Identification and prevalence of ectoparasites on the fry of Asian sea bass (*Lates calcarifer*), white shrimp (*Litopenaeus vannamei*), and blue swimming crab (*Portunus pelagicus*)

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Abstract. The study aims to find out the types of ectoparasites infected in the fry of Asian Sea Bass (*Lates calcarifer*), White Shrimp (*Litopenaeus vannamei*), and Blue Swimming Crab (*Portunus pelagicus*), and to know their prevalence. The method used in this study is an examination of fish samples using the wet mount method. The results showed that the parasites found in the fry of Asian Sea Bass were *Trichodina* sp., *Caligus* sp., and *Dactylogyrus* sp., with the prevalence, were 18.85%, 3.28%, and 1.64% respectively. While, the parasites of *Vorticella* sp., *Epistylis* sp and *Zoothamnium* sp. infected on white shrimp with the prevalence respectively were 2.71%, 0.84%, and 0.17%. Furthermore, on the blue swimming crab was found parasite of *Vorticella* sp. with the prevalence was 16.47% and *Epistylis* sp. with the prevalence value was 12.54%.

1. Introduction
Indonesia has a high potential for the development of finfish mariculture. Fish parasites have been repeatedly reported to be a major threat to this developing industry, due to a severe parasite and disease outbreak [1].

The fish parasite is the major component of aquatic biodiversity is considered an essential element of the management of the health of fish. The environmental condition of the culture system is the particular increased density of fish, repeated introduction of hosts, homogeneous host populations, fast growth and a potential decrease in genetic diversity have an important effect on commercial production and could prevent the expansion of the industry [2,3,4].

Parasitic infection and diseases are some of the factors hindering the productivity in aquaculture affecting both food fishes and ornamental fishes. These parasites cause mortality in cultured fin fishes resulting in economic loss to the farmers [5]. Also, Bedasso [6] explained that fish parasites can inflict a different variety of damages such as irritation, wound, injury or atrophy of tissues and occlusion of the alimentary canal and blood vessels.

Numerous studies on the parasites of marine fish were carried out. Investigations showed that parasites possibly have the capability to directly lessen the appearance of their hosts, in terms of growth and reproduction, through their direct impact on fish health [7]. The high mortality rate due to the progress infection by parasites such as mechanical damages in gill [8], alterations in reproduction...
organ [9], and secondary infection by bacterial diseases [10]. The paper deals with the types of ectoparasites infected in the fry of Asian Sea Bass (Lates calcalifer), White Shrimp (Litopenaeus vannamei), and Blue Swimming Crab (Portunus pelagicus), and to know their prevalences.

2. Materials and methods

2.1 Sample collection
The samples, namely Asian Seabass, Vannamei Shrimp, and Blue Swimming Crab, were collected randomly from a pond in Balai Besar Perikanan Budidaya Air Payau (BBPBAP) Jepara, East Java Province. One hundred twenty-two fish of seabass fingerlings were collected from the ponds. Also, the seed of vannamea shrimp and blue swimming crab were collected to know the external parasites' infestations, respectively 590 shrimps and 225 crabs.

2.2 Laboratory sample processing and parasite identification
The samples were sacrificed by decapitation and pithing. The life fish samples were put in a plastic container and subsequently transported to the laboratory for analysis. The parasitological analysis was carried out immediately on arrival while each was clinically examined for any abnormality. In the laboratory, the weight, total length and standard length of each fish were measured and recorded. The external examination was observed to identify the pathological damage caused by parasites. The body, skin, fins, gill were examined for external parasites infestations. The wet mount preparation or biopsy procedures were applied to observe the parasites from experimental fishes [11]. The surface of the body and fins were scrapped to observe the parasites infestation. The parasites examination and identification were done by using the microscope examination [11,12]. Parasites and prevalence of parasites were analyzed by descriptive analysis.

2.3 Analysis of parasitic infestation
The analysis infestation for finding the prevalence was carried out by following formulae of Petchimuthu et al [11]:

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\text{Prevalence (%) = \frac{\text{Infected host}}{\text{Total host examined}} \times 100}
\]

3. Results and Discussion
The results showed that the parasites found in the fry of Asian Sea Bass were Trichodina sp., Caligus sp., and Dactylogyrus sp., with the prevalence, were 18.85%, 3.28%, and 1.64% respectively. While, the parasites of Vorticella sp., Epistylis sp, and Zoothamnium sp. infected on white shrimp with the prevalence respectively were 2.71%, 0.84%, and 0.17%. Furthermore, on the blue swimming crab was found parasite of Vorticella sp. with the prevalence was 16.47% and Epistylis sp. with the prevalence was 12.54%.

| Table 1. Prevalence of parasite found in Asian Seabass |
|------------|-----------------|------------|
| No | Parasites | Number of Host (Fish) | Prevalence (%) |
| | | Infected | Examined | |
| 1 | Caligus sp | 4 | 122 | 3.28 |
| 2 | Dactylogyrus sp | 2 | 122 | 1.64 |
| 3 | Trichodina sp | 23 | | 18.85 |

| Table 2. Prevalence of parasite found in Vannamei Shrimp |
|------------|-----------------|------------|
| No | Parasites | Number of Host (Fish) | Prevalence (%) |
| | | Infected | Examined | |
| 1 | Epistylis sp | 5 | 590 | 0.84 |
| 2 | Vorticella sp | 16 | | 2.71 |
Zoothamnium sp

Table 3. Prevalence of parasite found in Blue Swimming Crab

| No | Parasites   | Number of Host (Fish) | Prevalence (%) |
|----|-------------|-----------------------|----------------|
|    |             | Infected   | Examined     |                 |
| 1  | Epistylis sp | 32         | 255         | 12.54          |
| 2  | Vorticella sp | 42         |             | 16.47          |

The present study revealed that Trichodina sp infected Asian Seabass the most. A total of 122 fry of Asian Seabass were examined, there are 23 fish infected by Trichodina sp with 18.85% of Prevalence. Seng and Yong [14] found that Small fish were more susceptible to infection by Trichodina sp as indicated by high prevalence. Trichodina sp is known to infect young fish more often than older ones. Also Ruckert [1] mentioned that Parasite fauna of cultured L. calcarifer in Lampung Bay, Indonesia was dominated by monoxenous parasites on the gills and the body surface, monogenean species and trichodinid ciliates Trichodina spp. Both trichodinid ciliates and monogenean parasites are known to cause severe problems in aquaculture. After a first infestation, they can spread rapidly and drastically increase in numbers; in such cases, they can severely affect the infested fish.

This study also found that vannamei shrimp samples were infected by Vorticella sp., Epistylis sp, and Zoothamnium sp. This result has similarity with the work of Hafidloh and Sari [15] that investigated the protozoan parasites infesting the vannamei shrimp in farmed fish from Pasuruan, Indonesia. The protozoan parasites found in infested vannamei shrimp were ectoparasites; the protozoan Zoothamnium sp., Vorticella sp. and Epistylis sp. Furthermore, Putra et al [16] found that Ectoparasites were infected on vannamei shrimp cultured in Langgenharjo Village, Pati, Indonesia. They are Epistylis sp, Zoothamnium sp, Vorticella sp, dan Trichodina sp with prevalence were 85%, 50%, 60%, and 10%.

As same as with Vannamei Shrimp, Blue Swimming Crab was also infected by Vorticella sp. and Epistylis sp. According to Setiyaningish et al [17], several parasites could be infected in crab. Their results showed that mangrove crab (Scylla serrata) samples collected from ponds in Pemalang, Indonesia were infected with ectoparasites i.e Ichthyobodo sp., Epistylis sp., Octolasmis sp., Carchesium sp., Vorticella sp. Poecilasmatidae, Copoedit and Lepeophtheirus sp. Moreover, Blomsterberg et al [18] explained that mangrove crab was infected by Protozoan (Haemotodinium, Vorticella sp., Zoothamnium sp. and Vorticella sp.), Platyhelminthes (Cestoda dan Trematoda), Nemathelminthes (Nematoda), Arthropoda (Balanus dan Octolasmis).

4. Conclusion
This study obtained the results that the parasites found in the fry of Asian Sea Bass were Trichodina sp., Caligus sp., and Dactylogyrus sp., with the prevalences, were 18.85%, 3.28%, and 1.64% respectively. While, the parasites of Vorticella sp., Epistylis sp and Zoothamnium sp. infected on white shrimp with the prevalences respectively were 2.71%, 0.84%, and 0.17%. Furthermore, on the blue swimming crab was found parasite of Vorticella sp. with the prevalence was 16.47% and Epistylis sp. with the prevalence was 12.54%.

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