Distribution of Polyopisthocotyleans in Some Marine Fishes from the Gulf of Thailand, Chonburi Province

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ABSTRACT

A survey of polyopisthocotylean parasites was carried out in 77 marine fish species from the Gulf of Thailand, Chonburi province during 2006-2007. A total of 17 species from eight families of polyopisthocotyleans were identified from fish samples during the study period, as follows: Family Axinidae (*Axine* sp.), Family Discocotylidae (*Oligapta* sp., *Vallisia* sp.), Family Gastrocotylidae (*Gotocotyla* sp.), Family Heteraxinidae (*Allencotyla* sp., *Leuresthicola* sp.), Family Heteromicrocotylidae (*Heteromicrocotyla* sp.), Family Mazocraeidae (*Diclidophoropsis* sp., *Mazocraeoides* spp.), Family Microcotylidae (*Aspinatrium* sp., *Microcotyle* spp.) and Family Thoracocotylidae (*Pricea multae*, *Pseudothoracocotyla ovalis*). *Microcotyle* spp. had the highest number of species (four out of six). The prevalence of polyopisthocotylean parasites in *Caranx armatus* and *Tylosurus annulata* was the highest (100%). The mean intensity of *Pricea multae* in *Scomberomorus guttatus* was the greatest, followed by *Pseudothoracocotyla ovalis* in *Scomberomorus guttatus* and *Mazocraeoides* sp.2 in *Anodontostoma chacunda*, 5.6, 5.33 and 4 respectively. In this study, *Allencotyla* sp., *Aspinatrium* sp., *Diclidophoropsis* sp., *Leuresthicola* sp., *Mazocraeoides* sp.1, *Mazocraeoides* sp.2, *Oligapta* sp., *Pricea multae*, *Pseudothoracocotyla ovalis* and *Vallisia* sp., parasites of *Caranx armatus*, *Sphyraena obstusata*, *Johnius dussumieri*, *Tylosurus annulata*, *Anodontostoma chacunda*, *Stolephorus* sp., *Hyporhamphus gaimardi*, *Scomberomorus guttatus* and *Chorinemus lysan* were reported for the first time in Thailand.
Key words : Polyopisthocotylean, parasite, marine fish, Gulf of Thailand, Chonburi

INTRODUCTION

Monogeneans are flatworms with representatives in freshwater, brackishwater and marine habitats. They are the most common and abundant ectoparasitic flukes of fish, with a greater diversity of species occurring in the tropics than in the temperate regions of the world (Rohde, 1982). All monogeneans have a direct life cycle without intermediate hosts. Most monogeneans are ectoparasites of fish. The main characteristic of the group is the opisthaptor. This organ of attachment is normally equipped with sclerotinized structures such as hooks, clamps and suckers. The hooks, clamps and suckers all have direct contact with host tissues and may directly inflict mechanical damage. Monogeneans comprise of two very distinct groups, the monopisthocotyleans and the polyopisthocotyleans, which differ considerably, with important implications for pathogenicity, treatment and host response. Polyopisthocotyleans can possess sclerotized clamps, often in large numbers, which are extremely important for pinching the gill secondary lamellae of the host fish (Buchmann and Bresciani, 2006).

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Polyopisthocotyleans, which are primary sanguinivorous parasites, are adapted for the absorption of hemoglobin (Halton, 1974). Direct blood feeding by polyopisthocotyleans can result in anemia in the host. Several reports have described high pathogenicity of these parasites to certain host species, not only in aquaculture systems but also in natural lakes, rivers and seas (Buchmann and Bresciani, 2006). For example, in Japan, an infestation of *Pseudanthocotyloides* sp. in the semi-enclosed Sea of Lyo resulted in the death of 87,000 Japanese anchovy (*Engraulis japonica*) (Yamamoto *et al.*, 1984). The European catfish *Silurus glanis* can have high populations of *Ancylodiscoides vistulensis* (Szekely and Molnar, 1990). *Sparicotyle chrysophriiwas* (originally called *Microcotyle chrysophrii*) is a gill monogenean strongly specific for sea bream and able to induce mortalities in culture systems (Sanz, 1992). Moreover, monogeneans have been used widely as biological tags to provide information for fishery managers on the movements and population structure of their hosts (Buchmann and Lindenstrom, 2002; Buchmann and Bresciani, 2006).

The aim of the present study was to survey the occurrence of polyopisthocotylean parasites in marine fishes in the Gulf of Thailand, Chonburi province. The results will provide fundamental data for fish parasite research.

MATERIALS AND METHODS

Seventy-seven marine fish species were bought from fishermen in the Gulf of Thailand at Chonburi Province during 2006-2007. Identification of the fishes was undertaken according to the Department of Fisheries (1964), Collette and Nauen (1983), Russell (1990), McKay (1992), Nakamura and Parin (1993), Rainboth (1996) and Nelson (2006). The gills of fishes were examined for polyopisthocotyleans under a stereomicroscope. Parasites were then removed from the hosts and preserved in ammonium picratum glycerine. Samples were studied using light microscopy, manipulation and measuring techniques.

Polyopisthocotylean identification was based on morphological features of the opisthaptor (clamps and hooks) and the genital atrium according to McMahon (1963), Yamaguti (1963), Schell (1970), Hayward and Rohde (1999), Rohde and Hayward (1999) and Sirikanchana (2003). Prevalence and mean intensity of each parasitic species were determined as in Margolis *et al.* (1982).

RESULTS AND DISCUSSION

One thousand eight hundred and twenty fish samples from 77 marine fish species were collected from the Gulf of Thailand. Sixteen fish species were found to be infested with polyopisthocotylean parasites (Table 1). The highest diversity of parasites was found in *Scomberomorus guttatus*, *Hyporhamphus gaimardi* and *Caranx armatus* with 3, 2 and 2 species of parasites, respectively. There were 17 species of polyopisthocotyleans found on the gill filaments. These 17 species belong to 13 genera and eight families (Figure 1). Two genera each were found from families Discocotylidae, Heteraxinidae, Mazocraeidae, Microcotylidae and Thoracocotylidae, while one genus each was found from families Axinidae, Gastrocotylidae and Heteromicrocotylidae (Table 1, Figure 1).

Two genera, *Aspinatrium* sp. and *Microcotyle* spp., were found under family Microcotylidae, with genus *Microcotyle* having four species, the highest number of species (four out of six) found under one genus in this study. *Microcotyle* spp. (Figure 2) are gill filament parasites of six species of Perciformes fishes, *Gerres filamentosus*, *Gazza minuta*, *Nemipterus hexodon*, *Pelates quadrilineatus*, *Therapon jarbua* and *T. theraps*. Moreover, *Microcotyle* sp. 4 was found in three species of fish of two genera in the same family.

The prevalence of polyopisthocotylean parasites in *Caranx armatus* and *Tylosurus annulata* was the highest at 100%. The mean intensity of *Pricea multae* in *Scomberomorus guttatus* was the highest, followed by *Pseudothoracocotyla ovalis* in *S. guttatus* and *Mazocraeoides* sp.2 in *Anodontostoma chacunda*, 5.6, 5.33 and 4, respectively. All marine fish samples were infected with a low number of parasites (mean intensity of 1.00-5.60), which was insufficient to cause any mortality.

Microcotylidae are encountered very widely on the Perciformes (Bychowsky, 1961). In this study, four species of family Microcotylidae were found only in Perciform fishes. *Pseudanthocotyloides* sp. (family Mazocraeidae) was found in *Stolephorus* sp. (order Clupeiformes). This result was similar to the report of Bychowsky (1961) which found Mazocraeidae in Clupeiformes. These data showed host-specificity of *Pseudanthocotyloides* at the order level.

The gills of Spanish mackerel (family Scombridae, *Scomberomorus* spp.) are known to be infected with representatives of two families of polyopisthocotyleans that belong to the suborders Gastrocotylinea, Gotocotylidae and Thoracocotylidae (Hayward and Rohde, 1999). In this study, *Pseudothoracocotyla ovalis* (family Thoracocotylidae) was found on *S. guttatus*. In India and other countries from the Indo-west Pacific, *Pseudothoracocotylaovalis* was found in *S. guttatus* and seven species of *Scomberomorus* spp. (Hayward and Rohde, 1999). *Pricea multae* has been recorded from seven species of *Scomberomorus* from the Indo-west Pacific, from off eastern South Africa north to the Persian Gulf and as far east as Fiji (Rohde and Hayward, 1999). These data showed host-specificity at the genus level of these polyopisthocotyleans.

Allencotyla sp., *Aspinatrium* sp., *Diclidophoropsis* sp., *Leuresthicola* sp., *Mazocraeoides* spp., *Oligapta* sp., *Pricea multae*, *Pseudothoracocotyla ovalis* and *Vallisia* sp. were regarded as having been reported in Thailand for the first time (Figure 3).

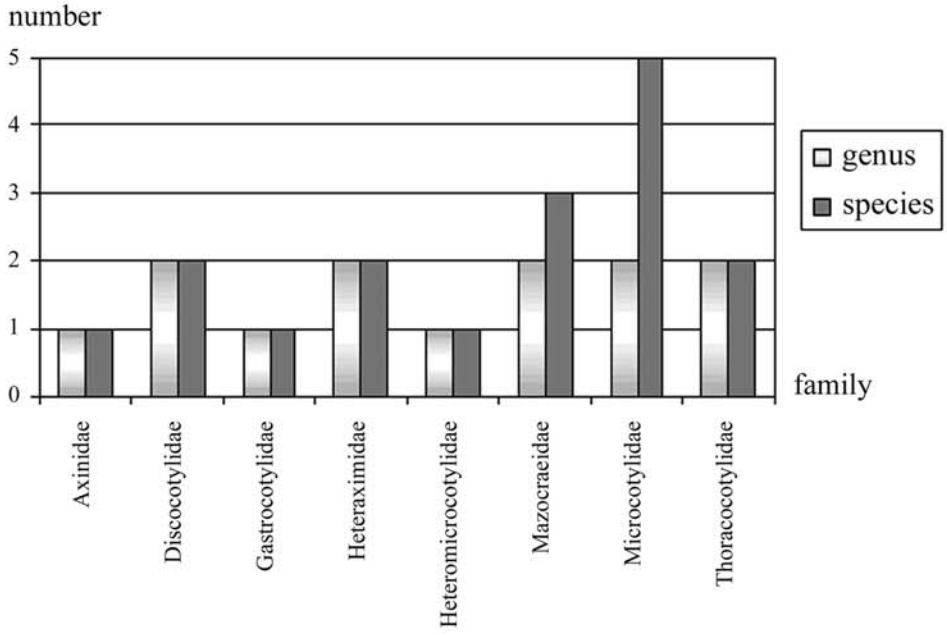

Figure 1 The number of families, genus and species of polyopisthocotylean found in some marine fishes in the Gulf of Thailand.

Table 1 Prevalence and mean intensity of polyopisthocotyleans in marine fishes from the Gulf of Thailand, Chonburi province.

fish			no. of	parasite		prevalence	mean
order	**family**	**species**	**fish**	**species**	**family**		**intensity**
Orectolobiformes	Hemiscylliidae	*Chiloscyllium punctatum*	60	-	-	-	-
Anguilliformes	Muraenesocidae	*Muraenesox* sp.	60	-	-	-	-
	Ophichthidae	*Ophichthys* sp.	12	-	-	-	-
Clupeiformes	Clupeidae	*Dussumieria hasseltii*	45	-	-	-	-
	Engraulidae	*Stolephorus* sp.	2	*Mazocraeoides* sp.1	Mazocraeidae	50.00	1.00
Cypriniformes	Cyprinidae	*Hilsa kanagurta*	20	-	-	-	-
		Anodontostoma chacunda	9	*Mazocraeoides* sp.2	Mazocraeidae	11.11	4.00
Siluriformes	Plotosidae	*Plotosus anguillaris*	40	-	-	-	-
		Plotosus canius	16	-	-	-	-
	Ariidae	*Arius* sp.	20	-	-	-	-
Aulopiformes	Synodontidae	*Saurida micropectoralis*	60	-	-	-	-
Batrachoidiformes	Batrachoididae	*Batrachus grunniens*	2	-	-	-	-
Mugiliformes	Mugilidae	*Liza dussumieri*	8	-	-	-	-
		Liza vaigiensis	4	-	-	-	-
		Valamugil buchanani	12	-	-	-	-
Beloniformes	Hemirhamphidae	*Hyporhamphus gaimardi*	40	*Axine* sp.	Axinidae	44.00	2.50
				Oligapta sp.	Discocotylidae	40.00	3.00

Table 1 Prevalence and mean intensity of polyopisthocotyleans in marine fishes from the Gulf of Thailand, Chonburi province (continued).

fish			no. of	parasite		prevalence	mean
order	**family**	**species**	**fish**	**species**	**family**		**intensity**
	Belonidae	*Tylosurus annulata*	2	*Leuresthicola* sp.	Heteraxinidae	100.00	1.00
Beryciformes	Holocentridae	*Holocentrus rubrum*	5	-	-	-	-
Scorpaeniformes	Platycephalidae	*Platycephalus indicus*	30	-	-	-	-
Perciformes	Latidae	*Lates calcarifer*	40	-	-	-	-
		Psammoperca waigiensis	1	-	-	-	-
	Serranidae	*Epinephelus areolatus*	30	-	-	-	-
		Epinephelus tauvina	25	-	-	-	-
		Epinephelus faveatus	5	-	-	-	-
	Priacanthidae	*Priacanthus tayenus*	34	-	-	-	-
	Sillaginidae	*Sillago sihama*	30	-	-	-	-
		Sillago maculata	20	-	-	-	-
	Rachycentridae	*Rachycentron canadum*	10	-	-	-	-
	Carangidae	*Selaroides leptolepis*	15	-	-	-	-
		Caranx malam	45	-	-	-	-
		Caranx hippos	45	-	-	-	-
		Caranx armatus	1	*Allencotyla* sp.	Heteraxinidae	100.00	3.00
				Heteromicrocotyla sp.	Heteromicro-cotylidae	100.00	1.00

Table 1 Prevalence and mean intensity of polyopisthocotyleans in marine fishes from the Gulf of Thailand, Chonburi province (continued).

fish			no. of	parasite		prevalence	mean
order	family	species	fish	species	family		intensity
		Chorinemus lysan	6	*Vallisia* sp.	Discocotylidae	50.00	1.50
		Seriolina nigrofasciata	20	-	-	-	-
		Pampus argenteus	15	Unidentified Polyopisthocotylean	-	10.00	1.00
		Parastromateus niger	15	-	-	-	-
	Leiognathidae	*Gazza minuta*	25	*Microcotyle* sp. 1	Microcotylidae	2.94	1.00
		Leiognathus sp.	60	-	-	-	-
	Lutjanidae	*Lutianus vitta*	20	-	-	-	-
		Lutianus johni	2	-	-	-	-
	Gerreidae	*Gerres filamentosus*	19	*Microcotyle* sp. 2	Microcotylidae	10.53	3.50
		Gerres oyena	20	-	-	-	-
	Haemulidae	*Plectorhynchus pictus*	4	-	-	-	-
		Gaterin diagrammus	2	-	-	-	-
		Pomadasys maculatus	2	-	-	-	-
	Nemipteridae	*Nemipterus furcosus*	14	-	-	-	-
		Nemipterus hexodon	250	*Microcotyle* sp. 3	Microcotylidae	3.80	2.00
		Scolopsis dubiosus	25	-	-	-	-
	Polynemidae	*Eleutheronema tetradactylum*	10	-	-	-	-

Table 1 Prevalence and mean intensity of polyopisthocotyleans in marine fishes from the Gulf of Thailand, Chonburi province (continued).

fish			no. of	parasite		prevalence	mean
order	**family**	**species**	**fish**	**species**	**family**		**intensity**
	Sciaenidae	*Johnius soldado*	20	-	-	-	-
		Otolithes rubber	20	-	-	-	-
		Johnius dussumieri	23	*Diclidophoropsis* sp.	Mazocraeidae	8.70	1.50
	Sparidae	*Sparus berda*	1	-	-	-	-
	Mullidae	*Parupeneus* sp.	6	-	-	-	-
Perciformes	Platacidae	*Platax orbiculasis*	1	-	-	-	-
		Platax teira	1	-	-	-	-
	Drepaneidae	*Drepane punctata*	45	-	-	-	-
	Chaetodontidae	*Parachaetodon ocellatus*	2	-	-	-	-
	Terapontidae	*Therapon jarbua*	65	*Microcotyle* sp. 4	Microcotylidae	24.56	1.93
		Therapon theraps	20	*Microcotyle* sp. 4	Microcotylidae	42.86	1.50
		Pelates quadrilineatus	15	*Microcotyle* sp. 4	Microcotylidae	33.33	1.75
	Gobiidae	*Trypauchen vagina*	20	-	-	-	-
		Unidentified sp.1	1	-	-	-	-
	Scatophagidae	*Scatophagus argus*	70	-	-	-	-
	Siganidae	*Siganus javus*	25	-	-	-	-
		Siganus canaliculatus	25	-	-	-	-

Table 1 Prevalence and mean intensity of polyopisthocotyleans in marine fishes from the Gulf of Thailand, Chonburi province (continued).

fish			no. of	parasite		prevalence	mean
order	**family**	**species**	**fish**	**species**	**family**		**intensity**
	Sphyraenidae	*Sphyraena obstusata*	12	*Aspinatrium* sp.	Microcotylidae	40.00	2.00
	Trichiuridae	*Trichiurus lepterus*	10	-	-	-	-
	Scombridae	*Rastrelliger neglectus*	20	-	-	-	-
		Rastrelliger kanagurta	30	-	-	-	-
		Scomberomorus guttatus	15	*Gotocotyla* sp.	Gastrocotylidae	33.33	2.50
				Pricea multae	Thoracocotylidae	33.33	5.60
				Pseudothoracocotyla ovalis	Thoracocotylidae	40.00	5.33
		Euthynnus affinis	8	-	-	-	-
Pleuronectiformes	Psettodidae	*Psettodes erumei*	34	-	-	-	-
	Soleidae	*Synaptura quagga*	3	-	-	-	-
	Cynoglossidae	*Cynoglossus bilineatus*	30	-	-	-	-
Tetraodontiformes	Monacanthidae	*Monacanthus chinensis*	40	-	-	-	-
	Tetraodontidae	*Lagocephalus spadiceus*	1	-	-	-	-

CONCLUSION

Seventy-seven species (1,820 samples) of marine fishes from the Gulf of Thailand were investigated and 16 species (86 samples) or 20.78% (4.73% of samples) were found to be infested with polyopisthocotylean parasites. Seventeen species of polyopisthocotylean parasites were found in this study and some species were specific to their hosts.

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