Case Report: Cryptocaryonosis in Indian Ocean Oriental Sweetlips (*Plectorhinchus vittatus*) Fish at the Closed System Quarantine of the Jakarta Aquarium and Safari

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ABSTRACT

Cryptocaryon irritans, known as cryptocaryonosis disease infection in fish, is a significant problem for aquarists because they not only cause the disease but also lead to high mortality in the aquarium population. This case report aims to identify *Cryptocaryon irritans* infection in four Indian Ocean oriental sweetlips at the Jakarta Aquarium and Safari. Before they died, a total of four fish showed signs of weakness, scratching, excessive mucus, and pale gills. The diagnosis was confirmed through clinical assessment, physical examination, and microscopic analysis of skin scrape and gill clip samples, which revealed the presence of numerous trophonts (the young immature stages) of *C. irritans*. These findings underscore the importance of vigilant monitoring and prompt intervention to mitigate the impact of *C. irritans*, especially on marine aquarium fish populations.

Keywords: *Cryptocaryon irritans*, Jakarta Aquarium and Safari, Oriental sweetlips

INTRODUCTION

The growing local and international demand for ornamental fish has led to a boom of small- and medium-sized commercial aquariums and marine museums in Indonesia. These aquariums and museums display aquatic creatures that have been successfully adapted to live in large numbers in artificial environments. Ornamental fish are more colorful and sculptural than other fish, making them

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more attractive to aquarists and visitors. The Indian Ocean oriental sweetlips, also known as oriental blubberlips, are ray-finned marine fish of the Plectorhinchinae subfamily, one of two subfamilies of the Haemulidae family that contains the grunt fish. This species originated in the Indian and western Pacific oceans (Leu et al., 2012) . However, ornamental fish in aquariums are prone to many fish diseases, including parasitic infections. One of these infections, caused by *C. irritans*, poses a serious health risk to marine aquarists and commercial marine culture worldwide (Van and Nhinh, 2018).

Cryptocaryon irritans is the only species in the genus *Cryptocaryon*, which belongs to the phylum Ciliophora, class Oligohymenophorea, order Hymenostomatida, and family Ichthyopthiridae. They are oval-shaped, like a pear, and have a C-shaped nucleus, which is only visible in adult organisms. The entire body is covered with cilia, which can only be seen under the microscope (Des, 2018; Hyun Kim et al., 2019).

C. irritans causes cryptocaryonosis, commonly called marine white spot disease, because of the presence of several or many white or greyish dots on the surface of the body or gills of infected fish. The motile ciliates can cause disease and have infected several aquarium commodities and marine ornamental fish (Van and Doan, 2018; Li et al., 2022). Clinical signs shown by fish infected with this parasite include loss of appetite, haemorrhage on the surface of the body, exophthalmia in the eyes, and abnormal swimming behaviour. Fish with severe infections show rapid respiration rates, produce excessive mucus, and rub their bodies against objects (Li et al., 2022). Skin erosion will produce wounds that are very susceptible to secondary infections. This ciliate protozoan is a common ectoparasite (Zeng et al., 2023). Severe protozoal infections can cover the entire body, resulting in increased mucus production and the possibility of secondary infections leading to death. This protozoan infects when the fish is weak, and the *Cryptocaryon* disrupts respiration by eating the gill lamellae (Jiang and Huang, 2023). This parasite often attacks marine fish in aquariums or cultivation (Yin et al., 2023). This pathogenic infection can cause major losses for aquarists, especially in aquariums (Cardoso et al., 2019).

Cryptocaryonosis presents a threat to marine ornamental fish. Therefore, it is crucial to comprehend the methods of detecting and treating this disease in oriental sweetlips fish. This knowledge will enable timely treatment for infected fishes with *C. irritants*.

MATERIALS AND METHODS

Case Findings

Four oriental sweetlips (*Plectorhinchus vittatus*) were found to have died at the Closed System Quarantine of the Jakarta Aquarium and Safari between August 27th and September 1st 2023. These new fish were placed in the closed-system quarantine aquarium to accommodate aquarium conditions. Before they died, they showed some clinical signs such as lack of appetite, abnormal swimming behaviour, and frequent scratching of the body on the coral in the aquarium.

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Examination Method

A physical examination of dead fish is carried out as a first step, namely examining all parts of the body. The dead fish had an average length of ±26.5 cm and an average weight of around ± 850 g. Examination showed excessive mucus on the body, and the gills were very pale. The diagnosis was made based on clinical symptoms and physical examination, proven by examining samples of skin scrapings and gill clips from each fish viewed under a microscope with 40x and 100x magnification. The sample showed the presence of the parasite *C. irritans*. In this case, ethical clearance was not required as this case report was not based on experimental animal research.

Treatment

This case began with the death of one fish and the other fish showed clinical symptoms. One of the preventive and curative efforts undertaken by the Jakarta Aquarium to address this issue was the administration of a copper-based parasite treatment made of ionic copper at a dosage of 1 ml per 50 liters of water. Copper is the most widely used chemical for combating parasites or protozoa (Yin et al., 2023; Zhan et al., 2023).

RESULTS AND DISCUSSION

Parasites in four oriental sweetlips fish were identified at the Jakarta Aquarium and Safari Laboratory using skin scrape and gill clip samples (Figure 1), which were observed under a microscope. The identification results showed that the *C. irritans* parasite was present in each skin scrape and gill clip sample, indicating that the four oriental sweetlips fish were infected with the *C. irritans* parasite.

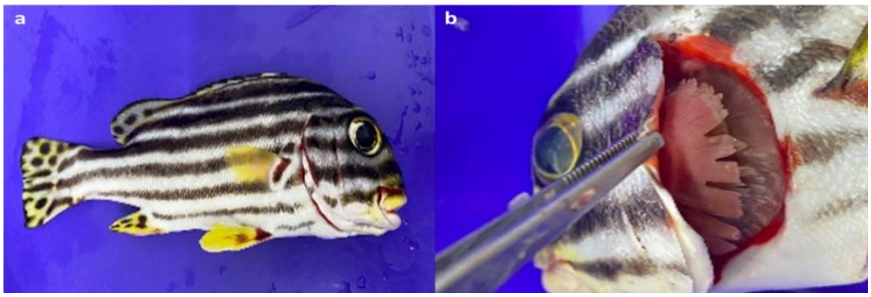

Figure 1. Clinical signs of cryptocaryonosis in oriental sweetlips fish include excessive mucus on the skin (a) and lesions as well as paleness on the gills (b).

The skin samples (Figure 2) and gill samples (Figure 3) showed that the fish were infected by *C. irritans* at the trophont stage (the young immature stage of *C. irritans*). This was because the C-shaped macronucleus was not fully developed, and there were no white spots on the fish as seen in adult *C. irritans* infections.

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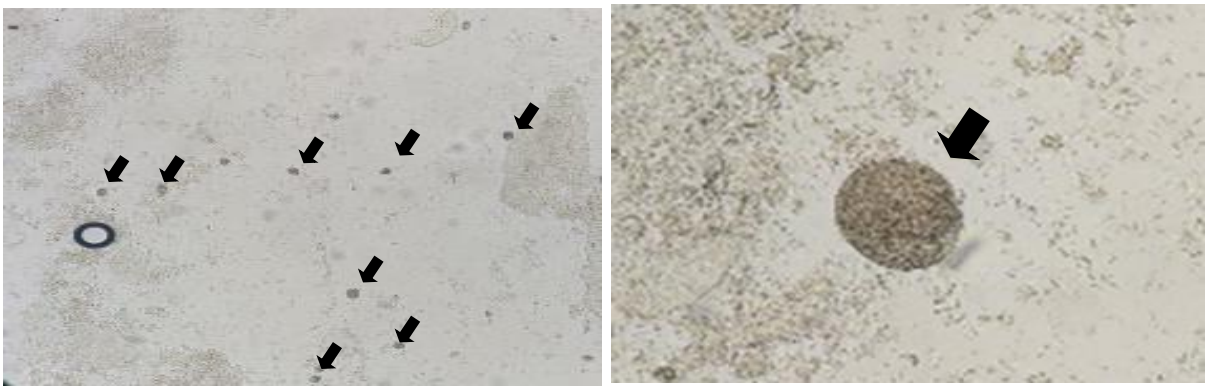

Figure 2. Identification results of skin scraping samples showing many trophonts (parasitic stage) of *C. irritans* (black arrows)

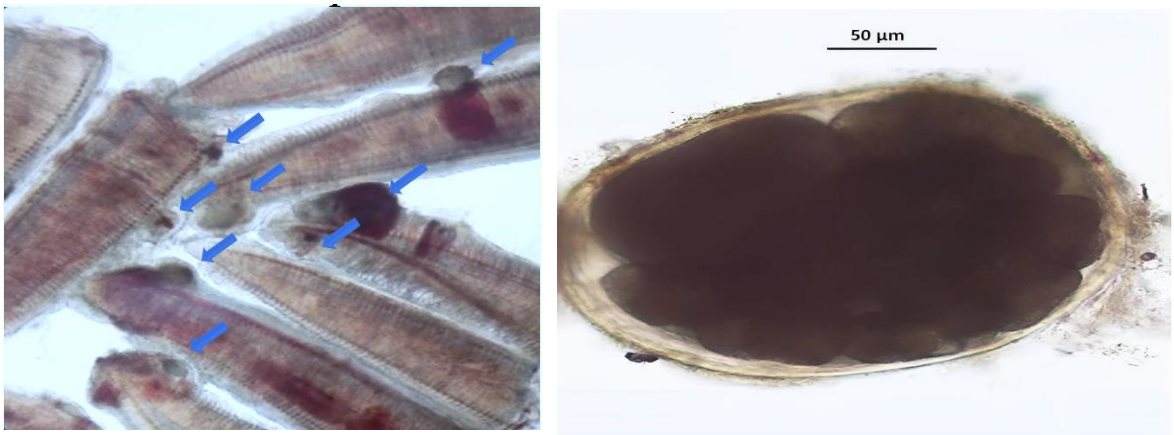

Figure 3. Pictures of trophonts (parasitic stage) in a gill cavity (blue arrows)

C. irritans infection in fish is a significant disease problem for marine aquarists and commercial mariculture in Indonesia. It is able to infect many different species of fish including oriental sweetlips (Li et al., 2022). Infected fish often have small white spots or patches on the fins, skin, or gills. They also show several clinical signs, such as uneven fins, cloudy eyes, pale gills, increased mucus production, skin discolouration, and thinness. The characteristic white spots may not be visible in pale-coloured fish or in infections that only affect the gills. The absence of white spots or parasites on the fins or skin does not rule out the presence of *C. irritans*. Therefore, it is necessary to identify parasites on the skin or gills of fish to confirm whether they are infected.

C. irritans was identified by the authors through the observation of clinical signs in diseased fish and trophons using a light

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microscope, which is considered the most effective diagnostic tool for *C. irritans* in practical applications. This approach is characterised by its simplicity and efficiency, as it does not necessitate the use of costly equipment or skilled personnel. In recent times, advancements in molecular and immunological methodologies have yielded enhanced precision in the identification of *C. irritans* (Chen et al., 2008; Taniguchi, 2011). In this case, several parasites were also found, such as monogenean and uronema, but not as many as *C. irritants*. This proves that disease in fish can occur due to concurrent infection (Dong et al., 2015; Islam et al., 2024). This is according to research conducted by Li et al. (2022), which states that the usual behaviour of infected fish is scratching, abnormal swimming, hanging on the surface or at the bottom of the water, lethargy, or rapid breathing. In a population, mortality rates can increase rapidly within a few days, as with other diseases. General fish health and environmental factors, including water quality, will affect the status of the fish's immune system and can worsen the impact of infection. If the fish's immune system is compromised or environmental factors are suboptimal, *C. irritans* infection will become more severe and dangerous. *C. irritans* has a direct life cycle, meaning the infection can spread within a group of fish without requiring another host animal to develop. The life cycle is complex and includes stages that develop inside and outside the fish. Microscopic evaluation of the skin, fin, and gill samples and identification of globular to pear-shaped, ciliated, opaque, rolling, or one of the other life stages of the trophont are necessary to verify the presence of infection.

Chemical bath agents such as formalin, dyes, quinine derivatives, and copper sulphate have been beneficial in treating *C. irritans* infections. Some chemicals are banned in several countries due to their harmful effects on humans, fish, and invertebrates and their environmental impact (Li et al., 2022). Treatment should be prompt because the parasite reproduces quickly. The use of copper is one of the best solutions for treating Cryptocaryonosis with a certain dose accompanied by regular observation (Noga, 2010; Smith, 2019).

This study demonstrates the early detection of white spot disease in Indian Ocean Oriental Sweetlips and the effectiveness of copper treatment in preventing fish mortality losses. These findings highlight the importance of getting the right diagnosis and starting treatment immediately to prevent losses.

CONCLUSION

C. irritans is the causative agent of disease in various types of fish, including the Oriental Sweetlips fish. This leads to significant financial losses, greatly impacting the confidence of mariculturists. This parasite frequently infects marine fish in aquariums and cultivation. The identification results showed that four Oriental Sweetlips were infected with the *C. irritans* parasite, based on skin scrape and gill clip samples. Based on the findings of this case, a water examination should be carried out periodically to control and prevent similar cases in the future.

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ETHICS APPROVAL

Ethical clearance was not required as this case report was not based on experimental animal research.

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