

## A Survey of Parasitic Copepods in Marine Fishes from the Gulf of Thailand, Chon Buri Province

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### ABSTRACT

A survey of parasitic copepods was carried out at the Gulf of Thailand, Chon Buri province between 2006-2007. A total of 18 genera, 39 species of copepodid parasite were found on 61 marine fish species as follows; *Abasia* sp., *Brachiella lutiani*, *Brachiella* sp., *Caligus hamruri*, *Caligus* spp., *Clavellisa dussumieria*, *Ergasilus* spp., *Hatschekia caudate*, *Hatschekia* sp., *Hermilius pyriventris*, *Holobomolochus* sp., *Taeniacanthus* sp., *Lepeophtheirus* spp., *Lernanthropus opisthopteri*, *Lernanthropus sciaenid*, *Lernanthropus forficatus*, *Lernanthropus* spp., *Naobranchia* sp., *Nothobomolochus* sp., *Parapetalus occidentalis*, *Protochondracanthus* spp., *Pseudocongericola* sp., *Orbitacolax* sp. and *Synestius caliginus*. *Caligus* spp. had the highest number of species (10 species from 9 fish species), followed by *Lernanthropus* spp. and *Ergasilus* spp. which found 6 and 4 species from 5 and 4 fishes, respectively. The prevalence and mean intensity of *Hatschekia caudate* in *Lutianus vitta* were highest number with 82% and 136.57, respectively. The presence of *Naobranchia* sp. on *Therapon jarbua*, *Pseudocongericola* sp. on *Muraenesox* sp., *Clavellisa dussumieria* on *Dussumieria hasseltii*, *Hermilius pyriventris* on *Arius* sp. and *Parapetalus occidentalis* on *Rachycentron canadum* are the new record in Thailand.

**Key words:** parasite, marine fish, the Gulf of Thailand, Chon Buri province

### INTRODUCTION

About 2,000 species of parasitic arthropods have been described and the majority of which belong to the class Copepoda. Sea lice (Class Copepoda: Family Caligidae) have come under intense scrutiny with the development of rearing fish in sea cages, due to the most notorious pests affecting wild and cultured marine fish species (Chinabut, 1996; Lester and Hayward, 2006). Effects of copepodid parasites on their hosts, in particular genera, *Lepeophtheirus*, *Caligus* and *Pseudocaligus* are the most

interesting, as they can cause high mortalities (Chinabut, 1996). The problem of *Caligus* has become a threat for the farmers, producing economic losses (Carvajal *et al.*, 1998). Salmon lice (*Lepeophtheirus salmonis*) have been reported to cause skin lesions in fish and losses in productivity in several farmed species in different parts of the world (Boxshall and Defaye, 1993).

The gills are a favorite site for the attachment of several parasitic copepods. They damage the gills by feeding on the delicate tissue of the gill lamellae or on the blood circulating within the lamellae, leading to a loss of respiratory

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surface area (Pillai, 1985; Lester and Hayward, 2006). There is extensive gill damage and severe haemorrhage, with inflammation and exsanguination associated with the attachment and feeding of the parasite (Lester and Hayward, 2006). Blood vessels in the gill filaments are blocked and this leads to atrophy of gill tips (Dogiel *et al.*, 1961). Ojha and Hughes (2001) estimated that one *Ergasilus begalensis* on the gill filament of *Wallago attu* caused a 30% reduction in laminar flow, resulting in a 68% reduction in oxygen uptake (Lester and Hayward, 2006).

The presence of sea lice is enough to cause stress to fish (Sievers *et al.*, 1996; Ho, 2000). At higher levels of infection, these become skin lesions and then large open wounds (Lester and Hayward, 2006). The large open wounds may be associated with secondary bacterial infections (Egidius, 1985). Moreover, parasitic copepods may serve as vectors of viral and bacterial diseases of fish, for example *Lepeophtheirus salmonis* may act as a vector for *Aeromonas salmonicida* (Nylund *et al.*, 1993). However, parasitic copepods from other families have also been reported from cultured fish and in some instances have been responsible for disease (Lester and Hayward, 2006).

This study, aims to survey the parasitic copepods from marine fishes at the Gulf of Thailand, Chon Buri province. This result will be a fundamental data for parasitic study and for prophylaxis this disease causing agents in marine aquaculture.

## MATERIALS AND METHODS

Sixty one marine fish species were caught in the Gulf of Thailand at Anghila jetty, Chon Buri Province (Table 1) between 2006-2007. Identification of fishes were taken according to Department of Fishery (1964), Collette and Nauen (1983), Russell (1990), McKay (1992), Nakamura and Parin (1993), Rainboth (1996) and Nelson

(2006). Copepods were removed from the hosts using fine point forceps, preserved in 70% ethanol. Samples were studied using light microscopy, standard staining, manipulation and measuring techniques.

Copepod identification was based on morphological features according to Yamaguti (1963), Kabata (1979), Pillai (1985), Sirikanchana (2003), Ho and Kim (2004). Prevalence and mean intensity of each parasitic species were determined as in Margolis *et al.* (1982).

## RESULT AND DISCUSSION

Six hundred and ninety-nine fish samples from 61 marine fish species were collected from the Gulf of Thailand (Table 1).

There were 39 species of parasitic copepods found on gill filaments. These 39 species belong to 18 genera and nine families. Caligidae was found to have the most diverse genera (16 genera), while other eight families had one to seven genera (Figure 1).

*Caligus* spp. were found in highest number (10 spp.), followed by *Lernanthropus* spp. (6 spp.) and *Ergasilus* spp. (4 spp.) which found 11, 5 and 4 species, respectively. While *Holobomolochus*, *Nothobomolochus*, *Pseudoorbitacolax*, *Abasia*, *Hermilius*, *Parapetalus*, *Synestius*, *Pseudocongericola*, *Clavellisa*, *Naobranchia* and *Irodes* were found only 1 species (Figure 2).

*Naobranchia* sp., *Pseudocongericola* sp., *Clavellisa dussumieria*, *Hermilius pyriventris*, *Parapetalus occidentalis* were regarded as the first record in Thailand (Figure 3).

Caligidae currently accommodates 33 genera, 445 species, more than 75% are members of *Caligus* (239 spp.) and *Lepeophtheirus* (107 spp.) (Ho, 2000). *Caligus* sp. is dominant on marine teleost fishes (Kabata, 1979). In Thailand, *Caligus* sp. has been found on the body and gills of sea bass (*Lates calcarifer*) in cage culture in

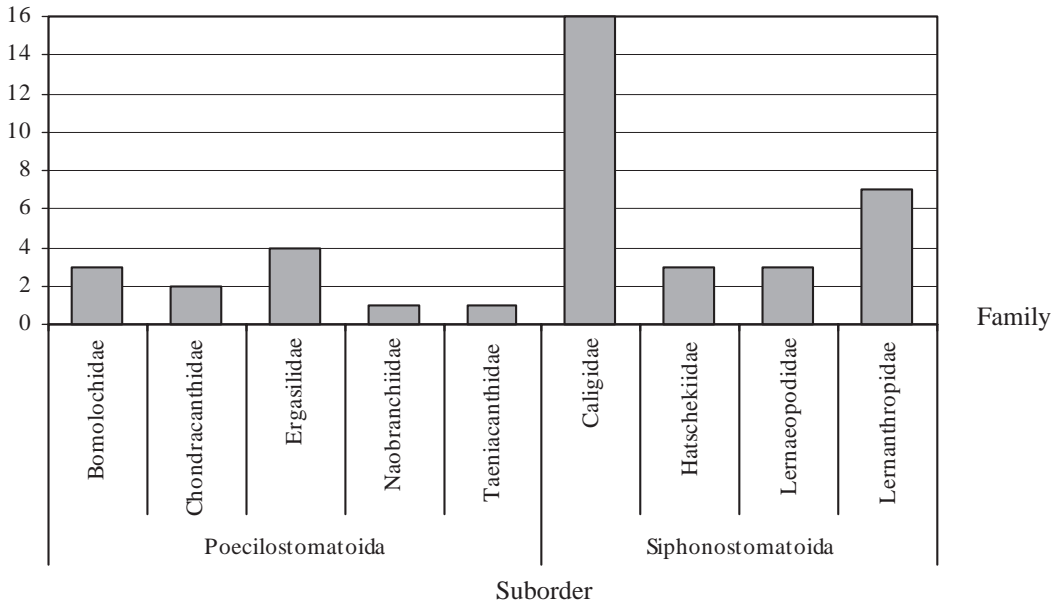
**Table 1** Prevalence and mean intensity of parasitic copepods in marine fishes from the Gulf of Thailand, Chon Buri province.

Fish species	Parasites		Prevalence	Mean intensity
	Species	Families		
<i>Muraenesox</i> sp.	<i>Pseudocongericola</i> sp.	Hatschekiidae	22.73	2.00
<i>Ophichthys</i> sp.	-	-	0	0
<i>Dussumieria hasseltii</i>	<i>Clavellisa dussumieria</i>	Lernaeopodidae	5.00	4.00
<i>Anodontostoma chacunda</i>	<i>Lernanthropus</i> sp.1	Lernanthropidae	20.00	1.00
<i>Plotosus anguillaris</i>	-	-	0	0
<i>Plotisus canius</i>	-	-	0	0
<i>Arius</i> sp.	<i>Ergasilus</i> sp.1	Ergasilidae	25.00	1.40
	<i>Hermilius pyriventris</i>	Caligidae	5.00	1.00
<i>Saurida micropectoralis</i>	-	-	0	0
<i>Liza dussumieri</i>	-	-	0	0
<i>Liza vaigiensis</i>	-	-	0	0
<i>Valamugil buchanani</i>	-	-	0	0
<i>Holocentrus rubrum</i>	-	-	0	0
<i>Platycephalus indicus</i>	-	-	0	0
<i>Lates calcarifer</i>	-	-	0	0
<i>Psammoperca vaigiensis</i>	-	-	0	0
<i>Epinephelus areolatus</i>	<i>Ergasilus</i> sp.2	Ergasilidae	30.00	1.00
<i>Epinephelus tauvina</i>	-	-	0	0
<i>Epinephelus faveatus</i>	-	-	0	0
<i>Priacanthus tayenus</i>	<i>Caligus hamruri</i>	Caligidae	13.33	1.50
	<i>Caligus</i> sp.1	Caligidae	6.67	1.00
<i>Sillago sihama</i>	<i>Brachiella</i> sp.	Lernaeopodidae	6.45	1.00
<i>Sillago maculata</i>	-	-	0	0
<i>Rachycentron canadum</i>	<i>Parapetalus occidentalis</i>	Caligidae	33.33	1.00
<i>Selaroides leptolepis</i>	-	-	0	0
<i>Caranx malam</i>	<i>Lernanthropus</i> sp.2	Lernanthropidae	25.00	1.60
<i>Caranx hippos</i>	-	-	0	0
<i>Parastromateus niger</i>	<i>Synestius caliginus</i>	Caligidae	20.00	1.50
<i>Lutianus vitta</i>	<i>Hatschekia caudate</i>	Hatschekiidae	82.35	136.57
	<i>Caligus</i> sp.2	Caligidae	17.65	1.67
	<i>Brachiella lutiani</i>	Lernaeopodidae	47.06	1.25
<i>Lutjanus johni</i>	-	-	0	0
<i>Gerres filamentosus</i>	<i>Lernanthropus</i> sp.3	Lernanthropidae	20.00	1.50
<i>Gerres oyena</i>	<i>Caligus</i> sp.3	Caligidae	10.00	1.00
	<i>Caligus</i> sp.4	Caligidae	15.00	1.33
<i>Gazza minuta</i>	<i>Lernanthropus opisthopteri</i>	Lernanthropidae	20.00	1.50
<i>Plectorhynchus pictus</i>	-	-	0	0
<i>Gaterin diagrammus</i>	-	-	0	0
<i>Pomadasys maculatus</i>	-	-	0	0
<i>Nemipterus furcosus</i>	-	-	0	0
<i>Nemipterus hexodon</i>	<i>Holobomolochus</i> sp.	Bomolochidae	0.83	1.00
<i>Scolopsis dubiosus</i>	<i>Hatchekia</i> sp.	Hatschekiidae	53.33	5.00
	<i>Caligus</i> sp.5	Caligidae	13.33	1.00
<i>Eleutheronema tetradactylum</i>	<i>Caligus</i> sp.6	Caligidae	40.00	1.00
	<i>Abasia</i> sp.	Caligidae	20.00	1.00
<i>Johnius soldado</i>	<i>Lernanthropus sciaenid</i>	Lernanthropidae	20.00	1.00
	<i>Caligus</i> sp.7	Caligidae	30.00	1.33
<i>Otolithes rubber</i>	<i>Ergasilus</i> sp.3	Ergasilidae	25.00	1.60
<i>Johnius dussumieri</i>	-	-	0	0
<i>Parupeneus</i> sp.	-	-	0	0
<i>Drepane punctata</i>	-	-	0	0
<i>Parachaetodon ocellatus</i>	-	-	0	0

**Table 1** Prevalence and mean intensity of parasitic copepods in marine fishes from the Gulf of Thailand, Chon Buri province. (Continue)

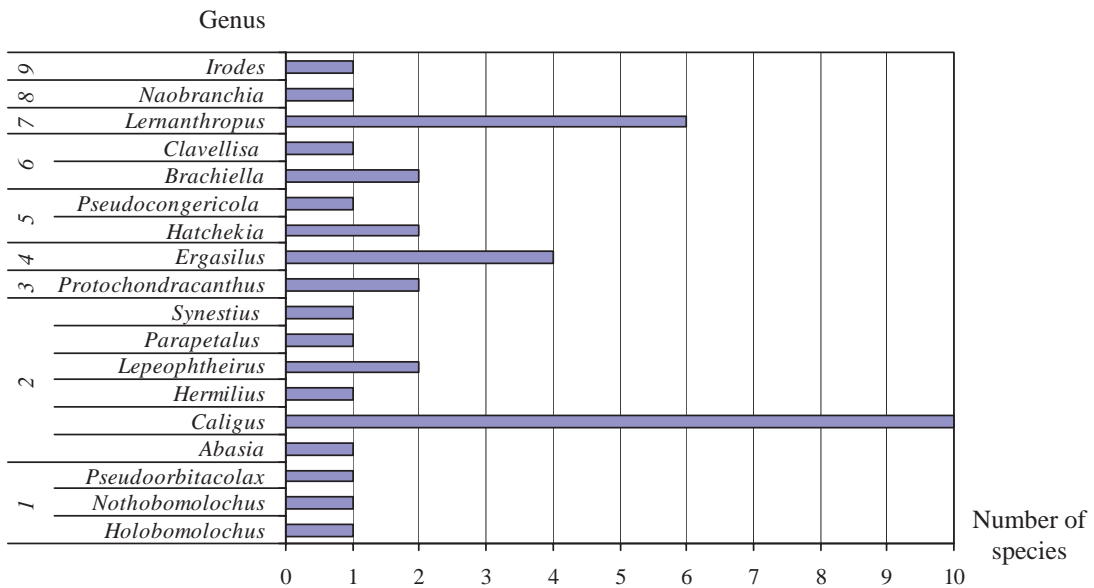
Fish species	Parasites		Prevalence	Mean intensity
	Species	Families		
<i>Terapon jarbua</i>	<i>Caligus</i> sp.8	Caligidae	46.00	1.65
	<i>Naobranchia</i> sp.	Naobranchiidae	36.00	1.28
	<i>Nothobomolochus</i> sp.	Bomolochidae	2.00	1.00
<i>Therapon theraps</i>	-	-	0	0
<i>Pelates quadrilineatus</i>	-	-	0	0
Unidentified fish in Fam. Gobiidae	-	-	0	0
<i>Trypauchen vagina</i>	-	-	0	0
<i>Scatophagus argus</i>	<i>Lepeophtheirus</i> sp.1	Caligidae	30.00	2.00
	<i>Lepeophtheirus</i> sp.2	Caligidae	5.00	1.00
<i>Siganus javus</i>	-	-	0	0
<i>Siganus canaliculatus</i>	-	-	0	0
<i>Sphyraena obtusata</i>	<i>Caligus</i> sp.9	Caligidae	33.33	1.00
<i>Trichiurus lepterus</i>	<i>Lernanthropus forficatus</i>	Lernanthropidae	33.33	1.50
<i>Rastrelliger neglectus</i>	-	-	0	0
<i>Rastrelliger kanagurta</i>	-	-	0	0
<i>Scomberomorus guttatus</i>	-	-	0	0
<i>Psettodes erumei</i>	<i>Protochondracanthus</i> sp.1	Chondracanthidae	30.00	1.67
	<i>Protochondracanthus alatus</i>	Chondracanthidae	40.00	1.50
	<i>Ergasilus</i> sp.4	Ergasilidae	10.00	6.00
<i>Cynoglossus bilineatus</i>	-	-	0	0
<i>Monacanthus chinensis</i>	<i>Orbitacolax</i> sp.	Bomolochidae	45.00	1.44
<i>Lagocephalus spadiceus</i>	<i>Taeniacanthus</i> sp.	Taeniacanthidae	100.00	1.00

Number of species



**Figure 1** Number of parasitic copepods species according to families.

(1= Bomolochidae, 2= Caligidae, 3= Chondracanthidae, 4= Ergasilidae, 5= Hatschekiidae, 6= Lernaeopodidae, 7= Lernanthropidae, 8= Naobranchiidae, 9= Taeniacanthidae)



**Figure 2** Number of parasitic copepods according to genera.

the southern part of Thailand (Chinabut, 1996). Ho and Kim (2004) reported five species of parasitic copepods on fishes of the Gulf of Thailand, *Lernanthropus corniger*, *L. latis*, *L. nemipteri*, *Norion tayenus* and *N. priacanthi*. In this study, *Caligus* spp. were found in the highest number and infected nine marine fish species (28.21%).

Despite these marine fishes were infected with low number of parasites (mean intensity = 4.85) not severe enough to cause mortality. However, they might affect weight and length reduction (Lester and Hayward, 2006). Moreover, these copepodid grips the skin with its clawed antennae. Open wounds caused by attachment organs (claws) may induced the bacteria infections.

Although, these copepod parasites were external parasites but in each marine fishes species did not have same parasitic species. Many fishes genera in this study had same parasites as found in India (Pillai, 1985). For example, *Brachiella lutiani* found in *Lutianus* sp., *Clavellisa dussumieria* found in *Dussumieria hasseltii*, *Hermilius pyrivertris* found in *Arius* sp.,

*Parapetalus occidentalis* found in *Rachycentron canadum*, these remarks could be confirm about host-specificity of copepodid parasite. Pillai (1985) reported about several remarkable instances of strict host-specificity at the genus level. The bomolochids; *Pseudorbitacolax*, *Pumiliopes* and *Pumiliopsis* including the known species of *Pseudopetalus* parasitize on clupeids. *Sciaenophilus* shows a distinct preference for sciaenids. *Hermilius* is confined to catfishes. In this study, *Hermilius pyrivertris* was found on *Arius* sp. (Ariidae).

## CONCLUSION

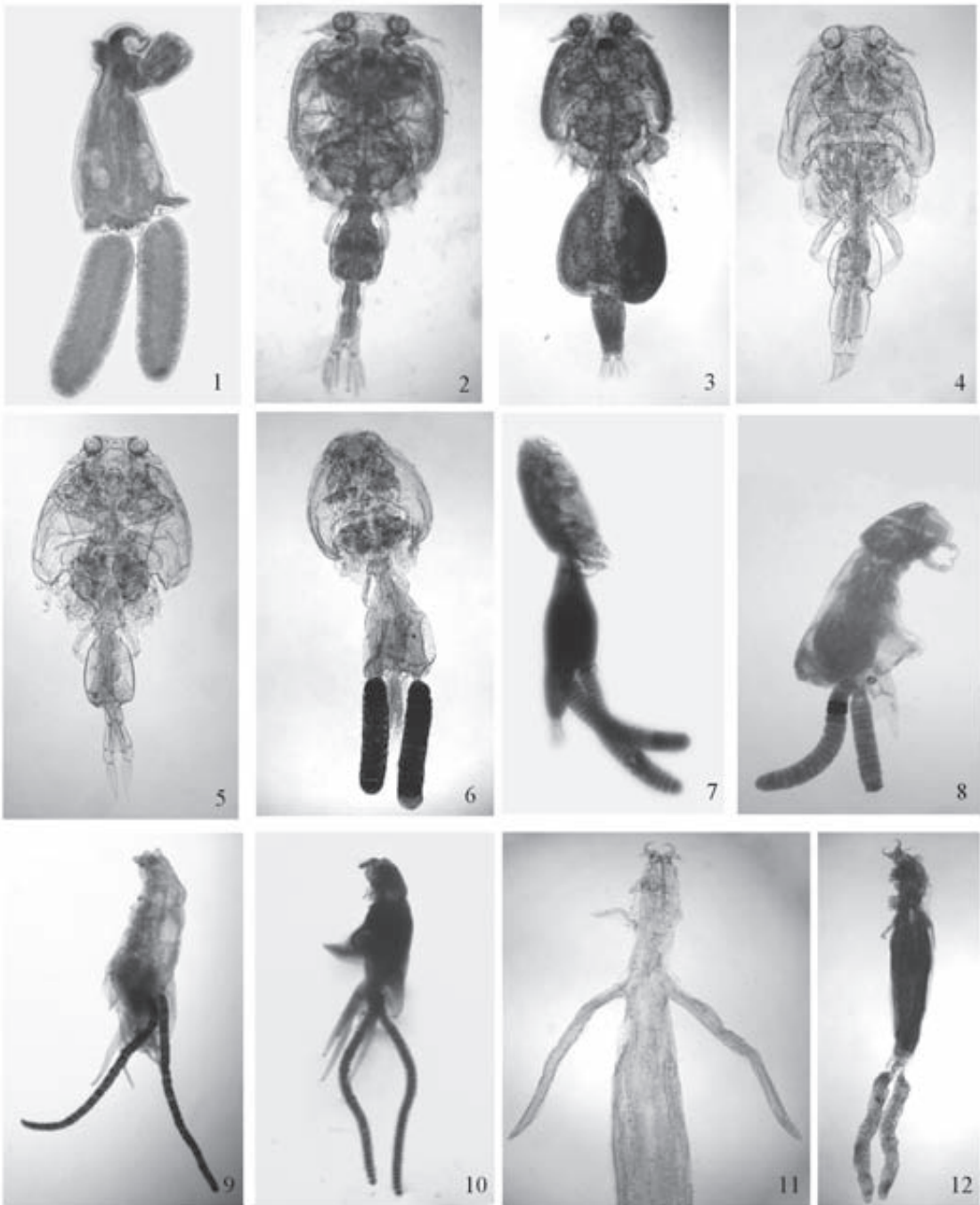
Sixty-one species (669 samples) of marine fishes from the Gulf of Thailand were investigated and 26 species (154 samples) or 42% of species (23.02% of samples) were found to be infested with copepod parasites. Thirty-nine species of copepod parasites were found in this study, and further eight species (*Pseudocongericola* sp., *Clavellisa dussumieria*, *Hermilius pyrivertris*, *Parapetalus occidentalis*,



**Figure 3** Some parasites from marine fishes in Gulf of Thailand, Chon Buri province.

- |                                  |                                    |                                   |
|----------------------------------|------------------------------------|-----------------------------------|
| 1. <i>Pseudocongericola</i> sp.  | 2. <i>Hatschekia caudata</i>       | 3. <i>Lepeophtheirus</i> sp.      |
| 4. <i>Hermilius pyriventris</i>  | 5. <i>Parapetalus occidentalis</i> | 6. <i>Synestius caliginus</i>     |
| 7. <i>Brachiella lutiani</i>     | 8. <i>Ergasilus</i> sp.            | 9. <i>Nothobomolochus</i> sp.     |
| 10. <i>Pseudoorbitacolax</i> sp. | 11. <i>Naobranchia</i> sp.         | 12. <i>Clavellisa dussumieria</i> |





**Figure 4** Some parasites from marine fishes in Gulf of Thailand, Chon Buri province.

- |                                   |                                     |                                    |
|-----------------------------------|-------------------------------------|------------------------------------|
| 1. <i>Brachiella</i> sp.          | 2. <i>Caligus</i> sp.2              | 3. <i>Caligus</i> sp.5             |
| 4. <i>Caligus</i> sp.6            | 5. <i>Caligus</i> sp.7              | 6. <i>Caligus</i> sp.8             |
| 7. <i>Caligus</i> sp.9            | 8. <i>Lernanthropus</i> sp.3        | 9. <i>Lernanthropus forficatus</i> |
| 10. <i>Lernanthropus sciaenid</i> | 11. <i>Protochondranchus alatus</i> | 12. <i>Protochondranchus</i> sp.   |

*Syneustius caliginus*, *Hatschekia caudate*, *Brachiella lutiani*, *Protochondracanthus alatus*) were specific to their hosts. This result could be used as the basic information for future study.

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