

THE FLATFISHES (HETEROSOMATA) OF INDIA, WITH A LIST
OF THE SPECIMENS IN THE INDIAN MUSEUM.

PART I.

By J. R. NORMAN.

(Plates II—VII.)

INTRODUCTION.

In the following account of the Flatfishes of India I have included all those from the coast of southern Asia, from the Persian Gulf to the Mergui Archipelago, including the Andaman and Nicobar Islands, and from the Indian Ocean as far south as Cargados Carajos, including the Seychelles group, the Maldives, and the Chagos Archipelago. This account is based on the extensive collection of the Indian Museum, including a number of deep-sea forms obtained by the R. I. M. S. "Investigator", and on the material preserved in the collection of the British Museum (Natural History). In addition, I have examined the Flatfishes from Ceylon collected by Herdman in 1902, which were studied by Johnstone.

The synonymy and known distribution of each species is given, and in the majority of cases a redescription has also been included. No attempt has been made to give a complete synonymy of every species, but I have endeavoured to include all the more important Indian references.

The scheme of classification here adopted is that of Regan.¹ The families Psettodidae, Bothidae and Pleuronectidae are dealt with in the first part of this paper; the Soleidae and Cynoglossidae will form the subject of Part II.

I take this opportunity of expressing my thanks to the Director of the Zoological Survey of India for entrusting me with this investigation, and for the loan of several type specimens; to Dr. S. L. Hora for his assistance in sorting and listing the material, and for generously handing over to me the notes on the group which had been already made by him; and to Mr. R. J. Daniel, M.Sc., of the Department of Oceanography, University of Liverpool, for his kindness in lending me the Ceylon material preserved in that institution. Finally, I have to thank Mr. C. Tate Regan, F.R.S., for the frequent help and advice which he has given me from time to time.

Artificial Key to the Families and Sub-families of Heterosomata represented in India.

- I. Dorsal fin not extending forward on the head, the anterior rays spinous; each pelvic fin with a spine and 5 soft-rays; eyes on the right or left side

.. 1. PSETTODIDAE.

¹ *Ann. Mag. Nat. Hist.*, Ser. 8, VI, p. 484 (1910).

II. Dorsal fin extending forward on the head at least to above the eye; none of the rays spinous; pelvic fins without spines.

A. Præoperculum with a free margin; lower jaw generally prominent.

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| 1. Eyes on the left side, except in reversed examples | 2. BOTHIDAE. |
| a. Pelvic fins equal, short-based | 2a. Paralichthinae. |
| b. Left pelvic fin median with base much longer than that of right | 2b. Bothinae. |
| 2. Eyes on the right side, except in reversed examples | 3. PLEURONECTIDAE. |
| a. Origin of dorsal fin above the eyes; pelvic fins sub-equal, similar in form | 3a. Pleuronectinae. |
| b. Origin of dorsal fin before the eyes; right pelvic fin larger than left, median, and somewhat advanced | 3b. Samarinae. |

B. Præopercular margin not free, hidden by the skin and scales of the head; lower jaw never prominent.

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| 1. Eyes on the right side | 4. SOLBIDAE. |
| 2. Eyes on the left side | 5. CYNOGLOSSIDAE. |

Family 1. PSETTODIDAE.

1. Psettodes.

Psettodes, Bennett, *Proc. Zool. Soc.*, p. 147, 1831.

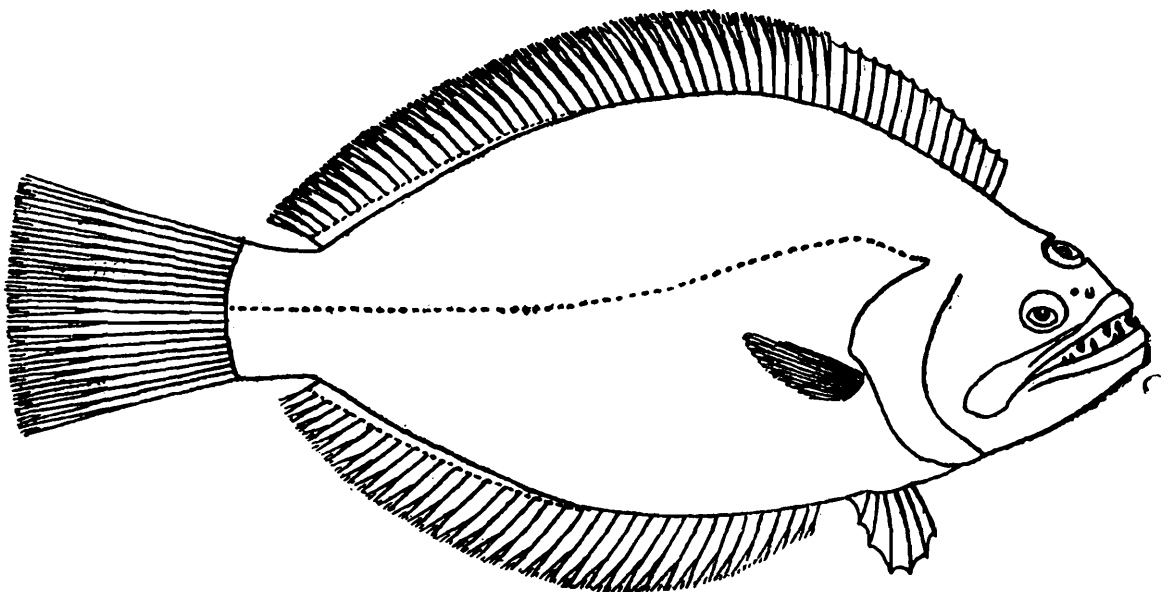
Sphagomorus, Cope, *Trans. Amer. Phil. Soc.*, XIII, p. 407, 1869.

Two species, one from West Africa, the other Indo-Pacific.

1. *Psettodes erumei* (Bloch & Schn.).

Pleuronectes erumei, Bloch, Schneider, *Syst. Ichth.*, p. 150 (1801).

Psettodes erumei, Günther, *Cat. Fish.*, IV, p. 402 (1862); Bleeker, *Atl. Ichth.* VI, p. 4, Pleuron, pl. i, fig. 2 (1866); Day, *Fish. India*, p. 422, pl. xci, fig. 4 (1877); Alcock, *J. Asiat. Soc. Bengal*, LVIII, pt. 2, p. 280 (1889); Regan, *J. Bombay Nat. Hist. Soc.*, XVI, p. 330 (1905); Jenkins, *Mem. Ind. Mus.*, III, p. 23 (1910); Norman, *Biol. Res. "Endeavour"*, V, p. 221 (1926).
 "Adalah", "Nooree Nataka" C., Russell, *Descr. Fish. Vizag.*, I, pp. 54, 60, pls. lxxix, lxxvii (1803).



TEXT-FIG. 1.—Outline drawing of *Psettodes erumei* (Bl. & Schn.) $\times \frac{1}{2}$

Hab.—East Africa to the Pacific.

F.3634/1.	Off Santapalii, Madras	..	“ Golden Crown ”
F.3644/1.	Off Gopalpur, Ganjam Coast	..	”
510.	Madras.		
12325-6.	Orissa Coast, 13 fms.	.	“ Investigator ”
———(3 spec.)	Eastern Channel, Mouth of R.		
	Hughli	.. ..	“ Golden Crown ”
450 (cat.)	Akyab, Burma.		
F.2139/1.	Off Elephant Pt., Arakan Coast,		
	Burma	..	“ Golden Crown ”
10775.	Mergui, Burma	..	Mergui Exped.
			(Anderson).
1187-8, 10382.	Andaman Is.	.. ..	Day, Dobson.

Specimens in the British Museum from the Persian Gulf ; Muscat, Gulf of Oman ; Madras.

Family 2. **BOTHIDAE.**Subfamily **PARALICHTHINAE.**

Two genera represented in Indian waters.

Synopsis of the Indian Genera.

- I. Mouth moderate or large ; maxillary more than $\frac{1}{2}$ head ; lateral line developed on both sides of body 1. *Pseudorhombus*.
- II. Mouth small ; maxillary less than $\frac{1}{2}$ head ; lateral line absent on blind side of body 2. *Taenioopsetta*.

1. **Pseudorhombus.**

Pseudorhombus, Bleeker, *C. R. Acad. Sci. Amsterdam*, XIII, Pleuron, p. 5 (1862) ; Regan, *Ann. Durban Mus.*, II, p. 207 (1920) ; Norman, *Biol. Res. " Endeavour,"* V, p. 222 (1926).

Several species from the Indo-Pacific ; eight known from India.

Synopsis of the Indian Species.

- I. Gill-rakers “ palmate ” (short, broad, strongly spinulate) ; body with three or four conspicuous double ocelli 1. *dupliciocellatus*.
- II. Gill-rakers pointed, longer than broad ; body without double ocelli.
 - A. Anterior dorsal rays longer than those following ; 23-25 gill-rakers on lower part of anterior arch ; depth $1\frac{3}{4}$ to $1\frac{1}{2}$ in length.
 1. Scales of blind side cycloid, except anteriorly and at bases of dorsal and anal fins ; body with three conspicuous ocelli arranged in the form of a triangle 2. *triocellatus*.
 2. Scales of blind side all ctenoid ; body with dark rings, but no conspicuous ocelli 3. *annulatus*.

B. Anterior dorsal rays not prolonged ; 8 to 15 gill-rakers on lower part of anterior arch ; depth $1\frac{1}{2}$ to $2\frac{1}{2}$ in length.

1. Maxillary extending to below posterior part of eye in adults ; 6 to 13 teeth on blind side of lower jaw ; dorsal with 71 to 80 rays ; a line from base of first ray through posterior nostril crosses the maxillary

a. Scales of blind side ctenoid ; lower jaw $1\frac{1}{2}$ to $1\frac{2}{3}$ in head ; right pectoral $1\frac{1}{2}$ to nearly twice in head

4. *malayanus*.

b. Scales of blind side cycloid ; lower jaw $1\frac{1}{2}$ to twice in head ; right pectoral 2 to $2\frac{2}{3}$ in head

5. *arsius*.

2. Maxillary not extending beyond middle of eye ; 23-32 teeth on blind side of lower jaw ; dorsal with 67 to 72 rays ; a line from base of first ray through posterior nostril passes above the maxillary or crosses its posterior part.

a. Dorsal profile of head notched in front of eyes ; origin of dorsal fin above anterior nostril of blind side ; 59 to 67 scales.

i. Maxillary reaching middle of eye, $2\frac{1}{4}$ to $2\frac{1}{2}$ in head ; membranous fold from first dorsal ray continued downwards nearly as far as nostrils of blind side ; accessory branch of lateral line reaching ninth to eleventh ray of dorsal fin ..

6. *elevatus*.

ii. Maxillary barely reaching middle of eye, $2\frac{3}{4}$ to nearly three in head ; membranous fold from first dorsal ray feebly developed, not nearly reaching nostrils of blind side ; accessory branch of lateral line reaching seventh or eighth ray of dorsal fin ..

7. *micrognathus*.

b. Dorsal profile of head evenly convex or very slightly notched in front of eyes ; origin of dorsal fin in front of nostrils of blind side ; 68 to 72 scales ..

8. *javanicus*.

1. *Pseudorhombus duplici-cellatus*, Regan.

Pseudorhombus duplici-cellatus, Regan, *Ann. Mag. Nat. Hist.*, Ser. 7, XV, p. 25 (1905) ; Norman, *Biol. Res. "Endeavour"*, V, p. 228, fig. 2 (1926).

Platophrys palad, Evermann and Seale, *Bull. Bur. Fish.*, XXVI, p. 105, fig. 21 (1906), 1907.

Pseudorhombus cartwrighti, Ogilby, *Mem. Queensland Mus.*, I, p. 47 (1912).

Hab.—From the Nicobar Islands, through the Malay Archipelago to Australia and Japan.

125. Nankauri Harbour, Nicobar Is. .. Sewell.
 167. Stn. 631 ; Nankauri Harbour, Nicobar
 Is., 22-31 fms. .. “ Investigator ”

2. *Pseudorhombus triocellatus* (Bl. & Schn.).

Pleuronectes triocellatus, Bloch, Schneider, *Syst. Ichth.*, p. 145 (1801).

Rhombus triocellatus, Bleeker, *Nat. Tijdschr. Ned. Ind.*, V, p. 528 (1853); *Verh. Bat. Gen.*, XXV, Bengal p. 76 (1853).

Pseudorhombus triocellatus, Günther, *Cat. Fish.*, IV, p. 428 (1862); Bleeker, *Atl. Ichth.*, VI, p. 9, Pleuron, pl. viii, fig. 1 (1866); Day, *Fish. India*, p. 424, pl. xcii, fig. 1 (1877); Alcock, *J. Asiat. Soc. Bengal*, LVIII, pt. 2, p. 283 (1889).

“ *Nooree Nalaka* ”, Russell, *Descr. Fish. Vizag.*, I, p. 59, pl. lxxvi (1803).

Depth of body $1\frac{1}{2}$ to $1\frac{3}{4}$ in the length, length of head $3\frac{1}{3}$ to $3\frac{1}{2}$. Dorsal profile of head sometimes a little notched in front of eyes. Snout about as long as eye, diameter of which is $3\frac{1}{3}$ to 4 in length of head; anterior margins of eyes level, or lower a little in advance of upper, which is separated from edge of head by a space equal to $\frac{1}{4}$ or $\frac{1}{3}$ its diameter. Maxillary extending to below middle of eye or not quite as far, length $2\frac{1}{4}$ to $2\frac{1}{3}$ in head; lower jaw not projecting, a knob at the symphysis, length nearly twice in head. Teeth minute in both jaws. Gill-rakers rather long, slender; about 23 on lower part of anterior arch.¹ Scales of ocular side ctenoid; those of blind side cycloid except anteriorly and near bases of dorsal and anal fins; 63 to 68 scales in a longitudinal series,² 25 to 28 between lateral line and highest point of dorsal profile. Accessory branch of lateral line extending towards tenth to thirteenth ray of dorsal fin. Dorsal 65-70; commencing above or a little in front of anterior nostril of blind side, and at a distance in front of eye equal to about $\frac{1}{3}$ its diameter; anterior rays free, prolonged, first ray nearly $\frac{2}{3}$ length of head. Anal 49-52; tip of first interhaemal spine sometimes projecting. Left pectoral with 12 or 13 rays (8 or 9 branched), length $1\frac{1}{4}$ to $1\frac{1}{2}$ in head. Caudal with 2-3/11-12/2-3 rays; rounded or double-truncate. Length of caudal peduncle 3 to $3\frac{1}{2}$ in its depth, which is $2\frac{1}{5}$ to $2\frac{1}{3}$ in length of head. Brownish, with indistinct darker spots and markings, and sometimes with some scattered white spots and blotches; three large and conspicuous dark ocelli arranged in the form of a triangle; vertical fins with dark spots and blotches.

Described from numerous specimens, 85 to 130 mm. in total length.

Hab.—East coast of India to the Malay Archipelago.

- 452 (cat.) .. Ceylon
 1185-6 .. Madras
 12160-3, 12165, 12229-32,
 12248-56, 12265-8 .. Orissa Coast, 8 fms. .. “ Investigator ”
 F.2076/1 Puri, Orissa Coast .. Paiva.
 10599 Akyab, Burma .. Yunnan Exped.
 (Anderson).

Specimens in the British Museum from Madras.

¹ Counted on blind side of head.

² Counted from upper angle of gill-opening, across the arch of the lateral line, and from thence above the straight part.

3. *Pseudorhombus annulatus*, sp. nov.

Plate II.

Rhomboidichthys pantherinus (non Rüppell), Regan, *J. Bombay Nat. Hist. Soc.*, XVI, p. 332 (1905). (Name only).

Depth of body $1\frac{2}{3}$ in the length, length of head $3\frac{1}{2}$ to $3\frac{2}{3}$. Dorsal profile of head scarcely notched in front of eyes. Snout shorter than eye, diameter of which is 3 to $3\frac{2}{3}$ in length of head; upper eye a little in advance of lower, separated from edge of head by a space equal to about $\frac{1}{3}$ its diameter. Maxillary extending to below middle of eye or not quite as far, length a little more than twice in head; lower jaw not projecting, a knob at the symphysis, length about $1\frac{5}{6}$ in head. Teeth minute in both jaws. Gill-rakers rather long, slender; 23 to 25 on lower part of anterior arch. Scales all ctenoid on both sides of body; 62 to 65 scales in a longitudinal series, about 26 between lateral line and highest point of dorsal profile. Accessory branch of lateral line extending towards tenth to twelfth ray of dorsal fin. Dorsal 67-70; commencing above or a little in front of anterior nostril of blind side, and at a distance in front of eye equal to more than $\frac{1}{3}$ its diameter; anterior rays free, somewhat prolonged, first ray not much more than $\frac{1}{2}$ length of head. Anal 49-51; tip of first interhaemal spine projecting. Left pectoral with 12 rays (8 branched), length $1\frac{1}{3}$ to $1\frac{2}{5}$ in head. Caudal with 3/11/3 rays; double-truncate. Length of caudal peduncle 3 to $3\frac{1}{2}$ in its depth, which is $2\frac{1}{5}$ to $2\frac{1}{4}$ in length of head. Pale brownish, with a number of more or less distinct darker annular markings; vertical fins with brown spots and blotches.

Described from 5 specimens, 90 to 105 mm. in total length; types of the species: (British Museum No. 1904.5 25, 74-76).

Hab.—Muscat, Gulf of Oman, 15 to 30 fms.

4. *Pseudorhombus malayanus* Bleeker.

Pseudorhombus malayanus, Bleeker, *Ned. Tijdschr. Dierk.*, III, p. 43 (1866):

Atl. Ichth., VI, p. 7, Pleuron, pl. iii, fig. 2 (1866); Alcock, *J. Asiat. Soc. Bengal*, LVIII, pt. 2, p. 282 (1889).

Pseudorhombus arsius (part), Jenkins, *Mem. Ind. Mus.*, III, p. 24 (1910).

Depth of body $1\frac{4}{5}$ to twice in the length, length of head $3\frac{1}{4}$ to $3\frac{3}{5}$. Dorsal profile of head a little notched in front of eyes. Snout as long as or longer than eye, diameter of which is $4\frac{1}{2}$ to $5\frac{3}{4}$ in length of head; anterior margins of eyes level, or upper a little in advance of lower; upper eye separated from edge of head by a space equal to $\frac{1}{4}$ or $\frac{1}{3}$ its diameter. Maxillary extending to below hinder edge or posterior part of eye, length $2\frac{1}{8}$ to $2\frac{1}{4}$ in head; lower jaw not projecting, a knob at the symphysis, length $1\frac{3}{4}$ to about $1\frac{5}{6}$ in head. Lateral teeth of upper jaw small, rather close-set, anterior teeth enlarged; teeth of lower jaw stronger and wider apart than those of upper, 7 to 11 on blind side of jaw; some of the teeth in both jaws barbed. Gill-rakers of moderate length or rather short; 8 to 10 on lower part of anterior arch. Scales ctenoid on both sides of body; 68 to 76 scales in a longitudinal series, 27 to 32 between lateral line and highest point of dorsal profile. Accessory branch of lateral line extending towards ninth to eleventh ray of

dorsal fin. Dorsal 71-77 ; commencing above or very little in advance of posterior nostril of blind side, and at a distance in front of eye equal to $\frac{1}{4}$ or $\frac{1}{3}$ its diameter. Anal 55-61 ; tip of first interhaemal spine sometimes projecting. Left pectoral with 12 or 13 rays (7 to 9 branched), length $1\frac{2}{5}$ to $1\frac{3}{5}$ in head ; length of right pectoral $1\frac{2}{3}$ to about twice in head. Caudal with 2/13/2 rays ; double-truncate. Length of caudal peduncle 3 to 4 times in its depth, which is $2\frac{1}{4}$ to $2\frac{2}{5}$ in length of head. Brownish, with or without indistinct groups of small white spots above, below, and on straight part of lateral line ; sometimes some irregular dark spots and markings, and generally a dark blotch at the commencement of straight part of lateral line ; vertical fins with indistinct brown spots and rings.

Described from 14 specimens, 110 to 210 mm. in total length.

Hab.—East coast of India through the Malay Archipelago to the Philippines.

F.5038/1	..	Puri Beach, Orissa	..	Annandale.
F.3438/1, F.3442/1		" "	..	" Golden Crown."
F.3440/1	..	Balasore Bay, Orissa	..	" "
12224, 12340	..	Orissa Coast, 13 to 25 fms.		" Investigator."
12712	..	Vizagapatam Coast, 25 fms.		" "
F.6051/1, F.6058/1		Khulna, Sundarbans	..	Rahim.
F.3443/1	..	Bay of Bengal	..	" Golden Crown."
F.2142/1	..	Off Elephant Pt., Arakan Coast, Burma	..	" "

A specimen in the British Museum from Madras.

Apart from the presence of ctenoid scales on the blind side of the body, this species is very similar to *P. arsius*. If specimens more or less equal in size are compared, however, the latter species may generally be recognised by the shorter lower jaw, the stronger anterior canine teeth in both jaws, and by the shorter pectoral fin on the blind side.

P. malayanus is closely related to *P. oligodon*, Bleeker, from China and Japan, which is also characterised by the presence of ctenoid scales on the blind side. In *P. oligodon* the depth of the body is 2 to $2\frac{1}{5}$ in the length, length of head $3\frac{1}{2}$ to $3\frac{5}{8}$; there are 76 to 80 scales in a longitudinal series ; the arch of the lateral line is lower than in *P. malayanus* ; there are 78 to 81 dorsal rays, and 62 to 64 anal rays ; length of left pectoral $1\frac{2}{3}$ to nearly twice in head, that of the right side about $2\frac{1}{4}$.

5. *Pseudorhombus arsius* (Ham. Buch.).

? *Pleuronectes nauphala*, Hamilton (Buchanan), *Fish. Ganges*, p. 126 (1822).

Pleuronectes arsius, Hamilton (Buchanan), *t. c.*, p. 128.

Platessa russellii, Gray, *Illust. Indian Zool.*, II, pl. xciv, fig. 2 (1834).

Rhombus arsius, Bleeker, *Verh. Bat. Gen.*, XXV, Bengal, p. 76 (1853).

Rhombus polyspilus, Bleeker, *Nat. Tijdschr. Ned. Ind.*, IV, p. 503 (1853).

Pseudorhombus russellii, Günther, *Cat. Fish.*, IV, p. 424 (1862) ; Bleeker, *Atl.*

Ichth., VI, p. 6, Pleuron, pl. ii, fig. 2 (1866) ; Alcock, *J. Asiat. Soc. Bengal*,

LVIII, pt. 2, p. 282 (1889) ; Jenkins, *Mem. Ind. Mus.*, III, p. 25 (1910) ;

Regan, *Ann. Durban Mus.*, II, p. 208, fig. 1 (1920).

Pseudorhombus arsius, Günther, *t. c.*, p. 426 (1862) ; Day, *Fish. India*, p. 423,

pl. xci, fig. 5 (1877) ; Hora, *Mem. Ind. Mus.*, V, p. 758 (1923) ; Norman,

Biol. Res. " Endeavour ", V, p. 231 (1926).

Pseudorhombus polyspilus, Bleeker, *Atl. Ichth.*, VI, p. 7, Pleuron, pl. vi, fig. 3 (1866).

Pseudorhombus arsius (part), Jenkins, *Mem. Ind. Mus.*, III, p. 24 (1910).

Depth of body $1\frac{3}{4}$ to $2\frac{1}{5}$ in the length, length of head $3\frac{1}{3}$ to $3\frac{3}{4}$. Dorsal profile of head straight or a little notched in front of eyes. Snout longer than eye (except in young), diameter of which is $4\frac{2}{3}$ to 7 in length of head; anterior margins of eyes level, or upper a little in advance of lower; upper eye separated from edge of head by a space equal to $\frac{1}{3}$ to $\frac{2}{3}$ its diameter. Maxillary extending to below hinder edge or posterior part of eye, length $2\frac{1}{5}$ to $2\frac{2}{3}$ in head; lower jaw not projecting, a knob at the symphysis, length $1\frac{4}{5}$ to twice in head. Lateral teeth of upper jaw small and rather close-set; 2 to 4 pairs of moderate canines anteriorly; lateral teeth of lower jaw much stronger and wider apart than those of upper jaw, 6 to 13 on blind side of jaw, and one or two pairs of strong canines anteriorly; none of the teeth barbed. Gill-rakers of moderate length or rather short; 9 to 13 on lower part of anterior arch. Scales of ocular side ctenoid, those of blind side cycloid; 67 to 78 scales in a longitudinal series, 26 to 34 between lateral line and highest point of dorsal profile. Accessory branch of lateral line reaching eighth to twelfth ray of dorsal fin. Dorsal 72-80; commencing above or a little in advance of nostrils of blind side, and at a distance in front of eye equal to $\frac{1}{3}$ to $\frac{2}{3}$ its diameter. Anal 56-61; no visible spine. Left pectoral with 11 to 13 rays (7 to 9 branched), length $1\frac{2}{5}$ to $1\frac{3}{5}$ in head; length of right pectoral 2 to $2\frac{2}{5}$ in head. Caudal with 2/13/2 rays; double-truncate. Length of caudal peduncle $2\frac{1}{4}$ to $3\frac{1}{2}$ in its depth, which is 2 to $2\frac{2}{3}$ in length of head. Brownish, usually with darker spots and rings; often a conspicuous dark spot surrounded by a ring of white dots at commencement of straight part of lateral line, and sometimes one or two similar spots on the straight portion; in some specimens the head and body are covered with small dark brown spots, which may be surrounded by bluish white (*polyspilus*); vertical fins with brown spots and rings.

Described from numerous specimens, 50 to 350 mm. in total length.

Hab.—East Africa to the Pacific.

F.1844/1	Karachi	..	..	Cumming.
679	..	..	S. Canara	
678	..	..	Madras	
163	..	..	Ennur Backwater, Madras	Annandale.
F.5034/1, F.5037/1	..	..	Puri Beach, Orissa	"
F.1683/1	..	..	Puri, Orissa	Annandale and Lloyd.
F.5891-9/1, F.3439/1	Balasore Bay, Orissa	..	..	"Golden Crown."
12242	..	..	Orissa Coast, 7 fms.	"Investigator."
217-9	..	..	Chilka Lake	.. Chilka Survey.
263	..	..	"	.. "
453-4 (cat.) (11 spec.)	Calcutta Bazaar	..	..	Anderson.
1449	..	..	Calcutta	
451 (cat.)	..	..	Akyab, Burma	.. Day.
10386	..	..	Andaman Is.	.. Dobson.
112	..	..	"	.. Day.
680	..	..	"
278	..	..	Morrison Bay, Mergui Archipelago	.. "Investigator."
14306	..	..	??

Specimens in the British Museum from Muscat, Gulf of Oman ; Karachi ; Sind ; Madras ; Bengal ; Calcutta ; S. Canara ; Akyab ; Andaman Is.

After examining and tabulating more than 100 specimens from various localities in the Indo-Pacific, I have concluded that *P. polyspilus* cannot be recognised as a distinct species. It was said to differ from *P. arsius* in the more slender body and less convex dorsal profile, in having the anterior margins of the eyes level, fewer teeth on blind side of lower jaw, fewer scales in a longitudinal series, and in the colouration. None of these characters appear to be constant.

6. *Pseudorhombus elevatus* Ogilby.

Pseudorhombus javanicus (part), Day, *Fish. India*, p. 424, pl. xcii, fig. 2 (1877) ; Jenkins, *Mem. Ind. Mus.*, III, p. 24 (1910).

Pseudorhombus elevatus, Ogilby, *Mem. Queensland Mus.*, I, p. 45 (1912) ; Norman, *Biol. Res. " Endeavour "*, V, p. 234, fig. 3 (1926).

Pseudorhombus affinis, Weber, "*Siboga*"-*Exped. Monogr.* 57, p. 426, pl. xi, fig. 1 (1913).

Depth of body $1\frac{1}{8}$ to twice in the length, length of head $3\frac{1}{5}$ to nearly $3\frac{1}{2}$. Dorsal profile of head somewhat notched in front of eyes. Snout about as long as eye, diameter of which is $3\frac{1}{2}$ to $4\frac{1}{4}$ in length of head ; anterior margins of eyes level, or lower very slightly in advance of upper which is separated from edge of head by a space equal to $\frac{1}{3}$ or $\frac{1}{2}$ its diameter. Maxillary extending to below middle of eye, length $2\frac{1}{4}$ to $2\frac{1}{2}$ in head ; lower jaw scarcely projecting, a knob at the symphysis, length $1\frac{2}{3}$ to nearly twice in head. Teeth all small in both jaws, scarcely enlarged anteriorly ; 23 to 32 on blind side of lower jaw. Gill-rakers rather long, slender ; 12 to 15 on lower part of anterior arch. Scales of ocular side ctenoid, those of blind side cycloid ; 59 to 67 scales in a longitudinal series, 25 to 27 between lateral line and highest point of dorsal profile. Accessory branch of lateral line nearly reaching base of ninth to eleventh ray of dorsal fin. Dorsal 67-71 ; commencing above anterior nostril of blind side, and at a distance in front of eye equal to about $\frac{1}{2}$ its diameter ; a line from base of first dorsal ray through posterior nostril of blind side passes above the hinder end of the maxillary or crosses its posterior part ; a membranous fold runs downwards from the first dorsal ray nearly as far as nostrils of blind side. Anal 52-55 ; tip of first interhæmal spine, if projecting, comes out on the blind side behind the vent and above the first or second anal ray. Left pectoral with 11 or 12 rays (6 to 8 branched), length $1\frac{1}{2}$ to $1\frac{2}{3}$ in head. Caudal with 2/13/2 rays ; double-truncate. Length of caudal peduncle $2\frac{1}{2}$ to $2\frac{3}{4}$ in its depth, which is $2\frac{2}{5}$ to nearly three times in length of head. Pale brownish, with 5 series of inconspicuous annular markings ; generally a dark blotch, with or without small white dots, at the junction of the straight and curved parts of the lateral line, and one or two smaller ones on the straight portion ; sometimes similar blotches above and below lateral line ; vertical fins with brown spots and markings.

Described from 16 specimens, 98 to 140 mm. in total length.

Hab.—From the Persian Gulf, through the Indian Ocean and Archipelago to Australia.

159	..	Stn. 352 : Persian Gulf (29° 20' N., 48° 57' E.), 13 fms.	..	" Investigator."
149-51	..	Stn. 467 : off Travancore Coast (9° 55' N., 75° 41' E.), 4 to 75 fms.	.. ..	"
1184		Madras.		
12339	..	Ganjam Coast, 23 fms.	..	"
12166, 12272-3, 12227-8, 12257, 12314	..	Orissa Coast, 7 to 11 fms.	.	"
F.5035-6/1		Puri Beach, Orissa	..	Annandale.
11588	.	Sandheads, R. Hughli	..	Daly.
F.2143/1		Off Elephant Pt., Arakan Coast, Burma		" Golden Crown."

Specimens in the British Museum from the Persian Gulf, 10 to 20 fms.

This species is close to *P. pentophthalmus*, Günther, from Japan, differing chiefly in the smaller number of gill-rakers, in the dentition, and in the colouration.

7. *Pseudorhombus micrognathus*, sp. nov.

Plate III.

Pseudorhombus javanicus (part), Day, *Fish. India*, p. 424 (1877); Jenkins, *Mem. Ind. Mus.*, III, p. 24 (1910).

Close to the preceding species, but length of head $3\frac{1}{2}$ to $3\frac{2}{3}$ in the length; maxillary scarcely reaching middle of eye, length $2\frac{3}{4}$ to nearly 3 in head; length of lower jaw more than twice in head. Accessory branch of lateral line reaching seventh or eighth ray of dorsal fin. Dorsal fin commencing at a distance in front of eye equal to $\frac{1}{4}$ or $\frac{1}{3}$ its diameter; membranous fold from first ray feebly developed, not nearly reaching nostrils of blind side. Tip of first interhæmal spine not projecting. Brownish, with numerous small dark spots; 3 or 4 fairly prominent ocelli, a pair above and below anterior third of straight part of lateral line, a third below junction of straight and curved portions, and sometimes an inconspicuous fourth ocellus above the curved portion; sometimes a faint blotch at junction of straight and curved parts of lateral line; vertical fins with small brown spots.

Described from 3 specimens, 115 to 165 mm. in total length.

Hab.—Coast of Orissa, India.

F.3441/1. (Holotype)	Puri Beach, Orissa	}	..	Annandale.
F.5039/1, F.5041/1	.. ..	..	..	"

8. *Pseudorhombus javanicus* (Bleeker).

Rhombus javanicus, Bleeker, *Nat. Tijdschr. Ned. Ind.*, IV, p. 502 (1853).

Pseudorhombus javanicus, Günther, *Cat. Fish.*, IV, p. 427 (1862); Bleeker, *Atl. Ichth.*, VI, p. 8, Pleuron, pl. i, fig. 3 (1866).

Depth of body $2\frac{1}{10}$ to $2\frac{1}{4}$ in the length, length of head $3\frac{2}{3}$ to 4. Dorsal profile of head evenly convex or very slightly notched in front of eyes. Snout a little longer than eye, diameter of which is about 5 in length of head; anterior margins of eyes about level, upper separated from

edge of head by a space equal to $\frac{2}{3}$ or $\frac{3}{4}$ its diameter. Maxillary extending to below middle of eye or a little beyond, length $2\frac{1}{3}$ to $2\frac{2}{3}$ in head ; lower jaw not projecting, a knob at the symphysis, length twice or nearly twice in head. Teeth all small in both jaws, scarcely enlarged anteriorly ; 23 to 25 on blind side of lower jaw. Gill-rakers rather short, length less than half that of longest gill-filaments ; 12 to 14 on lower part of anterior arch. Scales of ocular side ctenoid anteriorly, mostly cycloid on posterior part of body ; those of blind side cycloid ; 68 to 72 scales in a longitudinal series, about 27 between lateral line and highest point of dorsal profile. Accessory branch of lateral line nearly reaching ninth or tenth ray of dorsal fin. Dorsal 69-72 ; commencing in front of both nostrils of blind side, and at a distance in front of eye equal to $\frac{2}{3}$ to $\frac{4}{5}$ its diameter ; a line from base of first ray through posterior nostril of blind side passes above the maxillary. Anal 54-55 ; tip of first interhæmal spine sometimes projecting. Left pectoral with 11 rays (7 branched), length $1\frac{2}{3}$ in head. Caudal with 2/13/2 rays ; double-truncate. Length of caudal peduncle $2\frac{1}{4}$ to $2\frac{1}{2}$ in its depth, which is $2\frac{1}{3}$ to $2\frac{2}{5}$ in length of head. Yellowish brown, with or without small paler spots and ocelli which extend on to the vertical fins ; a black blotch at the junction of the straight and curved parts of the lateral line, and another on the straight portion ; vertical fins with small brown spots.

Described from 3 specimens, 170 to 215 mm. in total length, including an example from Dr. Bleeker's collection.

Hab.—East Coast of India to the Malay Peninsula and Archipelago.
F.5040/1 .. Puri Beach, Orissa Annandale.

2. *Taeniopsetta*.

Taeniopsetta, Gilbert, *Bull. U. S. Fish. Comm.*, XXIII, pt. 2, p. 680 (1905).

Two species from the Indo-Pacific ; one from India.

Taeniopsetta ocellata Günther.

Pseudorhombus ocellatus, Günther, *Shore Fishes "Challenger"*, p. 56, pl. xxiv, figs. A-B (1880) ; Regan, *Trans. Linn. Soc., Zool.*, XII, p. 232 (1908).

Hab.—Saya de Malha Bank, Indian Ocean ; Admiralty Islands.

Three specimens in the British Museum from the Saya de Malha Bank, 123 fms., collected by Prof. J. Stanley Gardiner.

Sub-family BOTHINAE.

Eight genera represented in Indian waters.

Synopsis of the Indian Genera.

I. Dentition more or less developed on both sides of jaws.

A. Mouth moderate or small ; length of maxillary $\frac{1}{2}$ or less than $\frac{1}{3}$ head ; lower jaw not prominent.

1. Lateral line absent on blind side.

a. Eyes separated by a bony ridge, or by a concave space of moderate width ; interorbital region similar in both sexes ; males without rostral spines.

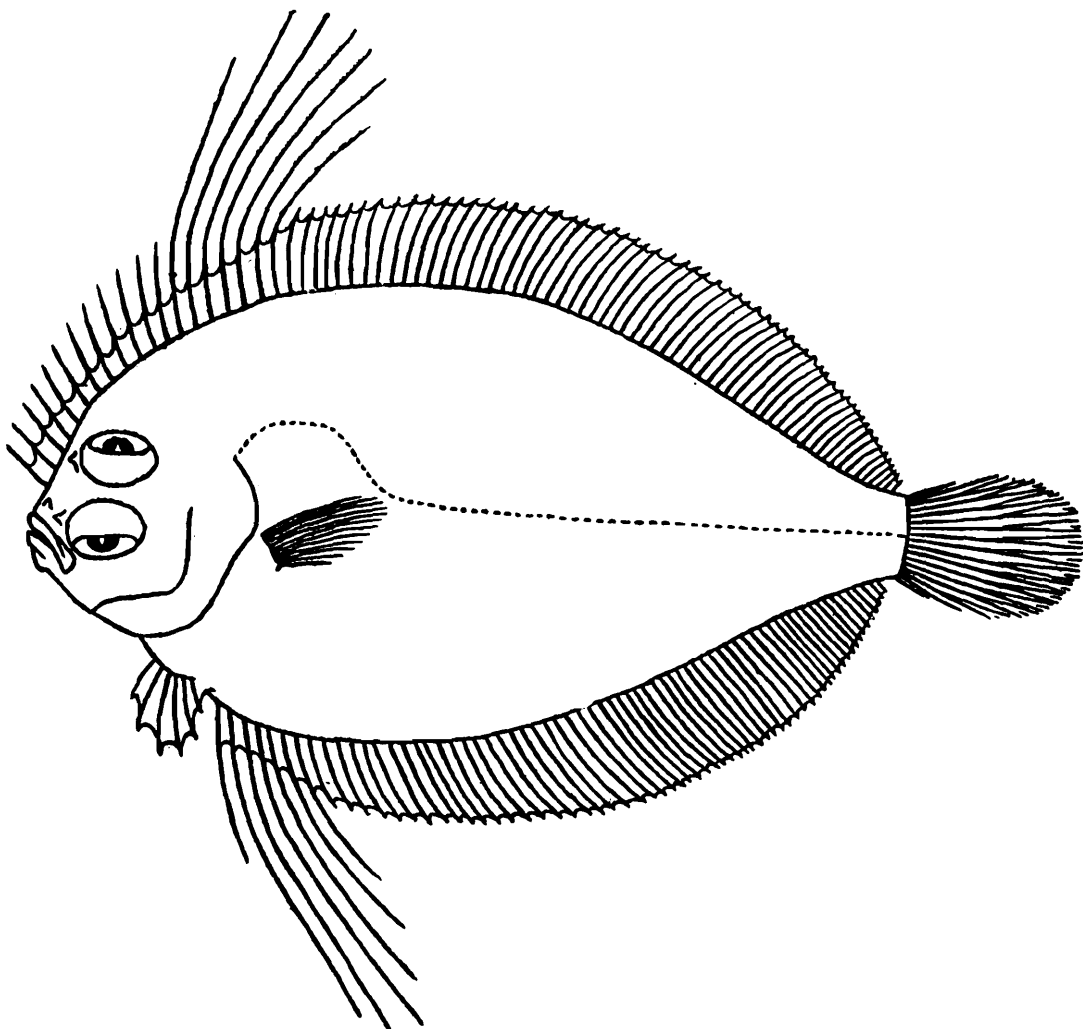
i. Scales of ocular side rather weakly ctenoid or ciliated

ii. Scales of colour side strongly ciliated

1. *Arnoglossus*.

2. *Crossolepis*.

- b. Interorbital region concave, generally very broad in adult males; males with one or more rostral spines.
- i. Scales moderate or large (38 to 60); gill-opening extending upwards to lateral line, or ending a short distance above the pectoral, in which case the scaling of head and body is continuous below the lateral line.
 - α. Scales of ocular side rather weakly ctenoid or ciliated
 - β. Scales of ocular side strongly ciliated
 - ii. Scales small (80 or more); gill-opening ending a short distance above pectoral fin; membrane connecting operculum with shoulder scaleless
2. Lateral line developed on both sides of body; interorbital region rather narrow, concave, similar in both sexes; scales small
- B.** Mouth very large; length of maxillary more than $\frac{1}{2}$ head; lower jaw very prominent; body elongate ..
- II. Dentition almost entirely confined to blind side of jaws; mouth small; length of maxillary $3\frac{1}{2}$ to $4\frac{3}{8}$ in head ..

3. *Engyprosopon*.4. *Crossorhombus*.5. *Bothus*.6. *Grammatobothus*.7. *Chascanopselta*.8. *Laeops*.

TEXT-FIG. 2.—Outline drawing of *Taeniopselta ocellata* Günther. $\times \frac{1}{2}$.

The sub-division into genera of the Flatfishes related to *Arnoglossus* is a matter of some difficulty, and one about which there is considerable

diversity of opinion. The form of the gill-opening appears to be a less important character than it was thought to be, and the form of the interorbital region, the dentition and the scaling are all variable characters. Possibly, it may eventually prove convenient to unite the genera *Arnoglossus*, *Engyproson*, *Bothus*, etc., but I have hesitated to adopt this course before examining further material.

1. *Arnoglossus*.

Arnoglossus, Bleeker, *Vers. Med. K. Akad. Wet., Amsterdam*, XIII, p. 427 (1862)
Anticitharus, Günther, *Shore Fishes "Challenger"*, p. 47 (1880).

Several species from the Eastern Atlantic, Mediterranean, and Indo-Pacific; five known from India.

Synopsis of the Indian Species.

- I. Anterior teeth of upper jaw enlarged, much stronger than lateral teeth; teeth of lower jaw all stronger and more widely separated than lateral teeth of upper jaw. (*Anticitharus*.)
- A. Eyes separated by a bony ridge or by a very narrow space.
1. Dorsal with 81 rays; anal with 56 rays; 48 scales in a longitudinal series; depth of body nearly twice in length 1. *annulatus*.
 2. Dorsal with 103 to 106 rays; anal with 81 to 84 rays; 70 to 75 scales in a longitudinal series; depth of body $2\frac{2}{3}$ to $2\frac{1}{2}$ in length .. 2. *polyspilus*.
- B. Interorbital region concave, width $\frac{1}{2}$ to $\frac{2}{3}$ diameter of eye.
1. Dorsal with 112 rays; anal with 92 rays; 96 scales in a longitudinal series; depth of body about 3 in length 3. *malhensis*.
 2. Dorsal with 77 to 82 rays; anal with 57 to 62 rays; 43 to 46 scales in a longitudinal series; depth of body $2\frac{1}{2}$ to $2\frac{3}{4}$ in length .. 4. *intermedius*.
- II. Anterior teeth of upper jaw not enlarged; teeth of lower jaw small, close-set, similar to those of upper jaw; eyes separated by a bony ridge. (*Arnoglossus*) 5. *macrolophus*.

1. *Arnoglossus annulatus* (Weber).

Anticitharus annulatus, Weber, "*Siboga*"-*Exped. Monogr.* 57, p. 433, pl. xi, fig. 5 (1913).

Depth of body nearly twice in the length, length of head $3\frac{1}{2}$. Dorsal profile of head a little notched in front of eyes. Snout nearly as long as eye, diameter of which is $3\frac{1}{3}$ (4) in length of head; lower eye a little in advance of upper, which is separated from edge of head by a space equal to about $\frac{1}{4}$ its diameter; eyes separated by a very narrow ridge. Maxillary extending to below middle of eye, length $2\frac{1}{4}$ in head; lower jaw not projecting, a knob at the symphysis, length more than $\frac{1}{2}$ that of head. Teeth of upper jaw small and close-set laterally, some enlarged canines anteriorly; lateral teeth of lower jaw much stronger and wider apart than those of upper jaw, anterior teeth somewhat enlarged. Gill-rakers of moderate length, slender; 6 or 7 on lower part of anterior part of anterior arch. Scales of ocular side weakly ciliated, those of blind side cycloid; about 48 scales in a longitudinal series,

18 between lateral line and highest point of dorsal profile. Dorsal about 81; commencing above nostrils of blind side, and well in front of eyes; all the rays simple. Anal 56. Left pectoral with 12 simple rays, length about $\frac{3}{4}$ that of head. Anterior ray of left pelvic inserted below level of posterior edge of lower eye; first ray of right pelvic opposite fourth of left. Caudal with 2/13/2 rays; middle rays longest, about $\frac{4}{5}$ length of head. Caudal peduncle very short. Brownish; head and body with rounded or irregular pale dark-edged areas; vertical fins with small blackish dots; dorsal and anal with a series of larger spots; 3 series of large dark spots on caudal fin; distal part of pectoral with one or two narrow dark cross-bars.

Described from a single specimen, 73 mm. in total length.

Hab.—Nicobar Islands; Djampeah; Timor Sea.

172 .. Stn. 631: Nankauri Harbour,
Nicobar Is., 22-31 fms. .. "Investigator."

2. *Arnoglossus polyspilus* (Günther).

Anticitharus polyspilus, Günther, *Shore Fishes "Challenger"*, p. 48, pl. xxii, fig. A (1880); Weber, "*Siboga*"-*Exped. Monogr.* 57, p. 433 (1913).

Depth of body $2\frac{2}{3}$ to $2\frac{3}{4}$ in the length, length of head $3\frac{3}{4}$ to $3\frac{4}{5}$. Dorsal profile of head not notched in front of eyes. Snout as long as or shorter than eye, diameter of which is $3\frac{1}{2}$ to a little more than 4 in length of head; lower eye a little in advance of upper, which is separated from edge of head by a space equal to about $\frac{1}{3}$ its diameter; eyes separated by a low, narrow ridge. Maxillary extending to below anterior $\frac{1}{3}$ (adult), or anterior $\frac{1}{2}$ (young) of eye, length $2\frac{1}{4}$ to $2\frac{3}{5}$ in head; lower jaw not projecting, a knob at the symphysis, length twice or nearly twice in that of head. Teeth of upper jaw small and rather close-set laterally, some enlarged canines anteriorly; lateral teeth of lower jaw much stronger and wider apart than those of upper jaw, anterior teeth somewhat enlarged. Gill-rakers of moderate length, slender; 8 or 9 on lower part of anterior arch. Scales of ocular side weakly ciliated, those of blind side cycloid; 70 to 75 scales in a longitudinal series. Dorsal 103-106; commencing above nostrils of blind side, and well in front of eyes; all the rays simple. Anal 81-84; preceded by a stout spine. Left pectoral with 11 or 12 simple rays, length a little more than $\frac{1}{2}$ that of head. Anterior ray of left pelvic inserted behind level of posterior edge of lower eye; first ray of right pelvic opposite space between third and fourth of left. Caudal with 2/13/2 rays; middle rays longest, $\frac{3}{5}$ to $\frac{2}{3}$ length of head. Caudal peduncle very short. Pale brownish, with traces of darker markings; a series of large brown spots on dorsal and anal fins, and a pair of smaller spots at base of caudal.

Described from 3 specimens, 120 to 220 mm. in total length, including the types of the species.

Hab.—Mergui Archipelago; Ki Islands; Timor Sea.

179 Stn. 535: Mergui Archipelago
(13° 4' 30" N., 96° 44' E.),
65 fms. "Investigator",

3. *Arnoglossus malhensis* Regan.

Arnoglossus malhensis, Regan, *Trans. Linn. Soc., Zool.*, XII, p. 235, pl. 26, fig. 2 (1908).

Hab.—Saya de Malha Bank, over 123 fms.

Known from a single specimen, 175 mm. in total length, in the British Museum.

4. *Arnoglossus intermedius* Bleeker.

Plate IV.

Platophrys (Arnoglossus) intermedius, Bleeker, *Ned. Tijdschr. Dierk.*, III, p. 47 (1866); *Atl. Ichth.*, VI, p. 14, Pleuron, pl. i, fig. 1 (1866).

Rhomboidichthys intermedius, Regan, *Fish Maldive Is.*, p. 277 (1902)

Engyprosopon intermedius, Regan, *Trans. Linn. Soc., Zool.*, XII, p. 235 (1908).

Arnoglossus intermedius, Norman, *Biol. Res. "Endeavour"*, V, p. 248 (1926).

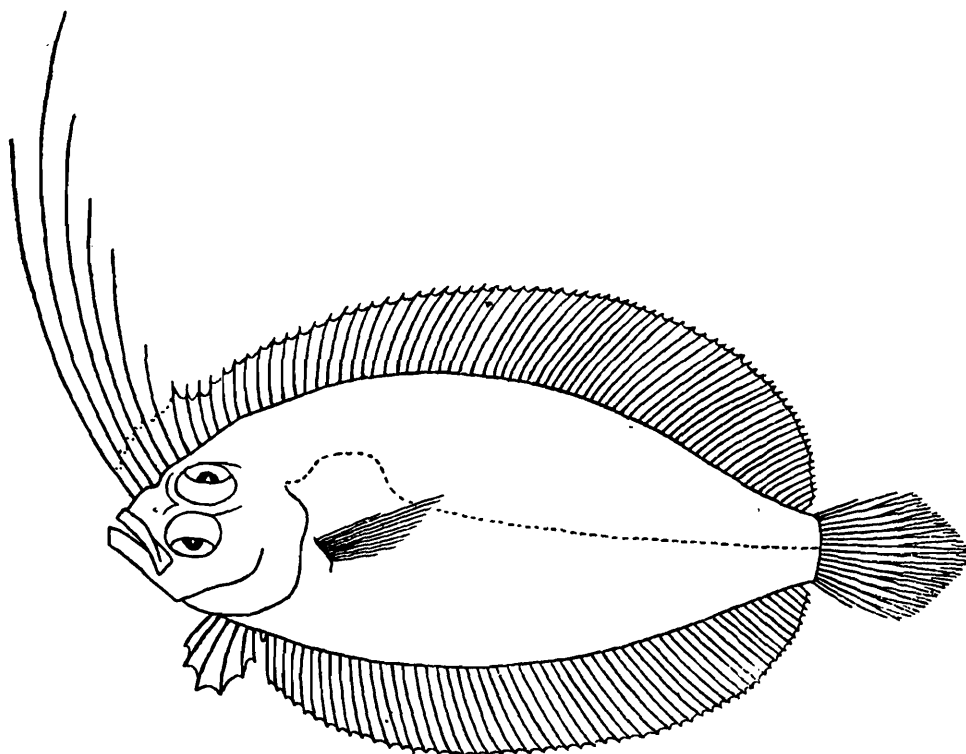
Hab.—Indian Ocean and Archipelago to Australia.

Specimens in the British Museum from the Seychelles and Maldives.

5. *Arnoglossus macrolophus* Alcock.

Arnoglossus macrolophus, Alcock, *J. Asiat. Soc. Bengal*, LVIII, pt. 2, p. 280, pl. xviii, fig. 2 (1889); *Ann. Mag. Nat. Hist.*, Ser. 6, VI, p. 433 (1890); *J. Asiat. Soc. Bengal*, LXV, pt. 2, p. 237 (1896); *Illust. Zool. "Investigator"*, *Fishes*, pl. xxiii, fig. 3 (1898); Johnstone, *Ceylon Pearl Oyster Fish.*, *Supp. Rep.*, XV, p. 211 (1904); Weber, *"Siboga"-Exped. Monogr.* 57, p. 432 (1913).

Depth of body $2\frac{1}{2}$ to 3 in the length, length of head 3 to nearly 4. Dorsal profile of head generally a little notched in front of eyes. Snout



TEXT-FIG. 3.—Outline drawing of *Arnoglossus macrolophus*, Alcock. (Nat. size).

shorter than eye, diameter of which is 3 to $3\frac{3}{4}$ in length of head; anterior margins of eyes level, or lower a little in advance of upper, which is

close to edge of head ; eyes separated by a narrow, bony ridge. Maxillary extending to below anterior edge or anterior $\frac{1}{3}$ of eye, length $2\frac{3}{5}$ to $2\frac{1}{2}$ in head ; lower jaw a little projecting, a knob at the symphysis, length a little more than $\frac{1}{2}$ that of head. Teeth rather small and close-set in both jaws, not enlarged anteriorly. Gill-rakers of moderate length, slender ; 8 to 12 on lower part of anterior arch. Scales of ocular side weakly ctenoid, those of blind side cycloid ; 48 to 55 scales in a longitudinal series. Dorsal 89-98 ; commencing above nostrils of blind side, and well in front of eyes ; all the rays simple ; anterior rays greatly prolonged in adult males, a little longer than those which follow in females. Anal 67-72 ; preceded by a stout spine. Left pectoral with 11 or 12 simple rays, length about $\frac{2}{3}$ that of head. Anterior ray of left pelvic inserted below level of posterior edge of lower eye ; first ray of right pelvic opposite fourth of left. Caudal with 2/13/2 rays ; middle rays longest, about $\frac{4}{5}$ length of head. Caudal peduncle very short. Brownish ; a series of indistinct darker blotches along upper and lower edges of body ; a large dark blotch at junction of straight and curved parts of lateral line, and generally one or two smaller blotches on the straight portion ; vertical fins with numerous small brown spots ; a large dark spot at base of posterior parts of dorsal and anal ; a large dark spot on distal part of pectoral ; distal parts of pelvics blackish.

Described from several specimens, 35 to 88 mm. in total length.

Hab.—From the Persian Gulf to the Malay Peninsula and Archipelago.

272-6	..	North end of Persian Gulf, 15 fms.	“ Investigator ”.
F.998-1001/1	..	Stn. 291 : Persian Gulf (26° 22' N., 56° 10' E.), 48-49 fms.	”
12441. (Type)	..	5 miles south of Ganjam, 25 fms.	”
12686-7, 12690-1, 12693-5, 12697, 12699-701	..	Ganjam Coast, 29 to 39 fms.	”
13643	.	Bay of Bengal, 31 fms.	Marine Survey.
F.793-8/1	..	Andaman Is., 53 fms.	“ Investigator ”
		Stn. 396 : off Tenasserim Coast, Burma (13° 27' 30" N., 97° 37' E.), 50 fms.	”

Specimens in the British Museum from the Ganjam Coast, and in the Herdman Collection from off Galle, Ceylon.

2. *Crossolepis*, gen. nov.

Eyes on the left side, separated by a narrow ridge ; interorbital region similar in both sexes. Mouth rather small ; teeth small, pointed, uniserial in both jaws ; palate toothless. Gill-membranes united ; upper angle of gill-opening midway between pectoral fin and commencement of lateral line ; scaling of head and body continuous below lateral line. Dorsal fin commencing in advance of the eyes ; all the rays simple, scaly on ocular side. Left pelvic fin median, with long base ; right lateral, base shorter. Scales of moderate size, strongly ciliated on

ocular side,¹ cycloid on blind side. Lateral line with a strong curve anteriorly, absent on blind side.

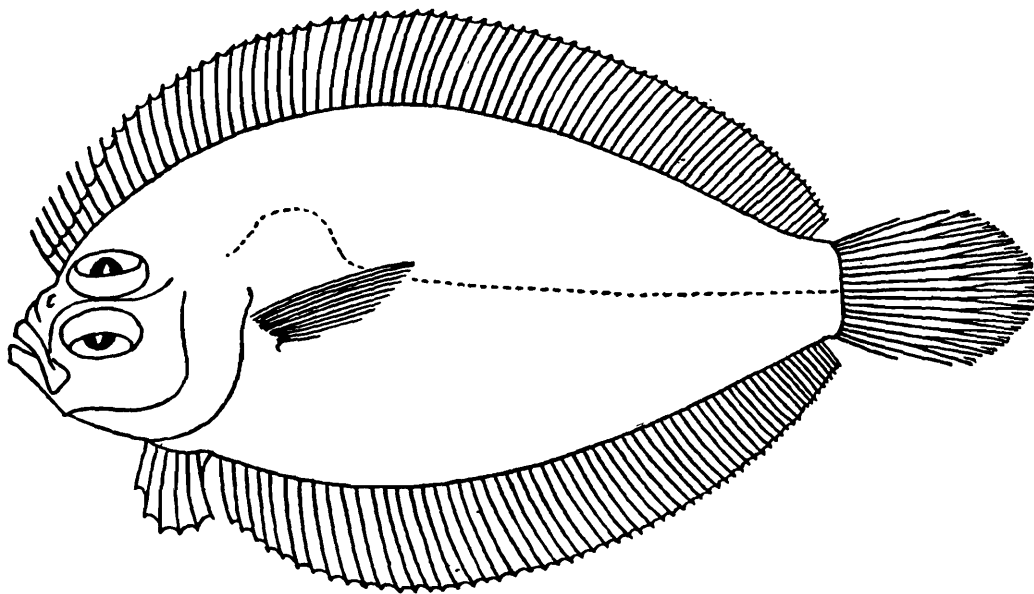
A single species from India (*Arnoglossus brevirectis*-type).

The peculiar scales of this genus are similar to those of *Crossorhombus*, Regan, but in other characters it appears to be more nearly related to *Arnoglossus*.

1. *Crossolepis brevirectis* (Alcock).

Arnoglossus brevirectis, Alcock, *Ann. Mag. Nat. Hist.*, Ser. 6, VI, p. 433 (1890); *J. Asiat. Soc. Bengal*, LXV, pt. 2, p. 327 (1896); *Illust. Zool. "Investigator" Fishes*, pl. xxii, fig. 4 (1898); Weber, "*Siboga*"-*Exped. Monogr.* 57, p. 432 (1913).

Depth of body 2 to $2\frac{1}{8}$ in the length, length of head about $3\frac{1}{2}$. Dorsal profile of head evenly convex, or very slightly notched in front of eyes. Snout shorter than eye, diameter of which is 3 to $3\frac{1}{4}$ in length of head; lower eye a little in advance of upper, which is close to edge of head. Maxillary extending to below anterior edge of eye or a little beyond, length $3\frac{2}{5}$ to $3\frac{4}{5}$ in head; lower jaw scarcely projecting, a knob at the symphysis, length $2\frac{2}{5}$ to $2\frac{3}{5}$ in head. Teeth all very small in both jaws,



TEXT-FIG. 4.—Outline drawing of *Crossolepis brevirectis* (Alcock). $\times 1\frac{1}{2}$.

not enlarged anteriorly. Gill-rakers short, rather stout; 7 or 8 on lower part of anterior arch. 47 to 50 scales in a longitudinal series. Dorsal 78-82; commencing above nostrils of blind side, and well in front of eyes; anterior rays not prolonged. Anal 60-66; preceded by a stout spine. Left pectoral with 11 simple rays, length $\frac{3}{5}$ to $\frac{2}{3}$ that of head. Anterior ray of left pelvic inserted behind level of posterior edge of lower eye; first ray of right pelvic opposite fourth of left. Caudal with $2\frac{1}{2}$ rays; middle rays longest, about $\frac{1}{5}$ length of head. Caudal peduncle very short. Brownish; a series of rather indistinct dark blotches along upper and lower edges of body, continued on to the bases of dorsal and anal fins; two or three blotches on the lateral

¹ See footnote to description of *Crossorhombus valde-rostratus*, p. 29.

line ; a dark patch on distal part of pectoral ; a broad blackish band across distal part of caudal fin.

Described from 9 specimens, 60 to 75 mm. in total length, including one of the types of the species.

Hab.—South Eastern India ; Celebes.

13922-3. (Types)	Stn. 85 ; 9½ miles S.E. by S. of Bawanapadu Beacon, Ganjam Coast, 30-31 fms.	“ Investigator ”.
14014-20	Madras Coast, 20 fms.	
152 ..	Stn. 467 : off Travancore Coast (9° 55' N., 75° 41' E.), 42-75 fms.	.. .. .

3. *Engyprosopon*.

Engyprosopon, Günther, *Cat. Fish.*, IV, p. 431 (1862).

Scaeops, Jordan & Starks, *Bull. U. S. Fish. Comm.*, XXII, p. 627 (1902), 1904.

Several species from the Indo-Pacific ; eight known from India.

Synopsis of the Indian Species.

I. 39 to 43 scales in a longitudinal series.

A. Maxillary $2\frac{1}{2}$ to $2\frac{2}{5}$ in head 1. *cocosensis*.

B. Maxillary $2\frac{3}{4}$ to $3\frac{1}{2}$ in head.

1. Dorsal with 78 to 90 rays ; anal with 56 to 57 rays.

a. Caudal fin with a pair of large dark spots .. 2. *grandisquama*.

b. Caudal fin without large dark spots.

i. Depth $1\frac{4}{5}$ to twice in length.

α. Left pectoral about $\frac{2}{3}$ head ; upper ray scarcely prolonged in males 3. *latifrons*.

β. Left pectoral as long as or longer than head (at least in males) ; upper ray distinctly prolonged in males.

δ. Head $3\frac{2}{5}$ in length ; anterior edge of upper eye above anterior part of lower ; eye $3\frac{1}{3}$ in head .. 4. *macrolepis*.

β. Head $3\frac{1}{3}$ to $3\frac{3}{4}$ in length ; anterior edge of upper eye above middle of lower ; eye 3 in head .. 5. *flimanus*.

ii. Depth $2\frac{1}{5}$ in length 6. *sechellensis*.

2. Dorsal with 70 to 76 rays ; anal with 53 to 58 rays 7. *maldivensis*.

II. 51 to 57 scales in a longitudinal series 8. *mojkii*.

1. *Engyprosopon cocosensis* (Bleeker).

Rhombus cocosensis, Bleeker, *Nat. Tijdschr. Ned. Ind.*, VIII, p. 179 (1855).

Platophrys (Arnoglossus) cocosensis, Bleeker, *Atl. Ichth.*, VI, p. 13, Pleuron, pl. iv, fig. 1 (1866).

Scianectes macrophthalmus (part), Jenkins, *Mem. Ind. Mus.*, III, p. 27 (1910).

Depth of body twice or a little more than twice in the length, length of head $3\frac{2}{5}$ to $3\frac{3}{5}$. Snout shorter than eye, diameter of which is 3 to $3\frac{1}{4}$ in length of head ; anterior margins of eyes level, or lower a little in advance of upper ; interorbital space concave, narrow in both sexes, width $\frac{1}{5}$ to $\frac{1}{3}$ (♂) or $\frac{1}{8}$ to $\frac{1}{4}$ (♀) of diameter of eye. Males with a short spine on the snout. Maxillary extending to below middle of eye or not

quite as far, length $2\frac{1}{5}$ to $2\frac{2}{5}$ in head. Teeth uniserial (?) in both jaws, enlarged anteriorly. Gill-rakers rather short, 5 to 7 on lower part of anterior arch. Scales not very adherent, those of ocular side weakly ciliated, those of blind side cycloid; about 40 scales in a longitudinal series.¹ Dorsal 77-84. Anal 59-63. Left pectoral with the upper ray prolonged in the male, length $\frac{3}{4}$ to $\frac{4}{5}$ that of head; right pectoral shorter. Brownish, with traces of some paler areas, and with some black spots and blotches; vertical fins with small dark spots; left pectoral with 2 or 3 dusky bars.

Described from 12 specimens, 40 to 65 mm. in total length.

Hab.—Travancore Coast (?); coast of Burma; Nicobar Islands; Cocos Islands; Sumatra.

121-3, 126-30, 132-6	Nankauri Harbour, Nicobar Is.	.. Sewell.
169-70	.. Stn. 631: Nankauri Harbour, Nicobar Is., 22-31 fms.	“ Investigator ”
——(2 spec.)	.. Stn. 631: Nankauri Harbour, Nicobar Is., 22-31 fms.	”
F.4181-2/1, F.4184/1	Stn. 387: off C. Negrais, Burma ($15^{\circ} 25' N.$, $93^{\circ} 45' E.$), 40-49 fms.	”
?? 140-142	.. Stn. 467: off Travancore Coast ($9^{\circ} 55' N.$, $75^{\circ} 41' E.$), 42-75 fms.	”

Dr. L. F. de Beaufort has kindly compared two of these specimens with material of *E. cocosensis* in the Zoological Museum, Amsterdam, and confirms my identification. This species may be readily distinguished from all other species of the genus by the larger mouth.

2. *Engyprosopon grandisquama* (Schlegel).

Rhombus grandisquama, Schlegel, *Fauna Japon.*, *Pisces*, p. 183, pl. xcii, figs. 3-4 (1846).

Rhombus poecilurus, Bleeker, *Nat. Tijdschr. Ned. Ind.*, III, p. 293 (1852).

Platophrys poecilurus, Bleeker, *Atl. Ichth.*, VI, p. 14, Pleuron, pl. v, fig. 1 (1866).

Rhomboidichthys spilurus, Günther, *Shore Fishes "Challenger"*, pp. 47, 53, pl. xxi, fig. A (1880).

Rhomboidichthys spiniceps, Macleay, *Proc. Linn. Soc. N. S. Wales*, VI, p. 127 (1882).

Arnoglossus spilurus, Johnstone, *Ceylon Pearl Oyster Fish.*, *Supp. Rep.*, XV, p. 211 (1904).

Rhomboidichthys poecilurus, Regan, *J. Bombay Nat. Hist. Soc.*, XVI, p. 332 (1905).

Scaeops grandisquama, Jordan & Starks, *Proc. U. S. Nat. Mus.*, XXXI, p. 168, fig. 1 (1906); Barnard, *Ann. S. Afric. Mus.*, XXI, p. 387 (1925).

Scaeops poecilurus, Regan, *Trans. Linn. Soc., Zool.*, XII, p. 233 (1908).

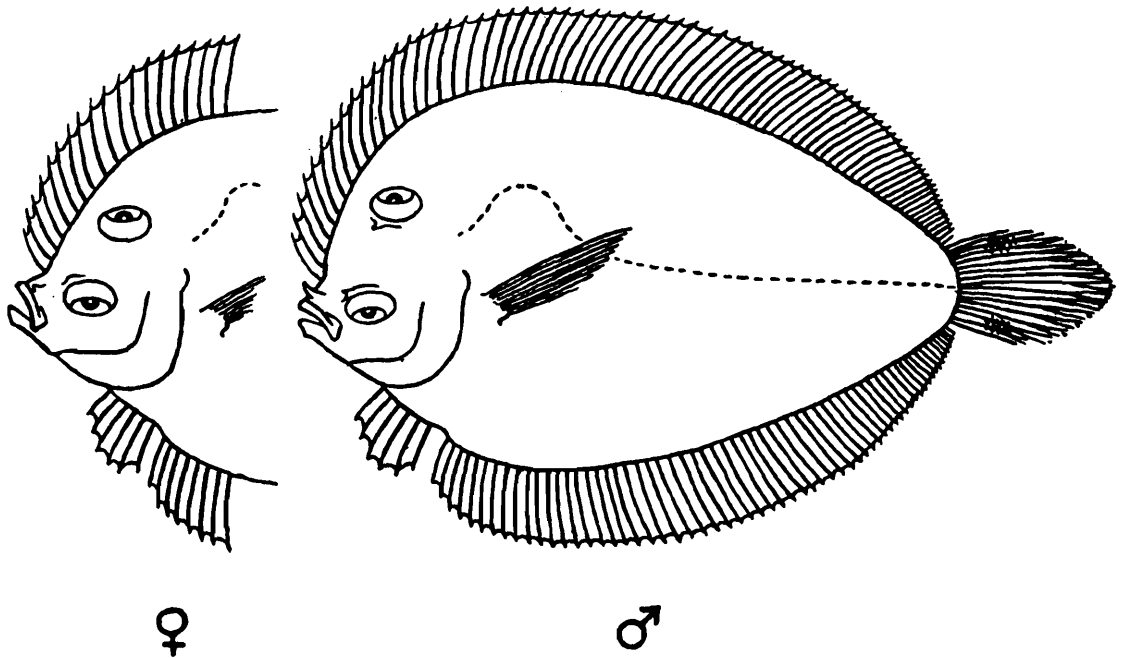
Rhomboidichthys valderostratus, Jenkins, *Mem. Ind. Mus.*, III, p. 26 (1910).

Engyprosopon grandisquama, Norman, *Biol. Res. "Endeavour"*, V, p. 250 (1926).

Depth of body $1\frac{3}{4}$ to $2\frac{1}{8}$ in the length, length of head $3\frac{2}{3}$ to 4. Snout shorter than eye, diameter of which is $3\frac{1}{4}$ to nearly 4 in length of head;

¹ In the "Atlas Ichthyologique" Bleeker gives 55 scales in a longitudinal series for this species, but in his original description the number was given as 45.

anterior edge of upper eye above anterior part or middle of lower; interorbital width $\frac{2}{3}$ of to $1\frac{1}{2}$ times (σ) or $\frac{1}{3}$ to $\frac{7}{8}$ (♀) diameter of eye. Males with a spine on the snout. Maxillary extending to below anterior



TEXT-FIG. 5.—Outline drawing of *Engyprosopon grandisquama* (Schlegel), $\times \frac{3}{4}$.

edge of eye or not quite as far, length 3 to $3\frac{1}{2}$ in head. Teeth in upper jaw uniserial laterally, often an outer series of stronger and more widely separated teeth anteriorly; a single series of small teeth in lower jaw. Gill-rakers short, 5 to 7 on lower part of anterior arch. Scales not very adherent, those of ocular side weakly ciliated, those of blind side cycloid; 38 to 43 scales in a longitudinal series. Dorsal 81-88. Anal 59-68. Left pectoral with 10 to 12 simple rays, the upper ray sometimes prolonged in the male; length equal to or less than that of head; length of right pectoral $\frac{1}{3}$ or $\frac{1}{2}$ head. Brownish, with some irregular dark spots and markings; vertical fins generally with small brown spots; a pair of large blackish spots situated in the middle of the upper and lower margins of the caudal fin.

Described from numerous specimens, up to 100 mm. in total length.

Hab.—East Africa, through the Indian Ocean and Archipelago to Australia and Japan.

14286.(2 spec.)	. Mekran Coast ..	.. Townsend.
F.2623/1, 2624/1.		
(6 spec.)	Arakan Coast, Burma	“Golden Crown.”
F.3429/1	Stn. “631 : Nankauri Har-	”
171	bour, Nicobar Is., 22-31	
	fms. ..	“Investigator.”

Specimens in the British Museum from Muscat, Gulf of Oman; and the Maldives; and in the Herdman Collection from Galle, Ceylon.

The relative positions of the eyes and the width of the interorbital space appear to differ somewhat in specimens from different localities, but, after examining a fair number of examples, I conclude that they

all represent a single variable species. Probably, if sufficient material were studied, two or three distinct races would be recognised.

3. *Engyprosopon latifrons* (Regan).

Scaeops latifrons, Regan, *Trans. Linn. Soc., Zool.*, XII, p. 233, pl. 25, fig. 3 (1908).

Hab.—Seychelles, 37 fms. ; Saya de Malha Bank, 47 fms. ; Cargados Carajos, 20 to 30 fms. ; Maldives, 27 to 44 fms.

13 specimens in the British Museum, up to 100 mm. in total length, including the types of the species.

4. *Engyprosopon macrolepis* (Regan).

Scaeops macrolepis, Regan, *Trans. Linn. Soc., Zool.*, XII, p. 233, pl. 27, fig. 4 (1908).

Hab.—Cargados Carajos, 20 to 30 fms.

Known from a single specimen, 72 mm. in total length, in the British Museum.

5. *Engyprosopon filimanus* (Regan).

Scaeops filimanus, Regan, *Trans. Linn. Soc., Zool.*, XII, p. 234, pl. 25, fig. 2 (1908).

Hab.—Maldives, 27 to 44 fms.

Two specimens in the British Museum, 62 mm. in total length ; types of the species.

6. *Engyprosopon sechellensis* (Regan).

Scaeops sechellensis, Regan, *Trans. Linn. Soc., Zool.*, XII, p. 234, pl. 27, fig. 5 (1908).

Hab.—Seychelles, 37 fms.

Known from a single specimen, 72 mm. in total length, in the British Museum.

7. *Engyprosopon maldivensis* (Regan).

Scaeops maldivensis, Regan, *Trans. Linn. Soc., Zool.*, XII, p. 234, pl. 25, fig. 1 (1908).

Hab.—Maldives, 27 to 44 fms.

Three specimens in the British Museum, up to 70 mm. in total length ; types of the species.

8. *Engyprosopon mogkii* (Bleeker).

Plate V.

Rhombus mogkii, Bleeker, *Nat. Tijdschr. Ned. Ind.*, VII, p. 256 (1854).

Rhomboidichthys mogkii, Günther, *Cat. Fish.*, IV, p. 438 (1862).

Platophrys (Arnoglossus) mogkii, Bleeker, *Atl. Ichth.*, VI, p. 14, Pleuron, pl. ii, fig. 1 (1866).

Depth of body nearly twice in the length, length of head a little more than 4. Dorsal profile of head evenly convex. Snout a little shorter than eye, diameter of which is $3\frac{3}{5}$ to $3\frac{2}{3}$ in length of head ; anterior edge of upper eye opposite anterior part of lower ; interorbital space narrow,

concave, width about $\frac{1}{4}$ diameter of eye (♀).¹ Maxillary extending a little beyond anterior edge of eye, length $2\frac{4}{5}$ to 3 in head. Teeth of upper jaw biserial, at least anteriorly, those of the outer row being stronger and wider apart; a single series of teeth in the lower jaw. Gill-rakers of moderate length, pointed; 6 on lower part of anterior arch. Scales adherent, those of ocular side rather weakly ciliated, those of blind side cycloid; 51 to 53 scales in a longitudinal series. Dorsal 83-86. Anal 61-62. Left pectoral with 11 simple rays, length about $\frac{3}{4}$ that of head; length of right pectoral about $\frac{1}{2}$ head. Brownish, with numerous small dark brown spots on head, body and fins.

Described from 2 specimens, 82 to 110 mm. in total length, including one from Dr. Bleeker's collection.

Hab.—Indian Ocean; Malay Archipelago.

266. Stn. 609 : $7^{\circ} 47' 36''$ N., $76^{\circ} 42' 54''$ E. to
 $7^{\circ} 48' 36''$ N., $76^{\circ} 41' 48''$ E.,
 102-105 fms. "Investigator."

Engyprosopon sp.

The following specimens appear to belong to this genus, but are either very small or badly preserved, so that the species cannot be determined :—

280 .. Trivandrum, Travancore.
 —. Stn. 533 : Mergui Archipelago ($12^{\circ} 55' 50''$
 N., $96^{\circ} 51' 50''$ E.), 58 fms. "Investigator."

4. Crossorhombus.

Crossorhombus, Regan, *Ann. Durban Mus.*, II, p. 211 (1920).

Three or four species from the Indo-Pacific; two known from India,

Synopsis of the Indian Species.

- I. Interorbital width $1\frac{1}{2}$ to $1\frac{2}{3}$ times (♂) or abc $\frac{4}{5}$ (♀) diameter of eye; anterior edge of upper eye opposite posterior part of lower; upper pectoral ray prolonged in adult males .. 1. *valde-rostratus*.
- II. Interorbital width $\frac{2}{3}$ to once (♂) or $\frac{1}{2}$ to $\frac{1}{2}$ (♀) diameter of eye; anterior edge of upper eye opposite middle or anterior part of lower; upper pectoral ray not prolonged in males .. 2. *azureus*.

1. *Crossorhombus valde-rostratus* (Alcock).

Rhomboidichthys valde-rostratus, Alcock, *Ann. Mag. Nat. Hist.*, Ser. 6, VI, p. 435 (1890); *J. Asiat. Soc. Bengal*, LXV, pt. 2, p. 328 (1896); *Illust. Zool. "Investigator"*, *Fishes*, pl. xxiv, fig. 2 (1898).

Platophrys dimorphus, Gilchrist, *Mar. Invest. S. Afric.*, III, p. 10, pl. xxvii (1905).

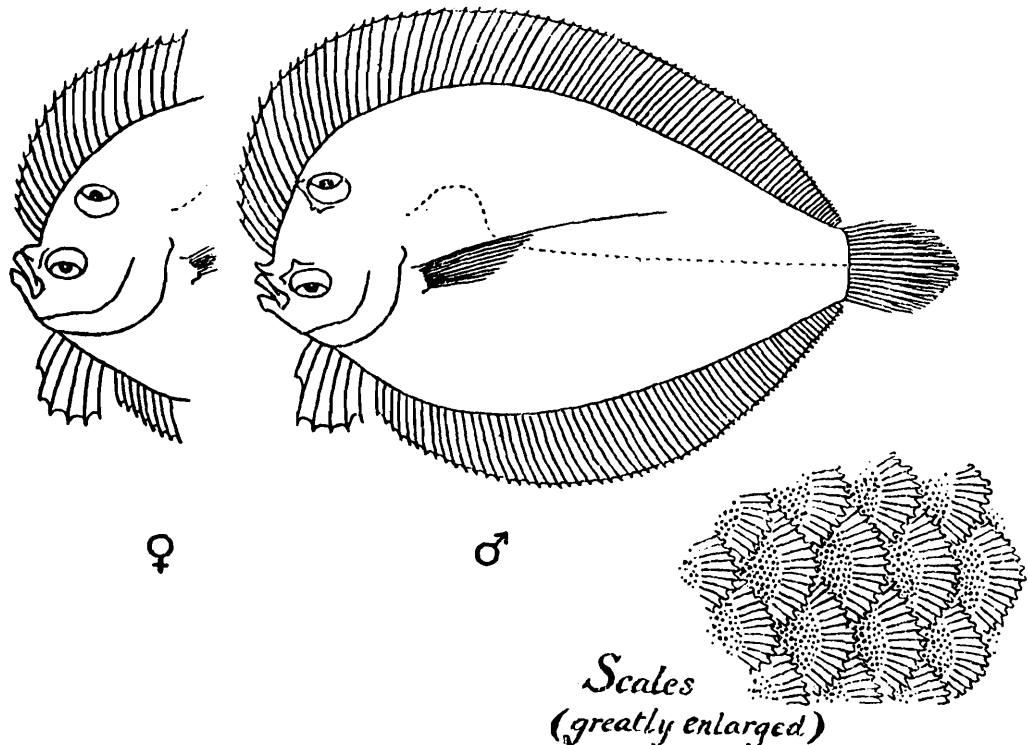
Crossorhombus dimorphus, Regan, *Ann. Durban Mus.*, II, p. 212 (1920).

Crossorhombus dimorphus (part), Barnard, *Ann. S. Afric. Mus.*, XXI, p. 386 (1925).

Depth of body $1\frac{4}{5}$ to nearly twice in the length, length of head $3\frac{2}{3}$ to 4. Anterior profile of head notched in front of eyes; more vertical

¹ I have not seen a male specimen of this species.

in the male. Snout shorter than eye, diameter of which is $3\frac{1}{3}$ to $3\frac{1}{2}$ in length of head ; anterior edge of upper eye opposite posterior part of lower ; interorbital width $1\frac{1}{3}$ to $1\frac{2}{5}$ times (σ) or about (ρ) diameter of



TEXT-FIG. 6.—Outline drawing of *Crossorhombus valde-rostratus* (Alcock), female and male $\times \frac{2}{3}$; scales greatly enlarged.

eye. Males with a strong spine on the snout, and some smaller spines on the orbital margins. Maxillary scarcely reaching anterior edge of eye, length nearly 4 in head. Teeth uniserial in both jaws. Scales adherent, those of ocular side strongly ciliated,¹ those of blind side cycloid ; 47 to 51 scales in a longitudinal series. Dorsal 85-88. Anal 68-72. Left pectoral with 10 or $1\frac{1}{2}$ simple rays, the upper ray prolonged in adult males, length $1\frac{1}{4}$ to $1\frac{3}{4}$ times that of head ; length of right pectoral about $\frac{1}{2}$ head. Greyish brown, with darker spots and blotches ; males sometimes with some small dark or bluish spots on head in front of interorbital space.

Described from 3 specimens, 95 to 120 mm. in total length, including the type of *Rhomboidichthys valde-rostratus*.

Hab.—Off mouth of Umhlanga River, Natal, 22-26 fms. ; Coast of Ceylon, 32 fms.

12910. (Type of *R.*

valde-rostratus) .. Ceylon Coast, 32 fms. .. "Investigator".

¹ The long and delicate ciliations of the scales of this genus tend to wear off after a time, especially if the fishes are roughly handled, with the result that in specimens which have been preserved for some time most of the scales appear to be weakly ciliated or even cycloid ; closer examination, however, generally reveals a few scales with the ciliations still more or less intact.

2. *Crossorhombus azureus* (Alcock).

Rhomboidichthys azureus, Alcock, *J. Asiat. Soc. Bengal*, LVIII, pt. 2, p. 283, pl. xvi, fig. 3 (1889); *Ann. Mag. Nat. Hist.*, Ser. 6, VI, p. 435 (1890); *J. Asiat. Soc. Bengal*, LXV, pt. 2, p. 328 (1896); *Illust. Zool. "Investigator,"* Fishes pl. xxiv, fig. 3 (1898); Johnstone, *Ceylon Pearl Oyster Fish., Supp. Rep.* XV, p. 210 (1904); Jenkins, *Mem. Ind. Mus.*, III, p. 27 (1910).

Close to *C. valde-rostratus*. Depth of body nearly twice in the length, length of head $3\frac{1}{2}$ to 4. Snout shorter than eye, diameter of which is $2\frac{3}{4}$ to $3\frac{1}{2}$ in length of head; anterior edge of upper eye opposite middle or anterior part of lower; interorbital width $\frac{2}{3}$ to once (σ) or $\frac{1}{6}$ to $\frac{1}{2}$ (ρ) diameter of eye. Maxillary extending slightly beyond anterior edge of eye, length $3\frac{2}{5}$ to $3\frac{4}{5}$ in head. 53 to 57 scales in a longitudinal series. Dorsal 84-88 (90). Anal (64) 68-73. Left pectoral with 11 or 12 simple rays, the upper ray not prolonged in males, length $1\frac{1}{4}$ to $1\frac{2}{5}$ in that of head; length of right pectoral about $\frac{1}{2}$ head. Brownish, variously marked with paler and darker; generally one or two dark blotches on lateral line; males sometimes with two series of dark spots (azure in life) on head in front of interorbital space; fins with dark brown or blackish spots and blotches.

Described from 14 specimens, 55 to 105 mm. in total length, including the type of the species.

Hab.—South Eastern India and Ceylon; Burma; Nicobar Islands.

12897-12903	..	Stn. 59 : off South coast of Ceylon (6° 6' 30" N., 81° 23' E.), 32 fms.	"Investigator."
—	..	Stn. 152 : 11½ miles S. 83° W of Colombo Lt., Ceylon, 26½ fms.	"
12907-9	..	Ganjam Coast, 30-33 fms.	"
12184 (Type)	..	Orissa Coast, 7-13 fms.	"
12354-5	..	" "	"
F.2625/1	.	Arakan Coast, Burma	"Golden Crown."
124, 131	..	Nankauri Harbour, Nicobar Is.	Sewell.
168	.	Stn. 631 : Nankauri Harbour, Nicobar Is., 22-31 fms.	"Investigator."

Two specimens in the Herdman Collection from Galle, Ceylon, 16-30 fms.

5. *Bothus*.

Bothus, Rafinesque, *Car. N. Gen.*, p. 23 (1810); Kyle, *Rep. Danish Ocean. Exped.* II, A. 1, p. 94 (1913).

Platophrys, Swainson, *Nat. Hist.*, II, p. 302 (1839).

Rhomboidichthys, Bleeker, *Act. Soc. Sci. Indo-Ned.*, I, Manado etc., p. 67 (1856).

Psettylis, Alcock, *Ann. Mag. Nat. Hist.*, Ser. 6, VI, p. 436 (1890); Johnstone, *Ceylon Pearl Oyster Fish., Supp. Rep.* XV, p. 207 (1904).

? *Citharichthys*, Day, *Fish. India*, p. 422 (1877).

? *Pseudocitharichthys*, Weber, "*Siboga*"-*Exped. Monogr.* 57, p. 413 (1913).

Several species from the tropical Atlantic, Mediterranean, and Indo-Pacific; four known from India.

Synopsis of the Indian Species.

- I. Anterior edge of upper eye opposite anterior part of lower; interorbital width $\frac{1}{6}$ diameter of eye (adult ρ); dorsal with 83 rays; membrane connecting operculum with shoulder partly scaled .. 1. *polylepis*.

II. Anterior edge of upper eye opposite middle or posterior part of lower, or even further back; interorbital width a little less than to $2\frac{1}{2}$ times diameter of eye; dorsal with 86 to 100 rays; membrane connecting operculum with shoulder scaleless.

A. Depth of body $1\frac{2}{3}$ in the length; eye $2\frac{1}{4}$ to 3 in head; maxillary $3\frac{1}{2}$ to 4 in head; a circular ocellus above commencement of straight part of lateral line

2. *ovalis*.

B. Depth of body $1\frac{3}{4}$ to twice in the length; eye $3\frac{1}{2}$ to $6\frac{1}{4}$ in head; maxillary $2\frac{2}{3}$ to 3 in head; no circular ocellus above commencement of straight part of lateral line.

1. Interorbital width less than, equal to, or a little greater than diameter of eye; gill-rakers short, stout, 6 to 8 on lower part of anterior arch; dorsal with 86 to 93 rays; anal with 66 to 70 rays

3. *pantherinus*.

2. Interorbital width $1\frac{2}{3}$ to $2\frac{1}{3}$ times diameter of eye; gill-rakers of moderate length, rather slender, 10 on lower part of anterior arch; dorsal with 98 to 100 rays; anal with 77 to 79 rays

4. *mancus*.

I have examined the type of *Citharichthys aureus*, Day (= *Pseudocitharichthys*, Weber), which appears to be a post-larval *Bothus*—probably *B. pantherinus*. Day's statement that there are two lateral lines on the ocular side is incorrect.

1. *Bothus polylepis* (Alcock).

Arnoglossus polylepis, Alcock, *J. Asiat. Soc. Bengal*, LVIII, pt. 2, p. 290, pl. xvi fig. 1 (1889).

Rhomboidichthys polylepis, Alcock, *Ann. Mag. Nat. Hist.*, Ser. 6, VI, p. 434 (1890); *J. Asiat. Soc. Bengal*, LXV, pt. 2, p. 328 (1896); *Illust. Zool. "Investigator," Fishes* pl. xxiv, figs. 4-5 (1898).

Depth of body $2\frac{1}{8}$ in the length, length of head $3\frac{1}{5}$ to $3\frac{1}{2}$. Dorsal profile of head a little notched in front of eyes. Snout shorter than eye, diameter of which is 3 to nearly 4 in length of head; lower eye a little in advance of upper; interorbital space very narrow, concave, naked, width about $\frac{1}{6}$ diameter of eye (mature ♀). A blunt knob on the snout above the maxillary. Maxillary extending to a little beyond anterior edge of eye, length $2\frac{3}{4}$ to 3 in head. Teeth uniserial in both jaws, somewhat enlarged anteriorly. Gill-rakers rather short, 8 or 9 on lower part of anterior arch. Gill-opening ending close to the commencement of the lateral line; membrane connecting operculum with shoulder partly scaled. Scales adherent, those of ocular side ctenoid, those of blind side cycloid; 82 to 85 scales in a longitudinal series. Dorsal 83. Anal 63-66. Left pectoral with 11 simple rays, length $1\frac{1}{2}$ to $1\frac{2}{3}$ in that of head. Brownish; a series of large dark rings at upper and lower edges of body, inconspicuous in the larger specimen; two dark blotches or ocelli at junction of straight and curved parts of lateral line, and a larger blotch on middle of straight portion; vertical fins with small brown spots; left pectoral with three indistinct brown cross-bars.

Described from 2 specimens (♀), 80 and 130 mm. in total length, including the type of the species. The male has not been described.

Hab.—Off S. and S.E. Coast of Ceylon.

12713	..	Stn. 59 : off S. coast of Ceylon (6° 6' 30" N., 81° 23' E.), 32 fms.	" Investigator."
11750 (Type)	..	Off S.E. coast of Ceylon, 34 fms.	,"

2. *Bothus ovalis* (Regan).

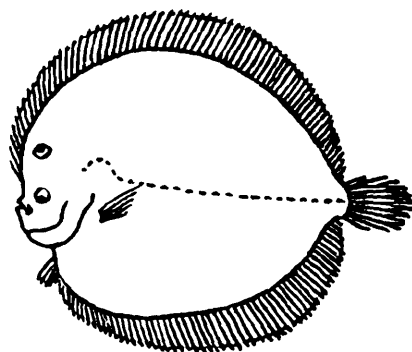
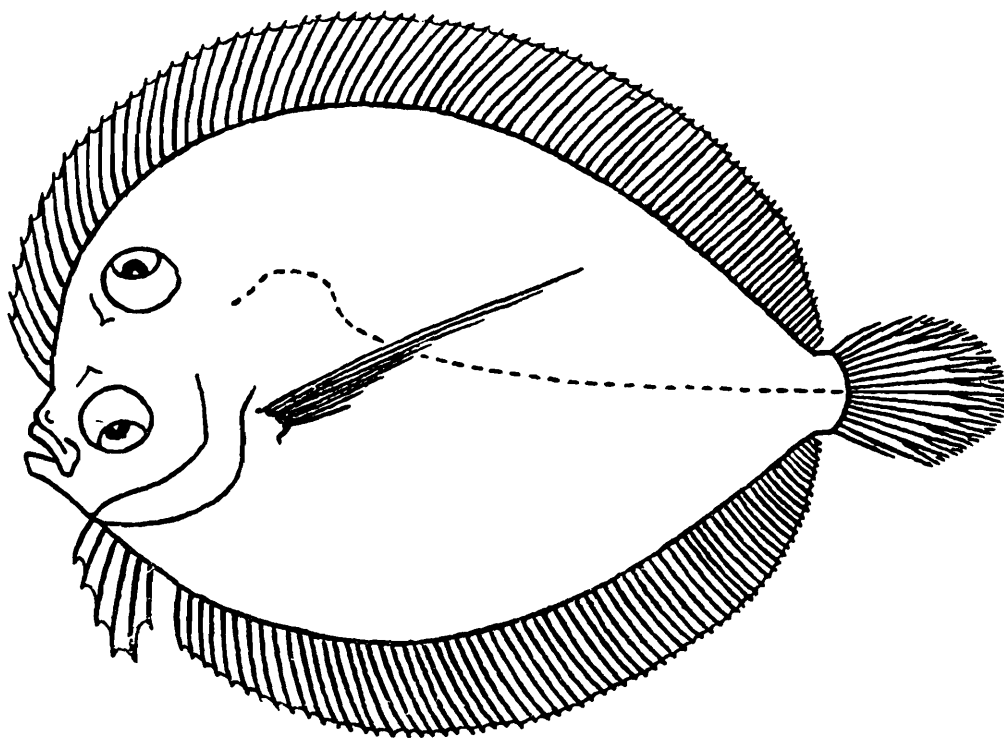
Psettylis ocellata (non *Rhombus ocellatus*, Agassiz), Alcock, *Ann. Mag. Nat. Hist.*, Ser. 6, VI, p. 437, fig. 3 (1890); *J. Asiat. Soc. Bengal*, LXV, pt. 2, p. 328 (1896); Johnstone, *Ceylon Pearl Oyster Fish.*, *Supp. Rep.* XV, p. 207, pl. i, fig. 3, pl. ii (1904).

Platophrys ovalis, Regan, *Trans. Linn. Soc., Zool.*, XII, p. 232, pl. 27, fig. 6 (1908).

Platophrys circularis, Regan, *t. c.* p. 233, pl. 26, fig. 3 (1908).

Platophrys pantherinus, Jenkins, *Mem. Ind. Mus.*, III, p. 26 (1910).

Depth of body $1\frac{1}{4}$ (yg.) to $1\frac{2}{3}$ in the length, length of head $3\frac{2}{5}$ to $4\frac{1}{5}$ (yg.). Snout shorter than eye, diameter of which is $2\frac{3}{4}$ to nearly 4 in



TEXT-FIG. 7.—Outline drawing of *Bothus ovalis* (Regan)—adult and young $\times 1$.

length of head; anterior edge of upper eye opposite middle or posterior part of lower, except in the very young, in which the anterior margins

of the two eyes are nearly level ; interorbital width a little less than or rather more than diameter of eye. Males with a strong spine on the snout. Maxillary scarcely reaching anterior edge of eye, length $3\frac{1}{2}$ to 4 in head. Teeth biserial in both jaws, more strongly developed on the blind side. Gill-rakers short, 6 to 8 on lower part of anterior arch. Scales adherent, partially imbedded in the skin ; those of ocular side cycloid, except at extreme upper and lower edges of body where there are two or three rows of ctenoid scales ; those of blind side all cycloid ; about 95 scales in a longitudinal series. Dorsal 88-99. Anal 66-73. Left pectoral with 8 or 9 simple rays ; one or more of the rays prolonged in both sexes, especially long in the males. Greyish brown, clouded and marked with darker ; a circular ocellus above commencement of straight part of lateral line ; head and body with numerous small spots, some blue enclosed in brownish rings, others white with dark centres ; vertical fins with minute brown spots, and with a series of larger spots ; posterior part of caudal blackish.

Described from 11 specimens, 38 to 115 mm. in total length, including the types of *B. ovalis*, and *B. circularis*.

Hab.—Seychelles Group ; South-Eastern India and Ceylon ; Burma.

12944 (Type of

Psettylis ocellata)

.. Off Ganjam Coast, 9-13 fms. .. "Investigator."
F.2622/1 .. Arakan Coast, Burma .. "Golden Crown."

Specimens in the British Museum from Amirante, Seychelles Group, 22-85 fms.; and in the Herdman Collection from Palk Bay, Ceylon.

This species is close to *B. myriaster*, Schlegel, differing chiefly in the deeper body and in the colouration. Examination of the fine series of examples collected by Herdman in Ceylon shows that *B. circularis* (= *Psettylis ocellata*) is without doubt the young of *B. ovalis*.

3. *Bothus pantherinus* (Rüppell).

Rhombus pantherinus, Rüppell, *Fische roth. Meers*, p. 121, pl. 31, fig. 1 (1828).

Rhombus parvimanus, Bennett, *Proc. Zool. Soc.*, p. 168 (1831).

Rhombus sumatranus, Bleeker, *Nat. Tijdschr. Ned. Ind.*, I, p. 409 (1851).

Rhomboidichthys pantherinus, Günther, *Cat. Fish.*, IV, p. 436 (1862).

Platophrys pantherinus, Bleeker, *Atl. Ichth.*, VI, p. 11, Pleuron, pl. ii, fig. 3 (1866); Day, *Fish. India*, p. 425, pl. xcii, figs. 3-4 (1877); Steindachner, *Denk. Akad. Wien*, LXXI, p. 31 (1902); Regan, *J. Bombay Nat. Hist. Soc.*, XVI, p. 332 (1905); *Trans. Linn. Soc., Zool.*, XII, p. 232 (1908).

Bothus pantherinus, Regan, *Ann. Durban Mus.*, II, p. 212, fig. 3 (1920).

Hab.—East Africa to the Pacific.

? 1243 (Type of

Citharichtys

aureus) .. Madras.

2357 .. ??.

260 .. Spiteful Bay, Madras .. "Investigator."

1189 .. Andaman Is.

— .. Fehendu I., Horsburgh Atoll,
Maldives .. Sewell.

Specimens in the British Museum from Muscat, Gulf of Oman ; Karachi ; Seychelles ; Maldives ; Andaman Islands ; Nicobar Islands.

This species exhibits considerable variation in the depth of the body, size of the eye, width of the interorbital space, and the extent to which the upper pectoral rays are prolonged in the males ; these variations are apparent even in specimens of the same size and sex. After examining a large series of specimens, however, I am unable to recognize more than one species.

4. *Bothus mancus* (Broussonet).

Pleuronectes mancus, Broussonet, *Ichthyol.* (1782).

Rhombus macropterus, Quoy and Gaimard, *Voyage " Uranie," Zoology*, p. 236, pl. 50 (1824).

Rhombus pavo, Bleeker, *Nat. Tijdschr. Ned. Ind.*, VIII, p. 177 (1855).

Rhomboidichthys pavo, Günther, *Cat. Fish.*, IV, p. 435 (1862).

Platophrys pavo, Bleeker, *Atl. Ichth.*, VI, p. 11, Pleuron, pl. iv, fig. 2 (1866) ; Regan, *Trans. Linn. Soc., Zool.*, XII, p. 232 (1908).

Platophrys mancus, Jordan and Evermann, *Bull. U. S. Fish. Comm.*, XXIII, p. 514 (1903), 1905.

Hab.—Indian Ocean, through the Malay Peninsula and Archipelago to the Pacific.

262

.. Addu Atoll, Maldive Is.

Sewell.

Bothus sp.

Psettylis pellucida, Alcock, *Ann. Mag. Nat. Hist.*, Sr. 6, VI, p. 437, fig. 2 (1890) ; *J. Asiat. Soc. Bengal*, LXV, pt. 2, p. 328 (1896) ; Johnstone, *Ceylon Pearl Oyster Fish., Supp. Rep.* XV, p. 207 ; Weber, "*Siboga*"-*Exped. Monogr.* 57, p. 412 footnote (1913).

The following post-larval specimens appear to belong to this genus but the species cannot be determined with any certainty. They closely resemble post-larval and young specimens of *B. ovalis*, but are unpigmented.

14010-3	..	Madras Coast, 20 fms.	'..	" Investigator."
12940-3 (12940- type of <i>P.</i> <i>pellucida</i>)	..	Ganjam Coast	.	"
F.1139/1	..	Stn. 332 ; Andaman Sea (10° 21' N., 92° 46' E.), 279 fms.	..	"
—	..	Stn. 614 ; Nankauri Harbour, Nicobar Is., 12-27 fms.	..	"

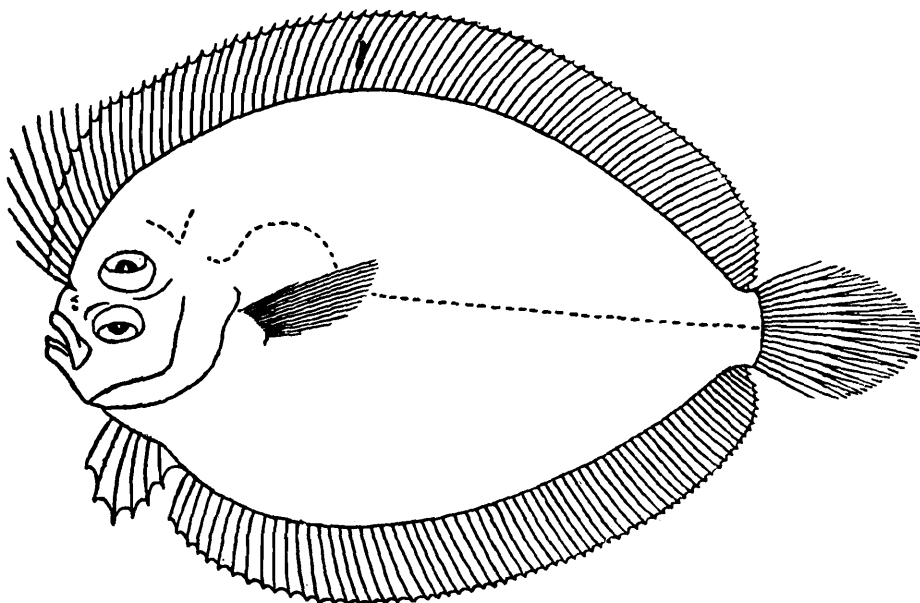
6. *Grammatobothus*.

Grammatobothus, Norman, *Biol. Res.* "*Endeavour*," V, p. 253 (1926).

Two species from the Indo-Pacific ; one known from India.

1. *Grammatobothus polyophthalmus* (Bleeker).

- Platophrys polyophthalmus*, Bleeker, *Nat. Tijdschr. Dierk.*, III, p. 46 (1866);
Atl. Ichth., VI, p. 12, Pleuron, pl. iii, fig. 3 (1866).
Rhomboidichthys angustifrons, Günther, *Shore Fishes "Challenger,"* p. 46, pl.
 xxi, fig. B (1880); Alcock, *Ann. Mag. Nat. Hist.*, Ser. 6, VI, p. 435 (1890);
J. Asiat. Soc. Bengal, LXV, pt. 2, p. 328 (1896).
Psettylis ocellata, Jenkins, *Mem. Ind. Mus.*, III, p. 27 (1910).
Grammatobothus polyophthalmus, Norman, *l. c.*, p. 253.



TEXT FIG. 8.—Outline drawing of *Grammatobothus polyophthalmus* (Bleeker). $\times \frac{3}{4}$.

Hab.—From the Indian Ocean, through the Malay Peninsula and Archipelago to Australia.

- | | | | | |
|----------|----|--|----|-----------------|
| 12896 | .. | Stn. 59 : off the S. Coast of Ceylon
(6° 6' 30" N., 81° 23' E.), 32
fms. | .. | "Investigator." |
| F.4183/1 | .. | Stn. 387 : off C. Negrais, Burma
(15° 25' N., 93° 45' E.), 40-49
fms. | .. | .. |

7. *Chascanopsetta*.

- Chascanopsetta*, Alcock, *J. Asiat. Soc. Bengal*, LXIII, pt. 2, p. 128 (1894); *Cat. Indian Deep-Sea Fishes*, p. 125 (1899).
 ? *Pelecanichthys*, Gilbert and Cramer, *Proc. U. S. Nat. Mus.*, XIX, p. 432 (1897).
Trachypterophrys, Franz, *Abh. K. Bayer. Ak. Wiss. München*, IV, Supp. Bd. 1, p. 60 (1910).

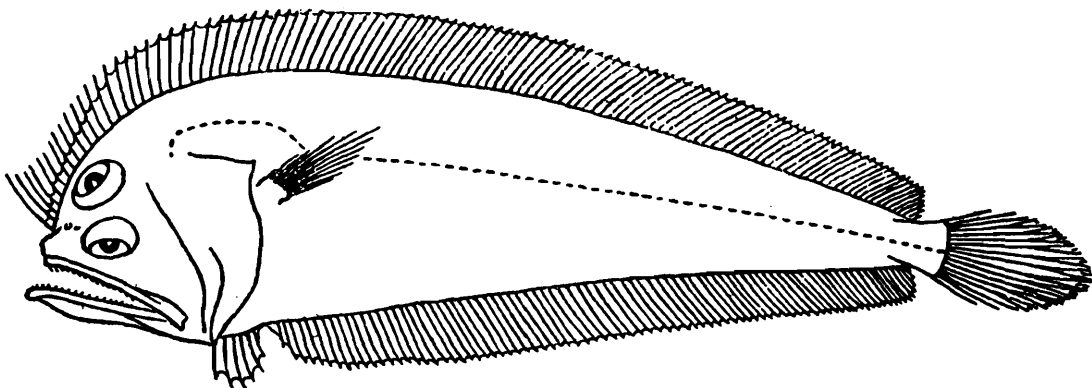
Several species from the Indo-Pacific ; one known from India.

1. *Chascanopsetta lugubris* Alcock.

- Chascanopsetta lugubris*, Alcock, *J. Asiat. Soc. Bengal*, LXIII, pt. 2, p. 129, pl. vi, fig. 4 (1894); *Illust. Zool. "Investigator," Fishes* pl. xv, fig. 3 (1895); *J. Asiat. Soc. Bengal*, LXV, pt. 2, p. 327 (1896); *Cat. Indian Deep-Sea Fishes*, p. 125 (1899).
Chascanopsetta gilchristi, Von Bonde, *Rep. Fish. Mar. Biol. Survey S. Afric.*, 2, Spec. Rep. I, p. 7, pl. ii, fig. 2 (1922); Barnard, *Ann. S. Afric. Mus.*, XXI, p. 390 (1925).
Chascanopsetta maculata, Von Bonde, *l. c.*, p. 8.

Depth of body $3\frac{1}{4}$ to nearly 4 in the length, length of head 4 to $5\frac{1}{4}$.
 Diameter of upper eye $3\frac{2}{3}$ to 4 in length of head, and 3 to 5 times the

interorbital width. Cleft of mouth generally oblique; but sometimes nearly vertical or nearly horizontal; maxillary extending well beyond eye, length $1\frac{1}{4}$ to $1\frac{2}{5}$ in head; lower jaw strongly projecting. A single row of slender, curved teeth in both jaws, those of the lower jaw depressible. Scales minute, cycloid on both sides of body. Lateral line developed on both sides of body; a low, flat-topped curve above the pectoral fin,¹ length of curve 5 to 6 times in the straight part. Dorsal 114-122; commencing above anterior nostril of blind side, and well in front of eye; all the rays simple. Anal 81-85. Left pectoral with



TEXT-FIG. 9.—Outline drawing of *Chascanopsetta lugubris*, Alcock. $\times \frac{1}{2}$.

14 to 17 simple rays, length $1\frac{3}{4}$ to $2\frac{1}{5}$ in that of head. Caudal with 17 rays. Caudal peduncle constricted, depth immediately behind the dorsal and anal fins greater than the length. Greyish or yellowish brown, with or without numerous small dark spots; fins dusky.

Described from 8 specimens, 145 to 245 mm. in total length, including the type of the species, and the types of *C. gilchristi* and *C. maculatus*.

Hab.—Off Natal and Delagoa Bay; Gulf of Manar; Bay of Bengal.

13728-9 (Types)	Stn. 162 : Bay of Bengal ($13^{\circ} 51'$ $12''$ N., $80^{\circ} 28' 12''$ E.), 145-250 fms. " Investigator."
F.591-3/1	.. Stn. 257 : West of Ceylon ($7^{\circ} 15'$ N., $77^{\circ} 46'$ E.), 143 fms. "

C. raptator, Franz, from Japan, may be identical with this species; *C. prorigera*, Gilbert, from the Hawaiian Islands, differs chiefly in the smaller mouth, and the shorter anterior curve of the lateral line.

8. Laeops.

Laeops, Günther, *Shore Fishes "Challenger,"* p. 29 (1880).

Scianectes, Alcock, *J. Asiat. Soc. Bengal*, LVIII, pt. 2, p. 284 (1889); *Ann. Mag. Nat. Hist.*, Ser. 6, VI, p. 216 (1890).

Lambdopsetta, Smith and Pope, *Proc. U. S. Nat. Mus.*, XXXI, p. 496 (1906).

? *Laeoptichthys*, Hubbs, *Proc. U. S. Nat. Mus.*, XLVIII, p. 460 (1915).

Several species from the Indo-Pacific; four known from India.

¹ In the type of the species the curve of the lateral line has a sharp angle above the base of the pectoral fin on the ocular side. This is clearly an abnormal condition, the curve being quite normal on the blind side of the body.

Synopsis of the Indian Species.

- I. Teeth in villiform bands ; maxillary hardly reaching anterior edge of eye ; dorsal with 97 to 102 rays ; anal with 77 to 81 rays 1. *guentheri*.
- II. Teeth uniserial ; maxillary reaching anterior edge of eye.
- A. Head 4 to $4\frac{2}{3}$ in length ; eye about 3 in head ; dorsal with 95 to 98 rays ; anal with 80 to 83 rays 2. *nigrescens*.
- B. Head 3 to $3\frac{2}{3}$ in length ; eye $3\frac{1}{2}$ to 5 in head ; dorsal with 85 to 90 rays ; anal with 67 to 70 rays.
1. Eye $3\frac{1}{4}$ to $4\frac{1}{5}$ in head ; longest dorsal rays shorter than head .. 3. *macrophthalmus*.
2. Eye $5\frac{1}{5}$ in head ; longest dorsal rays equal to head 4. *lophoptera*.

1. *Laeops guentheri* Alcock.

Laeops guentheri, Alcock, *Ann. Mag. Nat. Hist.*, Ser. 6, VI, p. 438 (1890); *J. Asiat. Soc. Bengal*, LXV, pt. 2, p. 328 (1896); *Illust. Zool. "Investigator," Fishes*, pl. xxii, fig. 4 (1898).

Scianectes macrophthalmus (part), Jenkins, *Mem. Ind. Mus.*, III, p. 27 (1910).

Depth of body $2\frac{1}{2}$ to 3 in the length, length of head $4\frac{1}{3}$ to 5. Dorsal profile of head notched in front of eyes. Snout much shorter than eye, diameter of which is 3 to $3\frac{1}{3}$ in length of head ; lower eye in advance of upper, which bulges into dorsal profile of head. Maxillary hardly reaching anterior edge of eye, length 4 to $4\frac{3}{5}$ in head. A rather narrow band of villiform teeth in each jaw, almost entirely confined to the blind side. 6 to 8 small gill-rakers on lower part of anterior arch. Scales cycloid on both sides of body ; about 95 in the lateral line. Dorsal 97-102 ; commencing on blind side of head above posterior nostril ; the first two rays separated from rest of fin ; all the rays simple. Anal 77-81. Left pectoral with 14 simple rays, length $1\frac{2}{5}$ to $1\frac{3}{4}$ in that of head ; length of right pectoral 2 to $2\frac{2}{5}$ in head. Caudal with 17 rays. Brownish ; vertical fins darker towards their edges.

Described from 10 specimens, 62 to 120 mm. in total length, including the type of the species.

Hab.—Persian Gulf ; East Coast of India ; Gulf of Martaban.

271	North End of Persian Gulf, 15 fms.	..	"Investigator."
12890	Vizagapatam Coast, 20 fms.	..	"
12883, 12886,			
12888 (type)	Ganjam Coast, 15-25 fms.	..	"
13770-1	.. Orissa Coast, 60 fms.	..	"
F.3436/1 (2 spec.)	.. Puri, Orissa Coast	..	"Golden Crown."
12879	.. Gulf of Martaban, Burma	..	"Investigator."

This species is perhaps identical with *L. parviceps*, Günther, from the Arafura Sea, which has, however, a slightly smaller head, with less arched dorsal profile, and a somewhat larger number of dorsal (104) and anal (86) rays.

of head; lower eye a little in advance of upper, which is very close to edge of head. Maxillary extending to beyond anterior edge of eye, length $3\frac{3}{4}$ to $4\frac{1}{4}$ in head. Teeth curved, uniserial in both jaws, confined to the blind side. 6 to 8 short gill-rakers on lower part of anterior arch. Scales cycloid on both sides of body; about 93 in a longitudinal series from origin of lateral line. Height of anterior curve of lateral line about $\frac{1}{2}$ length of same. Dorsal 85-90; commencing on blind side of head above posterior nostril; the first two rays more or less separated from rest of fin; all the rays simple, longest shorter than head. Anal 67-70. Left pectoral with 13 to 15 simple rays, length $1\frac{1}{6}$ to $1\frac{3}{5}$ in that of head. Caudal with 17 rays. Brownish; dorsal and anal fins darker towards their edges; middle rays of caudal and distal part of pectoral dark brown or blackish; edge of gill-cover dusky.

Described from 20 specimens, 95 to 135 mm. in total length, including co-types of the species.

Hab.—From the Gulf of Oman, through the Indian Ocean to Akyab, Burma.

267-8, 270	..	Stn. 609 : 7° 47' 36" N., 76° 42' 54" E. to 7° 48' 36" N., 76° 41' 48" E., 102-105 fms.	..	" Investigator."
F.660/1, 662-7/1, 669/1		Off Calicut, Madras, 100 fms.	..	"
12805-9	..	Stn. 96 : Bay of Bengal (18° 30' N., 84° 46' E.), 98-102 fms.	..	"
13632	..	Stn. 170 : Bay of Bengal (13° 1' 6" N., 80° 36' 56" E.), 107 fms.	..	"
12814, 13633 and 11721 (Types).			..	"

Specimens in the British Museum from the Gulf of Oman, 180 fms.

4. *Laeops lophoptera* (Alcock).

Scianectes lophoptera, Alcock, *J. Asiat. Soc. Bengal*, LVIII, pt. 2, p. 284, pl. xvi, fig. 2 (1889); *ibid.*, LXV, pt. 2, p. 329 (1896).

Closely related to *L. macrophthalmus*, but diameter of eye $5\frac{1}{5}$ in length of head; length of maxillary $3\frac{3}{5}$ in head; anterior curve of lateral line higher and more pointed dorsally, the height of the curve about $1\frac{1}{4}$ in length of same; longest rays of dorsal fin about as long as head, those of anal fin longer than head.

Described from a single specimen, 78 mm. in total length; type of the species.

Hab.—Off Orissa Coast.

12435-6 (Types) .. Off Orissa Coast, 68 fms. .. " Investigator."

Family 3. PLEURONECTIDAE.

Subfamily PLEURONECTINAE.

• A single genus represented in Indian waters.

1. *Poecilopsetta*.

Poecilopsetta, Günther, *Shore Fishes "Challenger,"* p. 48 (1880); Hubbs, *Proc. Biol. Soc. Washington*, XXXII, p. 163 (1919).

Boopsetta, Alcock, *J. Asiat. Soc. Bengal*, LXV, pt. 2, p. 305 (1896); *Cat. Indian Deep-Sea Fishes*, p. 126 (1899).

Alaeops, Jordan and Starks, *Bull. U. S. Fish. Comm.*, XXII, p. 623 (1902), 1904.

Several species from the Atlantic and Indo-Pacific; two known from India.

Synopsis of the Indian Species.

- I. Depth $2\frac{2}{3}$ to 3 in length; maxillary $3\frac{2}{3}$ to $3\frac{3}{4}$ (yg.) or $3\frac{2}{3}$ to $3\frac{3}{4}$ (ad.) in head; eyes almost contiguous; right pectoral with 8 to 10 simple rays .. 1. *praelonga*.
- II. Depth $1\frac{1}{10}$ to $2\frac{1}{2}$ in length; maxillary $3\frac{1}{2}$ to $3\frac{1}{2}$ (yg.) or about 3 times (ad.) in head; eyes separated by a low narrow ridge; right pectoral with 11 or 12 rays, middle rays branched 2. *colorata*.

1. *Poecilopsetta praelonga* Alcock.

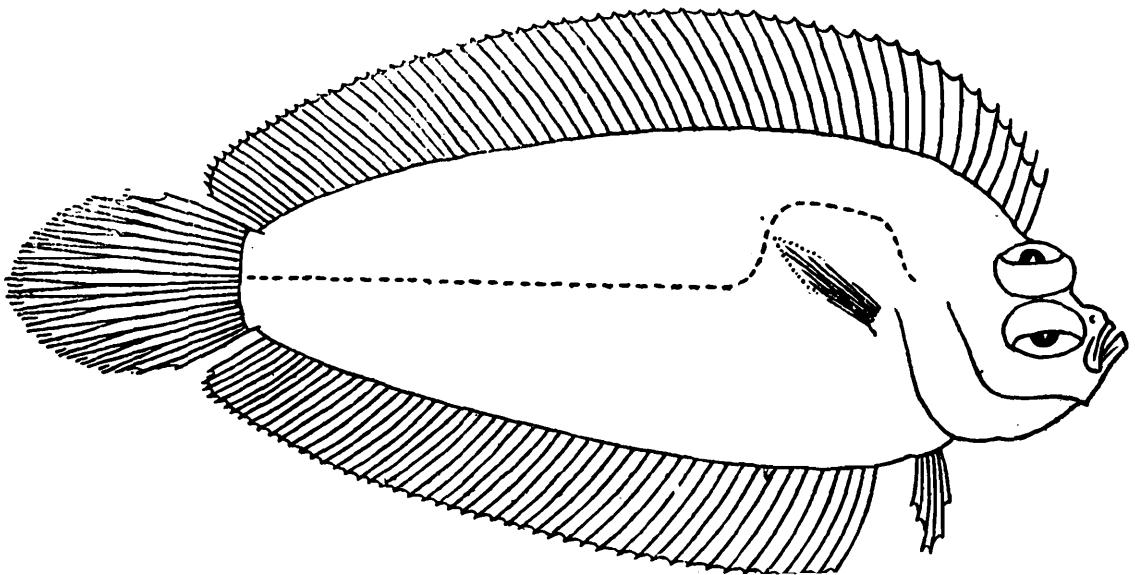
Poecilopsetta praelonga, Alcock, *J. Asiat. Soc. Bengal*, LXIII, pt. 2, p. 139, pl. vii, fig. 2 (1894); *Illust. Zool. "Investigator," Fishes*, pl. xv, fig. 2 (1895); *J. Asiat. Soc. Bengal*, LXV, pt. 2, p. 328 (1896); *Ann. Mag. Nat. Hist.*, Ser. 7, II, p. 156 (1898).

Boopsetta umbrarum, Alcock, *J. Asiat. Soc. Bengal*, LXV, pt. 2, p. 305 (1896); *Illust. Zool. "Investigator," Fishes*, pl. xvii, fig. 5 (1897).

Boopsetta praelonga, Alcock, *Cat. Indian Deep-Sea Fishes*, p. 126 (1899).

Boopsetta praelonga (part), Sewell, *Rec. Ind. Mus.*, VII, p. 10. (1912).

Depth of body $2\frac{2}{3}$ to 3 in the length, length of head $3\frac{4}{5}$ to 4. Snout much shorter than eye, diameter of which (in specimens of 120 to 150 mm.) is $2\frac{2}{5}$ to 3 in length of head; eyes almost contiguous; lower eye in advance of upper, which bulges into upper profile of head. Maxillary extending to below anterior part of eye, length $3\frac{2}{3}$ to $3\frac{3}{4}$ (young) or $3\frac{2}{3}$ to $3\frac{3}{4}$ (adult) in head; lower jaw not projecting, an inconspicuous knob at the symphysis, length $2\frac{3}{5}$ to $2\frac{4}{5}$ in head. Teeth in villiform bands, more



TEXT-FIG. 11.—Outline drawing of *Poecilopsetta praelonga*, Alcock. $\times\frac{3}{4}$.

developed on blind side of jaws. Gill-rakers of moderate length, slender; 10 to 12 on lower part of anterior arch. Scales of ocular side rather

weakly ctenoid in adults, cycloid in young ; those of blind side cycloid ; 90 to 95 scales in a longitudinal series. Lateral line absent on blind side. Dorsal 59-65 ; commencing above posterior part of upper eye ; longest rays about $1\frac{1}{2}$ in length of head. Anal 50-54. Right pectoral with 8 to 10 simple rays ; length of left pectoral about $\frac{1}{2}$ head.¹ Pelvics sub-symmetrical ; that of right side a little nearer median line than that of left. Caudal with 18 rays ; pointed. Caudal peduncle very short, depth $2\frac{1}{4}$ to $2\frac{2}{5}$ in length of head. Adult yellowish brown, with some large darker blotches on ocular side ; blind side whitish, with traces of black spots ; vertical fins brownish, with paler margins ; right pectoral brown, with blackish extremity. In the young the ocular side is pale yellowish brown, with a series of 6 or 7 black blotches or short bars situated at the upper and lower edges of the body, and with two series of rather larger blotches on the middle of body, one on either side of the lateral line ; on the blind side these black bars or blotches are very clearly marked, and those on the middle of the body are smaller and arranged in four series.

Described from 9 specimens, 82 to 160 mm. in total length, including the types of *P. praelonga* and *Boopsetta umbrarum*.

F.61/1 (Type of *P.*

praelonga)

.. Stn. 162 : Bay of Bengal
($13^{\circ} 51' 12''$ N., $80^{\circ} 28' 12''$
E.), 145-250 fms.

" Investigator."

13733 (Type of *B.*

umbrarum)

Off Colombo, Ceylon, 180-217
fms.

"

F.363-5/1, F.367/1..

Stn. 233 ; Andaman Sea (13°
 $17' 15''$ N., $93^{\circ} 10' 25''$ E.),
185 fms.

"

— . ??.

Hab.—Gulf of Manar ; Bay of Bengal ; Andaman Sea.

2. *Poecilopsetta colorata* Günther.

Poecilopsetta colorata, Günther, *Shore Fishes* "Challenger," p. 48, pl. xxii, fig. B (1880)

Poecilopsetta maculosa, Alcock, *J. Asiat. Soc. Bengal*, LXIII, pt. 2, p. 130, pl. vii, fig. 1 (1894) ; *Illust. Zool.* "Investigator," *Fishes*, pl. xv, fig. 1 (1895) ; *J. Asiat. Soc. Bengal*, LXV, pt. 2, p. 328 (1896).

Boopsetta maculosa, Alcock, *Cat. Indian Deep-Sea Fishes*, p. 127 (1899).

? *Boopsetta praelonga*, Brauer, "Valdivia" *Tiefsee-Fische*, p. 295 (1906).

Boopsetta praelonga (part). Sewell, *Rec. Ind. Mus.*, VII, p. 10 (1912).

? *Boopsetta maculosa*, Weber, "Siboga" *Exped. Monogr.* 57, p. 434 (1913).

Closely related to *P. praelonga*, but depth of body 1 to $2\frac{1}{5}$ in the length, length of head $3\frac{1}{2}$ to $4\frac{1}{5}$. Eyes separated by a low narrow ridge, which is scaled in the adult. Length of maxillary $3\frac{1}{4}$ to $3\frac{1}{2}$ (young) or about 3 times (adult) in head. Dorsal 56-61 ; commencing above or a little behind middle of upper eye ; longest rays about twice in length of head. Anal 46-50. Right pectoral with 11 or 12 rays, the middle rays branched (at least in adults) ; length of left pectoral $2\frac{1}{5}$ to $2\frac{3}{5}$ in

¹ The right pectoral is broken in all the specimens, and cannot be accurately measured.

head. Adult pale brownish on ocular side; head and body with numerous blackish dots; blind side whitish, with traces of black spots; right pectoral with a large dark spot, occupying nearly the whole of the fin; caudal with a pair of large dark spots situated near its upper and lower margins. Colouration of young similar to that of *P. praelonga*.

Described from 7 specimens, 85 to 145 mm. in total length, including the type of the species and the type of *P. maculosa*.

Hab.—Gulf of Manar; Andaman Sea; Northwest of Sumatra; Timor Sea; Ki Islands.

13732 (Type of *P. maculosa*)

Stn. 151: off Colombo, Ceylon, (13½ miles N. 64° W. of Colombo Lt.), 142-400 fms.

“ Investigator.”

F.368/1, F.643-6/1

Stn. 233: Andaman Sea (13° 17' 15" N., 93° 10' 25" E.), 185 fms.

.. ..

Examination of a series of examples leaves little doubt that *Poecilopsetta maculosa* is the young of *P. colorata*. Brauer (1906) expressed some doubt as to the distinction between *P. maculosa* and *P. praelonga*; Sewell (1912) and Weber (1913) concluded that the two species were synonymous. After studying a fair number of specimens, including the types of both species, I conclude that they are quite distinct.

Subfamily SAMARINAE.

Three genera represented in Indian waters.

Synopsis of the Indian Genera.

- I. Mouth rather large, the maxillary $\frac{1}{2}$ or more than $\frac{1}{2}$ head; vomerine teeth present; gill-rakers rather long, slender, denticulated; scales large (29 to 32); lateral line with a curve anteriorly; both pectorals developed 1. *Brachypleura*.
- II. Mouth rather small, the maxillary generally less than $\frac{1}{2}$ head; vomer without teeth; gill-rakers (if present) short, not denticulated; scales small (more than 50); lateral line without distinct curve anteriorly; left pectoral absent.
- A. Some of the anterior dorsal rays and those of the right pelvic prolonged and filamentous; all the caudal rays simple 2. *Samaris*.
- B. Anterior rays of dorsal and those of right pelvic not prolonged; middle caudal rays branched 3. *Samariscus*.

1. *Brachypleura*.

Brachypleura, Günther, *Cat. Fish.*, IV, p. 419 (1862).

Laiopteryx, Weber, “*Siboga*”-*Exped. Monogr.* 57, p. 422 (1913).

A single species from the Indo-Pacific,

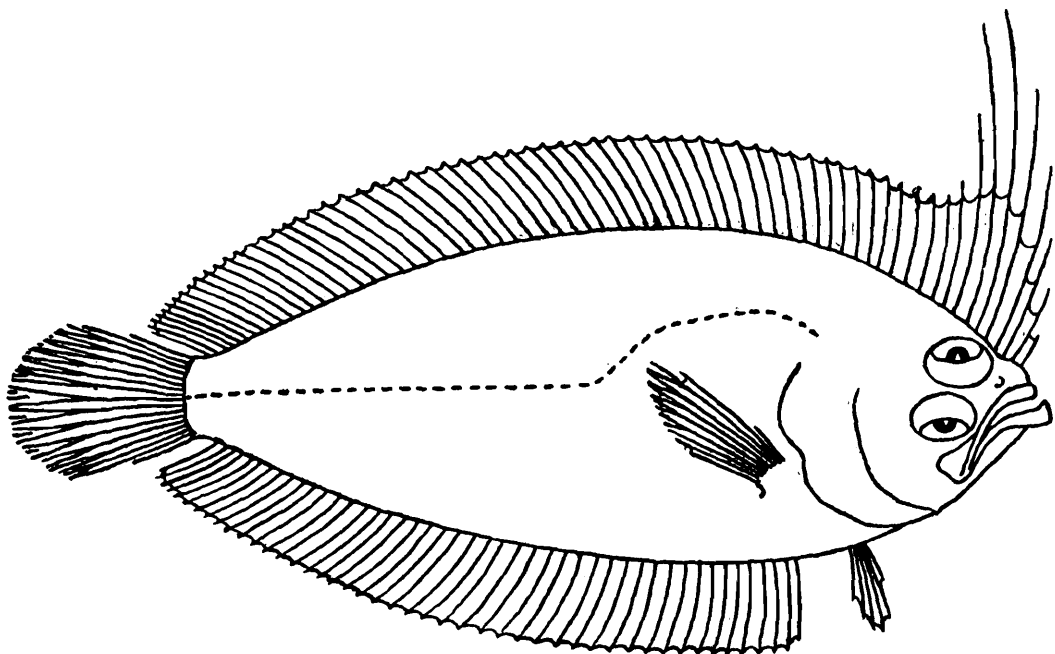
1. *Brachypleura novae-zeelandiae* Günther.

Brachypleura novae-zeelandiae, Günther, *Cat. Fish.*, IV, p. 419 (1862); *Shore Fishes "Challenger,"* p. 49 (1880).

Brachypleura xanthosticta, Alcock, *J. Asiat. Soc. Bengal*, LVIII, pt. 2, p. 281, pl. xvii, fig. 3 (1889); *ibid.*, LXV, pt. 2, p. 327 (1896); *Illust. Zool. "Investigator," Fishes*, pl. xxii, fig. 2 (1898); Regan, *Trans. Linn. Soc. Zool.*, XII, p. 232 (1908); Jenkins, *Mem. Ind. Mus.*, III, p. 27 (1910).

Laiopteryx xanthosticta, Weber, "*Siboga*"-*Expéd. Monogr.* 57, p. 423 (1913).

Depth of body $2\frac{2}{5}$ to $2\frac{3}{5}$ in the length, length of head $3\frac{1}{5}$ to $3\frac{2}{5}$. Snout shorter than eye, diameter of which is $3\frac{4}{5}$ to $4\frac{1}{4}$ in length of head; eyes separated by a narrow bony ridge, the upper well in advance of the lower. Cleft of mouth curved, a convexity of the mandible fitting into a concavity of the upper jaw; maxillary extending to below middle of eye or beyond, length $\frac{1}{2}$ or more than $\frac{1}{2}$ that of head; lower jaw a little projecting, length $1\frac{1}{2}$ to $1\frac{2}{3}$ in head. Teeth conical, pointed; anterior teeth of upper jaw enlarged and biserial; teeth of lower jaw biserial, those of the inner series the larger; a group of teeth on the head of the vomer. Gill-rakers rather long and slender, denticulated on the inner edge; 8 to 10 on lower part of anterior arch. Scales of ocular side ciliated, those of blind side cycloid or rather weakly ciliated; 29 to 32 scales in a longitudinal series. Lateral line with a curve anteriorly. Dorsal 66-74; commencing in front of upper eye; some of the anterior rays prolonged and filamentous in the males; most of the dorsal and anal rays simple, a few at the hinder ends of the fins being bifid. Anal 43-49. Right pectoral with 10 to 12 rays, the middle rays branched, length $\frac{2}{5}$ to $\frac{4}{5}$ that of head. Pelvics with 6 rays; asymmetrical, that of the right side median and somewhat advanced. Caudal with 17 to 19 rays (13 branched). Yellowish or greyish brown, sometimes with some indistinct darker markings; vertical fins often with small dark spots.



TEXT-FIG. 12.—Outline drawing of *Brachypleura novae-zeelandiae*, Günther. Nat. size.

Described from numerous specimens, 50 to 120 mm. in total length, including the types of the species.

Hab.—Indian Ocean and Archipelago ; New Zealand.

12619, 12626-9, 12634-6, 12644, 12649-57	.. Ganjam Coast, 25-35 fms.	“ Investigator.”
F.3426/1 (2 spec.)	.. Off Gopalpur, Ganjam Coast	“ Golden Crown.”
F.3449/1	. Off Gopalpur, Ganjam Coast	”
F.3427/1	.. Off Pilot ship, Eastern Channel, mouth of R. Hughli	”
13460-2	Bay of Bengal, 12 fms.	.. “ Investigator.”
F.784-92/1	Andaman Is., 53 fms.	”
257	Stn. 395 : off Tenasserim Coast, Burma (13° 29' N., 97° 30' E.), 50 fms.	.. ”
— (2 spec.)	.. Stn. 396 : off Tenasserim Coast, Burma (13° 27' 30" N.; 97° 37' E.), 50 fms.	.. ”

Specimens in the British Museum from the Ganjam Coast and the Maldive Islands.

Brachypleura xanthosticta was said to differ from *B. novae-zeelandiae* in the presence of an anterior curve to the lateral line, and in having a double row of teeth in the lower jaw, differences which led Weber to erect the genus *Laiopteryx* for its reception. Examination of the types of *B. novae-zeelandiae* shows that Günther's description was inaccurate, and that the teeth of the lower jaw are distinctly biserial. The scales of these specimens are entirely wanting, and the anterior curve of the lateral line is not apparent ; Günther clearly mistook the septum between the myotomes for the lateral line.

Two specimens from the Maldives in the British Museum have ciliated scales on both sides of the body, but are otherwise exactly similar to other examples.

2. *Samaris*.

Samaris, Gray, *Zool. Miscell.*, p. 4 (1831).

Several species from the Indo-Pacific ; two known from India.

Synopsis of the Indian Species.

- | | | |
|--|---------|------------------------|
| I. 67 to 72 scales in a longitudinal series ; dorsal with 77 to 79 rays ; first 13 or 14 rays greatly prolonged, longest 4 or 5 times length of head ; anal with 50 to 53 rays | .. .. . | 1. <i>cristatus</i> . |
| II. About 55 scales in a longitudinal series ; dorsal with 60 rays ; first 8 rays moderately prolonged, longest 2½ times length of head ; anal with 47 rays | .. .. . | 2. <i>macrolepis</i> . |

1. *Samaris cristatus* Gray.

Samaris cristatus, Gray, *Zool. Miscell.*, p. 5 (1831) ; Günther, *Cat. Fish.*, IV, p. 420 (1862) ; Alcock, *J. Asiat. Soc. Bengal*, LVIII, pt. 2, p. 291, pl. xvii, fig. 4 (1889) ; *ibid.*, LXV, pt. 2, p. 327 (1896) ; *Illust. Zool. "Investigator," Fishes*, pl. xxiii, fig. 2 (1898).

Depth of body 2½ to 3 in the length, length of head 3¾ to 5½. Snout shorter than eye, diameter of which is 2¼ to 4 in length of head ; eyes

separated by a narrow ridge, their anterior margins level. Maxillary extending to below anterior edge of eye or a little beyond, length $2\frac{2}{3}$ to 3 in head; lower jaw a little projecting, length $1\frac{3}{4}$ to 2 in head. Scales of ocular side ctenoid, those of blind side cycloid or rather weakly ctenoid; 67 to 72 scales in a longitudinal series. Dorsal 77-79; first 13 or 14 rays greatly prolonged (except in very young examples), the longest 4 or 5 times the length of head. Anal 50-53. Right pectoral with 4 rays, length $1\frac{1}{4}$ to $1\frac{1}{2}$ times that of head. Caudal with 16 simple rays. Brownish, mottled and spotted with paler and darker; snout white; anterior dorsal rays white, some of them blackish at their bases; rest of dorsal and anal fins brownish, with darker edges, and with a series of small white spots; right pectoral dark brown.

Described from 6 specimens, 30 to 160 mm. in total length, including the types of the species.

Hab.—Deep water off Ceylon; Andaman Islands; Chinese Seas.

13629, 13772	.. Off Colombo, Ceylon, 26½ fms.	.. "Investigator."
11751-2	.. South of Ceylon (6° 01' N., 81° 16' E.), 34 fms.	.. "
12983, 14035	.. Stn. 59: S. of Ceylon (6° 6' 30" N., 81° 23' E.), 32 fms.	.. "
13872	.. Ceylon, 34 fms.	.. "
—	.. And. Stn. 2: Aberdeen, Port Blair, Andaman Is.	.. Kemp.
—	.. And. Stn. 8: off Pier, Ross I., Andaman Is., 3-4 fms.	.. "

Samaris ornatus, Von Bonde, and *S. delagoensis*, Von Bonde, from Southeast Africa, are very close to this species, but appear to have a larger number of scales in a longitudinal series; *S. cacatuæ*, Ogilby, from Queensland, has a larger number of dorsal and anal rays and a different colouration.

2. *Samaris macrolepis*, sp. nov.

Plate VI.

Close to the preceding species. Depth of body $2\frac{1}{2}$ in the length, length of head $4\frac{2}{5}$. Snout shorter than eye, diameter of which is $3\frac{1}{2}$ in length of head; eyes nearly contiguous, their anterior margins about level. Maxillary extending to a little beyond anterior edge of eye, length about $\frac{1}{3}$ that of head. Scales ctenoid on both sides of body; about 55 in a longitudinal series. Dorsal 60; first 8 rays moderately prolonged, decreasing in height from the first, which is $2\frac{1}{2}$ times length of head. Anal 47. Right pectoral with 4 rays, length $1\frac{1}{2}$ times that of head. Rays of right pelvic prolonged, longest nearly twice head; rays of left pelvic short. Caudal with 16 simple rays; pointed. Brownish, mottled and spotted with paler and darker; vertical fins with brown spots; right pelvic with 3 narrow cross-bars.

Described from a single specimen, a male 45 mm. in total length ; type of the species : (British Museum : No. 88.12.1.32).

Hab.—Gulf of Martaban.

3. *Samariscus*.

Samariscus, Gilbert, *Bull. U. S. Fish. Comm.*, XXIII, p. 682 (1903), 1905.

Five species from the Indo-Pacific ; four known from India.

Synopsis of the Indian Species.

- | | |
|--|------------------------|
| I. Depth $2\frac{2}{5}$ in length ; maxillary $3\frac{1}{2}$ to $3\frac{2}{3}$ in head .. | 1. <i>inornatus</i> . |
| II. Depth $2\frac{3}{5}$ to $3\frac{1}{5}$ in length ; maxillary $2\frac{2}{5}$ to 3 in head. | |
| A. Right pectoral twice as long as head ; dorsal with 66 to 71 rays ; anal with 50 to 54 rays ; head $3\frac{1}{2}$ to $3\frac{2}{3}$ in length .. | 2. <i>longimanus</i> . |
| B. Right pectoral less than twice as long as head ; dorsal with 72 to 74 rays ; anal with 55 to 57 rays ; head $3\frac{1}{2}$ to $4\frac{2}{3}$ in length. | |
| 1. Head $3\frac{3}{4}$ in length ; maxillary 3 in head ; right pectoral shorter than head | 3. <i>maculatus</i> . |
| 2. Head $4\frac{2}{5}$ ($4\frac{3}{4}$) in length ; maxillary about $2\frac{1}{2}$ in head ; right pectoral longer than head | 4. <i>huysmani</i> . |

1. *Samariscus inornatus* (Lloyd).

Samaris inornata, Lloyd, *Mem. Ind. Mus.*, II, p. 160, pl. xlvii, fig. 7, 7a (1909).

Depth of body about $2\frac{2}{5}$ in the length, length of head $3\frac{3}{4}$ to 4. Snout shorter than eye, diameter of which is nearly 4 in length of head ; eyes separated by a narrow scaly space, their anterior margins about level. Maxillary extending to below anterior $\frac{1}{4}$ of eye, length $3\frac{1}{2}$ to $3\frac{2}{3}$ in head ; lower jaw a little projecting, length about $2\frac{1}{2}$ in head. 8 or 9 short tubercular gill-rakers on lower part of anterior arch. Scales more or less ctenoid on both sides of body, the denticulations much stronger on the ocular side ; about 63 scales in a longitudinal series below lateral line. Dorsal (61) 63-67. Anal 48-50. Right pectoral with 5 rays, longer than head. Caudal with 16 rays, the middle rays branched ; rounded. Brownish, with darker spots and blotches on head, body and fins ; right pectoral blackish.

Described from 2 specimens (co-types), 100 and 130 mm. in total length.

Hab.—Gulf of Aden, 130 fms.

F.2401-3/1 (Types) .. Stn. 360 : Arabian Sea (13°
 $36'$ N., $47^{\circ} 32'$ E.), 130
 fms. " Investigator."

2. *Samariscus longimanus*, sp. nov.

Plate VII.

Depth of body $2\frac{2}{5}$ to nearly 3 in the length, length of head $3\frac{1}{2}$ to $3\frac{2}{3}$. Snout shorter than eye, diameter of which is $3\frac{1}{2}$ to $3\frac{3}{4}$ in length of head ; eyes separated by a narrow ridge, their anterior margins level. Max-

illary extending to below anterior $\frac{1}{4}$ of eye, length about $\frac{1}{3}$ that of head ; lower jaw a little projecting, length $2\frac{1}{5}$ to $2\frac{1}{4}$ in head. Scales ctenoid on both sides of body, the denticulations stronger on the ocular side ; 55 to 60 (?) scales in a longitudinal series. Dorsal 66-71. Anal 50-54. Right pectoral with 5 rays, length twice that of head. Caudal with 16 rays, the middle rays branched ; pointed (?). Greyish brown, with a series of 5 black blotches on upper edge of body, and 3 or 4 similar blotches on lower edge ; a group of black blotches round anterior part of lateral line, and one or two smaller ones on the straight portion ; dorsal and anal fins pale, with a narrow dark margin and a series of dark spots ; pectoral blackish ; distal part of caudal dusky ; two small dark spots near base of fin.

Described from 2 specimens (σ and ♀), 100 and 130 mm. in total length ; types of the species.

Hab.—West of Ceylon.

265-6 .. Stn. 609 : W. of Ceylon, 102-105 fms. " Investigator."

No. 266 is selected as the holotype.

3. *Samariscus maculatus* (Günther).

Samaris maculatus, Günther, *Shore Fishes "Challenger,"* p. 47, pl. xxi, fig. A (1880) ; Regan, *Fish. Maldives*, p. 277 (1902) : *Trans. Linn. Soc., Zool.* XII, p. 232 (1908).

Hab.—Ki Islands, 129 fms.; Maldive Islands.

A young example, 27 mm. in total length, from the Maldives, appears to belong to this species.

4. *Samariscus huysmani* Weber.

Samariscus huysmani, Weber, "*Siboga*"-*Expéd. Monogr.* 57, p. 420, pl. vi, fig. 6 (1913).

Hab.—Gulf of Martaban ; Java Sea.

F.1180/1 .. Stn. 328 : Gulf of Martaban (14° $46'$ N., 95° $52'$ E.), 61 fms. .. " Investigator."

Samariscus sp.

The following specimen may represent another new species of *Samariscus*, but is in a very bad state of preservation.

F.799/1 .. Andaman Is., 53 fms. .. " Investigator."