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RESEARCH ARTICLE

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Parasitic examination of marine ornamental fish at the Denpasar Fish Quarantine, Quality Control, and Fishery Product Safety Center

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Abstract

The study in this research includes examination of parasites in ornamental seawater fish pathologically and clinically which includes examination of mucus, fins, intestines, and gills. This research was conducted at BKIPM Denpasar from January 06, 2020 to February 7, 2020. The samples of marine ornamental fish examined consisted of ornamental fish from various species including *Chrysiptera* sp., *Pterapogon* sp., *Chromis* sp., *Amphirion* sp., and *Dascyllus* sp. The results showed that the types of parasites that attacked marine ornamental fish were *Tricodina* sp., *Opegaster* sp., *Archigetes* sp., and *Camallanus* sp. These four types of parasites came from 6 samples from a total of 40 samples examined at BKIPM Denpasar. The total prevalence of infecting parasites was 0.15%. Meanwhile, the prevalence of each species is 0.16% for *Tricodina* sp. and *Opegaster* sp. while for *Archigetes* sp. and *Camallanus* sp. is 0.33%. Based on the results of the prevalence calculation, the examined seawater ornamental fish samples are still classified as safe for export.

Keywords: Parasites, seawater fish, prevalence, intensity

Introduction

The safety of fishery products is a crucial concern, particularly for commodities intended for the export market. One such commodity is ornamental fish. Success in marine ornamental fish businesses often hinges on managing fish parasite issues. Although less frequent in well-maintained aquaculture systems, parasite outbreaks in marine ornamental fish can lead to significant losses for fishery entrepreneurs due to high fish mortality. Parasites represent a major disease category in fish, causing substantial economic impacts[1].

Indonesia, as a tropical country, has a climate that fosters parasite proliferation. Parasitic diseases in fish are often challenging to detect because numerous parasites can cause similar symptoms. The severity of losses due to parasites depends on various factors, including the age of the affected organisms, the percentage of the population infected, the intensity of the disease, and the occurrence of

secondary infections[2]. Parasitic examination in fish encompasses pathological and clinical assessments, including examination of mucus, fins, intestines, and gills.

Balai Karantina Ikan Pengendalian Mutu Dan Keamanan Hasil Perikanan (BKIPM) Denpasar is a governmental institution responsible for fish quarantine activities, quality control, and fishery product safety, as well as fish biosecurity. According to the Accreditation Body of the National Accreditation Committee (KAN) Letter No. 1660/4.a2/LP/06/09 dated June 12, 2009, updated as LP 428 IDN from December 12, 2013, to December 11, 2017, BKIPM Denpasar is recognized as a testing laboratory that consistently implements ISO/IEC 17025:2008. The study of parasitic examinations at BKIPM Denpasar is strongly supported by a well-equipped parasitology laboratory, prompting in-depth parasitological research conducted at this facility.

Material and methods

Research site

This study was conducted from January 6, 2020, to February 7, 2020, during working hours from 08:00 to 16:00 WITA (GMT+8), Monday through Friday, with additional shifts on Saturdays from 09:00 to 13:00 WITA, following the operating hours at BKIPM Denpasar. The research site location is illustrated in **Figure 1**.

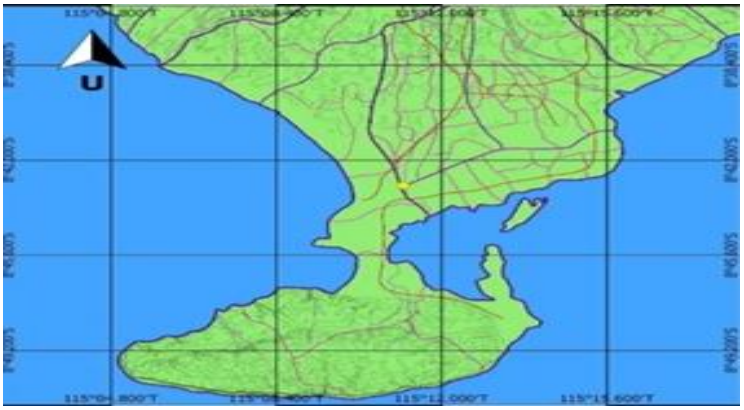

Figure 1. BKIPM Denpasar location.

Equipment sterilization

Sterilization involves cleaning equipment to be used in the study with 70% alcohol. Equipment for marine fish parasite examination—such as dissecting sets, petri dishes, measuring cylinder, dropper pipettes, trays, and glass slides—is sprayed with 70% alcohol to eliminate microbial contamination.

Sample recording and measurement

Commodity samples were recorded in the necropsy logbook, documenting fish name, clinical symptoms, length, and weight. Entries were sorted by sampling date to accommodate samples collected on the same day but recorded on different dates. Measurement of sample length and weight was conducted using a ruler and an analytical balance, respectively, as shown in **Figure 2**.

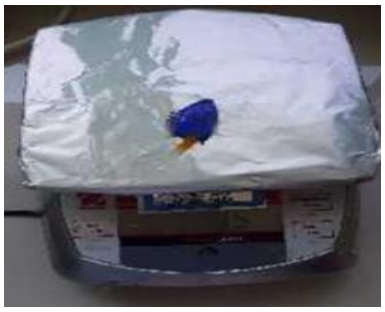

Figure 2. Sample measurement process.

Sample necropsy process

The necropsy method for marine fish involved dissecting tools such as scissors and forceps. Prior to necropsy, a scraping procedure was performed to collect mucus from the fish's head to tail, which was then placed on a glass slide. Gill organs, operculum, caudal fin, and intestines were sampled, placed on a glass slide, and moistened with sample-derived water using a dropper pipette.

Microscopic observation and identification

The glass slide containing marine ornamental fish organs was examined under a microscope, with observations made at 40x and 100x magnifications. Any parasites detected were morphologically identified to the genus level, and the infection rate was analyzed using prevalence calculations.

Result and Discussion

Based on prevalence calculations, the total prevalence of parasitic infection was 15%. The prevalence for each parasite species was as follows: 16% for *Trichodina* sp. and *Opegaster* sp., while *Archigetes* sp. and *Camallanus* sp. showed a prevalence of 33%. Given these prevalence levels, the marine ornamental fish samples examined were classified as safe for export, as they fell under the category of very rare infection. The prevalence calculations are summarized below.

This study found that the morphology of *Camallanus* sp. is distinguished by a thickly cuticle-lined buccal capsule with a pair of ridges. The mouth structure resembles a strong clamp, surrounded by horn-like tubercles. This morphology allows the parasite to attach firmly to the intestinal wall, causing it to remain securely in place. Such attachment sites in the intestine may result in bleeding. The esophagus and mouth feature thick muscular walls, often lined with cuticle. According to Kabata (2015)[3], male *Camallanus* can reach lengths of up to 6.2 mm, while females can grow as long as 11 mm. Notably, *Camallanus* sp. has a capsule cavity formed by two lateral valves, a basal ring, and two tridents. Females contain motile larvae approximately 0.5 mm in length. *Camallanus* sp. feeds on blood, potentially causing anemia, and attachment via its buccal capsule can lead to mucosal erosion[4].

Trichodina sp., a protozoan and ectoparasite on fish, is typically circular in shape and, when viewed from the side, resembles a bicycle bell. This highly active, bowl-shaped parasite has a central ring of teeth. From a ventral view, *Trichodina* sp. appears rounded, with body sizes reaching up to 120 μm and covered in cilia. Fish infected with *Trichodina* sp. may display skin irritation, white spots on the head and dorsal region, and loss of appetite. Increased mucus production often gives the fish a shiny appearance. External bleeding, dull coloration, and frequent rubbing against the sides of the tank are also observed symptoms[5].

Another species identified was *Opegaster* sp., characterized by an oval, broad body at the midsection. This parasite lacks a preoral lobe and features an oval oral sucker and a larger, rounded ventral sucker. The papillae are weakly developed and sometimes appear on one or both lips of the ventral sucker. *Opegaster* sp. possesses two testes, with an expanded, elongated, and coiled external seminal vesicle reaching back to the ventral sucker and a sphincter at the distal end. The reniform ovary is pretesticular and adjacent to the anterior testis, containing brownish eggs. This parasite impacts fish tissue, causing necrosis, organ dysfunction, and, in severe cases, mortality, especially in larvae and small fish[6].

Additionally, *Archigetes* sp. was observed, appearing dorsoventrally flattened with a whitish, opaque coloration, ranging from a few millimeters to 25 meters in length. Nearly all members, except those in the orders Caryophyllidea and Spathebothriidea, are polyzoic, with repeated reproductive organ sets along the body, and most are protandrous hermaphrodites, excluding those in the order Dioecocestidae. The majority, excluding caryophyllideans, consist of several to 4000 proglottids (segments) with a characteristic body differentiation pattern into a scolex (head), neck, and strobila. The scolex, situated at the anterior end, is a small (often less than 1 mm) organ with specific attachment systems, including rostrum, acetabula, suckers, bothria, grooves, and hooks. Behind the scolex is a narrow neck region composed of undifferentiated proglottid proliferation tissue, leading to progressively mature proglottids in the strobila. Currently, this cytological process remains poorly understood[7].

Conclusions

The study identified four parasite species infecting marine ornamental fish: *Trichodina* sp., *Opegaster* sp., *Archigetes* sp., and *Camallanus* sp. These parasites were detected in six of the 40 samples examined at BKIPM Denpasar during the research period. The overall prevalence of parasitic infection was calculated at 15%, with species-specific prevalence rates of 16% for *Trichodina* sp. and *Opegaster* sp., and 33% for *Archigetes* sp. and *Camallanus* sp. Based on these findings, the examined marine ornamental fish samples remain within acceptable safety levels for export. This study enhanced understanding of parasitological examination in marine ornamental fish, facilitating species identification at the genus level.

Acknowledgments

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Conflicts of Interest

The authors declare no conflict of interest

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