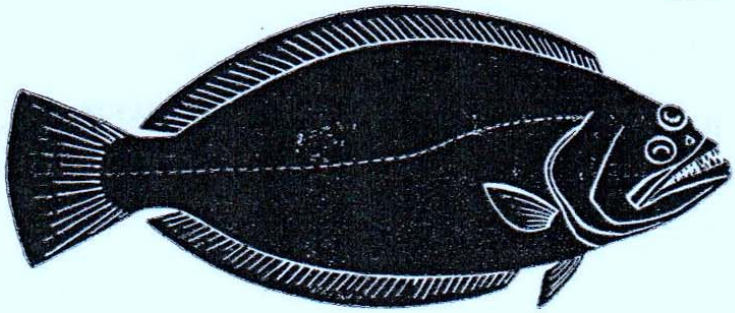
A REVIEW OF THE FLATFISHES (PLEURONECTIFORMES=HETEROSOMATA) OF THE GULF OF THAILAND AND ITS TRIBUTARIES IN THAILAND

by SUPAP PUNPOKA



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ABSTRACT

Fifty species in sixteen genera of flatfishes (Order Pleuronectifomes or Heterosomata) are shown or suspected to be present in the Gulf of Thailand and its tributary waters in Thailand. These fishes are in the Psettodidae, Bothidae, Pleuronectidae, Soleidae, and Cynoglossidae, which comprise all of the currently recognized pleuronectiform families. Many of the species are of commercial significance.

Reported for the first time in these waters are: *Arnoglossus aspilos* (Bleeker); *Grammatobothus polyophthalmus* (Bleeker); *Pseudorhombus dupliciocellatus* Regan; *P. elevatus* Ogilby; *P. quinquocellatus* Weber & de Beaufort; *Brachypleura novae-zeelandiae* Günther; *Samaris cristatus* Gray; *Aseraggodes dubius* Weber; *Heteromycteris oculus* (Alcock); *Liachirus melanospilus* (Bleeker); *Solea ovata* Richardson; *Synaptura altipinnis* Alcock; *S. cornuta* Kaup; *S. quagga* (Kaup); *Cynoglossus cynoglossus* (Hamilton & Buchanan); *C. oligolepis* (Bleeker); *C. sibogae* Weber; *C. sumatranus* (Bleeker); *C. versicolor* Alcock.

Methods of counting and measuring are described and a key to the species is provided. For each species a descriptive synopsis is given along with synonymies of technical names and English and Thai common names. Also included are statements of diagnostic features and geographic distribution. Six species are known only from presumedly freshwater: *Achiroides leucorhynchos* Bleeker; *Synaptura aenea* Smith; *S. harmandi* Sauvage; *S. panoides* Bleeker; *Cynoglossus microlepis* (Bleeker); *C. xiphoideus* Günther. In addition, two species occur in both marine and brackish waters: *Synaptura commersoniana* (Lacépède) and *S. orientalis* (Bloch & Schneider). The remaining species are exclusively marine.

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BY

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INTRODUCTION

It was originally planned to treat only the flatfishes (Heterosomata) of the Gulf of Thailand. For this purpose, the extensive collections of the Naga Expedition, 1959-1961, were available. Most of the material was taken at numerous localities in the Gulf, but many additional specimens were secured in the fish markets of Bangkok and the maritime provinces. In spite of the intensive collecting, a few species previously reported from Thailand were not represented in the Naga material, but some of these were available to me at the large, permanent fish collection in the Natural History Museum of Stanford University.

Late in the course of my investigations, it was decided that in order to make the work most valuable it would be advisable to discuss all of the species of flatfishes known from the Gulf drainage of Thailand, and consequently the freshwater forms were added. Unfortunately, these were not represented in the material of the Naga Expedition nor in the Stanford collection. However, my colleagues at the College of Fisheries, Kasetsart University, Thailand, cooperated generously in providing me with photographs and literature so that freshwater species could be included and the work could be finished. The treatment of the freshwater species is necessarily incomplete, but all of the flatfishes known from Thailand are included, and it is hoped that the present paper may make it possible to determine any specimen taken from the waters of the entire country.

There has been no previous work which deals specifically with the flatfishes of Thailand, and the larger faunal lists (*e.g.*, Suvatti, 1950) concerned with the area are far from complete. How incomplete they are is indicated by the fact that some twenty species are here reported from the Gulf of Thailand for the first time, in spite of the fact that several of them appear regularly in the markets.

The present work attempts to clarify the taxonomy of the Thai flatfishes and is planned as a tool for the identification of specimens. Separate keys are used for

the marine and freshwater species. This division seemed logical since it was possible for me to construct the key for the marine forms on the basis of data gathered from examination of the fishes themselves, whereas for some freshwater species I was forced to rely on information gleaned from other sources. Thus, rather than unite two disparate units into one key, two keys are presented; the two keys are not strictly comparable. The ecological source of the material to be identified will determine which key should be used, and if this is unknown and one key does not provide identification, the other one should be tried.

Most of the short diagnostic descriptions of each species are based on my own examination of preserved specimens, and these observations have been carefully verified and compared with the original descriptions and/or with reliable standard references. For a few species specimens were not available; the diagnoses for these have been based on the literature alone.

The specimens used in this study were all preserved. These were originally placed in formalin and later transferred to alcohol, either ethyl or isopropyl; some were first transferred from formalin to ethanol and later to isopropyl alcohol. Each of these preservatives modified or faded the colors and rendered it impossible to give adequate description of the colors in living or fresh fishes. The best that could be done was to describe the patterns that remained.

The morphometric measurements and meristic counts used in the descriptions and identification keys were taken in the following manner. The total length was measured to the nearest millimeter from the medial point of the snout to the distal end of the caudal fin. This is the measurement used in listing the size of the specimens seen. The standard length, measured from the same point on the snout to the distal end of the hypural plate as discerned by a crease upon flexure of the tail, was used as a basis for in comparison with other measurements as noted in the keys and descriptions. The body depth was taken as the widest part of the body between the bases of the dorsal (D) and anal (A) fins. The length of the head was measured from the medial anterior point of the snout to the most distant point on the posterior margin of the opercular membrane. Eye diameter was taken as the greatest horizontal distance across the bony orbit of whichever eye was largest. Each fin ray, whether simple or branched, was counted as one. The scales of the middle lateral line, represented by pores, were counted from the scale just above the angle of the gill opening to the scale at the end of the hypural plate on the caudal peduncle. The scales between upper and middle lateral lines were counted in a diagonal line downward and backward, following the natural scale row; the count began with

the scale directly under the ray at the middle of the length of the dorsal fin and included all of the scales between the lateral lines but not those of the lateral lines themselves.

The flatfishes constitute an order, the Heterosomata, or Pleuronectiformes, a group that is readily recognized on sight because its members are unique in having both eyes on the same side of the head, and one side of the body dark in color while the other side is normally white or very light. The group is distributed throughout the marine waters of the world; many species favor brackish-water habitats, and a few are confined to fresh water. They are typically fishes of soft bottoms, but some inhabit areas of gravel as well as sand.

In the Systema Naturae (1758) Linnaeus placed all of the flatfishes known to him in a single genus, *Pleuronectes*. During the last decade of the eighteenth century and the first part of the nineteenth, eight more genera of flatfishes were described. Recognizing the similarities of these forms, Cuvier (1817) established a family for their reception, but grouped them together with the gadoids, gobiesocids, cyclopterids, echineids and ophicephalids in a division of sub-brachial malacoptergians, characterized by the thoracic position of the ventral fins and the absence of spines in the dorsal fins. Johannes Müller (1846) restricted the number of forms associated with the flatfishes in a higher systematic category, but still placed them together with the gadoids and ophidioids in his new order Anacanthini. According to Norman (1934), it was not until 1871 that Cope finally isolated the flatfishes in their own order, the Heterosomata, also subsequently called the Pleuronectiformes by other authors.

Various authors have divided the order Heterosomata into a larger or smaller number of families. The extreme points of view among fairly modern writers are probably those of Jordan (1923), who recognized eleven families, and Weber and de Beaufort (1929), who recognized only four. Regan (1910) presented a classification, founded on considerable anatomical investigation, that divided the order into the five families Psettodidae, Bothidae, Pleuronectidae, Soleidae and Cynoglossidae. This was accepted by Norman (1934) and subsequent authors, and it is the classification used here.

All five of the heterosomate families are represented in the waters of Thailand (Table I) where, because they have both eyes on the same side of the head, they are known as Pla seek-deo, meaning one-sided fish. All of the species of the genus *Cynoglossus* bear the vernacular name Pla lin-ma (dog-tongue fish). The Psettodidae,

Bothidae and Pleuronectidae are strictly marine, but several of the Soleidae and Cynoglossidae enter fresh water, some ascending rivers and occurring several hundred kilometers from the sea. The only species that are known to frequent fresh waters exclusively are *Synaptura aenea*, *Cynoglossus xiphoideus*, and *C. microlepis*.

TABLE 1

NUMERICAL SUMMARY BY FAMILIES OF THE FLATFISHES OF THE GULF OF THAILAND AND TRIBUTARY WATERS IN THAILAND

ITEM	FAMILY				
	Psettodidae	Bothidae	Pleuronectidae	Soleidae	Cynoglossidae
Genera	1	4	2	7	2
Species reported previously	1	4	—	12	7
Species reported here for first time	—	5	2	7	5
Number of species verified as specimens or based on reports judged to be reliable	1	9	2	16	16
Additional species of probable occurence	—	—	—	3	3
Total number of species (Grand total, 50 species)	1	9	2	19	19

Throughout all of the populated coastal areas of the world, the flatfishes are prized as food, and Thailand is no exception. The fish markets of the cities and villages daily offer numerous species for sale, and often in large numbers. These fishes constitute an important resource which is vigorously exploited today, and one which can probably yield greater returns in the future if properly managed.

SYSTEMATIC PART

The order Heterosomata is placed in the percomorphous series; however, many characters are different from its allies—body strongly compressed; head asymmetrical; skull twisted in front; both eyes on one side, either right or left; teeth present, often very small or obsolescent, in many cases, more developed on blind side. The asymmetry of the head, eyes, and mouth also applies to the paired fins. Dorsal and anal fins long; caudal fin with 17 principal rays (15 branched) or fewer. Lateral line usually present, sometimes 2 or 3, or entirely absent. Scales of various sizes, usually small, rarely absent; ctenoid or cycloid, often differing on the two sides of the body. The ocular side of body is pigmented, uniform or displaying various patterns; the blind side generally without pigment.

SPECIES LIST

The following list of species embraces all of the flatfishes known from or presumed to be present in the Gulf of Thailand and/or its tributary waters in Thailand. For each species a corresponding page number is also given.

Family Psettodidae

1. *Psettodes erumei* (Bloch & Schneider), p. 13

Family Bothidae

2. *Arnoglossus aspilos* (Bleeker), p. 15
3. *Engyprosopon grandisquama* (Temminck & Schlegel), p. 16
4. *Grammatobothus polyophthalmus* (Bleeker), p. 18
5. *Pseudorhombus arsius* (Hamilton), p. 20
6. *Pseudorhombus dupliciocellatus* Regan, p. 21
7. *Pseudorhombus elevatus* Ogilby, p. 23
8. *Pseudorhombus javanicus* (Bleeker), p. 24
9. *Pseudorhombus malayanus* Bleeker, p. 26
10. *Pseudorhombus quinquocellatus* Weber & de Beaufort, p. 27

Family Pleuronectidae

11. *Brachypleura novae-zeelandiae* Günther, p. 29
12. *Samaris cristatus* Gray, p. 30

Family Soleidae

13. *Achiroides leucorhynchos* Bleeker, p. 32
14. *Aseraggodes dubius* Weber, p. 34
15. *Heteromycteris hartzfeldii* (Bleeker), p. 35
16. *Heteromycteris oculus* (Alcock), p. 36

KEY TO SPECIES

Methods of counting and measuring are those given earlier in the text. Unless otherwise stated, all characteristics used in this key are on the eyed side of the fish.

Separate keys are given for the marine (p. 7) and the freshwater species (p. 11).

MARINE SPECIES

1a Dorsal fin origin clearly behind eye; anterior dorsal rays spinous; pelvic fin with a spine; maxillary with a supplemental bone . (p. 13) *Psettodes erumei*

1b Dorsal fin origin above or in front of eye; no spinous dorsal rays; pelvic fins without spine; maxillary without supplemental bone 2

2a Eyes on the right side 3

2b Eyes on the left side 20

3a Preopercular with a free margin 4

3b Preopercular margin not free 5

4a Only pectoral fin of eyed side developed, none on blind side; the anterior 11-14 dorsal rays much elongated, filamentous; 68-77 scales in lateral line . . . . . (p. 30) *Samaris cristatus*

4b Both pectoral fins developed; anterior 3 to 6 dorsal rays prolonged only in male; 29-33 scales in lateral line . . . . . (p. 29) *Brachypleura novae-zeelandiae*

5a Head and body with crossbars, continued on dorsal and anal fins . . . 6

5b Head and body without crossbars, but more or less dark spots and blotches on the body 9

6a First dorsal ray thickened and prolonged; 13-14 dark crossbars; scales only feebly ctenoid or cycloid on both sides . (p. 48) *Synaptura cornuta*

6b First dorsal ray unmodified, not prolonged; 10-24 dark crossbars; scales ctenoid on both sides 7

7a Right pectoral fin falciform, as long as eye and snout combined; 12 pairs of dark crossbars . . . . . (p. 55) *Synaptura zebra*

7b Right pectoral fin broad based, as long as eye or a little shorter; 10-14 single dark crossbars 8

8a Dorsal rays (D.) 75-88; anal rays (A.) 64-74; lateral-line scales 105-135; 14 dark crossbars; no fleshy tentacles on eyes . . . . . (p. 45) *Synaptura altipinnis*

8b D. 64-73; A. 53-61; lateral-line scales 85-99; 10-11 dark crossbars; one fleshy tentacle on each eye . . . . (p. 54) *Synaptura quagga*

9a Dorsal and anal confluent with caudal 10

9b Dorsal and anal separated from caudal 15

10a Pectoral fin absent; D. 54; A. 36-42; . (p. 32) *Achiroides leucorhynchos*

10b Pectoral fin present; D. 57-81; A. 41-66; 11

11a Scales on blind side cycloid 12

11b Scales on blind side either strongly or feebly ctenoid 13

12a Body broad, its depth 1.8 to 2.2 in standard length; 98-117 scales in lateral line of ocular side . . . . . (p. 44) *Synaptura aspilos*

12b Body rather elongate, its depth 3.2 to 3.5 in standard length; 155-170 scales in lateral line of ocular side . . . . . (p. 47) *Synaptura commersoniana*

13a Scales of nape and upper part of head enlarged; D. 57-61; A. 43-46 . . . . . (p. 52) *Synaptura pan*

13b Scales of nape and upper part of head not enlarged; D. 62-82; A. 47-61 14

14a Head 4.2 to 5.0 in standard length. D. 62-72; 63-85 scales in lateral line; rictus of mouth reaching below middle of lower eye . . . . . (p. 50) *Synaptura orientalis*

14b Head 5.4 in standard length; D. 73-82; 92-110 scales in lateral line; rictus of mouth not reaching below middle of lower eye . . . . . (p. 53) *Synaptura panoides*

15a Pectoral fins present; body depth 1.5 to 2.2 in standard length; scales 100-110 in lateral line . . . . . (p. 41) *Solea ovata*

15b Pectoral fins absent; body depth 2.1 to 3.0 in standard length; scales 66-102 in lateral line 16

16a A short curved branch of lateral line extends from about the anterior end of dorsal base to the nape on the blind side 17

16b No short branch of lateral line along anterior part of dorsal base on blind side 18

17a Scales cycloid on both sides; 70-75 in lateral line; no pores at the base of dorsal and anal rays . . . . . (p. 38) *Liachirus melanospilus*

17b Scales feebly ctenoid on both sides; 85-100 in lateral line; each dorsal and anal ray with a pore at its base . . . . (p. 39) *Pardachirus pavoninus*

18a Lower profile with a row of short tentacles from chin to gill opening; dorsal origin in front of upper eye and well above tip of rostral hook; D. 67-70; A. 46-51 . . . (p. 34) *Aseraggodes dubius*

18b No fringes beneath lower jaw; dorsal origin at tip of rostral hook and well below upper eye; D. 88-103; A. 60-67 19

19a Dorsal and anal fins scaly on ocular side . (p. 35) *Heteromycteris hartzfeldii*

19b No scales on dorsal and anal fins of ocular side (p. 36) *Heteromycteris oculus*

20a Dorsal and anal fins free from caudal; pectoral fins present; preopercular margin free 21

20b Dorsal and anal confluent with caudal; pectoral fins absent; preopercular margin not free 29

21a Lateral line developed only on eyed side 22

21b Lateral line developed on both sides 23

22a Interorbital space wide, equal to or greater than length of snout; mouth small; maxillary length 3.0 to 3.5 in head . . . . . (p. 16) *Engyprosopon grandisquama*

22b Interorbital space narrow, its width markedly less than length of snout; mouth large; maxillary length 2.1 to 2.4 in head . . . . . (p. 15) *Arnoglossus aspilos*

23a Mouth small, maxillary extending only to anterior margin of eye; caudal peduncle narrow, its depth markedly less than combined width of eyes and interorbital space . . . . . (p. 18) *Grammatobothus polyophthalmus*

23b Mouth large, maxillary extending to or beyond middle of eye; caudal peduncle broad, its depth equal to or greater than combined width of eyes and interorbital space 24

24a Gill rakers palmate . . . . (p. 21) *Pseudorhombus dupliciocellatus*

24b Gill rakers pointed 25

25a Scales on blind side ctenoid . . . . . (p. 26) *Pseudorhombus malayanus*

25b Scales on blind side cycloid 26

26a Mouth large, a projection of the posterior margin of maxillary (with mouth closed) passing behind eyes; teeth on blind side of lower jaw 15-32 27

26b Mouth moderate, a projection of posterior border of maxillary passing through lower eye; teeth on blind side of lower jaw 6-14 . 28

27a Scales on posterior part of eyed side cycloid; tip of first interhemal spine feeble, not projecting . . . . . (p. 24) *Pseudorhombus javanicus*

27b Scales on eyed side all ctenoid; tip of first interhemal spine projecting on blind side . . . . . (p. 23) *Pseudorhombus elevatus*

28a Body with five dark blotches, each surrounded by a brown ring; tip of first interhemal spine strongly projecting; lower eye slightly in advance of upper one . . . . (p. 27) *Pseudorhombus quinquocellatus*

28b Body without the five dark encircled blotches as noted above; tip of first interhemal spine not projecting; eyes on same vertical, or upper one, slightly in advance of lower one (p. 20) *Pseudorhombus arsius*

29a Lips fringed 30

29b Lips not fringed 31

30a Rostral hook of moderate length, extending below middle or posterior part of lower eye; lateral-line scales 75-83; 13-16 scales between lateral lines . . . . . (p. 78) *Paraplagusia blochii*

30b Rostral hook rather long, extending farther than vertical through hind border of lower eye; lateral-line scales 98-114; 16-19 scales between lateral lines . . . . . (p. 76) *Paraplagusia bilineata*

31a Three lateral lines (upper, middle, and lower) on eyed side 32

31b Two lateral lines (upper and middle) on eyed side 33

32a Eye 13.0 in head; D. 134; A. 107; middle lateral-line scales 140; scales between upper and middle lateral lines 21 . . . . . (p. 73) *Cynoglossus trigrammus*

32b Eye 6.5 to 7.5 in head; D. 108-114; A. 87-89; middle lateral-line scales 74-75; scales between upper and middle lateral lines 12-13 . . . . . (p. 74) *Cynoglossus versicolor*

33a Scales cycloid on blind side 34

33b Scales ctenoid on blind side 39

34a Upper and middle lateral lines separated by 6-10 scales 35

34b Upper and middle lateral lines separated by 12-20 scales 37

35a Depth 4.8 to 5.0; eye 15.0 to 17.0; 8-10 scales between lateral lines . . . . . (p. 57) *Cynoglossus arel*

35b Depth 3.8 to 4.4; eye 8.0 to 12.0; 6-9 scales between lateral lines . . . 36

36a Rictus of mouth nearer to gill opening than to end of snout; 8-9 scales between lateral lines . . . . (p. 68) *Cynoglossus oligolepis*

36b Rictus of mouth midway between end of snout and gill opening; 6-7 scales between lateral lines . . (p. 64) *Cynoglossus macrolepidotus*

37a Depth 4.7 to 5.5; D. 127-175; A. 100-124; 12-14 scales between lateral lines . . . . . (p. 62) *Cynoglossus lingua*

37b Depth 3.4 to 4.5; D. 102-114; A. 82-97; 14-20 scales between lateral lines . 38

38a Two lateral lines on blind side; 14-19 scales between lateral lines of eyed side . . . . . (p. 58) *Cynoglossus bilineatus*

38b One lateral line on blind side; 19-20 scales between lateral lines of eyed side . . . . . (p. 59) *Cynoglossus borneensis*

39a Body and head with irregular and incomplete dark vertical crossbands . 40

39b Body and head without irregular and incomplete dark crossbands . . . 41

40a Eye 12.0 to 14.0; 75-87 scales in middle lateral line; 12-14 scales between lateral lines . . . . . (p. 70) *Cynoglossus semifasciatus*

40b Eye 8.0 to 10.0; 91-100 scales in middle lateral line; 16-18 scales between lateral lines . . . . . (p. 69) *Cynoglossus puncticeps*

41a D. 100-119; lateral-line scales 104-126; both nostrils definitely in front of eyes . . . . . (p. 66) *Cynoglossus monopus*

41b D. 98-112; lateral-line scales 57-95; one nostril in interorbital space . . . 42

42a Rictus of mouth extending to below middle of lower eye; 10 scales between lateral lines . . . . . (p. 71) *Cynoglossus sibogae*

42b Rictus of mouth extending to below posterior end of lower eye or a little beyond; 11-15 scales between lateral lines 43

43a Posterior edge of maxillary nearer to end of snout than to gill opening; body depth 3.5 to 3.7 in standard length . . (p. 60) *Cynoglossus cynoglossus*

43b Posterior edge of maxillary nearer to gill opening than to end of snout; body depth 4.0 to 4.2 in standard length 44

44a Rostral hook short, extending to a little beyond mandibulary symphysis; 11-12 scales between lateral lines (p. 72) *Cynoglossus sumatranus*

44b Rostral hook of moderate length, extending to below lower eye; 13-15 scales between lateral lines . . . . . (p. 61) *Cynoglossus lida*

FRESHWATER SPECIES

Synaptura krempfi Durand is not included in the following key because there are no records from the Gulf of Thailand or its tributaries (see p. 50).

1a Eyes on right side of head; body depth 1.8 to 2.2; D. 48-82; A. 36-61; one lateral line on eyed side 2

1b Eyes on left side of head; body depth 4.0 to 5.0; D. 112-123; A. 93-101; three lateral lines on eyed side 7

2a Pectoral fins present 3
2b Pectoral fins absent . . . . . (p. 32) *Achiroides leucorhynchos*

3a Body depth 1.8; color of blind side reddish brown; lips with fringes . . . . . (p. 43) *Synaptura aenea*

3b Body depth 2.0 to 3.5; color of blind side whitish or yellowish; lips with or without fringes 4

4a D. 61-82; A. 44-66; 63-170 scales in lateral line 5

4b D. 48; A. 38; 54 scales in lateral line . . (p. 49) *Synaptura harmandi*

5a Lip not fringed; pectoral fins rudimentary . . . (p. 53) *Synaptura panoides*

5b Lip fringed; pectoral fins well developed 6

6a Body depth 3.2 to 3.5; 155-170 scales in lateral line . . . . . (p. 47) *Synaptura commersoniana*

6b Body depth 2.0 to 2.3; 63-85 scales in lateral line . . . . . (p. 50) *Synaptura orientalis*

7a One distinct lateral line on blind side; tip of rostral hook reaching behind vertical from posterior margin of lower eye; lateral-line scales 132-150 . . . . . (p. 65) *Cynoglossus microlepis*

7b No distinct lateral line on blind side; tip of rostral hook not reaching beyond vertical from front margin of lower eye; lateral-line scale 126-135 . . . . . (p. 75) *Cynoglossus xiphoideus*

SYNOPSES

There follow descriptive synopses of the families and species. In addition, I have also given for each species Thai and regional English common names, faunal and taxonomic remarks, a list of the specimens seen by me, and partial synonymies and references. The distributional comments are largely from Weber and de Beaufort, 1929.

FAMILY PSETTODIDAE

Eyes on the right or the left side. Mouth large, terminal with straight cleft; jaws equally developed, the lower jaw prominent; supplemental maxillary well developed; supplemental teeth strong, equally developed on both sides; palatine toothed. Preoperculum with free margin. Dorsal fin not extending forward onto the head, anterior rays more or less spinous; pectoral well developed; ventral fins nearly symmetrical in form and posterior, each consisting of 1 spinous and 5 soft rays; caudal fin truncate or double truncate, and free from dorsal and anal fins. Lateral line well developed on both sides of body, with a low curve above the pectoral fin, no distinct supratemporal branch.

13

PSETTODES ERUMEI (Bloch and Schneider), 1801

Figure 1, 0.5×

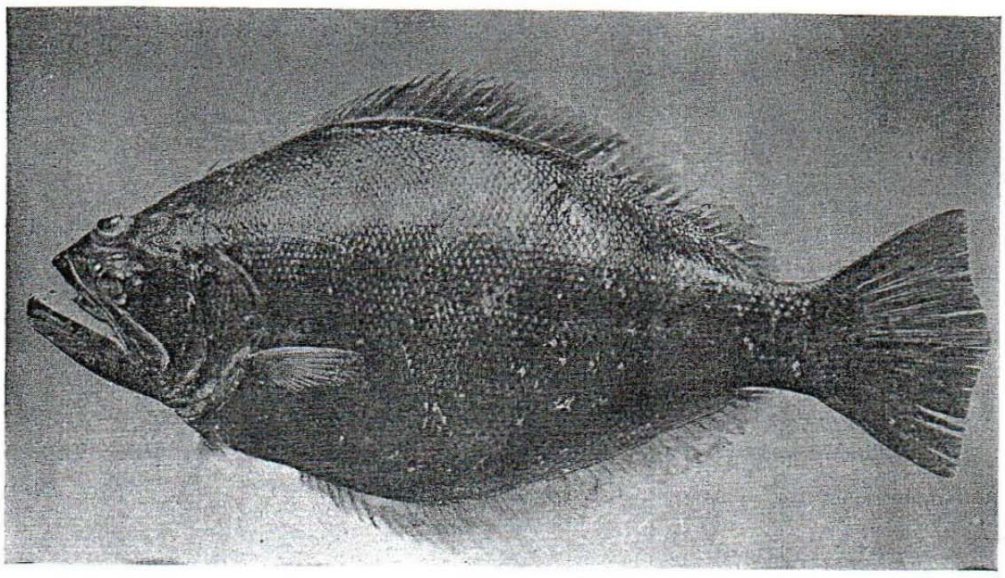

Figure 1

COMMON NAMES :

Pla seek-deo ; big-mouth flounder, arrow tooth flounder (Herre, 1953) ; Indian halibut (Munro, 1955) ; spiny-rayed flounder (Fowler, 1956) ; halibut (Scott, 1959).

DESCRIPTION :

Body ovate or rather elongate, relatively thick and massive for a flatfish, its depth 2.1 to 2.7 in standard length. Head 2.9 to 3.5 in standard length. Both eyes on either side of the body ; eye 5.0 to 7.0 in head. Snout as long or a little longer than eye ; mouth very large ; posterior end of upper jaw extending far beyond eye ; maxillary with a supplemental bone ; teeth numerous, strong, sharp and barbed at the tips ; a single row of teeth on palatines.

Dorsal and anal fins completely separate from caudal fin ; dorsal rays 49-56, anterior rays spinous ; anal rays 34-44. Origin of dorsal fin behind eyes. Pectoral fins well developed on both sides. Pelvic fin with a spine. Caudal fin with posterior margin truncate or double emarginate. Lateral lines well developed on both sides of body, with a low curve above the pectoral fin, no distinct supratemporal branch ; lateral line on eyed side with about 68-77 scales ; scales rather small, adherent, with fine diverging striae and finely crenuated margins.

Color of eyed side, including dorsal, anal, and caudal fins, grayish brown ; color on blind side white ; pectoral and pelvic fins lighter than general body color.

It is reported in the literature that in some specimens four broad dark transverse bars occur on the body, but this has not been observed in material from Thailand.

REMARKS :

This is the only species of the family Psettodidae found in the waters of Southeast Asia. In all other flatfishes in this region, the dorsal fin always originates above or in front of the eyes, there are no spinous dorsal rays, the maxillary does not have a supplemental bone, and there are no palatine teeth.

Psettodes erumei is the largest flatfish occurring in the Gulf of Thailand and one of the most abundant.

Distribution marine in East Africa and from the Red Sea to the Pacific.

SPECIMENS SEEN :

November, 1957, Songkhla Province, 1 specimen, 156 mm. ; December, 1957, Cholburi Province, 1 specimen, 208 mm. ; June, 1960, Borka Village, Chumporn Province, 1 specimen, 208 mm. ; June, 1960, Prachuab Khiri Khan Province, 2 specimens, 164-169 mm. ; August, 1960, Prachuab Khiri Khan Province, 3 specimens, 273-286 mm.

REFERENCES :

Pleuronectes erumei Bloch and Schneider, 1801, Syst, Ichth. : 150.

Psettodes erumei Bleeker, 1866-1872, Atl. Ichth., 6 : 4, pl. 232, fig. 2; Day, 1878-1888, Fish. India, 1 : 422, atlas, pl. 91, fig. 4; Norman, 1927, Rec. Ind. Mus., 29: 8, fig. 1; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 97, fig. 24; Norman, 1934, Syst. Monogr. Flatfish., 1: 57, fig. 30; Fowler, 1935, Proc. Acad. Nat. Sci. Philad., 87: 130; Suvatti, 1936, Index Fish. Siam: 93; Fowler, 1938, Fish. Malaya: 79; Smith, 1949, Sea Fish. S. Africa: 155, fig. 299; Suvatti, 1950, Fauna Thailand: 322; Herre, 1953, Check List Philippine Fish. : 176; Munro, 1955, Fish. Ceylon: 256, pl. 49, fig. 741: Scott, 1959, Sea Fish. Malaya: 41.

FAMILY BOTHIDAE

Eyes on the left side. Mouth large or moderate, terminal, the lower jaw somewhat prominent, and often with a symphysial knob on the chin; maxillary without a supplemental bone; teeth in jaw more or less equally developed on both sides, canine teeth often present, palatine teeth absent. Preoperculum with free margin. Dorsal fin extending on head at least to above the eye, no spinous fin rays; pectoral present; each ventral fin with 6 or fewer rays, either short based and symmetrical or the base of that of left side longer than that of the right one; caudal free from dorsal and anal fins. Lateral line with curve anteriorly, supratemporal branch present or absent.

15

ARNOGLOSSUS ASPILOS (Bleeker), 1851

Figure 2, 1.0×

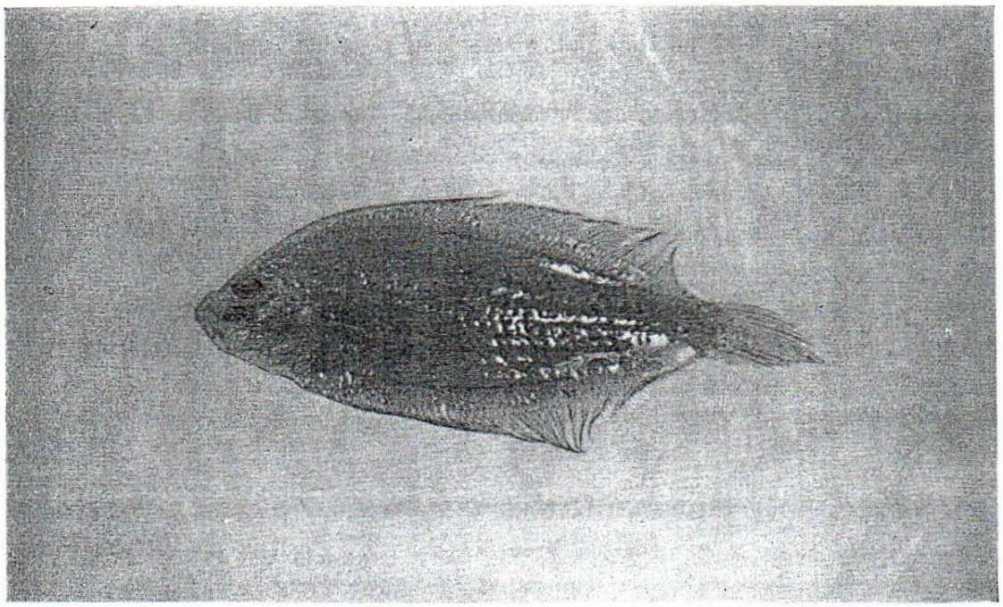

Figure 2

COMMON NAME:

Pla bai-mai

DESCRIPTION:

Body ovate and very flat, its depth 2.3 to 2.5 in standard length. Dorsal profile of head sloping downward, not strongly convex; head 3.0 to 4.3 in standard length. Both eyes on the left side of the body, separated by a narrow interspace, the width of which is markedly less than the length of the snout; the lower eye in advance of the upper one; eye 3.0 to 4.0 in head. Snout shorter than eye. Mouth oblique, somewhat curved; posterior end of upper jaw extending beyond anterior margin but not reaching to vertical of middle of eye; the maxillary 2.1 to 2.4 in head; lower jaw about twice in head. Seven rather slender gill rakers on lower part of anterior arch.

Dorsal and anal fins separated from caudal fin; dorsal rays 80-84, anal rays 61-64; dorsal and anal rays simple, those of caudal forked. Dorsal beginning on blind side of snout; anal originating about on vertical through hind border of gill opening. Pectoral fins well developed. Left ventral in advance of right one. Caudal fin obtusely pointed. Lateral line developed only on ocular side, with a distinct curve above the pectoral fin; no supratemporal branch; lateral-line scales 45-48; scales ctenoid on ocular side, cycloid on blind side, rather deciduous.

Color brownish or reddish brown.

REMARKS:

Arnoglossus aspilos is one of the small species. It has not been recorded from the Gulf of Thailand before.

Distribution–Gulf of Thailand, Malay Peninsula and Archipelago.

SPECIMENS SEEN:

January, 1960, Goh Pha-ngang, 1 specimen, 196 mm.; December, 1960, Trad Province, 10 specimens, 68-181 mm.

REFERENCES:

Rhombus aspilos Bleeker, 1851 c, Nat. Tijdschr. Ned Ind., 1: 408; 1852 a, Verh. Bat. Gen., 24: 14.

Arnoglossus aspilus Günther, 1862, Cat. Fish. Brit. Mus., 4: 417.

Platophrys (Arnoglossus) aspilus Bleeker, 1866-1872, Atl. Ichth., 6: 15, pl. 6, fig. 2.

Arnoglossus aspilos Fowler, 1928, Mem. Bishop Mus., 10: 89; Norman, 1934, Syst. Monogr. Flatfish., 1: 187, fig. 113.

Bathus (Arnoglossus) aspilus Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 132.

ENGYPROSOPON GRANDISQUAMA (Temminck and Schlegel), 1846

Figure 3, 1.0×

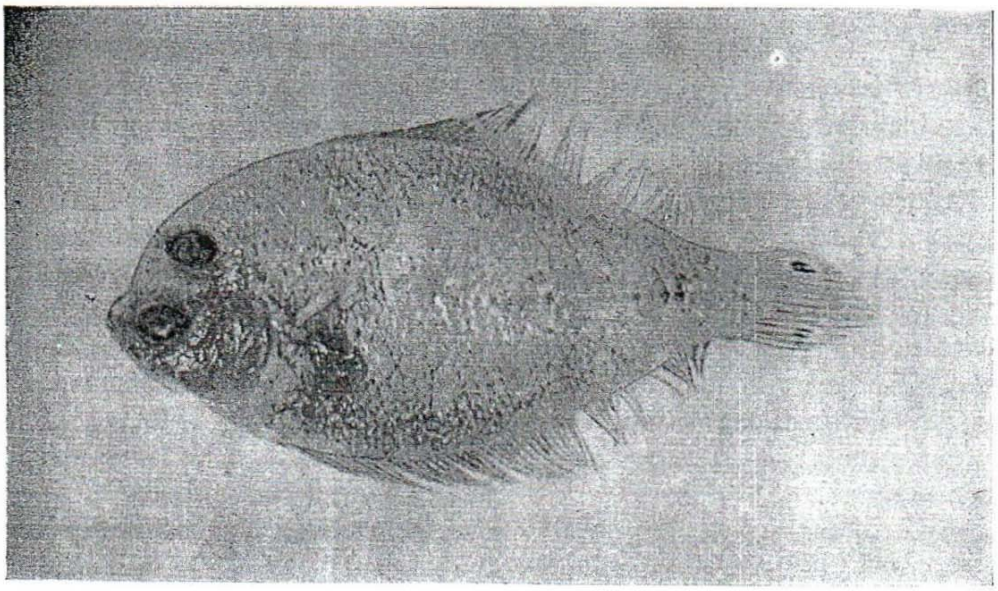

Figure 3

COMMON NAMES:

Pla bai-kanoon; large-scaled flounder (Munro, 1955)

DESCRIPTION:

Body ovate and strongly flattened, its depth 1.6 to 2.3 in standard length. Upper profile of head steep, especially in males, less so in females; head 3.5 to 4.8 in

standard length. Both eyes on left side of body, 2.5 to 4.0 in head, separated by a broad concave scaly space which is wider than length of snout; lower eye in advance of upper one. Snout shorter than eye; male with spine on snout. Mouth small. Posterior end of upper jaw extending to or slightly beyond front border of eye, the maxillary 3.0 to 3.5 in head.

Dorsal and anal fins separated from caudal fin; dorsal rays 79-90; anal rays 59-68. Dorsal beginning at tip of snout. Pectoral fins unequal, that of eyed side larger and sometimes prolonged in male. Caudal rounded. Lateral line developed only on eyed side, with a distinct curve above the pectoral fin. Scales in lateral line 36-48; scales weakly ctenoid on eyed side, cycloid on blind side. Scales larger on ocular side than on the blind side, readily deciduous.

Color of the eyed side brownish with irregular dark spots and marks. Vertical fins usually with small brown spots. Two blackish spots at the upper and lower margins of caudal.

REMARKS:

Engyprosopon grandisquama is very similar to *E. xystrias*. Both have a pair of dark spots on the caudal fin, but they differ in the number of gill rakers on the lower part of anterior arch; the former has 5-7 and the latter has 14.

E. grandisquama is fairly common in the Gulf of Thailand and appears in moderate numbers in the Bangkok Fish Market.

Distribution—East Africa through the Indian Ocean and Malay Archipelago to Australia and Japan.

SPECIMENS SEEN:

April, 1960, Gulf of Thailand, 3 specimens, 78-98 mm.; August, 1960, Prachuab Khiri Khan Province, 6 specimens, 88-117 mm.

REFERENCES:

Rhombus grandisquama Temminck and Schlegel, 1846, Fauna Japonica (Pisces) 10-14: 183, pl. 92, fig. 3-4.

Rhombus poecilurus Bleeker, 1852c, Nat. Tijdschr. Ned. Ind. 3: 293; 1852a, Verh. Bat. Gen., 24: 29.

Rhomboidichthys grandisquama Günther, 1862, Cat. Fish. Brit. Mus., 4: 437; Regan, 1905, Journ. Bombay Nat. Hist. Soc., 16 (2): 332.

Pseudorhombus poecilurus Bleeker, 1865c, Ned. Tijdschr. Dierk, 2: 274; 1866-1872, Atl. Ichth., 6: 14.

Rhomboidichthys spilurus Günther, 1880, Challenger Exped. Zool., 1 (6): 47, pl. 21, fig. A.

Engyprosopon grandisquama McCulloch and Whitley, 1925, Rec. Austral. Mus., 14: 343, fig. 1; Norman, 1927, Rec. Ind. Mus., 29: 25; 1934, Syst. Monogr. Flatfish., 1: 209, fig. 156; Munro, 1955, Fish Ceylon: 261, pl. 50, fig. 756; Fowler, 1956, Fish. Red. Sea and S. Arabia: 167; Kuronuma, 1961, Check list Fish. Vietnam: 32; Smith, 1949, Sea Fish. of S. Africa: 159.

Bothus (Arnoglossus) poecilurus Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 131, fig. 31; Suvatti, 1936, Index Fish. Siam: 94; 1950 Fauna Thailand: 322.

Arnoglossus grandisquama Fowler, 1934, Hong Kong Nat., 5 (1): 62.

GRAMMATOBOTHUS POLYOPHTHALMUS (Bleeker), 1866

Figure 4, 0.8 ×

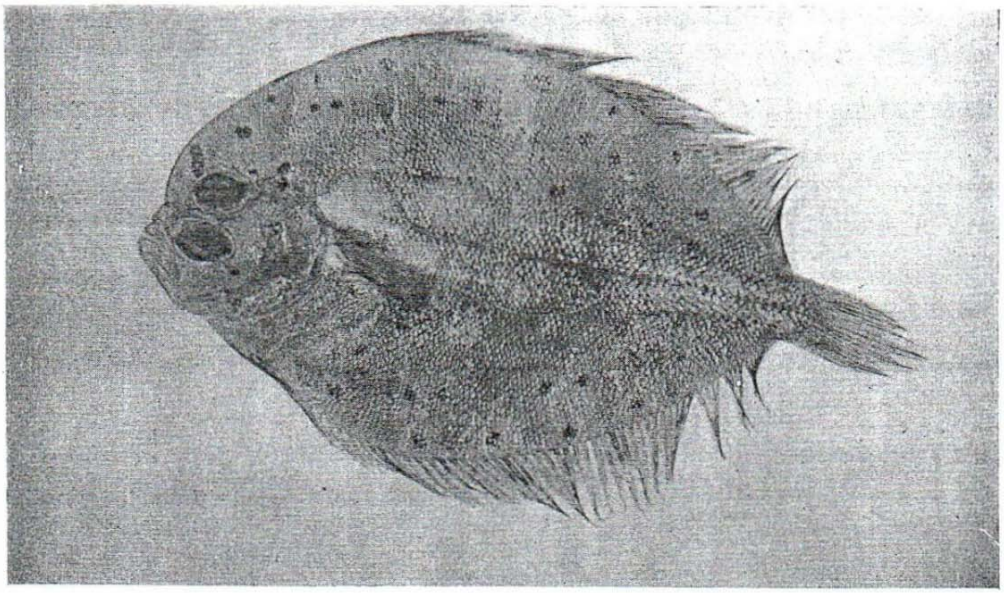

Figure 4

COMMON NAMES :

Pla lin-ma-ngon-son, many-eyed flounder (Munro, 1955)

DESCRIPTION :

Body ovate and very flat, its depth 1.5 to 1.7 in standard length. Upper profile of head more or less deeply notched in front of eyes; head 3.3 to 4.0 in standard length. Both eyes on left side of body, eyes large, 2.7 to 3.8 in head, separated by a bony ridge, lower one in advance of upper one. Usually one or two blunt prominences in front of lower eye and two more above the maxillary. Snout shorter than eye. Posterior end of upper jaw reaching to front border of eye.

Dorsal and anal fins separated from caudal fin; dorsal rays 77-86; anal rays 61-68; dorsal beginning on blind side on snout; first 8 to 10 rays connected only at the base; second to fifth or sixth moderately prolonged in some specimens, probably males; all rays of dorsal and anal simple, those of caudal forked. Pectoral of eyed side longer than the one on blind side. Caudal bluntly pointed. One lateral line on each side of the body, the one on ocular side with a distinct curve above the pectoral fin. Scales in lateral line of colored side 61-68; scales ctenoid on ocular side, cycloid on blind side.

Color of eyed side pale brownish with three large black ocelli forming a triangle, the two anterior ones above and below the pectoral fin, and the third on the middle of the straight portion of the lateral line. A number of small dark brown spots and markings arranged in a more or less regular series on head and body. Vertical fins with dark spots and blotches. Pectoral fin on left side of body with broad darker and paler crossbars, whereas the right one is white and without bars.

REMARKS :

Grammatobothus polyophthalmus appears in the Bangkok Fish Market. All specimens examined were collected from the west coast of the Gulf of Thailand, and they appear to be the first specimens of this species, to be reported from the Gulf of Thailand.

Distribution – Indian Ocean and the shores of the Malay Peninsula and Archipelago including the Gulf of Thailand to Australia.

SPECIMENS SEEN :

April, 1960, Prachuab Khiri Khan Province, 11 specimens, 126-156 mm.; June, 1960, Borka Village, Prachuab Khiri Khan Province, 5 specimens, 144-170 mm; August, 1960, Prachuab Khiri Khan Province, 2 specimens, 139-144 mm.

REFERENCES :

Platophrys polyophthalmus Bleeker, 1866, Ned. Tijdschr. Dierk., 3: 46; 1866-1872, Atl. Ichth., 6: 12, pl. 3, fig. 3.

Rhomboidichthys angustifrons Günther, 1880, Challenger Exped. Zool., 1 : 46, pl. 21, fig. B; Alcock, 1890, Ann. Mag. Nat. Hist., 6 (36) : 435.

Platophrys angustifrons Jenkins, 1910, Mem. Ind. Mus., 3: 27.

Grammatobothus polyophthalmus Norman, 1927, Rec. Ind. Mus., 29: 35, fig. 8; 1934, Syst. Monogr. Flatfish., 1: 245, fig. 187; Munro, 1955, Fish. Ceylon: 260, pl. 49, fig. 750.

Bothus polyophthalmus Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 119.

PSEUDORHOMBUS ARSIUS (Hamilton), 1822

COMMON NAMES :

Large-toothed flounder (Norman, 1934; Herre, 1953); smooth-scaled brill (Herre, 1953).

DESCRIPTION :

Body oblong and flat, its depth 1.8 to 2.3 in standard length. Upper profile of head straight or a little notched in front of eyes; head 3.0 to 4.0 in standard length. Both eyes on the left side of the body, anterior margins of eyes on same vertical, or upper a little in advance of lower; eye 4.0 to 7.0 in head. Snout longer than eye in adult. Mouth large, with upper jaw extending to below posterior edge of lower eye; lower jaw not projecting; maxillary without supplemental bone. Preoperculum with free margin. Gill rakers pointed, moderate in length or rather short.

Dorsal and anal fins separated from caudal fin; dorsal rays 71-81, anal rays 54-62. Origin of dorsal fin above or a little in advance of nostril of blind side, its anterior rays not prolonged and never free from membrane. Pectoral and ventral fins present, the former about twice as long as the latter. No connection between anal and ventral fin. Caudal fan-shaped and double truncate. Tip of interhemal spine feeble, not projecting. A lateral line on each side of the body; the one on colored side with a supratemporal branch reaching to base of eighth to twelfth ray of dorsal fin; 67-80 scales in lateral line; scales ctenoid on ocular side, cycloid on blind side.

Color of the eyed side brownish or grayish with darker spots and rings; usually two prominent dark spots, one on the junction of the straight and curved parts of the lateral line, the other on the straight part, about half way between caudal peduncle and the former spot. Head and body sometimes with numerous scattered small dark spots, with or without bluish white margins. Ventral fin with brown spots and rings.

REMARKS :

Pseudorhombus arsius is quite similar to *P. malayanus,* but the latter has ctenoid scales on both sides of the body.

Pseudorhombus arsius is very common in the Gulf of Thailand and is always to be found in the fish markets in Bangkok and in the villages along the coast of the Gulf of Thailand.

Distribution—From the East Coast of Africa, along the coast of India, Gulf of Thailand, South Vietnam, and Malay Archipelago to the Pacific.

SPECIMENS SEEN :

April, 1960, Prachuab Khiri Khan Province, 16 specimens, 151-208 mm.; April, 1960, Rayong Province, 1 specimen, 98 mm.; May, 1960, Chumporn Province, 23 specimens, 47-286 mm.; May, 1960, Goh Kol Thee, Ranong Province, 1 specimen, 156 mm.

REFERENCES :

Pleuronectes arsius Hamilton, 1822, Fish. Ganges : 128; Hora 1929, Mem. Ind. Mus., 9: 186, pl. 17, fig. 1-2.

Pleuronectes maculosus Cuvier, 1829, Reis. Anim., 2: 341.

Platessa russellii Gray, 1834, Illust. Ind. Zool., pl. 94, fig. 2; Cantor, 1850, Journ. Asiat. Soc. Bengal, 18 (2) : 1196.

Rhombus lentiginosus Richardson, 1843, Ann. Mag. Nat. Hist., 11: 495; Bleeker, 1852a, Verh. Bat. Gen., 24: 15.

Platessa balteata Richardson, 1846, Ichth. China and Japan: 278.

Pseudorhombus russellii Günther, 1862, Cat. Fish. Brit. Mus., 4: 424; Day, 1865, Fish. Malabar: 172; Bleeker, 1866-1872, Atl. Ichth., 6: 6, tab. 233, fig. 2; Alcock, 1889, Journ. Asiat. Soc. Bengal, 58 : 282.

Pseudorhombus arsius Günther, 1862, Cat. Fish. Brit. Mus., 4: 426; Day, 1878-1888, Fish. India, 1: 423, atlas, pl. 91, fig. 5; Jordan and Seale, 1906, Bull. U.S. Bur. Fish., 26: 45; Jenkins, 1910, Mem. Ind. Mus., 3: 24; Snyder, 1912, Proc. U.S. Nat. Mus., 42: 439; Hora, 1923b, Mem. Ind. Mus., 5: 758; Norman, 1927, Rec. Ind. Mus., 29: 13; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 105; Norman, 1934, Syst. Monogr. Flat-fish., 1: 101, fig. 62; Fowler, 1934a, Hong Kong Nat., 5: 57; Herre, 1953, Check List Phillipine Fish.: 187; Suvatti, 1936, Index Fish Siam: 94; Smith, 1949, Sea Fish. S. Africa: 156, pl. 10, fig. 304; Suvatti, 1950, Fauna Thailand: 322; Munro, 1955, Fish. Ceylon: 259, pl. 49, fig. 747; Fowler, 1956, Fish. Red Sea and S. Arabia: 162; Kuronuma, 1961, Check List Fish. Vietnam: 32.

PSEUDORHOMBUS DUPLICIOCELLARUS Regan, 1905

COMMON NAME:

Pla lin-kwai

DESCRIPTION:

Body elongate and flat, its depth 2.0 to 2.4 in standard length. Upper profile of head notched in front of eyes; head 3.3 to 4.0 in standard length. Both eyes on left side of body, 4.0 to 6.2 in head, separated by a very narrow bony ridge; eyelid of the lower eye with a fleshy tentacle in some specimens. Two nostrils on eyed side, the anterior one with a tentacle. Maxillary scaly on colored side and without supplemental bone. Mouth large with upper jaw reaching beyond middle of eye. Gill rakers palmate, as broad as long, 8 to 9 on lower part of anterior arch.

Dorsal and anal fins not confluent with caudal fin but extending close to it; dorsal rays 74-78; anal rays 53-63; subposterior rays of dorsal and anal longest, and all rays simple and scaly. First interhemal spine not projecting. Origin of the dorsal on the blind side above or behind posterior nostril; anal beginning before vertical through hind border of gill opening. Caudal fin bluntly pointed. One lateral line on each side of body, the one on colored side with supratemporal branch splitting from the median lateral line at the upper end of gill opening, reaching to base of eighth or ninth dorsal ray. Scales in lateral line of ocular side 73-84; scales ctenoid on colored side, cycloid on blind side, covering the head with exception of the snout.

Color of eyed side brownish with a number of darker spots and rings and with three or four large ocelli arranged in a square or triangular pattern; if three ocelli occur, one lies below the lateral line just at the end of its curve, the second and the third ones, more posteriorly, one above and one below the lateral line; if the fourth ocellus is present, it lies directly above the first one and with the others, completes a square; each ocellus consists of two dark brown round blotches, each surrounded by chalk white dots, the whole surrounded at some distance by a brown ring. Generally a series of rings on dorsal and anal; sometimes a pair of indistinct rings on the base of caudal.

REMARKS:

Pseudorhombus dupliciocellatus is one of the large species usually found in the Bangkok Fish Market, but no record of this species having been taken in the Gulf of Thailand has previously been published.

Distribution—From the Nicobar Islands through the Malay Archipelago and Gulf of Thailand to northeastern Australia and Japan.

SPECIMENS SEEN:

June, 1960, Goh Chuong, Prachuab Khiri Khan Province, 4 specimens, 196-240 mm.; July, 1960, Prachuab Khiri Khan Province, 5 specimens, 227-270 mm.; August, 1960, Prachuab Khiri Khan Province, 12 specimens, 227-277 mm.

REFERENCES:

Pseudorhombus dupliciocellatus Regan, 1905a, Ann. Mag. Nat. Hist., 15 (7): 25; Jordan and Starks, 1906, Proc. U.S. Nat. Mus., 31: 177; Norman, 1927, Rec. Ind. Mus., 29: 10; McCulloch, 1929, Mem. Aust. Mus., 5: 278; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 102; Norman, 1934, Syst. Monogr. Flatfish., 1: 94, fig. 55.

Platophrys palad Evermann and Seale, 1906, Bull. U.S. Bur. Fish., 26: 105, fig. 21.

Pseudorhombus cartwright Ogilby, 1912, Mem. Queensland Mus., 1: 47.

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PSEUDORHOMBUS ELEVATUS Ogilby, 1912

Figure 5, 0.8 ×

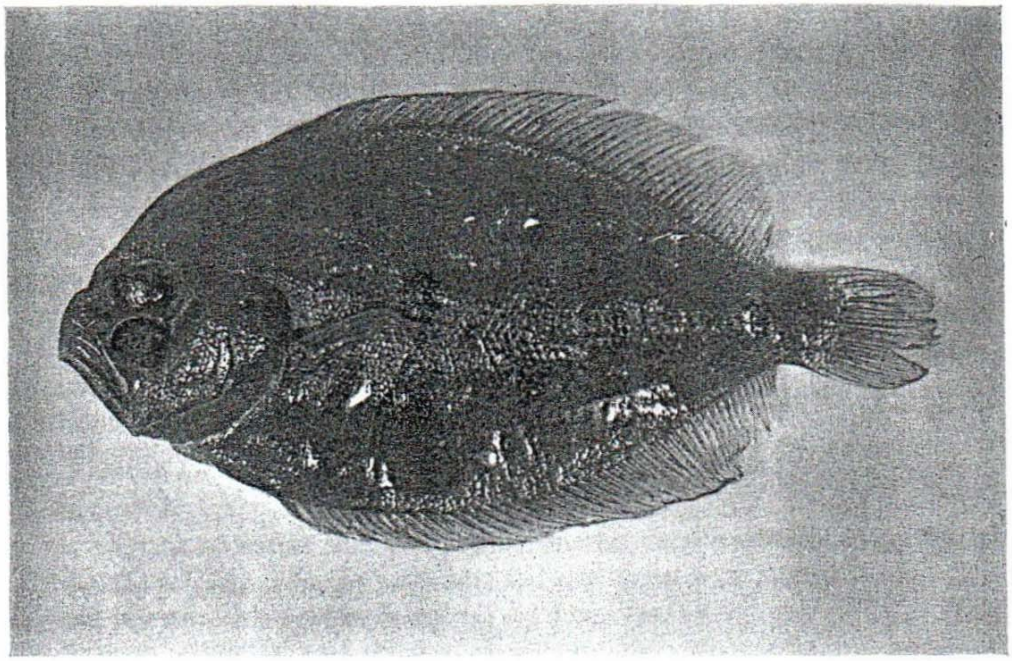

Figure 5

COMMON NAMES:

Pla bai-kanoon; deep flounder (Ogilby, 1912).

DESCRIPTION:

Body ovate and flattened, its depth 1.8 to 2.2 in standard length. Upper profile of head in front of upper eye evenly and rather strongly convex; head 3.0 to 3.5 in standard length. Both eyes on left side of body, 3.5 to 4.5 in head, separated by a narrow sharp elevated ridge; anterior margin of lower eye a little in advance of upper. Mouth strongly arched; maxillary extending below the middle of the eye. Operculum with free margin. Gill rakers long, pointed, 11-15 on lower branch of first arch.

Dorsal and anal fins separated from caudal fin, dorsal rays 66-76; anal rays 51-58; rays of dorsal and anal simple except hindermost, which are forked as are the caudal rays. Dorsal beginning on the blind side above anterior nostril, while origin of anal lies slightly anterior to the vertical through hind border of operculum. Ventral fins well developed, that of ocular side inserted rather nearer to the abdominal ridge. Caudal obtusely pointed. Tip of first interhemal spine projecting on blind side behind vent and above the first or second anal rays. One lateral line on each side, that of eyed side with a supratemporal branch splitting from the median

lateral line at the upper part of operculum and reaching base of ninth, tenth or eleventh ray of dorsal fin; lateral-line scales of ocular side 65-75; scales ctenoid on colored side and cycloid on blind side.

Color of eyed side brownish red with three dark blotches on lateral line, the first just behind its curve, one below end of dorsal, and the other between them. Two similar blotches above and below lateral line somewhat in front of the first one; less distinct brown rings are scattered on the body. A dark spot at the beginning of the lateral line. Median fins with brown spots and markings.

REMARKS:

Pseudorhombus elevatus has not previously been recorded from the Gulf of Thailand. This species is very closely related to *P. javanicus,* but the body is markedly deeper in the former than in the latter, and the arrangement of dark blotches on the eyed side of *P. elevatus* is distinctive.

Distribution—Along the Asiatic mainland from the Persian Gulf to the Gulf of Thailand, and through the Malay Archipelago to Australia.

SPECIMENS SEEN:

January, 1960, Goh Rong, 2 specimens, 125-134.; July, 1960, Prachuab Khiri Khan Province, 1 specimen, 117 mm.; August, 1960, Prachuab Khiri Khan Province, 14 specimens, 105-156 mm.; December, 1960, Goh Sattakut, 1 specimen, 131 mm.

REFERENCES:

Pseudorhombus javanicus Bleeker, 1866-1872, Atl. Ichth., 6: 8, 232, fig. 3; Day, 1878-1888, Fish. India, 1: 424, pl. 92, fig. 2; Jenkins, 1910, Mem. Ind. Mus., 3:24.

Pseudorhombus elevatus Ogilby, 1912, Mem. Queensland Mus, 1: 45; Norman, 1926, Biol. Res. "Endeavour," 5: 234, fig. 3; 1927, Rec. Ind. Mus., 29: 15; McCulloch, 1929, Mem. Aust. Mus., 5: 279; Norman, 1934, Syst. Monogr. Flatfish., 1: 108, fig. 66.

Pseudorhombus affinis Weber, 1913, Siboga-Exped. Fische: 426, pl. 11, fig. 1; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 110, fig. 25.

PSEUDORHOMBUS JAVANICUS (Bleeker), 1852

COMMON NAMES:

Pla bai-kanoon, pla lin-ma; Javanese flounder (Munro, 1955).

DESCRIPTION:

Body rather elongate, its depth 2.0 to 2.5 in standard length. Upper profile of head sloping gently upward or very slightly notched in front of eye; its length 3.1

to 4.0 in standard length. Both eyes on left side of body, 4.0 to 5.0 in head, separated by a narrow bony ridge; anterior border of upper and lower eye in about the same vertical line. Maxillary scaly; posterior edge of upper jaw reaching below middle of eye or a little beyond. Preoperculum with free margin. Gill rakers pointed, rather short; 12 to 15 on lower part of anterior arch.

Dorsal and anal fins separated from caudal fin; dorsal rays 67-74; anal rays 50-56; dorsal beginning on blind side in advance of anterior nostril; a line connecting base of first ray and posterior nostril, if continued, passes above hinder end of maxillary. Pectoral fin of eyed side longer than that of blind side. Caudal bluntly pointed. First interhemal spine not projecting. One lateral line on each side of body, the one on eyed side with supratemporal branch reaching base of ninth to eleventh ray of dorsal fin. Lateral-line scales of ocular side 67-74; scales of ocular side more or less ctenoid anteriorly and cycloid posteriorly, while those of blind side are all cycloid.

Color of eyed side brownish or reddish brown with darker spots and blotches; a round black blotch, sometimes surrounded by white dots, at the junction of straight and curved parts of lateral line, and usually another smaller blotch on middle of straight portion. A number of pale spots and ocelli scattered irregularly over the body and extending onto the median fins.

REMARKS:

Distribution—the East Coast of India through the Malay Peninsula and Archipelago to South China.

SPECIMENS SEEN:

November, 1960, Ile de Phu Quoc, 1 specimen, 182 mm.; December, 1960, Goh Chuong, 2 specimens, 156-169 mm.

REFERENCES:

Rhombus javanicus Bleeker, 1853b, Nat. Tijdschr. Ned. Ind., 4: 502.

Pseudorhombus javanicus Günther, 1862, Cat. Fish. Brit. Mus., 4: 427; Bleeker, 1866-1872, Atl. Ichth., 6: 8, pl. 1, fig. 3; Day, 1878-1888, Fish. India, 1: 424; Jordan and Richardson, 1907, Bull. U.S. Bur. Fish., 27: 281; Jenkins, 1910, Mem. Ind. Mus., 3: 24; Weber, 1913, Siboga-Exped. Fische: 424; Norman, 1927, Rec. Ind. Mus., 29: 16; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 109; Norman, 1931, Ann. Mag. Nat. Hist., 8: 598; 1934, Syst. Monogr. Flatfish., 1: 109, fig. 67; Suvatti, 1950, Fauna Thailand: 323; Munro, 1955, Fish Ceylon: 259, pl. 49, fig. 748.

Platophrys javanicus Evermann and Seale, 1906, Bull. U.S. Bur. Fish., 26: 105.

PSEUDORHOMBUS MALAYANUS Bleeker, 1866

COMMON NAMES:

Pla bai-kanoon; rough-scaled brill (Herre, 1953)

DESCRIPTION:

Body oblong and flat, its depth 1.7 to 2.0 in standard length. Upper profile of head slightly notched in front of eyes; head 3.2 to 3.5 in standard length. Both eyes on left side of body, 4.5 to 6.0 in head; anterior margin of eyes level, or upper a little in advance of lower. Snout as long as or a little longer than eye. Mouth large and strongly oblique, with upper jaw reaching to below hind border of eye; maxillary scaly on colored side and without supplemental bone. Preoperculum with free margin. Gill rakers rather short, 8 to 10 on lower part of anterior arch.

Dorsal and anal fins separated from caudal fin, but ending close to it; dorsal rays 71-77; anal rays 55-61. Origin of dorsal fin on the blind side above posterior nostril; origin of anal fin before vertical through hind border of gill opening; rays of both fins simple; anterior rays of dorsal fin not prolonged and never free from membrane. First interhemal spine projecting. Caudal fin double truncate. One lateral line on each side of body, the one on colored side with a supratemporal branch, reaching the upper profile at the base of the ninth, tenth or eleventh dorsal ray; lateral line scales 70-78; scales ctenoid on both sides of body; scales covering the head except the area of snout.

Color of eyed side brown with a dark blotch on the lateral line behind the curvature, and sometimes another small blotch between the former and the caudal. Vertical fins with more or less dark spots.

REMARKS:

Pseudorhombus malayanus is very similar to *P. arsius*, if specimens of more or less equal size are compared. The latter species is recognized by the shorter lower jaw, strong canines on both jaws, shorter pectoral fin on the blind side, and the scales being ctenoid on the colored side only.

No record of *Pseudorhombus malayanus* from the Gulf of Thailand has been published previously. This species is usually found on sand bars in the shallow water of the west coast of the Gulf and has also been seen in the Bangkok Fish Market.

Distribution—East Coast of India through the Malay Peninsula and Archipelago, Gulf of Thailand, to the Philippines.

SPECIMENS SEEN:

April, 1960, Gulf of Thailand, 2 specimens, 154-189 mm.; May, 1960, on sand flat, Goh Matapoan, Chumporn Province, 2 specimens, 139-170 mm.; August, 1960,

along shore, Langsuan District, Chumporn Province, 1 specimen, 182 mm.; May, 1960, Goh Matapoan, Chumporn Province, 8 specimens, 81-189 mm.

REFERENCES:

Pseudorhombus malayanus Bleeker, 1866, Ned. Tijdschr. Dierk, 3: 43; 1866-1872, Atl. Ichth., 6: 7, pl. 3, fig. 2; Alcock, 1889, Journ. Asiat. Soc. Bengal, 58 (2): 282; Norman, 1927, Rec. Ind. Mus., 29: 12; 1934, Syst. Monogr. Flatfish., 1: 98, fig. 59; Fowler, 1938, List Fish. Known from Malaya: 81; Herre, 1953, Check List Philippine Fish.: 179; Fowler, 1956, Fish. Red. Sea and S. Arabia: 162.

Pseudorhombus oligodon Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 101.

PSEUDORHOMBUS QUINQUOCELLATUS Weber and de Beaufort, 1929

Figure 6, 0.8 ×

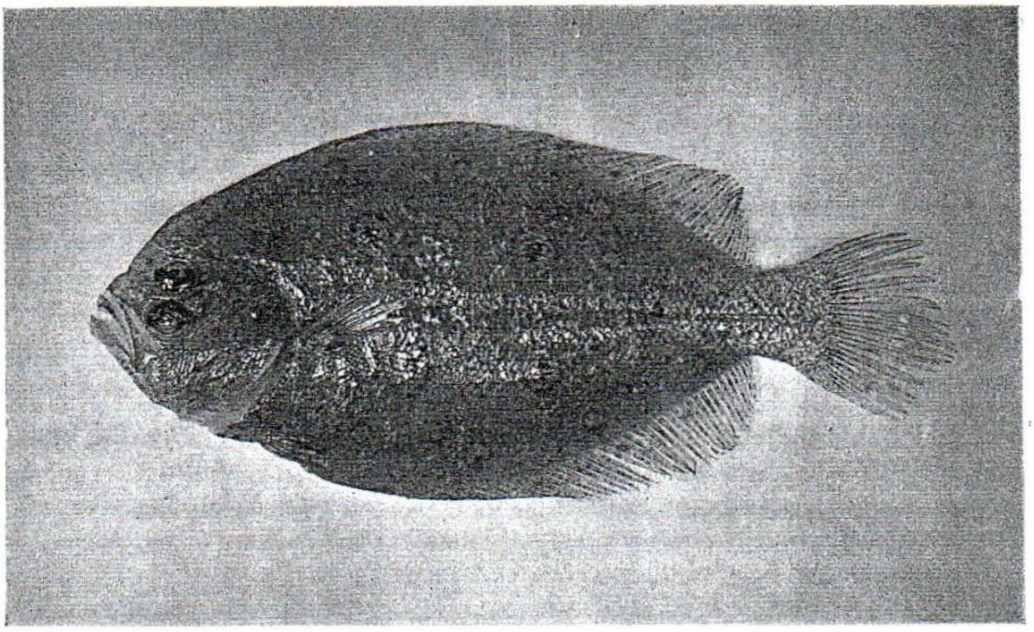

Figure 6

COMMON NAME:

Pla lin-kwai

DESCRIPTION:

Body oblong and flattened, its depth 1.8 to 2.1 in standard length. Upper profile of head a little notched in front of upper eye; head 3.2 to 3.5 in standard length. Both eyes on left side of body, 4.0 to 4.7 in head, separated by a narrow bony

ridge; lower eye very slightly in advance of upper. Snout as long as eye. Mouth large and strongly oblique; maxillary scaly on colored side, reaching to below posterior part of the eye; lower jaw scarcely projecting. Preoperculum with free margin. Gill rakers of moderate length; 9 or 10 on lower part of anterior arch.

Dorsal and anal fins separated from caudal fin but ending close to it; dorsal rays 68-70; anal rays 52-55; all of dorsal and anal rays simple and scaly except the hindermost dorsal ones. Dorsal beginning on blind side above space between nostrils; origin of anal somewhat behind or before vertical through hindborder of gill opening. Caudal fin bluntly pointed. Tip of first interhemal spine strongly projecting. One lateral line on each side of body, the one on colored side with a supratemporal branch extending towards base of eighth ray of dorsal fin. Lateral line scales 76-79; scales ctenoid on ocular side, cycloid on blind side, and covering the head as well as the body but not present on the snout.

Color of eyed side reddish brown with five dark blotches arranged in two vertical pairs forming a square with a single blotch behind them; the paired blotches lie above and below the lateral line with the upper anterior one just touching the top of the curve of lateral line; the hindermost blotch lies directly on the lateral line itself; each blotch is surrounded by a brown ring; incomplete rings are scattered over body.

REMARKS:

Pseudorhombus quinquocellatus is usually available in the Bangkok Fish Market, but is here reported from the Gulf of Thailand for the first time.

Distribution—This species is restricted to the strait of Madura, near the Kangeang Islands and to the Gulf of Thailand.

SPECIMENS SEEN:

June, 1960, Prachuab Khiri Khan Province, 7 specimens, 126-145mm.; July, 1960, offshore east of Kau Samroiyord, Prachuab Khiri Khan Province, 7 specimens, 136-169 mm.; August, 1960, Prachuab Khiri Khan Province, 1 specimen, 166 mm.

REFERENCES:

Pseudorhombus quinquocellatus Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 104; Norman, 1934, Syst. Monogr. Flatfish., 1: 100, fig. 61.

FAMILY PLEURONECTIDAE

Eyes on the right side. Mouth usually terminal, more or less prominent; maxillary without a supplemental bone; teeth in jaws often more developed on blind side than on colored side; palatine teeth absent. Preoperculum with free margin. Dorsal fin extending on head at least above the eye, no spinous fin-rays; both pectoral fins present, or the left one absent; each ventral fin with 3 to 13 fin rays, either short based and symmetrical or long based and asymmetrical; caudal fin free from dorsal and anal fins. Lateral line straight or with a curve anteriorly, supratemporal branch present or absent.

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BRACHYPLEURA NOVAE-ZEELANDIAE Günther, 1862

Figure 7, 0.9 ×

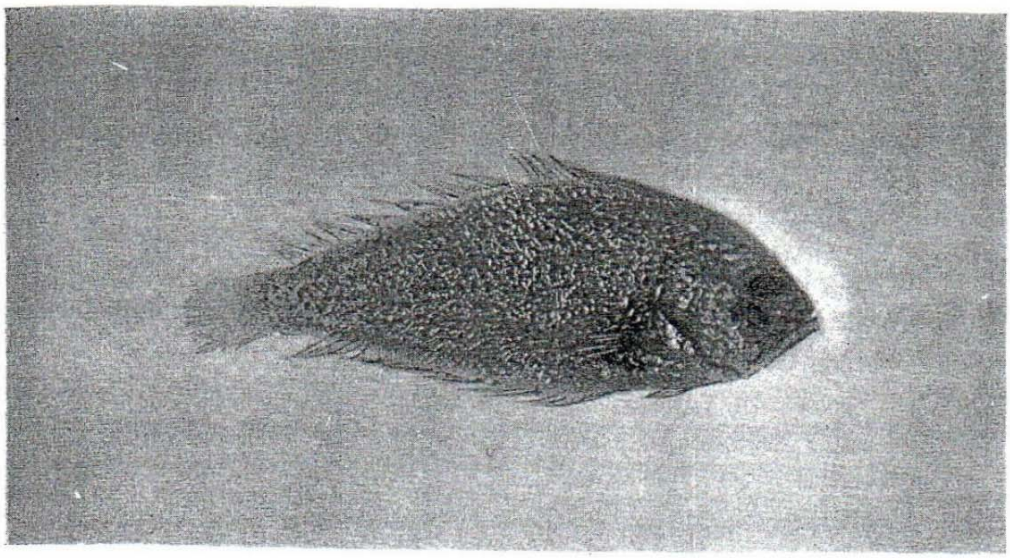

Figure 7

COMMON NAME:

Pla seek-deo

DESCRIPTION:

Body elongate and flat, its depth 2.3 to 2.6 in standard length. Head 3.0 to 3.6 in standard length. Both eyes on the right side of head, 3.0 to 4.5 in head, separated by a bony keeled ridge, the upper eye in advance of the lower one. Snout shorter than eye. Cleft of mouth curved, its anterior part horizontal, its major extent strongly oblique, and with a convexity of the mandible fitting into a concavity of the upper jaw; maxillary extending below middle of eye or beyond; lower jaw a little projecting; maxillary without supplemental bone. Preoperculum with free margin. Gill-rakers pointed, 8 to 10 on lower part of anterior arch.

Dorsal and anal fins separate from caudal fin; dorsal rays 65-74; anal rays 43-49. Origin of dorsal on blind side immediately behind point of snout and below nostril, third to sixth rays long and filamentous in male. Anal fin beginning behind vertical through origin of pectoral; right pectoral fin with 10 to 12 rays, the middle rays branched. Pelvic fin with 6 rays, asymmetrical, that of the right side median and somewhat advanced. Caudal fin with 17 to 19 rays, rounded. One lateral line on each side, that of the right side with a curve above pectoral; top of curve separated by two scales from dorsal. Scales on lateral line of eyed side 29 to 33; scales deciduous, ctenoid on eyed side, cycloid or feebly ctenoid on blind side; not covering eyes, jaw, and snout; no scales on fins.

Color of alcohol specimens uniform yellowish brown on both sides, sometimes with some indistinct darker markings; median fins with small dark spots.

REMARKS:

The specimens of *Brachypleura novae-zeelandiae* listed below are the first ones known from the Gulf of Thailand.

Distribution – The species ranges the Bay of Bengal through the Malay Archipelago and the Gulf of Thailand to the Philippines and New Zealand.

SPECIMENS SEEN:

January, 1960, Goh Phangan, 4 specimens, 88-105 mm.

REFERENCES:

Brachypleura novae-zeelandiae Günther, 1862, Cat. Fish. Brit. Mus., 4: 419; Norman, 1927, Rec. Ind. Mus., 29: 43, fig. 12; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 145, fig. 37; Norman, 1934, Syst. Monogr. Flatfish., 1: 400-401, fig. 289; Herre, 1941, Mem. Ind. Mus., 13: 319.

Brachypleura xanthosticta Alcock, 1889, Journ. Asiat. Soc. Bengal 58 (3): 281-282, pl. 17, fig. 3; 1896, Journ, Asiat. Soc. Bengal, 65 (3): 327; 1898, Illust. Zool. "Investigator," Fish., pl. 22, fig. 2; Jenkins, 1910, Mem. Ind. Mus., 3: 27.

Laiopteryx xanthosticta Weber, 1913, Siboga-Exped. Fische: 423.

SAMARIS CRISTATUS Gray, 1831

Figure 8, 0.8 ×

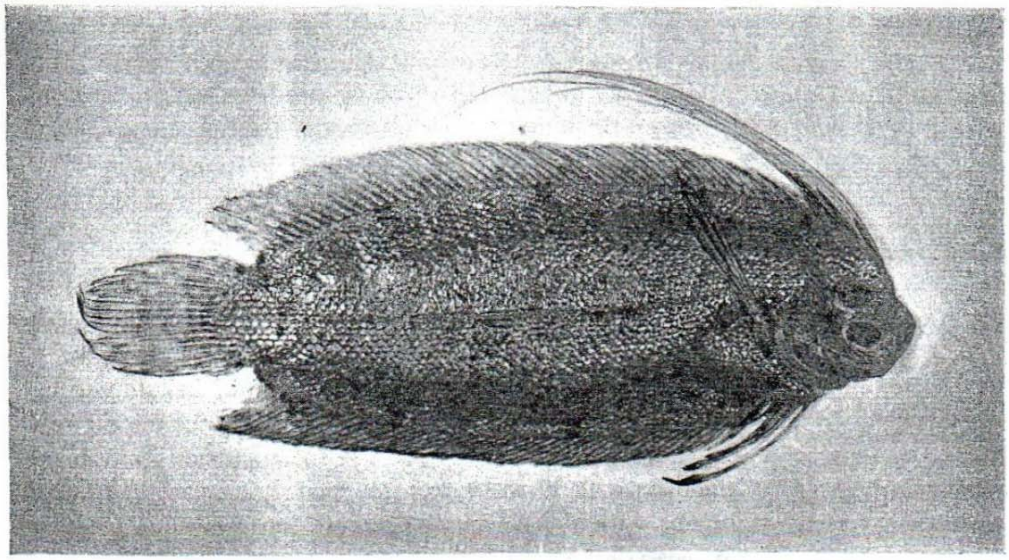

Figure 8

COMMON NAMES:

Pla lin-ma-ngon-yow; Gray's crested flounder (Munro, 1955); right-hand flounder (Kuronuma, 1961).

DESCRIPTION:

Body elongate and flat, its depth 2.3 to 3.5 in standard length. Upper profile of head much elevated, with more or less distinct notch before eyes; head 3.7 to 5.3 in standard length. Both eyes on the right side, large, separated by a narrow keeled ridge; eye 3.0 to 4.0 in head. Snout rather shorter than eye, diameter of which is 2.8 to 4.0 in length of head. Mouth small and very oblique. Maxillary extending below anterior edge of eye or a little beyond; lower jaw slightly projecting.

Dorsal and anal fins separated from caudal fin; dorsal rays 73-81; anal rays 50-57. First 11 or 14 of the anterior dorsal rays greatly prolonged. Only right pectoral fin developed, with four prolonged rays. The left ventral fin with rays short, those of the right fin prolonged and with broad tips, especially the first and longest ray which is separated from the rest. Caudal fin with 16 simple rays, rounded. Middle lateral line of eyed side straight, and slightly ascending anteriorly. Scales on lateral line 68 to 77; scales ctenoid on eyed side, and feebly ctenoid on blind side.

Color of the body brownish red, irregularly mottled and spotted with lighter and darker tones. Snout white. Anterior dorsal rays white, some of them blackish at their bases, rest of dorsal and anal fins brownish with small dark and white spots. a series of small black blotches along the entire upper and lower profiles of the body. Pectoral fin dark brown.

REMARKS:

The geographical distribution of *Samaris cristatus* is in deep water off Ceylon, the Adaman Islands, China Seas and Gulf of Thailand.

SPECIMENS SEEN:

August, 1960, Prachuab Khiri Khan Province, 4 specimens, 100-125 mm.; July, 1960, Prachuab Khiri Khan Province, 2 specimens, 120-144 mm.; December, 1960, Goh Chuang, 2 specimens, 131-139 mm.; August, 1961, Prachuab Khiri Khan Province, 1 specimen, 136 mm.

REFERENCES:

Samaris cristatus Gray, 1831, Zool. Miscell., 1: 5; Günther, 1862, Cat. Fish. Brit. Mus., 4: 420; Alcock, 1889, Journ. Asiat. Soc. Bengal, 58 (2): 291, pl. 17, fig. 4; 1896, Journ. Asiat. soc. Bengal, 65 (2): 327; Norman, 1927, Rec. Ind. Mus., 29: 44; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 138, fig. 34; Norman, 1934, Syst. Monogr. Flatfish., 1: 403; Smith, 1949, Sea Fish of S. Africa: 156, pl. 10, fig. 303; Munro, 1955, Fish. Ceylon: 257.

FAMILY SOLEIDAE

Eyes on the right side. Mouth small, terminal, subterminal or inferior, strongly asymmetrical, with the snout often produced above the mouth and forming a hook; lower jaw not prominent; minute teeth in jaws on blind side, feebly developed or absent on eyed side; preopercular edge not free, covered by skin. Dorsal fin extending on head above or beyond eye, no spinous fin rays; pectoral fin present or absent; ventral fins either symmetrical or asymmetrical, free from anal, or one of them connected with this fin; caudal fin free or confluent with dorsal and anal fins. Lateral line straight.

ACHIROIDES LEUCORHYNCHOS Bleeker, 1851

Figure 9, 1.5 ×

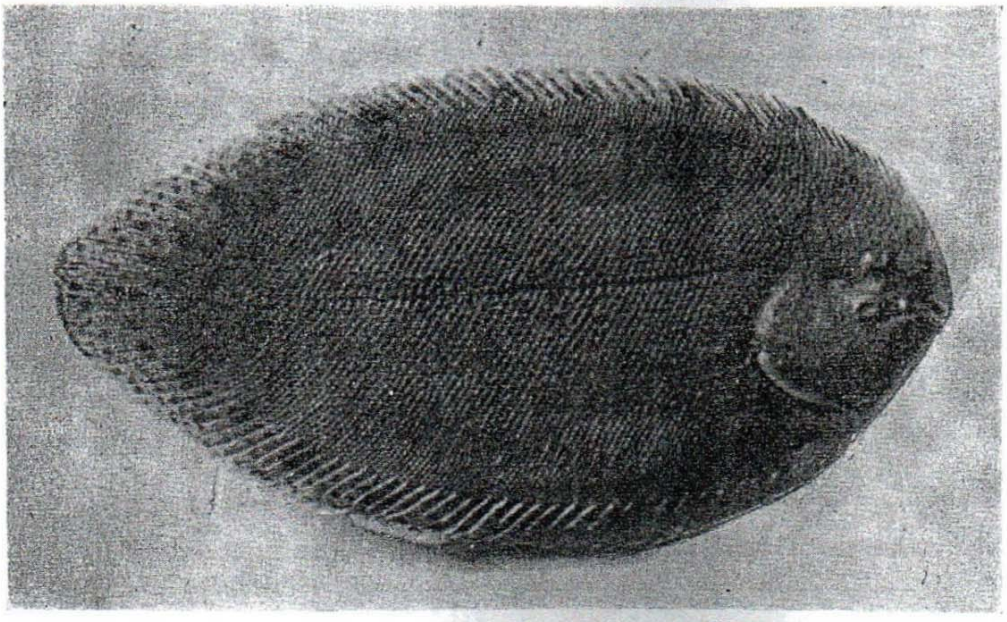

Figure 9

COMMON NAME:

Pla lin-ma

DESCRIPTION:

Body depth about 2.0 in total length. Head 4.5 in total length. Both eyes on the right side of the body, seperated by scaly interspace; the upper eye in advance of lower one; eye 5.0 to 6.0 in head. Snout not forming a prominent hook. Mouth

small and curved; rictus of mouth below front border of eye. Lower lip fringed; lower part of gill opening of eyed side edged with fleshy filaments and continued to the blind side.

Dorsal and anal fins confluent with caudal fin; dorsal rays 54, anal rays 36-42; rays of vertical fins divided or split at the tips only. Dorsal beginning at snout. Pectorals wanting. Ventrals short, rather broad based, free from each other and from anal. One straight lateral line on each side; lateral-line scales 60-67; scales ctenoid on both sides. Scales of blind side at posterior edge of mouth and on chin replaced by fleshy tentacles.

Color of eyed side brownish with diffuse irregular dark blotches, a white area behind and above the angle of the mouth; blind side whitish, without any black markings surrounding the mouth.

REMARKS:

Achiroides leucorhynchos is closely related to *A. melanorynchus* of the Malay Peninsula, but the latter has the area surrounding the mouth on blind side black.

Achiroides leucorhynchos is found in fresh and brackish water. The specimens which were described by Bleeker were caught in the river near Surakarta, Java; Herre and Myers (1937) have recorded the species from the coast of Sumatra. I have seen no specimens, but it has been reported in Thailand from Klong Sok, Ban Don District, by Smith (1945).

SPECIMEN SEEN:

September, 1964, Kasetsart University Museum of Fisheries, 1 specimen, 73 mm.

REFERENCES:

Achiroides leucorhynchos Bleeker, 1851c, Nat. Tijdschr. Ned. Ind., 1: 411; 1852a, Verh. Bat. Gen., 24: 20; 1866-1872, Atl. Ichth., 6: 26; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 181; Smith, 1945, Freshwater Fish. Siam: 440; Suvatti, 1950, Fauna Thailand: 326.

Eurypleura leucorhyncha Kaup, 1858, Arch. Nat., 24: 100.

Synaptura leucorhyncha Günther, 1862, Cat. Fish. Brit. Mus., 4: 486.

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ASERAGGODES DUBIUS Weber, 1913

Figure 10, 1.0 ×

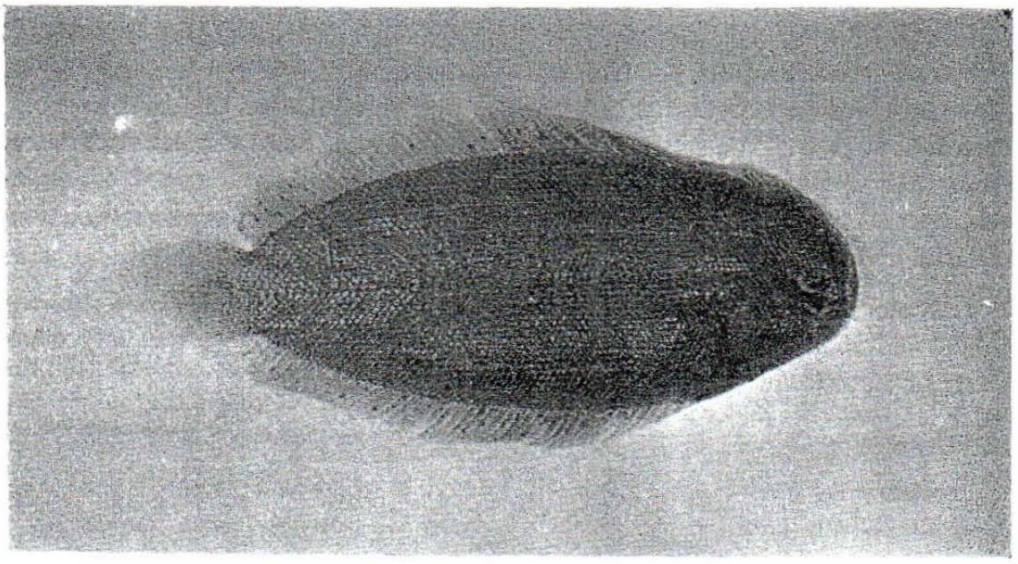

Figure 10

COMMON NAME:

Pla seek-deo

DESCRIPTION:

Body oblong and flat, its depth 2.5 to 2.8 in standard length. Lower profile of head with a row of short tentacles from chin to gill opening, head 4.0 to 4.6 in standard length. Both eyes on right side of body, separated by a scaly space; the upper eye slightly in advance of the lower one; eye 5.5 in head. Anterior nostril of both sides tubular, situated near upper lip. Mouth opening strongly curved.

Dorsal and anal fins separated from caudal fin; dorsal rays 67-70; anal rays 46-51; rays of dorsal and anal simple and naked, but those of rounded caudal are divided and scaly. Origin of dorsal on snout in front of eye; anterior dorsal rays shorter than following ones. Pectorals wanting. Right ventral somewhat longer than left one. One straight lateral line on each side; lateral-line scales of ocular side 66-70, scales ctenoid on both sides.

Color greyish brown on eyed side, with inconspicuous irregular dark spots scattered over the body. Vertical fins with light brown and dark spots.

REMARKS:

There has been no record of *Aseraggodes dubius* being found in the Gulf of Thailand before.

Distribution–Gulf of Thailand and the Java Sea to the Philippines.

SPECIMENS SEEN:

December, 1960, Goh Koram, 1 specimen, 91 mm.

REFERENCES:

Aseraggodes dubuis Weber, 1913, Siboga-Exped. Fische: 438, fig. 82; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 156, fig. 39; Herre, 1953, Check List Philippine Fish.: 186.

HETEROMYCTERIS HARTZFELDII (Bleeker), 1853

COMMON NAME:

Pla lin-ma

DESCRIPTION:

Body ovate, its depth 2.5 to 2.8 in standard length. Head with symmetrically rounded profile, its length 3.8 to 4.0 in standard length. Both eyes on the right side of the head, separated by a flat scaly interspace; upper eye in advance of lower one; eye 6.0 to 7.0 in head. Snout forming a rostral hook over the mouth. Anterior nostril on colored side a rather wide short tube; on the blind side the anterior nostril consists of a thick fleshy sucker-like papilla, the posterior one a short simple tube. Mouth strongly curved, reaching below anterior half of lower eye. No fringes beneath lower jaw.

Dorsal and anal fins separated from caudal fin; dorsal rays 88-101, anal rays 61-65; dorsal and anal rays simple, those of caudal divided and scaly. Dorsal origin on hook of snout. Pectorals absent. Right ventral continuous with anal; base of left ventral somewhat shorter than that of the right one. One straight lateral line on eyed side, but that of the blind side has a Y-shaped break just behind the gill cleft; lateral-line scales of ocular side 97-102; scales strongly ctenoid on both sides.

Color purplish brown, with wavy anastomosing lighter lines which surround irregular darker spots or rings. Eight large ocelli, each consisting of two concentric dark rings surrounded by a light area, in two rows, one along the base of dorsal and the other along base of anal; sometimes a row of similar ocelli on lateral line. Vertical fins with blackish spots and stripes.

REMARKS:

Although *Heteromycteris hartzfeldii* has previously been reported from the Gulf of Thailand, no specimens were available to me. Consequently, the characters as given have been extracted from the descriptions of Alcock (1886) and Weber and de Beaufort (1929).

Distribution—British India; Malay Archipelago; Philippines.

REFERENCES:

Achirus hartzfeldii Bleeker, 1853a, Nat. Tijdschr. Ned. Ind., 4: 123; 1886-1872, Atl. Ichth., 6: 25, pl. 246, fig. 1; Evermann and Seale, 1906, Bull. Bur. Fish., 26: 106.

Aseraggodes hartzfeldi Kaup, 1858, Archiv. Naturges 24: 103.

Solea hartzfeldii Günther, 1862, Cat. Fish. Brit. Mus., 4: 471.

Soles oculus Alcock, 1889, Journ. Asiat. Soc. Bengal, 58 (3): 285.

Achirus hartzfeldi Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 160, fig. 45.

Heteromycterus hartzfeldii Suvatti, 1950, Fuana Thailand: 323.

HETEROMYCTERIS OCULUS (Alcock), 1889

Figure 11, 1.0 ×

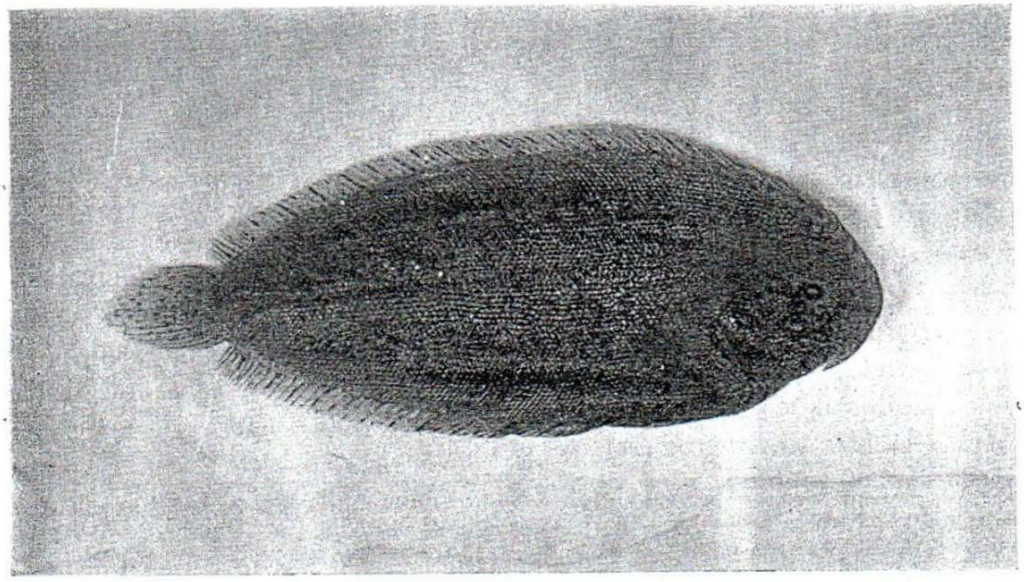

Figure 11

COMMON NAME:

Pla seek-deo

DESCRIPTION:

Body ovate, its depth 2.6 to 3.0 in standard length. Head with symmetrically rounded profile, 3.7 to 4.5 in standard length. Both eyes on right side of body, separated by scaly space, eye 6.5 in head. On the colored side both nostrils are in front of the lower eye and near upper lip, the anterior one tubular, the posterior one simple; on the blind side the anterior nostril is surrounded by a large fleshy sucker-like papilla. Snout forming a rostral hook which curves around behind the symphysis of the lower jaw and extends to a vertical from the front edge of the lower eye.

Rictus of mouth reaching a vertical from the middle of the lower eye. No fringes beneath the lower jaw.

Dorsal and anal fins separated from caudal fin; dorsal rays 90-103; anal rays 60-67; no scales on ocular side of dorsal and anal. Dorsal origin at tip of rostral hook; pectoral fins absent. Right ventral continuous with anal; caudal more or less rounded. One straight lateral line on each side; lateral-line scales of ocular side 86-102; scales ctenoid on both sides.

Color of alcoholic specimens brown on eyed side with small irregular dark brown ocelli along the lateral line and with numerous dark brown dots scattered over the body. Vertical fins uniform light brown, but some rays of dorsal and anal with dark brown streaks.

REMARKS:

Heteromycteris oculus is very close to *H. hartzfeldii* (Bleeker), but appears to differ in the absence of scales on the ocular side of the rays of the dorsal and anal fins, and in the coloration. Moreover, from examination of *H. japonica* (Jordan and Snyder), it appears that *H. oculus* is also close to this species, but *H. japonica* has fewer scales in the lateral line than does *H. oculus*.

Alcock (1889) presented a detailed description of the color of live specimens of this species. His account reads as follows :

> Ground colour light brown, intersected by a most elegant network of irregular light olive-green lines forming a somewhat pentagonal pattern. Along the dorsal curve are five large, perfect, and complicated ocelli with light-green centre, brown irides, and light green margins. Four similar ocelli along the ventral curve, and another small one at the base of the caudal. A few small incomplete ocelli along the lateral line, and numerous dark brown dots and rings scattered all over the body. Fins transparent grey-green, every fourth or fifth ray uniform dark brown, and the intermediate rays streaked with brown.

Heteromycteris oculus has never before been reported from the Gulf of Thailand.

Distribution – Ceylon and the Bay of Bengal to the Gulf of Thailand.

SPECIMENS SEEN :

April, 1960, Ban Phe, Rayong Province, 3 specimens, 47-108 mm.

REFERENCES :

Solea oculus Alcock, 1889, Journ. Asiat. Soc. Bengal, 58 (3) : 285, pl. 18, fig. 3.

Solea (Achirus) oculus Alcock, 1896, Journ. Asiat. Soc. Bengal, 65 (3) : 329.

Heteromycteris oculus Chabanaud, 1927, Ann. Mag. Nat. Hist., 20 (9) : 526; Norman, 1928, Rec. Ind. Mus., 30: 190, fig. 8.

LIACHIRUS MELANOSPILUS (Bleeker), 1854

Figure 12, 0.9 ×

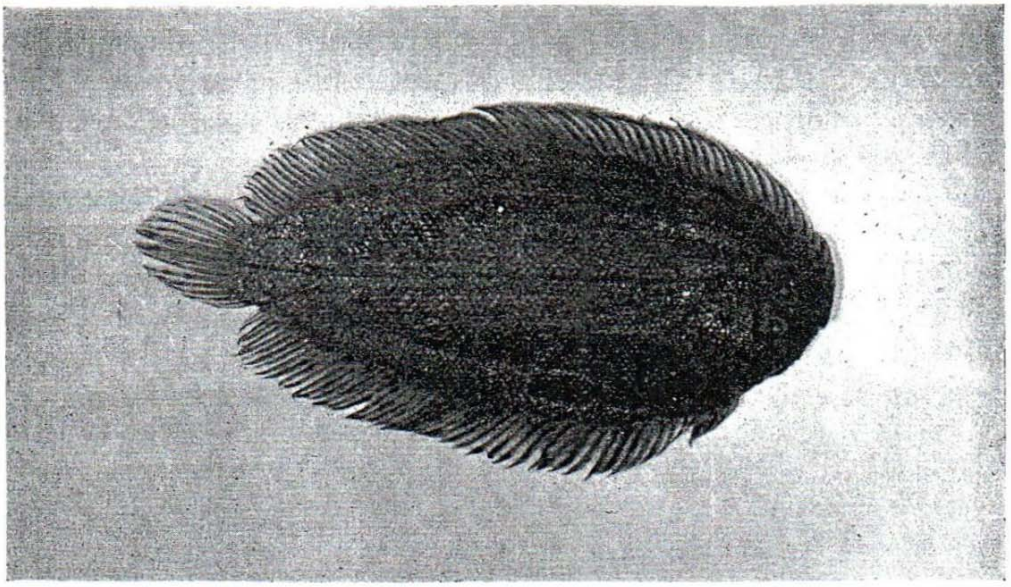

Figure 12

COMMON NAME :

Pla seek-deo

DESCRIPTION :

Body oblong and flat, its depth 2.2 to 2.5 in standard length. Lower profile of head and edge of gill opening with fringes; head 3.7 to 4.3 in standard length. Both eyes on right side of the body, separated by a concave scaly space, 5.2 to 5.6 in head, the front border of lower one below middle of upper eye, which is one eye diameter from tip of snout. Anterior nostrils of both side tubular, the one on colored side near upper lip. Mouth curved, reaching to below front border of eye.

Dorsal and anal fins separated from caudal fin; dorsal rays 56-70; anal rays 44-55; rays of dorsal and anal simple, those of caudal split at their tips. Dorsal origin near tip of snout. Pectoral fins wanting. Right ventral base longer than that of the left one, both free from anal. Caudal rounded, Lateral line developed on both sides; a second one along dorsal profile of head on blind side from snout to nape. Lateral-line scales 70-75; scales cycloid on both sides.

Color of alcohol specimens brownish with numerous small and large irregular brown spots, edged with dark brown dots. Vertical fins with brown streaks.

REMARKS :

No record of *Liachirus melanospilus* from the Gulf of Thailand has been published before.

Distribution – From the Gulf of Thailand, Singapore, and the East Indies through the Philippines and along the Asiatic mainland to southern Japan.

SPECIMENS SEEN :

January, 1960, Prachuab Khiri Khan Province, 66 specimens, 78-117 mm.

REFERENCES :

Achirus melanospilos Bleeker, 1854a, Nat. Tijdschr. Ned. Ind., 7: 257; 1866-1872, Atl. Ichth., 6: 23, pl. 244, fig. 1.

Liachirus nitidus Günther, 1862, Cat. Fish. Brit. Mus., 4: 479; Jordan and Evermann, 1903, Proc. U.S. Nat. Mus., 25: 366, fig. 28; Jordan, 1906, Proc. U.S. Nat. Mus., 31: 231; Fowler and Bean, 1922, Proc. U.S. Nat. Mus., 62: 67.

Liachirus melanospilus Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 158, fig. 42-43; Herre, 1953, Check List Philippine Fish. : 188.

PARDACHIRUS PAVONINUS (Lacépède), 1802

Figure 13, 0.5 ×

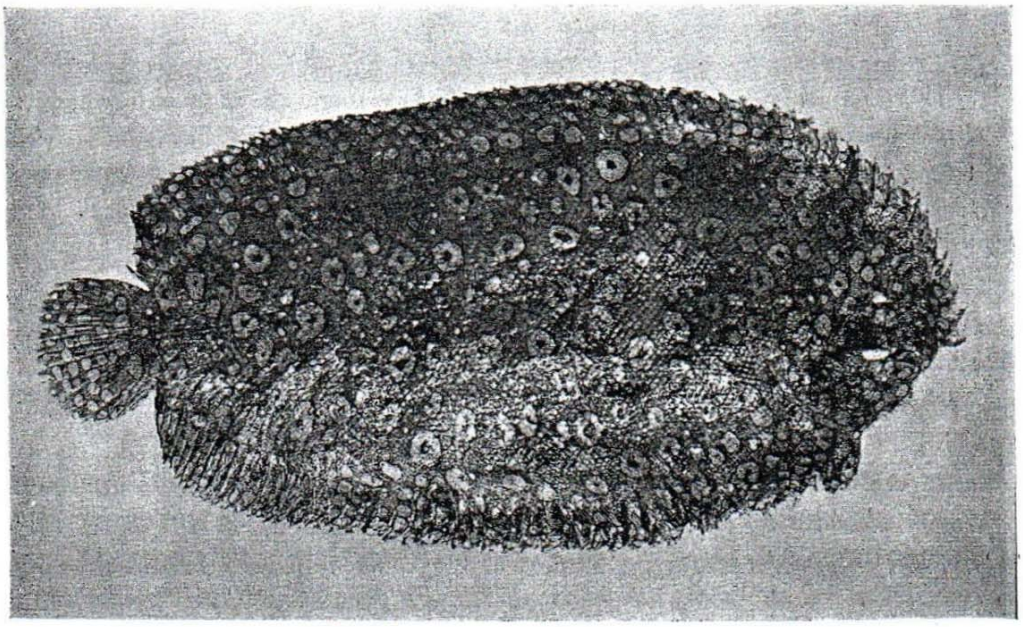

Figure 13

COMMON NAMES :

Pla lin kwai-jood; broad sole (Suvatti, 1950)

DESCRIPTION :

Body oblong, flattened, its depth 2.1 to 2.6 in standard length. Head 3.8 to 5.6 in standard length. Long fringes present along the edge of both upper and lower

profiles of head, and along the margin of the operculum. Both eyes on right side of body, eye 5.0 to 8.0 in head, the upper one slightly in advance of lower one. Anterior nostril tubular, situated above the middle of mouth. Rictus of mouth just beneath front border of the eye. Gill opening narrow; gill membranes broadly united below the throat.

Dorsal and anal fins separated from caudal fin; dorsal rays 63-70; anal rays 49-56; dorsal and anal rays branched, each ray with a pore at the base. Dorsal originating on snout and ending on the caudal peduncle opposite the end of anal fin. Pectorals wanting. Ventrals unsymmetrical, the right one with an elongated base and its membrane attached posteriorly to the base of the first anal ray. Caudal rounded. A single straight lateral line present on the eyed side; on the blind side, in addition to a similar one, a short curved lateral line is also found running below the base of dorsal fin from the snout to the nape. Lateral-line scales 85-100; scales feebly ctenoid on both sides.

Numerous dark edged, white blotches of various shapes and sizes, on the reddish brown eyed side of body. These blotches, excepting those on the fins, have a dark spot at the center.

REMARKS :

There is only one species of genus *Pardachirus* found in the Gulf of Thailand, and this species is rather abundant and often seen in the Bangkok Fish Market.

Distribution—Andaman Islands, through the Malay Peninsula and Archipelago including the Gulf of Thailand to Japan, Australia and the Pacific.

SPECIMENS SEEN :

April, 1960, Koh Samet, Rayong Province, 10 specimens, 39-154 mm.; May, 1960, Goh Matsee, Chumporn Province, 31 specimens, 40-139 mm.; June, 1960, Borka Village, Chumporn Province, 18 specimens, 155-214 mm.; August, 1960, Langsuan District, Chumporn Province, 3 specimens, 184-196 mm.

REFERENCES :

Achirus pavoninus Lacépède, 1802, Hist. Nat. Poissons, 8: 361, 363; Cantor, 1850, Journ. Asiat. Soc. Bengal, 18: 1207; Bleeker, 1852a, Verh. Bat. Gen., 24: 18; 1866-1872, Atl. Ichth., 6: 24, pl. 241, fig. 1; Day, 1878-1888, Fish. India, 1: 427, Atlas, pl. 93, fig. 2; Suvatti, 1936, Index Fish. Siam: 95.

Pardachirus pavoninus Günther, 1862, Cat. Fish. Brit. Mus., 4: 479; 1909, Fische der Südsee, 6: 347; Fowler and Bean, 1922, Proc. U.S. Nat. Mus., 62: 67; Norman, 1928, Rec. Ind. Mus., 30: 187, fig. 6; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 165, fig. 46; Herre, 1953, Check List Philippine Fish.: 187; Suvatti, 1950, Fauna Thailand: 323; Kuronuma, 1961, A Check List Fish. Vietnam: 32.

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SOLEA OVATA Richardson, 1846
Figure 14, 1.2 ×

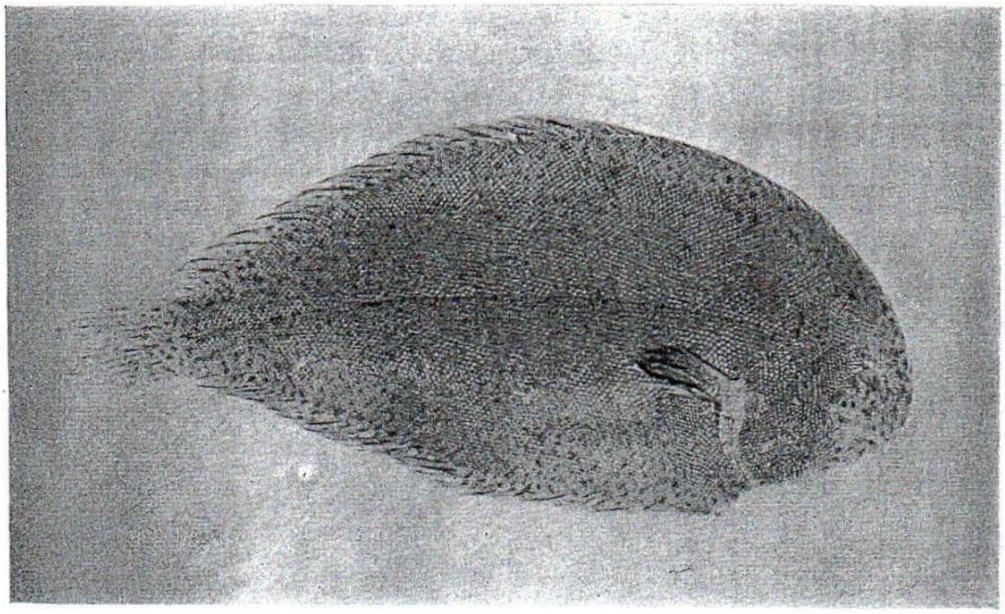

Figure 14

COMMON NAMES:

Pla seek-deo; ovate sole (Herre, 1953)

DESCRIPTION:

Body ovate and flat, its depth 1.5 to 2.2 in standard length. Profile of head arched, depth of head wider than its length, head 3.5 to 4.2 in standard length. Numerous white filaments occur on the anterior part of the blind side of the head, and extend backwards to the lower edge of the gill opening. Both eyes on right side, 4.0 to 5.0 in head, separated by a concave scaly interorbital space; the upper eye somewhat in advance of the lower one which touches the upper lip. Two nostrils, a small simple one just in front of the lower eye, and another tubular one situated anterior to the former. No dilated nostrils on blind side. Mouth twisted slightly behind the projecting obtuse snout; maxillary extending to below the middle of eye; gill membranes united to isthmus.

Dorsal and anal fins separated from caudal fin; dorsal rays 58–67; anal rays 41–51. Dorsal fin originating above anterior nostril, ending very close to caudal. Pectoral fin of colored side twice as long as the one on the blind side. Both ventral fins present. Caudal fin rounded. One straight lateral line on each side; lateral-line

scales of colored side 100–110; scales strongly ctenoid on both sides, present on dorsal and anal fin rays.

Color of eyed side brownish with black spots and blotches; sometimes a series of white blotches along upper and lower edges of body, and one or two whitish spots in the region of lateral line. Both pectoral fins with deep black blotches on the distal parts. The right ventral fin brownish but the left one white. Caudal spotted.

REMARKS:

Solea ovata has not previously been recorded from the Gulf of Thailand.

Bleeker observed that *Solea ovata* Richardson was the same species as that which Cantor called *S. humilis,* and thought that *S. maculata* was probably the same species also. He therefore reduced both of these forms to synonyms of *S. ovata* and his views are generally accepted by modern ichthyologists.

Distribution–Coast of India, through the Malay Peninsula and Archipelago including the Gulf of Thailand to China.

SPECIMENS SEEN:

December, 1960, Goh Si-Chang, Cholburi Province, 2 specimens, 81-84 mm.

REFERENCES:

Solea ovata Richardson, 1846, Ichth. China and Japan: 279; Cantor, 1850, Journ. Asiat. Soc. Bengal, 18 (2): 1202; Günther, 1862, Cat. Fish. Brit. Mus., 4: 472; Day, 1878–1888, Fish. India., 1: 426; atlas, pl. 93, fig. 1; Alcock, 1889, Journ. Asiat. Soc. Bengal, 58 (3): 285; Norman, 1928, Rec. Ind. Mus., 30: 176.

Solea humilis Cantor, 1850, Journ. Asiat. Soc. Bengal, 18 (2): 1201; Günther, 1862, Cat. Fish. Brit. Mus., 4: 471; Bleeker, 1866–1872, Atl. Ichth., 6: 16, pl. 237, fig. 1; Weber and de Beaufort, 1929, Fish. Indo–Austral. Archip., 5: 148; Fowler. 1938, List Fish. Known from Malaya: 82.

Solea maculata Bleeker, 1851c, Nat. Tijdschr. Ned. Ind. 1: 409; 1852a, Verh. Bat. Gen., 24: 17.

Microbuglossus humilis Jordan and Seale, 1907, Bull. U.S. Bur. Fish., 26: 46.

Microbuglassus ovatus Herre, 1953, Check List Philippine Fish.: 187.

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SYNAPTURA AENEA Smith, 1931

Figure 15, 1.2 ×

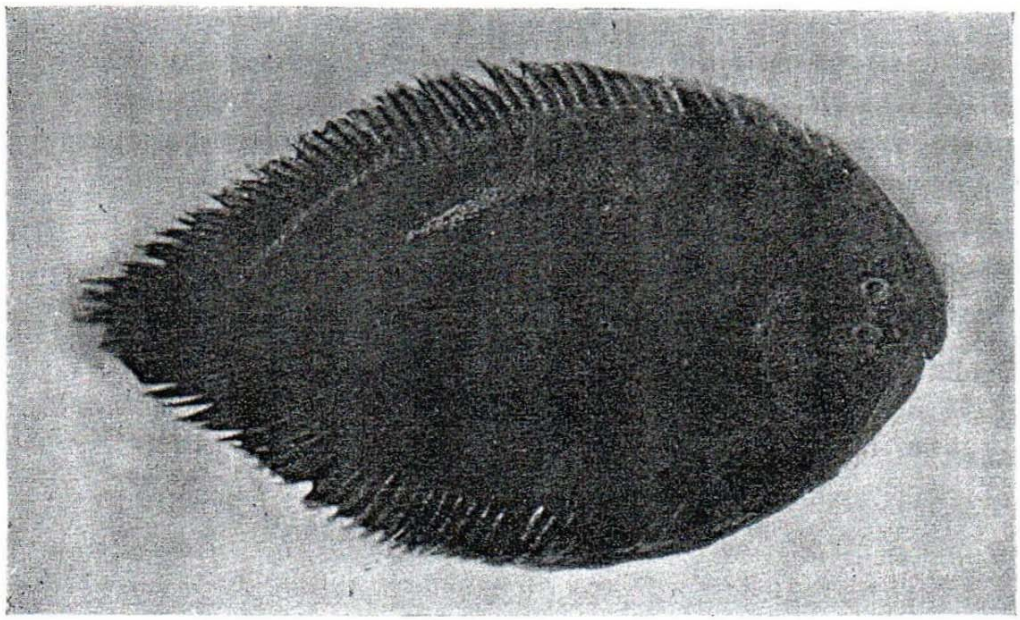

Figure 15

COMMON NAMES:

Pla lin-ma; pla lin-kwai.

DESCRIPTION:

Body ovate and flat, its depth 1.8 in standard length. Head broad, rounded in front, 3.8 in standard length. Both eyes on right side of body, upper eye slightly anterior to lower; eye 6.0 in head. Two small tubular nostrils in advance of lower eye, nostril on blind side dilated, having a flap, and surrounded by long fringes. Lip with fringes; mouth slightly curved, its rictus extending below anterior part of lower eye.

Dorsal and anal fins confluent with caudal fin; dorsal rays 54; anal rays 45. Dorsal fin not extending on snout. Pectoral on each side rudimentary. Caudal rounded. One straight lateral line on each side of body; lateral-line scales on eyed side 60; scales strongly ctenoid on eyed side, less so on blind side.

Color of ocular side light brown, with numerous darker brown spots of irregular size and shape on body and head; anterior margin of head between mouth and gill opening blackish, with a well defined rounded white spot on chin. Vertical fins having small and irregular dark brown spots, and in addition four large, round, well defined, blackish spots on proximal part of both dorsal and ventral fins; these spots more than twice diameter of eye. Blind side of body reddish brown, becoming less intense toward the head, which is white except for a dark area about mouth and on chin, below white spot on eyed side.

REMARKS:

Synaptura aenea is a fresh-water flatfish, found so far only in Thailand. Smith (1931) described a specimen, taken from the Lopburi River at Lopburi province, Central Thailand, and it seems to be known only from that locality.

Distribution– Lopburi River at Lopburi; Pitsanulok, near the mouth of the Nan River in central Thailand; Kemarat on the Mekong in Eastern Thailand; and at Chiengmai on the Meping in Northern Thailand (Smith, 1945)

SPECIMENS SEEN:

September, 1964, Kasetsart University Museum of Fisheries, no. 3006, 1 Specimen, 94 mm.

REFERENCES:

Synaptura aenea Smith, 1931a, Proc. U.S. Nat. Mus., 79 (7): 32; 1931b, Journ. Siam Soc. Nat. Hist. Supple., 8 (3): 225; Suvatti, 1950, Fauna Thailand: 324.

SYNAPTURA ASPILOS Bleeker, 1852

COMMON NAME:

Pla lin-ma

DESCRIPTION:

Body broad and flat, its depth 1.8 to 2.2 in standard length. Head 3.9 to 4.7 in standard length. Both eyes on right side of body, separated by a scaly interspace; upper eye in advance of lower one; eye 8.0 to 10.0 in head. Snout hooked. Anterior nostril of colored side a short tube; nostril of blind side hidden. Upper jaw prominent. Mouth curved, reaching below anterior half of eye.

Dorsal and anal fins confluent with caudal fin; dorsal rays 64-75; anal rays 45-60. Dorsal originating near point of snout; its first rays somewhat shorter than the posterior ones Left pectoral small, as long as eye or a little longer; right pectoral better developed and nearly twice as long. Right ventral longer and larger than the left one; right ventral connected by strong membrance with anal, but the left one attached to this fin only at its base by a low rim which borders the anus. Caudal obtusely pointed. One straight lateral line on each side; lateral-line scales of ocular side 98-117; scales strongly ctenoid on colored side, cycloid on blind side; scales of anterior part of head on blind side transformed into cutaneous filaments; lips, eyelids and some patches on chin and nape of colored side filamentous.

Color of eyed side reddish brown with a number of pale spots and blotches; vertical fins with a subterminal dark band and a marginal white one. Right pectoral fin black.

REMARKS:

Synaptura aspilos is closely related to *S. orientalis,* but it can be distinguished from the latter species by the fact that it possesses cycloid scales on blind side, while *S. orientalis* has ctenoid scales on both sides.

Synaptura aspilos has been recorded from the Gulf of Thailand previously, but it was not taken by the Naga Expedition. The species is here described from the type specimens collected by Herre in the Philippines and from an additional individual taken at Singapore.

Distribution—Gulf of Thailand; the Philippine Islands; the East Indies, and New Britain.

SPECIMENS SEEN:

April, 1931, Philippine Islands, 2 specimens, 220-252 mm. (types); February, 1937, Singapore, 1 specimen, 163 mm.

REFERENCES:

Synaptura aspilos Bleeker, 1852b, Nat. Tijdschr. Ned. Ind., 3: 74; 1852a, Verh. Bat. Gen., 24: 29; Günther, 1862, Cat. Fish. Brit. Mus., 4: 482; Suvatti, 1950, Fauna Thailand: 324.

Synaptura marmorata Bleeker, 1853c, Nat. Tijdschr. Ned. Ind., 5: 90.

Synaptura heterolepis Bleeker, 1856, Act. Soc. Sci. Indoneerl., 1: 65; Günther, 1862, Cat. Fish. Brit. Mus., 4: 482; 1909, Fische der Südsee, 8: 347.

Brachirus heterolepis Bleeker, 1866-1872, Atl. Ichth., 6: 20.

Synaptura aspilus Weber 1913, Siboga-Exped. Fische: 440; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 170.

SYNAPTURA ALTIPINNIS Alcock, 1890

COMMON NAMES:

Pla lin-ma lai

DESCRIPTION:

Body flat and oval in shape, its depth 2.4 to 2.6 in standard length. Head 4.6 to 5.5 in standard length. Lower profile of head with small close-set tentacles. Both eyes on right side of body, nearly contiguous but separated by a small scaly interorbital space; eye 5.0 to 6.2. in head, the upper eye a little in advance of lower one; eye without tentacles. Anterior nostril on colored side tubular, the posterior one simple. Mouth cleft reaching to below middle of lower eye.

Dorsal and anal fins totally confluent with caudal fin; dorsal rays 75-88; anal rays 64-74; rays of vertical fins scaly, almost simple but slightly split near tips. Dorsal originating just in advance of upper eye. Pectoral fins of both sides very small and symmetrical; each broad based and united to gill membrane by a fold; their upper rays not prolonged. Caudal rounded. One straight lateral line on each side; lateral-line scales on ocular side 105-135; scales ctenoid on both sides; around the tip of snout on blind side, they are replaced by short fringes.

Color of eyed side greyish brown, with 14 dark brown crossbands extending on vertical fins, where they bend in a posterior direction. The first band across the snout, the second behind the eyes, and the third across the gill opening. Color of blind side yellowish white. Right pectoral dark brown, while the one on the left side is white with a small black blotch at tip. Caudal dark brown with 2-3 large yellowish white spots.

REMARKS:

Synaptura altipinnis is closely related to *S. quagga*, but the latter has 10-11 crossbands, each eye with a small tentacle, and its shape more tapering posteriorly. *Synaptura altipinnis* is also similar to *S. zebra* and *S. cornuta*, but may be distinguished from both by means of the presence of a falciform pectoral fin and two small barbels under chin. It differs from *S. zebra* by having 14 instead of 12 pairs of crossbands, and from *S. cornuta* by lacking the prolongation of the first dorsal ray.

Synaptura altipinnis has been seen in the Bangkok Fish Market, but no definite record of this species from the Gulf of Thailand has been published previously.

Distribution–East Coast of India to Malay Peninsula and Archipelago.

SPECIMENS SEEN:

June, 1960, Goh Chuong, Prachuab Khiri Khan Province, 6 specimens, 154-202 mm.

REFERENCES:

Synaptura altipinnis Alcock, 1890, Ann. Mag. Nat. Hist., 6 (36): 441; 1896, Journ. Asiat. Soc. Bengal, 65 (3): 329; Jenkins, 1910, Mem. Ind. Mus., 3: 29; Weber and de Beaufort, 1929, Fish Indo-Austral. Archip., 5: 178.

Zebrias altipinnis Norman, 1928, Rec. Ind. Mus., 30 (7): 184.

SYNAPTURA COMMERSONIANA (Lacépède), 1802
Figure 16, 0.5 ×

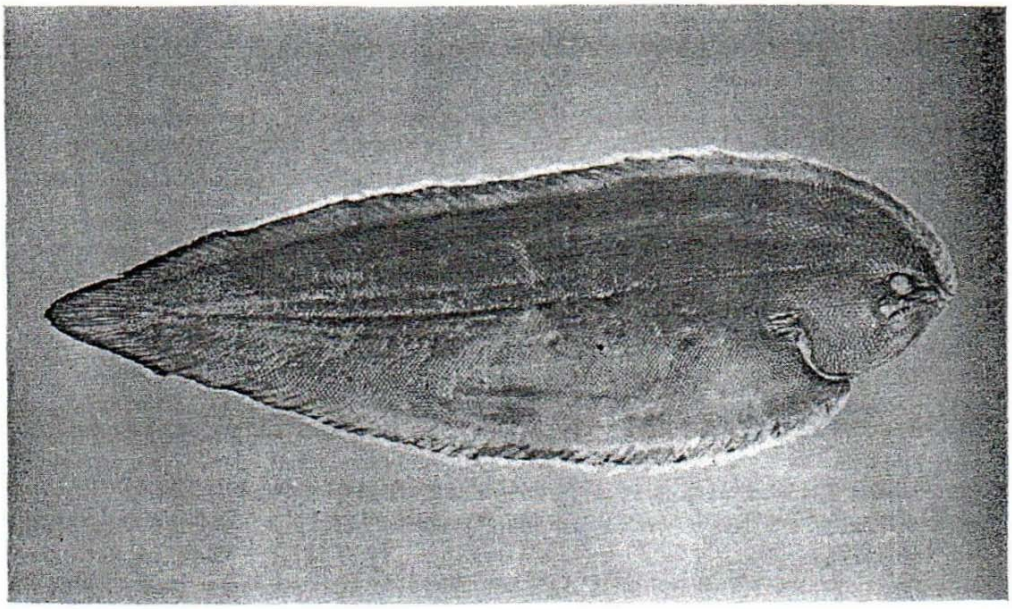

Figure 16

COMMON NAMES:

Pla lin-ma: commerson's sole (Munro, 1955); sole (Scott, 1959).

DESCRIPTION:

Body flat and shaped like a tongue, its depth 3.2 to 3.5 in standard length. Head 5.0 to 5.5 in standard length. Both eyes on right side of body, separated by a wide scaly interorbital space; the upper eye almost entirely in advance of the lower one; eye 6.0 to 8.0 in head. Two tubular nostrils in front of the lower eye and just behind a bony prominence on the front part of the hooked snout. Mouth curved, reaching somewhat behind middle of lower eye; lower lip distinctly fringed.

Dorsal and anal fins completely confluent with caudal fin; dorsal rays 68-81; anal rays 57-66. Dorsal fin originating in front of the upper eye. Rays of the vertical fins branched at their tips. Right pectoral fin rounded; left pectoral fin equal to or somewhat larger than the right one. Ventrals united with each other and with anal. Caudal fin obtusely pointed. One straight lateral line on each side; lateral-line scales of ocular side 155-170; scales ctenoid on eyed side, cycloid on blind side; scales of head larger than those on the other parts of the body; those on blind side of head produced into barbel-like processes.

Color of eyed side greyish brown; vertical fins darker, edged with white. Right pectoral fin blackish.

REMARKS:

Synaptura commersoniana is a very common species, frequently to be seen in markets.

Distribution – Seas of India to the Malay Archipelago; in marine and fresh waters.

SPECIMENS SEEN:

April, 1960, Samut-Sarkorn Province, 8 specimens, 182-245 mm.

REFERENCES:

Pleuronectes commersonianus Lacépède, 1802, Hist. Nat. Poissons, 3: 272, pl. 12, fig. 2; 4: 656.

Brachirus commersonii Swainson, 1839, Nat. Hist. Fish., 2: 303; Norman, 1928, Rec. Ind. Mus., 30 (2): 178.

Synaptura commersoniana Cantor, 1850, Journ. Asiat, Soc. Bengal, 18 (2): 1204; Günther, 1862, Cat. Fish. Brit. Mus., 4: 483; Bleeker, 1866-1872, Atl. Ichth., 6: 18, pl. 235, fig. 3; Day, 1878-1888, Fish. India, 1: 428, atlas, pl. 94, fig. 1; Weber and de Beaufort, 1929, Fish. Austral. Archp., 5: 168; Suvatti, 1936, Index Fish. Siam: 95; 1950, Fauna Thailand: 324; Fowler, 1956, Fish. Red Sea and S. Arabia: 176, fig. 93.

Synapura commersonii Fowler, 1938, Fish. Known from Malaya: 83; Munro, 1955, Fish. Ceylon: 262, pl. 50, fig. 761; Scott, 1959, Sea Fish. Malaya: 42.

SYNAPTURA CORNUTA (Kaup), 1858

COMMON NAMES:

Pla lin-ma lai; horned sole (Munro, 1955; Kuronuma, 1961)

DESCRIPTION:

Body flat and shaped like a tongue, its greatest depth 2.7 to 3.0 in standard length. A few short filaments along the lower profile of head; head 5.0 to 5.2 in standard length. Both eyes on right side of body, adjacent to each other; eye 4.0 to 4.5 in head. Two tubular nostrils on upper lip in front of the lower eyes, the posterior one shorter than the upper one and very close to the lower eye. Mouth small, its rictus below the middle of the eye.

Posterior rays of dorsal and anal fins completely joined to caudal. Dorsal rays 67-79; anal rays 61-66; first dorsal ray thickened and prolonged, the next few rays shorter than the succeeding ones; rays of vertical fins scaly. Pectorals short and with broad bases connected to the gill membranes. Caudal obtusely pointed. One straight lateral line on each side; lateral-line scales on ocular side 87-100; scales feebly ctenoid or cycloid on both sides, some of those on blind side of head produced into barbel-like processes.

Color brownish on eyed side, with 13-14 dark brown crossbands extending onto the vertical fins, which have a white edge. Caudal dark with white markings.

REMARKS:

According to Day (1787-1888) and Norman (1928), the scales are cycloid, but they are slightly ctenoid on both sides of the specimens seen.

Synaptura cornuta is closely related to *S. zebra, S. quagga* and *S. altipinnis,* but may readily be distinguished from the latter three species by its thickened and prolonged first dorsal ray.

Synaptura cornuta is not common, but a few specimens were seen in the Bangkok fish markets. No previous record of this species in the Gulf of Thailand has appeared.

Distribution–South Africa through the Gulf of Thailand to Japan.

SPECIMENS SEEN:

June, 1960, Goh Teo, Chumporn Province, 1 specimen, 151 mm.; June, 1960, Borka Village, Chumporn Province, 1 specimen, 156 mm.

REFERENCES:

Aesopia cornuta Kaup, 1858, Arch. Nat. 24: 98; Günther, 1862, Cat. Fish. Brit. Mus., 4: 487; Jordan and Starks, 1906, Proc. U.S. Nat. Mus., 31: 235, fig. 27; Norman, 1928, Rec. Ind. Mus., 30: 185; Munro, 1955, Fish. Ceylon: 263, pl. 50, fig. 764; Kuronuma, 1961, Check List Fish. Vietnam: 32.

Synaptura cornuta Day, 1878-1888, Fish. India, 1: 430, atlas, pl. 94, fig. 4; Alcock, 1889, Journ. Asiat. Soc. Bengal, 58 (3): 287; Jenkins, 1910, Mem. Ind. Mus., 3: 29.

Coryphaesophia cornuta Smith, 1949, Sea Fish. of S. Africa: 161, fig. 319.

SYNAPTURA HARMANDI Sauvage, 1878

COMMON NAME:

Pla lin-ma

DESCRIPTION:

Both eyes on the right side of the body. Dorsal rays 48; anal rays 38; scales in lateral line 54. Pectoral fins rudimentary, that on the blind side longer than that on the eyed side. Color of blind side whitish or yellowish.

REMARKS:

In 1878, in a very rare paper to which I have been unable to refer directly, Sauvage described a flatfish collected by Harmand in the Mekong River as a new species *Synaptura harmandi.* Smith, 1945, and Suvatti, 1950. both list it from Thailand, but based their inclusion of this form solely on the original reference and made no attempt to restrict the type locality. Although the meristic counts indicate that the species is valid, the fact that it has not been reported again for almost 100 years, and also the fact that for the greatest part of its course the Mekong River does not impinge on the territory of Thailand, renders its inclusion in the known fauna of Thailand dubious.

REFERENCES :

Synaptura (Anisochirus) harmandi Sauvage, 1878. Bull. Soc. Philom., 2 (7): 94; Smith, 1945, Freshwater Fish. Siam: 438; Suvatti, 1950, Fauna Thailand: 324.

SYNAPTURA KREMPFI Durand, 1940

This species has been listed as a representative of the fauna of Thailand by Suvatti, 1950, but without any definite record. It was originally described from Grand Lac in Cambodia, and I have been unable to find any other definite localities listed in the literature. Its occurrence in Thailand is questionable until confirmed by new collections, and it is included here only in an attempt to make the list of all flatfishes reported from the country complete.

Synaptura krempfi Durand. 1940, Inst. Ocean. Indochine 36: 39, pl. 7; Suvatti, 1950, Fauna Thailand: 324.

SYNAPTURA ORIENTALIS (Bloch and Schneider), 1801

Figure 17, 0.5 ×

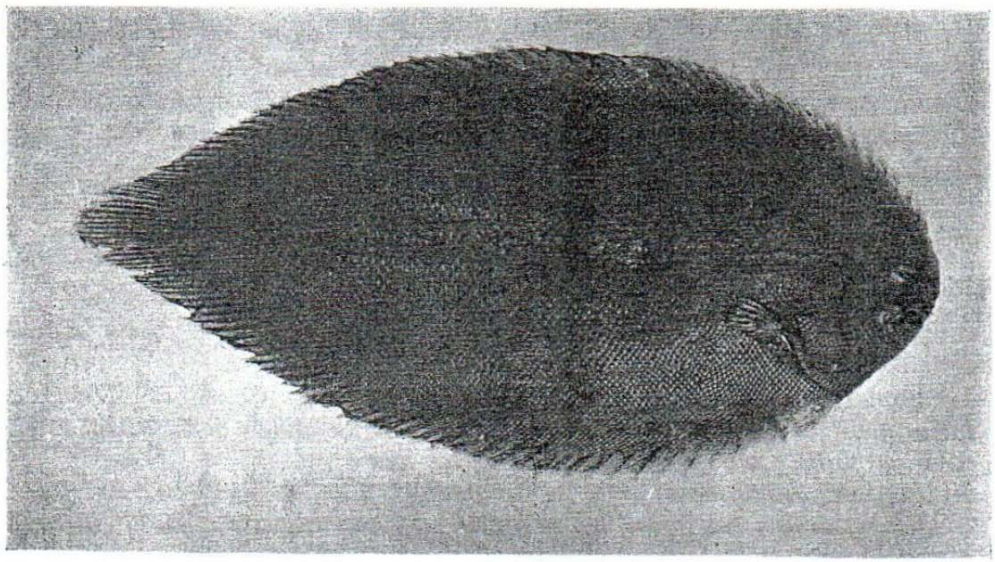

Figure 17

COMMON NAMES :

Pla lin-kwai kone-dum; pla pluk; oriental sole (Munro, 1955).

DESCRIPTION :

Body deep and flat, its depth 2.0 to 2.3 in standard length. Head 4.2 to 5.0 in standard length, its blind side fringed. Both eyes on right side, separated by a

scaly space, the upper one in advance of the lower, eye 6.0 to 7.0 in head. Two nasal tubes on the upper lip in front of the lower eye. Nostrils on blind side covered by fringes of the scales. Snout not hooked. Mouth small with a feeble lower lip, reaching below middle of the eye or not quite so far.

Dorsal and anal fins confluent with caudal fin; dorsal rays 62-72; anal rays 47-57. Dorsal fin originating above the anterior margin of upper eye. Vertical fins scaly and with the rays branched at their tips. Right pectoral rounded or obtusely pointed; left pectoral rather small. Caudal rounded. Lateral line on both sides straight. Lateral-line scales 63-85; scales ctenoid on both sides; each scale on ocular side with a series of 12-13 spinules on the posterior edge; irregular groups of strong filamentous processes present on the eyed side.

Color of eyed side greyish or brownish with dark blotches, and with short dark vertical streaks crossing the lateral line. The blind side of body pale, except for black fringes at the anterior edge of the head. Pectoral fins with black tips.

REMARKS :

Synaptura orientalis is closely related to *S. villosa* of New Guinea, but they may be distinguished by differences in body depth, which in *S. orientalis* is about 2.0 to 2.3. An additional differentiating characteristic is provided by the snout which is hooked in the latter species but not in the former one.

Synaptura orientalis is primarily a marine species but has also been found in the brackish and freshwater areas in the Chao Phya River up to Nontaburi Province.

Distribution—From the Persian Gulf, through the Malay Peninsula to China and Australia.

SPECIMENS SEEN :

June, 1960, Langsuan District, Chumporn Province, 22 specimens, 169-240 mm. ; June, 1960, Prachuab Khiri Khan Province, 5 specimens, 180-252 mm.; August, 1960, Langsuan District, Chumporn Province, 7 specimens, 189-227 mm.

REFERENCES :

Pleuronectes orientalis Bloch and Schneider, 1801, Syst. Ichth. : 157.

Synaptura orientalis Day, 1878-1888, Fish. India, 1: 429, atlas, pl. 94, fig. 2; Hora 1923b, Mem. Ind. Mus., 5: 759; Weber and de Beaufort, 1929, Fish. Indo-Austral, Archip., 5: 175; Fowler, 1935, Proc. Acad. Nat. Sci. Philad., 87: 132, fig. 79-83; Suvatti, 1936, Index Fish. Siam: 95; Fowler, 1938, List Fish. Known from Malaya: 83; Suvatti, 1950, Fauna Thailand: 324; Fowler, 1956, Fish. Red Sea and S. Arabia: 176.

Brachirus orientalis Norman, 1928, Rec. Ind. Mus., 30 (2): 179; Munro, 1955, Fish. Ceylon: 263, pl. 50, fig. 762.

SYNAPTURA PAN (Hamilton and Buchanan), 1822

COMMON NAMES :

Pla lin-ma; pla lin-kwai

DESCRIPTION :

Body ovate and flat, its depth about 2.0 to 2.2 in standard length. Head about 4.0 to 5.0 in standard length. Both eyes on right side of body, separated by a scaly interorbital space; the upper eye in advance of lower one; eye 5.0 to 6.0 in head. Anterior nostril of eyed side tubular, those of blind side concealed. Lower lip slightly fringed on colored side. Mouth curved, its rictus reaching below anterior half of eye.

Dorsal and anal fins confluent with caudal fin; dorsal rays 57-61; anal rays 43-46. Dorsal originating on a horizontal through lower border of upper eye, its first rays shorter than the posterior ones; rays of vertical fins divided. Pectoral fins subequal, short based. Ventral fins with broad bases, free from each other and from anal. Caudal obtusely pointed. One straight lateral line on each side. Lateral-line scales of colored side about 66-80; scales ctenoid on both side; those on upper part of head and nape distinctly enlarged; some of those on blind side of head produced into barbel-like processes.

Color dull red or muddy brown with irregular black spots and bands, five to eight short dark vertical streaks crossing the lateral line. Margin of right pectoral black.

REMARKS :

Synaptura pan was not represented in the Naga Expedition collections; however, Suvatti (1950) mentions this species as having been found in the Gulf of Thailand before.

While only six or seven short black lines have previously been reported to cross the lateral line, the Bengalese specimen examined showed eight. However, its other characters agree with those reported by Günther (1862), Day (1878-1888) and Weber and de Beaufort (1929).

Distribution–Coast of India; Burma; Malay Archipelago; South China.

SPECIMENS SEEN :

April, 1937, Bengal, 1 specimen, 60 mm.

REFERENCES :

Pleuronectes pan Hamilton and Buchanan, 1822, Fish Ganges: 130, 373, pl. 24, fig. 42.

Synaptura pan Günther, 1862, Cat. Fish. Brit. Mus., 4: 418; Day, 1878-1888, Fish. India, 1: 429, atlas, pl. 93, fig. 3.

Brachirus pan Swainson, 1839, Nat. Hist. Fish., 2: 303; Bleeker, 1866-1872, Atl. Ichth., 6: 21, pl. 9, fig. 1: Norman, 1928, Rec. Ind. Mus., 30: 181.

SYNAPTURA PANOIDES Bleeker, 1851

COMMON NAMES:

Pla lin-ma, pla lin-kwai (Smith, 1945; Suvatti, 1950)

DESCRIPTION:

Body oblong and flat, its depth 2.2-2.7 in standard length. Head 5.0-5.4 in standard length. Both eyes on the right side of the body, eyes very small, 6.0 to 8.0 in head; upper eye in advance of lower one, separated by a concave scaly interspace. Anterior nostril of eyed side a short tube, those on blind side covered by filaments of skin. Lower lip with fleshy filaments. Mouth curved, its rictus reaching below anterior margin of lower eye.

Dorsal and anal fins confluent with caudal fin; dorsal rays 70-82; anal rays 54-61. Dorsal beginning at a short distance above mouth, the first ray short, as are those of anal; all rays of vertical fins divided. Pectoral fins rudimentary, about as long as eye, the left pectoral fin longer than the right one. Ventral fins broad based, but not united with each other. One straight lateral line on each side; lateral-line scales on eyed side 92-110; scales ctenoid on both sides. Anterior part of head on blind side covered by fleshy filaments, arranged in rows.

Color brownish red with irregular large and small blackish blotches and numerous dark spots, which are also present on the vertical fins and on the ventrals. Pectoral of eyed side black, that of blind side whitish. Sometimes rather indistinct vertical blackish lines, crossing the dorsal half of the body and extending to the lateral line.

REMARKS:

Synaptura panoides has been found in the seas and rivers in Borneo, Sumatra, Malaya, and Thailand. It is common in the Chao Phya River, several hundred kilometers from the sea, and it also has been found in Tapi River above Bandon in Peninsular Thailand (Smith, 1945). This species attains a maximum length of 240 mm., and many over 200 mm. have been examined in Thailand.

SPECIMENS SEEN:

September, 1964, Kasetsart University Museum of Fisheries, 11 specimens 140-205 mm.

REFERENCES:

Synaptura panoides Bleeker, 1851d, Nat. Tijdschr. Ned. Ind., 2: 440; 1852a, Verh. Bat. Gen., 24: 30; Günther, 1862, Cat. Fish. Brit. Mus., 4: 486; Weber and de Beaufort, 1929, Fish Indo-Austral. Archip., 5: 174; Smith, 2845, Freshwater Fish. Siam: 438.

Brachirus panoides Bleeker, 1866-1872, Atl. Ichth., 6: 21.

Synaptura siamensis Sauvage, 1878, Bull. Soc. Philom. 2 (7): 94.

SYNAPTURA QUAGGA (Kaup), 1858

COMMON NAMES:

Pla lin-ma lai; zebra sole (Munro, 1955; Scott, 1959)

DESCRIPTION:

Body flat, tapering posteriorly, its depth 2.5 to 2.7 in standard length. Head 4.2 to 5.3 in standard length. Both eyes on the right side of the body; eye 4.0 to 5.0 in head; eyes contiguous, the upper eye a little in advance of the lower one, each with a small membranous tentacle. Nasal tube short. Anterior nostril tubular, the posterior one simple. Mouth curved, reaching to below anterior part of eye. Jaw more or less equal.

Dorsal and anal fins completely confluent with caudal fin; dorsal rays 64-73; anal rays 53-61; rays of vertical fins scaly, mostly divided at their tips. Pectoral fins with broad bases, connected by a folded membrane with gill membranes; upper rays of right pectoral more or less prolonged, while those of the left one are short. Ventrals small with broad bases, the right one connected with genital papilla. Caudal rounded. One straight lateral line on each side; lateral-line scales 85-99; scales ctenoid on both sides of body; each scale with several series of small spinules posteriorly and some scales on blind side of snout produced into short papillae.

Eyed side yellowish brown with 10-11 dark brown crossbands; these broader than interspaces and continued on vertical fins, where they are bent in a posterior direction; the first band across the snout, the second behind the eyes, and the third across the gill opening. Color or blind side yellowish white. Caudal fin irregularly marked with yellowish white and black.

REMARKS:

Synaptura quagga can be differentiated from its allies by the presence of a membranous tentacle on each eye. This species has been seen in the Bangkok Fish Market in small numbers.

Distribution—Seas of India through the Malay Peninsula and Archipelago including the Gulf of Thailand to China.

SPECIMENS SEEN:

April, 1960, Prachuab Khiri Khan Province, 2 specimens, 136-140 mm.; December, 1960, Kau Takiab, 1 specimen, 105 mm.; February, 1961, Phu Quoc Islands, 1 specimen, 95 mm.

REFERENCES:

Aesopia quagga Kaup, 1858, Arch, Naturg. 24: 98.

Synaptura quagga Günther, 1862, Cat. Fish. Brit. Mus., 4: 485; Alcock, 1889, Journ. Asiat. Soc. Bengal, 58 (3): 286; 1890, Ann. Mag. Hist., 6 (36): 440; 1896, Journ. Asiat. Soc. Bengal, 65 (3): 329; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 173.

Zebrias quagga Hubbs, 1915, Proc. U.S. Nat. Mus., 48: 493; Norman, 1928, Rec. Ind. Mus., 30 (6): 184; Munro, 1955, Fish. Ceylon: 263, pl. 50, fig. 763; Fowler, 1956, Fish. Red Sea and S. Arabia, 1: 178; Scott, 1959, Sea Fish Malaya: 42.

SYNAPTURA ZEBRA (Bloch), 1787

Figure 18, 0.8 ×

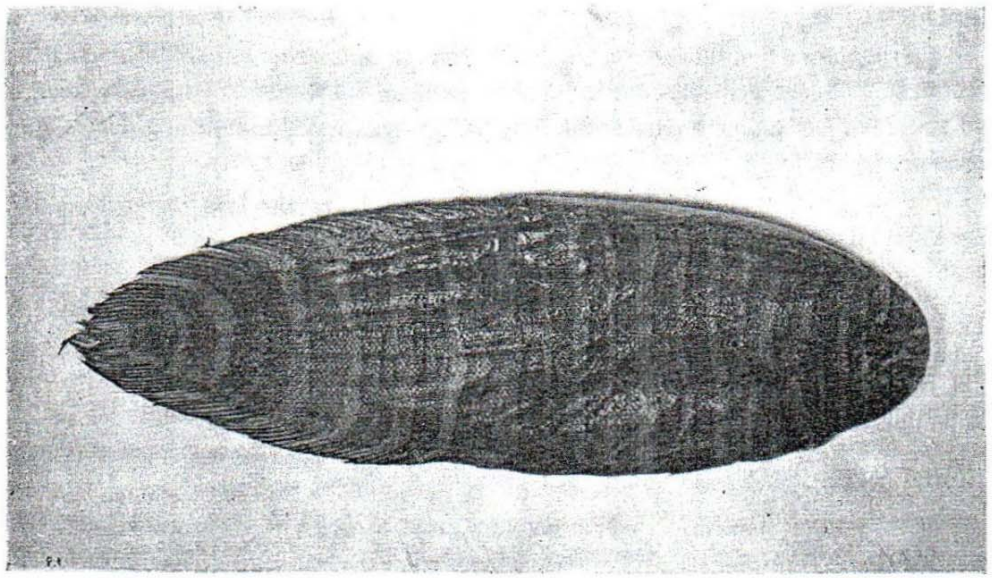

Figure 18

COMMON NAMES:

Pla lin-ma lai (Suvatti, 1950); zebra sole (Scott, 1959)

DESCRIPTION:

Body flat and shaped like a tongue, its depth 2.5 to 2.8 in standard length. Head 5.2 to 5.6 in standard length. Both eyes on right side of body, separated by a scaly space; eye 5.3 to 6.0 in head. Anterior nostril on colored side with a short tube, while those on blind side are not tubular and wide apart. Mouth slightly curved reaching to below anterior border of eye.

Dorsal and anal fins confluent with caudal fin; D. 74-89; A. 65-79; rays of vertical fins divided and scaly. The upper part of right pectoral fin prolonged, while the pectoral of the other side is very short; both pectorals with broad bases and connected to gill membrane. Right ventral with a longer base than the left one and connected by membrane to the genital papilla. Caudal rounded. One straight lateral line on each side; lateral-line scales 113-128; scales strongly ctenoid on both sides, but absent on snout and chin where they are replaced by short fringes which also border the base of dorsal rays and anterior part of head on the blind side. Two short barbels below chin, each as long as diameter of eye.

Color of eyed side reddish brown, with 12 pairs of dark brown bands continued on fins where they are bent in a posterior direction, the first across the snout, the second behind the eyes and the third across the gill opening. Right pectoral with black tip. Caudal brownish black with some irregular white spots.

REMARKS :

Synaptura zebra closely resembles *S. quagga, S. cornuta* and *S. altipinnis,* but specimens of *S. zebra* species are differentiated from the others by the presence of two short barbels under the chin, the longer right pectoral fin, and the greater number of crossbars.

A small number of members of this species have been seen in the Bangkok Fish Market.

Distribution – Coast of India and the Malay Peninsula including the Gulf of Thailand, northwards to Japan.

SPECIMENS SEEN :

February, 1960, Bangkok Fish Market, 1 specimen, 182 mm.

REFERENCES :

Pleuronectes zebra Bloch, 1787, Nat. Ausland. Fische, 3: 27.

Solea zebrina Temminck and Schlegel, 1846, Fauna Japonica Poissons: 185.

Solea amnatura Richardson, 1846, Ichth. China and Japan: 279.

Synaptura zebra Cantor, 1850, Journ. Asiat. Soc. Bengal, 18: 1206; Günther, 1862, Cat. Fish. Brit. Mus,, 4: 484; Day, 1878-1888, Fish. India, 1: 430, atlas, pl. 94, fig. 3; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 177; Suvatti, 1936, Index Fish. Siam: 96; Fowler, 1938, List Fish Known from Malaya: 84; Suvatti, 1950, Fauna Thailand: 325.

Solea zebra Bleeker, 1852a, Verh. Bat. Gen. 24: 16.

Brachirus zebra Bleeker, 1866-1872, Atl. Ichth. 6: 22; Swainson, 1839, Cabinet Cyclopedia, 2: 303.

Zebrias zebra Jordan and Evermann, 1903, Proc. U.S. Nat. Mus., 25: 367.
Aesopia zebra Bean and Weed, 1912, Proc. U.S. Nat. Mus., 42: 611.

FAMILY CYNOGLOSSIDAE

Eyes on the left side. Mouth asymmetrical, curved, the snout hooked and overhanging the mouth opening; lips with or without fringed tentacles. Preopercular not free, margin covered with skin. Dorsal extending on head; no spinous fin rays; pectoral fins absent; only left ventral fin developed, with or without connection to anal fin; caudal fin confluent with dorsal and anal fins. Lateral line absent, present or multiple.

CYNOGLOSSUS AREL (Bloch and Schneider), 1801

COMMON NAMES :

Pla lin-ma; brown tongue sole (Munro, 1955)

DESCRIPTION :

Body elongate and flat, its depth about 4.8 to 5.0 in standard length. Head about 4.7 in standard length. Both eyes on left side of the body; eyes small, 15.0 to 17.0 in head; upper eye a little in advance of lower one. Snout rounded or obtusely pointed; rostral hook rather short, extending a little beyond mandibular symphysis. Two nostrils on colored side, a simple one between the eyes, a tubular one in front of lower eye. Maxillary extending to beyond eye, much nearer to gill opening than to end of snout.

Dorsal and anal fins confluent with caudal fin; dorsal rays 122-138; anal rays 90-109. Pectoral fins absent. Only left ventral developed, separated from anal fin. Caudal fin pointed. Two lateral lines on ocular side, separated by 8-10 scales; no distinct lateral line on blind side; scales of middle lateral line 60-65; scales ctenoid on ocular side, cycloid on blind side.

Color brownish with or without irregular blackish blothches.

REMARKS :

Cynoglossus arel has been found in the Gulf of Thailand (Suvatti, 1950), but no specimens were present in the Naga Expedition collection. The only specimens available to me were from Hong Kong, collected by Captain Flinch. In these, it appears that there are no distinct lateral lines on blind side. This is in agreement with the description given by Norman (1928), but contrary to the facts as reported by Day (1878-1888).

Distribution – Coast of India to Hong Kong.

SPECIMENS SEEN :

Hong Kong, 2 specimens, 270-298 mm.

REFERENCES :

Pleuronectes arel Bloch and Schneider, 1801, Syst. Ichth.: 159.

Plagusia lingua Cantor, 1850, Journ. Asiat. Soc. Bengal, 18 (2): 1215.

Cynoglossus arel 1878-1888, Fish. India, 1: 434, atlas, pl. 98, fig. 2; Norman, 1928, Rec. Ind. Mus., 30: 201; Suvatti 1950, Fauna Thailand: 326; Munro, 1955, Fish. Ceylon: 265, pl. 51, fig. 769.

CYNOGLOSSUS BILINEATUS (Lacépède), 1802

COMMON NAMES :

Pla lin-ma; pla yod-muong; four-lined tongue-sole (Munro, 1955)

DESCRIPTION :

Body greatly flattened, shaped like a tongue, its greatest depth 3.4 to 4.3 in standard length. Head moderate in size, its length 4.0 to 5.0 in standard length. Both eyes on left side of head, rather large; eye 9.0-11.0 in head, separated by a scaly space. Anterior nostril of eyed side tubular, on upper lip in front of lower eye; posterior nostril simple, in interorbital space. Snout rounded; rostral hook short; rictus of mouth situated behind posterior margin of lower eye.

Dorsal and anal fins confluent with caudal fin, which tapers to form a pointed tail; dorsal rays 102-114, anal rays 82-97. Pectoral fins absent. Only left ventral fin developed, connected with anal fin. Two lateral lines on blind side as well as on the eyed side of body; those on eyed side separated by 14-19 scales; 84-96 scales in the middle one. Scales ctenoid on eyed side, cycloid on blind side, replaced by papillae on blind side of the head. Scales of head, the anterior part of the body immediately behind the gill opening, and along the bases of the dorsal and anal fins smaller than the rest, but those of the most of the body relatively large.

Color of eyed side brownish with an irregular dark blotch on gill opening; fins dusky with white borders; blind side white.

REMARKS:

This is the only species of the family known from the Gulf of Thailand that has two lateral lines on the blind side (hence the species name), and it can be recognized at once by this single characteristic.

Cynoglossus bilineatus is taken from the Gulf of Thailand in large quantities, and it is a very common species in the neighboring fish markets.

Distribution—From the Red Sea through the Indian Ocean and Malay Archipelago, including the Gulf of Thailand, to Australia and Japan.

SPECIMENS SEEN:

May, 1960, Sand bar between Goh Matapoan and Ban Paknam Village, Chumporn Province, 1 specimen, 180 mm.; June, 1960, Borka Village, Chumporn Province, 3 specimens, 204—229 mm.; August, 1960, along shore, Langsuan District, Chumporn Province, 9 specimens, 198—305 mm.; April, 1960, Samuth Sarkorn Province, 4 specimens, 153—280 mm.

REFERENCES;

Achirus bilineatus Lacépède, 1802, Hist. Nat. Poissons, 8: 316–368.

Plagusia bilineata Rüppel, 1862, Atl. Reis. N. Afr. Fisch.: 123.

Plagusia quadrilineata Bleeker, 1851c. Nat. Tijdschr. Ned. Ind., 1: 412; 1852a, Verh. Bat. Gen. Batavia : 21.

Cynoglossus quadrilineatus Günther, 1862, Cat. Fish. Brit. Mus., 4: 497-498; Bleeker, 1866–1872, Atl. Ichth., 6: 32, pl. 245, fig. 3; Day, 1878–1888, Fish. India, 1: 435; Alcock, 1889, Journ. Asiat. Soc. Bengal, 58 (3): 288; Smith and Pope, 1906, Proc. U.S. Nat. Mus., 31: 498; Suvatti, 1936, Index Fish. Siam: 98.

Cynoglossus bilineatus Norman, 1928, Rec. Ind. Mus., 30 : 198; Suvatti, 1950, Fuana Thailand : 326; Munro, 1955, Fish. Ceylon : 264, pl. 50, fig. 767.

CYNOGLOSUSS BORNEENSIS (Bleeker), 1859

Figure 19, 0.4 ×

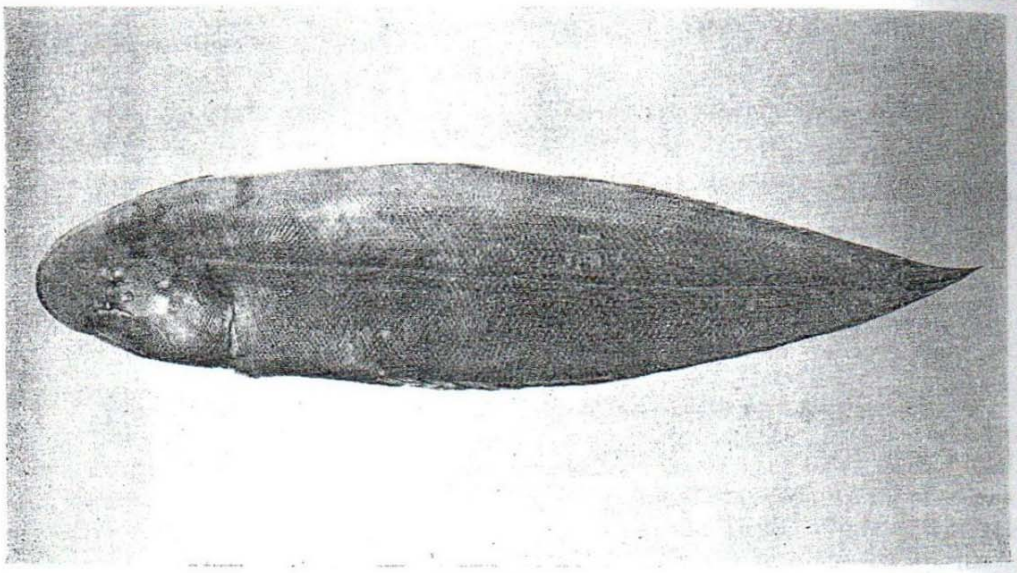

Figure 19

COMMON NAMES:

Pla lin-ma; tongue sole (Suvatti, 1946)

DESCRIPTION:

Body shaped like a tongue and greatly flattened, its depth 3.8 to 4.5 in standard length. Head rounded, 4.2 to 4.9 in standard length. Both eyes on the left side of the body, separated by narrow space which is slightly concave; eye 9.0 to 12.0 in head. Snout rather long, well flattened, and rounded anteriorly. The rostral hook does not extend below the eye. Two nostrils, one between the eyes and not tubular, while the other is near the middle of upper lip and tubular. Lips not fringed. Rictus of the mouth below hind border of lower eye.

Dorsal and anal fins confluent with caudal fin which tapers to form a pointed tail; dorsal rays 108–142; anal rays 86–88. Pectoral fin absent. Only left ventral fin developed, connected with anal fin. Two lateral lines on the eyed side and one on the blind side; the upper and middle lateral lines separated by 19–20 scales; middle lateral-line scales of ocular side 81-100; scales ctenoid on eyed side, small and crowded on the anterior half and around the edge of the body, but becoming enlarged on the posterior half; on the blind side the scales are cycloid.

Color of eyed side uniform light brown, blind side white. Vertcial fins brownish, darker than the body. A diffuse dark patch on gill cover. Sometimes with three parallel longitudinal darker stripes on colored side, the middle one of which is on the median lateral line.

REMARKS:

Cynoglossus borneensis is abundant in Borneo and in the Gulf of Thailand.

Distribution–Borneo through Gulf of Thailand.

SPECIMENS SEEN:

1960, Gulf of Thailand, 2 specimens, 267–295 mm.

REFERENCES:

Plagusia borneensis Bleeker, 1858–1859, Act. Soc. Sci. Indo-Neerl., 5: 6.

Arelia borneensis Bleeker, 1959, Enum. Spec. Pisc. Arch. Ind.: 184.

Cynoglossus borneensis Günther, 1862, Cat. Fish. Brit. Mus., 4: 498; Bleeker, 1866-1872, Atl. Ichth., 6: 34, tab. 245, fig. 5; Fowler, 1905, Proc. Acad. Nat. Sci. Philad., 57: 518; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 205; Smith, 1933, Journ. Siam Soc. Nat. Hist. Suppl., 9 (1): 73; Suvatti, 1936, Index Fish. Siam: 96; 1950, Fauna Thailand: 326.

CYNOGLOSSUS CYNOGLOSSUS (Hamilton and Buchanan), 1822

COMMON NAMES:

Pla lin-ma; Bengal tongue-sole (Munro, 1955)

DESCRIPTION:

Body flat and tapered posteriorly, its depth 3.5 to 3.7 in standard length. Head 4.6 to 5.0 in standard length. Both eyes close together on the left side of the body, the upper in advance of the lower one; eye 10.0 to 12.0 in head. Snout pointed. Rostral hook rather short, extending a little beyond mandibular symphysis. Two nostrils on eyed side, a simple one between the eyes, and a tubular one in front of lower eye. Lips not fringed; rictus of the mouth extending to below posterior edge of maxillary, much nearer to snout than to gill opening.

Dorsal and anal fins confluent with caudal fin; dorsal rays 98-106; anal rays 78-83. Pectoral fins absent. Only left ventral fin developed, not connected with anal. Caudal pointed. Two lateral lines on ocular side, separated by 13-15 scales; no distinct lateral line on blind side; scales in the middle lateral line 80-89; scales ctenoid on both sides.

Color brownish or grayish on eyed side, sometimes vaguely marbled with darker tones.

REMARKS:

Cynoglossus cynoglossus is very close to *C. sumatranus* (Bleeker), and it is very difficult to differentiate these two species by just looking at them. However, they may be distinguished through careful examination, since they differ in the number of scales between the two lateral lines, and in the body depth. The former species has 13-15 scales between the lateral lines, and the body depth measures 3.5 to 3.7 in standard length, while *C. sumatranus* has 11 to 12 scales, and the body depth 4.0 to 4.6 in standard length.

SPECIMENS SEEN:

February, 1960, Bangkok Fish Market, 4 specimens, 97-125 mm.

REFERENCES:

Achirus cynoglossus Hamilton and Buchanan, 1822, Fish. Ganges: 132, 373.

Plagusia cynoglossa Cantor, 1850, Journ. Asiat. Soc. Bengal, 28: 1211.

Cynoglossus hamiltonii Günther, 1862, Cat. Fish. Brit. Mus., 4: 504; Day, 1878-1888, Fish. India, 1: 436.

Cynoglossus cynoglossus Norman, 1928, Rec. Ind. Mus., 30: 208; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 199; Munro, 1955, Fish. Ceylon: 266, pl. 50, fig. 773.

CYNOGLOSSUS LIDA (Bleeker), 1851

COMMON NAMES:

Pla lin-ma; shoulder-spot tongue-sole (Munro, 1955)

DESCRIPTION:

Body very elongate and flat, its depth 4.0 to 4.2 in standard length. Head 4.0 to 4.6 in standard length. Both eyes on left side of body; eye 9.0 to 11.0 in head, much greater than interorbital width; upper eye a little in advance of lower one. Rostral hook of moderate length, extending to below lower eye. Two nostrils on ocular side, a simple one between anterior part of eyes, a tubular one in front of lower eye. Lips not fringed, rictus of mouth extending to below posterior edge of eye or beyond, much nearer to gill opening than to end of snout.

Dorsal and anal fins confluent with caudal fin; dorsal rays 99-112; anal rays 75-87. Ventral not united to anal fin. Two lateral lines on eyed side, separated by 13-15 scales; no distinct lateral lines on blind side; lateral-line scales 82-95; scales ctenoid on both sides.

Color brownish or grayish, sometimes a dark mark on the operculum.

REMARKS:

According to Günther (1862), Day (1878-1888), and Weber and de Beaufort, (1929), there is one distinct lateral line on the blind side of *Cynoglossus lida*, but Norman (1928) reports none, and none appear on specimens that I have seen.

I have not found specimens of this species in the Naga Expedition collection. However, Suvatti (1950) reported that *Cynoglossus lida* has been found in the Gulf of Thailand off Tha-chin. Further, I have been able to examine two in the Stanford University collection, one from west and the other from east of the area under study. The former specimen, 148 mm. in standard length, was collected in South Africa by Marley in December 1918, and the latter specimen, 155 mm. in standard length, was collected in the Philippines by Herre in August 1940.

Distribution–From the coast of Natal, South Africa to the Philippines.

REFERENCES :

Plagusia lida Bleeker, 1851c, Nat. Tijdschr. Ned. Ind., 1 : 413; 1852 a, Verh. Bat. Gen., 24: 23.

Cynoglossus lida Günther, 1862, Cat. Fish. Brit. Mus., 4: 498; Bleeker 1866-1872, Atl. Ichth., 6 : 36, pl. 12, fig. 2; Day, 1878-1888, Fish. India, 1 : 436, atlas, pl. 97, fig. 3; Alcock, 1889, Journ. Asiat. Soc. Bengal, 57 (2): 288; Norman, 1928, Rec. Ind. Mus., 30 : 210; Weber and de Beaufort, 1929, Fish. Indo-Austral Archip., 5: 203; Smith, 1933, Journ. Siam Soc. Nat. Hist. Suppl., 9 (1): 83; Munro, 1955, Fish. Ceylon: 266, pl. 51, fig. 774.

CYNOGLOSSUS LINGUA Hamilton and Buchanan, 1822

Figure 20, 0.4 ×

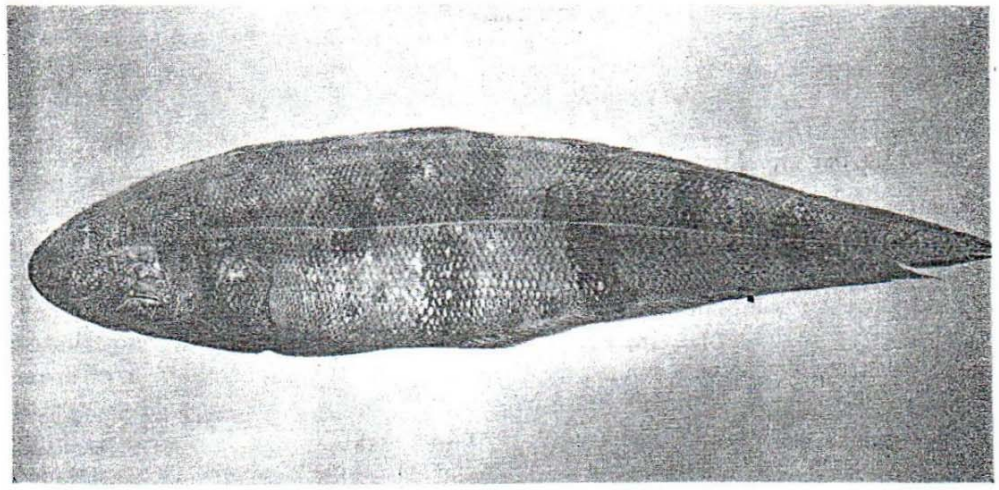

Figure 20

COMMON NAMES :

Pla lin-ma lai; pla bai mai; pla yod muang; long tongue-sole (Munro, 1955); tongue sole (Scott, 1959)

DESCRIPTION :

Body very long and flat, its depth 4.7 to 5.5 in standard length. Head 4.0 to 4.8 in standard length. Both eyes on left side of body; eye 11.0 to 15.0 in head.

Upper eye a little in advance of lower one. Snout obtusely pointed. Rostral hook short, not reaching to the front border of lower eye. Two nostrils on eyed side, a simple one between the eyes and a tubular one in front of lower eye. Lips not fringed; rictus of the mouth extending to a short distance behind hind border of lower eye; posterior edge of maxillary nearer to gill opening than to end of snout.

Dorsal and anal fins confluent with caudal fin; dorsal rays 127-175, anal rays 100-124. Pectoral fins absent. Only left ventral fin developed, connected with anal fin. Caudal fin pointed. Two lateral lines on eyed side, separated by 12-14 scales, the lower line straight; no distinct lateral line on the blind side; the middle lateral-line scales 81-115; scales ctenoid on eyed side and cycloid on blind side; scales on the middle posterior part of the colored side larger than those on the anterior part; bases of the dorsal and anal fins scaly.

Color of eyed side reddish brown, sometimes with or without irregular blackish brown patches; blind side white. Vertical fins pale brownish with dark edges. Gill cover blackish.

REMARKS:

Cynoglossus lingua is very common in the Gulf of Thailand and also has been found in the brackish water even though it is a marine species. According to Day (1878-88), *C. lingua* is the largest of the marine and estuarine species in India.

Distribution-Coast of India to the Gulf of Thailand and the Malay Archipelago.

SPECIMENS SEEN:

April, 1960, Chumporn Province, 1 specimen, 328 mm.; August, 1960, Langsuan District, Champorn Province, 1 specimen, 307 mm.

REFERENCES:

Cynoglossus lingua Hamilton and Buchanan, 1822, Fish. Ganges: 32, 365; Günther, 1862, Cat. Fish. Brit. Mus., 4: 501; Day, 1878-1888, Fish. India, 1: 433, atlas, pl. 96, fig. 1; Norman, 1928, Rec. Ind. Mus., 30: 200; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 203; Smith, 1933, Journ. Siam Soc. Nat. Hist. Suppl., 9 (1): 83; Suvatti, 1936, Index Fish. Siam: 97; 1950, Fauna Thailand: 327; Munro, 1955, Fish. Ceylon: 264; Fowler, 1956, Fish Red Sea and S. Arabia: 186; Scott, 1959, Fish. Malaya: 42; Smith, 1949, Sea Fish. S. Africa: 339; Kuronuma, 1961, Check List Fish. Vietnam: 32.

Plagusia lingua Cantor, 1850, Journ. Asiat. Soc. Bengal, 18: 1215.

Plagusia potous Bleeker, 1852a, Verh. Bat. Gen., 24: 23.

Arelia potous Bleeker, 1859, Act. Soc. Sci. Indo-neerl, 6: 185.

Cynoglossus potous Bleeker, 1866-1872. Atl. Ichth., 6: 33.

CYNOGLOSSUS MACROLEPIDOTUS (Bleeker), 1851

COMMON NAMES:

Pla yod-muong-klade yai; pla lin-ma (Suvatti, 1950); large scaled tongue-sole (Munro, 1955); tongue-sole (Scott, 1959; Kuronuma, 1961)

DESCRIPTION:

Body very long and flat, its depth 3.8 to 4.3 in standard length. Head 4.0 to 4.4 in standard length. Both eyes on the left side of the body, separated by narrow scaly space, upper eye in advance of lower one; eye 8.0 to 12.0 in head; snout rounded or obtusely pointed; rostral hook short, not reaching to vertical through front margin of upper eye. Two nostrils on eyed side, a simple one between the eyes and a tubular one in front of lower eye. Lips not fringed. Rictus of the mouth extending beyond hind border of lower eye, midway between end of snout and gill opening.

Dorsal and anal fins confluent with caudal fin; dorsal rays 105-113, anal rays 80-89. Pectoral fins absent. Only left ventral fin developed, separated from anal fin. Caudal fin pointed. Two lateral lines on eyed side, no distinct one on blind side; the two lateral lines separated by 6-7 scales; middle lateral-line scales 50-66; scales ctenoid on eyed side and cycloid on blind side; scales on body are larger than those on the head and along the bases of dorsal and anal fins.

Color of eyed side uniform brownish; blind side light. Sometimes each of dorsal and anal rays marked with a dark stripe. A dark patch on gill cover of eyed side.

REMARKS:

Cynoglossus macrolepidotus is very close to *C. oligolepis*. In the latter species, the body tapers more gradually and is more slender posteriorly than the former. They also differ in the number of scales between lateral lines; *C. oligolepis* has 8-9, while *C. macrolepidotus* has only 6-7. Moreover, the eyes of *C. macrolepidotus* are larger in proportion to the head than are those of *C. oligolepis*.

Norman (1928) was unable to separate these two species and considered them to belong to a single form in which the size of the eyes was very variable. Consequently, he placed *Cynoglossus oligolepis* as a synonym of *C. macrolepidotus*, but his action appears to have been ill advised. Because of Norman's error, the dorsal and anal fin-ray counts given by him and by subsequent workers who accepted his views (Fowler, Munro) show far too wide a range for *C. macrolepidotus*. Values above 115 for the dorsal and 89 for the anal, as well as some lower counts for the latter fin, are almost certainly based on specimens of *C. oligolepis*.

Cynoglossus macrolepidotus is one of the large tongue soles found in the Gulf of Thailand. It is also seen in fish markets in Bangkok.

Distribution—From the Persian Gulf along the coast of Southern Asia to China, and also in the Malay Archipelago.

SPECIMENS SEEN:

April, 1960, Gulf of Thailand, 1 specimen, 252 mm.; June, 1960, Prachuab Khiri Khan Province, 1 specimen, 273 mm.

REFERENCES:

Plagusia macrolepidotus Bleeker, 1851c, Nat. Tijdschr. Ned. Ind., 1: 415; 1852a, Verh. Bat. Gen., 24: 25.

Arelia macrolepidota Bleeker, 1859, Act. Soc. Sci. Indo-neerl, Enum. Spec. Pisc., 6: 184.

Cynoglossus macrolepidotus Günther, 1862, Cat. Fish. Brit. Mus., 4: 496; Bleeker, 1866-1872, Atl. Ichth., 6: 34, pl. 11, fig. 2; Alcock, 1889, Journ. Asiat. Soc. Bengal, 58 (2): 288; Jenkins, 1910, Mem. Ind. Mus., 3: 30; Norman, 1928, Rec. Ind. Mus., 30: 202, fig. 18; Fowler, 1934b, Hong Kong Nat., 5 (3): 219; 1938, List Fish. Known from Malaya: 87; Suvatti, 1950, Fauna Thailand: 327; Munro, 1955, Fish. Ceylon: 265, pl. 51, fig. 770; Fowler, 1956, Fish Red Sea and S. Arabia: 186, fig. 101; Scott, 1959, Sea Fish of Malaya: 43; Kuronuma, 1961, Check List Fish. Vietnam: 32.

CYNOGLOSSUS MICROLEPIS (Bleeker), 1851

COMMON NAME:

Pla lin-ma (Smith, 1945; Suvatti, 1950)

DESCRIPTION:

Body elongate and flat, its depth 4.2 to 5.0 in standard length. Head 5.2 to 5.7 in standard length. Both eyes on the left side of the body; the upper eye somewhat in advance of lower one; eye 11.0 to 14.0 in head. Tip of rostral hook reaching behind vertical from posterior margin of lower eye. Two nostrils on eyed side, a posterior one between the eyes, and the other tubular, situated above upper lip. Lips not fringed, rictus of the mouth behind eyes, and nearer to gill opening than to end of snout.

Dorsal and anal fins confluent with caudal fin; dorsal rays 112-123; anal rays 93-97. Ventral and anal fins united. Three lateral lines on eyed side, and one on blind side, the upper and the middle lateral lines separated by 21-22 scales, while the lower and the middle ones are separated by 23-24 scales. The middle lateral-line scales 132-150; scales ctenoid on both sides.

Color on eyed side reddish or grayish brown, with dark cloudy spots which are more or less regularly arranged.

REMARKS:

Cynoglossus microlepis looks very much like *C. xiphoideus,* but the principal points that may be used to differentiate them seem to be that in *C. microlepis* there is a single distinct lateral line on the blind side, and the number of scales in the median lateral line of eyed side average more. However, the latter character is limited in value by the fact that the minimum number of scales is overlapped by the maximum number in *C. xiphoideus.*

Sauvage (1883) described *Arelia soleum* which is probably a synonym of *Cynoglossus microlepis.* It is characterized as having 3 lateral lines on the colored side, one on the blind side, 160 scales in the lateral line 110 dorsal rays and 88 anal rays, and one of the nostrils situated between the eyes.

Cynoglossus microlepis is a strictly freshwater river fish, with specimens taken in Lopburi River at Lopburi Province, and the Chao Phya River at Paknampo. This species is also known from rivers in Sumatra and Borneo, according to Weber and de Beaufort (1929).

SPECIMENS SEEN:

September, 1964, Kasetsart University Museum of Fisheries, 2 Specimens 222-225 mm.

REFERENCES:

Plagusia microlepis Bleeker, 1851c, Nat. Tijdschr. Ned. Ind., 1: 413; 1852a, Verh. Bat. Gen., 24: 31.

Arelia microlepis Bleeker, 1859, Act. Soc. Sci. Indo-neerl., 6: 154.

Cynoglossus microlepis Günther, 1862, Cat. Fish. Brit. Mus., 4: 495; Bleeker, 1866-1872, Atl. Ichth., 6: 32; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 190; Smith, 1933, Journ. Siam Soc. Nat. Hist. Suppl., 9 (1): 83; Smith, 1945, Freshwater Fish. Siam: 442; Suvatti, 1950, Fauna Thailand: 327.

Arelia soleum Sauvage, 1883b, Bull. Soc. Philom. Paris, 7 (7): 151.

CYNOGLOSSUS MONOPUS (Bleeker), 1849

COMMON NAME:

Pla lin-ma

DESCRIPTION:

Body elongate, shaped like a tongue and greatly flattened; its depth 4.0 to 4.6 in standard length. Head 4.3 to 5.2 in standard length. Both eyes on the left side of the body; eyes on short stalks, very small, close together; upper eye in advance loof wer one; eye 15.0 to 16.0 in head. Snout obtusely pointed. Rostral hook short

not reaching below eyes. Two nostrils on eyed side, situated closely together in front of eyes; anterior nostril tubular, posterior one simple. Rictus of the mouth below or somewhat behind vertical through hind border of lower eye, nearer to end of snout than to gill opening.

Dorsal and anal fins confluent with caudal fin; dorsal rays 110-119, anal rays 85-98. Pectoral fins absent. Only left ventral fin developed, connected with anal fin. Caudal fin pointed. Two lateral lines on eyed side, no distinct one on blind side; the two lateral lines of ocular side separated by 17-21 scales; middle lateral-line scales 104-126; scales ctenoid on both sides.

Color brownish on eyed side, dorsal and anal fins dusky with a broad black margin posteriorly. Gill cover grayish.

REMARKS :

Cynoglossus monopus is a common species which has been found in the Fish Market in Bangkok and in the countries along the Gulf of Thailand.

Distribution – From the northern part of the Bay of Bengal through the Malay Archipelago and Gulf of Thailand to China.

SPECIMENS SEEN :

August, 1960, Samut Prakarn Province, 7 specimens, 108-166 mm.

REFERENCES :

Plagusia monopus Bleeker, 1849, Verh. Bat. Gen. Bijdr., 22: 11.

Plagusia melanopterus Bleeker, 1851c, Nat. Tijdschr. Ned. Ind., 1: 415; 1852a, Verh. Bat. Gen., 24: 25.

Arelia melanopterus Bleeker, 1859, Enum. Spec. Pisc. Arch. Ind. 6: 184;

Cynoglossus melanopterus Günther, 1862, Cat. Fish. Brit. Mus., 4: 502; Alcock, 1889, Journ. Asiat. Soc. Bengal, 58 (3): 289.

Cynoglossus monopus Bleeker, 1866-1872, Atl. Ichth., 6: 38, pl. 245, fig. 4; Alcock, 1896, Journ. Asiat. Soc. Bengal, 65 (2): 330; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 197; Norman, 1929, Rec. Ind. Mus., 30: 204; Smith, 1933, Journ. Siam Soc. Nat. Hist. Suppl., 9 (1): 84; Fowler, 1934b, Hong Kong Nat., 5 (3): 219; Suvatti, 1936, Index Fish. Siam: 94; 1950, Fauna Thailand: 326; Kuronuma, 1961, Check List Fish Vietnam: 32.

CYNOGLOSSUS OLIGOLEPIS (Bleeker), 1854

COMMON NAME :

Pla lin ma

DESCRIPTION :

Body elongate, shaped like a tongue and greatly flattened, its depth 3.9 to 4.4 in standard length. Head 3.8 to 4.1 in standard length. Both eyes on the left side, separated by a concave scaly space, the upper eye in advance of the lower one: eyes large, 8.0 to 9.0 in head. Snout rounded; rostral hook short. Two nostrils on eyed side, posterior one simple, between the eyes, the anterior one tubular and situated on the upper lip. Rictus of the mouth below, or somewhat behind hind border of lower eye, nearer to gill opening than to end of snout.

Dorsal and anal fins confluent with caudal fin; dorsal rays 116-129; anal rays 81-95. Pectoral fins absent. Only left ventral fin developed, connected with anal fin. Caudal fin pointed. Two lateral lines on the eyed side, and no distinct one on blind side; the upper and the middle lateral lines separated by 8-9 scales; scales in middle lateral line 58-68; scales ctenoid on eyed side and cycloid on blind side.

Color of eyed side brownish, but vertical fins greyish brown; a dark gray path on the gill cover of eyed side.

REMARKS :

Cynoglossus oligolepis is one of the large species of tongue soles. No previous record of it in the Gulf of Thailand has been published.

Distribution–India and Ceylon to China.

SPECIMENS SEEN :

April, 1960, Gulf of Thailand, 6 specimens, 214-328 mm.; May, 1960, Goh Matapoan, Chumporn Province, 1 specimen, 265 mm.; December, 1960, Goh Chang, Chantaburi Province, 3 specimens, 152-250 mm.

REFERENCES :

Plagusia oligolepis Bleeker, 1854b, Nat. Tijdschr. Ned. Ind., 7: 445.

Arelia oligolepis Bleeker, 1859, Enum. Spec. Pisc. Arch. Ind. 6: 185.

Cynoglossus oligolepis Günther, 1862, Cat. Fish. Brit. Mus., 4: 496; Bleeker, 1866-1872, Atl. Ichth., 6: 34, tab. 242, fig. 3; Day, 1878-1888, Fish. India, 1: 433, atlas, pl. 95, fig. 4; Alcock, 1889, Journ. Asiat. Soc. Bengal, 58 (3): 288; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 206.

CYNOGLOSSUS PUNCTICEPS (Richardson), 1846

Figure 21, 1.0 ×

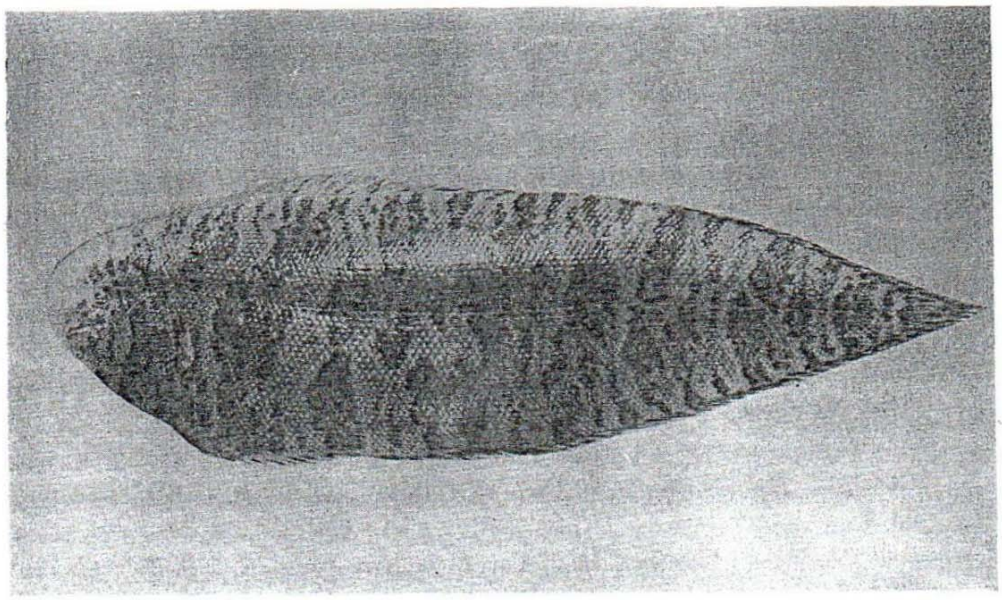

Figure 21

COMMON NAMES:

Golden-winged sole, black spotted sole (Fowler, 1934); pla chang-chune, pla lin-ma (Suvatti, 1950); speckled sole (Herre, 1953); spotted-tongue sole (Munro, 1955).

DESCRIPTION:

Body flat and tongue shaped, its depth 3.0 to 4.0 in standard length. Head wider than long, 4.3 to 5.5 in standard length. Both eyes on the left side of the body, close together, upper eye in advence of lower one; eye 8.0 to 10.0 in head. Snout rounded anteriorly. Two nostrils, one between the eyes, the other one in front of the lower eye. Lips without fringes. Rictus of the mouth reaching below hind border of the lower eye, a little nearer to end of snout than to gill opening.

Dorsal and anal fins coufluent with caudal fin, dorsal rays 92-107, anal rays 70–83. Pectoral fins absent. Only left ventral fin developed, connected with anal fin. Caudal fin pointed. Two lateral line on colored side, no distinct one on blind side, the upper and the lower lateral lines separated by 16-18 rows of scales; middle lateral-line scales of colored side 91-110; scales ctenoid on both sides.

Color of eyed side yellowish brown with irregular dark brown blotches on the head and body; these often united to form irregular gross-bands. Vertical fins light in color. Some rays of vertical fins marked with dark brown.

REMARKS:

According to Day (1878-88), *Cynoglossus puncticeps* has 16-17 scales between the lateral lines, and the rictus of the mouth reaching below middle of the eye.

C. puncticeps is found in great numbers along the coast of the Gulf of Thailand. Herre (1953) mentioned that this species was found in salt, brackish, and freshwater in the Philippines.

Distribution – The Indian Ocean, the Malay Archipelago and the Gulf of Thailand to the Philippines and China.

SPECIMENS SEEN :

May, 1960, Samut Sarkorn Province, 2 specimens, 109-125 mm.; May, 1960, Samut Songkhram Province, 1 specimen, 94. mm.; May, 1960, Chumporn Province, 21 specimens, 39-117 mm.

REFERENCES :

Plagusia puncticeps Richardson, 1946, Ichth. China and Japan: 280.

Plagusia brachyrhynchus Bleeker, 1851c, Nat. Tijdschr. Ned. Ind., 1: 414; 1852a, Verh. Bat. Gen., 24: 24.

Cynoglossus brachyrhynchus Günther. 1862, Cat. Fish. Brit. Mus., 4: 499; Bleeker, 1866-1872. Atl. Ichth., 6: 37; Day, 1878-1888, Fish. India, 1: 435, atlas, pl. 96 fig. 4.

Cynoglossus puncticeps Günther, 1862, Cat. Fish. Brit. Mus., 4: 500; Bleeker, 1866-1872, Atl. Ichth., 6: 37; Day, 1878-1888, Fish. India, 1: 437, atlas, pl. 97, fig. 1; Alcock, 1889, Journ. Asiat. Soc. Bengal, 58 (3): 289; Jenkins, 1910, Mem. Ind. Mus. 3: 30; Norman, 1928, Rec. Ind. Mus., 30 (2): 205; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 198; Smith, 1933, Journ. Siam Soc. Nat. Hist. Suppl., 9 (1): 84; Fowler, 1934b, Hong Kong Nat. 5 (2): 220; Suvatti, 1950, Fauna Thailand: 328; Herre, 1953, Check List Philippine Fish.: 190; Munro, 1955, Fish. Ceylon: 265, pl. 51, fig. 771; Fowler, 1956. Fish. Red Sea and S. Arabia: 187; Kuronuma, 1961, Check List Fish Vietnam: 32.

CYNOGLOSSUS SEMIFASCIATUS Day, 1878-88

COMMON NAME ;

Pla lin-ma

DESCRIPTION :

Body shaped like a tongue and very flattened, its depth 3.2 to 3.5 in the standard length. Head 4.5 to 5.0 in standard length. Both eyes on left side of body; upper eye in advance of lower one; eye 12.0 to 14.0 in head. Snout rounded, or obtusely pointed. Rostral hook covering symphysis of the lower jaw and extending to the front edge of the lower eye. Two nostrils on the eyed side; a simple one between the eyes anteriorly, and a tubular one in front of the lower eye. Rictus of the mouth behind the posterior edge of the lower eye, and slightly nearer to the snout than to gill opening.

Dorsal and anal fins confluent with caudal fin; dorsal rays 97-105; anal rays 94–81. Pectoral fins absent. Only left ventral fin developed, attached to anal fin. Caudal fin pointed, Two lateral lines on the eyed side, no distinct one on the blind side; the two lateral lines separated by 12-14 scales, and the number of scales in the lower lateral-line 75-87; scales ctenoid on both sides.

Color of eyed side brownish with vertical irregular, and incomplete darker crossbands, extending onto the vertical fins.

REMARKS:

Cynoglossus semifasciatus is closely related to *C. puncticeps*, but these species differ sharply in the number of scales present; whereas *C. puncticeps* has 91-110 lateral-line scales, and 16-18 scales between its two lateral lines, the respective values in *C. semifasciatus* are 75-81 and 12-14.

According to Day (1878-88), *Cynoglossus semifasciatus* has a single lateral line on the blind side, but Norman (1928) stated that none was present. No distinct lateral line was visible on the blind side of the specimens examined; in other details, they agreed with the description of Day (1878-88).

Distribution–East Coast of India to the Gulf of Thailand.

SPECIMENS SEEN:

May, 1960, Goh Matapoan, Chumporn Province, 3 specimens, 47-128 mm.

Cynoglossus semifasciatus Day, 1878-1888, Fish. India, 1: 436, atlas, pl. 97, fig. 5; Alcock, 1889, Journ. Asiat. Soc. Bengal, 58 (3): 289, Jenkins, 1910, Mem. Ind. Mus., 3: 30; Norman, 1928, Rec. Ind. Mus., 30 (2): 207; Suvatti, 1936, Index Fish. Siam: 98; 1950, Fauna Thailand: 328.

CYNOGLOSSUS SIBOGAE Weber, 1913

COMMON NAME:

Pla lin-ma

DESCRIPTION:

Body elongate and flat, its depth 3.5 to 3.8 in standard length. Head 4.5 to 5.0 in standard length. Both eyes close together on the left side of the body, the upper in advance of the lower one; eye 5.0 to 6.0 in head. Snout rounded. Rostral hook short, not reaching to the vertical through front border of upper eye. Two nostrils on colored side; anterior one tubular and situated before lower eye on upper lip, whereas the posterior one is simple and lies just in front of the eyes in the middle of the space between them. Rictus of the mouth below middle of lower eye, nearer to end of snout than to gill opening.

Dorsal and anal fins confluent with caudal fin; dorsal rays 98-109; anal rays 75-89. Pectoral fin wanting. Only left ventral fin developed, connected with the anal. Caudal pointed. Two lateral lines of ocular side separated by 10 scales; no conspicuous lateral line on the blind side. Scales in middle lateral line 57-64; scales ctenoid on both sides, increasing in size posteriorly.

Color brown or reddish brown with darker irregular spots on the scales, sometimes with dark patches on gill cover and abdomen. Fins spotted with dark brown.

REMARKS:

The specimens listed below are the first representatives of this species to be recorded from the Gulf of Thailand.

Distribution - The Gulf of Thailand, Malay Archipelago and Philippines.

SPECIMENS SEEN:

December, 1960, Goh Koram, 11 specimens, 58-126 mm.

REFERENCES:

Cynoglossus sibogae Weber, 1913, Siboga-Exped. Fische: 442; Weber and de Beaufort, 1929, Fish. Indo-Austral Archip., 5: 200, fig. 54; Herre, 1953, Check List Philippines Fish.: 191.

CYNOGLOSSUS SUMATRANUS (Bleeker), 1853

COMMON NAME:

Pla lin-ma

DESCRIPTION:

Body tapered and greatly flattened, its depth 4.0 to 4.2 in standard length. Head 4.5 to 5.0 in standard length. Both eyes on left side of body; upper eye a little in advance of lower one; eye 10.0 to 12.0 in head. Snout pointed. Rostral hook short, extending a little beyond mandibulary symphysis. Two nostrils on eyed side, a simple one between eyes and a tubular one in front of lower eye. Lips not fringed Rictus of the mouth extending beyond hind border of lower eye; posterior edge of maxillary nearer to gill opening than to end of snout.

Dorsal and anal fins confluent with caudal fin; dorsal rays 101-105; anal rays 73-80. Pectoral fins absent. Only left ventral fin developed. Caudal fin pointed. Two lateral lines on the eyed side, and no distinct one on the blind side; the two lateral lines separated by 11-12 scales; scales in middle lateral line 70-85; scales ctenoid on both sides of the body.

Color of eyed side, and vertical fins very light brownish or greyish; a dark patch present on gill cover.

REMARKS:

Cynoglossus sumatranus is a very common species, but there is no previous record of its occurrence in the Gulf of Thailand. This species is closely related to *C. lida*, but the latter has more scales in the lower lateral line than are to be found in *C. sumatranus*.

According to Bleeker (1866-1872) and Günther (1862), *Cynoglossus sumatranus* has a single lateral line on the blind side. However, Norman (1929) and Weber and de Beaufort (1929) stated that there is no distinct lateral line on the blind side, and my own observation corroborates the latter authors.

Distribution—From Burma and Sumatra to the Gulf of Thailand and the Philippines.

SPECIMENS SEEN:

August, 1960, Samut Prakarn Province, 6 specimens, 86-128 mm.

REFERENCES:

Plagusia sumatranus Bleeker, 1853d, Nat. Tijdschr. Ned. Ind., 5: 529.

Arelia sumatrensis Bleeker, 1859, Act. Soc. Sci. Indo-Neerl., 6: 185.

Cynoglossus sumatrensis Günther, 1862, Cat. Fish. Brit. Mus., 4: 497; Bleeker, 1866-1872, Atl. Ichth., 6: 35; Jordan and Richardson, 1907, Bull. U.S. Bur. Fish., 27: 281.

Cynoglossus sumatranus Norman, 1928, Rec. Ind. Mus., 30: 209; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 202; Fowler, 1938, List Fish Known From Malaya: 88; Herre, 1953, Check List Philippine Fish.: 191.

CYNOGLOSSUS TRIGRAMMUS Günther, 1862

COMMON NAMES:

Pla lin-ma; tongue of dragon (Fowler, 1934)

DESCRIPTION

Body very much flattened, its depth 4.6 in total length. Head 5.3 in total length. Both eyes on the left side of the body, the upper eye slightly in advance of the lower one; eye 13.0 in head. Rostral hook of upper jaw ending below symphysis of lower jaw. Two nostrils, one anteriorly between the eyes, the other before the lower angle of the lower orbit. Lips not fringed. The rictus of the mouth is somewhat behind the vertical from the posterior margin of the eye and a little nearer to the end of the snout than to gill opening.

Dorsal and anal fins confluent with caudal fin; dorsal rays 134; anal rays 107, Pectoral fins absent. One ventral united with anal. Three lateral lines on eyed side; the upper line is separated from the middle one by 21 scales; the middle line from the lower one by 24. One lateral line on blind side; median lateral-line scales about 140.

Color brownish, with several irregular black blotches on the opercles, the trunk, and front part of the tail.

REMARKS :

No specimens of *Cynoglossus trigrammus* were taken by the Naga Expedition, but the species was thought to be in the Gulf of Thailand by Suvatti (1950).

Distribution – China to the Gulf of Thailand.

REFERENCES :

Cynoglossus trigrammus Günther, 1862, Cat. Fish. Brit. Mus., 4: 494; Rutter, 1897, Proc. Acad. Nat. Sci. Philad.: 89.

Trulla trigramma Suvatti, 1950, Fauna Thailand: 329.

CYNOGLOSSUS VERSICOLOR Alcock, 1890

COMMON NAME :

Pla lin-ma

DESCRIPTION :

Body flat, tapering, gradually pointed to the tail, its depth 3.8 to 4.1 in standard length. Head 5.2 to 6.0 in standard length. Both eyes on the left side of the body; the upper eye a little in advance of the lower one; eye 6.5 to 7.5 in head. Snout rounded, rostral hook short. Two nostrils on eyed side, a simple one between the anterior part of the eyes, and a tubular one in front of the lower eye. Mouth small, the rictus reaching to below the posterior half of the lower eye or a little beyond its hind margin nearer to the end of snout than to gill opening.

Dorsal and anal fins confluent with caudal fin; dorsal rays 108-114; anal rays 87-89. Pectoral fin absent. Only left ventral fin developed, united to the anal by a broad membrane. Caudal fin pointed. Three lateral lines on the eyed side, and no distinct one on the blind side; the upper and the middle lateral lines separated by 12-13 rows of scales; lateral-line scales 74-75; scales ctenoid on both sides of the body.

Color of the eyed side yellowish brown with scattered darker brown spots. A brown patch present on the abdomen, just behind the gill opening. Vertical fins tinged with dark brown.

REMARKS :

Although seen by me in the Bangkok Fish Market, *Cynoglossus versicolor* is not a common species and has not been recorded from the Gulf of Thailand before. Alcock (1890) and Norman (1928) found this species on the hard sand of the Orissa Coast of India.

Distribution – Northeastern India to the Gulf of Thailand.

SPECIMEN SEEN :

June, 1960, Chumporn Province, 1 specimen, 102 mm.

REFERENCES :

Cyngolossus versicolor Alcock, 1890, Ann. Mag. Nat. Hist., 6 (36) : 442; 1896, Journ. Asiat. Soc. Bengal, 65 (2) : 330; Norman, 1928, Rec. Ind. Mus., 30: 195.

CYNOGLOSSUS XIPHOIDEUS Günther, 1862

COMMON NAMES :

Pla lin-ma, Pla lin-kwai (Smith, 1945).

DESCRIPTION :

Body elongate and flat, its depth about 4.0 to 4.7 in total length. Dorsal profile of head evenly curved; ventral profile more convex in its anterior half, and tapering to the end of the tail in a straight line posteriorly; head 4.5 in total length. Both eyes on left side of head, separated by a concave space; upper eye considerably in advance of lower eye; eye 11.0 in head; eyes covered by scaly eyelids. Snout rather pointed; rostral hook not extending beyond vertical from front margin of eye. Two nostrils, one between posterior parts of eyes, the other in front of lower eye. Lips not fringed; the rictus of the mouth extending behind vertical from the posterior margin of the eye.

Dorsal and anal fins confluent with caudal fin; dorsal rays 118-120; anal rays 98-101. Pectorals absent. Caudal pointed. Three lateral lines on eyed side, the upper and the lower ones separated from the middle line by 20-21 scales; on blind side no distinct lateral lines; scales on middle lateral line 126-135; scales ctenoid on both sides, those of anterior part of body smaller than the others.

Color light yellowish or brownish gray, scarcely lighter on blind side.

REMARKS:

There are some differences between Günther's type specimen as reported in the original description, and specimens examined in Thailand: Günther (1862) described one lateral line on the blind side, but no such lateral line has been seen by me, and J.R. Norman (*fide*, Smith, 1945 : 441) reports that the type material in the British Museum lacks a lateral line on blind side.

Distribution—*Cynoglossus xiphoideus* is rather numerous in the Chao Phya River, as far upstream as Nakorn Sawan Province, and it is often seen in the river markets in Ayuthya Province. This species has also been found in the Timor Sea and in China.

SPECIMENS SEEN:

May, 1963, Nakorn Sawan Province, 2 specimens, 273-300 mm.

REFERENCES:

Cynoglossus xiphoideus Günther, 1862, Cat. Fish. Brit. Mus., 4: 495; Bleeker, 1865a, Ned. Tijdschr. Dierk., 2: 33; Kner, 1865-1867, Novara Exped. Fische: 294; Weber, 1913, Siboga-Exped. Fische: 441; Hora, 1923a, Journ. Siam. Sec. Nat. Hist. Suppl., 6: 182; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 193; Smith, 1933, Journ. Siam Soc. Nat. Hist. Suppl., 9 (1): 83; 1945, Freshwater Fish. Siam: 441; Suvatti, 1950, Fuana Thailand: 329.

PARAPLAGUSIA BILINEATA (Bloch), 1787

Figure 22, 0.8 ×

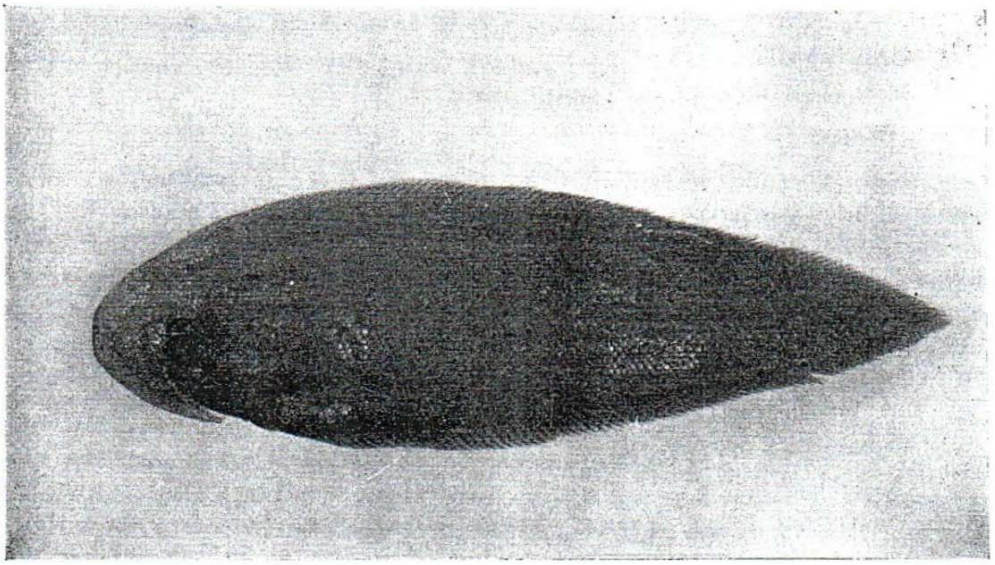

Figure 22

COMMON NAMES:

Pla lin-ma; two lined tongue sole (Munro, 1955)

DESCRIPTION:

Body shaped like a tongue, its depth 3.3 to 4.0 in standard length. Head 4.0 to 4.3 in standard length. Both eyes on the left side of the body, separated by a scaly space; the upper eye in advance of the lower one; eye 7.0 to 10.0 in head. Snout rounded. Rostral hook rather long, extending beyond vertical through hind

border of lower eye. One tubular nostril on upper lip of the colored side; two nostrils on blind side, the anterior one piercing a fleshy tentacle, the posterior one oval and with a short tube. Lower lip fringed with tentacles. Rictus of the mouth below and a little behind posterior part of the lower eye; posterior edge of maxillary nearer to gill opening than to end of snout.

Dorsal and anal fins confluent with caudal fin; dorsal rays 96-119; anal rays 75-93. Pectoral fins absent. Only left ventral developed and connected with anal. Caudal pointed. Two lateral lines on ocular side, no distinct one on blind side; lateral lines of eyed side separated by 16-19 scales; scales in middle lateral line 98-114; scales ctenoid on both sides.

Color of eyed side brownish, sometimes spotted and marbled with darker patches; blind side yellowish. Vertical fins pale brown.

REMARKS:

Paraplagusia bilineata is very close to *P. blochii,* but the latter differs from the former in having the snout obtusely pointed and the rostral hook of moderate length thus shorter; moreover, the number of scales between the lateral line's of *P. bilineata* is 16-19, but in *P. blochii* only 13-16 scales occur.

In the individuals seen, the color of the eyed side was uniform brownish, but according to Norman (1928) and Weber and de Beaufort (1929), some specimens have darker pigmentation forming into spots or freckles.

Paraplagusia bilineata was collected from the Gulf of Thailand, and it also has been seen in the fish market in Bangkok.

Distribution–From East Africa, through the Indian Ocean and the Malay Archipelago to China and Japan.

SPECIMENS SEEN:

February, 1960, East shore of the Gulf of Thailand, 1 specimen, 160 mm.; May, 1960, Chumporn Province, 4 specimens, 90-174 mm.; June, 1961, Prachuab Khiri Khan Province, 70 specimens, 152-275 mm.

REFERENCES:

Pleuronectes bilineatus Bloch, 1787, Nat. Ausland. Fische, 3: 29, pl. 188; Bloch and Schneider, 1801, Syst. Ichth.: 158.

Plagusia marmorata Bleeker, 1851c, Nat. Tijdschr. Ned. Ind., 1: 411; 1852a, Verh Bat. Gen., 24: 20; Günther, 1862, Cat. Fish Brit. Mus., 4: 491; Bleeker, 1866-1872, Atl. Ichth., 6: 28, pl. 246, fig. 5; Day, 1878-1888, Fish. India, 1: 431, atlas, pl. 95, fig. 1; Fowler, 1905, Proc. Acad. Nat. Sci. Philad., 57: 517; Günther, 1909-1910, Fische Südsee, 6: 348; Jenkins, 1910, Mem. Ind. Mus., 3: 29.

Paraplagusia bilineata Norman, 1928, Rec. Ind. Mus., 30: 191; Weber and de Beaufort, 1929, Fish. Indo-Austral. Archip., 5: 183, fig. 50-51; Fowler, 1934b, Hong Kong Nat., 5 (3): 211; 1938, List Fish. Known from Malaya: 88; Suvatti, 1950, Fauna Thailand: 329; Herre, 1953, Check List Philippine Fish.: 191; Munro, 1955, Fish. Ceylon: 264, pl. 51, fig. 765; Fowler, 1956, Fish. Red Sea and S. Arabia: 180; Kuronuma, 1961, Check List Fish. Vietnam: 33.

PARAPLAGUSIA BLOCHII (Bleeker), 1851

COMMON NAME:

Pla lin-ma (Suvatti, 1950)

DESCRIPTION:

Body shaped like a very flat tongue, tapering posteriorly, its depth 3.2 to 4.0 in standard length. Head 3.5 to 4.3 in standard length. Both eyes on the left side of the body, separated by a scaly space, the upper eye in advance of the lower one; eye 10.0 to 14.0 in head. Snout obtusely pointed. Rostral hook of moderate length, extending below middle or posterior part of lower eye. One tubular nostril on upper lip of colored side. Lower lip fringed with tentacles. Rictus of mouth below hind border of lower eye; posterior edge of maxillary nearer to gill opening than to end of snout.

Dorsal and anal fins confluent with caudal fin; dorsal rays 99-104; anal rays 74-82. Pectoral fin absent. Only left ventral fin developed and connected with anal. Caudal pointed. Two lateral lines on ocular side, separated by 13-16 scales; no distinct lateral line on blind side. Middle lateral-line scales 75-83; scales ctenoid on both sides.

Color of eyed side more or less uniform brownish, sometimes with narrow dark longitudinal stripes corresponding to the rows of scales; blind side pinkish.

REMARKS:

Paraplagusia blochii is closely related to *P. bilineata*, as mentioned under the discussion of the latter species.

Paraplagusia blochii is one of the common species usually found in the fish market in Bangkok.

Distribution--East Africa, through the Indian Ocean and Malay Archipelago to Formosa.

SPECIMENS SEEN:

January, 1960, Gulf of Thailand, 1 specimen, 110 mm.; June, 1960, Borka Village, Chumporn Province, 1 specimen, 166 mm.

REFERENCES:

Plagusia blochii Bleeker, 1851c, Nat. Tijdschr. Ned. Ind., 1 : 411; 1852a, Verh. Bat. Gen., 24 : 21.

Plagusia bilineata Cantor, 1850, Cat. Malayan Fish.: 227; 1850, Journ. Asiat. Soc. Bengal, 18 (2) : 1209; Günther, 1862, Cat. Fish. Brit. Mus., 4: 492; Day, 1878-1888, Fish. India, 1 : 431.

Paraplagusia blochii Norman, 1928, Rec. Ind. Mus., 30 : 192; Fowler, 1938, Fish Known from Malaya : 88 ; 1956, Fish Red Sea and S. Arabia : 182.

Paraplagusia blochi Weber and de Beaufort, 1929, Fish Indo-Austral. Archip., 5 : 184; Suvatti, 1936, Index Fish. Siam : 98; 1950, Fauna Thailand : 329; Herre, 1953, Check List Philippine Fish.: 192.

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———1851b. Nieuwe bijdrage tot de kennis der ichthyologische fauna van Borne met beschrijving van eenige nieuwe soorten van zoetwatervisschen. Nat. Tijdschr. Ned. Ind., **1** : 259-275.

———1851c. Over eenige nieuwe soorten van pleuronecteoiden van den Indischen Archipel. Nat. Tijdschr. Ned. Ind., **1** : 401-416.

———1851d. Vijfde bijdrage tot de kennis der ichthyologische fauna van Borneo met beschrijving van eenige nieuwe soorten van zoetwatervisschen. Nat. Tijdschr. Ned. Ind., **2** : 415-442.

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