

PART IV.—ON A COLLECTION OF INDIAN PLEURONECTIDAE.

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This collection was for the most part obtained by the Bengal Government's steam trawler the "Golden Crown" in the Bay of Bengal during 1908-09. A few specimens from the Trivandrum Museum, from the Indian Marine Survey collection, and several collected by Dr. Annandale on Puri beach are also included. Most of the species figured in the accompanying plate (pl. iii) have been described in the *Records of the Indian Museum*, vol. v, pp. 123—140 (1910).

So far as the observations of the "Golden Crown" extended it would appear that the Pleuronectidae are not so abundant in the Bay of Bengal between 10 and 35 fathoms as they are on similar ground in British waters. The genus *Pleuronectes*, which is frequently taken in enormous quantities in the seas of Northern Europe, and is a valuable commercial fish, is entirely absent in the Bay, and its place is apparently taken by the genera *Pseudorhombus* and *Psettodes*. At any rate these genera are found in localities which would in England be inhabited by *Pleuronectes*. The habitat of the two common species of *Pseudorhombus*, *P. arsius* and *P. javanicus*, is similar to that of the Dab (*Pleuronectes limanda*), while *Psettodes erumei* may be taken to be the representative of the Flounder (*Pleuronectes flesus*) in Indian waters.

Of the "soles," the genera *Cynoglossus* and *Synaptura* are characteristic of depths between 10 and 35 fathoms, while *Plagusia*, which was rarely taken on the "Golden Crown," would appear to frequent shallower areas since it is commonly taken by the beach fishermen at Puri. The commonest sole in the Bay is *Cynoglossus macrolepidotus*, and this species formed the bulk of the commercial "sole" of the "Golden Crown." So far as the limited observations in the Sunderbuns extended, it seems that *Cynoglossus* extends well into the estuaries, at any rate specimens were captured at Morrelganj and Kan Rondighee. At the latter place the salinity is very slight, the reading with the Kiel areometer being 1.0090.

PLEURONECTIDAE.

PSETTODES, Bennett.

Psettodes erumei, Bloch and Schneid.

Numerous specimens of this species were obtained by the "Golden Crown." It is especially abundant on the muddy grounds off the entrance to the Eastern Channel (mouth of the Hughli).

Three specimens were added to the Museum collection from the "Golden Crown."

No.	Locality.	Length.
2139.	Off Elephant Pt., Arakan Coast, July, 1909	35.7 cms.
3634.	Off Santapalii, Madras Presidency, October, 1909	17.6 "
3644.	Off Gopalpur, ,, ,,	27.3 "

PSEUDORHOMBUS, Bleeker.

Three species of *Pseudorhombus* are represented in the collection, viz. :—

Pseudorhombus arsius, Bleeker.

Pseudorhombus javanicus, Bleeker.

Pseudorhombus russellii, Gray.

As is the case in British Pleuronectidae, there is a considerable variation in colour and marking within the limits of a single species. This is especially noticeable in the case of the specimens of *Pseudorhombus arsius*. The presence of intermediate specimens between the extreme colour varieties, however, renders it certain that only one species is represented.

Pseudorhombus arsius, Bleeker.

This species is distinguished from the nearly related *P. javanicus* by the larger number of dorsal fin rays (over 70) and the enlarged anterior teeth.

No.	Locality.	Length.
F $\frac{2142}{1}$	Off Elephant Pt., Arakan Coast, "Golden Crown"	18.5 cms.
F $\frac{3438}{1}$	Puri beach, Dr. N. Annandale	20.8 cms.
F $\frac{3439}{1}$	Ten specimens. Balasore Bay, "Golden Crown"	16.1, 16.9, 19.4, 21.7, 22.8, 23.3, 24.6, 25.8, 26.1, 27.1 cms.
F $\frac{3440}{1}$	Balasore Bay, "Golden Crown"	24.9 cms.
F $\frac{3442}{1}$	Five specimens, namely :— P ₁ , P ₂ , P ₃ , P ₈ and P ₉ . Puri beach, Dr. N. Annandale	15.7, 18.4, 19.5, 21.5, 21.6 cms.
F $\frac{3443}{1}$	S. Orissa, "Golden Crown"	17.8 cms.

Pseudorhombus javanicus, Bleeker.

Day in his description of this species says "A well-developed pre-anal spine," whereas in *P. arsius* the "pre-anal spine, when present, is but slightly apparent."

According to my observations this spine is occasionally well-developed (*vide* Nos. F $\frac{2142}{1}$ or F $\frac{3442}{1}$, P₄) and more often absent (*vide* other specimens). Possibly

this is a sexual difference; at any rate it does not serve as a specific distinction from *P. arsius*. It will be noticed that the specimens of *P. javanicus* are on the average smaller than those of *P. arsius*.

No.	Locality.	Length.
F 2142	Off Elephant Point, Arakan Coast, "Golden Crown"	12.9 cms.
F 3441	Puri beach, Dr. N. Annandale	16.6 cms.
F 3442	Four specimens—P ₄ , P ₅ , P ₆ , P ₇ . Puri beach, Dr. N. Annandale	11.4, 13.3, 13.7, and 16.4 cms.

Pseudorhombus russellii, Gray.

Day evidently regards this species as identical with *P. arsius*, but from an examination of this collection I am convinced that the species are distinct.

12242. Off Orissa Coast, Marine Survey.

The Indian species of *Pseudorhombus* may be distinguished by the following characteristics:—

Anterior teeth enlarged	{	Dorsal fin rays over 70	<i>P. arsius</i> , Bleeker.
		Dorsal fin rays 70 or less	<i>P. javanicus</i> , Bleeker.
Teeth minute	{	Longest dorsal rays at commencement of posterior half of fin ..	<i>P. russellii</i> , Gray.
		Anterior dorsal rays elevated	<i>P. triocellatus</i> , Bl. Sch.

The following table gives the height, length, ratio of height to length of body (inclusive of caudal) and the number of dorsal and ventral fin rays in the various specimens of *Pseudorhombus* examined:—

No.	Length, mm.	Height.	Ratio H. to L.	Dorsal fin rays.	Ventral fin rays.	Species.
2142	185	83	2.2	74	6	<i>P. arsius</i> .
3438	208	90	2.3	71	6	"
3439 ₁₅	271	120	2.2	74	6	"
" 15a	246	104	2.4	75	6	"
" 15b	258	108	2.4	75	6	"
" 15c	261	115	2.3	73	6	"
" 15d	233	95	2.5	74	6	"
" 15e	194	81	2.4	76	6	"

No.	Length, mm.	Height.	Ratio H. to L.	Dorsal fin rays.	Ventral fin rays.	Species.
3439 ^{15f}	228	94	2.4	74	6	<i>P. arsius.</i>
„ 15g	217	92	2.3	73	6	„
„ 15h	161	69	2.3	75	6	„
„ 15i	169	71	2.4	73	6	„
3440	249	105	2.4	76	6	„
3442 ^{p1}	157	63	2.5	74	6	„
„ p2	216	89	2.4	73	6	„
„ p3	184	83	2.2	75	6	„
„ p8	215	91	2.4	71	6	„
„ p9	195	87	2.2	?	6	„
3443	178	73	2.4	76	6	„
2143	129	53	2.4	69	6	<i>P. javanicus.</i>
3441	166	70	2.4	70	6	„
3442 ^{p4}	133	56	2.4	68	6	„
„ p5	137	58	2.4	69	6	„
„ p6	164	69	2.4	68	6	„
„ p7	114	48	2.4	69	6	„
12242	107	45	2.4	69	6	<i>P. russellii.</i>

PLATOPHRYS, Swainson.

Platophrys was sparingly obtained by the "Golden Crown." Occasionally it was met with in rough ground off the Arakan Coast in the neighbourhood of Oyster Island. One species only was taken.

Platophrys pantherinus, Rüpp.

2622. Arakan Coast, January, 1909. Length, 9.6 cms.

RHOMBOIDICHTHYS, Bleeker.

At least two species are met with in the "Golden Crown" collection, both being obtained off the Arakan Coast in January, 1909, in the same locality as *Platophrys pantherinus*. Neither species had previously been recorded from the Arakan Coast.

Rhomboidichthys valderostratus, Alcock.

2623. Arakan Coast, January, 1909. Length, 8.2 and 7.5 cms.

2624. „ „ „ „ „ 6.2, 7.1, 7.7 and 7.7 cms.

Rhomboidichthys azureus, Alcock.

2625. Arakan Coast, January, 1909. Length, 7.6 cms.

BRACHYPLEURA, Günther.

Brachypleura xanthosticta, Alcock.

This species was recorded from the Ganjam Coast, whence Alcock's type specimens were obtained, and also off the entrance to the Eastern Channel at the mouth of the Hughli.

	Length.
F 3426, ♀ Off Gopalpur, Ganjam Coast, 24 fathoms, Feb., 1909 ..	11.2 cms.
F 3426a, ♀ " " " " ..	10.1 "
F 3449, ♂ " " " " ..	9.5 "
F 3427, ♀ Off Pilot Ship, Eastern Channel, 25th Feb., 1909 ..	7.2 "

PSETTYLIS, Alcock.

This genus was established by Alcock¹ in 1890 for a number of Pleuronectids allied to *Rhomboidichthys*. One of the generic characters as given by Alcock is "no scales"² but I agree with Johnstone³ that the body is covered with scales which are cycloid, except at the bases of the dorsal and anal fins, on the ocular side, where they are ctenoid. The single specimen in the collection is *Psettylis ocellata*.

Psettylis ocellata, Alcock.

F $\frac{4183}{1}$, Indian Marine Survey Station 387, 49-40 fathoms.
Lat. N. 15° 25'. Long. E. 93° 45'.

SCIANECTES, Alcock.

Scianectes macrophthalmus, Alcock.

This species was described by Alcock⁴ from a specimen taken at a depth of 100 fathoms off Akyab. It was obtained in much shallower water by the "Golden Crown" off Puri on March 15th, 1909.

	Length.
F 3436, Puri, Orissa Coast, March, 1909 ..	12.3 cms.
F 3436a " " " " ..	10.1 "
F $\frac{4180}{1}$, $\frac{4181}{1}$, $\frac{4182}{1}$, $\frac{4184}{1}$, Indian Marine Survey Station 387, 49-40 fathoms. Lat. 15° 25' N. Long. 93° 45' E.	

¹ *Ann. Mag. Nat. Hist.* (6), vi, 1890, p. 436.

² *Ibid.*, p. 437, and *Descriptive Catalogue of the Indian deep-sea Fishes in the Indian Museum*, Calcutta, 1899, p. 124.

³ *Rep. Ceylon Pearl Oyster Fish.*, pt. ii, p. 207 (Roy. Soc. Lond., 1904).

⁴ See *Journ. As. Soc. Beng.*, vol. lviii, pt. ii, No. 3, 1889.

SOLEA, Klein.

When fishing off the Ganjam Coast on the "Golden Crown," the trawl brought up a specimen of what at first sight appeared to be a *Synaptura zebra* or allied species. The caudal fin was, however, distinctly separate from the vertical fins. Subsequently another specimen was obtained in the same locality.

The term "*Synaptura*" was first applied by Cantor,¹ to distinguish a subgenus of *Solea*, in which the caudal, dorsal and anal fins are all united. In other respects the subgenus has the general structure of *Solea*.

Subsequently, when looking through some of the "Investigator" Pleuronectidae, three specimens were found provisionally labelled "*Synaptura quagga*," one of which was undoubtedly *Synaptura cornuta* (Kaup) (see below), and the other two showed the same distinction of the caudal fin, and are consequently referred, together with the two "Golden Crown" specimens, to a new species of *Solea*, here described as *Solea synapturoides*.

Solea synapturoides, sp. nov. (Plate iii, figs. 4, 4a, 4b.)

Type specimen F $\frac{3430}{1}$.

D. 76. V 5. P. 11. A. 61. L.1. circa 90-93. C. 14.

Length of head $5\frac{1}{2}$, height of body 3 in total length inclusive of caudal.

The eyes are situated close together less than half a diameter apart, the upper being slightly in advance of the lower. Diameter 5 in length of head and about a diameter or slightly more from end of snout.

Nostrils on coloured side at end of tube, which is situated just anterior to the lower orbit.

Fins.—Dorsal and anal rays unbranched. Both pectorals present.

Colour.—Slate-coloured, with nine dark transverse unbranched bands on body and seven or eight on head.

Locality.—Off Ganjam Coast, 24-30 fathoms. Obtained on the Steam Trawler "Golden Crown."

ACHIRUS, Lacépède.

One specimen of this genus was identified in the "Golden Crown" collection, namely, *Achirus maculatus*, Bl. Schn., taken off the Ganjam district of the Madras Presidency in March, 1909.

Achirus maculatus, Bloch and Schneid.

F 3428. Ganjam Coast, off Sonapur, March, 1909. Length 10.0 cms.; depth 20 to 25 fathoms.

SYNAPTURA, Cantor.

There are four species of *Synaptura* represented in the collection, and of these two were recorded on the "Golden Crown."

¹ "Catalogue of Malayan Fishes," *Journ. As. Soc. Bengal*, vol. xviii, p. 1204.

Synaptura commersoniana, Lacép.

- F 2328. Off Burmese (Arakan) Coast, 17th November, 1908. Length, 23.4 cms.
"Golden Crown."

Synaptura altipinnis, Alcock.

A specimen of this species was taken by the "Golden Crown" off the Ganjam Coast in from 24—30 fathoms. Alcock's type was recorded from the Vizagapatam Coast from similar depths (25 fathoms).

- F 2472. Ganjam Coast, 24—30 fathoms, February, 1909. Length, 18.0 cms.
"Golden Crown."

Synaptura orientalis, Bloch and Schneid.

- F 4179, Quilon, Trivandrum Museum, R. S. N. Pillay coll.
F 4186, Trivandrum ,, ,,

Synaptura cornuta (Kaup).

A specimen of this species occurs in the collection. It had been labelled provisionally "*Synaptura quagga*." There can, however, be no doubt, from the cycloid scales and the first dorsal ray being thickened and prolonged, that the specimen belongs to this species.

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| F 225, Off Malabar Coast, 68 fathoms, Marine Survey | Length.
12.6 cms. |
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PLAGUSIA, Cuvier.

The genus *Plagusia* appears to be an inshore genus. At any rate, it is far commoner on Puri beach than in the "Golden Crown" hauls. *P. bilineata* was occasionally taken on the "Golden Crown." Both species are represented in the collection.

Plagusia bilineata, Bloch.

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| F 3431, Ganjam Coast, "Golden Crown," March, 1909. | Length.
19.7 cms. |
| F 3431a, ,, ,, ,, | 16.2 ,, |

Plagusia marmorata, Bleeker.

- F 4177, young specimen, Puri beach, Dr. Annandale.

APHORISTIA, Kaup.

There is one damaged Pleuronectid in the collection which is referable to the above genus. In this specimen the head is badly damaged, and it is not possible to determine the extension of the mouth-cleft with reference to the eyes. Both sides of the body are coloured, and there are no cross-bands, consequently the species is either *Aphoristia wood-masoni*, Alcock, or *Aphoristia gilesii*, Alcock. The fact that

the anal fin commences a little way behind the ventral and not closely adjacent to it leads me to place this specimen in the former species, which has previously been recorded from the Andaman Sea.¹

Aphoristia wood-masoni, Alcock.

F 1140, Station 332, Indian Marine Survey, 279 fathoms.
Lat. N. 10° 21' Long. E. 92° 46½'

CYNOGLOSSUS, Ham. Buch.

At least three species were obtained on the "Golden Crown" and of these *Cynoglossus macrolepidotus* was by far the commonest, this species being the commercial "sole" of the "Golden Crown."

Cynoglossus macrolepidotus, Bleeker.

F 3648, Off Pilot Ship, Eastern Channel, mouth of Hughli,	Length.
Feb., 1909	31.5 cms.
F 3445, Off Puri, Orissa Coast, September, 1908	23.0 ,,
F 3445a, ,, ,, ,, ,, .	23.0 ,,

Cynoglossus semifasciatus, Day.

F 3437, Puri Coast, "Golden Crown," March, 1909 .. Length, 11.4 cms.

Cynoglossus quadrilineatus, Bleeker.

F 3444, Elephant Pt., Arakan Coast, "Golden Crown,"
July, 1908 Length, 26.7 cms.

Cynoglossus puncticeps, Richardson.

F 4185, Trivandrum, Trivandrum Museum.
F 4187, ,, ,, ,, .

Cynoglossus lida, Bleeker.

There are two specimens in the collection from the Trivandrum Museum which more nearly resemble this species than any other. The number of rows of scales between the lateral lines on the coloured side is slightly higher than that given by Day as characteristic for the species, being from 16 to 17 instead of 13. In other respects the resemblance is very close. One of the specimens (F 4188) has the coloured side marked with blackish dots. There is, however, a great amount of colour

¹ See Alcock, *Journ. As. Soc. Beng.*, vol. lviii, part ii, No. 3, 1889, p. 294.

variation amongst Pleuronectids, and consequently it would be safer to regard both these specimens as belonging to the same species.

F $\frac{4178}{1}$, Trivandrum, Trivandrum Museum.

F $\frac{4188}{1}$, ,, ,, ,, (var. *punctatus*).

