Infestation of parasitic barnacle *Sacculina* spp. in commercial marine crabs

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Abstract Commercial crab species infected of rhizocephalan cirripedes are reported from the coast of Parangipettai. *Sacculina* spp. were collected from brachyuran hosts *Portunus sanguinolentus*, *Portunus hastatoides*, *Charybdis feriatus*, *Charybdis variegata*, *Charybdis natator*, *Charybdis miles*, *Charybdis lucifera*, *Charybdis hoplites*, *Charybdis hellerii*, *Charybdis granulate*, *Charybdis amboinensis* and *Thalamita coeruleipes* respectively.

Keywords Crustacea · Cirripedia · Rhizocephala · *Sacculina* · Portunid crab

Crustacean endoparasites on marine crabs are diverse. Many species of crabs are infected by sacculinids (Crustacea: Cirripedia: Rhizocephala). To accomplish settlement the Cirripedia have developed a very specialized larva type. The female larvae will attach onto crabs and develop in the gonads of the host crab, much like a tumor. The host's gonads are destroyed in the process of the parasite developing, so that infection with *Sacculina* induces a phenomenon of parasitic castration. The *Sacculina* does not just change the crab's body, but also its habits. Contaminated crabs are no longer able to molt. Such crabs are constantly preoccupied with eating. *Sacculina* lives from the nutrients ingested by the crab, so the host has to eat all the time to produce sufficient energy for the two of them. Parasitization by sacculinids (Cirripedia: Rhizocephala:

Sacculinidae) induces cruel modifications in morphology, behavior, and reproduction of their host crabs. *Sacculina* are associated with many species of commercially important crabs around the world and cause significant economic losses to fisheries by killing, stunting, or damaging these crabs. Parasitic barnacles (cirripedia: Rhizocephala) are capable of reducing the value of commercial crustaceans (Lester 1978; Sloan 1984; Basson 1994). Larval rhizocephalan parasites infect mainly decapods and the effect is often a castration of both sexes of the host (Hoeg 1995). Castration of the female animal is commonly referred to as spaying (Boschma and Haynes 1969), reduction in growth rate (Hawkes et al. 1987). A previous study (Innocenti et al. 1998) had already revealed significant modifications in the infected crabs' behavior (Fig 1).

The present work is part of a research effort to study the impact of the invasive rhizocephalan parasite *Sacculina* spp. on populations of the invasive Commercial crab in the Parangipettai Area. Approximately 6,488 species have been described, and more than 1,914 species are known to parasitize crabs, they vary from 53 to 88 mm in carapace width (January–December 2011). In Hong Kong, several specimens of the shallow water swimming crab, *Charybdis truncata* (Fabricius 1789) collected in trawl samples (between 1997 and 2000) (Morton 2000) were infected by a *Sacculina* species. Blue king crabs in Olga Bay were sampled quarterly: spring (March–April 1980), summer (June 1980), autumn (October 1980), and winter (January 1981). Seasonal wise sample collection from different size range and a total of 422 males and 337 females were examined. Both sexes were measured to the nearest millimeter in carapace length (Wallace et al. 1949, for measurement). Carapace lengths ranged from 12 to 162 mm for males and 16 to 143 mm for females. All specimens of *Sacculina gregaria* (Okada and Miyashita 1935) are from

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Portunus sanguinolentus *Charybdis lucifera* *Portunus hastatoides* *Charybdis hoplites* *Charybdis feriatus* *Charybdis hellerii* *Charybdis variegata* *Charybdis granulate* *Charybdis natator* *Charybdis amboinensis* *Charybdis miles* *Thalamita coeruleipes* **Fig. 1** Parasitic barnacle *Sacculina* spp. in commercial 3 marine crabs

Maruyama River, (Hyogo, Japan). The material comprises a male crab (CW 52.2 mm) carapace with 19 externaee and a female crab (CW 48.6 mm) with 24 virginal externaee.

Rhizocephalans are related to the more well-known barnacles. As adults they lack appendages, segmentation, and all internal organs. Segmentation is usually indistinct and the body is more or less evenly divided between the head and thorax. Adult barnacles have few appendages on the head, with only a single, vestigial, pair of antennae, attached to the cement gland. There are six pairs of thoracic limbs, which are feathery and very long, being used to filter food from the water and move it towards the mouth.

Infestation of commercial marine crabs (*Portunus sanquinolentus*, *Portunus hastatoides*, *Chaybdis feriatius*, *Charybdis variegata*, *Charybdis natator*, *Charybdis miles*, *Charybdis lucifera*, *Charybdis hoplites*, *Charybdis hellerii*, *Charybdis granulata*, *Charybdis amboinensis*, *Thalamita coeruleipes*) is occasionally infected by *Sacculina* species from Parangipettai

The larvae of Sacculinidae are dioecious, only the female cyprid infect the crab by agreement on the external cuticle. The female cyprid then metamorphoses into a kentrogon which has a retracted hollow stylet (Glenner and co workers 2000; Glenner, 2001). The vermigon inside the kentrogon is subsequently injected through hemolymph of the crab. After injection, the vermigon develops a root system inside the host's tissue and absorb nutrients from the host's hemolymph (Bresciani and Hoeg 2001). The root system develops a reproductive body, the virgin externaee, which is a sac-like structure growing from the crab's abdomen. The virgin externaee consists of a mantle, a mantle cavity, an ovary and a pair of male receptacles. A male cyprid will then pass through the mantle opening of the virgin externaee and enter the male receptacles where spermatogenesis takes place (Hoeg 1990). Sperm is then produced which fertilizes the eggs inside the mantle cavity (Hoeg 1990; Glenner and co workers 2000; Glenner 2001). Most studies on species diversity and biology of the Sacculinidae are based on temperate regions. They may lead to economic loss of Crabs. In general parasitic infection of brachyuran crabs mainly depend upon host factors such as age, size, sex, maturity, stage, behavior, feeding and breeding, life cycle and particularly factors.

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