cells and replacing damaged cells, so that in Indonesia this fish becomes the consumption of sick people to accelerate wound healing.

Snakehead fish habitat is very influential on the growth of parasites so that it can reduce production and eventually cause losses. Parasites found in freshwater fish are trematode (monogenea and digenea), cestoda, nematode and acanthocephalans which complete their life cycle (Schmidt, 1990). In Singapore, Malacca and Seremban were found 16 species of worm such as *Senga malayana* n. sp. from the small intestine *Channa striata* and *S. ophicephaliana, S. parva* n.sp. from the intestine of *C. micropeltes* resembling *S. lucknowensis. S. filiformis* n.sp. from the intestine of *C. micropeltes*. *Camallanus yehi* n.sp. from the intestine of *Channa striata* resembles *Camallanus ophicephali. C. longitridentatus* n.sp. from *Clarias batrachus* and *Procamallanus malaccensis* n. sp. from the intestines of *Channa lucius* (Fernando, and Furtado, 1964). The four infected worms found in *Channa striata* were: Cestoda, *Bothriocephalus cuspidatus*, Nematoda, *Ascaridia* spp. and *Camallanus intestinalus* and one Acanthocephala; *Pallisentis ophiocephali* (Kundu and Bhuiyan, 2016).

2. Materials and Methods

Snakehead fish samples were taken from the swamps of the villager's paddy fields in the area of Seuneubuk Cina, Indra Makmur, Aceh Timur, Indonesia, the swamp area was around 20x15m, the bottom of the swamp was a mud with a depth of about 1.5m. The sampling of Snakehead fish (*Channa striata*) was carried out by purposive sampling method, that is by making a shock around the former paddy fields, using electrofishing equipment and fish affected by shocks will appear on the surface of the water, then put in a plastic bag filled with air, 1 plastic bag containing 4-5 fish and this sampling was carried out 4 days.

Examination of Parasitic Worms in the Fish Digestive Tract

Fish organs to be examined are the digestive tract (intestine). Examination of the organs in the fish's body is done by dissecting the body parts of the fish from the cloaca to the pectoral part, then the intestinal organs are removed from the fish's body and placed in a petri dish containing 0.85% NaCl then observed under a microscope. The examination of intestinal contents is by removing the intestinal contents by dissecting or cutting the intestines vertically. Intestinal contents are taken little by little and placed on a glass of object, then dripped with 0.85% NaCl solution and then closed using a cover glass. Observations were made under a microscope and using a digital camera, then an examination of the intestinal wall was carried out after all the intestinal contents were removed, then a thinly sliced intestine with a length of 0.5 cm was placed in a petri and dripped with 0.85% NaCl solution and observed throughout the intestinal wall under a microscope. Parasitic identification was carried out using the Yamaguti (2063), and the terminology refers to Margolis *et al.* (1982).

3. Results and Discussion

The type of parasite in the digestive tract of Snakehead fish in the Seuneubok Cina, Indra Makmur, Aceh Timur, Indonesia obtained 3 parasite genus :

a. *Pallisentis*

Worms found in the digestive tract of Snakehead fish precisely in the contents of the intestine are *Pallisentis* those identified by the characteristics of the elongated body with a proboscis, the lines on the neck are clearly visible, proboscis and fibers in the proboscis are seen more than other parasites, and the body parts have horns, *Pallisentis* body is muttered and can be seen in Figure 1.

Figure 1. *Pallisentis* which infects Snakehead fish (C. *Striata*) in the Seuneubok Cina, Indra Makmur, Aceh Timur, Indonesia in 0.85% NaCl, (10x40) a. proboscis; b. neck; c. body.

Pallisentis has a body extending around 10.20-22.94mm in width 0.36-0.65mm in females while in males it is about 7.88-12.20mm in length and 0.40-0.46mm in width, there are 8-9 spiral lines hooks with four hooks each have a cuticle, and 35-50 rows of posterior spiral rods like rods without spinulation. Acanthocephala is characterized by ducted thorn rods, proboscic has 4 circles of 10 hooks each, with hooks in the anterior circle 2 being much larger than the posterior circle 2. Y-shaped thorns are channeled into 2 regions separated by an infinite zone. The anterior neck spines are in a complete circle of 9-17 tightly spaced thorns and the larger posterior stem spines are in the 1 (posterior) to 41 (anterior) circles extending to the level of the cement glands in the posterior males, a considerable variation of the original description and new structure (Amin et al., 2000).

The Pallisentis classification is: Animalia (Kingdom); acanthocephala (Phylum); Eoacanthocephala (Class); Gyracanthocephala (Order); Quadrigyridae (Family); Pallisentinae (Subfamily); Pallisentis (Genus) (Amin et al., 2000). Pallisentis new species are based on LM and SEM described from sexual diversity in hook and spinal structures (Gupta, Gupta, and Singhal, 2016). There is found a *Pallisentis rexus* n. sp. worm type in fresh water snakehead, *Channa striata* Bloch, from the Chiang Mai Basin (Wongkham and Whitfield, 2004). The other Pallisentis species found in India are *Pallisentis jagani* sp. from *Channa channa's* intestine (Koul et al., 1991).

In India the parasitic acanthocephala type Pallisentis is reported to have 20 species (Bhattacharya, 2007). The Pallisentis genus is acanthocephala endoparasites that inhabit the intestinal wall (Gupta, Gupta, and Singhal, 2016) Ordinary Pallisentis characterized by proboscis hook size sub genetically divided into 19 species (Amin et al., 2000).

b. Procamallanus

Procamallanus those found based on dark brown characteristics, body covered with cuticles, digestive tract clearly visible (brown-black), female body size is smaller than male, in males longer than females and male tail tips are sharp mouthpieces and have oral cavity wide (Figure 2).

Figure 2. Procamallanus found in Snakehead fish (*C. Striata*) in the Seuneubok Cina, Indra Makmur, Aceh Timur, Indonesia in 0.85% NaCl (10x40) a. Procamallanus male, b. Procamallanus female, c. digestive tract, d. oral cavity, e. male tails, f. buccal capsules.

The genus Procamallanus has a buccal capsule not clearly visible like Camallanus. Procamallanus's mouth is usually hexagonal with six papillae that have not been fully formed on the edge of the mouth and there are four large papillae located mid-anterior, the esophagus consists of two parts, anterior and posterior. Classification of Procamallanus Kingdom: Animalia, Phylum: Platyhelminthes, Class: Nematodes, Family: Camallanidae, Genus: Procamallanus. *Procamallanus* sp. is a new species of nematode. *Procamallanus (Procamallanus) pacificus* n. sp., found from the stomach of the Pacific ocean (Moravec, 2006). Pallasentis found on *Oreochromis niloticus* and *Clarias gariepinus* (Domo, and Ester, 2015).

c. *Camallanus*

Camallanus found in the digestive tract organs of Snakehead fish (*C. Striata*) identified by the presence of cavity capsules covered with cuticles, the mouth is like a strong clamp that is surrounded by a horn, the digestive tract is clearly visible on the body part of dark brown and the muscle part is clearly visible, the body is muttered with a clear line and is brown. Female Camallanus has a conical tail without mucosa, not having a well developed vulva lips (Figure 3).

Figure 3. Camallanus which is found in the digestive tract of Snakehead fish in the Seuneubok Cina, Indra Makmur, Aceh Timur, Indpnesia in 0.85% NaCl (10x40 a. muscle b. intestinal part c. capsule cavity.

A new species of Camallanus in freshwater *Trachemys dorbigni* turtles. The new parasite species of Callallanus is described as *Camallanus emydidius* n. sp. This new species is different from other freshwater species mainly due to the morphology of the right spicule, the number of precloacal and postcloacal male papillae, and the presence of "mucosa" in the female posterior extremity (Mascarenhas and Muller, 2017). Fish farming (*Xiphophorus maculates*) (Osteichthyes: Poecilidae) in São Paulo State, Brazil was also attacked by *Camallanus maculatus* n. Sp. (Nematodes: Camallanidae) (Martins *et al.*,, 2007). *Camallanus tridentatus* is found from the stomach, caeca and intestine of naturally infected *Arapaima gigas* from Mexiana Island, Amazon River Delta, Brazil (Santo and Moravec, 2009). *Camallanus* sp. and *Ligula intestinalis* from fresh *E. sardella* (Mgwede and Msiska, 2018). *Camallanus polypteri* n. sp. obtained from *Polypterus bichir*, *Synodontis schall* and *Clarias anguillaris* in Lake Tingrela, Burkina Faso is different from other African species from the subfamily Camallaninae parasitic freshwater fish, because they do not have tridents (Kabre and Petter, 1997).

Camallanus sp has the characteristics of a capsule cavity, blood sucking habit that causes anemia, and attachment to the cavity of the capsule causes erosion of the mucosa. The life cycle of this species can develop in the aquarium because it can produce active larvae, so this parasite does not require a host for its survival. This parasite attacks the intestine and can infect the caecal pylorus. *Camallanus* sp. attack many ovipar fish species. Classification of Camallanus into subfamily Camallaninae (Chakravarty and Majumdar, 1960). Genus: Camallanus, Species: *Camallanus* sp.

Ectos and endoparasites in *Channa punctatus* have parasites such as protozoa, platyhelminth, nematodes, acanthocephala, arthropods, gastrotricha and rotifer. Overall the incidence of infection in *Channa punctatus* was higher (60.00%) of protozoa parasites. The highest incidence o protozoan parasite infection was recorded at 60.00% in 2007 in open water

samples. On the other hand, the highest incidence of infection in closed water is 75% of the platyhelminth parasites. Found two new species (Rotifer and *Chaetonotus* sp.) are new parasites in *Channa punctatus* (Miah *et al.*, 2013). In the *Parachanna obscura*, were also found nematode parasites (Esther, Daniel, and Chris, 2015).

4. Conclusion

The type of parasitic worm found in the digestive tract of Snakehead fish (*Channa striata*) in the village of Seuneubok Cina, Indra Makmur, Aceh Timur, Indonesia, is from the Ecanthocephala class i.e. the Pallissentis whereas from the Nematode class there are two types of Procamallanus and Camallanus.

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