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Southeast Asian Fisheries Development Center

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ECONOMICALLY IMPORTANT MARINE FISHES IN THE SOUTHEAST ASIAN WATERS

Compiled

by

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and

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Southeast Asian Fisheries Development Center

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PREFACE

The present textbook has been prepared to give SEAFDEC trainees a basic knowledge of economically important marine fishes found in the Southeast Asian Waters.

The twenty-five species of pelagic fishes and thirteen species of demersal fishes belonging to 22 families were carefully selected, representing the largest quantity and value of landing from the waters of Southeast Asian Region, as compiled in "Fishery Statistical Bulletin for South China Sea Area 1976" published by the Southeast Asian Fisheries Development Center, Bangkok, Thailand, in 1978.

The information on the principal characters of typical representative species, as well as all figures, were obtained from "FAO Species Identification Sheet (1974)". Many references cited in this book are based on a number of technical papers related to the selected species or group of species published in the region. Mrs. Marijana Lee and Miss Kesery Kanjana-vanit helped us in preparation the present book. We would like to extend our thanks to them as well as to authors of the works cited.

Shigeaki Shindo
&
Somsak Chullasorn

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PELAGIC FISHES

1. Carangidae

1.1 *Decapterus macrosoma* BLEEKER, 1851

Synonyms still in use	:	*Decapterus lajang* BLEEKER, 1855
English name	:	Layang scad
National species name	:	Filipino - Galonggong
		Indonesian - Ikan layang
		Malaysian - Selayang, Curut
		Thai - Pla-Tu-Kak-Klom

Distinctive characters: An elongate, fusiform, moderately compressed carangid. Depth of body 5.5 - 6.0 times in standard length. Upper jaw reaching to below front margin of eye. 1st dorsal fin with 8 spines; 2nd dorsal fin with 1 spine and 34-35 soft rays. Pectoral fins not falcate, tips reaching to below posterior spines of first dorsal fin. Anal fin with 2 detached spines, followed by 1 spine and 28-30 soft rays. A single finlet present behind dorsal and anal fins. Lateral line only slightly arched, becoming straight below 15th soft dorsal fin ray, curved portion much longer than straight portion; 25-30 small, weak scutes, height of largest scutes distinctly less than eye diameter.

Coloration: blue/green above, silvery-white below; fins pale yellow.

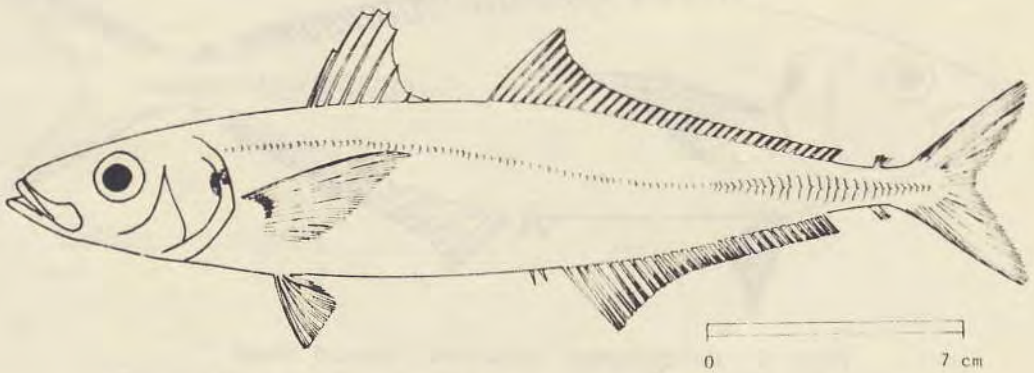

Fig. 1 *Decapterus macrosoma*, Layang scad
Maximum: 30 cm LX; common: 10-15 cm LX
LX denotes dorsal extreme length of fish body.

1.2 *Decapterus maruadsi* (TEMMINCK & SCHLEGEL, 1842)

Synonyms still in use : *Caranx maruadsi* (TEMMINCK & SCHLEGEL, 1842)
Decapterus dayi (WAKIYA, 1924)

English name : Round scad

National species name : Filipino - Galonggong
Indonesian - Ikan layang
Malaysian - Selayang, Curut
Thai - Pla Tu-kak

Distinctive characters: An elongate, fusiform, slightly compressed carangid. Depth of body 3.7 - 4.0 times in standard length. Posterior end of upper jaw relatively rounded, reaching to just below front margin of eye. Adipose eyelid well developed. First dorsal fin with 7-8 spines; second dorsal fin with 1 spine and 32-33 soft rays. Pectoral fins falcate, tip reaching to below origin of 2nd dorsal rays. A single finlet behind dorsal and anal fins. Body covered with small scales. Lateral line slightly arched becoming straight below 10th - 14th dorsal fin rays; curve portion longer than straight portion, 32-38 moderate scutes; height of largest scutes about 3/4 of eye diameter.

Coloration: green to blue-green above, silvery-white below; dorsal, pectoral and caudal fins pale yellow; a white blotch on top of anterior rays of 2nd dorsal fin; a black spot on edge of operculum; pupil black.

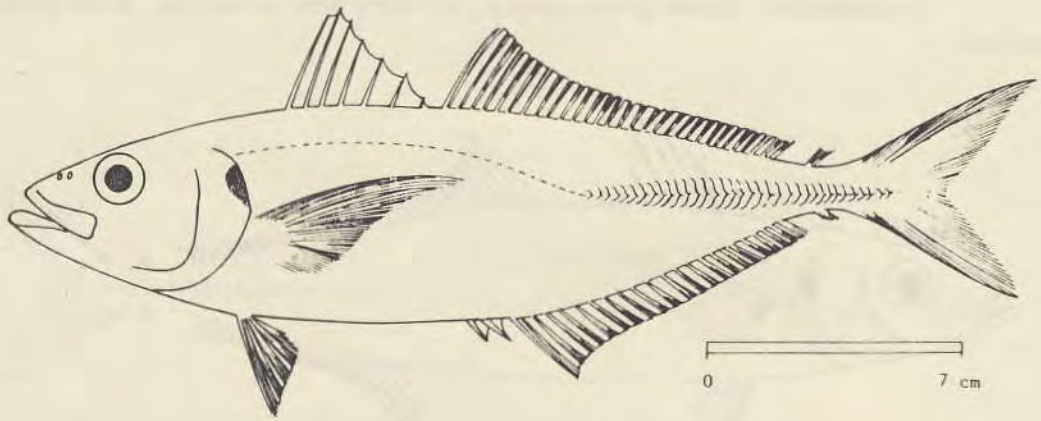

Fig. 2 *Decapterus maruadsi*, Round scad
Maximum: 35 cm LX; common: 15-25 cm LX.

Distribution and biology: Widely distributes throughout the areas at the middle and upper layers of the waters. Schooling in coastal waters is indicated by ripples on sea surface. Large concentrations found in 15-16 m depth can be seen by blackening of the waters.

In Filipino waters, *D. macrosoma* and *D. russelli* are abundant while *D. kurroides* is very rare. In the Gulf of Thailand *D. maruadsi* is the most abundant. *D. russelli* appears to be most abundant in Malaysia while *D. macrosoma* and *D. maruadsi* are also caught. In Indonesian waters both *D. macrosoma* and *D. maruadsi* have been reported.

The spawning season in the Gulf of Thailand occurs during a long period from February to August with two peaks in February - March and July - August. In Palawan area, it is supposed to spawn from November - March and in Manila Bay from December - May. In Hong Kong waters it appears to spawn over a fairly long period from January - August with the peak in April.

In the Gulf of Thailand, *D. macrosoma* matures at 16-23 cm LX and *D. maruadsi* at 16-28 cm LX. In Filipino waters, its fecundity was estimated to be 68,000 - 106,000 for *D. macrosoma* and 29,000 - 49,000 for *D. russelli*. In Hong Kong, average fecundity for *D. maruadsi* was estimated to be 97,000.

The growth parameters of *D. maruadsi* in the Gulf of Thailand was estimated as the following equation:

$$L_t = 23.07 \{1-e^{0.11 (t + 0.382)}\}$$

The yearly growth rate for *D. macrosoma* was estimated to be about 6-7 cm. The fish of sizes 15-20 cm caught by the bagnet in the Philippines were estimated to be in their third year of life. Juvenile fishes entering the fishery at the start of the year from January through April are in their second year of life.

Feeding behaviour is carnivorous; it feeds on larger plankton components (copepods), mysis stage of crustaceans as well as on small fishes.

Fishing grounds: Throughout its range from 15-80 m depth.

Fishing gears used: Caught mainly with luring purse seines, lift nets, encircling nets and bottom trawls.

Catches and values (1976): The catch statistics separated by species are not available. It was reported as *Decapterus* spp. catches.

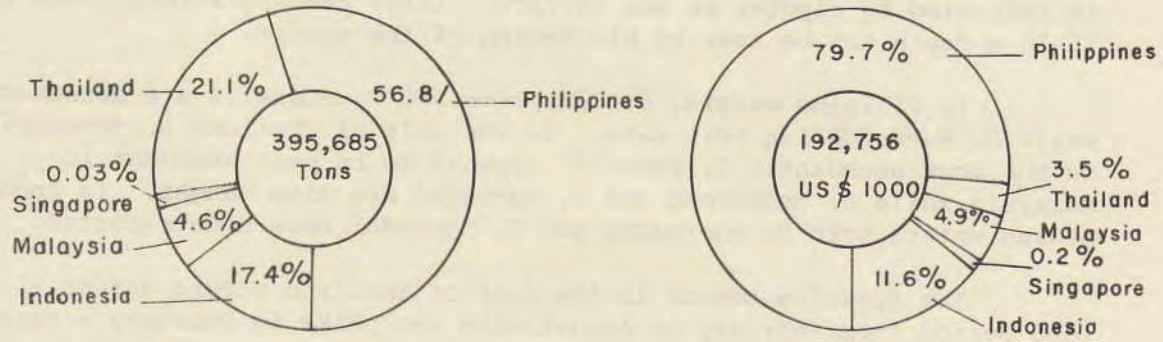

Fig. 3 Diagrams showing catch and value of scads (*Decapterus* spp.) in the South-east Asian waters.

Principal forms of utilization: Marketed mostly fresh, salted and dried, canned, used as fish bait and also for fish-meal.

1.3 *Megalaspis cordyla* (LINNAEUS, 1758)

Synonyms still in use	:	None	
English name	:	Hardtail scad	
National species name	:	Filipino	- Oriles
		Indonesian	- Tetengkek
		Malaysian	- Chincaru
		Thai	- Pla Khaeng-kai

Distinctive characters: An elongate, fusiform, slightly compressed body, its depth 3.8 - 4.0 times in standard length. Teeth present in jaws and on vomer and palatines (roof of mouth) and tongue; those in upper jaw in a band, those in lower jaw in a single series. First dorsal fin with 8-9 spines; second dorsal fin with 1 spine and 10 soft rays and 6-8 finlets. Lateral line strongly curved anteriorly, becoming straight below the 6th or 7th spine of 1st dorsal fin. 53-58 tall, strong, pungent, keeled scutes; height of largest scute twice eye diameter, caudal peduncle hard and strong.

Coloration: Blue/green above, silvery-white below; a black spot on posterior edge of operculum; dorsal, pectoral and caudal fins dusky grey.

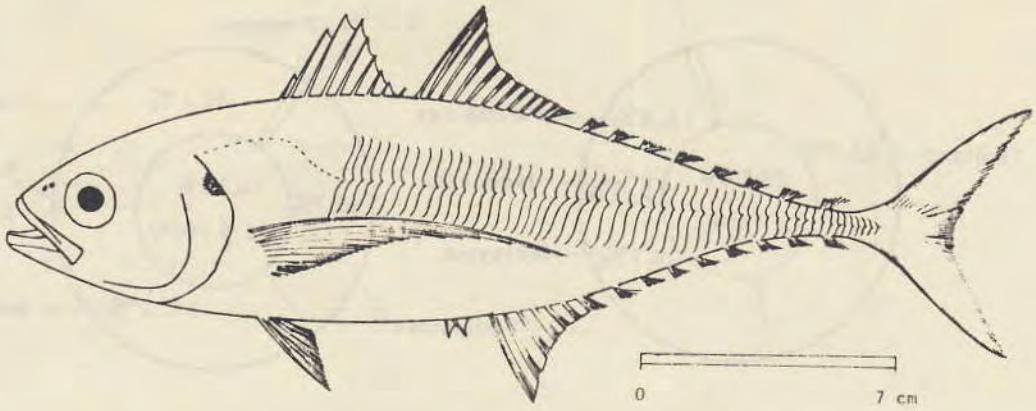

Fig. 4 *Megalaspis cordyla*, Hardtail scad
Maximum: 40 cm TL; common: 25-30 cm TL
TL denotes total length of fish body.

Distribution and biology: Distributes in most warm coastal waters of the area.

Occurs in a small school; inhabits coastal waters down to 60 m depth.

Feeds on small fishes (preferably anchovies) and crustaceans.

No information on the biology and bionomics of this fish in this area is available.

Fishing grounds: Coastal waters throughout its range.

Fishing gears used: Caught mainly with purse seines, gill nets, trawls and also traps.

Catches and Values (1976):

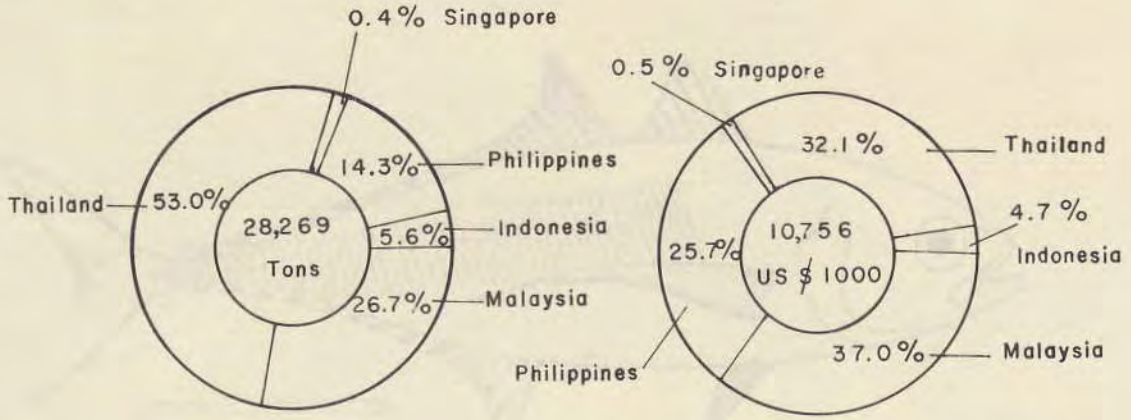

Fig. 5 Diagrams showing catch and value of hardtail scad in the Southeast Asian waters.

Principal forms of utilization: Marketed fresh and dried-salted.

1.4 *Selar crumenophthalmus* (BLOCH, 1793)

Synonyms still in use	:	None	
English name	:	Bigeye scad	
National species name	:	Filipino	- Matangbaka
		Indonesian	- Selar
		Malaysian	- Selar, Mata besar
		Thai	- Pla Tato, Sikun Tato

Distinctive characters: An oblong, moderately compressed body. Eye large, its diameter 3 times or less in head length. Dorsal and abdominal profiles about equally convex. A deep furrow on lower margin of gill opening. Teeth in both jaws in a single series; vomer and palatines (roof of mouth) toothed. Gill rakers 23 - 27 on lower limb of 1st arch. First dorsal fin with 1 forward-pointing spine (not always visible) and 8 normal spines; second dorsal fin with 1 spine and 24 - 26 soft rays; dorsal spine weak, the third and fourth the longest. Dorsal and anal fin bases equal. Pectoral fins falcate. Anal fin with 2 detached spines, followed by 1 spine and 21 - 23 soft rays; caudal rather deeply forked. Lateral line slightly curved anteriorly, becoming straight below middle of soft dorsal fin; 32 - 38

scutes, beginning below middle of soft dorsal fin; largest scute 9 - 10 times in body depth. Scales on body, chest, and cheeks.

Coloration: green/blue on back, silvery white below; gill cover with a dark brown spot; fins golden, with fine dots; caudal tipped with black.

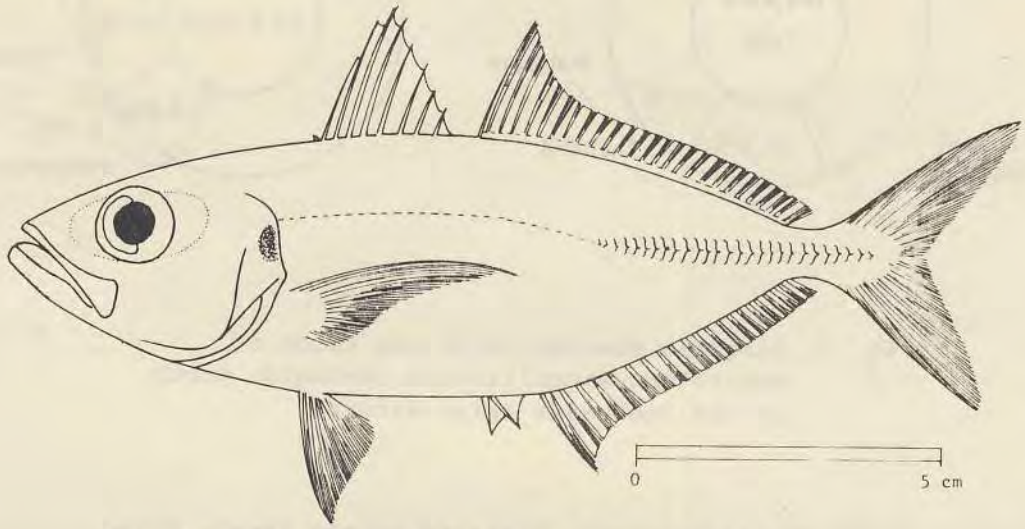

Fig. 6 *Selar crumenophthalmus*, Bigeye scad
Maximum: 30 cm TL; common: 18-25 cm TL.

Distribution and biology: Distributes throughout most warm coastal waters of the area. This fish is one of the most important species found in the South China Sea; it is caught in large numbers and often mixed with other species (such as *Decapterus* spp., *Sardinella* spp., *Rastrelliger* spp., and other carangids).

Moderate pelagic fish; forms small to large schools; inhabits coastal areas down to 80 m depth.

Feeds on invertebrates and small fishes.

The fish in the range from 19.4 - 21.5 cm LX have the fecundity of 82,000 - 141,000 eggs.

Fishing grounds: Coastal waters throughout its range.

Fishing gears used: Caught mainly with purse seines, bottom trawlers, bagnets, gill nets and fish traps.

Catches and Values (1976): Separate statistics for this species are not reported; it is included in the group of miscellaneous unspecified carangids for Thailand and selar group for other countries.

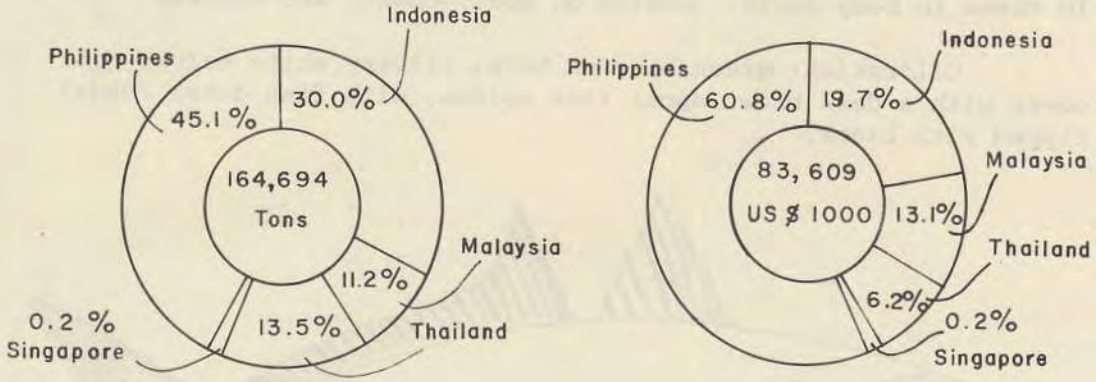

Fig. 7 Diagrams showing catch and value of selars and miscellaneous carangids group in the Southeast Asian waters.

Principal forms of utilization: Marketed mainly fresh, dried-salted, steamed and also made into fish balls and fish-meal.

1.5 *Selaroides leptolepis* (VALENCIENNES, 1833)

Synonyms still in use	:	None	
English name	:	Yellowstripe trevally	
National species name	:	Filipino	- Salay-salay, Batang
		Indonesian	- Kwe, Selar
		Malaysian	- Jamah, Selar
		Singapore	- Selar, Peleta
		Thai	- Pla Kaang-luang

Distinctive characters: An oblong, compressed body, with upper and lower profiles equally convex. Eye large with a broad posterior and narrow anterior adipose lid, its diameter 3.2 - 3.5 in head length. Upper jaw reaching to below front border of eye. No teeth in upper jaw or on vomer and palatines (roof of mouth); minute teeth in a single series in lower jaw and some rudimentary teeth on tongue. Gill rakers 26 on lower limb of 1st arch. First dorsal fin anteriorly $2\frac{1}{3}$ in height of body, with 8 spines; second dorsal fin with 1 spine and 25 soft rays. Dorsal and anal fin base nearly equal. Pectoral fins falcate. Anal fin with 2 detached spines, followed by 1 spine

and 20 soft rays. Breast covered by small but conspicuous scales. Lateral line scarcely arched, becoming straight below 16th soft dorsal fin ray; straight portion 1/3 of lateral line; 25 to 34 weak scutes.

Coloration: silvery; a golden yellow lateral band from eye to caudal fin; back green and blue, lower sides silvery; a dusky spot on operculum; fins yellowish.

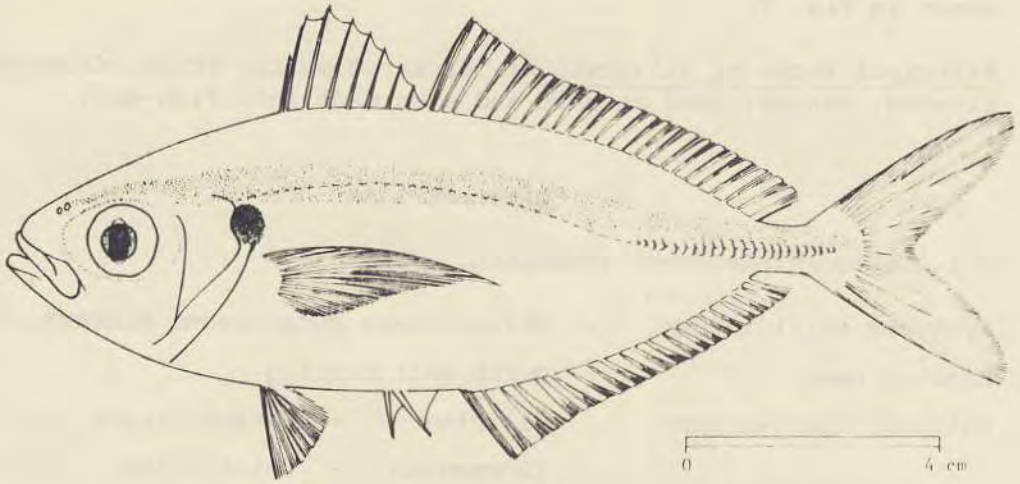

Fig. 8 *Selaroides leptolepis*, Yellowstripe trevally
Maximum: 20 cm TL; common: 10-15 cm TL.

Distributions and biology: Distributes throughout most warm coastal waters of the area. Inhabits shallow coastal areas; forms small and large schools.

The spawning season in the Gulf of Thailand occurs twice a year; one in March and another between July - August.

In Indian waters, it reaches a stage of maturity in February and between July - August.

The size of the majority of mature fish ranges from 15.0 - 16.0 cm LX.

The length-weight relationship study shows that males are heavier than females of the same length.

Feeds on crustaceans and presumably also on small fish.

Fishing grounds: Throughout the coastal shallow waters.

Fishing gears used: Caught mainly with purse seines, bottom trawls, and also bamboo stake traps.

In Thailand approximately 10 per cent of the catches come from trawls.

Catches and Values (1976): There are no separate statistics recorded for this species; it is included in the group of miscellaneous unspecified carangids for Thailand and selar group for other countries as shown in Fig. 7.

Principal forms of utilization: Marketed mainly fresh, dried-salted, steamed, canned, used as bait and also made into fish-meal.

2. Chirocentridae

2.1 *Chirocentrus dorab* (FORSSKAL, 1775)

Synonyms still in use	:	*Chirocentrus hypselosoma* BLEEKER, 1852
English name	:	Dorab wolf herring
National species name	:	Filipino - Parang-Parang
		Indonesian - Golok-Golok
		Malaysian - Parang-Parang
		Thai - Pla Dab-Lao

Distinctive characters: Body very elongate, strongly compressed, belly sharp but without scutes; scales very small, easily shed. Large canine teeth in both jaws, note especially two canine teeth on pre-maxillae (front part of upper jaw) pointing forward. Dorsal and anal fins set aback on body; pectoral fins set low on body; pelvic fins very small, about equidistant between pectoral base and anal origin. Anal fin origin approximately under that of dorsal fin; anal fin base twice or more than twice the length of dorsal fin base; caudal fin deeply forked. No spiny rays in fins.

Coloration: Blue/green on back, flank silvery; upper part of dorsal fin black.

Distribution and biology: Distributes throughout the area.

Pelagic, inhabit coastal waters from the shore to offshore about 120 m depth.

Predatory fish, feeding on small fishes and crustaceans.

The biology of wolf herring in this area is not known.

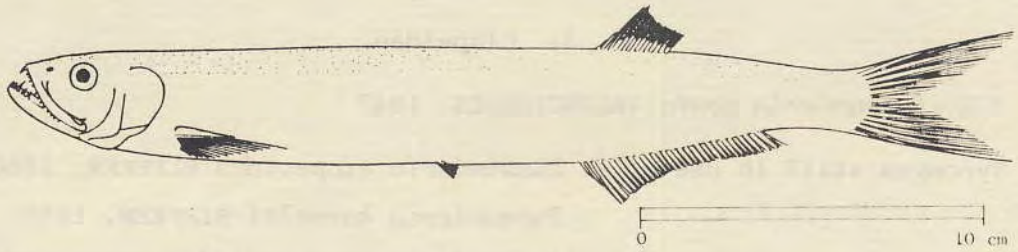

Fig. 9 *Chirocentrus dorab*, Dorab wolf herring
Maximum: 100 cm TL; common: 30-50 cm TL.

Fishing grounds: Caught throughout its ranges.

Fishing gears used: Caught mainly with gill nets, purse seines, bamboo stake traps and bottom trawls (both otter board and pair trawls).

Catches and Values (1976): The total reported catch included in a single statistical category as wolf herring.

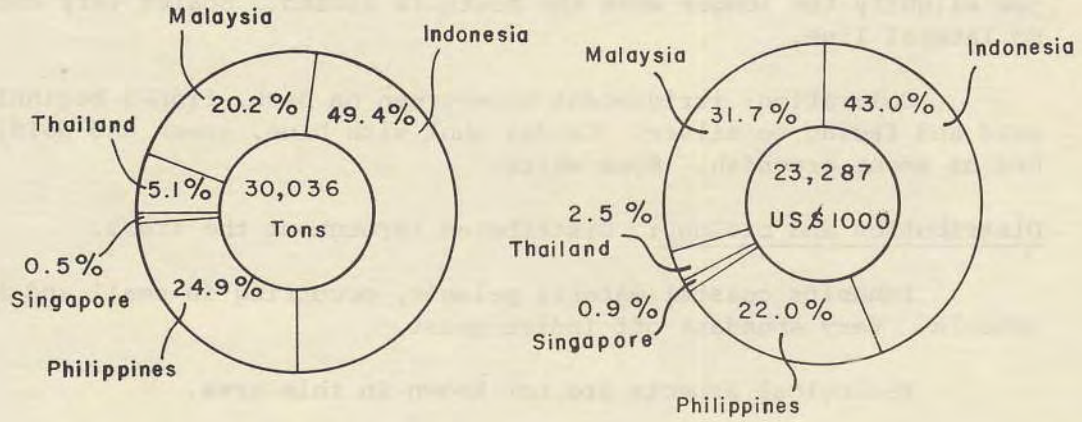

Fig. 10 Diagrams showing catch and value of wolf herrings in the Southeast Asian waters.

Principal forms of utilization: Marketed mainly fresh and also made into fish balls.

3. Clupeidae

3.1 *Dussumieria acuta* VALENCIENNES, 1847

Synonyms still in use : *Dussumieria elopsoides* BLEEKER, 1850
Dussumieria hasselti BLEEKER, 1850
Dussumieria productissima CHABANAUD, 1933
Etrumeus (Montalbania) albulina FOWLER, 1934

English name : Rainbow sardine, Round herring

National species name : Filipino - Tulis
Indonesian - Japuh
Malaysian - Japuh, Tamban buloh
Thai - Pla Kulair-kluay

Distinctive characters: Body elongate, cylindrical, belly rounded, without scutes (except for plate-like W-shaped pelvic scute), eyes with broad adipose lids, diameter $\frac{1}{4}$ of length of head. Dorsal fin just behind center part of body; anal fin base very short, well behind dorsal fin base, pelvic fin below middle of dorsal fin base. Premaxillae rectangular (not triangular) giving distinctive appearance to mouth; branchiostegal rays numerous (14-19). Snout pointed, lower jaw slightly the longer when the mouth is closed. Scales very deciduous. No lateral line.

Coloration: irridescent blue/green on back, flanks beginning gold and fading to silver. Caudal shot with blue, green and gold. End of snout greenish. Eyes white.

Distribution and biology: Distributes throughout the areas.

Inhabits coastal waters; pelagic, occurring in small and large schools. Very abundant off Indian coast.

Biological aspects are not known in this area.

Fishing grounds: Caught throughout its range both near and off the shore

Fishing gears used: Caught mainly with purse seines, beach seines, gill nets, set nets, and also trawls.

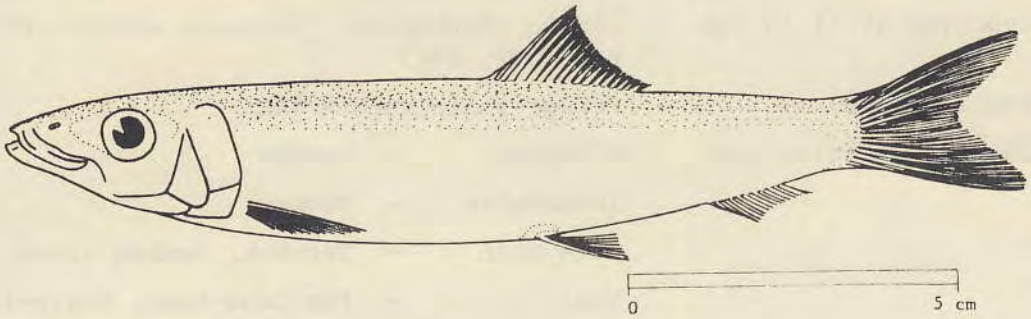

Fig. 11 *Dussumieria acuta*, Rainbow sardine or round herring
Maximum: 20 cm TL; common: 10-15 cm TL.

Catches and Values (1976):

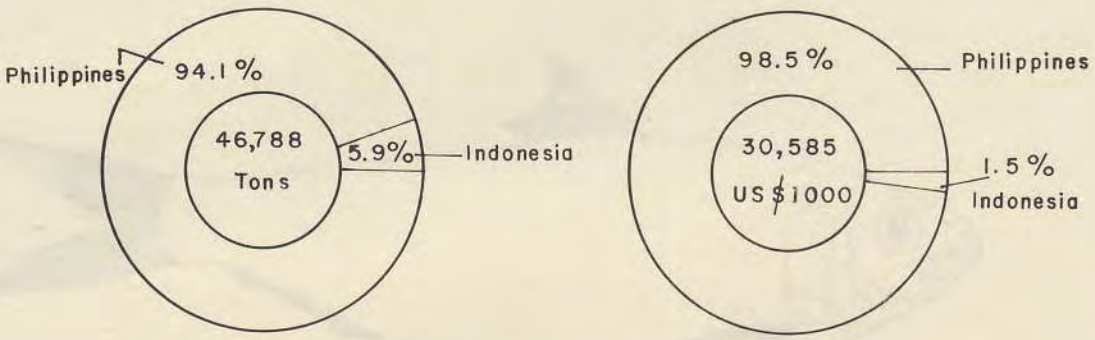

Fig. 12 Diagrams showing catch and value of round herrings in the Southeast Asian waters.

Notes: Separate statistics available only for the Philippines and Indonesia; the statistics for this species in Thailand and Malaysia may be included in *Sardinella* spp. catches.

Principal forms of utilization: Marketed fresh, dried, dried-salted, canned and also made into fish-meal and fish balls.

3.2 *Sardinella fimbriata* (VALENCIENNES, 1847)

Synonyms still in use : *Clupea (Harengula) fimbriata* WEBER & DE BEAUFORT, 1913

English name : Fringe-scale sardinella

National species name : Filipino - Tamban
Indonesian - Tamban
Malaysian - Terubok, Tamban sisek
Thai - Pla Lang-kaeo, Chair-lan

Distinctive characters: Fusiform, compressed body, its depth 3.0 - 3.6 (28-33%) times in standard length, abdominal more convex than the dorsal profile, belly sharp with keeled scutes. Dorsal fin origin slightly before midpoint of body, anal fin base short and lying far behind dorsal fin base; pelvic fins below anterior part of dorsal fin base. Anterior scales perforated and fimbriated at posterior margin. Post-pelvic scutes: 12-14. Caudal deeply forked, no spiny rays in fins. No lateral line. Lower gill rakers: 60-81.

Coloration: back blue/green, flank silvery; brown pigment dotted at bases of first few dorsal rays. Eye with orange postero-ventral mark on iris.

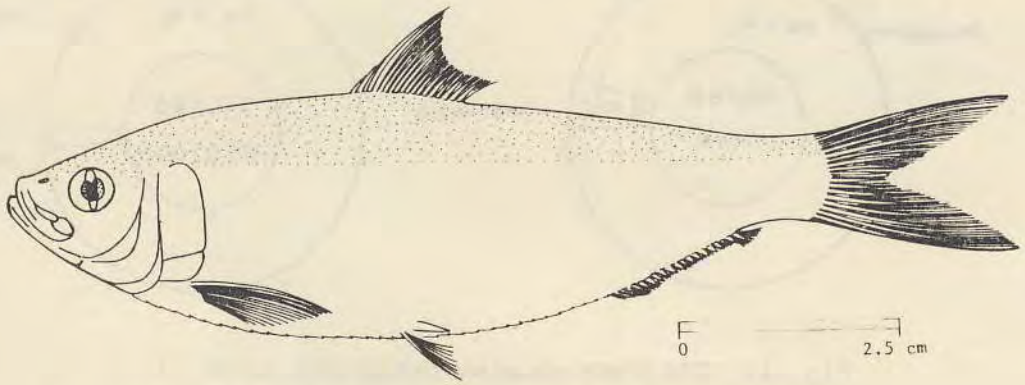

Fig. 13 *Sardinella fimbriata*, Fringescale sardinella
Maximum:16 cm TL; common:10-12 cm TL.

Distribution and biology: Distributes throughout most of the area.

Pelagic, inhabits coastal waters especially the shallow waters of not more than 30 m depth; forms small and large schools.

Fishing grounds: Throughout its range; mostly caught in the shallow waters of the coastal areas.

Fishing gears used: Caught mainly with purse seines, encircling nets, lift nets, beach seines, bamboo stake traps and also occasionally by trawls.

Catches and Values (1976): Separate statistics for this species are not reported. The catch may be included in the *Sardinella* catches.

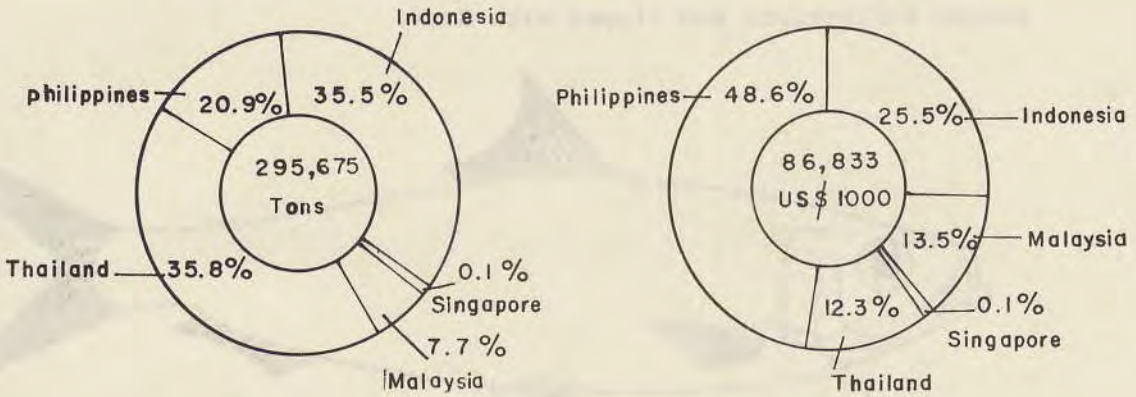

Fig. 14 Diagrams showing catch and value of sardines (*Sardinella* spp.) in the Southeast Asian waters.

Principal forms of utilization: Marketed mainly fresh, dried-salted, boiled and made into fish balls, and also used for fish-meal.

3.3 *Sardinella gibbosa* (BLEEKER, 1849)

Synonyms still in use	:	*Sardinella jussieu* (LACEPEDE, 1803)
		Sardinella tembang (BLEEKER, 1851)
English name	:	Goldstripe sardinella
National species name	:	Filipino - Tamban
		Indonesian - Tamban
		Malaysian - Tamban sisek
		Thai - Pla Lang-kaeo, Chair-lan

Distinctive characters: Body fusiform, a little compressed, its depth 3.6 - 4.1 times in standard length; abdominal more convex than the

dorsal profile, belly sharp with keeled scutes; post-pelvic scutes 15-16, rarely 14 or 17-18. Lower jaw slightly prominent, the maxilla reaches to below the first third of eye. A single dorsal fin, anal fin base short and lying far behind dorsal fin base, pelvic fins below anterior part of dorsal fin base, caudal deeply forked, no spiny rays in fins. Lower gill rakers, 43-63. Small scales extending to caudal margin; anterior scale with a few perforations and fimbriated at posterior margin. No lateral line.

Coloration: blue/green above and silvery on flanks, separated by a narrow yellow horizontal line; black spot at base of anterior dorsal rays and at operculum near the pectoral fin base. Caudal with bluish reflections and tipped with dark.

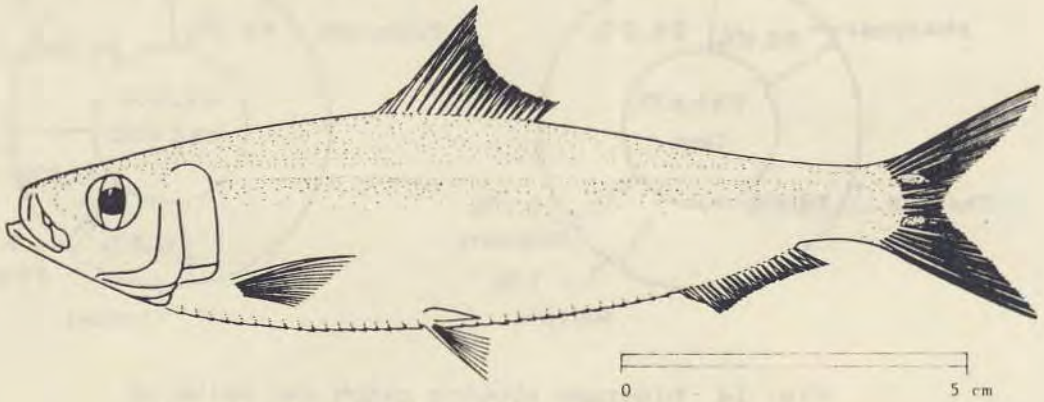

Fig. 15 *Sardinella gibbosa*, Goldstripe sardinella
Maximum: 18.5 cm TL;
common: 12-15 cm TL.

Distribution and biology: Distributes throughout most of the area.

In the Gulf of Thailand, it distributes in the coastal waters from 5 - 50 m depth.

Small pelagic, migratory fish; occurs in small and large schools in the coastal waters from 5 - 50 m depth.

Feeds mainly on phytoplankton, especially diatom.

Spawns throughout the year with the peak from October - November, January - March and June - July (when eggs and larvae have been found very abundant).

The size at maturing stage ranges from 13.3 - 18.5 cm LX.

Fishing grounds: Throughout its range from the coastal waters at 5 m depth to off shore at 50 m depth.

Fishing gears used: Caught mainly with purse seines (especially with lure), lift nets, encircling gill nets, drift gill nets, bamboo stake traps and also trawls.

Catches and Values (1976): No separate reported statistics for this species; the total recorded catch of *Sardinella* spp. are available as shown in Fig. 14.

Principal forms of utilization: Marketed fresh, dried-salted, boiled in brine, steamed, made into fish balls and canned; also used as bait for trolling line, long line and pole and line fishing. In Thailand used mainly for fish-meal.

3.4 *Sardinella longiceps* VALENCIENNES, 1847

Synonyms still in use	:	None	
English name	:	Indian oil sardine	
National species name	:	Filipino	- Tunsoy
		Indonesian	- Lemeru
		Malaysian	- Tamban sisek
		Thai	- Pla Lang-kaeo, Chair-lan

Distinctive characters: Body elongate, cylindrical; belly rounded, with scutes but without prominent keel. Head very long, about 3 times in standard length. A single dorsal fin, dorsal fin origin nearer to snout than to caudal fin base; anal fin base short and well behind dorsal fin base; pelvic fins below middle of dorsal fin base, caudal forked. Pelvic fin with 9 rays. Gill raker fine and numerous, about $\frac{1}{2}$ longer than the eye, more than 130 on lower part of gill arch.
Eye with broad adipose lids.

Coloration: blue/green, along the back with golden reflection, flank silvery and sometimes a golden line divides the colour of the back from that of the sides; head with a large greenish gold spot on the upper margin of the opercle and preopercle; caudal stained with green, the other fins transparent.

Distribution and behaviour: Distributes in wide areas; North Borneo, the Philippines, Malaysia, Cambodia, Vietnam and Australia (very rare in Thailand).

Inhabits coastal waters; pelagic, usually forms big schools, very abundant off Indian coasts.

Feeds on plankton, especially diatom.

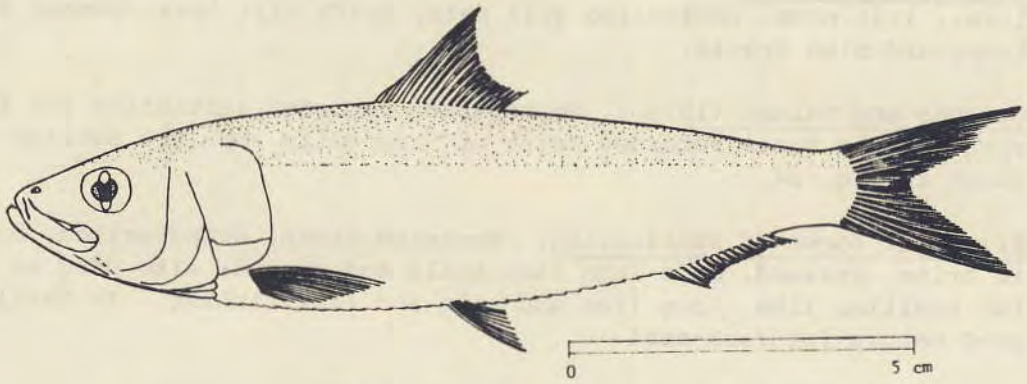

Fig. 16 *Sardinella longiceps*, Indian oil sardine
Maximum 23 cm TL; common: 10-15 cm TL.

The catches in Indonesian waters dominated by *S. longiceps* (about 99%), the rest of 1% come from *S. aurita* and *S. fimbriata*.

Apparently fish schools are not influenced much by light of the fishing lure. The school ascends only to 20 meters depth, from a depth of 40-60 m. There is migration to a deeper water layer.

Oil sardine in Indian Ocean (Calicut) spawns during June - August while in Indonesian waters spawns during June - July, and April - May. Size at maturity of oil sardine 17 cm LX for female. Mixed with anchovies in the coastal area and can be caught at the beginning of the season in September. The size at entry to the fishery is 9.0 cm LX.

The growth equation in Indonesian waters is obtained as:

$$L_t = 23.767\ (1-e^{-0.2523(t + 0.0012)})$$ on six months basis.

The sizes at 1, 2, 3 and 4 years old are 9.4, 15.08, 18.52 and 20.59 cm LX respectively.

Fishing grounds: Throughout its range from the coastal waters at 5 m depth to off shore at 60 m depth.

Small-sized fish were caught near the shore while the big-sized were caught off shore.

Fishing gears used: Caught mainly with purse seines, gill nets, beach seines, lift nets, scoop nets, cast nets and also by trawls.

Catches and Values (1976): Separate statistics are not available, it is included in the catches for *Sardinella* spp. as shown in Fig. 14.

Principal forms of utilizations: Marketed fresh, dried-salted, canned and made into fish balls and fish-meal. Large quantities of oil are also made from them.

4. Engraulidae

4.1 *Stolephorus heterolobus* (RÜPPELL, 1873)

Synonyms still in use : *Stolephorus pseudoheterolobus* HARDENBERG, 1933

Anchoviella heteroloba FOWLER, 1941

English name : Shorthead anchovy

National species name : Filipino - Dilis

Indonesian - Teri

Malaysian - Bilis, Pusu

Thai - Pla Katak-hualaem

Distinctive characters: Small silvery fish, body fusiform, sub-cylindrical; belly rounded, with 5-6 needle-like scutes between pectoral and pelvic fin bases. Head short (length more than 4 times in standard length); snout prominent and pointed; maxilla tip pointed, projecting beyond anterior border of pre-operculum; isthmus not reaching to hind border of gill membrane, leaving exposed a small (white or silver) diamond-shaped urohyal bony plate (easily visible without lens). Single dorsal fin; anal fin origin a little behind last dorsal fin ray, no spiny rays in fins. Lower gill rakers 24-27. No lateral line.

Coloration: pale cream when scales lost, bright silver stripe along flanks.

Distribution and biology: Distributes throughout the coastal area at 5-30 m depth, the outer limit is not more than 10-20 miles from the shore; little is known of the off shore distribution. Pelagic habits and their eggs are planktonic; definitely positively photo-trophic. They were observed to congregate in large shoals along the coast and around islands.

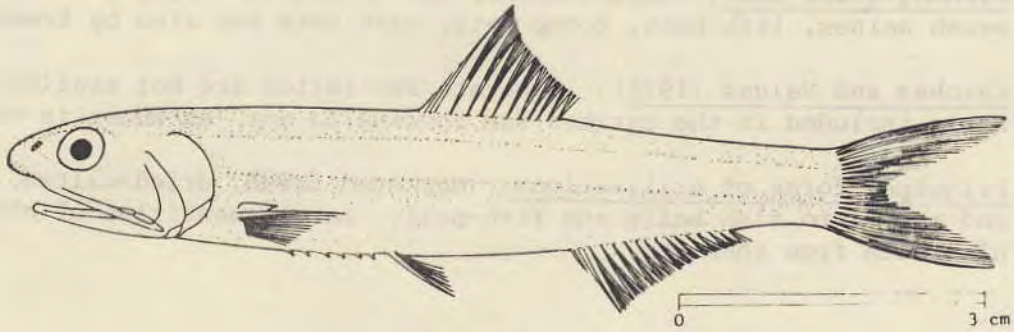

Fig. 17 *Stolephorus heterolobus*, Shorthead anchovy
Maximum: 12 cm TL;
common: 3.5-10 cm TL.

In Filipino waters, 8 species are found, of which *S. heterolobus* and *S. buccaneeri* are the dominant species, while *S. commersonii/bataviensis* are more abundant during the rainy season.

In the Gulf of Thailand 10 species of *Stolephorus* are recorded, of which *S. heterolobus* dominates about 90 per cent of the total *Stolephorus* catch.

Feeds mainly on both phytoplankton and zooplankton (the main food consists of calanid and harpacticid copepods, ostracods, other decapod larvae and also polychaete larvae).

Eggs of *S. heterolobus* were found throughout the year, showing that they spawn continually; the peak of spawning period is between March - April and July - September in the Gulf of Thailand, while in Filipino waters the peak is during August - March, with very little spawning during April - May.

The size at maturity was found to be 60, 65, 65-70 and 90 mm for *S. heterolobus*, *S. buccaneeri*, *S. commersonii/bataviensis* and *S. indicus* respectively.

The estimated fecundity of *S. heterolobus*, *S. buccaneeri*, *S. commersonii* and *S. bataviensis* ranges from 1,900 - 2,500, 7,000 - 11,000, 5,000 - 10,000 and 9,000 - 14,000 respectively.

The growth rate is very rapid. The ages of *S. heterolobus*, *S. bataviensis* and *S. indicus* in the South China Sea (Singapore) at 30 mm SL were estimated to be 56 days, 34 days and 42 days respectively.

S. heterolobus in Filipino waters attain a length of 30 and 60 mm at the end of the first and second year respectively, and do not live much older than 3 years.

The predators for the stolephorids are Spanish mackerel, wolf herring, lizard fish, barracuda, hairtail, tuna, etc.

Fishing gears used: Caught mainly with purse seines, lift nets, beach seines, bamboo stake traps and also by trawlers.

Catch and values (1976): Separate statistics by species are not reported, only catches for *Stolephorus* spp. are available.

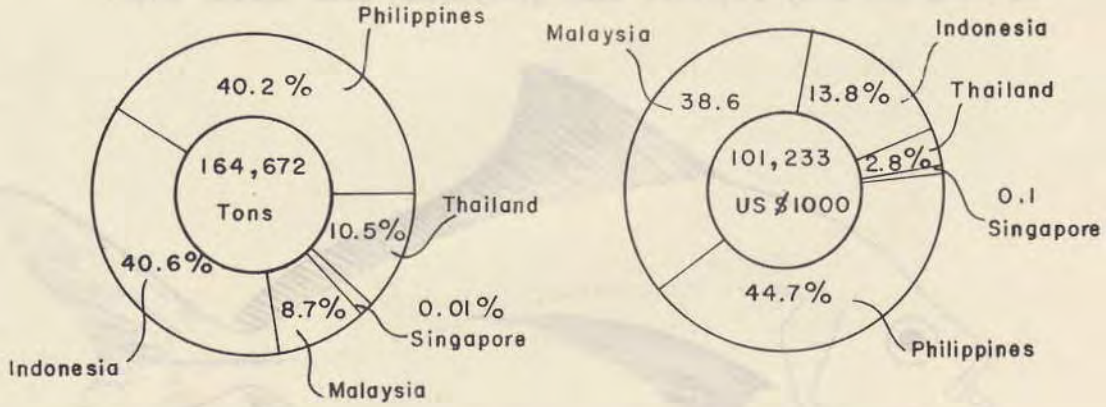

Fig. 18 Diagrams showing catch and value of anchovies (*Stolephorus* spp.) in the Southeast Asian waters.

Principal forms of utilization: Marketed fresh, dried, dried-salted, made into fish sauce and fish-meal; also used as live bait for tuna pole and line fishing.

5. Formionidae

5.1 *Formio niger* (BLOCH, 1795)

Synonyms still in use : *Parastromateus niger* (BLOCH, 1795)
Apolectus niger (BLOCH, 1795)

English name : Black pomfret

National species name : Filipino - Duhay
Indonesian - Bawal hitam

Malaysian - Dueh hitam, Bawal hitam

Thai - Pla Jaramed-dum

Distinctive characters: Body fairly deep, compressed, parallelogram shape. Mouth straight and fairly small; upper lip distinct, reaching to level of anterior border of eye. Gill membrane not united to isthmus; gill opening extending to underside of head. Dorsal and anal fins long, spine present only in small individuals, anterior part much higher than posterior, anterior part of the fins strongly concave; pectoral fins very long, falcate; pelvic fins small, near throat, absent in adult; caudal fin forked. Scales of lateral line scute-like on caudal peduncle.

Coloration: Grey/brown with a blue/grey tinge; lower portion of head and body lighter; fins grey/brown with darker edge.

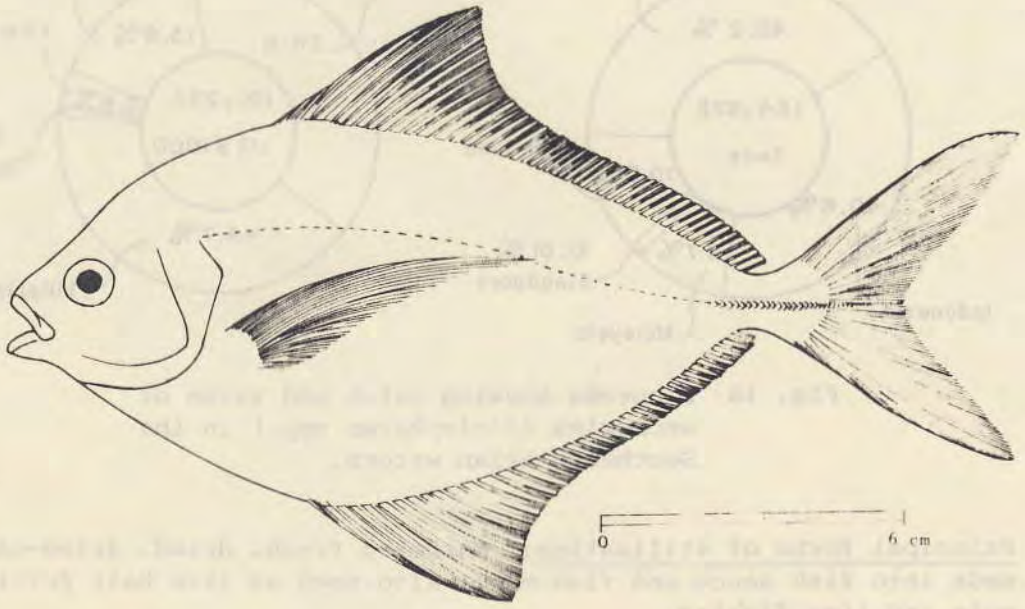

Fig. 19 *Formio niger*, Black pomfret
Maximum: 35 cm TL; common: 15-25 cm TL.

Distribution and biology: Distributes throughout most of the area, but not New Guinea or Australia.

Inhabits midwater and also bottom near coast over the continental shelf, down to 100 m depth. Occurs in small to large schools.

Feeds on crustaceans and small fishes.

No informations on the biology of this species in the region is available.

Fishing grounds: Coastal waters down to 100 m depth throughout its range.

Fishing gears used: Caught mainly with drift gill nets, purse seines (especially with lure), lift nets and bottom trawlers.

Catches and values (1976): This fish is highly esteemed by Southeast Asian people resulting in its fetching a very high price in the market.

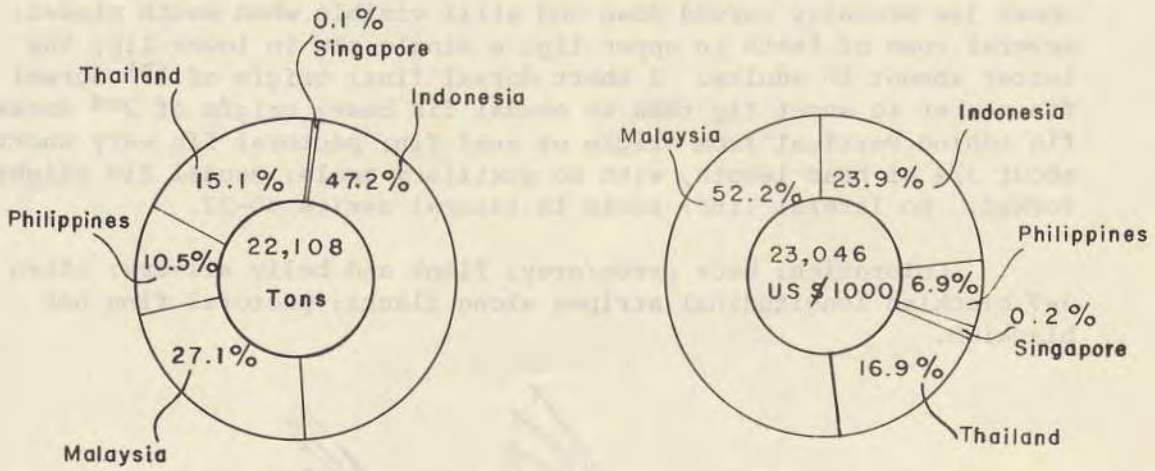

Fig. 20 Diagrams showing catch and value of black pomfrets in the Southeast Asian waters.

Principal forms of utilization: Marketed mainly fresh, frozen, dried-salted.

6. Mugilidae

6.1 *Mugil dussumieri* VALENCIENNES, 1836

Synonyms still in use : *Liza subviridis* (VALENCIENNES, 1836)
Mugil javanicus BLEEKER, 1852
Mugil sundanensis BLEEKER, 1853

English name : Greenback grey mullet

National species name : Filipino - Banak
Indonesian - Belanak
Malaysian - Belanak
Thai - Pla Kabok-tontai

Distinctive characters: Body rather stout, head broad and flattened on top, 23-25% of standard length; fatty (adipose) tissue covering eye except for pupil. Mouth rather small, terminal; upper and lower lips thin; a large symphysial knob at front of lower jaw; posterior tip of upper jaw strongly curved down and still visible when mouth closed; several rows of teeth in upper lip, a single row in lower lip, the latter absent in adults. 2 short dorsal fins; origin of 1st dorsal fin nearer to snout tip than to caudal fin base; origin of 2nd dorsal fin behind vertical from origin of anal fin; pectoral fin very short, about 3/4 of head length, with no auxillary scale; caudal fin slightly forked. No lateral line; scale in lateral series 30-32.

Coloration: back green/grey, flank and belly silvery; often 3-7 blackish longitudinal stripes along flanks; pectoral fins not blackish.

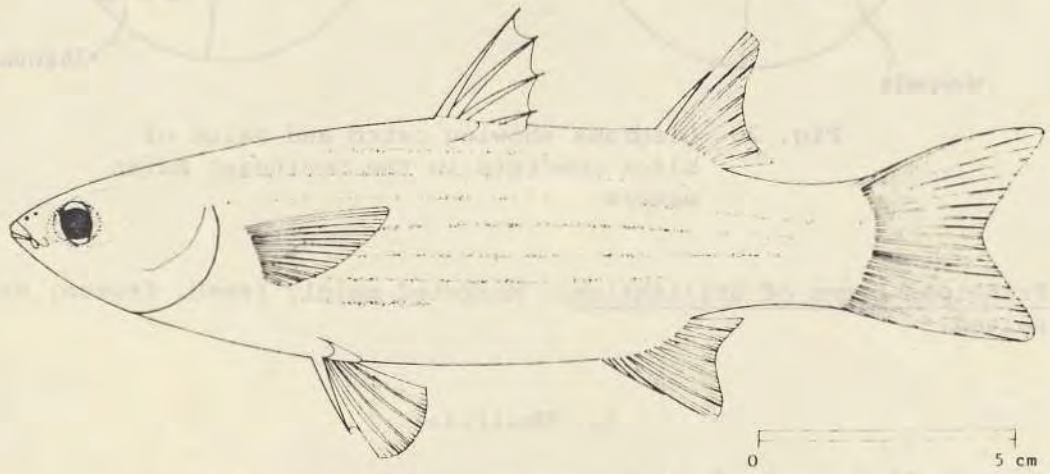

Fig. 21 *Mugil dussumieri*, Greenback grey mullet
Maximum:40 cm TL; common:20-25 cm TL.

Distribution and biology: Distributes throughout most of the area.

Pelagic, occurs in small schools in shallow coastal waters and enters lagoons and estuaries to feed. Juveniles often ascend rivers

into freshwater zones or they may inhabit the sea coast and mangrove swamps for their entire lives.

In Filipino waters, 21 species of mullets were found, the grey mullet (*M. dussumieri*) is the most common species which is also the dominant species in brackishwater ponds in Sumatra, Java and Kalimantan.

Limited studies on the biology and bionomics of the grey mullet have been carried out in the South China Sea area, mostly by scientists in Taiwan.

In Taiwan, *M. cephalus* are from 2-8 years old, with 4-year old fish being predominant. The average standard length of mature females was 44.5 cm and males 41 cm.

In Thailand, the average length of female of *M. dussumieri* was 20 cm and of males 18.1 cm.

The fecundity of the grey mullets off Taiwan was estimated to be between 700,000 and 3,000,000, depending on the size of the fish. In Thailand the fecundity of *M. dussumieri* was estimated as 165,000 for a 20 cm female.

Spawning takes place in the sea. The spawning season of *M. cephalus* in Hong Kong is from November to January, the same as for the stock off Taiwan.

The spawning season of *M. dussumieri* in Thailand was observed to be between October and December, which corresponds to the heavy rainfall period in south Thailand.

The age and growth of grey mullets off Taiwan have been estimated as follows:

$$\ell_t = 593\ (1-e^{-0.301\ (t + 0.123)})\quad \text{for females}$$

$$\ell_t = 498\ (1-e^{-0.393\ (t - 0,049)})\quad \text{for males}$$

Feeds on minute bottom-living organisms and on organic matter contained in mud and sand; perhaps also on floating algae. Post-larval grey mullet feed on both phyto and zooplankton. Sand grains are usually found in their stomachs. The food of young adults consists mostly of copepods, annellid worms, amphipods, benthos, etc.

Fishing grounds: Caught in the inshore, shallow coastal waters, estuaries, and mangrove swamps throughout the area.

Fishing gears used: They are caught by purse seines, gill nets, set nets, beach seines, cast nets and also trawls almost all the year round.

Catches and values (1976): Separate statistics for this species are not recorded, only total reported catches for *Mugilidae* are available.

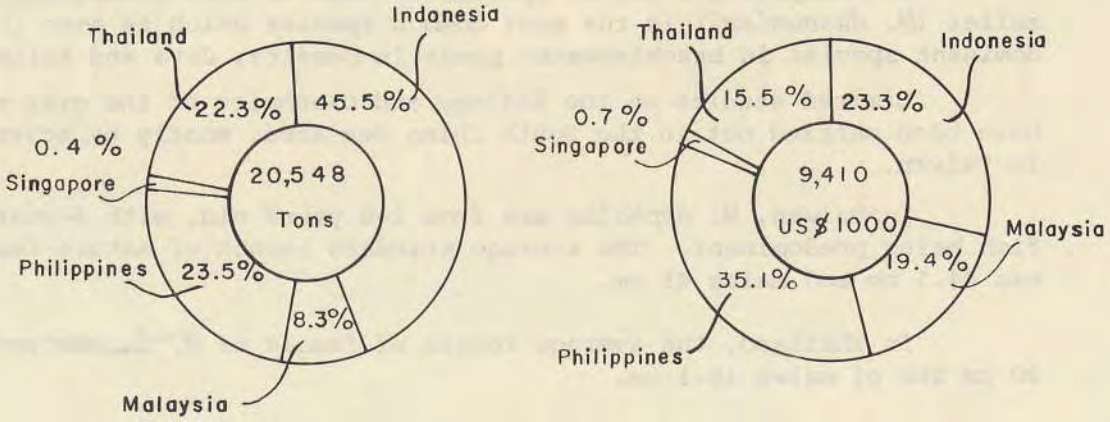

Fig. 22 Diagrams showing catch and value of mullets (Mugilidae) in the Southeast Asian waters.

Principal forms of utilization: Marketed fresh, dried-salted, steamed, smoked, canned or frozen.

7. Polynemidae

7.1 *Polynemus plebieus* (BROUSSONET, 1782)

Synonyms still in use	:	*Polydactylus plebieus* (BROUSSONET, 1782)
English name	:	Common threadfin
National species name	:	Filipino - Mamale
		Indonesian - Senangin, Kurau
		Malaysian - Ikan bulu, Ikan Kurau
		Thai - Pla-Kurau

Distinctive characters: Body oblong and somewhat compressed. Snout projecting, mouth large with small teeth; upper lip absent, lower lip well developed. Eyes large (eye diameter 3.8 - 4.0 times in head length); with adipose tissue. Pectoral fin in two parts, upper part with all rays unbranched, lower with 5 free filamentous rays, of which the upper 2 are the longest, reaching to end of pelvic fin; caudal fin with lobes equal; scales small, ctenoid (rough to touch).

Coloration: body golden olive, with narrow dusky stripes; pectoral fin black, inner side of pelvic fin white, outer side grey, dorsal and caudal fins grey-edged.

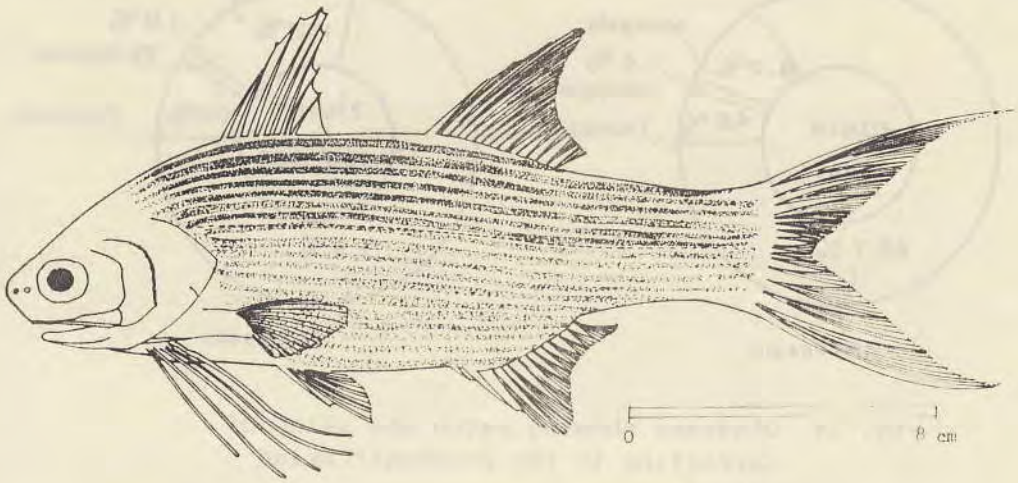

Fig. 23 *Polynemus plebieus*, Common threadfin
Maximum: 45 cm TL; common: 25-30 cm TL.

Distribution and biology: Distributes throughout the area and southward to Australia.

Inhabits mainly over shallow muddy bottoms on the continental shelf and also in brackish waters; occurs in small schools.

Feeds mainly on small crustaceans (especially shrimps and tiny crabs), fishes and other bottom living organisms.

Spawning is found to be prolonged and extends over the entire year. Spawning is in batches.

The fish is believed to mature after the completion of the second year.

Fishing gears used: Caught mainly with beach seines, gill nets, bamboo stake traps and bottom trawls.

Catches and values (1976): Separate statistics for this species are not reported; only total reported catches of Polynemids are available.

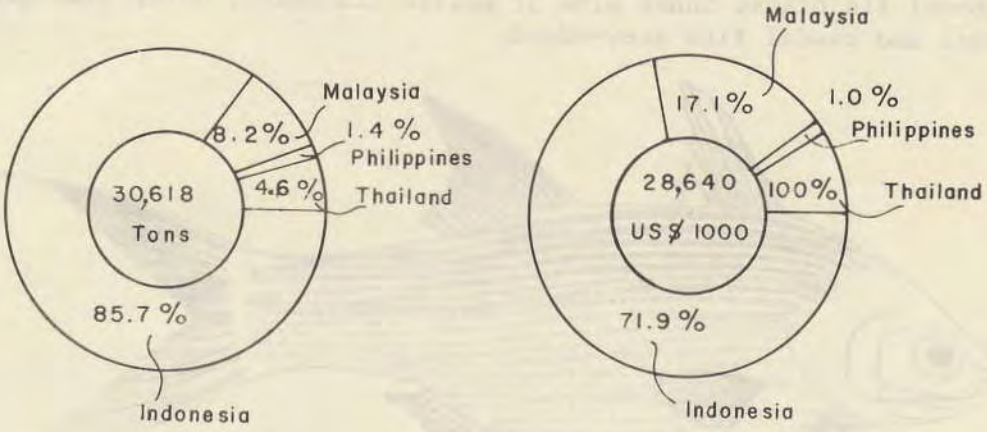

Fig. 24 Diagrams showing catch and value of threadfins in the Southeast Asian waters.

Principal forms of utilization: Marketed fresh, frozen and dried-salted.

8. Scombridae

8.1 *Auxis thazard* (LACEPEDE, 1803)

Synonyms still in use : *Auxis tapeinosoma* BLEEKER, 1854
Auxis hira KISHINOUYE, 1923

English name : Frigate mackerel

National species name
Filipino - Tulingan
Indonesian - Tongkol
Malaysian - Tongkol
Thai - Pla O-grab

Distinctive characters: Body robust, elongate and rounded. Snout pointed; mouth rather large. 2 dorsal fins, the first with 10-12 spines, separated from the second by a large interspace (at least equal in length to the first dorsal fin base), the second dorsal followed by 8 finlets; pectoral fins short reaching past vertical line from anterior margin of scaleless area above the corselet (area behind head and around pectoral fins covered with moderately large, thick scales). A large single-pointed flap (interpelvic process)

between the pelvic fins; anal fin followed by 7 finlets. Body naked except for corselet, which is well developed and narrow in its posterior part. A strong central keel on each side of caudal fin base between 2 smaller keels.

Coloration: black-bluish, turning to deep purple or almost black on the head; a pattern of 15 or more narrow, oblique to nearly horizontal, dark wavy lines in the scaleless area above lateral line; belly white; pectoral and pelvic fins purple, their inner side black.

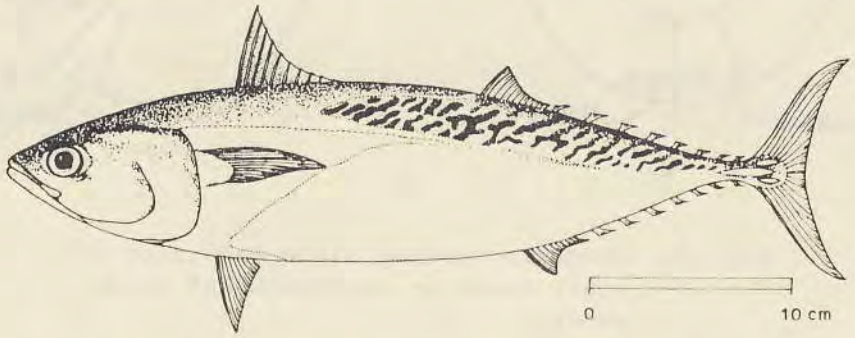

Fig. 25 *Auxis thazard*, Frigate mackerel
Maximum: 50 cm LF; common: 25-40 cm LF
LF denotes fork length of fish body.

Distribution and biology: Distributes throughout most of the area. Pelagic behaviour, occurs in large inshore and also off-shore schools. It is a seasonal visitor to the coastal waters, and usually caught inshore.

Feeds on small pelagic fishes especially anchovies and sardines as well as crustaceans and squids.

Spawning season occurs during February-July; the size at maturity ranges from 37-41 cm LF.

The growth rates of this fish is not very high when comparing to other species of tuna-like fishes; the size of fish at 26, 38 and 47 cm LF would be 1, 2 and 3 year old fish respectively. The life span in the fishery is estimated to be approximately 3 years.

Fishing grounds: Mainly coastal waters at 20-50 m depth.

Fishing gears used: Caught mainly with purse seines and drift gill nets, and also by trolling lines.

Catches and values (1976):

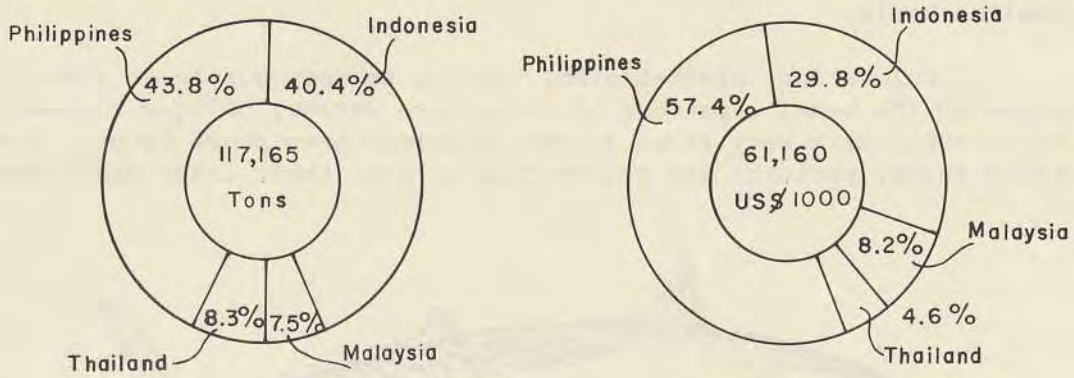

Fig. 26 Diagrams showing catch and value of small tunas in the Southeast Asian waters.

Notes: Figures included *Auxis thazard*, *Euthynnus affinis* and *Thunnus tonggol*.

Principal forms of utilization: Marketed fresh, dried-salted, dried (Japanese Kasuo-bushi), canned and also frozen.

8.2 *Euthynnus affinis* (CANTOR, 1850)

Synonyms still in use	:	*Euthynnus yaito* KISHINOUYE, 1923
English name	:	Eastern little tuna
National species name	:	Filipino - Katchorita, Tulingan
		Indonesian - Sakulan, Tongkol
		Malaysian - Tongkol
		Thai - Pla O-lai

Distinctive characters: Medium-size fish with robust, elongate and fusiform body. Snout pointed; mouth rather large. 2 dorsal fins, separated by only narrow interspace (not wider than eye), anterior spines of first much higher than those mid-way, giving the fin a strongly concave outline; second dorsal fin much lower than first and followed by 8 to 10 finlets. Pectoral fins short, never reaching the interspace between the dorsal fins, two flaps (interpelvic process)

between pelvic fins; anal fin followed by 6-8 finlets; caudal fin deeply forked. Body naked except for corselet (area behind head and around pectoral fins covered with moderately large, thick scales) and lateral line. Very slender caudal peduncle with a prominent lateral keel between 2 smaller keels at base of caudal fin.

Coloration: black/dark blue with a complicated striped pattern on back which does not extend forward beyond middle of first dorsal fin; lower sides and belly silvery white; several characteristic dark spots between pelvic and pectoral fins (which, however, may not always be very conspicious).

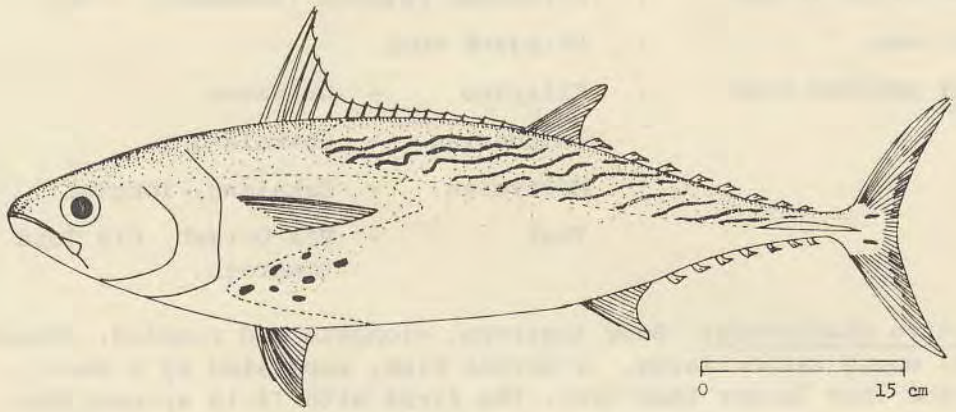

Fig. 27 *Euthynnus affinis*, Eastern little tuna
Maximum: 100 cm LF;
common: 40-60 cm LF.

Distribution and biology: Cosmopolitan in tropical and sub-tropical seas. Occurs in large schools in deep coastal and oceanic waters, generally above the thermocline.

Feeds on small pelagic fishes, cephalopods, and crustaceans.

Prolonged spawning period with the peak during March-April and August-October. Spawns almost throughout the year. The estimated fecundity ranges from 585,000-2,595,000 eggs for the fish of 39.5-51.0 cm LF. The number of ova estimated to be produced per spawning varies from 0.21-0.68 million eggs.

The life span in the fishery is about 3 years; the sizes of fish at age 1, 2 and 3 years old are 27, 41 and 53 cm LF respectively.

Fishing grounds: Throughout its range; mainly coastal waters at 20-50 m depth.

Fishing gears used: Caught mainly with purse seines, drift gill nets and also by trolling lines.

Catch and Values (1976): No separate reported statistics for this species; figures included *Auxis thazard*, *Euthynnus affinis* and *Thunnus tonggol* as shown in Fig. 26.

Principal forms of utilization: Marketed fresh, dried-salted, dried (Japanese Katsuo-bushi), canned and also frozen.

8.3 *Katsuwonus pelamis* (LINNAEUS, 1758)

Synonyms still in use	:	*Euthynnus pelamis* (LINNAEUS, 1758)	
English name	:	Skipjack tuna	
National species name	:	Filipino	- Gulyasan
		Indonesian	- Chakalang
		Malaysian	- Cakalang, Tongkol
		Thai	- Pla O-taeb, Pla Tuna tongtaeb.

Distinctive characters: Body fusiform, elongate and rounded. Snout pointed, mouth rather large. 2 dorsal fins, separated by a small interspace (not larger than eye), the first with 14-16 spines, the second followed by 7-9 finlets; pectoral fin short; 2 flaps (interpelvic process) between pelvic fins; anal fin followed by 7-8 finlets. Body scaleless except for corselet (area behind head and around pectoral fins covered with scales) and lateral line. A strong keel on each side of base of caudal fin between 2 smaller keels. Gill rakers on first arch 53-63.

Coloration: back dark purplish-blue, lower sides and belly silvery, with 4-6 very conspicious longitudinal dark bands along lower sides which on live specimens may appear as discontinuous lines of dark blotches.

Distributions and biology: Cosmopolitan in tropical seas.

Distributes in large schools in deep coastal and oceanic waters, also abundant along the coasts facing the Indian Ocean and around the islands in the South China Sea.

Feeds on fishes, cephalopods, and crustaceans (mainly on Amphipods, Euphausiids and Decapods).

Spawns throughout the year with the peak of spawning activity occurring at different times of the year in different localities.

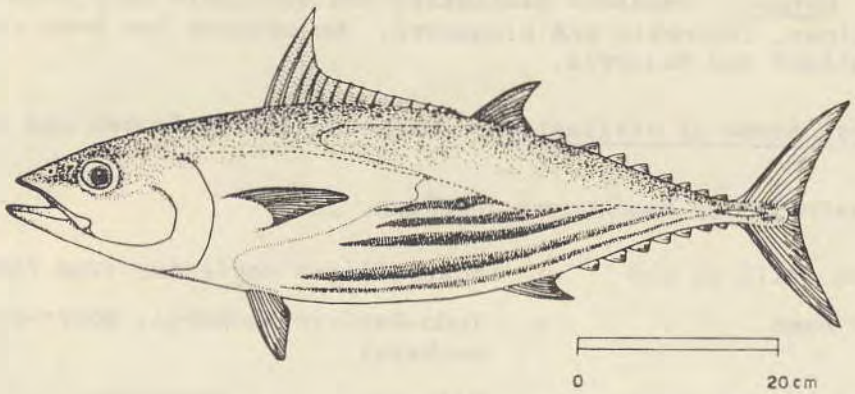

Fig. 28 *Katsuwonus pelamis*, Skipjack tuna
Maximum: 100 cm LF;
common: 40-80 cm LF.

The size of larvae at time of hatching is most likely to be between 2.44-3.04 mm. The size of egg ranges from 2.50-3.50 mm.

The growth parameters for K = 0.431 and L_{∞} = 881 mm (on annual basis).

Fishing grounds: Caught in the deep coastal and oceanic waters throughout its range.

Fishing gears used: Caught mainly with purse seines, pole and lines, long lines and also trolling lines.

Catches and values (1976):

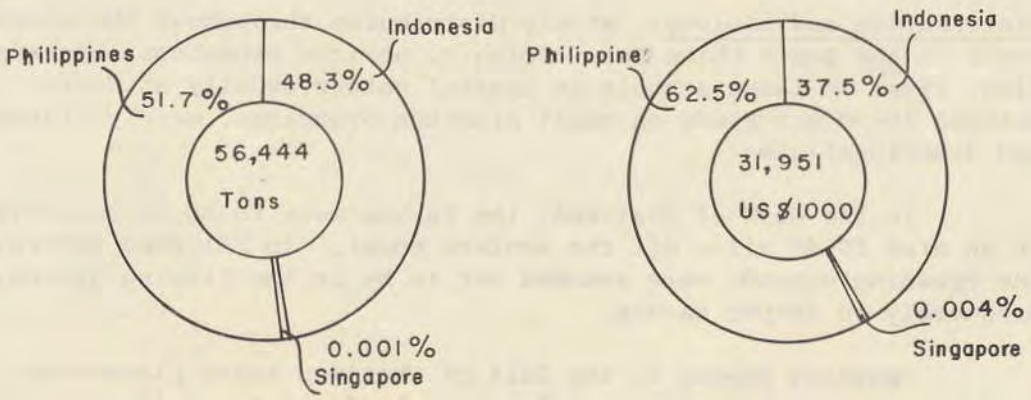

Fig. 29 Diagrams showing catch and value of skipjack tuna in the Southeast Asian waters.

Notes: Separate statistics are available only from the Philippines, Indonesia and Singapore. No catches has been recorded for Thailand and Malaysia.

Principal forms of utilization; Marketed fresh, frozen and canned.

8.4 *Rastrelliger brachysoma* (BLEEKER, 1851)

Synonyms still in use	:	*Rastrelliger neglectus* (VAN KAMPEN, 1970)
English name	:	Indo-Pacific mackerel, Short-bodied mackerel
National species name	:	Filipino - Hasa-hasa
		Indonesian - Kembung
		Malaysian - Kembung
		Thai - Pla Tu

Distinctive characters: Body fusiform, elongate; body very deep, its depth at margin of gill cover 3.7 - 4.0 times in standard length; head equal to or less than body depth. Teeth minute in both jaws, none on vomer or palate. Well developed adipose eyelids. Intestine very long, 3.0 - 4.0 times standard length. Gill raker very long, visible when mouth is opened, 30-48 on lower limb of first gill arch; numerous bristles on longest gill raker, about 150 on one side in specimens of 120 mm, 210 in specimens of 150 mm, and 240 at 180 mm standard length. Second dorsal and anal fins each followed by 5 finlets. Caudal fin deeply forked, two small keels on each side of caudal peduncle.

Coloration: back blue/green, sides and belly silvery, with a row of dark spots along back; spinous dorsal fin yellowish with a black edge, pectoral and pelvic fins dusky, other fins yellowish. There are two shining light spots above and behind either eye.

Distribution and biology: Widely distributes throughout the coastal areas in the South China Sea. Pelagic, neritic behaviour, migratory fish, lives in large schools in coastal waters usually at depth between 10-30 m. Feeds on small plankton organisms, mainly diatom and dinoflagellates.

In the Gulf of Thailand, the larvae were found to concentrate in an area 10-40 miles off the western coast. In Filipino waters, the spawning grounds were assumed not to be in the fishing ground, presumably in deeper waters.

Spawning season in the Gulf of Thailand takes place over a fairly prolonged period from February to September, with the two

peaks in February - March and July - September. In Manila Bay, it spawns during June - February while in the waters along the west coast of Peninsular Malaysia the spawning season was assumed to be August - December.

It matures at 18 cm LX for female and 17.5 cm LX for male (in the Gulf of Thailand); in Manila Bay, it starts maturing at 15-16 cm TL.

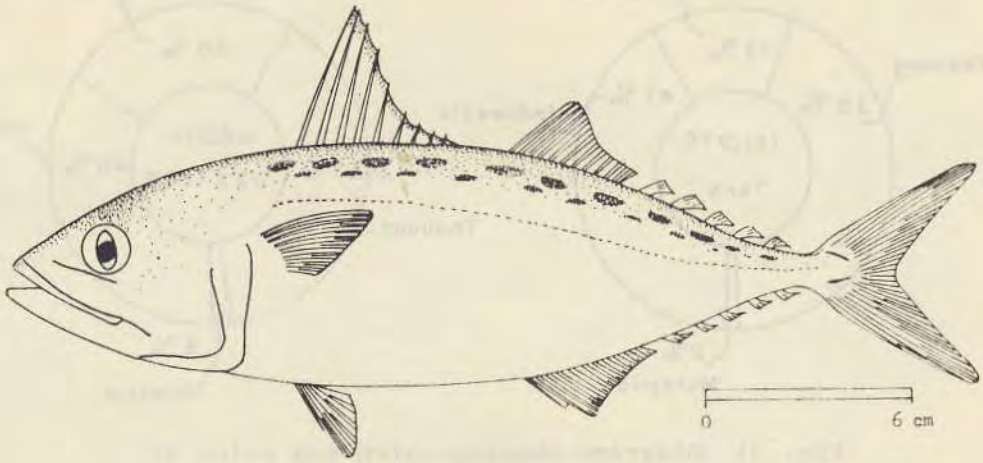

Fig. 30 *Rastrelliger brachysoma*, Indo-Pacific mackerel
Maximum: 30 cm LX; common: 15-20 cm LX.

The range of fecundity was estimated to be 200,000-500,000 for fish ranging 19-21 cm LX (in the Gulf of Thailand) and 11,300-119,300 for fish of 16-22 cm TL (in Manila Bay). The female release only about 1/10 of total eggs in an ovary, 20,000-30,000 in a spawning season.

The growth equations obtained from the studies:

In the Gulf of Thailand : $\ell_t = 20.91\ (1-e^{-0.282(t + 0.03)})$

Indonesian waters : $L_\infty = 22.9$ cm TL, $k = 0.19$

Malaysian waters : $L_\infty = 20.1$ cm TL

The age at entering to the fishery was estimated to be 4 months (14 cm total length); the life span in the fishery is approximately 1 year while the maximum age might extend to 3 years old.

Fishing ground: Coastal waters, throughout its range.

Fishing gear used: Caught mainly with purse seines, encircling gill nets, drift gill nets, lift nets, trawls (both otter board and pair trawls) and also bamboo stake traps.

Catches and values (1976):

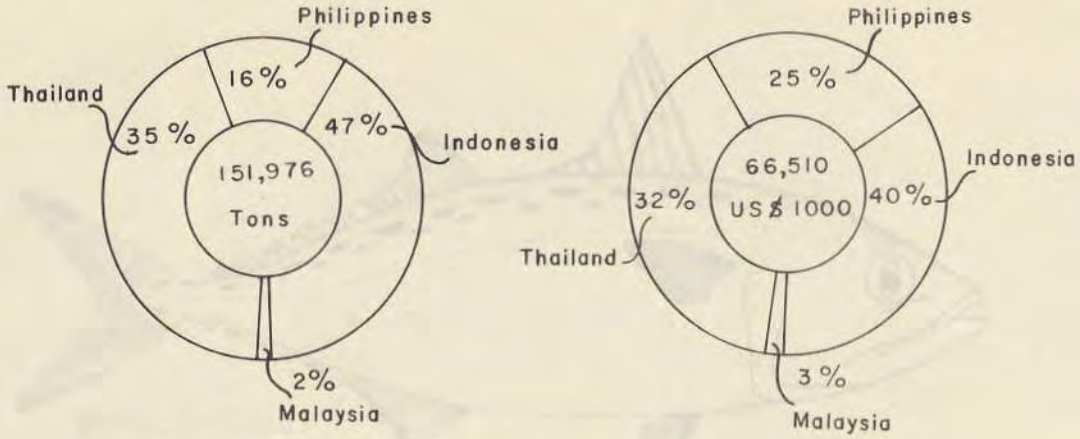

Fig. 31 Diagrams showing catch and value of Indo-Pacific mackerel in the Southeast Asian waters.

Notes: Catches and values for Malaysia are available only for Sabah.

Principal forms of utilization: Marketed fresh, steamed, frozen, dried-salted, smoked, canned, fermented and also made into fish sauce.

8.5 *Rastrelliger kanagurta* (CUVIER, 1816)

Synonyms still in use	:	*Rastrelliger chrysozonus* (RÜPPELL, 1835)
English name	:	Indian mackerel
National species name	:	Filipino - Alumahan
		Indonesian - Kembung lelaki
		Malaysian - Kembun, Ramahan
		Thai - Pla Lung, Pla Tu-moeng

Distinctive characters: Body moderately deep, its depth at margin of gill cover 4.0 - 4.8 times in standard length; head longer than body depth. Maxilla covered by lacrimal bone, but extending nearly to end of lacrimal. Well developed adipose eyelids. Teeth minute in both

jaws, none on vomer or palate. Intestine 1.3 - 1.7 time standard length. Gill raker very long, visible when mouth is opened, 30-46 on lower limb of first arch; moderate number of bristles on longest gill raker, 105 on one side in specimens of 120 mm, 140 in specimens of 150 mm and 160 in specimens of 180 mm standard length. Second dorsal and anal fins each followed by 5 finlets. Scales smaller above than below the lateral line and largest just beneath the pectoral fin. Lateral line very slightly curved.

Coloration: back blue/green, flank silvery with golden tint, two rows of small dark spots on sides of dorsal fin bases, narrow dark spots on sides of dorsal fin based, narrow dark longitudinal bands of upper part of body (golden in live specimens) and a black spot on body near lower margin of pectoral fin; dorsal fin yellowish with black tips, caudal and pectoral fin yellowish, other fins dusky.

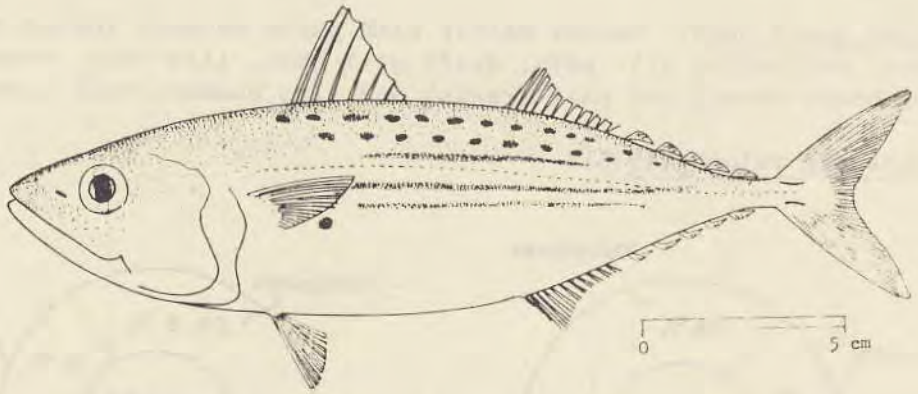

Fig. 32 *Rastrelliger kanagurta*, Indian mackerel
Maximum: 35 cm LX; common: 20-25 cm LX.

Distribution and biology: Distributes throughout the areas. A common pelagic and migratory fish, often found in large surface schools in coastal waters and also at open sea, usually at depth between 10-50 m.

Adult feeds on plankton organisms with preference for zooplankton, mainly copepods; larval stages prefer phytoplankton, mainly diatom.

Spawns almost throughout the year, the peak of spawning period varies with the locality:

Malaysian waters	:	January - March
Gulf of Thailand	:	January - March and July - August
Cape Camau	:	December - January

It starts maturing at 21-22 cm TL (in Filipino waters), 19.5 cm LX (in the Gulf of Thailand), and 19.0-22.4 cm LX (in Indian Ocean). It is possible to distinguish the sex when they are about 11.0-12.0 cm.

Fecundity was estimated to be 470,000 for fish of 24 cm LX (in the Gulf of Thailand), 200,000 for fish in Filipino waters.

The growth rate is very rapid and similar to *R. brachysoma;* the growth parameters obtained are:

Indonesian waters : L_∞ 23.9 cm TL, k = 0.23

Indian waters : L_∞ 22.2 - 23.5 cm, k = 0.26 - 0.42

Fishing grounds: Mainly in coastal waters and also off shore at the depth from 30-50 m.

Fishing gears used: Caught mainly with purse seines, luring purse seines, encircling gill nets, drift gill nets, lift nets, trawls (both otter board trawls and pair trawls) and also bamboo stake traps.

Catches and values (1976):

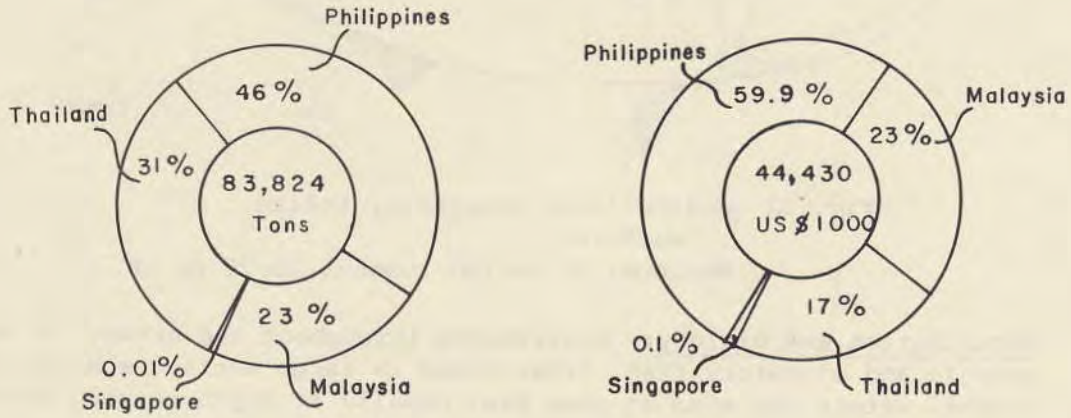

Fig. 33 Diagrams showing catch and value of Indian mackerel in the Southeast Asian waters.

Notes: Statistics for Indonesia not available.

Principal forms of utilization: Marketed fresh, frozen, dried-salted, canned, smoked, steamed, and also made into fish sauce.

8.6 *Scomberomorus commerson* (LACEPEDE, 1802)

Synonyms still in use	:	*Cybium commersoni* (LACEPEDE, 1802)
English name	:	Narrow-barred Spanish mackerel
National species name	:	Filipino - Tangigi
		Indonesian - Tenggiri
		Malaysian - Tenggiri
		Thai - Pla Insi-bang

Distinctive characters: Body elongate, rather strongly compressed. Snout pointed; upper jaw reaching to posterior margin of eye or slightly beyond; teeth in jaws strong and slightly compressed. Gill rakers 0 - 2 on upper limb and 2 - 6 on lower limb of first gill arch. 2 dorsal fins, the first with 14 - 17 spines and the second with 14 - 19 soft rays, followed by 8 - 10 finlets. Anal fin originating below midpoint of second dorsal fin and with 14 - 18 rays followed by 8 - 10 finlets. Lateral line abruptly bent downward below end of second dorsal fin. Body uniformly covered with small to moderate scales.

Coloration: back iridescent blue/grey, sides silver with bluish reflection, marked with numerous wavy vertical bands; the number of bars increases from as few as 20 in a 40 cm specimen to as many as 65 at 150 cm.

Fig. 34 *Scomberomorus commerson*, Narrow-barred Spanish mackerel
Maximum: 235 cm LF;
common: 50-90 cm LF.

Distribution and biology: Distributes throughout the area. Pelagic behaviour migratory fish; inhabiting coastal waters, at depth between 5-100 m. Small fish live in the shallow waters at depth between 5-20 m; large size fish distributes off the coast near the islands at the depth between 20-100 m.

Feeds chiefly on small schooling fish such as anchovies, sardines, mackerels, carangids as well as squids and shrimps. Spawns almost throughout the year, with the peak from February - April and June - September; the size at first maturity 58.5 cm; fecundity ranges from 500,000-3,800,000 for fish of 58.3-83.6 cm LF.

Fast growing fish; one year old fish reaches 67 cm, the life span in the fishery is about 3 years. The growth parameter of fish in the western coast of the Gulf of Thailand obtained $k = 0.12$ and $L_{\infty} = 92.07$ cm.

Fishing grounds: Coastal waters, throughout its range.

Fishing gears used: Caught mainly with drift gill nets, trawls (both otter board and two boat trawls), purse seines, bamboo stake traps and trolling lines.

Catches and values (1976):

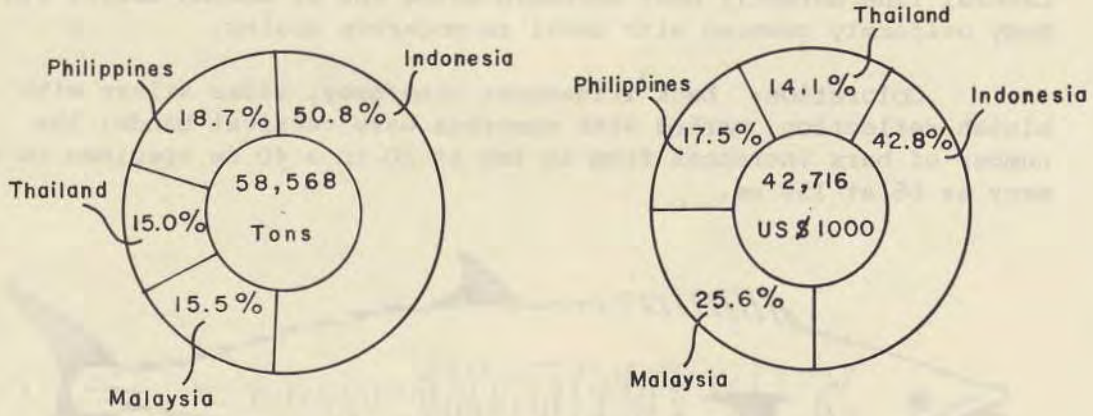

Fig. 35 Diagrams showing catch and value of narrow-barred Spanish mackerels in the Southeast Asian waters.

Notes: The catch statistics from Thailand, Malaysia and the Philippines may include all species of *Scomberomorus*. Data from Singapore are not available.

Principal forms of utilization: Marketed mainly fresh and dried-salted; and also made into fish balls.

8.7 *Thunnus albacares* (BONNATERRE, 1788)

Synonyms still in use : *Neothunnus macropterus* (TEMMINCK & SCHLEGEL, 1844)

English name : Yellowfin Tuna

National species name : Filipino - Albakora

Indonesian - Tuna

Malaysian - Tuna

Thai - Pla Tuna-Kreeb-luang

Distinctive characters: A large fish with an elongate, fusiform body slightly compressed from side to side. Snout pointed; mouth rather large. 2 dorsal fins, separated only by a narrow interspace, the second followed by 8-10 finlets; anal fin followed by 7-10 finlets; 2 flaps (interpelvic process) between pelvic fins; large specimens have very long second dorsal and anal fins, becoming well over 20% of fork length; pectoral fins moderately long, usually reaching beyond second dorsal fin origin but not beyond end of its base, usually 22-31% of fork length. Body covered with very small scales; corselet (area behind head and around pectoral fins covered with scales) of larger scales developed by not very distinct. Caudal peduncle very slender, bearing on each side a strong lateral keel between 2 smaller keels. No striations on ventral surface of liver; swimbladder present.

Coloration: back metalic dark blue changing through yellow to silver on belly; belly frequently crossed by about 20 broken, nearly vertical pale lines; dorsal and anal fins, and dorsal and anal finlets, bright yellow, the finlets with a narrow black border.

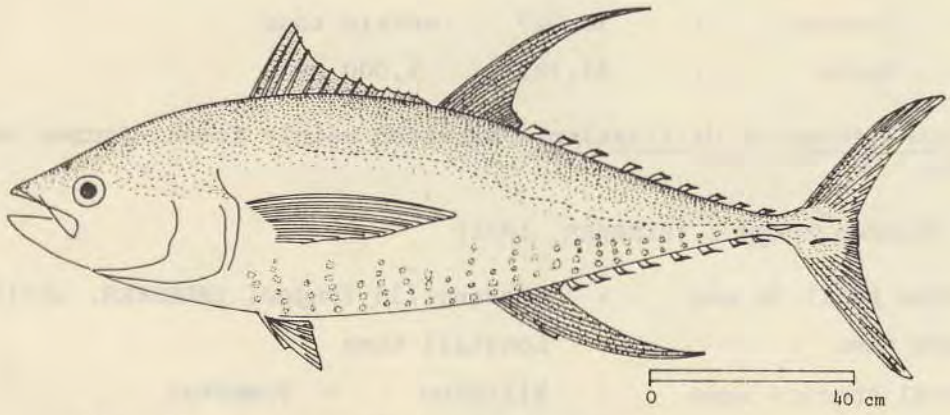

Fig. 36 *Thunnus albacares*, Yellowfin tuna
Maximum: 195 cm LF; common: 50-150 cmLF

Distribution and biology: Distributes in the offshore of the area and southward to western and eastern coast of Australia in the Indian Ocean.

Pelagic, oceanic, above and below thermocline, usually forms schools, but not as dense as schools of skipjack and sardine; the diameter of school 900-4,500 m.

Feeds on a wide variety of fishes, crustacean and cephalopods near the coast during daytime.

Spawning area differs from feeding area in general. The percentage of spawners from offshore areas are higher than those from the coastal area.

Duration of spawning season in low latitude area is longer than in higher latitude area; spawning season in the Pacific Ocean from June-October, in the Indian Ocean from December-May.

The range of fecundity: 2.9-6.3 million eggs.

The size at first spawning in the Eastern Pacific was about 50 cm.

Fishing grounds: Open seas, throughout its ranges.

Fishing gears used: Caught mainly with purse seines, longlines, trolling lines, pole and lines, also occasionally with gill nets (Indonesia, the Philippines).

Catches and values (1976): The total reported catches and values in 1976, which were the only records from the Philippines, were:

Catches	:	36,227	metric tons
Value	:	24,782	1,000 US $

Principal forms of utilization: Marketed mainly fresh, frozen and canned.

8.8 *Thunnus tonggol* (BLEEKER, 1851)

Synonyms still in use	:	*Kishinoella tonggol* (BLEEKER, 1851)	
English name	:	Longtail tuna	
National species name	:	Filipino	- Tambakol
		Indonesian	- Ikan kayu, Tuna
		Malaysian	- Tongkol, Kayu
		Thai	- Pla O-dum

Distinctive characters: Body fusiform and rounded. Snout pointed; mouth rather large. 2 dorsal fins, separated only by a narrow interspace, the second higher than the first and followed by 9 finlets; pectoral fins with 30-35 soft rays, short to moderately long, 22-31% of fork length in smaller specimens (under 60 cm fork length) and 16-22% in larger individuals; 2 flaps (interpelvic process) between pelvic fins; anal fin followed by 8 finlets. Very small scales on body; corselet of larger scales well developed but not particularly conspicuous. Caudal peduncle with a strong lateral keel between 2 smaller keels. Ventral surface of liver not striated; no swimbladder.

Coloration: back dark blue or black, lower sides and belly silvery white with colourless elongated anal spots arranged in horizontally oriented rows; dorsal, pectoral, and pelvic fins blackish, tip of second dorsal and anal fins washed with yellow; anal fin silvery; dorsal and anal finlets yellow with greyish margins; caudal fin blackish, with streaks of yellowish green.

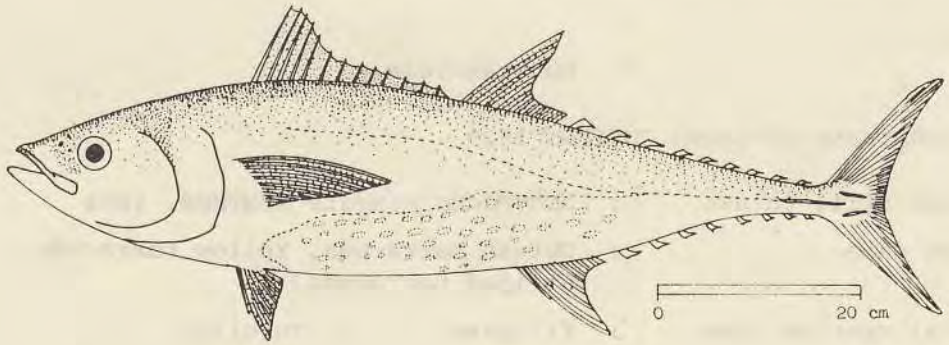

Fig. 37 *Thunnus tonggol*, Longtail tuna
Maximum: 105 cm LF; common:40-70 cm LF.

Distributions and biology: Distributes throughout the coastal and offshore areas. A largely coastal species but avoids low salinity areas near mouths of large rivers. Reported to occur in small schools off the coasts of India and in large schools off the West coast of Australia.

Feeds on a wide variety of small pelagic fishes such as sardines, mackerels, anchovies, carangids, cephalopods, and crustaceans, particularly stomatopods larvae and prawns.

Prolonged spawning period, with the peak from January-February and from September-December. Spawns in the vicinity of land masses.

Estimated fecundity ranges from 1,167,000-1,827,000 eggs of the fish 43.8-49.1 cm LF.

The life span in the fishery is about 3 years; the sizes of fish at age 1, 2 and 3 years old are 31, 49 and 60 cm LF respectively.

Fishing grounds: Throughout its range; mainly off the coastal waters at 30-80 m depth.

Fishing gears used: Caught mainly with purse seines, drift gill nets, long lines, pole and lines and also trolling lines.

Catches and values (1976): No separate reported statistics for this species; figures included *Auxis thazard*, *Euthynnus affinis* and *Thunnus tonggol* as shown in Fig. 26.

Principal forms of utilization: Marketed mainly fresh, canned, dried-salted, dried (Japanese Katsuobushi) and also frozen.

9. Sphyraenidae

9.1 *Sphyraena obtusata* CUVIER, 1829

Synonyms still in use : *Sphyraena pinguis* GUNTHER, 1874

English name : Obtuse barracuda, Yellow barracuda, Striped barracuda.

National species name : Filipino - Torcillo
Indonesian - Alu-alu
Malaysian - Alu-alu
Thai - Pla Saak-luang

Distinctive characters: Body elongated, slightly compressed, torpedo-like shape. Head large and very long, with long pointed snout and lower jaw projecting beyond upper. Mouth large, maxilla (upper jaw) not reaching to level of front border of eye. Upper jaw with a series of minute teeth and 2 sharp canines in front; teeth in lower jaw slender, nearly vertical and well separated, a single canine at front. Palatines with a single row of a few sharp teeth followed by numerous minute teeth. Edge of pre-operculum triangular. Gill raker minute except for 2 long rakers on 1st gill arch. Lateral line with 80-90 scales; 7½ scale rows above lateral line at level of origin of 1st dorsal fin.

Coloration: light brown, silvery below; inside of mouth yellow. 1st dorsal fin dusky with yellow tinge; pectoral and anal fins yellow; 2nd dorsal fin yellow with dark margin; pelvic fin white.

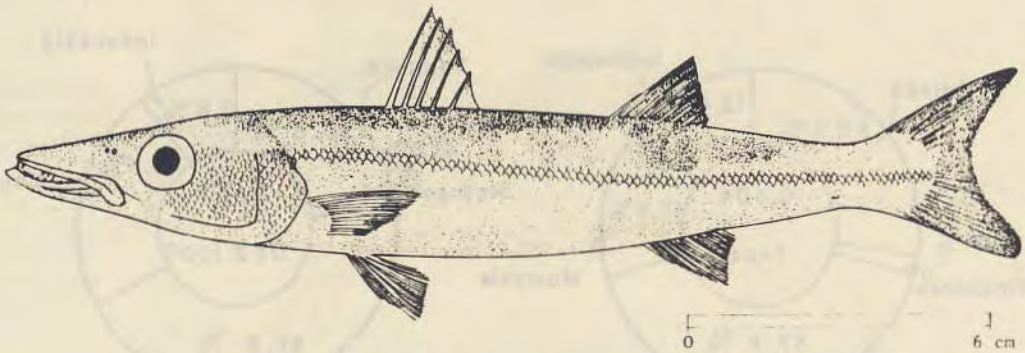

Fig. 38 *Sphyraena obtusata*, Obtuse barracuda
Maximum: 40 cm TL; common: 20-30 cm TL.

Distribution and biology: Distributes throughout most of the area; very common in the Indo-Pacific region.

Inhabits limpid more than turbid waters; living in the shallow coastal waters, especially near islands and mounds.

Small fishes occur in a large school.

Predatory fish; feeds predominately on small fishes.

Information on biology of this species in this region is not available.

Fishing grounds: Caught in shallow coastal waters, throughout its range.

Fishing gears used: Caught mainly with bottom trawls, purse seines (with lure), drift gill nets, longlines and set nets.

Catches and values (1976): Separate statistics for this species are not reported, the total reported catches of barracudas are available.

Principal forms of utilization: Marketed fresh, steamed, dried-salted, fermented and also prepared as fish sauce.

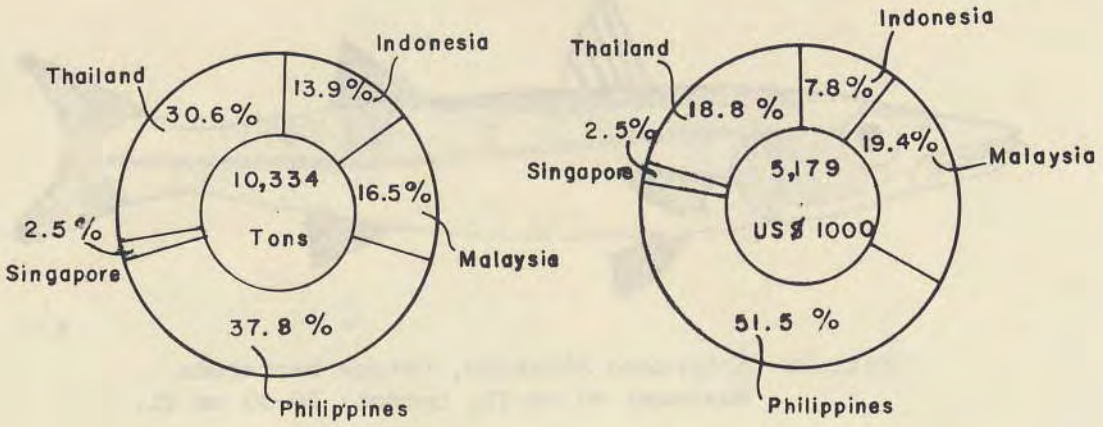

Fig. 39 Diagrams showing catch and value of barracudas in the Southeast Asian waters.

10. Stromateidae

10.1 *Pampus argenteus* (EUPHRASEN, 1788)

Synonyms still in use : None

English name : Silver pomfret

National species name : Filipino

Indonesian - Bawal putih

Malaysian - Bawal putih, Putih

Thai - Pla Jaramed-khao

Distinctive characters: Body very deep and compressed, parallelogram shape, with firm flesh. Mouth fairly small. Eye small covered with adipose eyelid. Gill membrane broadly united to isthmus, the gill opening restricted to a vertical slit on side of body. Single dorsal and anal fins, falcate, preceded by a series of 5-10 blade-like spines with anterior and posterior points. No pelvic fin; dorsal fin falcate, as also anal fin, caudal fin deeply forked, the lower lobe longer.

Coloration: black-grey, merging to silvery white toward belly; very small black dots all over body; vertical fins with dark edges and all fins faintly yellow.

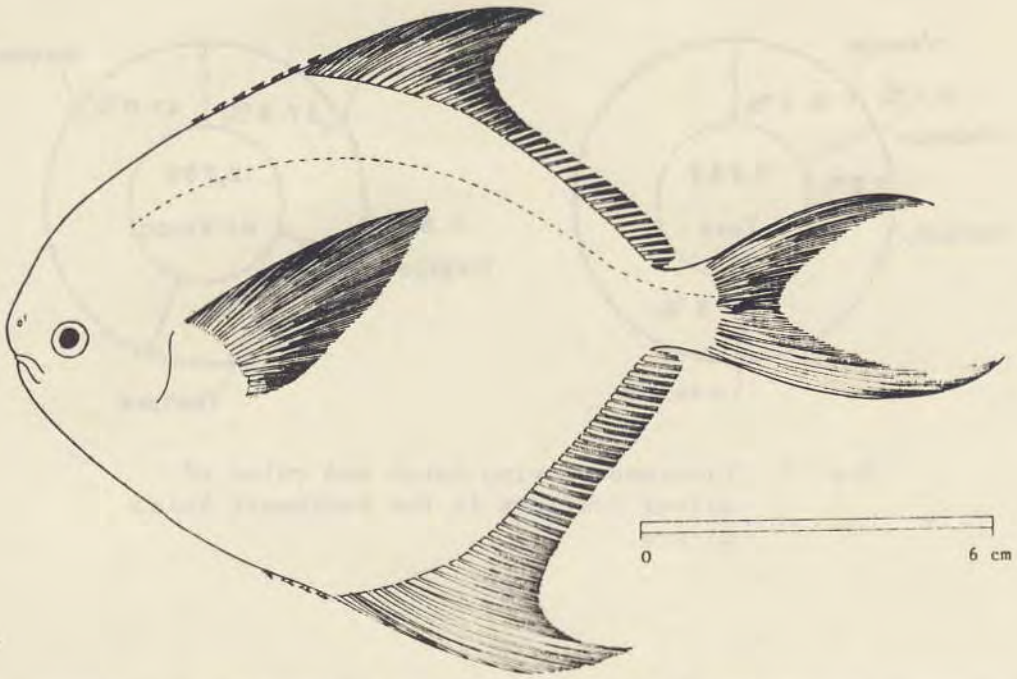

Fig. 40 *Pampus argenteus*, Silver pomfret
Maximum: 50 cm TL; common: 20-30 cm TL.

Distribution and biology: Distributes throughout the coastal waters of the area; also coast of India eastward to Hong Kong. No records from New Guinea and Australia.

Inhabits waters over muddy bottoms near coast over the continental shelf, down to 100 m depth. Usually found in schools; also enters brackish waters. Lives both near bottom and in midwater.

Two species are caught in substantial quantities in this area, silver pomfret *(P. argenteus)* and Chinese pomfret *(P. chinensis)*.

Feeds predominantly on soft bottom-living and larger planktonic invertebrates.

The spawning grounds are assumed to be offshore at 50 m depth.

Catches and Values (1976): This fish is highly esteemed by Southeast Asian people resulting in its fetching a very high price in the market.

Separate statistics for this species is not reported; the recorded catches of Stromateids are available.

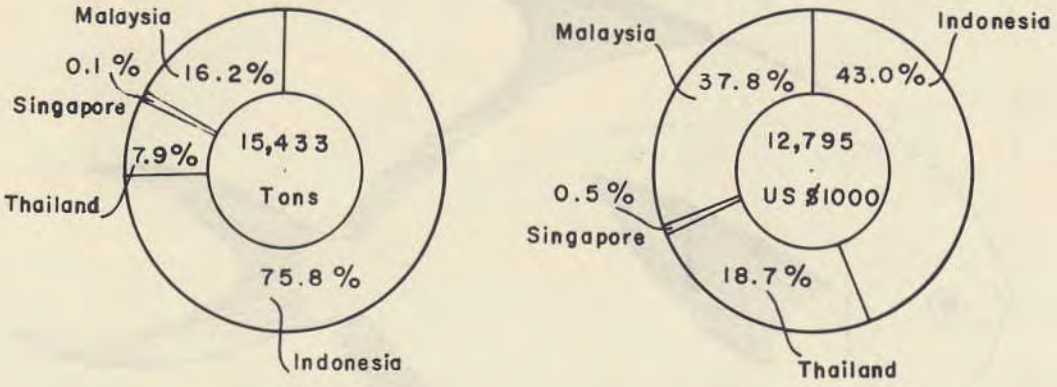

Fig. 41 Diagrams showing catch and value of silver pomfrets in the Southeast Asian waters.

Principal forms of utilization: Marketed mainly fresh, steamed and frozen.

11. Trichiuridae

11.1 *Trichiurus lepturus* LINNAEUS, 1758

Synonyms still in use : *Trichiurus haumela* (FORSKAL, 1775)
Trichiurus japonicus TEMMINCK & SCHLEGEL, 1884
Trichiurus lajor BLEEKER, 1854

English name : Largehead hairtail

National species name : Filipino - Espada
Indonesian - Layur
Malaysian - Selayur, Timah
Thai - Pla Daab-ngern

Distinctive characters: Body very elongate and strongly compressed, ribbon-like, tapering to a point (tip sometimes broken). Mouth large, strong fang-like teeth in jaws. Eye diameter 5-7 times in head length, lower hind margin of gill cover concave. A single dorsal fin running from behind head almost to end of body, pectoral fins about as long as snout; pelvic fins absent; anal fin reduced to separate spines, which

are buried in flesh in larger fish; caudal fin absent. Lateral line nearer to ventral profile than to dorsal profile, scales absent.

Coloration: steely blue with metalic reflection in live specimens; silvery grey in dead specimens.

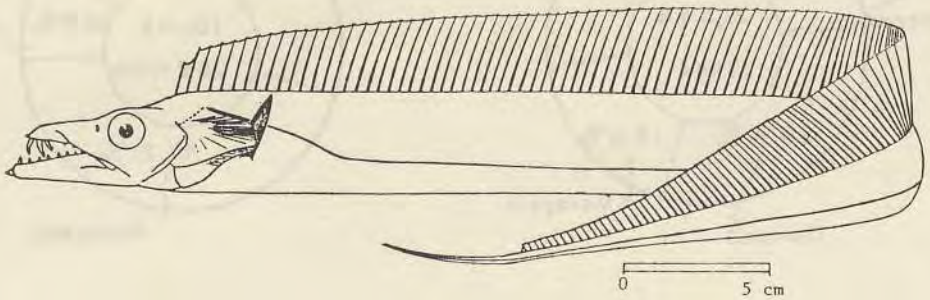

Fig. 42 *Trichiurus lepturus*, Largehead hairtail
Maximum:110 cm TL; common:70-90 cm TL.

Distributions and biology: Distributes throughout the area, inhabits especially the northern part of the South China Sea, the East China Sea and the Japan Sea. Both bottom-living and pelagic; it sometimes appears in large shoals in several areas of the South China Sea. Usually occurs in the shallow waters and also the deeper waters of at least 100 m depth. It sometimes enters estuaries and may be found in extremely shallow waters.

Exhibits predatory feeding habits; feeds mainly on crustaceans, cephalopods and fishes.

4 species of hairtails were reported in Filipino waters, of which *Trichiurus haumela* and *T. savala* are common species found throughout the southern part of the South China Sea.

No biological information in this area is available.

Fishing grounds: Throughout its range in coastal waters and trawling grounds down to 100 m depth.

Fishing gears used: Caught mainly with bottom trawlers (both otter board and pair trawls), purse seines, gill nets, long lines, hand lines, and bamboo stake traps.

Catches and values (1976): Separate statistic by species are not reported, it is included in *Trichiurus* spp. catches.

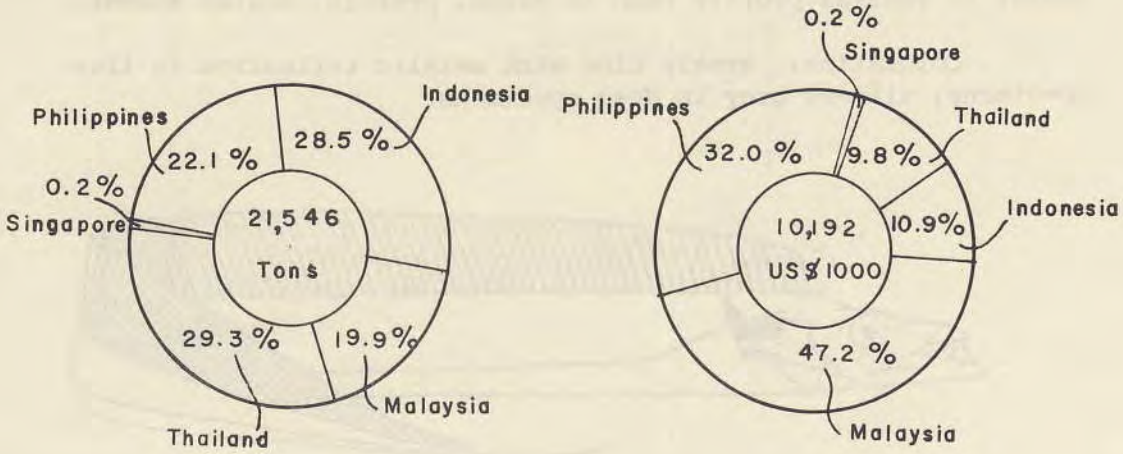

Fig. 43 Diagrams showing catch and value of hairtails in the Southeast Asian waters

Principal forms of utilization: Marketed mainly fresh, dried-salted, and made into fish balls.

DEMERSAL FISHES

12. Ariidae

12.1 *Arius thalassinus* (RÜPPELL, 1837)

Synonyms still in use : *Tachysurus thalassinus* (RÜPPELL, 1837)
Netuma thalassinus (RÜPPELL, 1837)

English name : Giant marine catfish

National species name : Filipino
Indonesian - Manyung
Malaysian - Duri
Thai - Pla-Kod-ta-le.

Distinctive characters: Body elongate, robust; snout rather pointed projecting clearly beyond lower jaw. Dorsal profile before dorsal fin nearly straight and somewhat steep. Three pairs of barbels around mouth. Head shield weakly striated and granulated, its surface nearly smooth; supra-occipital process about 1½ times longer than broad, its side borders almost parallel and striated. Teeth on palate fine.

villiform, in three groups on each side, arranged in a large triangular patch, the base of which is formed by two small anterior groups, while the hind group is much larger, extending backward. Dorsal and pectoral fins short, with a spine at front; adipose fin small, its origin just opposite origin of anal fin. Scale absent; lateral line complete.

Coloration: dark red/brown to blue/grey above, brown/white densely pigmented below; the whole with a bronze or silvery luster. Numerous narrow, parallel, transverse iridescent cross-bands corresponding with lines of papillae. Dorsal, adipose, anal and caudal fins dark terminally, as also the upper surface of pectoral and pelvic fins.

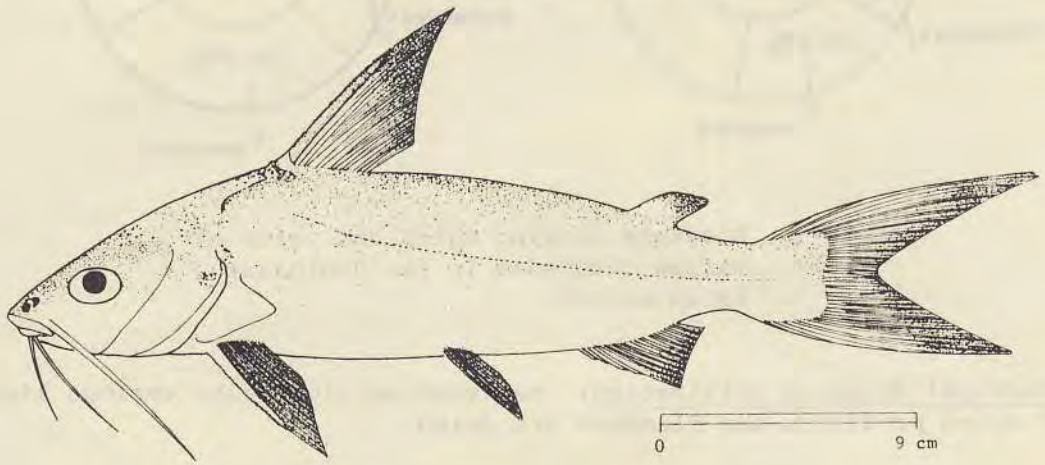

Fig. 44 *Arius thalassinus*, Giant marine catfish
Maximum:150 cm TL; common:25-70 cm TL.

Distribution and biology: A marine species often found in and around estuaries either individually or in schools.

Feeds mainly on crustaceans, molluscs, other invertebrates and also small fishes.

Females are much bigger than males, but the biggest specimen is male. Sex ratio of females to males is 1:1.7.

Spawning takes place during January-February. There is reason to believe that the male practises oral incubation of the eggs which are rather large and few in number.

Fishing grounds: Coastal waters throughout the area down to depth of 100 m.

Fishing gears used: Caught mainly with bottom trawls, longlines, handlines and bamboo stake traps.

Catches and values (1976): Separate statistics for this species are not reported. The total reported catches for Ariidae are available.

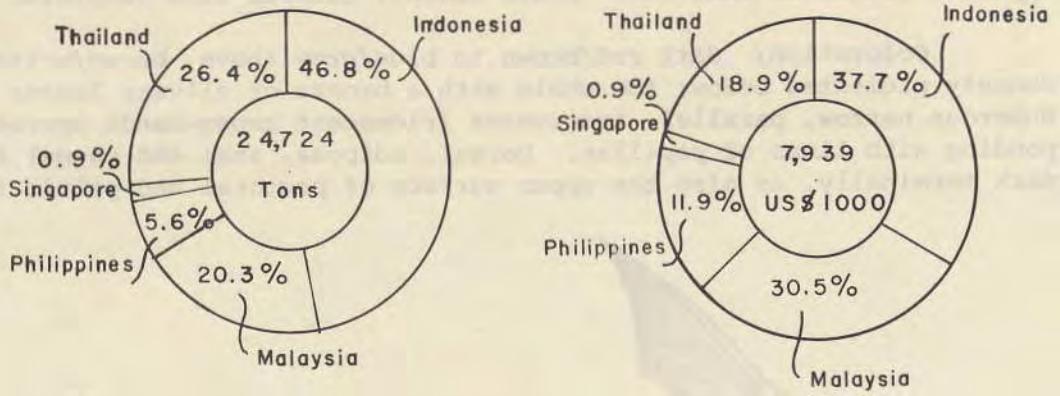

Fig. 45 Diagrams showing catch and value of marine catfishes in the Southeast Asian waters.

Principal forms of utilization: Marketed mainly fresh, various kinds of dried products, air bladders are dried.

13. Cynoglossidae

13.1 *Cynoglossus cynoglossus* (HAMILTON-BUCHANAN, 1822)

Synonyms still in use : *Cynoglossus sumatranus* (BLEEKER, 1853)
Cynoglossus bengalensis (BLEEKER, 1853)

Common name : Bengal tongue sole

National species name : Filipino - Dapang tsinelas
Indonesian - Ikan lidah
Malaysian - Lidah
Thai - Pla Lin-ma

Distinctive characters: Body flat and elongate, tongue-shaped; both eyes on left side of body, with a space between them. Gill opening very narrow. Snout rounded, rostral hook short, present below mouth, corner of mouth not reaching beyond lower eye, nearer to tip of snout than to gill opening, two nostrils, one patent between the eyes, the other tubular before the lower orbit. Dorsal fin reaching

forward on to head; both dorsal and anal fins joined to caudal fin. 2 lateral lines on eyed side but none on blind side. Scales on both sides of body ctenoid, 12-14 rows between lateral lines of eyed side.

Coloration: eyed side brown/grey, with vague dark marbling.

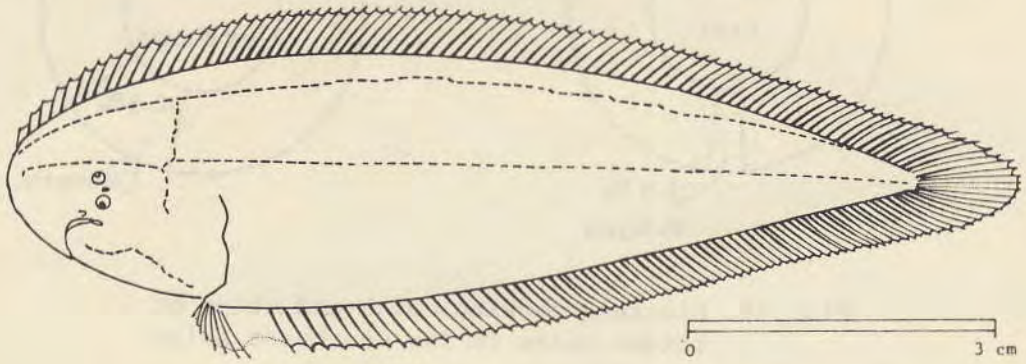

Fig. 46 *Cynoglossus cynoglossus*, Bengal tongue sole
Maximum:20 cm TL; common:10-15 cm TL.

Distribution and biology: Distributes throughout the area in the coastal waters down to depth of 50 m.

Inhabits muddy and sandy bottoms, often in shallow areas, including river estuaries and brackish waters.

Feeds predominantly on bottom-living invertebrates.

No informations on biology in this area is available.

Fishing grounds: Trawling grounds on the continental shelf and also in estuaries.

Fishing gears used: Caught mainly with bottom trawlers and also beach seines.

Catches and values (1976): Separate statistics for this species are not reported. The recorded catches for *Cynoglossus* spp. are available.

Principal forms of utilization: Marketed mostly fresh or frozen; also dried-salted and made into fish balls.

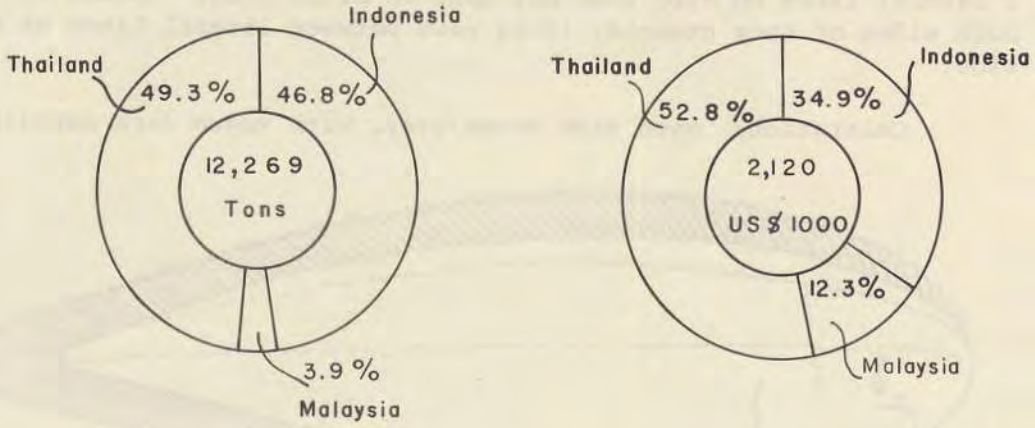

Fig. 47 Diagrams showing catch and value of tongue soles in the Southeast Asian waters.

14. Leiognathidae

14.1 *Leiognathus splenden* (CUVIER, 1829)

Synonyms still in use : None

Enslish name : Splendid ponyfish

National species name : Filipino - Sap-sap
Indonesian - Peperek, Pelek
Malaysian - Kikek
Thai - Pla pan.

Distinctive characters: Body compressed and rather deep, dorsal profile much more convex than that of abdomen. Head naked, nuchal spine present; snout shorter than eye diameter. Eye large, its diameter ½ of head length; mouth small, extremely protractile, pointing slightly downward when protracted. Pelvic fins not reaching to anal fin origin. A long dorsal fin with 7-8 spines and 15-17 rays; anal fin with 3 spines and 13-15 rays; caudal deeply forked. Scales distinct, in irregular rows, and extended over the breast and chest; a large one at base of ventral fin.

Coloration: body silvery; scales of lateral line, base of pectoral fins, margins of dorsal and anal fins bright yellow; sometimes, a black spot on upper third of spinous portion of dorsal fin.

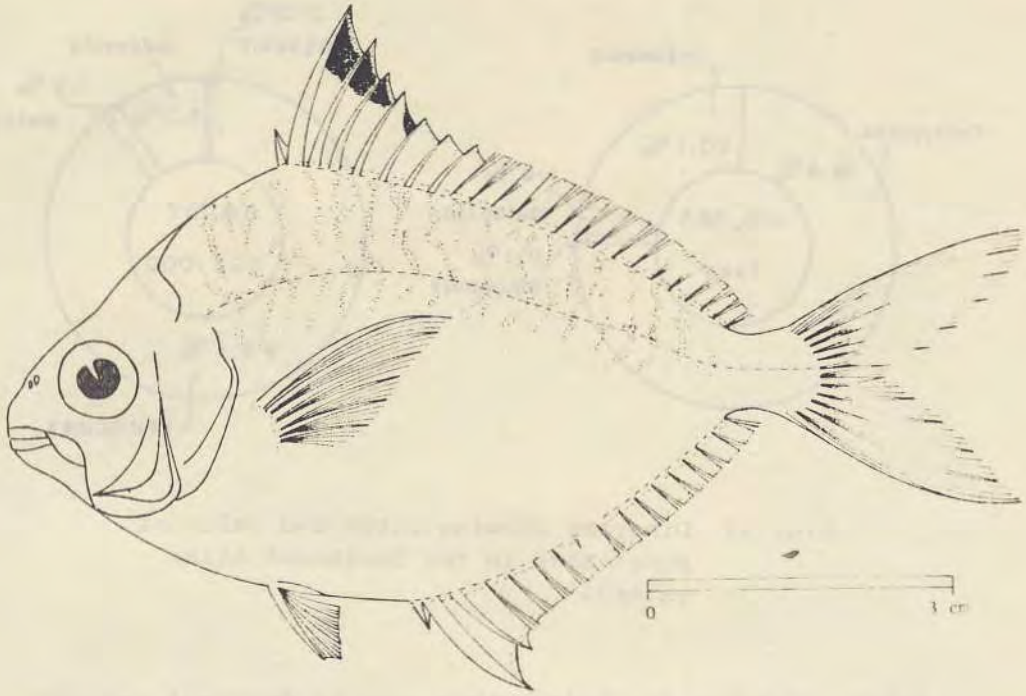

Fig. 48 *Leiognathus splenden*, Splendid ponyfish
Maximum:14 cm TL; common:6-12 cm TL.

Distribution and biology: Distributes throughout the area.

Inhabits shallow waters down to depths of about 20 m, predominantly near the bottom; usually found in schools.

Feeds on a great variety of zoo- and phytoplankton species; eats much more foraminiferans than other species; pelagic copepods and fish eggs are also present in the food composition.

Spawns almost throughout the year, with the peak from January-May and July-December. The length at maturity ranges from 9-12 cm. Males are smaller than females.

Fishing grounds: Caught in inshore waters, throughout the year.

Fishing gears used: Caught mainly with bottom trawls, bamboo stake traps, beach seines and also push nets.

Catches and values (1976): Separate statistics for this species are not reported. Only total catches of *Leiognathus* spp. are available.

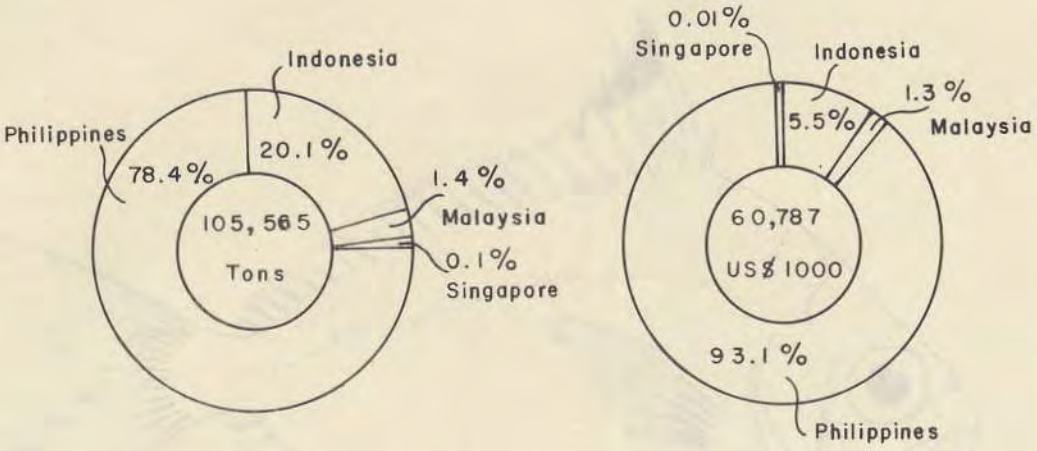

Fig. 49 Diagrams showing catch and value of ponyfishes in the Southeast Asian waters.

Notes: Catches for *Leiognathus* spp. in Thailand are not reported separately; they are included in miscellaneous and trash fishes.

Principal forms of utilization: Marketed fresh, used for fish meal and duck food.

15. Lutjanidae

15.1 *Lutjanus lineolatus* (RÜPPELL, 1828)

Synonyms sillI in use : None

English name : Bigeye snapper

National species name : Filipino - Maya-maya

Indonesian - Ikan merah

Malaysian - Jenahak, Merah

Thai - Pla Kapong-kang-luang

Distinctive characters: An elongate, large-eyed snapper with head profile moderately convex; interorbital space flat or slightly convex; distance from eye to jaw approximately 1/3 of eye diameter. Teeth in jaws in bands with a weak outer row of conical teeth and an enlarged pair of canines in upper jaw, and 2-3 enlarged canines halfway along lower jaw. Dorsal fin with 11 spines and 11-12 soft

rays; anal fin with 3 spines and 8 soft rays; caudal fin slightly forked. Longitudinal rows of scales above lateral line appear to rise upward to dorsal profile; scales below lateral line running horizontally, but curving slightly upward at base of caudal fin; soft parts of dorsal and anal fins with a scaly sheath.

Coloration: ground colour yellowish or pale brown with orange/brown lines following the scale rows on back and sides. One stronger, dark yellow line along sides from tip of snout through eye to caudal fin.

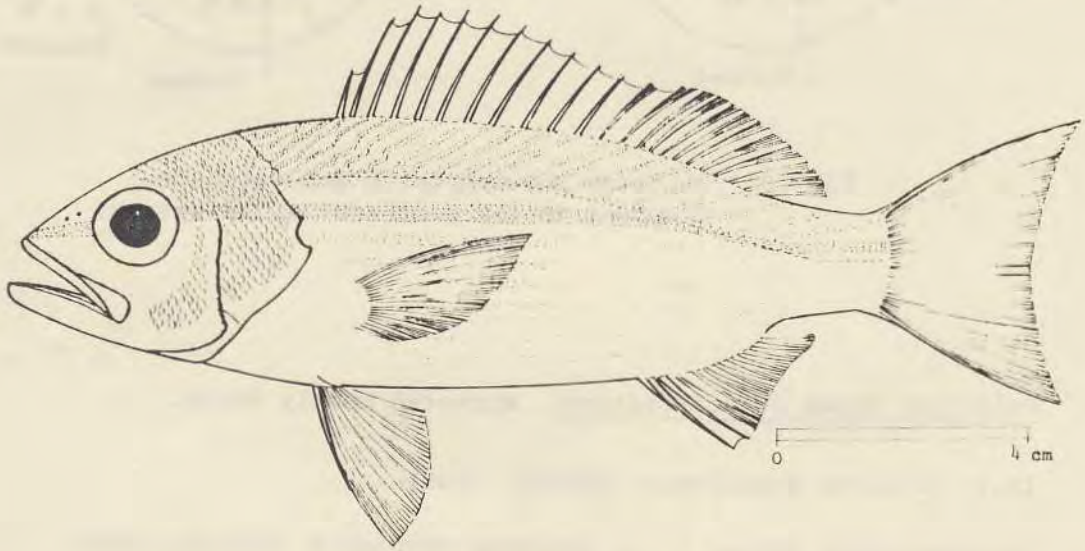

Fig. 50 *Lutjanus lineolatus*, Bigeye snapper
Maximum:25 cm TL; common:15-18 cm TL.

Distribution and biology: Distributes throughout the area and southward to tropical Australia; also, westward to South Africa.

Inhabits both shallow coral reef areas, and down to depth of 80 m.

Feeds on bottom-living invertebrates and small fishes.

Fishing grounds: Caught in the shallow rocky and coral reef areas, down to depth of 80 m.

Fishing gears used: Caught mainly with bottom trawls, hand lines and long lines.

Catches and values (1976): Separate statistics for this species are not reported. Only total reported catch of Lutjanidae is available.

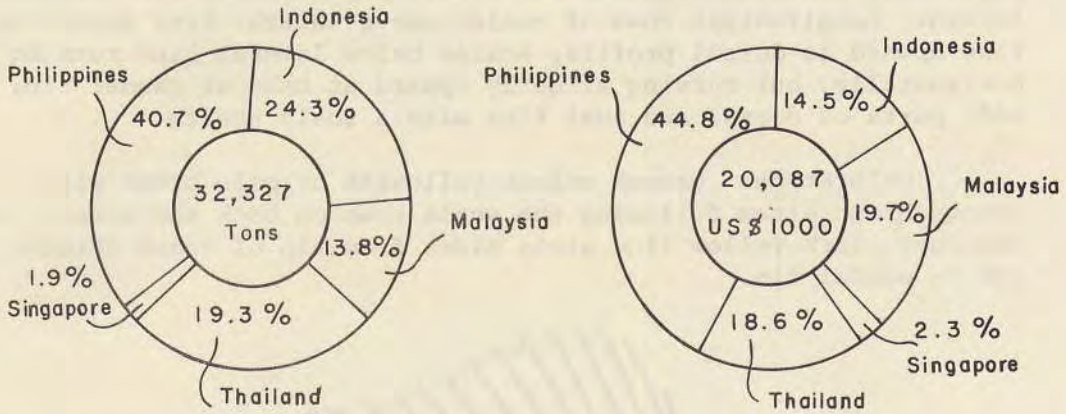

Fig. 51 Diagrams showing catch and value of snappers in the Southeast Asian waters.

Principal forms of utilization: Marketed mostly fresh.

15.2 *Lutjanus sanguineus* (CUVIER, 1828)

Synonyms still in use : *Lutjanus annularis* (CUVIER, 1828)
Lutjanus erythropterus (BLOCH, 1790)

English name : Blood snapper, red snapper

National species name : Filipino - Maya-maya
Indonesian - Ikan merah
Malaysian - Jenahak, Kilat
Thai - Pla Kapong-daeng

Distinctive characters: Deep-bodied, moderately compressed with head profile straight or concave; height 2.4-2.5 in body length; interorbital space 4.4-5.1 times in head length; preopercular notch shallow, almost absent; interopercular knob inconspicuous; ventral and horizontal edges of preoperculum finely serrated. Mouth rather oblique, maxillary reaches below front border of eye; teeth on the vomer in a reverse V shape. Dorsal fin with 11 spines and 14 soft rays; anal fin with 3 spines and 8-9 soft rays. Scales rather big, longitudinal rows of scales above lateral line, horizontal anteriorly but some turning obliquely upward posteriorly; scales on head beginning behind eye;

soft parts of dorsal and anal fins with a scaly sheath.

Coloration: deep red in adults; juveniles red/brown above, silvery below, with dark longitudinal stripes on body following scale rows, a saddle-like black blotch on caudal peduncle surrounded by a silvery band, and a dark brown band down front of head.

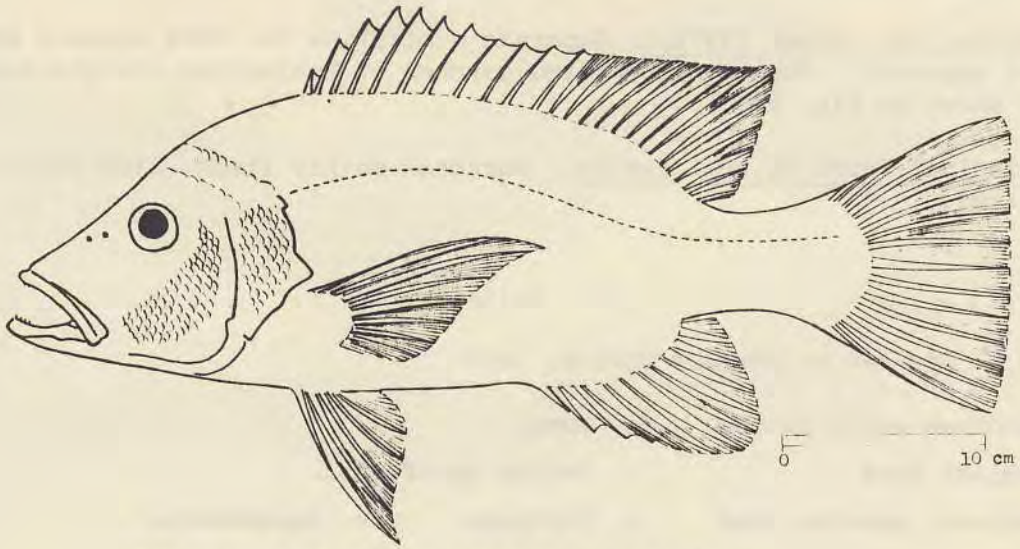

Fig. 52 *Lutjanus sanguineus*, Red snapper
Maximum:90 cm TL; common:50 cm TL.

Distribution and biology: Distributes throughout the area and southward to tropical coasts of Australia; also westward to South Africa.

This fish is one of the important and dominant demersal food fishes in the South China Sea. It is usually found at 35-100 m depth, and it seems that it inhabits around coral reef cup area and also at the muddy bottom.

Feeds on fishes, mollusks and crustaceans (Brachyura, Stomatopoda and shrimps). It changes its feeding habit with growth from fishes and crabs to fishes.

The spawning season extends from March to September and the peaks are in April and June.

Fecundity ranges from 691,000-2,620,000 eggs for the fishes of 52.2-73.6 cm LX (1.7-5.8 kg in body weight).

The biological minimum size is about 50 cm LX.

The fish of 23 cm LX will grow 20-24 cm within one year, and 18 cm the year after.

During the period from March-May, it migrates from deep to inshore waters.

Fishing grounds: Coastal and deep sea waters, throughout its range.

Fishing gears used: Caught mainly with bottom trawls, handlines and bottom longlines.

Catches and values (1976): Separate statistics for this species are not reported. The total reported catches of Lutjanidae are available as shown in Fig. 51.

Principal forms of utilization: Marketed mainly fresh, also dried-salted.

16. Mullidae

16.1 *Upeneus sulphureus* CUVIER, 1829

Synonyms still in use	:	None	
English name	:	Yellow goatfish	
National species name	:	Filipino	- Saramullete
		Indonesian	- Biji Nangka
		Malaysian	- Biji Nangka
		Thai	- Pla Pae-luang

Distinctive characters: Body elongate, but rather deep, under-side of head and also belly, flat. Chin with 2 thin, short barbels; no spine on operculum. Mouth in front of snout, rather small, and with a lateral cleft. Teeth in both jaws and on vomer and palatine (roof of mouth), the latter can only be seen after removal of lower jaw. Scales large, feebly ctenoid, and rather deciduous; 5 vertical rows of scales along the space between dorsal fins; 12 vertical rows of scales along upper part of caudal peduncle. Pelvic fins short, about 2/3 the length of pectoral fins, ventral fin with one spine and five rays.

Coloration: head reddish, back greenish bronze or olive green, lower sides and belly yellow; two yellow/orange bands along sides, the upper from eye to caudal peduncle and the lower from axil of pectoral fin to caudal peduncle. Both dorsal fins white, with 3 horizontal stripes, the uppermost (at tips of fin) black, the others grey; no marks on anal or caudal fins, the latter in uniform grey/green with a dusky margin; barbels white.

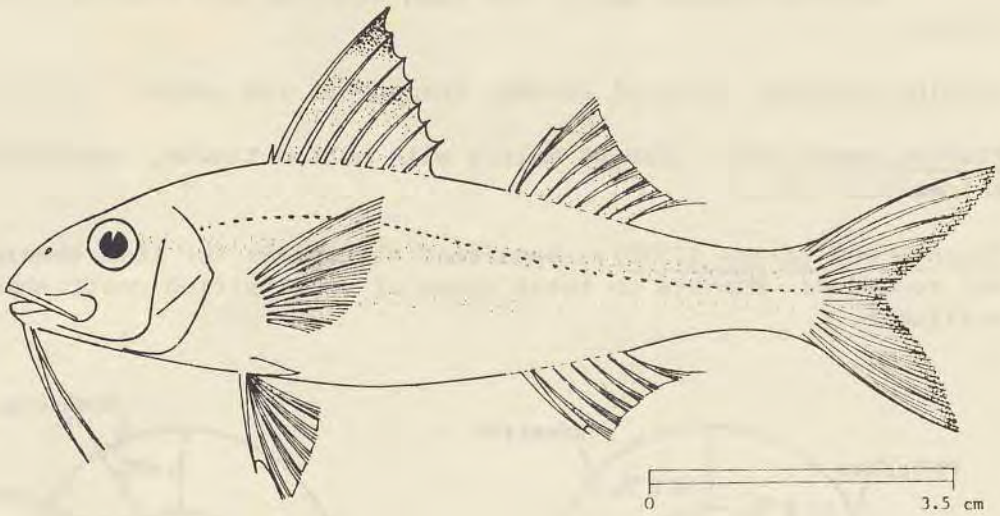

Fig. 53 *Upeneus sulphureus*, Yellow goatfish
Maximum:23 cm TL; common:12-15 cm TL.

Distribution and biology: Distributes throughout the area.

Inhabits coastal waters, often in river estuaries, at depth of 30-110 m, usually found in large schools.

Feeds on bottom-living organisms, mainly crustaceans (81%) and fishes (19%). Among crustaceans, shrimps predominant (43%), the second place is occupied by unidentified species (21%) and the third by crabs (17%).

Females are bigger than males. The condition coefficient of females is higher than that of males. The females predominate very strongly; the sex ratio is 7:1.

A part of breeding season is in September; the ripening season in January.

Study on the reproduction, growth and survival of goldband or red goatfish *(U. moluccensis)* had been carried out in Hong Kong. It was found that the main spawning grounds lie inshore, spawning season lasts from March to September, with a peak in May. They are found to be mature when one year old. The growth rate of juvenile fish is rapid, females grow faster than males. The common age group landed are 0-4, with the majority in age group 1 and 2. Fecundity of 14-22 cm LF ranges from 40,000-280,000 eggs, with the mean 1,175 egg/gm body weight.

After February-April, the fish disperse and migrate to deeper waters.

Fishing grounds: Coastal waters, throughout its range.

Fishing gears used: Caught mainly with bottom trawls, trap nets, seines and lines.

Catches and values (1976): Separated statistics for this species are not recorded. Reports on total catch of unclassified goatfishes are available.

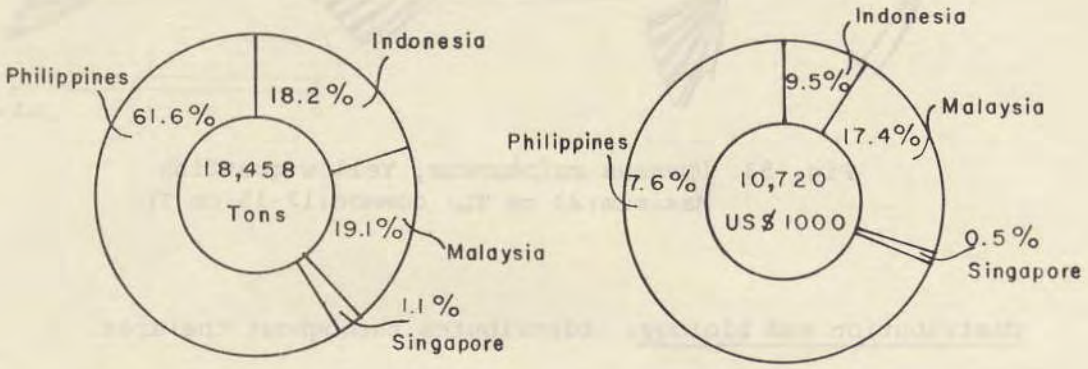

Fig. 54 Diagrams showing catch and value of goatfishes in the Southeast Asian waters.

Principal forms of utilization: Marketed mainly fresh, dried-salted, also used for fish-meal.

17. Nemipteridae

17.1 *Nemipterus hexodon* (QUOY & GAIMARD, 1824)

Synonyms still in use : *Synagris hexodon* GUNTHER, 1854

English name : Ornate threadfin bream

National species name : Filipino - Bisugo
Indonesian - Kurisi
Malaysian - Kerisi
Thai - Pla Sai-daeng

Distinctive characters: Body slightly compressed, deeper than head; head without spines, its anterior part scaleless. Mouth terminal, small teeth in bands; canine teeth in upper jaw. Dorsal fin single, with 10 spines and 9 soft rays; pelvic fins with an axillary scale; anal fin with 3 spines and 7 soft rays. No filament in fins; caudal deeply forked, upper lobe of caudal fin pointed in young, blunt in older fish.

Coloration: 6-7 yellow stripes along flanks, the stripe below lateral line broadest. A spot (upper part red, lower part yellow/green) below origin of lateral line. Dorsal fin rosy, with a yellow margin and a well defined green/yellow band, paralleled above and below by translucent blue bands from base of 1st spine to upper half of last soft ray; pectoral fin rosy, the inner side of pectoral base yellow; pelvic fin hyaline, with 2nd and 3rd rays pinkish; anal fin milky white with yellow line from base of 1st spine to tip of last soft ray; caudal fin usually with white lower margin and yellow tip on upper lobe (yellow tip less marked in young fish).

Fig. 55 *Nemipterus hexodon*, Ornate threadfin bream
Maximum:30 cm TL; common:15-25 cm TL.

Distribution and biology: Distributes throughout the Indo-Australian archipelago and northward to Hainan.

Bottom living, inhabits sand and muddy sand from the coastal waters to depth of at least 120 m.

In the Gulf of Thailand, 10 species of *Nemipterus* were found of which *N. mesoprion*, *N. japonicus*, *N. nematophorus* and *N. hexodon* are very common and economically important species.

The sexual dimorphism exists in *N. hexodon;* in the Gulf of

Thailand males are significantly longer than female; the sex ratio is 0.38 male for every female for the entire year. The growth rate of male seems to be more rapid than female, the growth increment approximately 1 cm/month.

It spawns throughout the year with the peak in the period during January-April and June-August (in the Gulf of Thailand).

Feeds on bottom-living animals (carnivorous) such as shrimps, squids, small fishes and worms. Small fish prefer to feed on crustaceans, copepods and ostracods in the coastal shallow waters.

Fishing grounds: Coastal waters throughout its range especially in the water 20-60 m depth.

Fishing gears used: Caught mainly with trawls (both otter board and paired trawls) and lines.

Catches and values (1976): Separate statistic for this species are not reported; the total reported catches of unclassified *Nemipterus* spp. are available.

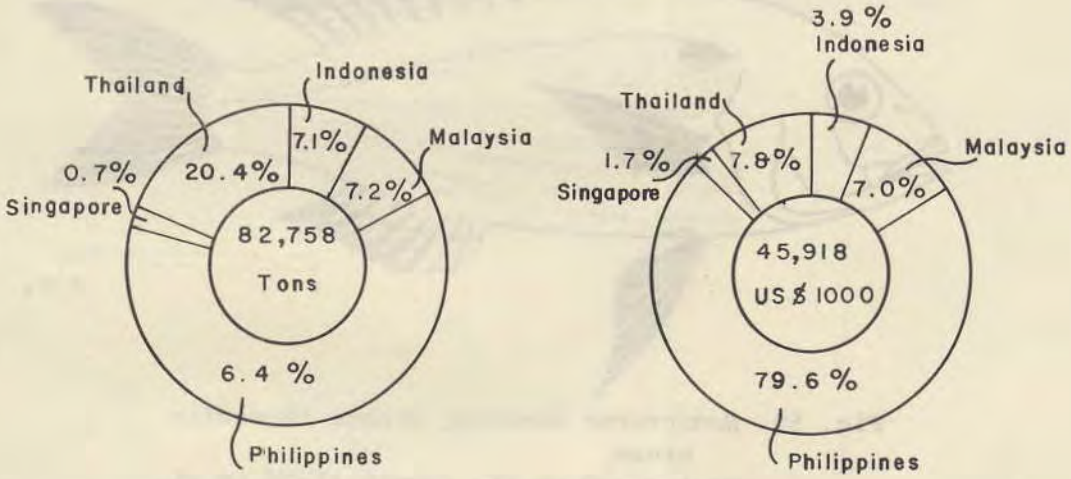

Fig. 56 Diagrams showing catch and value of threadfin breams in the Southeast Asian waters.

Principal forms of utilization: Marketed fresh, dried-salted, smoked, steamed, made into fish balls and fish-meal.

17.2 *Nemipterus japonicus* (BLOCH, 1791)

Synonyms still in use : *Synagris japonicus* (GÜNTHER, 1859)

English name : Japanese threadfin bream

National species name : Filipino - Bisugo

Indonesian - Kurisi

Malaysian - Kerisi

Thai - Pla Sai daeng

Distinctive characters: Body as deep or deeper than head; head without spines, its anterior part scaleless. Mouth terminal, small teeth in bands; canine teeth in upper jaw. Dorsal fin single with 10 spines and 9 soft rays; pelvic fins with an axillary scale; anal fin with 3 spines and 7 soft rays. Caudal deeply forked, upper lobe of caudal fin prolonged into a filament; no filaments in other fins.

Coloration: a brownish saddle on top of head. 1-3 longitudinal yellow lines above lateral line, 7-9 below, and a yellow band along belly; a bright orange/red blotch near origin of lateral line. No dark saddles on back of body. Dorsal fin rosy, with yellow/orange margin and a broad yellow band along base (less conspicious in fish shorter than 10 cm); pelvic fins yellowish at base and with yellow axillary scales; anal fin milky white or pale blue with faint, wavy, yellow lines which may form a recticulate pattern in larger fish; caudal fin red, tip of upper lobe and filament yellow.

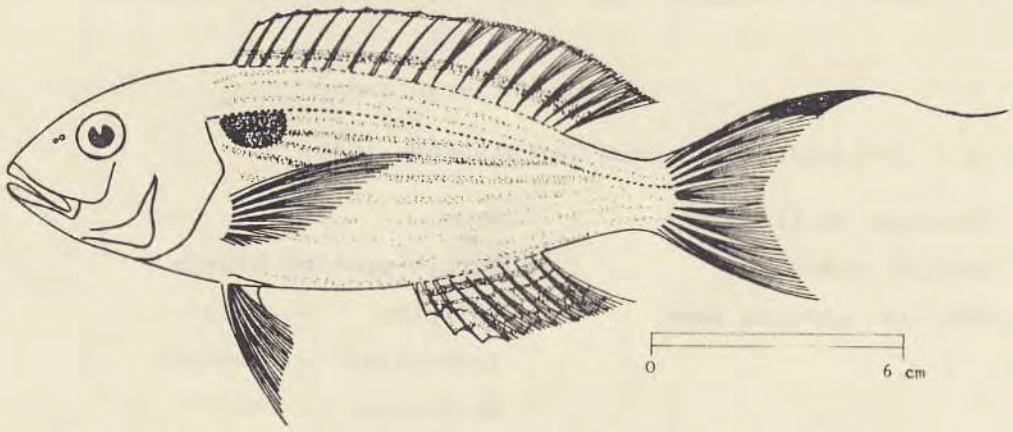

Fig. 57 *Nemipterus japonicus*, Japanese threadfin bream
Maximum:32 cm TL; common:12-25 cm TL.

Distribution and biology: Distributes throughout most of the area, possibly to northern coast of Australia.

Bottom living, inhabits muddy bottom with fine sand, from

the shoreline to 60 m depth; the smaller fish occur in the shallow waters. It always swims in small schools.

Feeds on a wide range of bottom-living animals including worms, crustaceans, mussels, cephalopods and fishes. The diet changes little with size but smaller fish prefer small crustaceans (copepods and ostracods).

It spawns throughout the year with the peak during January-April and August-September.

Males grow faster and to a larger size than females. The average length of female is less than that of male by 2.5 cm. The sex ratio between female and male is 1:1.3.

Fishing grounds: Coastal waters throughout its range.

Fishing gears used: Caught mainly with bottom trawls, gill nets, lines and bamboo stake traps.

Catches and values (1976): No separate statistics exist for this species; the total reported catches of unclassified *Nemipterus* spp. are available as shown in Fig. 56.

Principal forms of utilization: Marketed fresh, steamed, dried-salted, dry-smoked, fermented, made into fish balls and fish-meal.

18. Priacanthidae

18.1 *Priacanthus tayenus* (RICHARDSON, 1846)

Synonyms still in use	:	None
English name	:	Purple-spotted bigeye
National species name	:	Filipino - Dilat
		Indonesian - Swanggi
		Malaysian - Ungah
		Thai - Pla Tawaan

Distinctive characters: Body stocky and compressed, eyes very large. Mouth large and oblique. Head completely covered with scales. A single dorsal fin with 10 spines and 11-15 soft rays; soft part of dorsal and anal fins angulate or pointed; pelvic fins shorter than head, joined to body by a membrane; caudal fin lunate, often with both upper and lower filaments. Scales small, rough, difficult to detach.

Coloration: body brilliant crimson red, paler below. Pelvic fins with distinct blackish-red spots, other fins without spots.

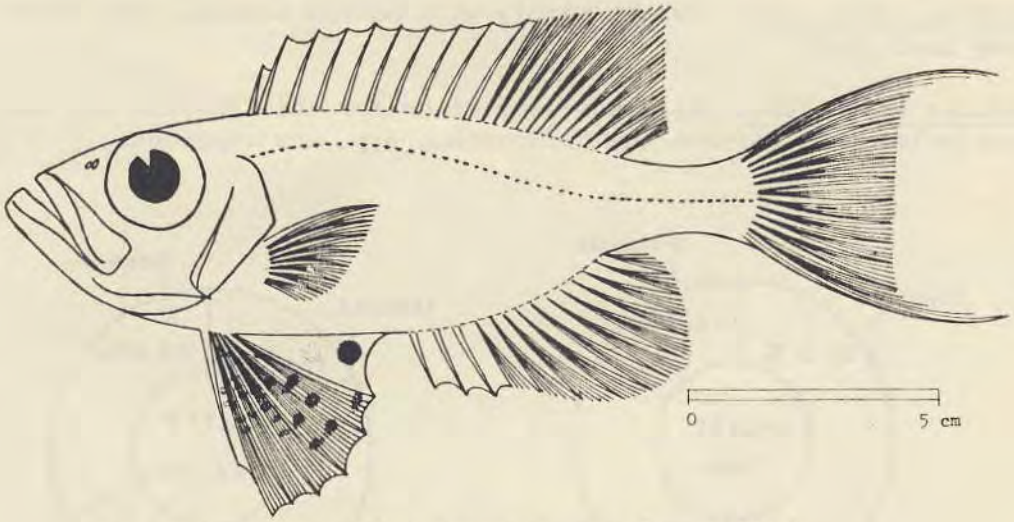

Fig. 58 *Priacanthus tayenus*, Purple-spotted bigeye
Maximum:30 cm TL; common:12-25 cm TL.

Distribution and biology: Distributes throughout the area and southward to northern Queensland; very common in the Indo-Pacific, China Sea, Formosa, the Philippines, Indian Ocean to the Malay Archipelago.

Normally inhabits shallow water and down to depth of 150-200 m on the muddy bottom with sand. Small fish mainly occur inshore at certain time but seem to be active at night. This species migrate to the inshore waters from January to March.

In the Gulf of Thailand 2 species were found, but *Priancanthus tayenus* is the most common.

Feeds on a wide range of bottom-living animals such as shrimps (72%), small fishes (14%), crabs (4%), squids (7%), snails (2%) and mantis shrimps (1%).

There is a long spawning period; it can be said that it spawns all the year round with the peaks during February-May and July-August. The fishes are ready to spawn at the age about 8-9 months (14.5 cm FL).

The growth rate of males is observed to be faster than that of females.

The fecundity of specimens of 17.0-24.5 cm LX is 56,000-152,000 eggs.

Fishing grounds: Caught mainly in the shallower grounds of the continental shelf throughout its range.

Fishing gears used: Caught mainly with bottom trawls, long lines and also hand lines.

Catches and values: Separate statistics for this species are not available; only catches for *Priacanthus* spp. are reported.

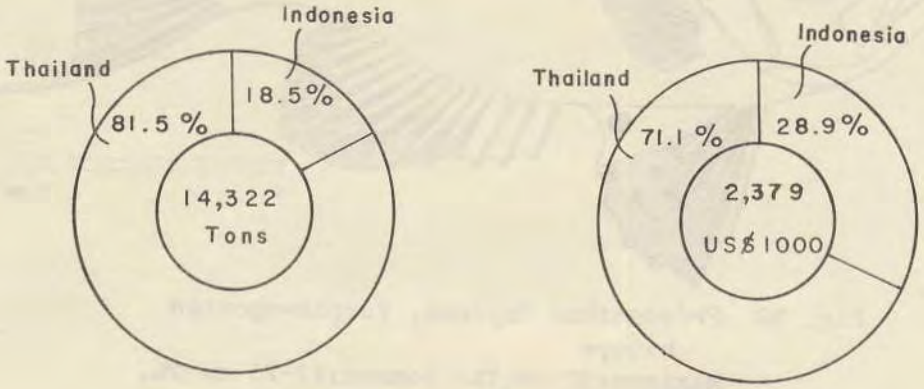

Fig. 59 Diagrams showing catch and value of bigeyes in the Southeast Asian waters.

Principal forms of utilization: Marketed mostly fresh, dried-salted, steamed and made into fish balls.

19. Sciaenidae

19.1 *Dendrophysa russelli* CUVIER, 1830

Synonyms still in use : *Umbrina russelli* CUVIER, 1830

Sciaena russelli BLEEKER, 1874; WEBER & DE BEAUFORT, 1936; LIN, 1938; CHU, LO & WU, 1963

English name : Goatee croaker, Russell's jewfish

National species name : Filipino

Indonesian - Gulamah

Malaysian - Gelama, Temeras, Tengkerong

Thai - Pla Juad-na-san.

Distinctive characters: A fairly small species, body compressed and oblong, its depth 3-4 times in standard length; snout rounded and projecting slightly beyond tip of upper jaw; mouth inferior; upper jaw less than ½ of head length; a single barbel on chin. Villiform teeth in both jaws, with an outer enlarged row in the anterior half of the premaxillaries; no canine teeth. Swimbladder carrot-shaped, with about 15 pairs of aborescent appendages, the first entering the head, the last bifid and parallel to tubular end of bladder. Dorsal fin with 10 spines, followed by a deep notch, second part of the fin with 1 spine and 26-28 soft rays; anal fin with 2 spines and 7 soft rays, the 2nd spine strong and a little less than ½ of head length; caudal fin rhomboid. Scales cycloid on front part of head and lowerparts of dorsal and anal fins, elsewhere ctenoid. Lateral line curves to above the middle of anal fin where it becomes straight, lateral line scales 44-50 reaching to tip of caudal fin.

Coloration: back grey, shading to white on belly; upper edge of spiny part of dorsal fin dark.

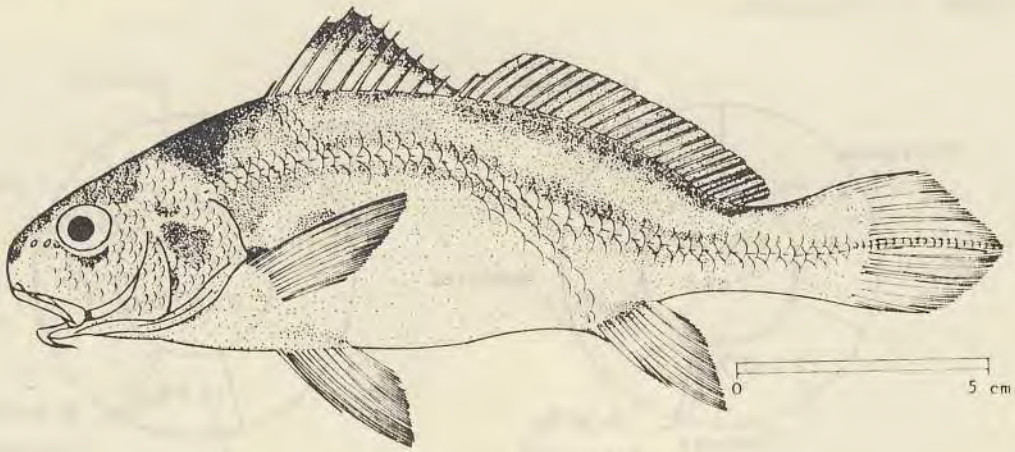

Fig. 60 *Dendrophysa russelli*, Goatee croaker
Maximum:25 cm TL; common:15 cm TL.

Distribution and biology: Distributes throughout the area.

Inhabits over the continental shelf where the depth of water is usually less than 150 m depth, and bottom is composed of sand and muddy sand; very abundant in coastal waters, down to 40 m.

The food for larval and juvenile stages of this fish is mostly zooplankton, mainly copepods and mysids, and that of the adults is shrimps, small fishes and some benthic animals in addition to zooplankton.

The fish population in the Gulf of Thailand consists of at least 7 groups. The new recruitments enter into the fishery in January, March, April, May, June, September and November. The fishing season is throughout the year, and catches are highest from April to September, possibly due to spawning migration.

Mature females are found almost throughout the year and the advanced stage of both sexes is found during March-May and November-January. There is no sexual dimorphism.

The growth rate is about 1 cm per month.

Fishing grounds: Coastal waters throughout its range.

Fishing gears used: Caught mainly with bottom trawls, handlines and traps.

Catches and values (1976): Separate statistics for this species are not recorded. The total reported catch of unclassified croakers and drums is available.

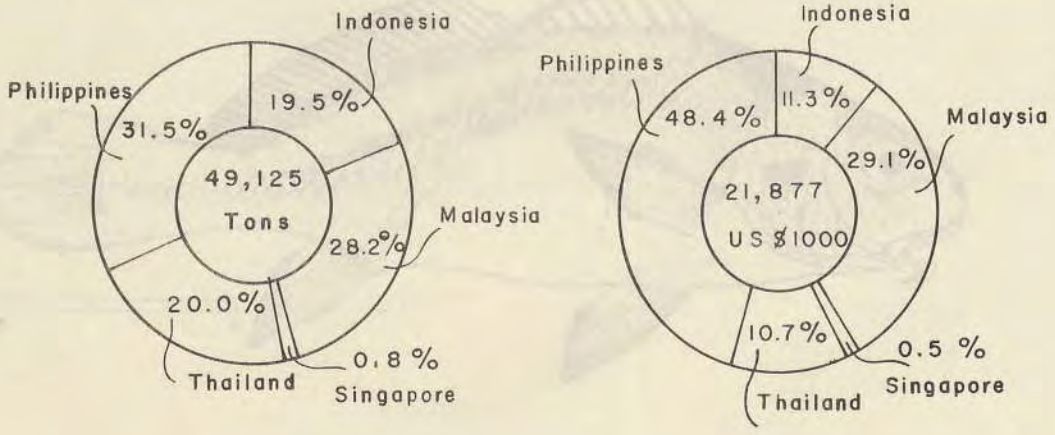

Fig. 61 Diagrams showing catch and value of croakers in the Southeast Asian waters.

Principal forms of utilization: Marketed fresh, dried-salted; swimbladder dried.

20. Serranidae

20.1 *Epinephelus tauvina* (FORSSKAL, 1775)

Synonyms still in use : *Epinephelus elongatus* SCHULTZ, 1953

English name : Greasy grouper

National species name : Filipino - Lapu lapu
Indonesian - Kerapu
Malaysian - Kerapu
Thai - Pla Karang-pak-maenam

Distinctive characters: Body oblong, moderately elongate and thick-set. Mouth large, maxilla tip broad; teeth in narrow bands, in 2 series on sides of jaws, those of the inner series longer and depressible. Preoperculum with a slightly convex serrated upper edge and several strong spinules at lower angle. Operculum with straight upper edge and 3 spines, the middle spine closer to the lower one. Gill raker 27-30 on lower part of 1st gill arch. Dorsal fin with 11 spines and 15-16 soft rays; caudal fin rounded.

Coloration: ground colour light brown, with darker vertical or oblique bands; upper part of head and body and base of pectoral fins covered by red/brown spots; spots on cheek arranged in regular series from eye to preopercular angle. Spots in large adults obscure or obsent.

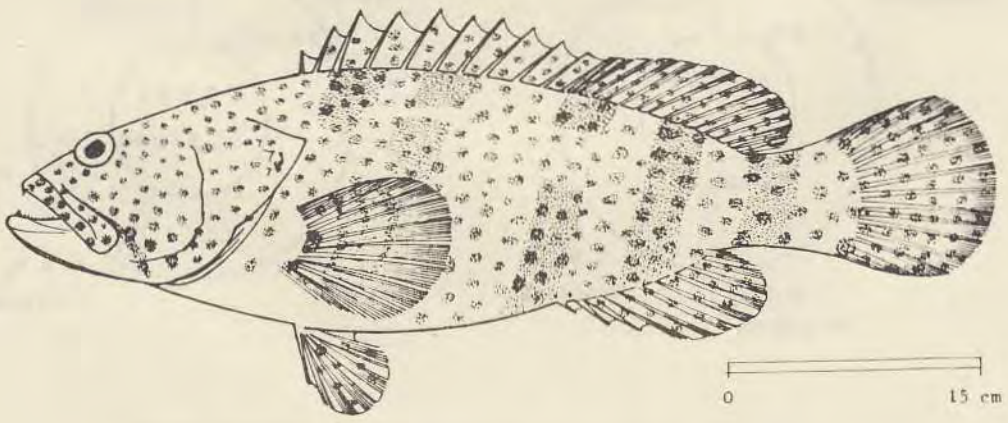

Fig. 62 *Epinephelus tauvina*, Greasy grouper
Maximum:150 cm TL; common:60-70 cm TL.

Distribution and biology: Distributes throughout the area.

It inhabits shallow waters, down to 60 m.

The fishing season is throughout the year on sandy bottom with shells and rocks.

Feeds on bottom-living crustaceans and fishes.

The peak of spawning occurs during the periods from January-April and July-August.

The minimum size at which a significant proportion of the population first takes part in spawning may be considered to be around 45-50 cm LB. The fishes from 56-74 cm LB have about 2,000,000-2,700,000 eggs; the numbers of eggs has been found to increase with body length up to 67.5 cm.

Gonadal histology has demonstrated that this fish is a protogenous hermaphrodite with females transforming into males at around 65.0-75.0 cm LB. Hence, males tend to be larger than females.

The obtained growth constants for k and L_∞ are 0.14 and 86.5 cm LB respectively; it shows that this fish is long-lived and slow-growing.

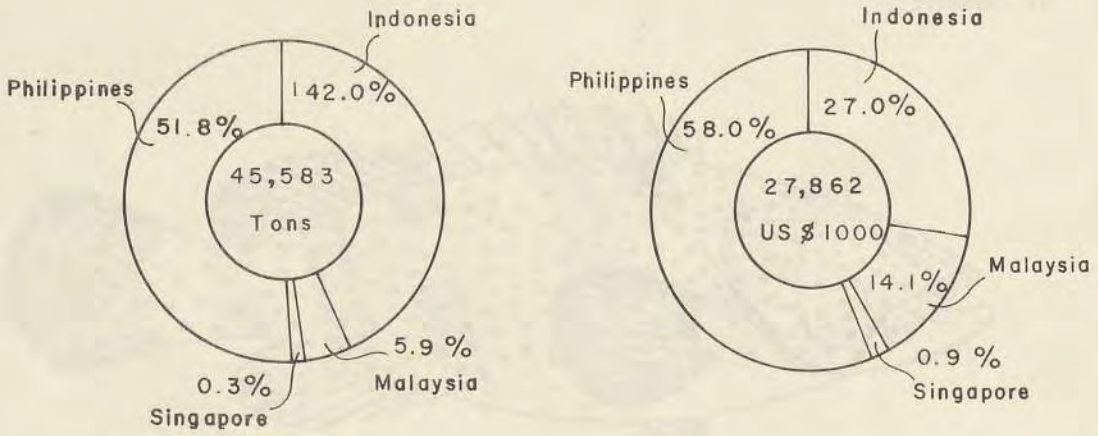

Fig. 63 Diagrams showing catch and value of groupers in the Southeast Asian waters.

Fishing grounds: Caught throughout its range.

Fishing gears used: Caught mainly with long lines, hand lines, bottom trawls and also traps.

Catches and values (1976): Separate statistics for this species are not reported. Only total reported catch of serranids in this area is available.

Principal forms of utilization: Marketed mostly fresh.

21. Sillaginidae

21.1 *Sillago sihama* (FORSSKAL, 1755)

Synonyms still in use	:	None
English name	:	Silver sillage, Silver whiting
National species name	:	Filipino - Asohos
		Indonesian - Bulus bulus
		Malaysian - Bulus bulus, Puntung damar
		Thai - Pla Hed-cone-ngern.

Distinctive characters: Body elongate, slightly compressed, snout pointed; upper head profile slightly convex. Mouth small, terminal; villiform teeth present in jaws and on vomer. Eye at least twice in length of snout; 2-3, mostly 2, series of scales on cheeks; a small, sharp spine on operculum. 1st dorsal fin higher than 2nd and with 11 weak spines; 2nd dorsal fin with 1 spine and 20-23 soft rays; anal fin with 2 spines and 22-24 soft rays. Lateral line slightly arched with 69-73 scales; 5-6 scale rows above lateral line.

Coloration: back light brown, lower ventral flanks and belly whitish or silvery, without dark blotches. Both dorsal fins and caudal fin dusky, other fins pale.

Distribution and biology: Distributes throughout the area and southward to northern coasts of Australia; also westward to East Africa.

Inhabits shallow sandy bottoms of shores and bays, also estuaries.

Feeds on small invertebrates.

The peak of spawning occurs during the period from January-March and May-June. The small fish enter the fishery in July and

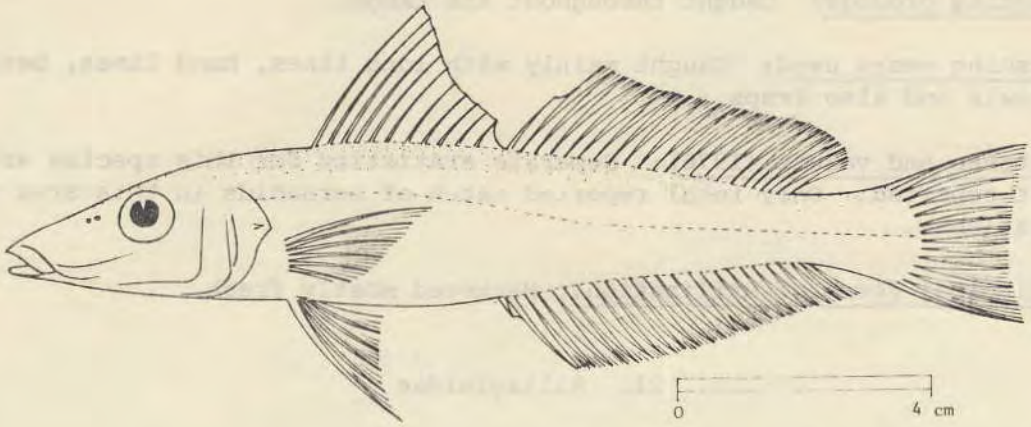

Fig. 64 *Sillago sihama*, Silver whiting
Maximum:25 cm TL; common:12-15 cm TL.

November with the size ranging from 10.5-11.5 cm. The mean length in the catch is 14.8 cm. The sex ratio for male: female is 1:0.7.

Fishing grounds: Caught in the shallow waters, throughout its range.

Fishing gears used: Caught mainly with bottom trawls (both otter board and pair trawls), beach seines and hand lines.

Catches and values (1976): Separate statistics are not reported for this species. The total reported catch of unclassified Sillaginidae is available.

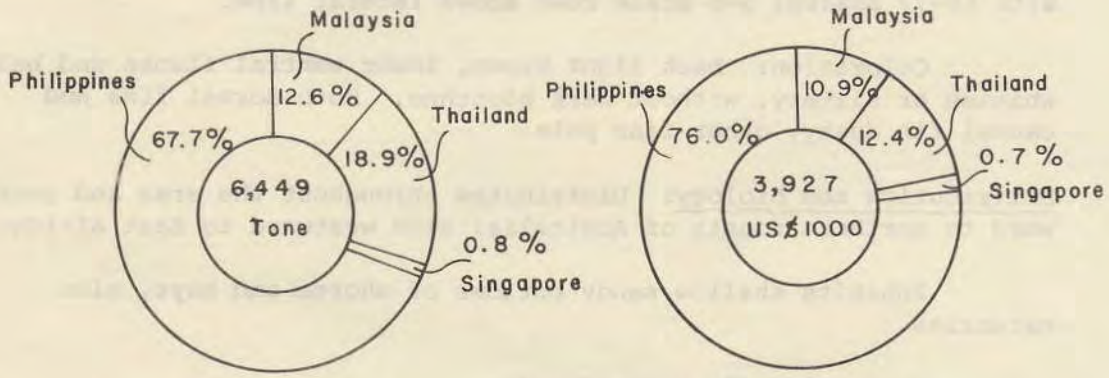

Fig. 65 Diagrams showing catch and value of whitings in the Southeast Asian waters.

Principal forms of utilization: Marketed fresh, frozen, steamed and dried-salted.

22. Synodontidae

22.1 *Saurida tumbil* (BLOCH, 1795)

Synonyms still in use	:	None	
English name	:	Greater lizard fish	
National species names	:	Filipino	- Kalaso
		Indonesian	- Beloso
		Malaysian	- Mengkerong
		Thai	- Pla Pak-kom

Distinctive characters: Body elongate, cylindrical, with lizard-like head and with an adipose fin. Mouth large and terminal with 3 or more rows of teeth on anterior part of outer palatine tooth bands. Pectoral fins just reaching to level of pelvic fin base; pelvic fin rays almost equal in length.

Coloration: back and upper sides brown, lower sides and belly white, sometimes traces of faint darker cross-bars on back, inner side of pelvic fins dusky black, except for their margins; stomach white.

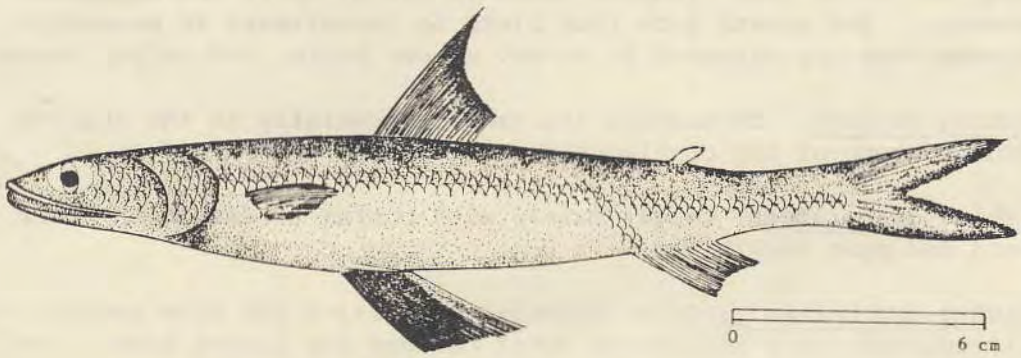

Fig. 66 *Saurida tumbil*, Greater lizard fish
Maximum:45 cm TL; common:20-30 cm TL.

Distribution and biology: Distributes throughout the area and southward to New South Wales; it is confined strictly to the tropical zone.

It is a schooling type of fish living only over the muddy or muddy sand bottoms of the continental shelf, down to about 100 m.

In the Gulf of Thailand, 5 species were found, but only *S. tumbil* and *S. undosquamis* are important and dominant species.

In Philippine waters, *S. tumbil* is the most abundant and represents more than 90% of the lizard fish landings.

The fish are carnivorous in nature - their food preference consists of fishes (especially *Stolephorus*, *Gobius* and *Leiognathus*), crustaceans and mollusks.

In Manila Bay and adjacent waters, it has a protracted breeding period and spawns two or even three times a year. Throughout the whole year, mature individuals with ripe gonads are observed among the commercial catches; no distinct spawning season could be detected. It spawns in the deeper areas. The male and female attain sexual maturity at the length of 17-19 and 19-21 cm LX respectively, being then approximately 2 years old. Males are found to be more abundant on the fishing ground than females most of the time.

In the Gulf of Thailand, two spawning seasons are found in a year, one from January-April and another during the month of August-September and thereafter the small fish (mean total length of 15 cm) group and enter into fishable stock in March, April and November-December. The growth rate from birth to recruitment in November-December was approximated to be 6-7 mm per month, 7-8 cm per annum.

Fishing grounds: Throughout its range, especially in the shallow muddy bottoms of the continental shelf.

Fishing gears used: Caught mainly with bottom trawls (both otter board and pair trawls).

Catches and values (1976): Separate statistics for this species are not reported; only records of total catches for lizard fishes are available.

Principal forms of utilization: Marketed fresh, dried-salted, made into fish cakes and fish balls.

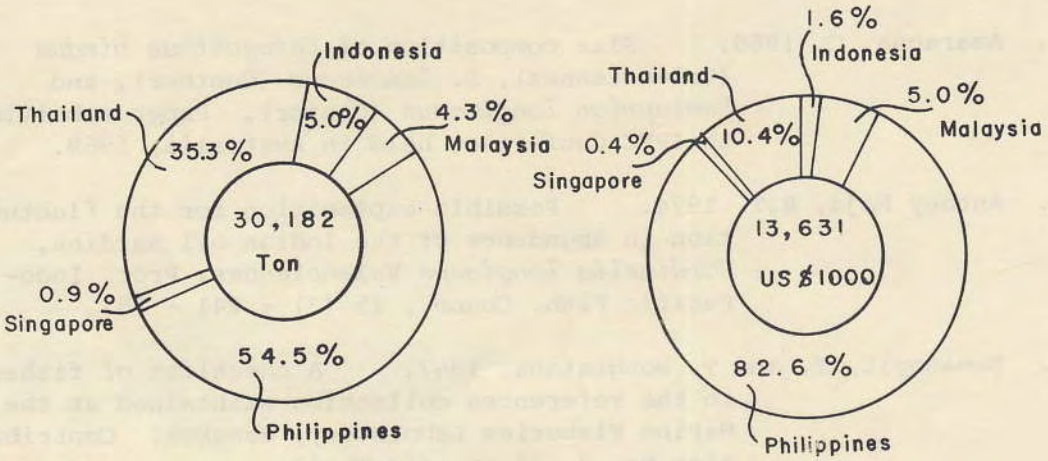

Fig. 67 Diagrams showing catch and value of lizard fishes in the Southeast Asian waters.

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