

## Species composition and Diversity of Fishes in the South China Sea, Area I: Gulf of Thailand and East Coast of Peninsular Malaysia

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### ABSTRACT

The collaborative research on species composition and diversity of fishes in the Gulf of Thailand and eastern Malay Peninsula was carried out by R. V. Pramong 4 in Thai waters and K.K. Manchong, K.K. Mersuji in Malaysian waters, through otter-board trawling surveys. Taxonomic surveys also done for commercial fishes in the markets of some localities. Totally 300 species from 18 orders and 89 families were obtained. Their diversity are drastically declined, compare to the previous survey from 380 species trawled. The station point of off Ko Chang, eastern Gulf of Thailand and off Pahang River shown significantly high diversity of fishes 57 and 73 species found. Demersal species form the main composition of the catches. The lizardfish *Saurida undosquamis*, *S. miropectoralis*, the bigeye *Priacanthus tayenus* and *P. macracanthus*, the rabbitfish *Siganus canaliculatus* and hairtail *Trichiurus lepturus* were the most abundant economic species found in most of the sampling stations. Fishing efforts were 34 hours and 49 hours for the cruises I and II, with average catch per hour of 12.04 and 34.79 kg. respectively. The maximum catch per hour was 175.3 kg in Malaysian waters, the minimum was 4.33 kg in Thai waters. The average percentage of economic fishes is higher than that of trash fishes in Malaysian waters, it ranged from 55.45 to 81.92 %.

**Key words;** Species composition, Diversity, Fishes, Gulf of Thailand, Eastern Malay Peninsula

### Introduction

The collaborative surveys of fishery and oceanography in the South China Sea; subject of fish diversity and species compositions was launched in 1995 and started from the areas of Gulf of Thailand and Malay Peninsula through the organizing by SEAFDEC/TD, DOF Thailand, and MFRDMD, DOF Malaysia. The objective of these surveys are; to update the status of the diversity and productivity of economic fishes in the South China Sea and prepare for the annotated checklist of fish species obtained in this survey.

The fishery resource in the South China Sea, the western part (Gulf of Thailand and West Malay Peninsula) has been investigated since 1903 by Johnstone. The natural history has been greatly emphasized after the result of oceanographic survey of R. V. Stranger under the well known Naga Expedition in 1959-1961, then Rofen (1963) reported to 122 economic species found in the Gulf and 400 species were noticed.

The Department of Fisheries of Thailand and Malaysia have launched the joint surveys since 1967, the result of species diversity and catching were reported (Anon., 1967; Wongratana, 1968). Previously, several report on fish diversity in many areas of this region. Johnstone (1903), Annandale (1911) and Hora (1924a,b) wrote the classic reports on the fishes of the Lake Songkhla and the updated was done by Sirimontraporn (1984, 1990); Anon. (1969) published the guidebook on edible marine animal including fish. In the South China Sea and adjacent areas, the ichthyological surveys and fieldguide for species was done by Fisher & Whitehead (1974) for the first FAO identification sheets; Rau & Rau (1980) for the Philippines; Chen (1993) for Taiwanese waters, and Kuitert & Debelius (1994) for the southeast asian reef fish. The fishery resource assesment through the Otter-board Trawl net surveys in this area was reported since 1965 by Tiew, and then by Tiew et al. (1967), Isarankura & Kuhlmann-Hille (1966), Ritrugsa et al. (1968, 1969), Anon. (1968,1969, 1980),

Kuhlmargan-Hille & Ritrugsa (1972), Poreeyanond & Pokapunt (1980) and Wongratana (1985).

## Materials and Methods

### *Cruising and survey methods.*

1. The survey for species diversity of the South China Sea fishes in the first phase was carried out in the Gulf of Thailand and East Malay Peninsula. Two cruises were conducted, during 4 September-6 October, 1995 and 24 April-17 May, 1996; by the M.V. Pramong 4 in Thai waters and K.K. Manchong, K.K. Mersuji in Malaysian waters. The modified high opening Otter-board bottom trawlnets was applied in these surveys, 2-3 hours in Thai waters and 1 hour in Malay waters. Both cruise selected 24 and 23 points of 81 oceanographic station for trawling surveys as shown in Fig. 1.

2. During the port of call periods at Songkhla and Ko Samui, additional surveys for economic fish diversity were conducted through purchasing and collecting in the fishing piers and markets.

### *Collecting, recording and specimens handling.*

1. All species of each haul were recorded and collected for species representative. Each species representative was collected covering their sizes, sex and variations. Some huge and unaffordable specimens was photo recorded or partially collected for its important part e.g. shark and ray.

2. The representative species were photographed, by Ektachrome slides. Each specimens was posturized in lateral plane and fin setting by pin out and rubbed with conc formalin. The dry transparency box and grey or white board background was applied, except the larger specimens used only background paper or in site background.

3. The specimens was preserved in 10% Formalin for 1 to 3 weeks and transferred to 50 and 75% Ethanal gradually. Each station sampling is stored in the separated bottle, the larger specimens are stored in the drum with locality label. All specimens in these survey have been deposited in the Aquatic Natural Resources Museum, Dept. of Fisheries.

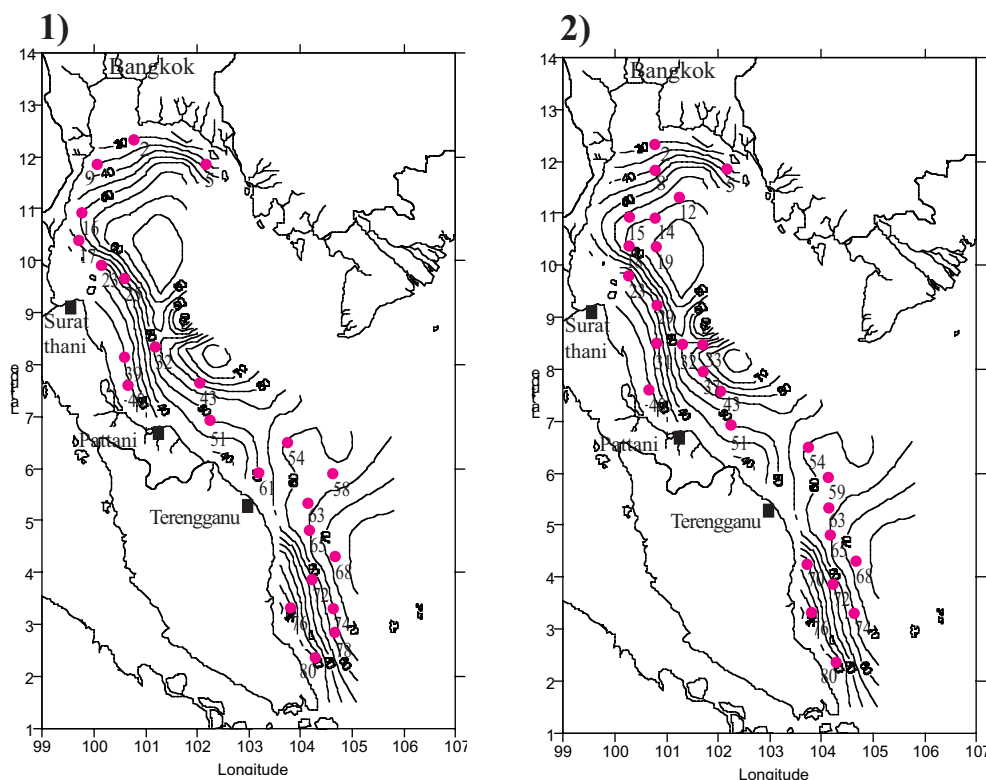


Fig. 1 The trawling station points and depth (m) in the cruise I (1) and cruise II (2).

**Identification and classifications.**

The classifications in this systematic account was follow Nelson (1994) for bony fishes and Compagno (1991), Last and Stevens (1994) for elasmobranches. Their identifications of each family was followed to several updated or previous references indicated in the text.

**Results**

Totally 300 species were obtained, at least 122 economic species were trawled and 32 species were collected in the markets. Eighth stations of each cruise were cancelled and changed due to unpermitted conditions of bottom and climate; station 10, 12, 28, 34, 35, 47, 57 and 67. The catching results was provided in the Table 1-4 and Fig. 2, 3.

Table 1. The average catch per hour made by different research vessels in the Gulf of Thailand. The figures showing the catch in kilogrammes per hour may effect also by method of operation, mesh opening, area of study, etc., however, they were chiefly declined according to the overexploitation demersal fishes of the resource. (From Wongratana, 1985 and Fishery Statistic Subdivision 1988-1996)

Author (s)	Year of survey	Vessel (tonnes)	Area visited	No. of Trawl hour	Depth range (m)	Average catch (kg) per hour
Tiewis (1965)	1961	Pramong 2(76)	Prachuab-kirikhan	266	10-50	297.8
		Pramong 3(50)				
Tiewis (1965)	1963-64	Pramong 2(76)	Entire Gulf	520	10-50	248.9
		Pramong 3(50)				
Isrankura & Kuhlorgen-Hill (1969)	1964	Pramong 3(50)	Trad, Songkhla	282	-	225.6
Isrankura & Kuhlorgen-Hill (1969)	1965	Pramong 2(76)	Trad, Prachuab- kirikhan	192	-	179.2
Ritragsa et al. (1968)	1966	Pramong 2(76)	Entire Gulf	713	10-44	130.77
		Pramong 1(50)				
Ritragsa et al. (1969)	1967	Pramong 2(76)	Entire Gulf	713	10-44	115.05
Ritragsa & Pramokchutima(1970)	1968	Pramong 2(76)	Entire Gulf	719	10-44	105.92
Dhamniyom & Vadhanakul (1970)	1968-69	Asa (40.92)	off Choburi	712	10-41	43043
Kuhlorgen-Hille & Ritragsa (1972)	1971	Pramong 2(76)	off Narathiwat,	21	12-54	134.77
		Penyelidex 1 (96)	Thai-Malaysian comparative survey	21		133.76
Boonyubol (1979)	1971	Pramong 2(76)	Entire Gulf	-	10-50	66.3
Boonyubol (1979)		Pramong 2(76)	Entire Gulf	-	10-50	63.1
Boonyubol (1979)		Pramong 2(76)	Entire Gulf	-	10-50	51.9
Boonyubol (1979)		Pramong 2(76)	Entire Gulf	-	10-50	57.7
Boonyubol (1979)		Pramong 2(76)	Entire Gulf	-	10-50	47.0
Boonyubol (1979)		Pramong 2(76)	Entire Gulf	-	10-50	57.2
Tanapong & Boonyapiwat (1981)	1976	Exploratory 1 (131)	Inner Gulf	16	10-30	38.65
Tanapong & Boonyapiwat (1981)	1977	Exploratory 1 (131)	Inner Gulf	16	10-30	38.24
Tanapong & Boonyapiwat (1981)	1979	Exploratory 1 (131)	Inner Gulf	16	10-30	35.28
Tanapong & Boonyapiwat (1981)	1980	Exploratory 1 (131)	Inner Gulf	16	10-30	18.93
Poreeyanond & Pokapunt (1980)	1980	Nagasaki-Marui (586)	Entire Gulf	11	32-74	77.62
Poreeyanond et al. (1981)	1981	Exploratory 1 (131)	Inner Gulf	6	9-28	16.72
Wongratana (1985)	1982	Nagasaki-Marui (586)	off Songkhla and Nakhon Si Thammarat	14	33-53	61.80
Fish. Statistic subdiv. 1990	1988	Commercial trawlers	Entire Gulf	-	-	54.15
Fish. Statistic subdiv. 1991	1989	Commercial trawlers	Entire Gulf	-	-	59.27
Fish. Statistic subdiv. 1992	1990	Commercial trawlers	Entire Gulf	-	-	34.42
Fish. Statistic subdiv. 1994	1991	Commercial trawlers	Entire Gulf	-	-	62.09
Fish. Statistic subdiv. 1995	1992	Commercial trawlers	Entire Gulf	-	-	51.22
Fish. Statistic subdiv. 1996	1993	Commercial trawlers	Entire Gulf	-	-	57.13
<b>Recent Survey</b>	<b>1996</b>	<b>RV Pramong 4 &amp; K.K. Manchong</b>	<b>Entire Gulf</b>	<b>81</b>	<b>30-80</b>	<b>26.10</b>

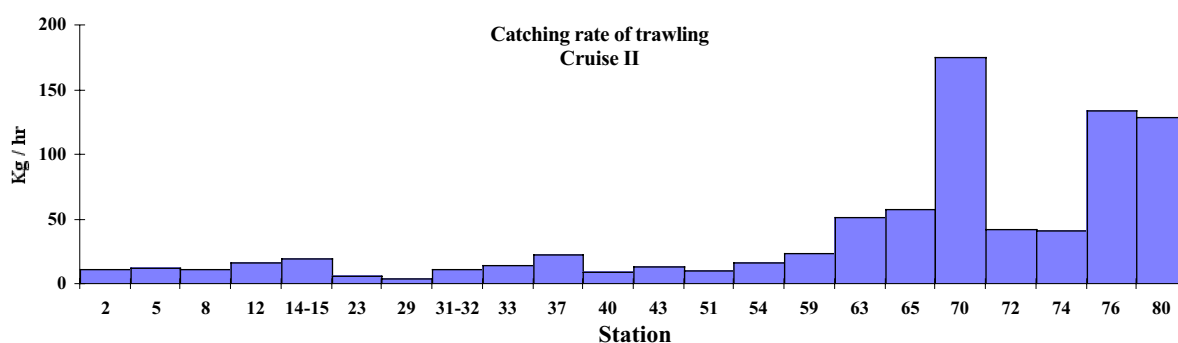


Fig. 2. Catching rate of trawling in Cruise II

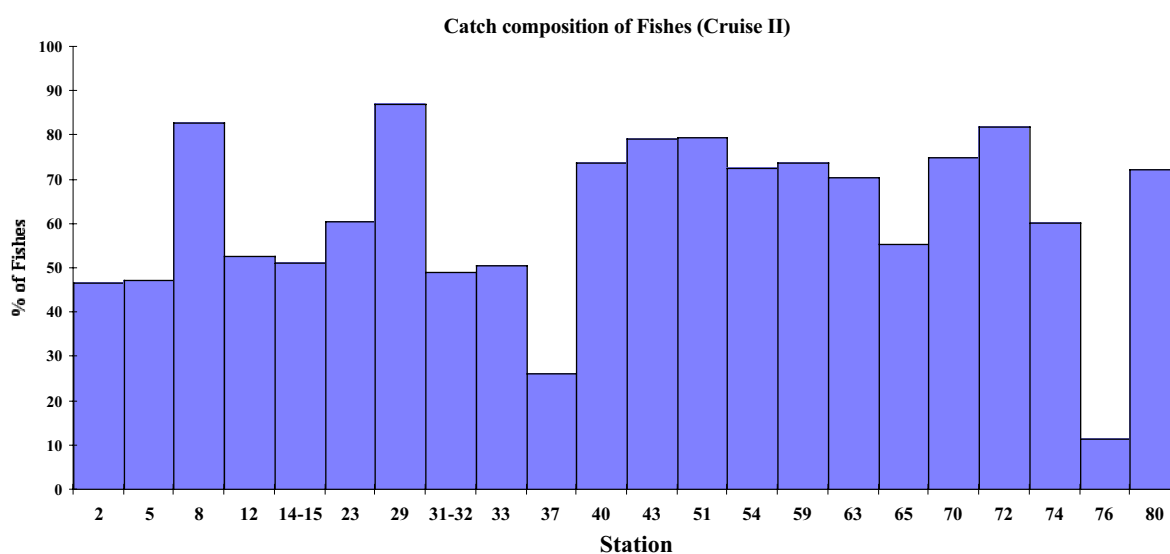


Fig. 3. Catch composition of fishes from Cruise II

## Diversity

At least 18 orders, 89 families and 300 species were found. There systematic account with brief description were available below.

## Systematic Account

### 1) Elasmobranchs

At least 13 orders, 34 families, 149 species known to Thailand and adjacent areas, mainly from coastal habitats. This survey obtained 18 species from 9 families and 5 orders. References; Compagno (1984 a,b); Michael (1993) and Last & Stevens (1994).

### Order Orectolobiformes

#### Family Stegostomatidae

##### *I. Stegostoma fasciatum* (Hermann, 1783)

An unmistakable shark with a very long, blade-like caudal fin, two ridger along side of body flank and yellowish brown colouration peppered with numerous, dark brown spots.

Head broad and stout, bluntly rounded. Fin broadly rounded, small eyes. Size attaining to 2.35m.

Distributed throughout Indo-West Pacific coasts. Only a 1 m. Specimens obtained off Malay Peninsular.

Randall (1995) suggest that *S. fasciatum* possibly junior synonym of *S. varium* (Seba, 1758).

#### Family Hemischiyllidae

##### 2. *Chiloscyllium punctatum* Mueller & Henle, 1838

A slender shark with relatively long barbels, two equal-sized dorsal fins with bases almost equal to the interdorsal space, the first dorsal fin partly over the pelvic-fins base.

Snout blunt, nasoral groove present, large spiracles. Large adults uniformly brownish or greyish above, pale ventrally, juveniles pale with 10 dark, vary bands, peppered with small dark spots. Size attaining to 10.5 cm.

Distributed throughout Indo-West Pacific, seldomly obtained along Malay peninsular, size 45-70 cm.TL.

#### Family Schliorhinidae

##### 3. *Atelomycterus marmoratus* (Bennett, 1830)

Very slender, narrow headed catshark with variegated colour pattern, gray saddle marking obsolete, black spots enlarged and merging together to form dash and bar marks that bridge saddle areas, large white spot scattered on sides and back. Anterior nasal flaps greatly expanded and extending to mouth. First dorsal with origin about opposite or slightly in front of pelvic insertion, second dorsal fin subequal to first dorsal.

Distributed throughout Indo-West Pacific. Size attaining to 70 cm., 55-60 cm. Specimens was obtained around Ko Kra by hand-line and trawl net.

### **Order Carcharhiniformes**

#### Family Triakidae

##### 4. *Hemitriakis* sp.

Body slender, head short, snout moderately long and bluntly angular in lateral view. Pectoral and pelvic fins relatively small. Uniform gray or grey-brown above, light below, with numerous white spots on dorsal area. Size attaining to 117 cm. Seldomly obtained off Malay Peninsula, 70 cm.SL. specimens.

Known from Philippines (Compagno in litt, 1997)

#### Family Hemigaleidae

##### 5. *Hemipristis elongatus* (Klunzinger, 1871)

Body fusiform and moderately slender. Snout long with protruding teeth (the upper long, curved and serrated on both edges), fulcate fins and a second dorsal fin about two-thirds the size of the first dorsal fin. Bronze to grayish brown dorsally, pale ventrally. Second dorsal and upper caudal fins with a dark blotch. Size attaining to 2.3 m.

Distributed throughout Indo-West Pacific, one specimen 1.5 m. Was obtained of Malay peninsula. It is considered to be among the best shark to eat.

#### Family Carcharhinidae

##### 6. *Carcharhinus dussumieri* (Valenciennes, 1834)

A small gray shark with moderately long rounded snout, fairly large horizontally oval eye, a black spot on the second dorsal fin but no other marking, Small semifulcated pectoral fins, a small triangular first dorsal fin with a short near tip and a moderately large second dorsal. Size attaining to 70 cm., one specimen of 40 cm. was obtained.

Distributed from northern Indian Ocean to Western Pacific. Commonly marketed for meat and shark's fin.

## **Order Rhinobatiformes**

### Family Rhinobatidae

#### 7. *Rhyncobatus* aff. *djiddensis*

Disc wedge-shaped; center of disc raised evenly; snout moderately long, broadly triangular; disc margin concave beside eye. Dorsal fins widely spaced fulcated with deeply concave posterior. Upper surface mostly yellowish brown; 10-30 distinctive white spots extending from mid pectoral fin to posterior tip of first dorsal fin; Ventral surface uniformly pale.

Size attaining to 3 m., one specimen of 1 m. Obtained. Distributed throughout Indo-West Pacific. Highly economic important.

note : *R. djiddensis* is restricted distribute to Red, this species is possibly *R. australiae* Whitley, 1939 or an undescribed species (Compagno, pers comm. 1997).

## **Order Torpediniformes**

### Family Narcinidae

#### 8. *Narcine maculata* Shaw, 1804

Body depressed; disc oval; eye small; the disc length equal to the tail. Tail elongated. Tapering gradually; dorsal fins spaces closely. Upper body surface pale brown with nummerous redish or dark brown, rounded spots; 3 pairs of dark brown bloch along the disc flanks. Size attaning 42 cm. Uncommon, taken by trawl-net, considered as trash.

#### 9. *Temera* sp. 1

Disc oval, tapering gradually with tail; eye small; dorsal fin ; pelvic fin large. Upper surface dark brown; disc and fins marginal pale, ventral uniform pale. Size attaining to 15 cm. One specimens found off Malay pennisula.

## **Order Myliobatiformes**

### Family Dasyatidae

#### 10. *Dasyatis kuhli* (Mueller & Henle, 1841)

Disc rhomboidal, with short thorns on the midline; tail with prominent dorsal and ventral fold. Dorsal surface grayish brown with bluish spots and dark transverse bone about the eyes, the tail is banded

Size attaining to 38 cm.width. Distributed throughout Indo-West Pacific, seldomly obtained by trawl net off Malay Peninsula. This ray is Economic edible species.

#### 11. *Dasyatis zugei* (Mueller & Henle, 1841)

Snout distinctively produced into acute angle; disc widest at the middle of length; short upper and lower fold on tail, usually single spine. Upper surface pale. Size attaining to 20 cm. (Disc width); commonly obtain throughout Gulf of Thailand.

#### 12. *Dasyatis* sp.1

Snout distinctively pointed, widest at the middle of its length; anterior mid-dorsal surface with single raw of thorns; tail slightly longer than disc, with two spine near the mid-length. Upper surface pale brown. Size attaining to 20 cm. Width.

Less common than other small species.

#### 13. *Dasyatis* sp.2

Similar to D. Sp.1 but more pointed snout; tail with a raw of short thorns granules (5-6) on anterior half; two spines. Upper surface dark or reddish brown. Size attaining to 20 cm .Width. Seldomly obtained off Malay Peninsular.

#### 14. *Dasyatis* sp.3

Similar to *D. kuhli* but without bluish spot on dorsal surface, the tail was less bands. Size attaining to 35 cm. width, more common than *D. kuhli*, of tenly trawled off Malay Peninsula and fished near Ko Kra.

15. *Himantura gerradi* (Gray, 1851)

Disc rhomboidal with pointed snout; pectoral fin apex angular; midline of dorsal with short row of thorns, tail several times longer than disc without fold. Upper surface grayish or dark brown with numerous pale spots, tail dark with several white spots.

Maximum size attaining 90 cm. width, commonly taken from off Malay Peninsula. Distributed in central Indo-West Pacific. Commonly found in fishes markets.

16. *Himantura jenkinsi* (Annandale, 1909)

Disc rhomboidal, pectoral fins with rounded apex; snout angular; tail shorter than disc length midline of trunk with a row of enlarged, spear shaped thorns and a narrow band of closely-spaced denticle extend along the head, back and tail. Upper surface uniformly yellowish brown, tail dark. Attains to 1.5 m. disc width.

17. *Himantura undulata* (Bleeker, 1852)

Disc quadrangular, trunk deep; pectoral fin apex narrowly rounded point: longer than disc length, upper surface granular in adult; one enlarge scapular thorn with as associated thorn patch retending onto nuchal area. Upper surface sandy brown with dark rays, leopard-like spots covering upto tail, before sting; ventral surface white.

Size attening to 1.4 m. on disc width. Distributed in Indo-West Pacific.

18. *Himantura walga* (Mueller & Henle, 1841)

Snout pointed; disc widest at anterior half of its length; tail shorter than disc; two spine on anterior posterior of tail. Upper surface uniform dark brown ventral pale with yellow margin.

Maximum size to 25 cm. width. Distributed in central Indo-Pacific, commonly taken with other small stingray species.

## 2) Bony fishes

At least 30 orders, 192 families and around 2375 species of bony fish known to Thailand and 1880 marine bony fish known to Thai waters. In this survey, 13 orders, 80 families and 282 species were collected.

### Order Anguilliformes

#### Family Muraenidae

The moray eels are distinguished by elongated body; without pectoral and pelvic fins; caudal fin jointed with elongated dorsal and anal fin; gill opening very small; large mouth gap with prominent canine teeth. There are more than 30 species known to South China Sea; four species found in this survey, this identification is followed Allen & Swainston (1993).

19. *Gymnothorax javanicus* (Bleeker)

A moray eel with yellow-brown head with small dark spots and large dark patch at gill opening, some adoult possesses leopard-like spotting on body. Body robust, eel-like with connected dorsal, caudal and anal fins, large head with prominent jaws and canine teeth.

Size attaining to 2.5 m , 60-70 cm specims were obtained by hand-like and trawled. Distributed throughout Indo-Pacific coasts.

20. *Gymnothorax* sp.2

Similar to *G. javanicus* but lack of brownish-black patch on gill opening; body with pale mottled on dark brown background. One species of 65 cm was obtained off Malay Peninsular.

21. *Siderea thyrsoidea* (Richardson)

Head relatively small; moray-eel like body form. Head dark brown with silvery eye, body yellowish pale with dark brown mottling, gill opening dark.

Size attaining to 35 cm, only one species obtained off Malay Peninsular. Distributed throughout Indo-West Pacific.

22. *Echidna* sp.

A very elongated eel with pale body color; dark mottlings. Two specimens were collected off Malay Peninsular, but almost damaged, unidentified. Not illustrated.

Family Congridae

23. *Conger myriaster* (Brevoort)

Body elongate, head small; upper lip with upturned labial large. Lateral line pores each placed in a whitish spot. Tip of tail flexible and tapering. Body pale grey, fins pigmented hyaline.

Size attaining to 1 m, two species of 25 cm obtained. Distributed in East China Sea.

Family Muraenesocidae

The pike eel have a stout body; well developed median fins; pectoral fin large; moderately large crescentic gill opening; large mouth gap, slender and prominently pointed snout. Castle (1984) reviewed the species found in Western Indian Ocean, two species were found in this survey.

24. *Muraenesox cinereus* (Forsskal, 1775)

Body elongate, cylindrical in front, compressed along tail. Head sharply conical, with the snout and lower jaw lengthened forward so that the mouth is large, extending to beyond eye, teeth generally large, conspicuous, sharp, more or less in 3 longitudinal rows on jaws and vomer; those on middle row of lower jaw and of vomer triangular, laterally compressed, with a prominent basal cusp in front and behind. Lateral line pores before level of anus 39 to 47.

Colour: light to dark greyish-brown above, lighter below; dorsal and anal fins with narrow black edges.

Maximum: 80 cm; common about 50 cm.

Distributed in Indo-West Pacific, only one species of 50 cm SL. was obtained.

25. *Congresox talabonoides* (Bleeker, 1853)

Head very sharply conical, with the snout and lower jaw markedly lengthened forward so that the mouth is very large, extending to well beyond eye; no lips; outer tooth row on lower jaw leaning outward; teeth on middle row of vomer prominent, needle-like; pectoral fins relatively small, their length about 4 times in length of head. Lateral line pores before level of anus 41 to 42. Vertebrae 132 to 145.

Colour: head and body olive to golden-yellow; vertical fins with narrow dusky edges.

**Order Clupeiformes**

Known as sardines and anchovies, four families occur in this region. Mainly inhabit pelagic and coastal, occasionally obtained by trawling but mainly caught by purse seine nets, most species are economically important. References; Whitehead (1985) and Whitehead, Nelson & Wongratana (1988).

Family Engraulididae

26. *Encrasicholina heteroloba* (Ruppell, 1837)

Body rather cylindrical, belly rounded, with 4 to 6 sharp needle-like prepelvic scutes, anal fin



begins under last dorsal fin ray. Maxilla tip pointed, projecting beyond second supra-maxilla and reaching to sub-operculum. Lower gillrakers 22 to 30, anal fin short, dull silvery/grey band on flank, the back beige.

Distributed throughout Indo-West Pacific.

Size: To at least 8 cm.

27. *Stolephorus dubiosus* Wongratana, 1983

Body somewhat compressed, belly with 4 to 7 small needle-like prepelvic scutes. Gillrakers 25 to 31, usually 26 to 28. Anal fin short, iii 18 or 19 finrays, its origin below about middle of dorsal fin base. A double pigment line on back behind dorsal fin.

Distributed from Eastern Indian Ocean to western Pacific. The species of engraulid are rarely obtained by trawl, but mainly by coastal fishing gears. There are highly economic group to Malaysia and Southeast Asian countries.

Size: attaining 7.5 cm.

28. *Stolephorus indicus* (van Hasselt, 1823)

Body slender, elongate, rather round in cross-section, belly rounded, with 2 to 6 pre-pelvic scutes. Lower gillrakers 20 to 28. Anal fin short, with usually iii 16 to 18 finrays, its origin below centre of dorsal fin base. Body light transparent fleshy brown, with a silvery stripe down flank; no dark pigment lines on back between head and dorsal fin.

Widespread in Indo-West Pacific.

Size: To 15.3 cm.

29. *Stolephorus insularis* Hardenberg, 1933

Body somewhat compressed, belly with 4 to 8, small pre-dorsal spine. A double pigment line on back behind dorsal fin; tail deep yellow

in Indo-West Pacific.

Size: To 6.4 cm.

Family Chirocentridae

30. *Chirocentrus dorab* (Forsskal, 1775)

Pectoral fin shorter than distant between mid-orbital to edge of opercle and the black marking of the upper part of the dorsal fin, also some black on the anterior part of the anal fin.

Geographical Distribution: throughout the warmer coastal waters of Indo-Pacific.

Size: To about 100 cm of standard length.

31. *Chirocentrus nudus* (Swainson, 1839)

Longer pectoral fin (than distant of mid-eye to opercular edge) absence of black markings on the dorsal fin tip and on the anterior part of the anal fin.

Geographical Distribution: Probably similar to that of *C. dorab*, but occurs in coastal areas mainly. Recently rare in Thai waters.

Size: to about 100 cm.

Family Clupeidae

32. *Ilisha megaloptera* (Swainson, 1839)

Body rather deep; belly with 28-35 total scutes; eye large; lower jaw strongly projecting; dorsal fin origin near midpoint of the body; anal fin with 38-53 finrays, origin below hind part of the dorsal fin. Body silvery with yellowish tint; fins yellowish hyalin; pectoral and caudal fin yellow, the caudal with dusky margin.

Attains to 27 mm, usually 20 cm.

Distributed in coastal of India to the South China Sea.

**33. *Sardinella fimbriata* (Valenciennes, 1847)**

Body somewhat compressed, total number of scutes 29 to 33. Lower gillrakers 54 to 82. A dark spot at dorsal fin origin.

Distributed in Indo-West Pacific,

Size: To 13 cm.

**34. *Amblygaster sirm* (Walbaum, 1792)**

Body slender, belly rather rounded, scutes not prominent. A series of 10 to 20 gold spots down the flank, lower gillrakers 33 to 43.

Distributed in Indo-West Pacific.

Size: To 23 cm.

**35. *Nematalosa nasus* (Bloch, 1795)**

Body rather deep, belly with total 28 to 32. Mouth inferior, lower jaw strongly flared outward. Last dorsal finray filamentous pectoral axillary scale present.

Geographical Distribution: Indian Ocean to southern Japan or southern tip of Korea.

Size: To 21 cm, usually about 15 cm.

**Order Aulopiformes**

Family Synodontidae

Lizardfishes are aptly named for their reptile-like head; large mouth and numerous needle like teeth; body cylindrical; no spine in the fins; high dorsal fin, small adipose fin; pelvic fin are large, caudal fin fork. Three genera and 6 species were found.

**36. *Saurida longimanus* Norman, 1939**

Body dusky olive above, silvery white below. Pectoral fin dark brown, its inner side dusky, reaching to or beyond line drawn between dorsal and ventral fin origin. About three rows of teeth in anterior part of outer palatine tooth band

**37. *Saurida micropectoralis* Shindo & Yamada, 1972**

Body fawn above, white below, with traces of dark blotches across back; brown spot at base of adipose fin; upper half of inner pectoral fin dusky and black bar across ventral fin. Pectoral fin short, never reaching ventral fin origin. Three or more rows of teeth in anterior part of outer palatine band.

**38. *Saurida tumbil* (Bloch, 1795)**

Distinguished from *S. micropectoralis* in the pectoral fin tip is just reach to pelvic fin origin. Coloration and other character is similar to the above species. Attain at least 40 cm. Distributed in Indo-Pacific.

**39. *Saurida undosquamis* (Richardson, 1842)**

Body plain olive brown above, silvery white below; upper edge of caudal fin with row of 4 to 9 black checks. Pectoral fin reaching ventral fin origin when laid toward it. Two rows of teeth on anterior part of outer palatine tooth band.

**40. *Synodus hoshinonis* (Tanaka, 1917)**

Prominent black area on upper of operculum split above into 3 or 4 branches. Brown bars across back. Pale peritoneum with 12-13 black spots. Anterior teeth of palatine band longer than posterior ones.

**41. *Trachinocephalus myops* (Forster, 1801)**

Snout blunt, shorter than eye diameter. Anal fin base longer than dorsal fin base. Body with

alternating narrow light blue and dark-edged yellow stripes, shading to whitish ventrally; a large diagonally elongate black blotch behind upper end of gill opening. **Order Ophiiformes**

Family Ophiidae

**42. *Serembo jerdoni* (Day, 1988)**

Head large; median fin confluent. Head and body yellowish gray crossed by 4 or 5 oblique dark brown bands anteriorly, each connecting with its partner over head and nape; dorsal fin with 3 or 4 dark brown blotches anteriorly followed by dark band, anal fin white with dark band. Short spine on operculum; small cycloid scales cover head and body; ventral fin base below posterior half of eye. Six or 7 oblique scale rows between lateral line and dorsal fin.

**43. *Serembo* sp.**

Head longer than *S. jerdoni*, robust body with 4 oblique dark-brown bands: dorsal fin with 3 dark blotches dorsally and submarginal dark band continuous to anal fin. Single species taken off Malay Peninsula.

**Order Siluriformes**

Family Ariidae

The sea catfish is the one of two siluroid families inhabit in the sea. Their head covered with a bony shield, often rugose; dorsal and pectoral fins with a strong, serrate spine. Jayaram (1983) reviewed the Indian Ocean species; up to 20 species known from this area; this survey found 3 species.

**44. *Arius bilineatus* (Valenciennes 1840)**

Snout broadly rounded and short, differ from *A. thalassinus* (pointed). head shield granules relatively coarse. Color, dark grey; silver to bronze ventrally, with 6-7 silver vertebral bands laterally. fins pale grey. Attains about 80 cm., usually 30-45 cm. Distributed in central Indo-Pacific area.

**45. *Arius maculatus* (Thunberg, 1792)**

Dorsal profile of head as a steep slope to first dorsal fin base; 3 pairs of barbels around mouth, the maxillary pair extending to pectoral fin base, head shield rugose and granulated from middle of or near posterior margin of orbit to supraoccipital process; supraoccipital process longer than broad at base with a median keel, palate teeth granular or molarlike, in a single large, fully elliptical or semioval patch on each side, first dorsal fin ray often produced into a long filament; total anal fin rays 19 to 22. Maximum size is 61 cm; common between 20 and 40 cm.

Colour: dark brown above, sides grey and belly whitish with dusky spots, the whole body with a bright sheen. All fins black tipped. Pectoral and pelvic fins dusky above, adipose mainly blackish.

Distributed from eastern Indian Ocean to South China Sea. Commonly found in market of coastal areas.

**46. *Arius thalassinus* (Ruppell, 1837)**

Dorsal profile of head sharply rising from occiput to first dorsal fin base; snout in males acute, pointed, with upper jaw longer than lower, in females rounded, jaw more or less equal, head shield weakly granulated and a prominent preorbital conical protuberance tapering as a wide V posteriorly, outer pelvic fin rays sometimes thickened in females; total anal fin rays 15 to 18. Maximum size is 185 cm, common between 25 and 70 cm.

Colour: dark-red-brown to bluish-grey above, densely pigmented below, the whole body with a bronze lustre; numerous narrow, parallel transverse iridescent crossbands of greenish colour, distal part of dorsal adipose, anal and caudal fins, as well as upper surface of pectoral and pelvic fins, dark.

Distributed throughout Indo-West Pacific. Highly economic species.

Family Plotosidae

The eel catfish is distinguished by continuous second dorsal fin to caudal and anal fin; four pairs of barbels; a slender, strong spine in the dorsal and pectoral fins. Over 4 species known from the South China Sea, 3 species were found. Reference; Gomon (1983).

**47. *Plotosus caninus* Hamilton-Buchanan, 1822**

Head moderately large, profile straight from tip of snout to dorsal fin origin; 4 pairs of barbels, the nasal barbels extending well behind eyes almost to nape, eyes small, teeth in upper jaw pointed, in 2 rectangular patches of 3 rows each, pectoral fins with 11 to 14 soft rays. Dendritic organ present posterior to anus.

Maximum: reportedly 150 cm; common to 80 cm.

Colour: Dorsal of body olive dark-brown, pale ventrally; fins dark or dark brown.

Distributed from eastern Indian Ocean to Western Pacific. Common economic species in estuary areas.

**48. *Plotosus lineatus* (Thunberg, 1787)**

Head moderately large, profile slightly arched from tip of snout to dorsal fin origin, the nasal barbels not extending well beyond posterior borders of eyes, dorsal procurent caudal fin with 69 to 115 rays, anal fin with 58 to 82 soft rays

Colour: brown or black above, whitish below, with 2 or 3 stripes (white or yellow in life); 2 of the stripes extend from snout to near caudal peduncle, margin of median fins blackish.

Maximum: about 30 cm; common to 25 cm.

Distributed throughout Indo-West-Pacific, commonly obtained by trawl-net in large school.

**49. *Plotosus* sp.1**

Head small, nasal barbels not reaching gill opening; body robust; second dorsal fin origin above pelvic fin.

color: silvery grey, 2 pale longitudinal stripes from head to caudal finbase. First dorsal fin with black tip, second dorsal and anal fin with dark margin.

Size; 16 cm. found at Songkhla fishmarket, only single specimens.

**Order Beloniformes**

Family Belontiidae

The needlefishes are very elongate body; extremely long, pointed jaws bearing numerous needle-like teeth; the fins lack of spines; the dorsal and anal fins are posterior in position; scales small, deciduous. Over 5 species of 4 genera known in this area, 2 species found (References; Collette, 1984a; Petchsathit, 1992). The beloniforms fish is surface inhabitant, usually obtained by purse seine, drift gillnet and scoop net.

**50. *Ablennes hians* (Valenciennes, 1846)**

Body elongate and greatly compressed laterally. Upper and lower jaws greatly elongated and studded with small sharp teeth. Gillrakers absent. Anterior parts of dorsal and anal fins with high falcate lobes; anal fin rays numerous 24 to 28, pectoral fins falcate.

Colour: bluish green above, silvery white below. A broad dark blue stripe along sides and about 12 to 14 prominent dark vertical bars on body; tip of lower jaw red. Scales and bones green.

Maximum: at least to 120 cm total length and 90 cm body length; common to 70 cm body length

Distributed throughout Indo-West Pacific; commonly obtained by purse seine and dipnet

**51. *Tylosurus crocodilus crocodilus* (Peron & LeSueur, 1821)**

Body elongate, rounded in cross section. Upper and lower jaws greatly elongated and studded with sharp teeth, anterior part of dorsal and anal fins with relatively high lobes, anal fin rays 19 to 22,

a small black lateral keel on caudal peduncle.

Colour: dark bluish green above, silvery below. A dark blue stripe along sides.

Maximum: at least to 124 cm standard length; common to 90 cm standard length.

Distribution: A worldwide species in tropical and warm-temperate waters.

#### Family Hemiramphidae

The halfbeaks differ from needlefishes in having a short, triangular upper jaw and prolonged lower jaw; well developed gill rakers. Five genera and over 22 species known in the South China Sea, 4 species were obtained by scoop net and from fish market. References; Collette, 1984b; Petchsathit, 1992.

##### **52. *Euleptorhamphus viridis* (van Hasselt)**

Body slender and strongly compressed. Pectoral fin longer than head, but not reaching to pelvic fin origin. Dark bluish above, bluish silver below, fins hyaline, pectoral and anal fin dusky. Attains 50 cm. Widely distributed in the Indian and Pacific Ocean.

##### **53. *Hemiramphus far* (Forsskal, 1775)**

An elongate fish with a greatly prolonged, beak-like lower jaw; upper jaw short. No spines in fins, anal fin rays 10 to 12, pectoral fins short, not reaching past nasal pit when folded forward.

Colour: dark bluish above, silvery white below, with 3 to 9 (usually 4 to 6) vertical bars on the sides. Beak dark, with a bright red fleshy tip.

Maximum: about 44 cm total length; Common to 27 cm standard length.

Distribution: An Indo-Pacific species.

##### **54. *Hyporhamphus (Reporhamphus) dussumieri* (Valenciennes, 1846)**

An elongate fish with beak-like lower jaw, equal to or longer than head length; upper jaw short, triangular, and scaly, preorbital ridge present; dorsal and anal fin rays 14 to 16, caudal fin forked, with lower lobe longer than upper. Anterior part of dorsal fin and all of anal fin covered with scales.

Colour: green above, silvery white below. Fleshy tip of beak red.

Maximum: about 29.5 cm standard length. Common to 19.0 cm standard length.

##### **55. *Rhynchorhamphus malabaricus* Collette, 1976.**

An elongate fish with a greatly prolonged, beak-like lower jaw; upper jaw about as long as wide; domed, and covered with scales, dorsal plus anal rays 25 to 29, pectoral fins short, caudal fin distinctly forked, lower lobe longer than upper. Two branches of lateral line running from ventral outline of fish toward pectoral fin base.

Colour: bluish-green above, silvery white below. Fleshy tip of beak red.

Maximum: about 35 cm total length, common to 20 cm standard length.

Distribution: Known from eastern Indian Ocean, found in local market at Ko Sarmui, the Gulf of Thailand.

#### Family Exocoetidae

##### **56. *Cypselurus oligolepis* (Bleeker, 1866)**

Body oblong, dorsal and anal fins posterior in position, pectoral fin enlarged, reaching to anal fin; pelvic fin large, caudal fin deeply forked, the lower lobe much longer.

Color: bluish dark dorsally, flank and abdomen silvery, pectoral fin black except tip and about lower fifth which are hyaline, pelvic fin hyaline. Size: attains to 27 cm., commonly 15 cm. pelagic, usually taken by purse seine fishing or clipnets.

#### **Order Gasterosteiformes**

#### Family Fistulariidae

**57. *Fistularia commersoni* Ruppell, 1835**

Body and snout more slender than *F. petimba*, elongate bony plate on the body; interorbital space convex. Body pink or olive, silvery below.

**58. *Fistularia petimba* Lacepede, 1803**

Slender body plates embeded in skin along midline of back. Upper ridges on snout parallel, those above and behind eye strongly serrated. Interorbital space concave. Skin granular at all sizes; small sharp spines along posterior part of lateral line. Body pink or red above, silvery below.

Family Centriscidae

**59. *Centriscus scutatus* (Devis, 1885)**

Body appears transparent and silverly-yellow with a dark longitudinal stripe and 8-10 vertical bars on lower sides. First dorsal fin spine tip not jointed. Top of head with longitudinal striations and groove along interorbital space. Attains to 20 cm TL.

Family Syngnathidae

**60. *Hippocampus kuda***

Body compressed; head almost at right angle to body trunk; no caudal fin; a cluster of 5 blunt spines (“coronet”) on top of head, the ridge behind it spineless. Dorsal fin base elevates. Body reddish brown, black or banded. Attains to 20 cm, usually 10 cm. Threatened by overfishing for chinese traditional medicines.

**61. *Hippocampus* sp.**

Differ from *H. kuda* in having fewer trunk rings; spine relatively longer; body yellowbrown, goldish with dark brown spots.

**62. *Corythoichthys* sp.**

Body very elongate, head and snout snort, dorsal fin close to head than to caudal. Body greyish brown, pale ventrally; fins hyaline.

Family Pegasidae

**63. *Pegasus laternarius* Cuvier, 1816**

Rostrum of male club-shaped, horizontal; in female short; carapace surface with paired, dorsomedial ridges. pectoral fin wide, horizontally spreaded. Body olive brown or darky brown with numerous dark spots, fin hyaline with dark brown, small rings. Attain to 8 cm. Distributed in Indo-west Pacific. Reference; Palsson & Pietsch (1989).

**Order Scorpaeniformes**

Family Scorpaenidae

The scorpionfishes are named for the venomous fin spines possessed by many of the species. Head usually large, with extended bony platee passing from the suborbital bone across the cheek below the eye to preopercle; mouth large; dorsal fin often strongly notched between spinous and soft portions. Over 15 genera and 40 species known in this region, 12 species found (References; Eschmeyer, Hallacher & Rama-Rao, 1979; Eschmeyer, Rama-Rao & Hallacher, 1979; Gloefelt-Tarp & Kailola, 1984; Masuda et al., 1984; Randall, 1995).

**64. *Apistus carinatus* (Bloch, 1801)**

Head and body fawn, white below. Large black white ringed ocellus over posterior dorsal fin spines. Inner pectoral fin charcoal, lower rays and near axil orange. Three chin barbels; body scales with rough edges. Pectoral fin very long, lowermost rays free on rodlike.

**65. *Brachypterois serrulata* (Richardson, 1848)**

Head large with numerous serrate ridge, body slightly compress; dorsal spines short, pectoral fin long, reaching to base of caudal fin, caudal fin long. Body reddish with five blackish bars, large dark spot on opercle, pectoral fin membrane black, soft dorsal, anal, caudal and pelvic fin with orange-red spots. Size attains to 11 cm. Known from Red sea, Indo-China and Philippines, the specimens taken of Malay Peninsula and Borneo.

**66. *Inimicus sinensis* (Valenciennes, 1833)**

Elongate, naked body; snout equal to or longer than postorbital distance. Dorsal fin spines almost free from membrane except for first three; lowermost two pectoral fin rays rodlike and free from rest of fin. Inner pectoral fin colour dark brown or black with large orange or cream spots, base of rays bright yellow, spotted brown.

**67. *Minous coccineus* Alcock, 1890**

Body naked. Second lachrymal spine must longer than first. First spine must shorter than second spine; lowermost pectoral fin ray rodlike and free from rest of fin. Body dark pink; dorsal fin crossed by diagonal brown bands; caudal fin plain pink. Inner pectoral fin yellow or pink, crossed by rows of oval tan or brown spots.

**68. *Minous trachycephalus* (Bleeker, 1854)**

Head large, body tapering. Both lachrymal spines about equal in length. Body pink to yellow, brown mottling on back tending to form longitudinal bands. Caudal fin finely barred or pale. Inner pectoral fin bright yellow, axil and rays red or pink, large white spots in axil.

**69. *Minous pictus* Gunther, 1880**

Body naked, slightly oblong. Body yellow or fawn, streaked above with dark brown oblique lines and blotches extending onto dorsal fin. Caudal fin plain; inner pectoral fin pink or yellow, gray or brown stripes and spots spreading along fin rays to margin.

**70. *Minous monodactylus* (Bloch & Schneider, 1801)**

Body naked; large head, lacrymal bone with two spurs extending over maxilla; pectoral fin reaching at middle of anal fin. Body mottled brown grey or yellowish grey; pale ventrally; a large black spot distally on anterior of soft dorsal fin; anal and pair fins dark brown distally; caudal fin with two broad dark bars. Attains about 12 cm., commonly 5 cm. Distributed in Indo-Pacific region.

**71. *Pterois russelli* Bennett, 1831**

Dorsal fin spined long, membrane only at bases. Pectoral fin long, reaching to above anal fin, all its rays simple. Scale cycloid. Crimson or brownish red bands over head and body. Soft dorsal, anal and caudal fin plain yellow or red with no trace of spots; alternating rows of black and white spots and checks over ventral fin.

**72. *Pterois* sp.**

Similar to *P. russelli* but shorter pectoral fins and dorsal spines. Body with rosy red bands on pale base, ventral pale. Less common than the above species, taken from The Gulf of Thailand and Malay Peninsula.

**73. *Scorpaenodes scaber* (Ramsey & Ogilby, 1886)**

No palatine teeth; spines present on interorbital and on coronal ridge; head and body scales ctenoid. Second anal fin spine equal to or more than half head length. Soft dorsal, anal, caudal and pectoral fins finely spotted brown; 3 to 5 irregular bars over back; four dark bars radiate from eye. 43-46 scale rows above lateral line.

**74. *Scorpaena neglecta* Heckel, 1840**

Dark brown to brownish purple; a white bar sometimes present below dorsal fin. Fins completely dark brown, or margins banded yellow, pink or orange; inner pectoral fin bright yellow or orange in axil and along edges, broad black band along hind margin and lower rays crimson; skin rosy underneath pectoral fin. Neck humped before dorsal fin origin; occipital pit present on upper part of head behind eyes.

**75. *Scorpaenopsis cirrhosa* (Thunberg)**

Dark brown, rosy ventrally; mandible, eye and dorsal spines tip with fleshy papillae. Body oblong; large pectoral fin. One specimens, 12 cm. taken by Hand-line at Ko-Kra.

**76. *Choridactylus multibarbus* Richardson, 1848**

Head blunt the dorsal profile of snout nearly vertical; two pairs of barbels on lower jaws; posterior of two lacrymal spines and upper of two preopercular spine very long. Body deep, no scales, pectoral fin large with tree detached and free rays, dorsal fin with 12-14 spines, caudal fin small.

Color: mottled reddish brown, a diagonal white band between fourth and sixth dorsal spines, caudal fin white with brown submarginal and basal dark bars. Size attains to 12 cm. single specimens 8.5 cm. found. Distributed in Indo-Pacific.

Family Triglidae

**77. *Lepidotrigla spiloptera* Guenter, 1880**

Head large, rostral process of preorbital with series of 7 spines, one closely longer than the rest. Pectoral fin upper portion and hind border dark pink, base and lower rays cream or creamy pink; mid and lower part of fin lime-green with charcoal stippling or small spots within. Pectoral fin moderate. Dorsal fin with large red blotch at the posterior portion. Breast and belly fully scaled. Pectoral fin slender.

Family Dactylopteridae

Body moderately elongate. Head large and blunt, bones on top of head united to form a shield which produced backward from top of head into a long post-temporal spine and a long spine from preopercular angle. Pectoral fin enormous and wing-like. Caudal fin lunate or emarginate. References; Gloefelt-Tarp & Kailola (1984).

**78. *Dactyloptena papilio* Ogilby, 1910**

Post-temporal spine elevated above body profile. five to 7 enlarged scales on lower sides. Two single free spines before first dorsal fin. Large black patch containing blue spots near base of inner pectoral fin.

**79. *Dactyloptena orientalis* (Cuvier, 1829)**

Post-temporal spine lies flat against body. Two to 4 enlarged scales on lower sides. Two single free spines before first dorsal fin. Inner pectoral fin with many olive and charcoal blotches over all of fin.

Family Platycephalidae

The flatheads have elongated and depressed body; head more depressed and broader than body, with bony ridges usually bearing serration or spines; without venomous spiny finray. More than 60 species of 19 genera known from Indo-Pacific, 7 species found (references; Wongratana, 1975; Gloefelt-Tarp & Kailola, 1984; Randall, 1995).

**80. *Elates ransonneti* (Steindachner, 1876)**



Body very elongate, head depressed. One very long preopercular spine reaching past edge of operculum. Caudal fin emarginate, upper lobe usually with filament. Head and body almost translucent cream, row of mauve blotches along mid-sides.

**81. *Inegocia japonicus* (Tilesius, 1812)**

Two low spines below eye on suborbital ridge; iris lappet a half-circle with long, branched cirri; upper preopercular spine slightly longer than lower; lower opercular flap well-developed and acute. Body fawn; caudal fin orangish with 3 or 4 series of distinct black spots across it.

**82. *Sorsogona tuberculata* (Cuvier, 1829)**

Head ridges very finely serrated, suborbital ridge expanded and overhanging cheek; 3 to 5 preopercular spines present; 5 or 6 preopercular spines. Body pale brown, nape pale; lower pectoral fin and outer ventral fin with patches of black, their margins white.

**83. *Rogodius pristiger* (Cuvier, 1829)**

Head large, depressed, with fine serrated ridges, preopercular spines usually four, teeth on vomer and palatines somewhat enlarged. Color: brown dorsally, shading to pale ventrally with 4-5 dark blotch on paired five. Attains about 17 cm., 15 cm. SL. Specimens found off Malay peninsula.

**84. *Kumococius rodericensis* (Cuvier, 1829)**

Head with spinous bony ridges, stout; the suborbital ridges with four or more species; usually three preopercular spines, the uppermost much the largest, reaching to or beyond edge of opercle; pectoral fin slightly falcate. Color: brown with four or five faint dark bars on back; fins dusky, the outer part of caudal fin and edges of pectoral fins darker. Attain about 20 cm., commonly 15 cm. Distributed in Indo-West Pacific.

**85. *Platycephalus indicus* (Linnaeus, 1758)**

Head short, depressed, with smooth ridge; single small preopercular spine; two preopercular spines, the upper shorter than lower and angling dorsally; body depressed tapering. Color: olivaceous light brown with numerous dark spots, caudal fin yellow with dark irregular stripes. Size attains to 70 cm.; commonly 40 cm. Distributed in Indo-West Pacific, economic species of the family.

**86. *Thysanophrys macracanthus* (Bleeker, 1876)**

Suborbital ridge ventrally but outwards; preopercular spine long extending to posterior half of opercle; anterior scales of lateral line spiny. Body light brown, with faint irregular cross bands on back, upper part of pectoral and caudal fins spotted with dark brown. Attains to 20 cm., commonly 15 cm. Known from Indo-West Pacific.

**Order Lophiiformes**

Family Lophiidae

**87. *Lophiomus* sp.**

Dusky iliac above, white below; inside of mouth white, tongue and floor of mouth with network of black lines. Three to 4 rows of teeth in jaw. Gill opening behind and below pectoral fin "elbow"

Family Antennariidae

**88. *Antennarius striatus* (Shaw & Nodder, 1794)**

Body short, bulky and slightly compressed. Head large; mouth large, oblique or vertical; eye lateral, teeth slender: gill opening pore-like; pectoral fin modified and single, with distinct "elbow". Dark brown streaks spread across head and obliquely over body; fins spotted or striped dark brown.

Tip of illicium with 2 or 3 simple filament: second dorsal fin spine noticeably shorter than illicium; soft dorsal fin rays simple, last 2 or 3 branched. Anal and caudal fin rays branched; pectoral fin rays simple.

**89. *Antennarius nummifer* (Cuvier, 1817)**

Similar to *A. striatus* in body shapes but shorter fins. Body color varies, yellow, orange or pale brown; a prominent dark spot present at base of soft dorsal fin. Attain to 12 cm., 7 cm. specimens taken from Malay peninsula.

Family Ogcocephalidae (reference; Gloefelt-Tarp & Kailola, 1984)

**90. *Halieutaea stellate* (Vahl, 1797)**

Many strong sharp spine over dorsal surface, ventral surface smooth except for scattered fine spines around ventral fin bases; disc slightly wider than long, slightly flattened behind eyes; roof of rostral cavity does not reach disc edge. Dorsal surface rosy or dusky pink, usually patterned with black spots forming crescentic lines or red with black margins.

**Order Perciformes**

Family Priacanthidae

**91. *Priacanthus macracanthus* Cuvier, 1929**

Preopercular spine long and narrow. Body silver-red but varies a lot. Dorsal, anal and ventral fins with horizontal rows of dusky-yellow-green spots. Caudal fin truncate, red and with black edge.

**92. *Priacanthus tayenus* Richardson, 1846**

preopercular spine long and slender. Body colour silver-red. Fourth and 5th dorsal rays produced in young specimen; anal fin deeply emarginate with pointed lobes. Ventral fins with numerous brown blotch of various sizes.

Family Callionymidae

Small fishes with depressed head and trunk. Mouth small and protractile; small, fine teeth in jaws; eye large; well-developed spine on preoperculum with barbs along margin, no opercular nor subopercular spine. Gill opening a small pore near top of head or on upper sides; gill membranes united to isthmus. No scales; lateral line well-developed. Usually two dorsal fins. Ventral fin large, its base before base of large pectoral fin, last ray usually connected to it by a broad membrane. References; Gloefelt-Tarp & Kailola (1984); Masuda et al., (1984).

**93. *Callionymus japonicus* Houttuyn, 1782**

Preopercular spine 6-13 serrae along inner margin, 2 rough bony patches above and behind eye. First 2 dorsal spines produced and filamentous (male), caudal fin very long, median rays produced, the fin equal to or more than body length. First dorsal with dark brown streaks, black blotch on 3rd membrane, back margin on anal fin, caudal fin crossed by dark brown bars, lower part of fin black; large black spot on breast.

**94. *Callionymus filamentosus* Valenciennes, 1837**

First dorsal spine produced into filament and detached from rest of fin (male) connected with 2nd spine and not filamentous (female); median rays of pointed caudal fin filamentous (male). Pearly and dark brown spots over upper two-thirds of body, dark bars across cheek, dusky patch on pectoral base; 2nd to 4th membranes of first dorsal black with white streaks or with some large, white-edged black ocelli (male). Second dorsal, caudal and ventral fins spotted with brown.

**95. *Callionymus* sp.**

Male with high, filamentous first dorsal fin ray, the first dorsal fin jet black, second dorsal fin

hyaline with dusky and pale spots; anal fin dark with white margin.

**96. *Dactylopus dactylopus* Valenciennes, 1837**

Snout short. Spinous dorsal high, beginning before gill opening; usually all dorsal rays divided. Body olive above, marbled reddish brown and blue; soft dorsal and upper caudal fins barred with charcoal; blue-ringed ocellus on spinous dorsal membrane; ventral spotted dark blue.

**97. *Repomucenus virgis* (Jordan & Fowler)**

First dorsal broad and high in male; dorsal spine filamentous; preopercular spine short with an anterior process at base, 2-4 very short upward process on inner side. Pale greenish above, first dorsal fin olive hyaline with pale vermiculation fins yaline, with dark spots; pectoral fin dusky. Distributed in West-Pacific. Attains to 15 cm.

Family Champsodontidae

**98. *Champsodon arafurensis* Regan, 1908**

Elongate, slightly compressed bodies. Mouth very large, oblique, lower jaw prominent; eye high on head with a short cirrus; angle of preoperculum ends in a long slender spine; gill openings wide. Scales small. Ctenoid and granular; 2 indistinct lateral line with transverse branches. Two well-separated dorsal fins, pectoral fins small; ventral fins large, caudal fin forked. Outer part of first dorsal and caudal fins stippled brown; dusky base on caudal fin.

Family Centropomidae

**99. *Lates calcarifer* (Bloch 1790)**

Body elongate, compressed with a deep caudal peduncle. Mouth large, slightly oblique, upper jaw reaching to behind eye. Head pointed with a concave profile. Dorsal fin with a deep notch almost separating soft part of fin. Colour either olive brown with silvery sides and belly or green/blue with silver sides. Common in Indo-Pacific region, especially near coastal waters. A highly economic species, found in all markets.

Family Serranidae

The groupers, coralcods and anthias are the large family, consist of four subfamilies in the South China Sea. The largest size is subfamily Epinephelinae, over 70 species known from the region. The groupers and coralcods is characterized in having of large mouth, the maxilla not forming the part of gape; lower jaw usually projecting anterior to the upper; preopercular margin always serrate and opercle with three flat spines; scales small and ctenoid. Seven species were found in this survey (references; Masuda et al., 1984; Randall & Hoese, 1986; Randall & Heemstra, 1991; Heemstra & Randall, 1993).

**100. *Cephalopholis boenak* (Bloch, 1790)**

Body depth less than head length, preopercle rounded, very finely serrate; no enlarged spines at angle, pectoral fins longer than pelvic fins, pelvic fins usually reaching to or beyond anus, caudal fin well rounded. Body scales ctenoid, without auxiliary scales; lateral-line scales 46 to 51

Colour: Dark brown, usually with 7 or 8 dark bars on body, black spot between upper and middle opercular spines; soft dorsal, anal and caudal fins darker distally, with a pale bluish line on the edge.

Geographical Distribution: *C. boenak* is primarily continental in its distribution, occurring from Kenya to the western Pacific.

Size: Maximum total length 26 cm.

**101. *Epinephelus areolatus* (Forsskal, 1775)**

Body depth less than head length, preopercle angular, with 2 to 7 enlarged serrae at the angle;

upper edge of operculum straight or slightly convex, maxilla extending to below rear half of eye, pelvic fins reaching to or nearly to anus; adults with auxiliary scales; lateral-line scales 49 to 53.

Colour: Head, body and fins pale, covered with numerous close-set brown, brownish yellow, or greenish yellow spots, those on front of head smaller than those on operculum. Pectoral fins pale, with small dark spots on the rays. Posterior edge of caudal fin with a distinct white margin.

Geographical Distribution: Indo-West Pacific.

Size: Maximum 31 cm standard length.

**102. *Epinephelus bleekeri* (Vaillant, 1877)**

Body elongate, preopercle angle with 2 to 9 enlarged serrae, caudal fin truncate or slightly convex. Lateral-body scales ctenoid; adults with a few small auxiliary scales.

Colour: Head and body brownish, reddish brown or purplish grey, covered with numerous reddish orange, gold, or yellow spots; dorsal fin and upper third of caudal fin with spots like those on body; lower two-thirds of caudal fin dusky, pectoral and pelvic fins and distal part of anal fin dusky; dark streak along maxillary groove.

Geographical Distributed in Indo-West Pacific.

**103. *Epinephelus coioides* (Hamilton, 1822)**

Body moderately elongate, but little compressed; teeth on midside of lower jaw in two rows; scale on body largely ctenoid; caudal fin rounded.

Colour, light greyish brown, shading to whitish ventrally, with numerous brownish orange or brownish yellow spots on head, body and fins, five slightly diagonal greyish brown bars on body which bifurcate ventrally.

Distributed from Red Sea to Western Pacific. Very economically important, widespread cultured in the Southeast Asia. Had long been misidentified as *E. tauvina*. Commonly found in fish markets throughout the areas.

**104. *Epinephelus heniochus* Fowler, 1904**

Body elongate, dorsal head profile distinctly convex; preopercle angular, with 2 to 4 large spines at the angle. Dorsal fin with XI spines and 14 or 15 rays, the third or fourth spine longest, caudal fin rounded. Lateral-body scales ctenoid, without auxiliary scales; lateral-line scales 54 to 60.

Colour: Head and body pale brown dorsally, shading to whitish or pale pink ventrally with minute brownish black dots on body and rear part of head; faint dark brown stripe from eye to end of operculum, pectoral fins hyaline greyish yellow; lower part of caudal fin sometimes darker than rest of fin; margin of interspinous dorsal-fin membranes yellow.

Geographical Distribution: Tropical western Pacific to South of Japan.

Size: Attains at least 35 cm standard length.

**105. *Epinephelus quoyanus* (Valenciennes, 1830)**

Body moderately elongate, compressed, dorsal head profile evenly curved, preopercle rounded or subangular; upper edge of operculum almost straight. Dorsal fin with XI spines and 16 to 18 rays, caudal fin rounded. Lateral-body scales ctenoid; auxiliary scales present; lateral-line scales 48 to 52.

Colour: Head and body pale, mostly covered with large, close-set, hexagonal to roundish, dark brown spots, dorsally the spots are so close together that the pale interspaces form a reticulum, dark spots on head smaller than anteriorly, ventral edge of anal and caudal fins and leading edge of pelvic fins with white line and broad blackish submarginal band, pectoral fins mostly dusky with indistinct dark spots.

Geographical Distributed from Eastern Indian Ocean to Western Pacific

Size: Maximum known 31 cm standard length.

**106. *Epinephelus sexfasciatus* (Valenciennes, 1828)**

Dorsal head profile convex; preopercle with 2 to 4 greatly enlarged serrae at the angle. Dorsal fin with XI spines and 14 to 16 rays, caudal fin rounded; caudal-peduncle deep.

Colour: Head and body pale greyish brown; 5 dark brown bars on body and 1 on nape; scattered pale spots may be present on body, and some faint small brown spots are often visible on the edges of the dark bars; soft dorsal, caudal, and pelvic fins dusky grey, the pectoral fins greyish or dusky orange-red; jaws and ventral parts of head pale reddish brown.

Geographical Distribution: Known only from the tropical western Pacific Ocean.

Size attaining to 30 cmSL.

**107. *Plectropomus leopardus* (Lacepede, 1802)**

Body elongate, robust, preopercle broadly rounded, with 3 large, ventrally-directed spines, interopercle and subopercle smooth. Dorsal fin with VII or VIII slender spines and 10 to 12 rays, pectoral fins subequal to pelvic fins, caudal fin emarginate, Lateral-line scales 89 to 99.

Colour: Olivaceous to head and median fins; more than 10 spots on cheek, pectoral fins reddish or hyaline with darker rays.

Geographical Distributed in Western Pacific.

Size: Attains 70 cm SL.

Family Apogonidae

The cardinalfishes are known as mouth brooder; distinctive body form with large mouth; dorsal fin fully separated; oblong, compress body and long caudal peduncle. About 250 species of 23 genera are known worldwide, over 100 species known from South China Sea, 13 species found (references; Gloefelt-Tarp & Kailola, 1984; Masuda et al., 1984; Kuitert, 1992; Allen & Swainston, 1993; Randall, 1995).

**108. *Apogon albomaculosus* Kailola, 1976**

Head mottled and checked with brown; rows of large distinct yellow or cream spots along body. Large black yellow-rimmed ocellus on soft dorsal and anal fins near bases. Caudal fin rounded.

**109. *Apogon aureus* (Lacepede, 1802)**

Head dark brownish-red with thin blue lines from snout to operculum; broad black band around caudal peduncle. Red tips on soft dorsal, anal and caudal fin lobes.

**110. *Apogon fasciatus* (Shaw, 1790)**

Preopercular edge fully serrate; preopercular ridge of adult usually irregular, caudal fin slightly emarginate; grey dorsally, shading to silvery white on sides and ventrally, with two blackish stripes, the narrow first from interorbital along back to upper edge of caudal peduncle, the second from front of snout through eye along side a little above middle of body to end at posterior end of caudal of caudal fin.

**111. *Apogon lineatus* Temminck & Schlegel, 1842**

Round corner of preopercle and most of ventral edge serrate; posterior edge largely smooth; preopercular ridge smooth; mouth strongly oblique; body depth 2.7-2.9 in standard length. Caudal fin slightly rounded; light grey dorsally, the edge of the scales dusky, shading to silver on sides and ventrally, with ten dusky bars on body narrower than pale interspace; a dusky bar from below posterior or part of eyes and another longer bar from behind upper parts of eye to center of preopercular; front of snout and chin dusky; outer half of first dorsal fin blackish; second dorsal and caudal fins slightly dusky. Attain at least 9 cm.

**112. *Apogon niger* Doderlein**

Body and head robust; Scales large. Body yellowish to dusky; fins dark except caudal fin hyaline.

line. Known from South China Sea.

**113. *Apogon poecilopterus* Kuhl & van Hasselt, 1828**

Outer part of first dorsal fin black; 2 to 3 irregular brown bands along soft dorsal fin; caudal fin dark. Dark line from eye to preopercular angle; nine to 10 brown vertical bands on body.

**114. *Apogon quadrifasciatus* Cuvier, 1828**

Two dark bands along body from head: first from snout above eye to upper caudal peduncle; 2nd through eye to tail and continuing across caudal fin to its margin.

**115. *Apogon sealei***

Body slightly elongate; rosy pink with two faint dark stripes from opercle to base of caudal and indistinct brownish stripe from snout along midbody; dark spot on caudal base; fins hyaline first dorsal fin dusky anteriorly, the second with dusky stripes above the fin base; caudal fin rosy hyaline. Specimens of 3.0-4.0 cm. were taken.

**116. *Apogon semilineatus* Temminch & Schlegel, 1846**

Dark brown horizontal stripe from snout to below soft dorsal fin and a thinner shorter stripe from above eye. Large black spot at caudal fin base; tip of first dorsal fin black. Preopercular margin serrated.

**117. *Apogon septemstriatus* Guenther, 1880**

Black line from snout along head midline to first dorsal fin origin; 2nd black line from nape to below first dorsal fin bases; 3rd black line from snout along black to upper caudal fin base; 4th and most prominent band horizontal: from snout to mid-caudal fin base and across fin to margin. Caudal fin truncate.

**118. *Apogon truncatus* Bleeker, 1854**

First dorsal black over outer half; black margin on soft dorsal, anal and caudal fins; black line along mid-height of soft dorsal and anal fins. Black line from eye to preoperculum angle; underside of head and body silvery, densely stippled black. Caudal fin rounded. The well known *A. ellioti* Day, 1878 is junior synonym (Randall, 1995).

**119. *Cheilodipterus macrodon* (Lacepede, 1802)**

Jaw with canine teeth. About 8 brown horizontal stripes from head to tail; dark brown band from pectoral fin to base to ventral fin base; broad indistinct black band around caudal peduncle at caudal fin base, upper and lower margins of caudal fin black. Soft dorsal, anal and caudal fins red.

**120. *Rhabdamia gracilis* (Bleeker, 1856)**

Body translucent pink or yellow, sometimes with fine black stripe from operculum to tip of pectoral fin.

Family Sillaginidae

The family was reviewed by McKay (1992), two genera and 9 species known from the South China Sea, 3 species found.

**121. *Sillago aeolus* Jordan & Evermann, 1902**

First dorsal fin with XI spines and second dorsal fin with I spine and 18 to 20 soft rays. Swimbladder with three rudimentary anterolateral extensions

Colour: The most posterior mid-lateral dark brown blotch elongate and reaching caudal flexure.

Geographic distribution: distributed throughout the Indo-West pacific

Size: to 30 cm.

**122. *Sillago ingenuua* McKay, 1985**

First dorsal fin with IX spines (last spine very short) and second dorsal fin with I spine and 17 soft rays; anal fin with II spines and 17 soft rays. Lateral-line scales 66 to 70; cheek scales ctenoid.

Geographic distribution: Known from the Gulf of Thailand, Taiwan, northern Australia and India .

Size: To 20 cm.

**123. *Sillago sihama* (Forsskal, 1775)**

First dorsal fin with IX spines and second dorsal fin with I spine and 20 to 23 soft rays; anal fin with II spines and 21 or 23 soft rays. Lateral-line scales 66 to 72.

Colour: Body light tan, silvery yellow-brown, sandy brown, or honey coloured; paler brown to silvery white below; a midlateral, silvery, longitudinal stripe normally present; dorsal fins dusky terminally with or without rows of dark brown spots on the second dorsal-fin membrane; caudal fin dusky terminally; other fins hyaline.

Geographical Distribution: A wide ranging species throughout the Indo-West Pacific.

Size: to 30 cm standard length.

Family Rachycentridae

**124. *Rachycentron canadus* (Linnaeus, 1768)**

Body elongate, slender; head broad, depressed, mouth wide. Scale small, embedded in thick skin. Dorsal fin long, precedes by 6-9 sort and broad spines, anal fin moderately long; caudal fin emarginate. Size attaining to 1 m. Circumtropical species. Body dark brown, pale yellow on lower sides; tips of soft dorsal and anal fins and caudal fin lobes white.

Family Echeneididae

**125. *Echeneis naucrates* Linnaeus, 1758**

Body elongate, slender; head depressed. Lower jaw projecting well beyond upper. Large oval-saped sucking disc on top of head, with paires transverse ridges, second dorsal fin long-bases, without spines, beginning; anal fin opposite and similar. Broad black band from snout to tail; caudal tips white. Size attaning to 90 cm, circumtropical distribution, considered as trash.

**Family Carangidae**

The jacks and travellies are charaterized in having of lateral scutes or freshy keel on caudal peduncle; two anal detached spines; long, crescent pectoral fins; body forms highly variable, from fusiform to deeply compressed. Seventeen genera and about 70 species known from Indo-Pacific, 24 species found. References; Gushiken (1983), Smith-Vaniz (1984), Randall (1995).

**126. *Alectis ciliaris* (Bloch,1788)**

Body deep, becoming more elongate with growth, and very compressed. Profile of nape and head broadly rounded; compressed. Profile of nape and head broadly rounded, anterior soft rays of dorsal and anal fins extremely long and filamentous in young

Colour: mostly silvery with a light metallic bluish tinge on upper thrid of body and head.

**127. *Alectis indicus* (Ruppell,1830)**

Body deep. Profile of nape and head somewhat angular; gillrakers (excluding rudiments) 8 to 11 upper, 21 to 26 lower and 29 to 37 total on first gill arch. Dorsal fin with 6 short spines, anterior soft rays of dorsal and anal fins extremely long and filamentous in young, fork length.

Distributed throughout Indo-West Pacific, seldomly obtained.

Colour: mostly silvery with a dusky green tinge dorsally; juvenile with dark bars on body.

**128. *Alepis kleinii* (Bloch, 1793)**

Body oval, strong compress, with ventral profile distinctly more convex than dorsal adipose eyelid well develop on posteriorly half of eye only; upper jaw anteriorly with 2 irregular rows of short conical teeth, posteriorly inner surface of jaw paved with blunt teeth; lower jaw with a single row of short, conical teeth except 2 rows anteriorly; straight part with 0 to 2 scales and 35 to 45 scules: total scales and scutes in lateral line 72 to 86.

Colour: bluish-grey to green above, silvery below; large black spot on upper margin of opercle and adjacent area of shoulder. Caudal fin dusky to bright yellow, other fins mostly pale to hyaline.

Distributed throughout Indo-Pacific, *Caranx kalla* Cuvier and *C. para* Cuvier are synonyms (Randall, 1995).

**129. *Alepes melanoptera* Swainson,1839**

Body oblong, compressed, adipose eyelid well developed on posterior half of eye only. Lateral line strongly arched anteriorly, with junction of curved and straight parts below second dorsal fin between origin and third soft ray, total scales and scutes in lateral line (excluding caudal scales) 95 to 114.

Colour: grey-blue above, silvery to white below; a diffuse dusky blotch on margin of opercle, not bordered above by a white spot. Spinous dorsal fin jet-black. Caudal fin dusky yellow, with darker trailing edges, other fins pale.

**130. *Atropus atropus* (Schneider,1801)**

Body strongly compressed, almost ovate; nape strongly convex; belly with a deep median groove, accommodating pelvic fins, anus and anal-fin spines, pelvic fins conspicuously long

Colour: bluish-green above, silvery below. Membranes pelvic fins black, with the rays white basally; other fins pale.

**131. *Atule mate* (Cuvier,1833)**

Body elongate oval, moderately compressed, with dorsal and ventral profiles almost evenly convex; snout pointed. Adipose eyelid well developed and completely covering eye except for a vertical slit centred on pupil, terminal dorsal and anal rays finlet-like in adults. Lateral line gently arched anteriorly, with junction of curved and straight parts below second dorsal fin below 6th to 8th soft rays; total scales and scutes in lateral line (extending caudal scales) 92 to 103.

Colour: bright olive-green dorsally, yellowish-green laterally and whitish ventrally; dorsolaterally 9 or 10 faint, grey bars, wider than pale interspaces. A black spot, slightly smaller than eye, on upper margin of opercle.

**132. *Carangoides armatus* (Ruppell,1830)**

Body strongly compressed and deep. Head profile very steep in adults but relatively straight from snout to nape; lobe of second dorsal fin elongate and filamentous in adult. Breast naked ventrally to behind origin of pelvic fins; laterally, naked area of breast extends diagonally to naked base of pectoral fin

Colour: bluish-grey above, silvery below; blackish blotch on upper margin of opercle. Spinous dorsal fin blackish; second dorsal and anal fins pale to dusky

**133. *Carangoides malabaricus* (Bloch & Schneider,1801)**

Body strongly compressed, almost ovate; dorsal profile of head strongly elevated to nape, almost straight. Lateral line anteriorly with a moderate regular arch, chord of curved part of lateral line longer than straight part with 31 to 55 total scute elements.

Colour: generally silvery with bluish-grey above, silvery white below; opercle with small black



spot on upper margin. Caudal fin, soft dorsal and anal fins pale greenish-yellow to dusky; interradial membranes of soft anal-fin rays often with a white spot basally.

**134. *Carangoides caeruleopinnatus* (Ruppell, 1830)**

Body strongly compressed, almost ovate; dorsal profile of body more strongly convex than ventral profile, nape moderately curved. Lobe of second dorsal fin filamentous in young, becoming shorter with age, in mature adults distinctly shorter than head length. Straight part of lateral line with 20 to 38 scutes.

Colour: bluish-green above, silvery grey below; sides with numerous, small yellow spots; small black blotch on upper margin of opercle.

**135. *Carangoides gymnostethus* (Cuvier, 1833)**

Body ovate and compressed, becoming elongate-ovate and slightly subcylindrical with age; profile of head and nape gently convex becoming less steep with age. In adult mouth cleft at level with lower margin of eye, diameter of eye smaller than snout length; both jaws with bands of villiform teeth, the bands widest anteriorly. Two separate dorsal fins, the first with 8 spines, the second with 1 spine and 28 to 30 soft rays. Lateral line anteriorly with a low regular arc, with junction of curved and straight parts below second dorsal fin between 16th to 20th soft rays; chord of curved part of lateral line longer than straight part of lateral line, straight part of lateral line with 14 to 25 scales followed by 20 to 31 small scutes. Breast naked ventrally to distinctly behind origin of pelvic fins; laterally naked area of breast extends diagonally to naked base of pectoral fin base.

Colour: olive-green above, silvery white below with a few brown or golden spots sometimes present midlaterally; opercular spot dusky and inconspicuous. Dorsal, anal and caudal fins pale olive-green to greenish-grey, leading edge and distal margin of anal fin white. Attain 80 cm., commonly 50 cm. Widely distributed throughout Indo-Pacific.

**136. *Carangoides hedlandensis* (Whitley, 1933)**

Body strongly compressed and deep; head profile extremely steep in adults with a distinct break in contour "bump" in the interorbital region which becomes more pronounced with increasing size. Lobe of second dorsal fin elongate and filamentous, longer than head length. Straight part of lateral line with 17 to 29 weak scutes.

Colour: greenish-blue above with dusky tinge, shading to silvery grey below; blackish blotch on upper margin of opercle. Spinous dorsal fin, elongated dorsal rays and edges of caudal fin blackish; filamentous lobe of anal fin either blackish or pale brownish, elongated rays always pale brownish.

**137. *Carangoides talamparoides* Bleeker, 1852**

Body strongly compressed, almost ovate; dorsal profile of head strongly elevated to nape, almost straight in profile. Chord of curved part of lateral line longer than straight part of lateral line, with 20 to 32 weak scutes. Breast naked ventrally to distinctly behind pelvic fins, often to origin of second anal fin; laterally, naked area of breast extends diagonally to naked base of pectoral fin, including small area anteriorly just above pectoral-fin base.

Colour: generally silvery, bluish-grey above, silvery white below; opercle with a small black spot on upper margin. Fins dusky; caudal fin with central ray dusky yellow with black distal margin.

**138. *Carangoides uii* Wakiya, 1924**

Body strongly compressed; dorsal profile of body more strongly convex than ventral profile, nape moderately curved. Lobe of second dorsal fin elongate, in largest adults may exceed length of second dorsal fin base. Chord of curved part of lateral line longer than straight part of lateral line, with 16 to 26 weak scutes.

Colour: bluish-grey above, silvery below; opercle spot indistinct. Spinous dorsal fin and lobe

and margins of second dorsal fin dark; anal fin spotted with yellow and tipped with white. Pelvic fins and caudal fin yellowish, the latter with dusky edges.

**139. *Caranx sexfasciatus* Quoy & Gaimard, 1824**

Body oblong, compressed; dorsal profile moderately convex to second dorsal fin. Adipose eyelid well developed, upper jaw with outer row of strong canines widely spaced in adults. Straight part of lateral line with 27 to 36 strong scutes.

Colour: head and body silvery olive to iridescent blue-green above, silvery olive to whitish below; a small blackish spot, much smaller than eye diameter, at upper margin of opercle. Second dorsal fin olive to blackish, the lobe with a white tip; anal and caudal fins yellowish to black. Lateral line scutes dark to black. In juveniles and young adults, head, body and scutes more silvery and fins paler.

**140. *Decapterus macrosoma* Bleeker, 1851**

Body very elongate, slender and nearly rounded. Scales on top of head do not extend forward to beyond posterior margin of pupil; terminal dorsal and anal soft rays each consisting of a widely detached finlet; pectoral fin short; straight part with 14 to 29 scales, followed by 24 to 40 scutes.

Colour: metallic blue above, silvery below; small black blotch on margin of opercle near upper edge. Caudal fin hyaline to dusky fins mostly pale.

**141. *Decapterus russelli* (Ruppell, 1830)**

Body elongate, moderately slender and slightly compressed. Terminal dorsal and anal soft rays each consisting of a widely detached finlet. Total scales and scutes in lateral line 77 to 102.

Colour: bluish-green above, silvery below; small black blotch on margin of opercle near upper edge. Caudal fin hyaline to dusky brown.

**142. *Decapterus kurroides* Bleeker, 1855**

Body elongate, moderately slender and slightly compressed. Eye moderate, with adipose eyelid well developed, completely covering eye except for a vertical slit centred on pupil. Shoulder girdle margin with 2 small papillae, the lower papillae the large. pectoral fin moderately long, tip of appressed fin typically extending to or slightly beyond a vertical line from second dorsal fin origin. Lateral line anteriorly with a low regular arch, with junction of curved and straight parts below second dorsal fin between 11th to 13th soft rays; scales in curved part of lateral line 47 to 55; scutes in curved part 0 to 2; straight part without anterior scales, and with 31 to 36 scutes;

Colour: Bluish-green above, silvery white below; moderate black blotch on margin of opercle near upper edge. Caudal fin yellowish orange in the taken specimens. spinous dorsal and second dorsal fin lobe sometimes dark, anal and pelvic fins pale dusky to white. Attains to 40 cm., common to 25-30 cm. Distributed in Indo-West Pacific.

**143. *Megalaspis cordyla* (Linnaeus, 1758)**

Body elongate, subcylindrical, with caudal peduncle strongly compressed with a marked medial keel; snout and lower jaw pointed. Eye moderate, with well developed adipose eyelid completely covering eye except for a vertical slit centred on pupil, posterior 7 to 9 rays of second dorsal and 8-10 of anal consisting of detached finlets.

Colour: head and body bluish-grey to green dorsally, sides and belly silvery; large black opercular spot. Dorsal and anal fins pale to yellow, distally dusky; pectoral and pelvic.

**144. *Parastromateus niger* (Bloch, 1795)**

Body deep and compressed; dorsal and ventral profiles of body strongly and equally convex. Mouth terminal with upper jaw unrestricted dorsally and ending below and slightly before anterior margin of eye. Dorsal fin with 4 or 5 short spines (embedded and not apparent in adults)

followed by 1 spine and 41 and 44 soft rays; anal fin with 2 spines followed by 1 spine and 35 to 39 soft rays; profile of second dorsal and anal fins nearly identical, with elevated, broadly rounded anterior lobes; pelvic fins absent in specimens larger than about 10 cm fork length. Pectoral fins long and falcate. Straight part of lateral line with 8 to 19 weak scutes, forming a slight keel on caudal peduncle; scales small and deciduous.

**145. *Scomberoides tol* (Cuvier,1832)**

Body oblong to elliptical, strongly compressed; dorsal and ventral profiles nearly equal, snout pointed with dorsal profile of head and nape slightly concave. Upper jaw extends to posterior margin of pupil in adults, posterior soft dorsal-and anal-fin rays consisting of semidetached finlets. Lateral line only slightly irregular. No scutes; scales on midbody below lateral line partially embedded and lanceolate.

Colour: body bluish dorsally, white ventrally; adults with 5 to 8 oval or vertically oblong black blotches, the first 4 or 5 of which intersect lateral line. Distal half of dorsal fin lobe abruptly and heavily pigmented.

**146. *Scomberoides commersonianus* Lacepede, 1802**

Body oblong, snout blunt with dorsal profile of head nape slightly convex; upper jaw extends well beyond posterior margin of eye; scales on midbody below lateral line, partially embedded and broadly lanceolate.

Colour; side of adult with 5-8 large, plumbeous blotches above or touching lateral line, first two intersect of lateral line; ventral yellowish gold to pale silvery.

**147. *Selaroides leptolepis* (Cuvier,1833)**

Body elongate, oblong and compressed; dorsal and ventral profiles equally convex. Adipose eyelid moderately developed on posterior half of eye. Chord of curved part of lateral line longer than straight part with 13 to 25 scales. Breast completely scaled.

Colour: metallic blue above, silvery white below, with a broad yellow stripe from upper margin of eye to caudal peduncle; prominent black opercular spot encroaching onto shoulder.

**148. *Selar crumenophthalmus* (Bloch,1793)**

Body elongate and moderately compressed, with lower profile slightly more convex than upper. Eye very large, with a well developed adipose eyelid completely covering eye except for a vertical slit centred on pupil. Dorsal and anal fins without a detached terminal finlet; pectoral fins shorter than head straight part with 29 to 42 scutes; total scales and scutes in lateral line (excluding caudal scales) 84 to 94.

Colour: upper third of body and top of head metallic blue or bluish-green; tip of snout dusky or blackish; lower two thirds of body and head silvery or whitish; a narrow, yellowish stripe may be present from edge of opercle to upper part of caudal peduncle. First dorsal fin dusky on margins with rest of fin clear.

**149. *Selar boops* (Valenciennes)**

Body elongate, similar to *Selar crumenophthalmus*; eye much larger more than 40% head length (v.s ca. 30%HL); straight part of lateral line with 29 - 42 large scutes.

Upper third of body and top of head bluish bronze, silvery with below, yellowish orange stripe from edge opercle to upper part of caudal peduncle, fins hyaline.

**150. *Seriola rivoliana* Valenciennes,1833**

Body elongate, moderately deep and slightly compressed. Upper jaw very broad at end (with very broad supramaxilla), anal fin with 2 detached spines (reduced or completely embedded in large fish). No scutes; caudal peduncle grooves present

Colour: brown or olivaceous to bluish-green above, sides and belly lighter, with brassy or lavender reflections; the nuchal bar often persistent in adults, and a faint amber lateral stripe extending backward from eye frequently present, pectoral fins entirely dark with the margins dusky.

**151. *Seriolina nigrofasciata* (Ruppell, 1829)**

Body elongate, moderately shallow and slightly compressed, with head profile rising steeply to interorbital. Anal fin with 1 detached spine (usually embedded). No scutes; caudal peduncle grooves present.

Colour: head and body bluish-grey to black dorsally, white to dusky below; young with 5 to 7 dark oblique bands and blotches on upper body that fade with age. Spinous dorsal fin black; second dorsal and anal fins dusky brown, tips of anterior lobes white, except in large adults.

**152. *Uraspis helvola* (Forster, 1801)**

Body oblong and compressed; dorsal profile strongly convex, ventral profile slightly convex to isthmus then nearly straight to origin of second dorsal fin; snout broadly rounded. Anal fin with 2 detached spines followed by 1 spine and 19 to 22 soft rays, pelvic fins very long in young but becoming relatively shorter with age; straight part of lateral line with 23 to 40 scutes; in fish smaller than about 20 cm fork length some of the scutes with spines directed anteriorly. Breast naked ventrally to origin of pelvic fins; lateral line naked area of breast separated from naked base of pectoral fin by a broad band of scales.

Colour: tongue, roof and floor of mouth white or cream-coloured, the rest blue-black; head dusky to black, with a large, diffuse black opercular blotch; body dusky to black dorsally, lighter below and with 6 wide, dark bars and narrow pale interspaces. Pelvic fins generally black in specimens smaller than 10 cm fork length, rapidly becoming pale-whitish at larger sizes.

**153. *Uraspis uraspis* (Günther, 1860)**

Body oblong and compressed; dorsal profile strongly convex, ventral profile slightly convex to ischmus. Straight part of lateral line with 24 to 39 scutes. Breast naked ventrally to origin of pelvic fin; laterally naked area of breast extends diagonally to naked base of pectoral fin

Colour: tongue, roof and floor of mouth white or cream-coloured, the rest blue-black; body and head dusky to black dorsally, shading to dusky or pale grey ventrally; juveniles and occasionally adults with 6 dusky or blue-black bars. In small specimens of 8 to 13 cm fork length, pelvic fins whitish with distal half to one-third black, becoming pale white in adult. Caudal fin pale to dusky with trailing edges dusky.

Family Ariommatidae

One dorsal fin, distinctly separated into spinous and soft-rayed portions. Scales cycloid. Caudal peduncle square in cross-section, with very low lateral keels (reference; Gloefelt-Tarp & Kailola, 1984).

**154. *Ariomma indicum* (Day, 1870)**

Body oval, compress. Pectoral fin long, reaching past anal fin origin. Head iridescent blue-mauve, body fawn, fins dusky olive.

Family Menidae

**155. *Mene maculata* (Bloch & Schneider, 1801)**

Body disc-like, very compressed, with almost straight dorsal profile and a deep curved and sharp belly profile; mouth protractile, pointing upward. A single long dorsal fin without spines; anal fin long, first ventral fin ray prolonged in adults. Body blue-green above, silvery white below; black spots on head and back.

Family Leiognathidae

The ponyfishes are characterized by a compressed body; small mouth which highly protractile

and tubular when protruded; three bony ridges dorsally on head which converge on nape, and a median bony ridge on nape anterior to dorsal fin origin. Known only from the Indo-Pacific region; 3 genera and about 24 species, 14 species found (references; Premcharoen, 1993; Randall, 1995).

**156. *Gazza achlamys* Jordan & Starks, 1917**

Canine-like teeth in mouth. Greatest body depth 1.9-2.2 in SL as opposed to the more slender. *G. minuta*. Irregular bands on upper part of body reaching a little below lateral line. Outer part of dorsal spines black, edge of soft dorsal grey, caudal fin margin dusky, all other fins colorless.

**157. *Gazza minuta* (Bloch, 1797)**

Greatest body depth 2.2-3.1 in SL. Irregular markings on upper part of body reaching nearly to mid-line of body. Edge of spinous dorsal black, soft dorsal and anal fins grey on edges.

**158. *Leiognathus bindus* (Valenciennes, 1835)**

Scales on breast but none on cheeks. A very deep-bodied and compressed species. Upper part of body with dark irregular semi-circular markings. Outer half of spinous dorsal bright orange with a black line beneath, anal spines tipped orange; soft dorsal greyish, other fins hyaline.

**159. *Leiognathus blochi* (Valenciennes, 1835)**

Body depth 2.4-2.7 in SL. Ten grey vertical lines on back do not reach the lateral line. A distinct brown blotch on nape. Outer half of spinous dorsal black, soft dorsal, anal and caudal fin lobes yellow with grey edges. Pectoral and ventral fins hyaline.

**160. *Leiognathus elongatus* (Gunther, 1874)**

Breast fully scaled but no scales on cheeks. Body very slender. Dorsal part dusky with irregular dark blotches extending to below lateral line. Snout pointed and sharp.

**161. *Leiognathus equulus* (Forsk., 1775)**

Large scales on breast but deciduous. Body deep upper side of body with many close-set bars. A dark saddle on caudal peduncle; soft dorsal with black margin, caudal edge dusky, all other fins slightly grey. Is the largest of the leiognathids at size 15-20 cm.

**162. *Leiognathus fasciatus* (Lecepede, 1803)**

Superficially resembles a small *L. equulus* but the dark vertical lines on upper part of body are more widely spaced; yellow oval spots in horizontal rows following the lateral line. Soft dorsal and anal spines elongated. Posterior margin of caudal lobes dusky to black.

**163. *Leiognathus leuciscus* (Gunther, 1860)**

Irregular, sometimes semi-circular markings on back; in large specimens several round to oval yellow marks on body below lateral line. Dorsal and anal fins and caudal lobe with yellow markings. Second dorsal spine prolonged and second anal spine elongated.

**164. *Leiognathus splendens* (Cuvier, 1829)**

Faint vertical lines on upper part of body in adults. Scales on lateral line bright yellow. Outer part of dorsal spines often with a dark blotch, dorsal and anal fin margins yellow, margin of caudal fin dusky.

**165. *Leiognathus lineolatus* (Valenciennes, 1835)**

Body elongated oval in shape; scales on breast but none on cheeks; eye moderately large; snout short; upper body with irregular semi-circular markings on silvery base; fins hyaline; dorsal and anal fins with yellow tip.

**166. *Leiognathus stercorarius* Evermans & Seale, 1907**

Breast and cheeks with scales. Body slender. Irregular markings on upper part of body, females do not display the blue horizontal line on mid-body.

**167. *Secutor ruconius* (Hamilton-Buchanan, 1822)**

Body very deep. Distinct broad metallic blue-green bars on upper side of body extend to mid-side of body. Lateral line terminates below middle of soft dorsal.

**168. *Secutor insidiator* (Bloch, 1787)**

Body deep. The bars on upper side are III-formed but on anterior part more like blue spots or blotches.

Family Gerreidae (references; Sirimontraporn, 1987; Premcharoen, 1993).

**169. *Gerres abbreviatus* Bleeker, 1850**

Body deep, body oblong and compressed. Mouth can be extended into a downward-pointed tube. Scales large, thin and deciduous. Pectoral fin long and pointed. Caudal fin deeply forked. Pectoral fin reaches anal fin origin or farther. Dark longitudinal lines along scale rows. Ventral fin yellow; white tips on anal fin and lower lobe of caudal fin; black edge on dorsal fin. 32-36 lateral line scales to caudal fin base only.

**170. *Gerres acinaces* Bleeker, 1854**

Body slender. Pectoral fin reaches anal fin origin or farther. Caudal fin deeply forked. Second dorsal fin spine greater than head without snout. Plain silverly-white, dusky above.

**171. *Gerres filamentosus* Cuvier, 1829**

Second dorsal fin spine produced into a filament, spine length about equal to body depth. Pectoral fin reaches anal fin origin or farther. Seven to 8 vertical bars of brown blotch or cheeks over sides; a row of brown checks along mid-dorsal fin and second dorsal fin spine dark brown.

**172. *Pentaprion longimanus* (Cantor, 1850)**

Body silvery, pale pink or grey when scales lost. Body soft and shabby; anal fin base longer than soft dorsal fin base.

Family Lutjanidae

The snappers are distinctive in having moderate large mouth; dorsal fin continuous or weakly notched; body usually compress; jaws with strong canine teeth anteriorly. At least 30 species known in the Indo-Pacific (Allen, 1985; Allen & Talbot, 1985), 11 species found.

**173. *Lutjanus johnii* (Bloch, 1792)**

Body moderately deep. Dorsal profile of head steeply sloped, posterior profile of dorsal and anal fins rounded, caudal fin truncate or slightly emarginate.

Colour: generally yellow with a bronze to silvery sheen, grading to silvery-white on belly and underside of head; centre of each scale often with a reddish-brown spot, giving an overall appearance of series of horizontal lines on side of body; a round black spot, larger than eye, on back, mainly above lateral line.

Geographical Distribution: Widespread in the Indo-West Pacific.

Size: Maximum total length about 70 cm.

**174. *Lutjanus lutjanus* Bloch, 1790**

Body fusiform, slender. Dorsal profile of head gently sloped; posterior profile of dorsal and

anal fins angular, caudal fin truncate or slightly emarginate. Scale rows on back rising obliquely above lateral line.

Colour: upper back golden-brown; sides silvery-white; a broad yellow to brownish stripe from eye to caudal fin base; a series of yellow horizontal lines on lower half of body, and similar lines running obliquely above lateral line; fins pale yellow to whitish.

Geographical Distribution: Widespread in the Indo-West Pacific.

Size: Maximum total length about 30 cm.

**175. *Lutjanus lineolatus* (Ruppell, 1829)**

Similar to *L. lutjanus* but all longitudinal lines of the body are in the same width, yellowish hyaline, pectoral fin yellow on the upper margin.

**176. *Lutjanus malabaricus* Schneider, 1801.**

Body relatively deep. Dorsal profile of head steeply sloped; snout profile straight or slightly concave, posterior profile of dorsal and anal fins slightly rounded to angular, caudal fin truncate. Scale rows on back rising obliquely above lateral line.

Colour: back and sides red or red-orange, lighter on lower parts; fins reddish; juveniles.

Geographical Distribution: Widespread in the Indo-West Pacific.

Size: Maximum total length about 100 cm, common to 50 cm.

**177. *Lutjanus monostigma* (Cuvier, 1828)**

Body moderately deep to somewhat slender. Dorsal profile of head gently to moderately sloped, posterior profile of dorsal and anal fins rounded to somewhat angular, caudal fin truncate. Scale rows on back rising obliquely above lateral line.

Colour: generally yellowish to pinkish with dusky scale margins; grey or brown on upper back and dorsal portion of head; a black spot, sometime faint or absent, on back below anterior soft dorsal rays; fins yellowish.

Geographical Distribution: Widespread in the Indo-West Pacific.

Size: Maximum total length about 60 cm; common to 50 cm.

**178. *Lutjanus russelli* (Bleeker, 1849)**

Body moderately deep to somewhat slender. Dorsal profile of head steeply to moderately sloped, posterior profile of dorsal and anal fins rounded, caudal fin truncate or slightly emarginate. Scale rows on whitish with a silvery sheen lateral line.

Colour: back and upper side brownish; lower sides and belly pink to whitish with a silvery sheen; a black spot, mainly above lateral line, below anterior rays of soft dorsal fin.

Geographical Distribution: Widespread in the Indo-West Pacific.

Size: Maximum total length about 45 cm; common to 30 cm.

**179. *Lutjanus sebae* (Cuvier, 1828)**

Body very deep. Dorsal profile of head steeply sloped, snout profile straight or slightly convex, posterior profile of dorsal and anal fins distinctly pointed. Scale rows on back rising obliquely above lateral line.

Colour: generally red or pink in adults; juveniles and smaller adults pink with a dark red band from first dorsal spine through eye to tip of snout; a second band from middle of spinous part of dorsal fin to pelvic fin; and a third band from base of last dorsal spine running obliquely downward across caudal peduncle and along lower edge of caudal fin.

Distributed in Indo-West Pacific.

Size: Maximum total length to at least 100 cm; common to 60 cm.

**180. *Lutjanus vitta* (Quoy & Gaimard, 1824)**

Body moderately deep. Dorsal profile of head moderately sloped; caudal fin slightly emarginate or truncate. Scale rows on back rising obliquely above lateral line. Colour: back and upper sides brown, lower sides and belly whitish or pink; narrow longitudinal brown lines, a dark brown to blackish stripe along middle of side from eye to upper half of caudal peduncle; fin yellow except pelvic whitish. Size: Maximum total length about 40 cm; common to 25 cm.

**181. *Pristipomoides filamentosus* (Valenciennes, 1830)**

Body elongate, robust, lower jaw slightly protruding; both jaws with an outer row of conical and canine teeth, bases of dorsal and anal fins scaleless, their last soft rays extended into short filaments; pectoral fins long, reaching level of anus, caudal fin forked. Scales relatively small, about 60 to 65 in lateral line; scale rows on back parallel to lateral line.

Colour: back and sides variable, ranging from brownish to lavender or reddish-purple; snout and interorbital space with narrow yellow lines and blue spots often; dorsal and caudal fins light blue or lavender with reddish-orange margins.

Geographical Distribution: Widespread in the tropical Indo-Pacific.

Size: Maximum total length about 80 cm; common to 50 cm.

**182. *Pristipomoides multidentatus* (Day, 1870)**

Body elongate, robust, bases of dorsal and anal fins scaleless, their last soft rays extended into short filaments; pectoral fins long, caudal fin forked. Scales moderate-sized about 6 broken, golden stripes on sides; side of snout and cheek with a series of chevron-shaped yellow bands with apices directed anteriorly; dorsal fin with yellowish stripes or rows of spots.

Geographical Distribution: Widely distributed in the tropical Indo-Pacific Ocean.

Size: Maximum total length about 90 cm.

**183. *Pristipomoides typus* Bleeker, 1852**

Body elongate, robust, bases of dorsal and anal fins scaleless, their last soft rays extended into short filaments; pectoral fins long, caudal fin forked. 48 to 52 in lateral line.

Colour: body and fins rosy red; top of head with longitudinal vermiculated lines and spots of brownish yellow; dorsal fin with wavy yellow lines.

Size: Maximum total length about 70 cm.

Family Caesionidae (reference; Carpenter, 1987)

**184. *Dipterygonotus balteatus* (Valenciennes, 1830)**

Body slender, fusiform, elongate and moderately compressed. Scales in lateral line 68 to 80; dorsal and anal fins without scales, supratemporal band of scales indistinct,

Colour : Upper body brownish bronze; a thin, stripe about 1 scale wide from orbit to caudal fin, directly above lateral line on caudal peduncle; above and parallel to this stripe 2 thin, irregular, and usually interrupted stripes of the same colour; lower body silverly white; dorsal, anal, pelvic and pectoral fins clear to pinkish ; axil of pectoral fin black; caudal fin tan to pinkish

Geographical Distribution: widespread in the Indo-Pacific

Size: Attains a total length of about 14 cm.

**185. *Pterocaesio chrysozona* (Cuvier, 1830)**

Body fusiform, elongate and moderately compressed. Scales in lateral line usually 64 to 69 , predorsal scales usually 23 to 26 , dorsal and anal fins scaled

Colour: upper body light blue to brownish, lower body white to pinkish; a bright yellow band directly below lateral line for most of its length, from behind eye to base of caudal fin, fins white to pinkish; axil of pectoral fin black; dorsal fin slightly dusky distally; tips of caudal lobes black.

Geographical Distribution: Widespread in the Indo-West Pacific.

Family Haemulidae



The grunts consist of two subfamilies; Haemulinae: *Pomadasys* spp. and Plectorhynchinae: *Plectorhynchus* spp. (Randall, 1995). The family name is senior synonym of Pomadasyidae. Over 25 species known from the Indo-Pacific, 4 species was found.

**186. *Diagramma pictum* (Thunberg, 1792)**

Body plain grey-blue, sometimes with darker spots and blotches on back posteriorly; dark brown or black spots on soft dorsal and caudal fins. Head profile moderately steep, caudal peduncle slender; dorsal fin spines highest anteriorly, 2nd spine longest and twice or more the length of first spine.

**187. *Plectorhynchus gibbosus* (Lacepede, 1802)**

Plain reddish brown to dull green or grey, bronze sheen on lower head and body; fins charcoal. Lips thick, swollen and fleshy in larger fish. Dorsal fin deeply notched between spined and rayed portions, spines strong.

**188. *Pomadasys kaakan* (Lacepede, 1802)**

Eight to 12 vertical bars of black spots over upper sides, spots arranged into blotches or grouped in pairs, bars faded in large fish; 3 to 4 conspicuous rows of black spots along dorsal fin; ventral, anal and lower lobe of caudal fin deep yellow. Eyes less than snout length; second dorsal spine longest, dorsal fin deeply notched.

**189. *Pomadasys maculatus* (Bloch, 1797)**

Silvery green, broad wedge-shaped black band across nape to just below lateral line; usually about 6 larger and smaller similar bars across back above lateral line. Fins yellow, large black blotch on dorsal fin anteriorly.

Family Nemipteridae

The theadfin and monocle breams are remarkable in its uniformity of the number of dorsal and anal finrays, all have X, 9 and III, 7 respectively. The orbital with single flat spine ; the second suborbital with a free margin. Russell (1990) reviewed the family, 5 genera and 64 species were recognized, 17 species of 4 genera were found in this survey.

**190. *Nemipterus aurorus* Russell, 1993**

Snout length equal to eye diameter, pectoral fins moderately long; caudal fin forked, tip of fin slightly rounded; scale rows on body below lateral line upward-curved anteriorly. Maximum size is 20 cm SL., commonly 15 cm SL.

Colour: Body pinkish above, shading through pale mauve to silvery on ventral half; sides with 4 or 5 longitudinal, upward-curved silvery-white stripes along the middle of each scales row below lateral line, from behind head to caudal peduncle; head pinkish with golden-yellow reflections on opercle; upper lip with yellow edge; dorsal fin pale translucent yellow, with lemon-yellow margin and pale mauve submarginal stripe; broad bicoloured submedial stripe, yellow above orange below, anal fin transparent, with pale lemon submedial stripe above base of fin; caudal fin yellowish pink, upper tip rosy.

Distributed in West Pacific.

**191. *Nemipterus balinensoides* (Poopta, 1918)**

Snout length equal to or less than diameter of eye, pelvic fins moderately long; reaching to or just beyond anus, caudal fin forked; upper lobe slightly longer than lower lobe; 3 or 4 pair of small, recurved canines anteriorly in upper jaw.

Colour : pale silvery-rose on upper part of body, silvery below; 2 or 3 pale yellowish stripes along sides, a distinct golden-yellow spot, edged red above and below, just above upper pectoral-fin

base at beginning of second stripe, dorsal fin pinkish, edged with greenish-yellow, pectoral fins rosy, pelvic fins pale yellow, caudal fin pale yellowish-pink; upper tip dark pink in some specimens.

Distributed in West Pacific, including Andaman Sea

**192. *Nemipterus bathybius* Snyder, 1911**

Snout length equal to or a little less than diameter of eye, preopercle naked width 1.6 to 2.2 in scaly width, pectoral fins long, caudal fin forked; upper lobe falcate; usually long and ribbon-like in adult. Maximum size is 20 cm SL., commonly 16 cm SL.

Colour: upper part of body pinkish, silvery below; 2 yellow lateral stripes, a pair of yellow stripes, united anteriorly, from the dorsal fin pink, edged with yellow, with a median stripe of yellowish undulating lines, anal fins transparent, pinkish near outer margin, caudal fin pink, upper lobe and filament yellow; bases of pelvic fins bright sulphur-yellow.

Distributed throughout Indo-West Pacific.

**193. *Nemipterus furcosus* (Valenciennes, 1830)**

Pectoral fins moderately long; reaching to or just short of level of anus, pelvic fins moderately long; reaching to or just short of level of anus, caudal fin deeply forked. Maximum size is 22.5 cm SL., commonly 18 cm SL.

Colour: head and body pale iridescent pink, paling on sides to silvery-white below; back with 9 indistinct cross bars, third bar somewhat darker and more distinct yellowish stripes along body, cheeks and opercle silvery. Upper jaw rosy, lower jaw silvery; eye rosy; dorsal fin pale rosy, with yellowish tinge, anal fin bluish white, with row of transparent or faint yellowish spots near base; caudal fin pale rosy, with yellow tinge, lower margin of fin white; pelvic fins and axillary scales white, pectoral fins rosy.

Distributed in West Pacific from southern Japan to northeastern Australia, and Indian Ocean, Sri Lanka.

**194. *Nemipterus hexodon* (Quoy & Gaimard, 1824)**

Suborbital depth, pectoral fins long, caudal fin forked; upper lobe slightly longer than lower; 3 or 4 pair of small recurved canines anteriorly in upper jaw. Maximum size 21 cm SL., commonly 15 cm SL.

Colour: upper part of body pinkish, paling to silvery white on ventral surface; 6 to 8 pale yellow stripes on sides from below lateral line; blood red, ovoid spot below origin of lateral line, bordered below by bright yellow; yellow stripe on either side of ventral midline, golden reflections behind eye, on cheeks and opercle, dorsal fin translucent whitish, with a yellow margin; a narrow yellow stripe beginning anteriorly near base of fin and extending backwards to just above midposterior margin, caudal fin pinkish, upper lobe tipped with yellow, anal fin translucent, pectoral and pelvic fins pale translucent pink; base of pelvic fins and axillary scale lemon-yellow.

Distributed throughout Indo-West Pacific

**195. *Nemipterus japonicus* (Bloch, 1791)**

Snout length greater than eye diameter, pectoral fins very long, caudal fin moderately forked; upper lobe slightly longer than lower and produced into a short or moderately long filament. Maximum size is 25 cm SL., commonly 15 cm SL.

Colour: upper part of body pinkish, becoming silvery below; top of head behind eye with a golden sheen; 11 to 12 pale golden-yellow stripes along body from behind head to base of caudal fin; a prominent red-suffused yellow blotch below origin of lateral line; dorsal fin whitish, margin of fin yellow, edged with red; a pale lemon stripe near base of dorsal fin, this stripe narrow anteriorly and widening on posterior part of fin; anal fin whitish with pale lemon broken lines or scribbles over most of fin; pectoral fin translucent pinkish; pelvic fins whitish with yellow axillary scale; caudal fin pink, upper tip and filament yellow.

Distributed in Widespread throughout the Indian Ocean and West Pacific.

**196. *Nemipterus mesoprion* (Bleeker,1853)**

Snout length greater than diameter of eye, pectoral and pelvic, fins long, reaching to between level of anus and origin of anal fin, caudal fin forked. Maximum size is 14 cm SL., commonly 13 cm SL.

Colour: upper part of head and body pinkish, silvery white below; head with oblique golden yellow stripe from beneath eye to middle of upper jaw, and less distinct oblique yellow stripe from anterior of eye to near tip of snout; interspace between these stripes pinkish mauve; upper lip pale mauve; opercle with golden reflections; back with indistinct golden stripe beneath dorsal fin; red shoulder spot beneath third to fifth lateral-line scales; golden stripe, broader and tapering posteriorly, from base of pectoral fins to midcaudal base; spinous dorsal fin with red margin, soft-rayed part of fin with yellow margin, caudal fin pinkish, upper and lower margins tinged yellowish; median area yellow.

Distributed known from southern Indonesia and the Gulf of Thailand.

**197. *Nemipterus nematophorus* (Bleeker,1853)**

Snout length about equal to eye diameter, dorsal fin with anterior pair of spinous rays close together, almost fused and produced into a long, trailing filament;, caudal fin forked, upper lobe produced into a trailing filament. Maximum size is 20 cm SL., comonly 15 cm SL.

Colour: upper part of head and body pinkish, silvery-white below; broad golden-yellow stripe beneath lateral line, with distinct gold patch anteriorly beneath origin of lateral line; 3 narrow golden-yellow stripes laterally along ventral half of the body; yellow stripe on either side of ventral midline; dorsal fin translucent pinkish, anterior dorsal filament and margin of fin yellow, faint yellow or orange stripe along fin extending from near base of first spine to middle , caudal fin pink, upper tip and caudal filament yellow

Distributed in Indo-West Pacific.

**198. *Nemipterus nemurus* (Bleeker,1857)**

Snout length a little more than eye diameter, caudal fin forked, the upper rays produced into a trailing filament.

Colour: body pinkish above, with distinct, broad, pale yellow stripe from behind eye to caudal base, ventral half of body pearly-white, head pinkish, with pale golden reflections on cheeks and opercle; golden yellow stripe from posterior nostril extending through eye, and similar stripe from anterior margin of upper lip to lower margin of eye; iris pink; dorsal fin pale yellow, interspinous membrane of first two dorsal spines bright red superiorly; anal fin white, with series of yellow spots or irregular yellow stripe submedially; caudal fin pinkish, posterior margin red; lower lobe of fin suffused with yellow, upper rays and filament yellow

Distributed in West Pacific, including the Philippine.

**199. *Nemipterus peronii* (Valenciennes,1830)**

Dorsal-fin spines elongate, interspinous membrane deeply incised; pectoral fins short, caudal fin forked, upper lobe pointed and slightly longer than lower. Maximum size is 26.5 cm SL., commonly 17 cm SL.

Colour: upper part of body pinkish, with 7 or 8 indistinct darker pink saddles reaching to or just below the lateral line; lower part of body silvery, with faint golden lines following each scale row; a diffuse pale reddish spot below and just behind origin of lateral line; a golden-yellow stripe on snout in front of eye passing through nostrils; upper lip yellow; dorsal fin pale whitish-pink, with a pale yellow line or series of spots just above base of fin; tips of spinous part of fin reddish-yellow; caudal fin pinkish.

Distributed in Indo-West Pacific.

**200. *Nemipterus tambuloides* (Bleeker,1853)**

Snout length greater than eye diameter; pectoral and pelvic fins long; caudal fin forked, upper lobe pointed.

Colour: upper part of head and body rosy, paling to silvery-white on ventral surface; 5 well-defined sulphur-yellow stripes along body; sulphur-yellow stripe along either side of ventral midline from isthmus to lower caudal-fin base; head with two yellow stripes beneath eye; cheeks and opercle with golden and mauve reflections; dorsal fin translucent pink, with yellow margin and bluish grey inframarginal stripe; narrow sulphur-yellow stripe extending just above base of dorsal fin; anal fin translucent bluish-white with pale yellow stripe near base of fin, this stripe bent posteriorly and extending out to tip of last anal ray; caudal fin bright rosy, upper tip sulphur-yellow.

Distributed in Andaman Sea, South China Sea.

**201. *Nemipterus thosaporni* Russell, 1991**

Snout length about equal eye diameter, pectoral fins long, caudal fin forked; upper lobe produced into a short filament.

Colour: upper part of body rosy, silvery-white below, head with a narrow yellow stripe from below nostrils to eye and from middle of upper jaw to eye; a broad yellowish-orange stripe, divided above pectoral fin, along body from below origin of lateral line to upper part of caudal peduncle, Dorsal margin yellowish, anal fin pale bluish; caudal fin reddish, its upper tip yellowish; pelvic fins pink; pectoral fins translucent

Distributed in West Pacific, including Southern coasts of Sumatra to the Solomon Islands.

**202. *Parascopis tanyactis* Russell, 1986**

Head scales reaching forward slightly; lower limb of preopercle naked; suborbital naked, 1 or 2 tiny spines at upper corner. Maximum size is 20.5 cm SL., commonly 15 cm SL.

Colour: pinkish, darker on back and becoming silvery on ventral surface; four dark brownish-pink saddle or bars on back; pale lemon-yellow stripe on either side of ventral midline from base of pelvic fins to base of caudal fin; dorsal fin pink with dusky reticulated markings, anteriormost three saddles on back.

Distributed in Western Pacific, including the Sarawak coast.

**203. *Pentapodus setosus* (Valenciennes,1830)**

Head scales reaching forward to between level of anterior margin of eyes and posterior nostrils; suborbital naked; ; caudal fin forked, upper lobe produced into a very long trailing filament. Maximum size is 17.5 cm SL., commonly 15 cm SL.

Colour: pale brownish on back; lower part of body whitish; a blue stripe along base of dorsal fin; a yellow stripe from behind eye, gradually arching on back and terminating in a black spot on upper caudal peduncle; a narrow blue line running through yellow stripe; two bluish stripes across snout, top of snout dusky; caudal fin pinkish, filament pinkish-brown

Distributed in Philippines, South China Sea.

**204. *Scolopsis monogramma* (Kuhl & Van Hasselt,1830)**

Antorse suborbital spine absent, caudal fin forked or lunate, upper lobe a little longer than lower (lobes produced to form short filamentous extensions. Maximum size is 26 cm SL., commonly 18 cm SL.

Colour: greyish on back, white below; brown longitudinal streaks on back above lateral line, and oblique yellow streaks below lateral line; a brown midlateral stripe, expanded in the middle; 3 blue stripes on snout; interspaces between stripes yellow; a blue stripe on preopercle behind eye; a blue chevron-shaped stripe running upwards onto opercle from below eye and bending downwards towards pectoral-fin base; space between stripes on preopercle and opercle yellow, unpaired fins pale

yellow. Edged with blue.

Distributed in West Pacific to northeastern Australia.

**205. *Scolopsis taeniopterus* (Kuhl & Van Hasselt, 1830)**

Pelvic fins long, reaching to or beyond level of anus; caudal fin emarginate. Maximum size is 20 cm SL., commonly 15 cm SL.

Colour: greyish-yellow on upper part of body, whitish below; sides of body with faint oblique blue and yellow lines, a narrow blue stripe joining eyes just behind nostrils; upper part of pectoral-fin base with a reddish-orange spot; fins yellowish; dorsal fin with a blue stripe along its middle area; upper tip of caudal fin bright yellow; upper base of caudal fin with a blue spot.

Distributed in Indo-West Pacific.

**206. *Scolopsis vosmeri* (Bloch, 1792)**

Body depth, lower limb of preopercle scaly; antrorse suborbital spine present beneath eye; caudal fin forked. Maximum size is 16 cm SL., commonly 15 cm SL.

Colour: variable, usually brownish with a reddish-purple tinge; a broad white vertical bar from top of head onto opercle; scales on sides with dark spots; opercular membrane blood-red; fins greyish, tinged red.

Distributed in Indo-West Pacific.

Family Lethrinidae

The emperors differ from the nemipterids in having of no free margin on suborbital bone, various types of dentition on jaws. Allen (1989) revised and recognized 39 species of Indo-Pacific, 4 species found.

**207. *Gymnocranius elongatus* Senta, 1973**

Body oblong. Head profile evenly rounded, snout somewhat pointed, eye large, its diameter usually about equal to length of snout; interorbital space convex, about equal to eye diameter, caudal fin deeply forked with pointed tips, the median rays shorter than eye diameter. Lateral-line scales 46 to 48 plus 2 to 4 tubed scales extending on to base of caudal fin.

Colour: overall silvery, sometimes slightly brownish dorsally; about 8 transverse brown bars on sides, the first crossing through eye, the remainder below dorsal fin and across caudal peduncle; scattered blotches and speckling sometimes evident on sides; fin clear to yellow-orange; caudal margin and tips often deep red.

Geographical Distribution: Coastal and shelf waters of the western Pacific and eastern Indian oceans

Size: Maximum total length about 35 cm.

**208. *Gymnocranius griseus* (Schlegel, 1844)**

Body oblong, deep. Dorsal and ventral profile of head evenly convex or ventral profile slightly straighter, eye relatively large, its diameter about equal to or slightly larger than preorbital and interorbital widths; mouth relatively small, caudal fin moderately forked with pointed tips, the median rays slightly longer than eye diameter. Lateral-line scales 46 to 48 plus 2 or 3 additional tubed scales extending on to base of caudal fin.

Colour: overall silvery, frequently with a diffuse to vivid pattern of 5 to 8 narrow dark bars on side, including one through eye and across cheek; fins mainly clear to yellowish, sometimes diffuse mottling or spotting on dorsal, caudal, and anal fins; few scattered blue spots or scribbling on the snout and cheek.

Geographical Distribution: Southern Japan to the Indo-Malaysian region.

Size: Maximum total length has been reported at 80 cm.

**209. *Lethrinus lentjan* (Lacepede, 1802)**

Body moderately deep, dorsal profile near eye nearly straight; snout moderately short, interorbital space convex, lateral teeth in jaws either rounded, rounded with tubercle, simple molars, anal fin with 3 spines and 8 soft rays, the first soft ray usually the longest. Lateral-line scales usually 46 to 47.

Colour: body greenish or grey, shading to white below, centers of scales on upper sides often white; posterior margin of opercle and sometimes base of pectoral fin red; pectoral fin white, yellow or pinkish; pelvic and anal fins white to orange; dorsal fin white and orange mottled with a reddish margin; caudal fin mottled orange or reddish.

Geographical Distribution: Widespread in the Indo-West Pacific, including the Red Sea.

Size: Maximum size to about 50 cm total length.

**210. *Lethrinus microdon* Valenciennes, 1830**

Body relatively elongate, dorsal profile near eye nearly straight; snout moderately long, cheek not high, anal fin with 3 spines and 8 soft rays, the first soft ray usually the longest. Lateral-line scales 47 or 48; cheek without scales.

Colour: body bluish grey or brown often with scattered irregular dark blotches on sides, fins pale or orangish.

Geographical Distribution: Wide-spread in the Indo-West Pacific.

Size: Maximum size to around 70 cm.

Family Sciaenidae (references; Trevawas, 1977; Lal Mohan, 1984 and Sirimontraphorn, 1987).

**211. *Otolithes ruber* (Schneider, 1801)**

Body slender species. Snout longer than eye diameter, its upper profile rising evenly to dorsal fin origin or slightly concave before eye; mouth large, terminal, slightly upturned; rostral pores absent. teeth in 2 series in upper jaw with 1 or 2 pairs of strong canines at front; a pair of canine teeth at tip of lower jaw. Dorsal fin with 9 or 10 spines, followed by a notch, second part of the fin with 1 spine and 27 to 30 soft rays; anal fin with 2 spines and 7 soft rays, the second spine short and weak, its base behind middle of soft part of dorsal fin; caudal fin rhomboid. Scales cycloid, but a few ctenoid lower part of hind end of body; lateral line scales reaching to tip of caudal fin. Colour: brownish above, silvery with a golden sheen on flanks and belly, often with oblique dark streaks dorsally. Size: maximum 70 cm, common to 40 cm. Widely distributed throughout Indo-Pacific. An economic important species.

**212. *Pennahia macrophthalmus* (Bleeker, 1850)**

A small, rather deep-bodied species, with a large, terminal, oblique mouth, rostral pores absent or minute, mental pores in 2 pair, pectoral fins rather long, anal fin with 2 spines and 7 or 8 soft rays, caudal fin truncate. Scales cycloid on snout elsewhere ctenoid. Swimbladder carrot-shaped with 18 to 22 arborescent appendages

Colour: body silvery white, back blue/grey; nape with a diffused dusky blotch; upper 2/3 of spinous dorsal fin dusky.

Maximum: 30 cm; common to 18 cm.

Distribution: along the West coast of the Indian subcontinent to China.

Family Mullidae

The goatfishes have the most distinctive feature in the pair of long mental barbels. Over 20 species known in the Indo-West Pacific, 7 species found (references Gloefelt-Tarp & Kailola; Allen & Swainston, 1993 and De Bruin et al., 1994).

**213. *Parupeneus cinnabarius* (Cuvier)**

Head large, nape and dorsal profile connex. Bright red spot 1-2 scales wide below lateral line and above pectoral fin. Blue horizontal stripes on head; back with pearly blue spots or broad mauve band. Barbels pale pink. Barbels extend beyond preoperculum.

**214. *Upeneus bensasi* Temminck & Schlegel, 1824**

Barbels pale yellow or white. Two or 3 orange bars across dorsal fins; pectoral, ventral and anal fin pale. Upper caudal fin lobe crossed by 3-5 oblique bars; lower lobe plain dusky orange with pale margin. First dorsal fin spine longest.

**215. *Upeneus luzonius* Jordan & Seale, 1907**

Up to 5 broad, dusky saddles on back, those below dorsal fins and on caudal peduncle more distinct. Red spots on scales and head fade soon after death. Barbels yellow. Both dorsals, anal and ventral fins crossed by 3-5 orange to brown-crimson bands. Each caudal fin lobe crossed by 5-7 dusky crimson bars. Barbels reach preopercular margin; second dorsal fin spine longest.

**216. *Upeneus moluccensis* Bleeker, 1855**

Bright yellow horizontal band through eye to caudal fin base. Barbels white or pink. Dorsal fins crossed by 3-4 orange or red bars; anal, ventral and pectoral fins pale. Upper lobe of caudal fin with 5-6 orange-black bars, lower lobe plain yellow with dark margin. First dorsal fin spine minute, 2nd longest.

**217. *Upeneus sulphureus* Cuvier, 1829**

Two orange-yellow horizontal bands from head to caudal peduncle. Both dorsal fins crossed by 2-3 olive bars; tips of fins black or dark brown. Anal, ventral and pectoral fins pale. Caudal fin plain dull yellow-ind margin dusky, lower lobe tipped white. Barbels white. First dorsal fin spine minute.

**218. *Upeneus sundaicus* Bleeker, 1855**

Olive-yellow horizontal band from eye to caudal peduncle. Dorsal fins blotched crimson; ventral, anal and pectoral fins plain white and pink. Caudal fin crimson with green rays and broad dark brown margin to lower lobe. Barbels bright yellow or orange. First dorsal fin spine minute.

**219. *Upeneus tragula* Richardson, 1845**

Many orange-brown spots over head and body; red or yellow band from eye to caudal fin base. Barbels white or pale yellow. Both dorsal, anal and ventral fins crossed by red bars or rows of blotches. Brown or red crossbars on caudal fin: 4-6 on upper lobe, 5-8 on lower lobe. Third or 4th dorsal fin spine longest. Barbels do not reach preopercular margin.

Family Cepolidae

**220. *Acanthocepola abbreviata* (Valenciennes, 1835)**

Body silvery red, head and belly paler; orange crossbands sometimes present on sides; fins brilliant dark red. Dark stripe in premaxillary groove and narrow black edge on caudal and anal fins. Strong spine on angle of preoperculum, 3 or 4 along lower limb. Scales increase slightly in size posteriorly.

Family Teraponidae (reference; Vari, 1976).

**221. *Terapon jarbua* (Forsskal, 1775)**

Oblong, compressed bodies. Upper jaw reaching beyond middle of eye; preopercular margin sharply serrated; 1 or 2 strong spines on operculum, the lower spine longest. Scales strongly ctenoid. Single dorsal fin, with 11-14 strong spines, slightly notched from soft part of fin. Three or 4 curved dark brown bands along body. Large black blotch on spinous dorsal fin. Caudal fin barred, each lobe black tipped.

Widely distributed in Indo-Pacific coasts.

**222. *Terapon theraps* (Cuvier, 1829)**

Four straight brown bands along body. Large black blotch on spinous dorsal fin and caudal fin barred. Scales moderate in size.

Family Ehippidae

**223. *Drepane punctata* (Linnaeus, 1758)**

Body silvery green, dusky above; 4 to 10 vertical rows of dark brown spots on upper sides; fin margins dusky. Mouth protractile into a downward-pointed tube; maxilla exposed posteriorly; predorsal body profile evenly convex at nape. Pectoral fin very long and falcate, reaching well over anal fin. Attains to 35 mm, usually 25 mm. Distributes throughout Indo-West Pacific, this economic species commonly seen in Songkhla markets.

**224. *Platax batavianus* Cuvier, 1831**

Two or 3 black cross bands on silvery, dusky green body; first as broad as eye passes through eye to throat, 2nd through pectoral fin base to ventral fin; fins yellowish, dusky basally, ventral fin charcoal. Maxilla hidden posteriorly; predorsal body profile angular, concave above and below eye. Scales on predorsal reach to eyes. Dorsal fin spines grade into elevated anterior fin rays, posterior spines longest.

Family Labridae

**225. *Xiphocheilus typus* Bleeker, 1856**

Body compressed. One pair of canine teeth on upper and lower jaw. Body dusky green with a pale blue margin of each scale forming many oblique wavy lines across body; yellow markings on head, 2 brown-edged blue lines on snout, blue line from mouth to beyond lateral line origin. Fins green or yellow, anal and caudal fins crossed by many slightly wavy, oblique, pale blue lines. Thin, compressed upper lip covered by suborbital when mouth closed. Lateral line continuous.

**226. *Xirichthys* sp.**

Head and body very compressed, rectangular in lateral shape; mouth small, with a pair of canine teeth on each jaw; dorsal and anal fins with long base; body greyish pale-brown, abdominal pale with large pinkish patch around anal; fins hyaline, anal fin with red margin, caudal fin dusky. A single specimen, 12 cm. taken from off Malay peninsula

Family Chaetodontidae

**227. *Coradion chrysozonus* (Kuhl & Van Hasselt, 1831)**

Body white with 5 yellow bands across, anterior ones dark brown ventrally: first band from nape through eye to isthmus; second and third bands close together, from spinous dorsal fin to belly; fourth band between soft dorsal and anal fins; fifth band dark brown, on caudal peduncle. Black ocellus on rounded mid-soft dorsal fin. Snout short.

Family Pomacentridae

**228. *Pristotis jerdoni* (Day, 1873)**

Body ovate and compressed. Mouth small. One nostril on each side of snout. Scales ctenoid. Dusky olive or fawn on back, pearly white below. Black spot on upper pectoral fin base and black edge on dorsal fin. Margin of preoperculum and suboperculum serrated; one row of teeth in jaws.

**229. *Pristotis* sp.**

Similar to above species but yellow fins, possibly juvenile or non-nuptial form of *P. jerdoni*?

Family Siganidae

The rabbit fishes or spinefoot is very compressed, oval body. Mouth small, teeth small and close together. Body covered with small, cycloid scales. Single dorsal fin with 13 spines, an antrorse



spine at fin origin. Woodland (1990) reviewed the family, recognized 27 species; this survey obtained 3 species.

**230. *Siganus canaliculatus* (Park, 1787)**

Grey green above to silvery below, covered with numerous pale spots on sides arranged into horizontal rows; fin marbled with brown. Rounded soft dorsal and anal fins low, caudal fin emarginate, forked in larger fish.

**231. *Siganus guttatus* (Bloch, 1787)**

Blue grey above to silvery below; pupil-sized golden orange spots over side, closer together and “honey-combed” on nape; large yellow patch on body below base of soft dorsal fin; soft portion of unpaired fins with rows of dark spots. Head profile slightly concave on nape. Rayed portion of dorsal and anal fins little higher than spinous portions; caudal fin truncate emarginate in larger fish.

**232. *Siganus javus* (Linnaeus, 1758)**

Body oval, strongly compressed. Depth 1.8-2.3. Mouth small, jaws with close-set teeth. Scales small, minute. A small forward-directed spine in front of spinous dorsal. Pelvic fins with two spines. Spots on lower part of sides elongated and wavy.

Family Scombridae

The scombroids mackerels are characterized in having a streamline fusiform to elongate body; caudal peduncle keeled; caudal fin stiff, deeply fork or lunate; posterior dorsal and anal fins with 5-12 finlets. Collette & Nauen (1983) reviewed the family, over 25 species known from the South China Sea; 5 species found.

**233. *Rastrelliger brachysoma* (Bleeker, 1851)**

Body very deep, head equal to or less than body depth. Gillrakers very long, visible when mouth is opened. Intertine very long, 3.2 to 3.6 times fork length.

Colour: spinous dorsal fin yellowish with a black edge, pectoral and pelvic fins dusky, other fins yellowish.

Distribution: Central Indo-West Pacific.

Size: Maximum fork length is 34.5 cm, common from 15 to 20 cm.

Remark: *R. neglectus* is possibly not a synonym of this species but separated, the further study on the two species is needed.

**234. *Rastrelliger faughni* Matsui, 1967**

Body slim, head longer than body depth. Gillrakers shorter than snout; when mouth is opened wide. Intestine short, less or about equal to fork length.

Colour: belly yellowish silvery; 2 to 6 large spots at base of first dorsal fin, visible from above; two faint stripes at level of lateral line in some specimens; a black blotch behind pectoral fin base.

Distributed central part of the Indo-West Pacific.

Size: Maximum size is at least 20 cm fork length.

**235. *Rastrelliger kanagurta* (Cuvier, 1817)**

Body moderately deep. Maxilla partly concealed, covered by the lacrimal bone, gillrakers very long, visible when mouth is opened. Intestine 1.4 to 1.8 times fork length.

Colour: narrow dark longitudinal bands on upper part of body (golden in fresh specimens) and a black spot on body near lower margin of pectoral fin; dorsal fins yellowish with black tips, caudal and pectoral fins yellowish; other fins dusky.

Distribution: Widespread in the Indo-West Pacific.

Size: Maximum fork length is 35 cm, common to 25 cm.

**236. *Scomberomorus commerson* (Lacepede, 1800)**

Body elongate, compressed, second dorsal and anal fins followed by 10-11 finlets. Gillrakers on first arch few. Lateral line abruptly bent downward below end of second dorsal fin.

Colour: sides silvery grey marked with transverse vertical bars of a darker grey; bars narrow and slightly wavy, bars number 40 to 50 in adults, first dorsal fin bright blue rapidly fading to blackish blue; pectoral fin light grey turning to blackish blue; caudal fin lobes, second dorsal, anal, and dorsal and anal finlets pale greyish white turning to dark grey.

Distribution: Widespread throughout the Indo-West Pacific.

Size: Maximum fork length is about 220 cm, common to 90 cm. Highly commercial species throughout its range.

**237. *Scomberomorus guttatus* (Bloch & Schneider, 1801)**

Body moderately deep, strongly compress. Gillrakers on first arch moderate: 1 or 2 on upper limb. Lateral line with many fine auxiliary branches extending dorsally and ventrally in anterior third, gradually curving down toward caudal peduncle.

Colour: sides silvery white with several longitudinal rows of round dark brownish spots scattered in about 3 irregular rows along lateral line. First dorsal fin membrane black, pectoral, second dorsal and caudal fins dark brown; pelvic and anal fins silvery white.

Distributed along the shores of continental Indo-West Pacific.

Size: Maximum fork length is 76 cm.

Family Trichiuridae

The hairtail or cutlassfish is the close related family to the scombrids; characterized by the very long, extremely compressed, silvery body; mouth large with long, compressed canine teeth on jaws; caudal fin small or filamentous. Nakamura & Parin (1993) revised the family and their relatives; at least 5 species known in this region, 3 species found.

**238. *Eupleurogrammus glossodon* (Bleeker, 1860)**

A pair of fangs on tip of lower jaw. Eye small, its diameter about 7 or 8 times in head length, located close to dorsal profile of head. A black spot just behind dermal process on bottom of lower jaw. A fairly noticeable black blotch on base of anterior margin of pectoral fins. Body extremely elongate and compressed, ribbon-like

Colour: body steely blue with metallic reflections, dorsal-fin membrane slightly tinged with black along spines, dorsal side of posterior part slightly tinged with black.

Distributed in Indo-West Pacific.

Size: Maximum 50 cm total length, common 15 to 40 cm.

**239. *Tentoriceps cristatus* (Klunzinger, 1884)**

Body strongly compressed, tapering to a point. Dorsal profile of head evenly convex; mouth large with a dermal process at tip of each jaw, pectoral fins short, posterior part of body tapering to a point.

Colour: body silvery white each jaw, dorsal and anal-fin bases sooty.

Distributed in Indo-West Pacific.

Size: Maximum 90 cm total length.

**240. *Trichiurus lepturus* Linnaeus, 1758**

Body extremely elongate and strongly compressed, ribbon-like, tapering to a point, position of anus nearer snout than posterior tip of body, eye large, 2 or 3 pairs of enlarged fangs with barbs nearer tip of upper jaw. Dorsal fin rather high and long, pelvic and caudal fins absent.

Colour: steel blue with silvery reflection, pectoral fins semi-transparent, other fins sometimes

tinged with pale yellow.

Distribution: Throughout tropical and temperate waters.

Size: Maximum 120 cm total length, common from 50 to 100 cm. This species is the most important commercially caught triciurid.

Family Stromateidae

**241. *Pampus argenteus* (Euphrason, 1788)**

One continuous dorsal fin 10 small blade-like spines before dorsal fin rays very deciduous scales. Body compressed and muscular. Maxilla ends under eye. Ventral fin never present. Dorsal and anal fins high anteriorly, falcate, their tips produced. Caudal fin deeply forked, tips sharp, lower lobe slightly longer. Body and fins iridescent blue-grey, back and fin margins dusky. Size attaining to 35 cm SL. Distributed from eastern Indian Ocean to West Pacific, Highly economic species.

**242. *Pampus chinensis* (Euphrason, 1788)**

Dorsal and anal fins elevated anteriorly but not produced into falcate lobes. Caudal fin forked, tips blunt. Body and fins bluish green, back and fin margins dusky. No spines before unpaired fins. Distributed same as *P. argenteus*.

Family Polynemidae

**243. *Eleutheronema tetradactylum* (Shaw, 1804)**

Body more or less elongate and compressed. Snout projecting, mouth very large, with small teeth; lips absent, except for lower lip near corner of mouth; eye large. Pectoral fins in 2 parts, upper part with all rays unbranched, lower with 4 free filamentous rays of which the upper filament is the longest. Caudal fin forked with lobes equal. Scales small, ctenoid. Maximum size in 200 cm; common to 50 cm.

Colour: body silvery green above, cream below; dorsal and caudal fins grey, dusky at edges, pelvic and anal fins orange, pectoral filamentous rays white.

Highly economic species of coastal areas from eastern India Ocean to Western Pacific.

Family Sphyraenidae (reference; Gloefelt-Tarp & Kailola, 1984; Masuda et al., 1984 and Randall, 1995)

**244. *Sphyraena forsteri* Cuvier, 1829**

Body elongate, slightly compressed or subcylindrical. Mouth large, lower jaw longer. Teeth strong and fang-like, of unequal size. Two well separated dorsal fins. Caudal fin forked. Body plain, back olive brown, sometimes marbled with brown; lower sides silvery white. Fins yellow, outer half of second dorsal, anal and caudal fins brown. Preopercular edge rounded. Eye very large.

**245. *Sphyraena obtusata* Cuvier, 1829**

Olive-brown above, silvery white below. Two dusky yellow stripes along mid-sides from head to tail base. Fins yellow or pale, second dorsal, anal and caudal fins edged brown. Preopercular edge rectangular. Pectoral fin reaches past first dorsal fin origin.

**246. *Sphyraena jello* Cuvier, 1829**

Lateral line scales 130-140; eye not large; conner of preopercle rounded, without a membranous flap; opercle with two flexible flat spines; no pointed cartilaginous knob at front of lower jaw; maxilla reaching to below front edge of eye; teeth erect; origin of first dorsal fin slightly posterior to origin of pelvic fins and anterior to tip of pectoral fins; caudal fin deeply fork, without inner lobe; dusky blue-green on back, silvery on sides, with about 20 dark bars on body about equal in width to pale interspaces, those posterior to second dorsal and anal fins faint; caudal fin yellow. Reaches about 140 cm. Red Sea and coast of East Africa to the western Pacific.

Family Blenniidae

**247. *Xiphasia setifer* Swainson, 1839**

Body elongate, eel-like. Teeth fixed, slender; very long canine posteriorly in lower jaw; gill membranes broadly united with throat, gill opening a small pore on side. Dorsal fin begins before eye; caudal united with dorsal and anal fins. Dusky green or grey, black and dorsal base crossed by about broad dark brown bands; black spots anteriorly on dorsal fin, first one smaller.

Family Gobiidae**248. *Oxyurichtys* aff. *papuensis* (Valenciennes, 1837)**

Scales ctenoid to below origin of second dorsal fin, cycloid anteriorly; scales present on chest and side of nape, but not on prepectoral region, cheek, or opercle; a fleshy ridge medially on nape; no tentacle on eye; body elongate, upper part of higher than dorsal profile of head; caudal fin long and pointed, nearly twice length of head; pelvic fins united, with a frenum; greenish dorsally, shading to whitish ventrally, with irregular golden lines above midbody; fins hyaline, anal fin dusky.

**249. *Yongeichthys nebulosus* (Forsskal, 1775)**

Longitudinal scale series 26-30; scales on body ctenoid except abdomen and prepelvic area where cycloid; no scales on head or nape except for a few ventrally on nape extending a short distance anterior to gill opening; gill opening ending at level of lower edge of pectoral fin base; several longitudinal rows of papillae on cheek; second dorsal spine filamentous, caudal fin rounded, a little shorter than head length; pelvic fin united; pelvic fin frenum present; whitish, the head and upper two-thirds of body mottled with brown; four large dark brown blotches in a row on side of body, dorsal and caudal fin with numerous dark brown spots; anal fin with a dark brown margin. Red Sea south to the western Pacific. Said to have toxic skin.

Family Pinguipedidae**250. *Parapercis filamentosa* (Steindachner)**

Body elongate, cylindrical. Depth 5-5.6. Mouth slightly oblique, lower jaw projecting slightly. Caudal slightly rounded. The first 5-6 dorsal rays long filamentous. Body goldish-brown with 6 indistinct dark brown blotch; fins hyaline, pelvic fin dusky. Two specimens of 10-13 cm. taken from off Malay peninsula.

**251. *Parapercis pulchella* (Schlegel, 1843)**

Body elongated, cylindrical; caudal fin emarginate only upper lobe; body rosy with 5-6 indistinct brown banded; pale ventrally, dorsal and caudal fins hyaline with yellowish stripes; anal fin and lower margin of caudal fin rosy red. Attaining to 25 cm, usually 15 cm. Commonly obtained almost every trawling stations. Distributed in Indo-West Pacific.

Family Uranoscopidae**252. *Uranoscopus oligolepis* Bleeker, 1878**

Moderately elongate, robust fishes. Head large, "square" flattened above; body compressed. Mouth large. Eyes practically on top of head which is often covered by bony plates. Caudal fin rounded or truncate. Usually a strong spine on "shoulder" above pectoral fin base which may be venomous. Plain olive brown over upper head and back. Spinous dorsal fin black but base of entire fin white. Pectoral fin dusky olive, lower border yellow-orange. Humeral spine strong, exposed. Nape naked. Flap of tissue along inside of lower jaw forming a very long filament. One pair of preventral spines plus anterior bucklers.

**Order Pleuronectiformes**

The flatfishes consist of 7 families in the Indo-West Pacific, about 60 species known from the South China Sea. This order is recognized by its sideway compressed and have both eyes oddly situated on the same side; fin with soft spiny rays except in the Psettodidae. Seven families and 23

species were found in this survey. References; Punpoka (1964); Mongkolprasit (1967); Menon (1977); Gloefelt-Tarp (1984); Masuda et al. (1984); Chen (1993) and Randall (1995).

Family Psettodidae

**253. *Psettodes erumei* (Bloch & Schneider, 1801)**

Eyed side plain brown or dark green, sometimes with broad crossbands and scattered white spots. White edge on caudal fin. Mouth large, teeth strong. Upper eye near dorsal profile and in front of lower eye. Caudal fin wedge-shaped. Left eyed side in tropical populations.

Family Citharidae

**254. *Branchypleura novaezeelandiae* Guenther, 1862**

Eyed side mottled pale brown with about 3 rows of dark near fin bases, small dark spots on fins. Mouth large, gill rakers long. Scales easily lost, none on front third of head; lateral line distinctly curved above pectoral fin. Anterior dorsal fin rays filamentous in male; both ventral fins short based, that of eyed side well before ventral fin on blind side.

Family Paralichthyidae

**255. *Pseudorhombus diplospilus* Norman, 1926**

Large double black ocelli on body ringed with yellow spots-2 above and 2 below lateral line. Dorsal fin begins just behind posterior nostril (blind side); head profile notched; 4-10 teeth on blind side of lower jaw; gill rakers short, broad and with spiny margins.

**256. *Pseudorhombus arsius* (Hamilton-Buchanan, 1822)**

Brown with dark spots and rings; large dark blotch on lateral line at beginning of straight part, sometimes 1 or 2 smaller blotches on line posteriorly. Dorsal fin begins just before nostrils or over space between nostrils; teeth strong, widely spaced, 6-13 on blind side of lower jaw.

**257. *Pseudorhombus elevatus* Ogilby, 1912**

Four to 5 rows of dark rings along body; large dark blotch on lateral line at beginning of straight part, sometimes 1 or 2 more on line posteriorly. Dorsal fin begins above or in front of front nostril; notched in head profile before eyes; teeth small. All scales ctenoid on eyed side.

**258. *Pseudorhombus quinqueocellatus* Weber & de Beaufort, 1929**

Five dark brown single ocelli on body, ringed with yellow spots and brown line-2 above, 2 below, 1 posteriorly on lateral line. Teeth strong, widely spaced, 12-14 on blind side of lower jaw. Caudal peduncle twice longer than deep. Dorsal fin begins above nostrils. Sharp spine projects horizontally before anal fin origin.

**259. *Pseudorhombus malayanus* Bleeker, 1866**

Head notched in front of upper eye; snout as long as eye diameter; maxilla extending to below posterior part of lower eye. Body plain brown; dark blotch at beginning of straight part of lateral line. Body scales ctenoid on both sides. Attains to 17 cm, usually 15 cm. Known from Oman coast to the South China Sea.

Family Bothidae

**260. *Grammatobothus polyophthalmus* (Bleeker, 1866)**

Interorbital narrow and concave; lateral line well-developed on both sides of body. Second to seventh dorsal fin rays produced. Brown with pale blue and brown spots; three large black and yellow ocelli on body: 2 above and below pectoral fin, another on middle of straight part of lateral line; broad dark and pale bars across pectoral fin.

**261. *Engyprosopon grandisquama* (Temminck & Schlegel)**

Interorbital concave (male with spine on snout and orbital spines.) Scales on eyed side feebly ctenoid, also covering membrane between operculum and pectoral fin base. Body tan to dark brown mottled and spotted; fine spots on dorsal and anal fins; 2 conspicuous black spots in middle of upper and lower caudal fin margins.

**262. *Engyprosopon multisquama* Amaoka, 1963**

A pair of jet-black blotches on caudal fin placed between 2nd and 4th rays counted from above and below respectively. Body narrow, its depth less than 1/2 of SL. Pectoral fin long, upper rays elongated into filaments, its length longer than head length. More scales in lateral line and less pectoral rays than in *E. grandisquama*. Distributed from Japan to South China Sea.

**263. *Laeops parviceps* Gunther, 1850**

Mouth small, maxilla ending opposite front eye border, fine teeth present only on blind side of jaws. Upper body profile nearly straight behind eyes; slightly separated from rest of fin. Plain brown, fin edges darker; first two dorsal fin rays white.

**264. *Arnoglossus aspilos***

Eyes separated by bony ridge; lateral teeth of both jaws small, close together, front teeth of upper jaw only slightly larger; body depth 2.7-3.0 in SL. Second to 4th dorsal fin rays produced. Body fawn, dark spots on body and fins; a blotch on straight part of lateral line anteriorly.

Family Pleuronectidae

**265. *Samaris cristatus* Gray, 1831**

Eyed side mottled pale brown with about 3 rows dark blotches; row of blotches along dorsal and anal fin bases, several rows across caudal fin. Mouth small, straight lateral line present only on eyed side; ventral bases rather elongate, fin rays produced, tips expanded, first ray free; all caudal rays simple.

**266. *Samaris* sp.**

Similar to *S. cristatus* but darker colour and more oblong body; dorsal and anal fin ray shorter. Single specimens of 10 cm., taken off Malay peninsula.

Family Soleidae

**267. *Aesopia cornuta* Kaup, 1858**

Body and fins pale orange, crossed by 13 or 14 dark brown bands which may be divided; banded caudal fin yellow. First dorsal fin ray thickened and prolonged. Scales cycloid or feebly ctenoid, in form of short papillae on blind side of head. Dorsal and anal fins united with caudal fin; pectoral fin very short and broad; ventral fin free from anal fin.

**268. *Aseragodes dubius* Weber, 1913**

Eye small, close together, anterior nasal tube short, not reaching anterior rim of eye; caudal fin separated from other fins, pectoral fin absent. Colour; fawn with pale brown mottling and dark checkered blotch on the eye side. A specimen of 9 cm. taken off Malay peninsula.

**269. *Pardachirus pavoninus* (Lecepede, 1802)**

Tan or reddish-brown, body and fins covered with cream spots which often have dark brown central spot and dark brown border. Eyes separated by scaled interorbital; scales feebly ctenoid. Dorsal and anal fins free from caudal fin; an open pore at base of each dorsal and anal ray. No pectoral fins; ventral fin bases unequal, the right fin often joined to anal fin.

**270. *Liachirus melanospilus* (Bleeker)**

Anterior nasal tube moderately long, usually reaching anterior rim of lower eye, when tube depressed posteriorly. Scales cycloid. Caudal fin free from other vertical fins, pectoral fins absent.

Family Cynoglossidae

**271. *Cynoglossus arel* (Bloch & Schneider, 1801)**

Eyed side tan, fins brown. Two lateral lines on eyed side, none on blind side. Eyes separated by narrow scaly space; corner of mouth midway between snout tip and gill opening. Scales ctenoid on eyed side.

**272. *Cynoglossus kopsi* (Bleeker, 1851)**

Eyed side tan, mottled darker brown; fins dark. Two lateral lines on eyed side, upper one often incomplete; none on blind side. Eyes not separated by scaly space; corner of mouth nearer snout tip than gill opening, below middle of eye. Ctenoid scales on both sides of body.

**273. *Cynoglossus lingua* Hamilton-Buchanan, 1822**

Eye separated with narrow scaly space. Lateral lines complete; body elongate, tapering posteriorly and pointed caudal fin. Eye side dark grey, fin greyish, dusky posteriorly. specimens obtained with 19 cm. size.

**274. *Cynoglossus* sp.**

Similar to *C. arel* but more robust body, longer scales and rounded snout. Eye side yellowish brown, dusky, fin hyaline brown, with dusky rays. Specimens taken with 20 cm. size.

**275. *Paraplagusia bilineata* (Bloch, 1874)**

Lips with fringes of branched tentacles. Body olive-green or brown on eyed side; fins fawn with narrow white margins. Scales ctenoid on blind side of body. Two or 3 lateral lines on eyed side, upper two separated by 16-19 scales.

**Order Tetraodontiformes**

This order consists of 9 families in 2 suborders: Balistoidei; triggerfishes, tripodfishes; and Tetraodontoidae; puffers. The order is characterized in having of small mouth, large head; gill opening small and low number of vertebrae. Over 80 species known from the South China Sea. References; Tyler (1968), Gloefelt-tarp & Kailola (1984), Masuda et al. (1984), Kumchirtchuchai (1985), Chen (1993) and Randall (1995).

Family Triacanthidae

**276. *Pseudotriacanthus strigilifer* (Cantor, 1850)**

Body grey, dark silvery above, pale below, oblong golden or orange blotches on sides; lower 1/3 to 1/2 of first dorsal fin pale, outer portion black. Bony pelvis broad anteriorly between ventral fin bases, tapering to point posteriorly. Length of 2nd dorsal spine more than half first spine length.

**277. *Tripodichthys oxycephalus* (Bleeker, 1851)**

Body short, rectangular, with elongated caudal peduncle; dorsal spine very long with short second to fourth spines; snout produces elongate. Body silvery grey with yellowish gold longitudinal dash; first dorsal spine membrane dark distally; fins hyaline.

**278. *Triphictys weberi* (Chauduri, 1910)**

Silvery blue body, orange blotch on base of and below first dorsal fin, dusky golden elongate blotches in roughly 3 bands along body; outer 1/3 of first dorsal fin black, remainder white. Bony pelvic almost as wide anteriorly between ventral fin bases as near its tip; snout concave and long, postorbital distance short.

Family Balistidae

**279. *Abalistes stellatus* (Lecepede, 1798)**

Deep groove before eye; teeth uneven and notched; caudal peduncle depressed. Third dorsal spine well-developed; tips of caudal fin produced. Many pale blue-green spots and dashes along body and over head; large cream blotches often present on back; unpaired fins banded yellow, green and brown.

Family Monacantidae

**280. *Aluterus monoceros* (Linnaeus, 1758)**

First dorsal spine slender, placed above eye; snout profile convex; body ovate; no ventral flap; caudal fin shorter than head, lobes produced with age. Body green-olive, darker above, often with dark brown spots and/or white reticulations.

**281. *Anacanthus barbatus* Gray, 1831**

Body very elongate. Fleshy barbel on lower jaw; mouth opens dorsally. First dorsal spine short and weak; caudal fin long, wedge-shaped. Green or brown body with cream mid-lateral band and spotted ventral flap. Another robust specimen was taken, possibly different species or variation of *A. barbatus*.

**282. *Chaetoderma penicilligera* (Cuvier, 1817)**

Skin roughened; long skin filaments, some branched, scattered over head and body; ventral fin rudiment at tip of pelvic movable. Teeth in upper jaw often protrude from mouth; first dorsal spine irregularly-shaped and often twisted. Caudal fin large, wedge-shaped. Body pale or dark brown with thin longitudinal dark brown lines from snout to tail base; body blotched brown, 2 black blotches above pectoral fin. Rows of small dark spots along unpaired fins, dark patches and dark margin on caudal fin.

**283. *Pseudomonacanthus macrurus* (Bleeker, 1857)**

Ventral fin rudiment at tip of pelvic not movable but pelvis itself very movable; ventral flap large. Gill opening almost entirely below eye. First dorsal spine placed above posterior half of eye; caudal fin rounded. Body yellowish brown to pale brown, covered with small, crowded dark brown spots much smaller than pupil; net-work of dark lines on ventral flap; caudal fin with broad brown crossband and dark brown border.

**284. *Paramonacanthus japonicus* (Tilesius, 1801)**

Elongate and slender movable ventral fin rudiment at tip of pelvic. Body moderately slender. First dorsal spine slender, originating over posterior half of eye; dorsal and anal fins elevated anteriorly (much higher in male); rounded caudal fin, upper ray produced into filament. Fawn or grey-green body with yellow patches on snout, dusky spots and vague patches over head and sides; either 3 or 4 dusky brown bands from head to tail base. Two or 3 brown bands across pale caudal fin.

**285. *Paramonacanthus* sp.1**

Body deep, skin roughened with minute spines. Body fawn with indistinct dark blotches; fins hyaline; caudal fin with faint dusky band. Taken in large amounts of Pahang river mouth and mixed with other 2 unknown species, possibly sexual variations. Size attains to 10 cm.

**286. *Paramonacanthus* sp.2**

Similar to species 1, but skin smoother; body fawn without dark blotches.

**287. *Paramonacanthus* sp.3**

Body returned deeper; caudal fin longer and pelvic fin flap dark.



Family Ostraciidae

**288. *Rhynchostracion nasus* (Bloch, 1785)**

Body 5-cornered in cross-section, ridges moderately sharp-edged but without spines, median dorsal ridge distinct; snout projects beyond mouth. Anal fin begins behind dorsal fin. Pale green, orange or grey body with scattered large or smaller brown spots, one on each plate; spots extending onto caudal peduncle and fin.

**289. *Tetrosomus gibbosus* (Linnaeus, 1758)**

Body roughly 3-cornered or triangular in cross-section; large, high, flattened spine on dorsal ridge, short upward-pointing spine above eye and 4 or 5 short, strong, backward-pointing spines along ventro-lateral ridge. Olive, grey-blue or brown body with black blotches on lower sides, base of dorsal spine, caudal peduncle, dorsal and anal fin bases.

Family Tetraodontidae

**290. *Lagocephalus gloveri* Abe et Tabeta, 1983**

Body oblong, covered with prickles. Prickles on dorsal surface do not reach origin of dorsal fin. Caudal fin double emarginate, Dorsal half of body blackish-brown, ventral silver. Pectoral and dorsal fins dark; anal fin white; caudal fin black with upper and lower white tips. Attains 35 cm. Distributed in the West Pacific.

**291. *Lagocephalus inermis* (Temminck et Schlegel, 1850)**

Dorsal surface of body without prickles, belly covered with prickles. Black gill opening. Attain 90 cm. Distributed in the East China Sea, the South China Sea to the Indian Ocean.

**292. *Lagocephalus lunaris* (Bloch & Schneider, 1801)**

Body round in cross-section, nostril a raised papilla with 2 openings; caudal fin moderately emarginate. Body naked except for patch of spinules on back from above eye to 3/4 or all the way to dorsal fin and another patch ventrally from throat to halfway along belly. Caudal peduncle deeper than wide. Top of head and back tan or green, sides silvery pale yellow; caudal fin tan, tipped white. Attains 45 cm. Distributed in the East China Sea and the Indian Ocean.

**293. *Lagocephalus sceleratus* (Gmelin, 1788)**

Body elongate and streamlined. Caudal peduncle depressed. A wide silver stripe running from mouth to caudal peduncle. Dorsal dark gray with many small black spots, Ventral silver. Attain 110 cm. Distributed to the Indo-West Pacific.

**294. *Lagocephalus spadiceus* (Richardson, 1845)**

Body round. Caudal fin slightly lunate. Body naked except for patch of spinules on back from eye to halfway before dorsal fin and another patch ventrally from throat to halfway along belly. Caudal peduncle deeper than wide. Three broad brown bands across back; sides silvery yellow. Dorsal and pectoral fins yellow, caudal fin dusky, tips white. Anal fin white.

**295. *Torquigener pallimaculatus* Hardy, 1933**

Nostril a raised papilla with 2 openings. Caudal fin truncate; eye free from body skin except dorsally. Sort spinules on back, sides and ventrally to about level of dorsal fin; lower half of gill opening edge with several papillae. Back with orange-brown large and small spots and large grey spots surrounded by spots. Large spots scattered over lower sides.

**296. *Arothron immaculatus* (Bloch et Schneider, 1801)**

Body round, nostril as pair of short thick tentacle; lateral line not branched above anal fin.

Dusky olive above, grey or white below. Gill opening and pectoral fin base dark brown, hind margin of caudal fin brown, other fins plain. Upper and lower borders of caudal fin conspicuously dark brown or black.

**297. *Arothron stellatus* (Bloch et Schneider, 1801)**

Body round in cross-section; nostril a pair of short thick tentacle; lateral line not branched above anal fin. Few or many black or dark brown spots over fawn or yellow-green upper half of body. Gill opening black or with large black spots; anus ringed black. Black spots on dorsal and anal fins; sometime caudal fin spotted or dorsal fin plain. Size attain to 60 cm. commonly 30 cm. Distributed throughout Indo-Pacific. Poisonous species.

Family Diodontidae

**298. *Diodon holocanthus* Linnaeus, 1758**

Body covered with many long erectile spines. Several dark-brown blotches on body. Attains 30 cm. Circumtropical distribution.

**299. *Diodon hystrix* Linnaeus, 1758**

Body covered with many long erectile spines. Body and fins covered with many small black spots and with no large dark markings. Attains 57 cm. Circumtropical distribution.

**300. *Tragulichthys orbicularis* (Bloch, 1785)**

Head and body fawn or olive above, white below; 3 or 4 rounded spots on sides-one between eye and gill opening, other above and behind pectoral fin; fins plain. Body spines mostly 3-rooted and fixed; 4 or 5 very long and erectile spines in pectoral fin axil; spines on sides longest, arising near bases of unpaired fins and reaching over caudal peduncle. distributed throughout Indo-West Pacific.

## Discussion

In this survey, 300 species including 122 economic species were obtained, their diversity is drastically decrease, in compare with the survey done by Wongratana (1968, 1985), they were 380 species obtained in the same areas, only by trawling method.

Four of the 24 station are highly species-richness areas, there are Station 70 (73 species), St. 80 (66 species), St. 5 (57 species) and St 14-15 (54 species). Off Ko Chang (37 m depth) in the Gulf of Thailand and off the Pahang River (50 m) in the eastern Malay Peninsula are represented for high diversity areas (Table 1).

Demersal fish forms the main composition of the trawls despite the modification of the 10-metre high opening made to the net. The lizardfish *Saurida undosquamis*, *S. miropectoralis*, the bigeye *Priacanthus tayenus* and *P. macracanthus*, the rabbitfish *Siganus canaliculatus* and hairtail *Trichiurus lepturus* were the most abundant economic species found in most of the sampling stations.

Fishing efforts were 34 hours and 49 hours for the cruises I and II, with average catch per hour of 12.04 and 34.79 kg. respectively. The maximum catch per hour was 175.3 kg in Malaysian waters, the minimum was 4.33 kg in Thai waters. The average percentage of economic fishes is higher than that of trash fishes in Malaysian waters. It ranged from 55.45 to 81.92 %, with the exception of station 76, which was 11.4% due to the massive landing of small filefishes *Paramonacanthus* spp. Economic fishes formed 26.1-89.9% of the catch in the Gulf of Thailand, but total catch was low, with 8.2-68 kg and 13-69 kg for the cruise I and II respectively. All the results see Table 1-4 and Fig. 2-3.

Table 2. Species list of fishes collected in the Cruise I (Gulf of Thailand and east coast of Peninsular Malaysia). SK = Songkhla market

Species	Station																									
	2	5	9	16	17	23	25	30	32	39	40	43	51	54	58	61	63	65	68	72	74	76	78	80	SK	
<b>Order Orectolobiformes</b>																										
<b>Family Hemiscylliidae</b>																										
<i>Chiloscyllium punctatum</i>	*																*									
<b>Family Scyliorhinidae</b>																										
<i>Aetomycterus marmoratus</i>							*	*																		
<b>Order Carcharhiniformes</b>																										
<b>Family Hemigaleidae</b>																										
<i>Hemipristis elongatus</i>																					*					
<b>Order Rhinobatiformes</b>																										
<b>Family Rhinobatidae</b>																										
<i>Rhynchobatus djiddensis</i>																							*			
<b>Order Torpediniformes</b>																										
<b>Family Narcinidae</b>																										
<i>Narcine sp.</i>																*										
<b>Order Myliobatiformes</b>																										
<b>Family Dasyatidae</b>																										
<i>Dasyatis zugei</i>				*		*		*																		
<i>Dasyatis sp.1</i>												*		*												
<i>Dasyatis sp.2</i>			*									*	*								*					
<i>Dasyatis sp.3</i>							*																			
<i>Himantura sp.</i>							*																			
<b>Order Anguilliformes</b>																										
<b>Family Muraenidae</b>																										
<i>Gymnothorax javanicus</i>	*																									
<i>Gymnothorax sp.1</i>					*																					
<i>Echidna ? sp.</i>					*																					
<b>Family Congridae</b>																										
<i>Conger sp.</i>													*													
<b>Family Muraenisocidae</b>																										
<i>Muraenox cinereus</i>																					*					
<i>Congresox talabonoides</i>																					*					
<b>Order Clupeiformes</b>																										
<b>Family Engraulidae</b>																										
<i>Stolephorus insularis</i>						*				*																
<i>Endrasicholina heteroloba</i>	*				*	*		*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<b>Family Chirocentridae</b>																										
<i>Chirocentrus dorab</i>		*			*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Chirocentrus nudus</i>										*																
<b>Family Clupeidae</b>																										
<i>Amblygaster sirm</i>					*																					
<i>Sardinella fimbriata</i>	*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<b>Order Aulopiformes</b>																										
<b>Family Synodontidae</b>																										
<i>Saurida micropectoralis</i>		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Saurida longimanus</i>		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Saurida undosquamis</i>	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Synodus hoshinonis</i>	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Trachinocephalus myops</i>																									*	
<b>Order Ophidiiformes</b>																										
<b>Family Ophiidae</b>																										
<i>Sirembo jerdoni</i>												*														
<b>Order Siluriformes</b>																										
<b>Family Ariidae</b>																										
<i>Arius sp.</i>																	*		*							
<b>Family Plotosidae</b>																										
<i>Plotosus lineatus</i>																									*	*
<i>Plotosus sp.</i>																									*	*
<b>Order Beloniformes</b>																										
<b>Family Belonidae</b>																										
<i>Ablenes hians</i>														*											*	*
<i>Tylosurus crocodylus</i>																									*	*
<i>Euleptorampus viridis</i>																*									*	*

Table 2. continue

Species	Station																									
	2	5	9	16	17	23	25	30	32	39	40	43	51	54	58	61	63	65	68	72	74	76	78	80	SK	
<b>Family Hemiramphidae</b>																										
<i>Hemiramphus far</i>																										*
<i>Hyporamphus dussumieri</i>								*																		*
<b>Family Exocoetidae</b>																										
<i>Cypselurus oligolepis</i>												*												*		*
<b>Order Gasterosteiformes</b>																										
<b>Family Pegasidae</b>																										
<i>Pegasus laternarius</i>		*																								
<b>Family Centriscidae</b>																										
<i>Centriscus scutatus</i>										*							*									
<b>Family Syngnathidae</b>																										
<i>Hippocampus kuda</i>			*																							
<i>Corythoichthys sp.</i>																					*					
<b>Family Fistulariidae</b>																										
<i>Fistularia petimba</i>		*		*		*			*		*	*	*		*	*		*	*		*	*		*		*
<b>Order Scorpaeniformes</b>																										
<b>Family Scorpaenidae</b>																										
<i>Apistus carinatus</i>		*				*			*												*			*		
<i>Pterois miles</i>		*	*			*	*					*	*	*			*									
<i>Scorpaenopsis cirrhosa</i>								*																		
<i>Scorpaenodes sp.</i>					*																					
<i>Scorpaenodes scaber</i>											*	*									*					
<i>Minous menodactylus</i>					*			*		*	*															
<i>Minous coccineus</i>													*													
<i>Inimiscus sinensis</i>	*		*		*		*	*					*													
<b>Family Platycephalidae</b>																										
<i>Elates ransoneti</i>							*	*					*	*										*		
<i>Platycephalus indicus</i>																										*
<i>Sarsogona tuberculata</i>							*			*							*									
<i>Thrysanophrys macracanthus</i>									*					*	*				*	*		*	*		*	*
<i>Gammoplites scaber</i>		*										*									*		*			
<i>Inegocia japonicus</i>																				*						
<b>Family Triglididae</b>																										
<i>Lepidotrigla sp.</i>												*	*			*	*						*			
<b>Family Dactylopteridae</b>																										
<i>Dactyloptena papilio</i>									*						*		*	*	*	*						
<i>Dactyloptena orientalis</i>		*	*	*																						
<b>Order Perciformes</b>																										
<b>Family Priacanthidae</b>																										
<i>Priacanthus tayenus</i>		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Priacanthus macrocanthus</i>						*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<b>Family Callionymidae</b>																										
<i>Repomucenus virgis</i>															*					*						
<i>Calliyichthys japonicus</i>												*	*				*	*	*							
<i>Dactylopus dactylopus</i>											*		*	*				*			*			*		
<b>Family Serranidae</b>																										
<i>Cephalophlis boenak</i>								*																		
<i>Epinephelus sexfasciatus</i>				*	*			*		*																
<i>Epinephelus quayanus</i>		*																								
<i>Epinephelus heniochus</i>								*		*			*													
<i>Epinephelus areolatus</i>							*	*				*	*			*	*			*	*					
<b>Family Apogonidae</b>																										
<i>Apogon septemstriatus</i>	*					*						*					*									
<i>Cheilodopterus macrodon</i>	*																									
<i>Apogon semilineatus</i>	*								*						*		*	*								
<i>Apogon quadrifasciatus</i>					*							*	*		*				*		*			*		*
<i>Apogon sp. 1</i>				*								*		*												
<i>Apogon elioti</i>								*									*								*	*
<i>Apogon poecilopterus</i>			*		*			*	*	*						*	*	*	*		*	*		*	*	*
<i>Apogon sealei</i>				*		*	*			*		*														
<i>Apogon albimaculosus</i>																					*					

Table 2. continue

Species	Station																									
	2	5	9	16	17	23	25	30	32	39	40	43	51	54	58	61	63	65	68	72	74	76	78	80	SK	
<b>Family Sillaginidae</b>																										
<i>Sillago sihama</i>										*																*
<b>Family Rachycentridae</b>																										
<i>Rachycentron canadum</i>																										*
<b>Family Carangidae</b>																										
<i>Parastromateus niger</i>				*					*							*				*		*				
<i>Selar boops</i>											*										*					
<i>Selar cruemepthalmus</i>				*			*		*					*		*	*		*		*		*			
<i>Alectis ciliaris</i>												*	*													
<i>Alepes para</i>											*															
<i>Alepes melanoptera</i>				*				*	*	*	*			*		*		*						*		
<i>Carangoides gymnothethus</i>																	*							*		
<i>Carangoides armatus</i>					*			*			*	*								*			*		*	
<i>Carangoides talamparoides</i>																*								*	*	
<i>Carangoides malabaricus</i>					*		*		*	*							*		*		*		*		*	
<i>Carangoides iii</i>								*																	*	
<i>Decapterus russelli</i>																	*		*		*					
<i>Uraspis helvola</i>																*				*		*				
<i>Atule mate</i>		*					*		*			*				*										
<i>Selaroides leptolepis</i>		*				*	*		*	*	*	*		*		*		*		*		*				
<i>Seriolina nigrofasciata</i>												*	*		*		*	*	*	*	*		*		*	
<i>Scomberoides sp.</i>																				*		*			*	
<i>Scomberoides tol</i>											*															
<b>Family Ariommatidae</b>																										
<i>Ariomma indicum</i>																*				*						
<b>Family Echeineidae</b>																										
<i>Echeineus naucrates</i>																									*	
<b>Family Meneidae</b>																										
<i>Mene maculata</i>				*	*																					
<b>Family Gerreidae</b>																										
<i>Gerres macrosoma</i>										*			*													
<i>Gerres filamentosus</i>			*									*														
<i>Pentaprion longimanus</i>				*	*									*	*	*	*	*	*	*	*	*	*	*	*	*
<b>Family Leiognathidae</b>																										
<i>Leiognathus bindus</i>				*								*		*	*	*	*							*		
<i>Leiognathus equalus</i>											*															*
<i>Leiognathus stercorarius</i>	*		*							*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Leiognathus leuciscus</i>					*	*			*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Leiognathus brevisrostris</i>	*		*		*	*		*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Secutor indicus</i>				*	*		*		*		*		*		*		*		*		*		*		*	
<i>Gazza minuta</i>					*		*		*		*		*		*		*		*		*		*		*	
<b>Family Lutjanidae</b>																										
<i>Lutjanus sebae</i>														*		*										
<i>Lutjanus malabaricus</i>		*		*	*									*		*		*								
<i>Lutjanus monostigma</i>								*																		
<i>Lutjanus johni</i>																									*	
<i>Lutjanus lutjanus</i>							*	*	*			*			*		*		*		*		*		*	
<i>Lutjanus russelli</i>																									*	
<i>Lutjanus quinqueringens</i>																									*	
<i>Lutjanus vittus</i>												*				*		*		*		*		*		*
<i>Pristipornoides filamentosus</i>							*						*		*		*		*		*		*		*	
<i>Pristipornoides multidentatus</i>							*			*			*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Pristipornoides typus</i>												*	*		*		*		*		*		*		*	
<i>Pterocaesio chrysozona</i>												*	*		*		*		*		*		*		*	
<i>Dipterygionotus bateatus</i>													*		*		*		*		*		*		*	
<b>Family Lethrinidae</b>																										
<i>Gymnocranius elongatus</i>																*	*		*		*		*		*	
<i>Lethrinus lentjan</i>		*																								

Table 2. continue

Species	Station																				SK					
	2	5	9	16	17	23	25	30	32	39	40	43	51	54	58	61	63	65	68	72		74	76	78	80	
<b>Family Haemulidae</b>																										
<i>Diagramma pictum</i>		*								*	*	*	*					*						*		
<i>Plectorhynchus gibbosus</i>																										*
<i>Pomadasys maculata</i>												*					*									*
<i>Pomadasys kakaan</i>								*																		
<b>Family Nemipteridae</b>																										
<i>Nemipterus furcosus</i>		*									*	*	*			*	*	*	*							
<i>Nemipterus hexodon</i>										*		*	*			*	*	*	*							
<i>Nemipterus nemurus</i>														*	*			*	*	*	*		*	*		
<i>Nemipterus mesoprion</i>				*	*	*	*		*	*		*	*		*		*	*	*	*	*	*	*	*	*	*
<i>Nemipterus bathybius</i>																		*	*							
<i>Nemipterus tambuloides</i>														*							*		*			
<i>Nemipterus japonicus</i>				*																						
<i>Nemipterus nematophorus</i>																*	*		*				*			
<i>Nemipterus balinensoides</i>														*	*											
<i>Nemipterus spl.</i>																		*								
<i>Pentapodes setosus</i>											*			*						*					*	
<i>Scolopsis monogramma</i>								*																		
<i>Scolopsis taeniopterus</i>	*			*	*				*	*	*	*	*		*		*	*	*					*	*	
<b>Family Mullidae</b>																										
<i>Upeneus sulphureus</i>	*													*		*		*					*			
<i>Upeneus moluccensis</i>														*												
<i>Upeneus bensasi</i>						*					*	*			*		*		*							
<i>Upeneus tragula</i>		*		*							*	*	*					*	*	*						
<i>Upeneus sp.</i>							*				*	*	*	*		*	*	*	*							
<i>Parupeneus cinnabarius</i>		*				*					*	*	*	*		*		*	*	*						
<b>Family Cepolidae</b>																										
<i>Acanthocephala abbreviata</i>							*																			
<b>Family Teraponidae</b>																										
<i>Pelates quadrifasciatus</i>		*																								
<i>Therapon theraps</i>		*								*	*	*														
<b>Family Labridae</b>																										
<i>Xiphocheilus typus</i>						*						*	*	*		*	*	*	*	*	*	*	*	*	*	
<b>Family Chaetodontidae</b>																										
<i>Coradion chryszonus</i>																*										
<b>Family Pomacentridae</b>																										
<i>Pristotis sp.</i>										*			*		*		*	*	*	*	*	*	*	*	*	
<i>Daya jerdoni</i>													*	*		*	*	*	*	*	*	*	*	*	*	
<b>Family Siganidae</b>																										
<i>Siganus canaliculatus</i>	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Siganus guttatus</i>																									*	
<b>Family Scombridae</b>																										
<i>Rastelliger kanagurta</i>		*			*	*	*		*	*																
<i>Rastelliger brachysona</i>				*	*	*		*	*																	
<i>Scomberomorus commerson</i>				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Scomberomorus guttatus</i>						*					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<b>Family Trichiuridae</b>																										
<i>Trichiurus lepturus</i>			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Eupleurogrammus glossodon</i>			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Tentoriceps cristatus</i>																*										
<b>Family Sphyraenidae</b>																										
<i>Sphyraena jello</i>								*					*													
<i>Sphyraena forsteri</i>			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Sphyraena obtusata</i>			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<b>Family Gobiidae</b>																										
<i>Trypauchen vagina</i>											*															
<i>Oxyurichthys papuensis</i>											*															
<i>Glossogobius sp.</i>											*															
<b>Family Pinguipedidae</b>																										
<i>Parapercis sp.</i>										*			*	*	*	*	*	*	*	*	*	*	*	*	*	

Table 2. continue

Species	Station																								
	2	5	9	16	17	23	25	30	32	39	40	43	51	54	58	61	63	65	68	72	74	76	78	80	SK
<b>Family Champsodontidae</b>																									
<i>Champsodon (cf) arafurensis</i>																			*	*			*		
<b>Family Uranosopidae</b>																									
<i>Uranoscopus oligolepis</i>											*		*												
<b>Order Pleuronectiformes</b>																									
<b>Family Bothidae</b>																									
<i>Engyprosopon multsquama</i>	*															*			*			*			
<i>Engyprosopon grandisquama</i>														*										*	
<i>Arnoglossus aspidos</i>													*												
<i>Grammatobothus polyophtalm</i>	*		*					*			*	*		*	*		*		*	*	*	*	*	*	*
<i>Laeops parviceps</i>					*										*			*							
<b>Family Paralichthyidae</b>																									
<i>Pseudorhombus arsius</i>	*	*			*		*			*			*	*									*		
<i>Pseudorhombus elevatus</i>																		*	*						
<b>Family Citharidae</b>																									
<i>Branchypleura novaezeelandiae</i>	*					*				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<b>Family Pleuronectidae</b>																									
<i>Sarmaris sp.</i>										*										*					
<b>Family Soleidae</b>																									
<i>Aesopia cornuta</i>																	*					*	*		
<i>Aseraggodes dubius</i>										*															
<i>Liachirus melanospilus</i>									*																
<b>Family Cynoglossidae</b>																									
<i>Cynoglossus lingua</i>																									*
<i>Cynoglossus (cf) arel</i>						*		*																	
<i>Paraplagusia bilineata</i>																									*
<b>Order Tetraodontiformes</b>																									
<b>Family Triacanthidae</b>																									
<i>Trixiphichthys weveri</i>																	*								
<b>Family Balistidae</b>																									
<i>Abalistes stellatus</i>															*	*	*			*					
<b>Family Monacanthidae</b>																									
<i>Pseudomonacanthus macrurus</i>	*																								
<i>Paramonachantus sp.</i>			*	*	*		*				*	*	*	*				*				*			
<i>Paramonacanthus japonicus</i>																		*							
<i>Aluterus monoceros</i>		*	*									*	*		*		*								
<i>Chaetoderma penicilligeral</i>	*																								
<i>Anacanthus barbatus</i>										*														*	
<i>Anacanthus sp.</i>																								*	
<i>Monacanthus chinensis</i>		*								*															
<b>Family Ostraciidae</b>																									
<i>Tetrosomus gibbosus</i>													*												
<i>Rhyncostracion nasus</i>		*	*																						
<b>Family Tetraodontidae</b>																									
<i>Lagocephalus lunaris</i>		*	*				*					*													
<i>Lagocephalus scleratus</i>	*			*	*	*		*			*	*	*	*		*		*	*	*	*	*	*	*	*
<i>Lagocephalus gloveri</i>											*														
<i>Lagocephalus sp. 1</i>											*														
<i>Lagocephalus sp. 2</i>											*														
<i>Arothron immaculatus</i>	*		*	*	*	*	*	*		*					*							*	*	*	*
<b>Family Diodontidae</b>																									
<i>Diodon holacanthus</i>													*	*			*	*			*	*	*	*	*
<i>Tragulichthys orbicularis</i>								*				*	*	*	*	*	*	*	*	*	*	*	*	*	*

Table 3. The species list of fishes collected in the Cruise II (Gulf of Thailand and east coast of Peninsular Malaysia).

Species	Station (SM= Koh Samui; SK= Songkhla)																									
	2	5	8	12	14/15	18/19	23	29	31/32	33	37	40	43	51	54	59	63	65	70	72	74	76	80	SM	SK	
<b>Order Orectolobiformes</b>																										
<b>Family Stegostomatidae</b>																										
<i>Stegosoma varium</i>																										*
<b>Family Hemiscylliidae</b>																										
<i>Chiloscyllium punctatum</i>			*		*				*										*				*			
<b>Family Scyliorhinidae</b>																										
<i>Aetomycterus marmoratus</i>													*													
<b>Order Carcharhiniformes</b>																										
<b>Family Triakidae</b>																										
<i>Mustelus manazo</i>																										*
<b>Family Carcharhinidae</b>																										
<i>Carcharhinus dussumieri</i>																										*
<b>Order Torpedeniformes</b>																										
<b>Family Narcinidae</b>																										
<i>Narke dipterygea</i>																									*	*
<b>Order Myliobatiformes</b>																										
<b>Family Dasyatidae</b>																										
<i>Dasyatis zugei</i>	*				*														*						*	
<i>Dasyatis kuhli</i>																										*
<i>Dasyatis sp. 1</i>																		*	*	*						
<i>Dasyatis walga</i>					*														*	*		*				
<i>Dasyatis imbricatus</i>					*	*																				
<i>Himantura jenkinsi</i>																			*						*	
<i>Himantura uarnak</i>																			*							
<i>Himantura gerrardi</i>																*	*		*				*	*		
<b>Order Anguilliformes</b>																										
<b>Family Muraenidae</b>																										
<i>Gymnothorax javanicus</i>	*																									
<i>Siderea thyrsoidea</i>																	*									
<i>Echidna sp.</i>						*																				
<b>Family Congridae</b>																										
<i>Conger sp.</i>																									*	
<b>Order Clupeiformes</b>																										
<b>Family Engraulididae</b>																										
<i>Encrasicholina heteroloba</i>									*																	
<i>Stolephorus dubiosus</i>												*														
<i>Stolephorus indicus</i>		*						*																		
<i>Stolephorus insularis</i>		*																								
<b>Family Chirocentridae</b>																										
<i>Chirocentrus dorab</i>		*				*	*	*			*	*	*	*	*	*										
<b>Family Clupeidae</b>																										
<i>Sardinella fimbriata</i>		*				*			*			*												*		
<i>Anodontosoma nasus</i>											*															
<b>Order Aulopiformes</b>																										
<b>Family Synodontidae</b>																										
<i>Saurida longimanus</i>					*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Saurida micropectoralis</i>			*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Saurida undosquamis</i>	*		*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Synodus hoshinonis</i>	*	*	*		*				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Trachinocephalus myops</i>																								*	*	
<b>Order Ophidiiformes</b>																										
<b>Family Ophiidae</b>																										
<i>Sirembo sp.</i>																									*	
<b>Order Siluriformes</b>																										
<b>Family Ariidae</b>																										
<i>Arius biliniata</i>																				*		*				
<i>Arius thalasinus</i>											*															*
<i>Arius maculata</i>																										*
<b>Family Plotosidae</b>																										
<i>Plotosus caninus</i>												*														
<i>Plotosus lineatus</i>																*	*	*	*				*			



Table 3. continue

Species	Station (SM= Koh Samui; SK= Songkhla)																										
	2	5	8	12	14/15	18/19	23	29	31/32	33	37	40	43	51	54	59	63	65	70	72	74	76	80	SM	SK		
<b>Order Beloniformes</b>																											
<b>Family Belonidae</b>																											
<i>Ablenes hians</i>																										*	
<i>Tylosurus crocodylus</i>																										*	
<i>Euleptorhamphus viridis</i>																										*	
<b>Family Hemiramphidae</b>																											
<i>Hemiramphus far</i>																										*	
<i>Rhynchorhamphus malabaricus</i>																								*			
<b>Order Gasterosteiformes</b>																											
<b>Family Pegasidae</b>																											
<i>Pegasus laternarius</i>																									*	*	
<b>Family Centriscidae</b>																											
<i>Centriscus scutatus</i>					*												*	*	*								
<b>Family Syngnathidae</b>																											
<i>Hippocampus kuda</i>		*																									
<i>Hippocampus</i> sp1								*											*			*					
<b>Family Fistulariidae</b>																											
<i>Fistularia petimba</i>		*	*	*	*	*	*		*		*		*		*		*	*	*		*						
<b>Order Scorpaeniformes</b>																											
<b>Family Scorpaenidae</b>																											
<i>Apistus carinatus</i>			*							*								*	*		*	*					
<i>Brachyteroides serrulata</i>				*	*				*			*															
<i>Chloridactylus multibaratus</i>																							*				
<i>Iminiscus sinensis</i>	*	*	*		*				*		*					*			*				*			*	
<i>Minous coccineus</i>																											
<i>Minous monodactylus</i>		*																	*								
<i>Minous pictus</i>																			*								
<i>Minous trachycephalus</i>																			*								
<i>Pterois russelli</i>	*	*	*		*	*										*	*		*								
<i>Scorpaenodes scabra</i>				*					*		*		*					*									
<i>Scorpaenopsis neglecta</i>																									*		
<b>Family Platycephalidae</b>																											
<i>Elates ransoneti</i>		*	*	*	*				*	*																	
<i>Grammolites scaber</i>		*	*	*						*	*																
<i>Platycephalus indicus</i>																										*	
<i>Sargosogona tuberculata</i>																	*		*			*					
<i>Sargosogona</i> sp. 1					*														*	*							
<i>Thysanophrys macracanthus</i>		*																									
<b>Family Trigidae</b>																											
<i>Lepidotrigla spiloptera</i>																	*				*						
<b>Family Dactylopteridae</b>																											
<i>Dactyloptena papilio</i>	*			*								*				*		*	*				*				
<i>Dactyloptena orientalis</i>		*																									
<b>Order Lophiiformes</b>																											
<b>Family Antenaridae</b>																											
<i>Antennarius mummifer</i>							*												*								
<i>Antennarius striatus</i>		*								*									*								
<b>Family Lophiidae</b>																											
<i>Lophiomus</i> sp.																*		*			*						
<b>Family Ogocephalidae</b>																											
<i>Halieutea</i> sp.																						*					
<b>Order Perciformes</b>																											
<b>Family Priacanthidae</b>																											
<i>Priacanthus tayenus</i>	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Priacanthus macracanthus</i>				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<b>Family Callionymidae</b>																											
<i>Callionemus filamentosus</i>														*									*	*			
<i>Callionemus</i> sp.																								*	*		
<i>Callychthys japonicus</i>																		*	*		*	*					
<i>Dactylopus dactylopus</i>																			*		*						
<i>Repomucenus virgis</i>																	*										

Table 3. continue

Species	Station (SM= Koh Samui; SK= Songkhla)																									
	2	5	8	12	14/15	18/19	23	29	31/32	33	37	40	43	51	54	59	63	65	70	72	74	76	80	SM	SK	
<b>Family Centropomidae</b>																										
<i>Lates calcarifer</i>																										*
<b>Family Ambassidae</b>																										
<i>Ambassis kopsii</i>																									*	*
<b>Family Serranidae</b>																										
<i>Cephalophis boenak</i>																										
<i>Epinephelus areolatus</i>	*	*				*				*						*			*		*	*				
<i>Epinephelus bleekeri</i>						*																				
<i>Epinephelus heniochus</i>		*			*	*	*																			
<i>Epinephelus quayanus</i>																										
<i>Epinephelus sexfasciatus</i>		*					*		*	*	*			*		*										
<i>Plectopomus leopardus</i>																		*								
<b>Family Apogonidae</b>																										
<i>Apogon aureus</i>																				*						
<i>Apogon elioti</i>	*		*							*			*		*				*	*					*	
<i>Apogon fasciatus</i>				*			*		*	*					*				*							
<i>Apogon lineatus</i>									*	*	*															
<i>Apogon niger</i>																							*			
<i>Apogon poecilopterus</i>				*			*	*	*		*															
<i>Apogon quadrifasciatus</i>	*			*	*				*								*		*							
<i>Apogon sealei</i>																*		*					*			
<i>Apogon semilineatus</i>															*				*							
<i>Apogon septemstriatus</i>											*													*		
<i>Apogon taeniophorus</i>																								*		
<i>Rhabdamia gracilis</i>																		*								
<b>Family Sillaginidae</b>																										
<i>Sillago aeolus</i>																									*	
<i>Sillago ingenua</i>																							*			
<b>Family Rachycentridae</b>																										
<i>Rachycentron canadum</i>										*	*								*							
<b>Family Carangidae</b>																										
<i>Alectes ciliatus</i>	*				*									*	*	*										
<i>Alectes indicus</i>		*																								
<i>Alepes melanopterus</i>				*			*	*	*						*											
<i>Alepes melanopterus</i>		*					*								*											
<i>Atule mate</i>		*	*	*	*	*	*	*	*	*	*	*	*	*	*								*			
<i>Carangoides gymnothetus</i>																				*		*				
<i>Carangoides armatus</i>				*			*	*	*	*	*	*	*	*				*		*		*			*	
<i>Carangoides caeruleopinnatus</i>																									*	
<i>Carangoides hedlandensis</i>																			*		*			*		*
<i>Carangoides malabalicus</i>											*	*					*				*			*		*
<i>Carangoides talamparoides</i>											*	*							*		*					*
<i>Carangoides uii</i>												*														*
<i>Caranx sexfasciatus</i>											*								*							
<i>Decapterus kurroides</i>																								*		
<i>Decapterus russelli</i>									*					*		*										
<i>Megalaspis cordyla</i>		*					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Parastromateus niger</i>		*		*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Scomberoides tol</i>												*														
<i>Selar cruemenuphthalmus</i>				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Selaroides leptolepis</i>		*	*				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Seriola rivuliana</i>									*		*															
<i>Seriolina nigrofasciata</i>				*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Uraspis uraspis</i>																				*		*				
<b>Family Ariommatidae</b>																										
<i>Ariomma indicum</i>																						*				
<b>Family Echeineidae</b>																										
<i>Echeineus naucrates</i>										*	*			*		*										
<b>Family Meneidae</b>																										
<i>Mene maculata</i>							*	*																		

Table 3. continue

Species	Station (SM= Koh Samui; SK= Songkhla)																										
	2	5	8	12	14/15	18/19	23	29	31/32	33	37	40	43	51	54	59	63	65	70	72	74	76	80	SM	SK		
<b>Family Gerreidae</b>																											
<i>Gerres abbreviatus</i>																										*	
<i>Gerres macrosoma</i>																				*							
<i>Gerres filamentosus</i>		*	*																								
<i>Pentaprion longimanus</i>		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<b>Family Leiognathidae</b>																											
<i>Gazza achlymis</i>					*			*																			
<i>Gazza minuta</i>			*				*																				
<i>Leiognathus bindus</i>			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Leiognathus blochi</i>																										*	
<i>Leiognathus brevirostris</i>												*														*	
<i>Leiognathus elongatus</i>																	*	*									
<i>Leiognathus equalis</i>																										*	
<i>Leiognathus fasciatus</i>																			*								
<i>Leiognathus leuciscus</i>	*	*	*					*									*	*	*	*	*	*	*	*	*	*	
<i>Leiognathus splendens</i>											*																
<i>Leiognathus stercorarius</i>	*	*	*					*			*						*	*	*	*	*	*	*	*	*	*	
<i>Leiognathus lineolatus</i>				*	*											*	*	*	*	*	*	*	*	*	*	*	
<i>Secutor insidiator</i>									*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Secutor ruconius</i>		*			*																						
<b>Family Lutjanidae</b>																											
<i>Dipterygnotus balteatus</i>										*						*	*	*	*	*	*	*	*	*	*	*	
<i>Lutjanus johni</i>																										*	
<i>Lutjanus lineolatus</i>	*																				*	*	*	*	*	*	
<i>Lutjanus lutjanus</i>	*			*								*				*	*	*	*	*	*	*	*	*	*	*	
<i>Lutjanus malabaricus</i>		*															*	*	*	*	*	*	*	*	*	*	
<i>Lutjanus monostigma</i>	*	*	*																								
<i>Lutjanus quinqueriatus</i>																								*	*	*	
<i>Lutjanus russelli</i>																										*	
<i>Lutjanus vittus</i>		*		*							*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Pristipornoides multidentis</i>				*						*						*	*	*	*	*	*	*	*	*	*	*	
<i>Pristipornoides typus</i>																	*	*	*	*	*	*	*	*	*	*	
<i>Pterocaesio chrysozona</i>				*						*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<b>Family Lethrinidae</b>																											
<i>Gymnocranius elongatus</i>																*	*	*	*	*	*	*	*	*	*	*	
<i>Gymnocranius griseus</i>																*	*	*	*	*	*	*	*	*	*	*	
<i>Lethrinus microdon</i>																						*	*	*	*	*	
<i>Lethrinus lentjan</i>			*																					*	*	*	
<b>Family Haemulidae</b>																											
<i>Diagramma pictum</i>	*							*									*	*	*	*	*	*	*	*	*	*	
<i>Plectorhynchus gibbosus</i>																										*	
<b>Family Nemipteridae</b>																											
<i>Nemipterus balinensoides</i>																	*	*	*	*	*	*	*	*	*	*	
<i>Nemipterus bathybius</i>				*												*	*	*	*	*	*	*	*	*	*	*	
<i>Nemipterus furcosus</i>	*	*	*						*							*	*	*	*	*	*	*	*	*	*	*	
<i>Nemipterus hexodon</i>	*	*	*	*	*			*																			
<i>Nemipterus japonicus</i>						*						*															
<i>Nemipterus marginatus</i>				*	*				*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Nemipterus mesoprion</i>	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Nemipterus nematophorus</i>			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Nemipterus nemurus</i>			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Nemipterus peroni</i>																	*	*	*	*	*	*	*	*	*	*	
<i>Nemipterus tambuloides</i>				*											*	*	*	*	*	*	*	*	*	*	*	*	
<i>Parascalopsis tanyactis</i>																									*	*	
<i>Pentapodus setosus</i>	*	*	*														*	*	*	*	*	*	*	*	*	*	
<i>Scolopsis monogramma</i>																	*	*	*	*	*	*	*	*	*	*	
<i>Scolopsis taeniopterus</i>	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	
<i>Scolopsis vosmeri</i>																								*	*	*	
<b>Family Sciaenidae</b>																											
<i>Pennahia macrophthalma</i>																					*	*	*	*	*	*	
<i>Otolithoides ruber</i>							*																				

Table 3. continue

Species	Station (SM= Koh Samui; SK= Songkhla)																								
	2	5	8	12	14/15	18/19	23	29	31/32	33	37	40	43	51	54	59	63	65	70	72	74	76	80	SM	SK
<b>Family Mullidae</b>																									
<i>Parupeneus cinnabarius</i>		*										*				*	*	*	*	*	*	*	*	*	*
<i>Upeneus bensasi</i>	*	*	*	*		*		*			*					*	*	*	*	*	*	*	*	*	*
<i>Upeneus sondaicus</i>	*	*		*	*	*		*		*	*	*	*	*								*			
<i>Upeneus sulphureus</i>					*	*	*	*	*	*	*		*	*	*					*					
<i>Upeneus tragula</i>	*	*	*		*	*			*																
<b>Family Cepolidae</b>																									
<i>Acanthocephala abbreviatus</i>																*									
<b>Family Teraponidae</b>																									
<i>Therapon jarbua</i>								*																	
<i>Therapon theraps</i>												*												*	*
<b>Family Ephippidae</b>																									
<i>Platax batavianus</i>		*																							
<b>Family Drepenidae</b>																									
<i>Drepane punctata</i>																									*
<b>Family Pomacentridae</b>																									
<i>Pristotis jerdoni</i>																*				*		*			
<b>Family Labridae</b>																									
<i>Xilichthys sp.</i>																							*		
<i>Xiphocheirus typus</i>								*	*	*	*			*	*		*	*		*	*				
<b>Family Siganidae</b>																									
<i>Siganus javus</i>											*														
<i>Siganus guttatus</i>																									*
<i>Siganus canaliculatus</i>	*	*	*	*	*		*	*	*		*	*	*	*					*	*			*		
<b>Family Scombridae</b>																									
<i>Rastelliger brachysona</i>		*		*		*		*	*																
<i>Rastelliger kanagurta</i>		*		*		*	*	*	*	*	*	*	*	*	*										
<i>Rastelliger faughti</i>		*																				*			
<i>Scomberomorus commerson</i>		*						*		*	*	*	*	*											
<i>Scomberomorus guttatus</i>							*			*															
<b>Family Trichiuridae</b>																									
<i>Trichiurus lepturus</i>				*			*		*	*		*													
<i>Eupleurogrammus glossodon</i>											*			*										*	
<i>Tentioiceps cristatus</i>										*	*			*											
<b>Family Stromateidae</b>																									
<i>Pampus argenteus</i>							*																		
<i>Pampus chinensis</i>							*																		
<b>Family Polynemidae</b>																									
<i>Eleutheronema tetradactylum</i>																								*	*
<b>Family Sphyraenidae</b>																									
<i>Sphyraena jello</i>					*																				
<i>Sphyraena forsteri</i>																					*				
<i>Sphyraena obtusata</i>		*							*			*	*				*								
<b>Family Blenniidae</b>																									
<i>Xiphasia setifer</i>																*	*						*		
<b>Family Gobiidae</b>																									
<i>Oxyurichthys papuensis</i>			*				*																		
<i>Yongichthys nebulosus</i>																								*	
<i>Priolepis sp.</i>																					*				
<b>Family Pinguipedidae</b>																									
<i>Parapercis filamentosa</i>																								*	
<i>Parapercis pulchella</i>														*		*	*		*	*					
<b>Family Champsodontidae</b>																									
<i>Champsodon (c) arafurensis</i>				*					*																
<b>Family Uranoscopidae</b>																									
<i>Uranoscopus oligolepis</i>									*	*	*			*							*				
<b>Order Pleuronectiformes</b>																									
<b>Family Psettodidae</b>																									
<i>Psettodes erumei</i>																						*			

Table 3. continue

Species	Station (SM= Koh Samui; SK= Songkhla)																								
	2	5	8	12	14/15	18/19	23	29	31/32	33	37	40	43	51	54	59	63	65	70	72	74	76	80	SM	SK
<b>Family Bothidae</b>																									
<i>Engyprosopon grandisquama</i>																*	*		*	*			*		
<i>Engyprosopon multisquama</i>	*																								
<i>Arnoglossus aspilos</i>																		*				*			
<i>Grammatobothus polyophthalm</i>	*	*	*						*	*		*	*		*	*		*							
<i>Laeops parviceps</i>																					*				
<b>Family Paralichthyidae</b>																									
<i>Pseudorhombus arsius</i>																					*		*		
<i>Pseudorhombus diplospilus</i>																	*		*	*					
<i>Pseudorhombus elevatus</i>																		*							
<i>Pseudorhombus quinqueocellatus</i>												*													
<i>Pseudorhombus malayanus</i>																	*						*		
<b>Family Citharidae</b>																									
<i>Branchypleura novaezeelandiae</i>					*				*			*		*							*				
<b>Family Pleuronectidae</b>																									
<i>Sarmaris cristatus</i>	*			*																*					
<i>Sarmaris</i> sp.		*		*									*			*									
<b>Family Soleidae</b>																									
<i>Aesopia cornuta</i>																								*	
<i>Aseraggodes dubius</i>																							*		
<i>Pardachirus pavoninus</i>																						*	*		
<i>Liachirus melanospilus</i>																						*	*		
<i>Synaptera orientalis</i>																									*
<b>Family Cynoglossidae</b>																									
<i>Cynoglossus (cf)arel</i>		*																							*
<i>Cynoglossus lingua</i>																									*
<i>Cynoglossus kopsii</i>																			*						*
<i>Paraplagusia bilineata</i>																									*
<b>Order Tetraodontiformes</b>																									
<b>Family Triacanthidae</b>																									
<i>Pseudotricanthus strigilifer</i>																							*		
<i>Tripodichthys oxycephalus</i>																*			*						
<i>Triphichthys weveri</i>																					*				
<b>Family Balistidae</b>																									
<i>Abalistes stellatus</i>																*	*	*		*					
<b>Family Monacanthidae</b>																									
<i>Aluterus monoceros</i>	*	*	*	*	*	*			*	*	*		*		*	*	*	*	*	*	*	*	*	*	*
<i>Anacanthus barbatus</i>																						*			
<i>Paramonacanthus</i> sp.1																			*	*		*			
<i>Paramonacanthus</i> sp.2																			*	*		*			
<i>Paramonacanthus</i> sp.3																						*			
<b>Family Ostracionidae</b>																									
<i>Tetrosomus gilobosus</i>																*									
<i>Rhyncostracion nasus</i>	*	*															*	*			*	*		*	*
<b>Family Tetraodontidae</b>																									
<i>Arothron immaculatus</i>	*	*	*		*				*	*	*		*		*	*	*		*		*		*		*
<i>Arothron stellatus</i>																	*		*			*		*	
<i>Lagocephalus lunaris</i>		*	*	*	*	*	*	*	*	*	*	*	*	*	*										
<i>Lagocephalus scleratus</i>	*	*		*	*		*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
<i>Lagocephalus spadiceus</i>									*		*														
<i>Torquigener pallimaculatus</i>																			*						
<b>Family Diodontidae</b>																									
<i>Diodon histrix</i>																*	*	*	*	*	*		*		*
<i>Diodon holocanthus</i>																							*		*
<i>Tragulichthys orbicularis</i>	*	*													*	*	*	*	*	*	*	*	*	*	*

S4/FB3<CHAVALIT>

Table 4. Operation results of the first cruise during 4 Sept. - 6 Oct. 1995

Station No.	Total (Kg)	Catch/hr	% of Fishes	Species No.	depth (m)
2	11.2	11.2	86.6	19	27
5	32.8	16.4	96	31	34
9	16.1	16.1	95.77	17	23
16	9.7	9.7	92.47	28	46
17	8.2	8.2	93.88	31	45
23	20	10	67.87	25	34
25	68	34	88.69	39	37
32	61.45	20.48	91	36	32
39	14.2	7.1	96.7	29	27
40	34.73	17.35	74	34	21
43	17.7	5.9	94	41	46
51	24.7	8.2	79.12	46	46
54	no data			48	
58	no data			42	
61	no data			36	
63	no data			41	
65	no data			47	
68	no data			37	
72	no data			35	
74	no data			36	
76			Jellyfish only		
78	no data			47	

\* Fishes : includes economic cephalopods and crabs

Table 5. Operation results of the second cruise during 24 Apr. - 17 May 1996

Station No.	Total (Kg)	Fishes *	Trash fish	% of Fishes	Catch/hr	Species No.	depth (m)
2	35.4	16.5	18.9	46.6	11.8	34	28
5	38.6	18.2	18.44	47.15	12.2	57	37
8	28.1	23.3	4.8	82.9	11.24	36	38-43
12	50.5	26.6	23.85	52.67	16.83	41	53
14-15	59.2	30.4	28.8	51.35	19.77	54	57
18-19	14.8	Emergency haul				29	64
23	18.8	11.4	7.5	60.63	6.13	27	34-35
29	13	11.3	1.74	86.9	4.33	27	30
31-32	34	16.7	17.3	49.1	11.33	47	33-37
33	44.6	22.6	21.96	50.67	14.86	43	54
37	69	18	51.1	26.1	22.96	44	55
40	27.9	20.6	7.37	73.83	9.31	36	20
43	39.25	31.1	8.15	79.23	13.1	43	48-55
51	32.18	25.56	6.62	79.42	10.72	40	46-50
54	16.5	12	4.5	72.72	16.5	28	47
59	23.3	17.2	6	73.8	23.3	31	60
63	51.3	30.1	15.2	70.37	51.3	45	60
65	57.7	32	25.7	55.45	57.7	42	61-63
68	Net deformed , unsucceed						
70	175.3	131.3	44	74.9	175.3	73	50
72	42.6	34.9	7.7	81.92	42.6	46	54-56
74	40.8	24.6	16.2	60.3	40.8	49	66-67
76	133.86	15.25	118.6	11.4	133.86	42	24-25

\* Fishes : includes economic cephalopods and crabs

Table 6. Catch composition by weight (kg) of major species trawled (Cruise I).

Species	Station																						
	2	5	9	16	17	23	25	32	39	40	43	51	54	58	61	63	65	68	72	74	78	80	
Saurida undosquamis	3.70	0.45	0.80	1.35	0.30	2.00	0.80	0.80	1.80	0.80	0.50	*	*	*	*	*	*	*	*	*	*	*	*
Priacanthus tayenus	3.95	1.62	0.90	1.20	1.20	1.00	1.00	1.10	4.00	0.90	2.00	5.50	*	*	*	*	4.50	*	*	*	2.50	*	
Siganus canaliculatus		2.46	0.55			0.50	0.50	0.90	4.00	0.90	2.00	*	*	*	*	*	*	*	*	*	*	*	*
Priacanthus macracanthus						0.70	0.70	1.15		1.15	1.70	*	*	*	*	*	7.00	*	*	*	4.00	*	
Trichurus spp.	0.82			1.15	1.28	0.50	8.20	0.80				*	*	*	*	*	*	*	*	*	*	*	*
Saurida micropectoralis			0.80			1.70	1.70	0.90	1.20	0.20	0.90	*	*	*	*	*	*	*	*	*	*	*	*
Nemipterus mesoprion		0.80	0.80	0.20		0.80	0.80	0.90	0.90	0.90	2.80	*	*	*	*	*	*	*	*	*	*	*	*
Selar crumenophthalmus			0.20	0.40	0.40	1.50	0.90				*	*	*	*	*	*	*	*	*	*	*	*	*
Nemipterus hexodon				0.50	0.50	0.40	0.40	0.50	0.50	0.70	0.50	0.40	*	*	*	*	*	*	*	*	*	*	*
Scolopsis taeniopterus	1.30					0.40	0.40	0.40	1.80	1.20	0.50	*	*	*	*	*	*	*	*	*	*	*	*
Chirocentrus dorab				0.20	0.25	0.70	19.8	2.00									*	*	*	*	*	*	*
Sardinella frimbriata			1.20			0.60	0.60				0.60	*	*	*	*	*	*	*	*	*	*	*	*
Rastelliger kanagurta	0.30			0.80	0.45	1.70	0.70			0.35							*	*	*	*	*	*	*
Nemipterus furcosus																	*	*	*	*	*	*	*
Alute mate	0.23	0.90				1.20	0.40																
Rastelliger brachysoma				0.30	0.60	0.60																	
Alutera monoceros						4.70					0.20												
Nemipterus nemurus				0.40																			
cephalopods & shellfishes	3.95	9.44	7.30	1.05	0.82	6.90	3.32	1.98	7.1	2.45	1.14												9.50
Mixed fishes	1.81	14.34	0.44	3.92	1.82	9.97	7.84	14.60	5.22	10.26	6.40	4.22											

Table 7. Catch composition by weight (kg) of major species trawled (Cruise II)

\* = included in mixed fishes

Species	Station																							
	2	5	8	12	14/15	18/19	23	29	31/32	33	37	40	43	51	54	59	63	65	70	72	74	76	80	
Mixed carangids	*	*	*	*	1.30	0.7	*	*	1.10	*	*	*	1.60	0.48	*	*	*	*	*	*	*	*	*	*
Priacanthus tayenus	*	0.78	15.5	2.73	4.50	*	*	*	1.34	*	2.00	1.17	0.66	*	0.56	1.60	3.70	3.70	3.70	*	2.50	*	*	*
Saurida undosquamis	*	0.45	*	7.00	3.40	*	*	*	6.56	1.23	0.65	5.53	0.53	1.80	*	2.80	4.86	3.80	*	*	*	*	*	*
Scolopsis taeniopterus	2.00	1.70	*	*	*	*	*	*	*	1.22	*	*	*	*	*	*	*	*	*	*	*	*	0.45	*
Nemipterus mesoprion	*	*	0.75	*	*	*	*	*	*	*	*	*	0.90	*	*	*	*	*	*	*	*	*	*	*
Siganus canaliculatus	0.97	0.50	0.30	0.75	0.45	*	*	*	*	*	0.80	*	*	*	*	*	*	*	*	*	*	*	*	*
Alutera monoceros	0.55	1.40	*	*	*	*	*	*	*	*	*	*	*	*	1.10	*	*	*	*	*	*	*	*	*
Priacanthus macracanthus				0.67	*	*	*	*	1.90	1.52	0.80	2.80	0.85	*	*	*	*	*	*	*	*	*	*	*
Saurida micropectoralis			0.80	*	*	*	*	*	3.50	3.05	5.80	1.90	*	*	*	*	*	*	*	*	*	*	*	*
Epinephelus spp.	2.45	1.80	1.34	*	*	*	*	*	*	*	0.75	*	*	0.76	*	5.20	*	*	*	*	*	*	*	*
Rastelliger kanagurta	*	*	*	*	*	*	*	*	0.80	0.77	*	*	*	0.33	*	*	*	*	*	*	*	*	*	*
Nemipterus nemurus			*		*		*								4.30	8.60	7.40	3.90	6.32	6.10	4.60	*	*	
Lutjanids	2.90	0.80			*						*	*	*	*	*	*	*	*	2.30	*	*	*	*	*
Chirocentrus dorab						2.00	*	*		0.82	0.64	*	*	*	*	*	*	*	*	*	*	*	*	*
Parupeneus cinnabarcus			*													*	1.30	*	*	*	*	*	*	*
Sphyraena spp.	1.00				4.20				1.20		*	*	*	3.30	0.55	*	*	*	*	*	*	*	*	*
Scomberomorus spp.	0.52					0.70				1.75	5.00	3.30	0.55	*	*	*	*	6.55	*	*	*	*	*	*
Pristipomoides multidens				*					*	*														
Nemipterus hexodon			1.58	*		10			*	*														
Nemipterus nematophorus			*	13	11	*			*	*			*	*	*									*
Selaroides leptolepis											1.30				7.50	3.30		0.60						
Trachinocephalus myops																							3.50	1.8
Shellfishes and Cephalopods	5.70	6.80	2.42	6.70	3.52	*	1.50	9.10	6.60	4.30	9.20	10.8	*	*	*	*	4.50	*	7.72	3.10	1.80	13		
Mixed fishes	5.86	5.25	18.20	16.38	9.89	2.10	9.90	11.30	5.60	8.08	3.31	7.86	7.65	21.95	4.50	7.74	21.50	6.45	127.4	20.86	13.10	5.33	80.10	



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