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[*N.B.*—An asterisk (*) preceding a line denotes a new variety or subspecies; a dagger (†) indicates a new species; a section (§) a new subgenus; and a double dagger (‡) a new genus; in the case of synonyms the page-numbers are printed in bold faced type.]

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T

REPORT ON THE FISHES TAKEN BY THE BENGAL FISHERIES STEAMER "GOLDEN CROWN."

PART II.—ADDITIONAL NOTES ON THE BATOIDEI.

By N. ANNANDALE, *D.Sc., F.A.S.B., Superintendent, Indian Museum.*

Since my report on the Batoidei was published (*Mem. Ind. Mus.*, ii, pp. 1—60), a considerable number of interesting specimens of this group have been obtained by the "Golden Crown," whose operations have now been brought to a close so far as the Government of Bengal is concerned; I have had the opportunity of examining some of the Indian rays in the British and the Royal Scottish Museums. It has therefore become advisable in some cases to supplement, and in one to correct my former statements in the light of additional knowledge. I have nothing to add to what I said as regards the Pristidae and Rhinobatidae, but the Trygonidae and Myliobatidae need further comment, while as regards the Torpedinidae I may note that a considerable number of specimens of *Bengalichthys impennis* of both sexes have recently been taken in Balasore Bay, and one small female on the shore at Puri.

My great and increased obligations in this work to Dr. J. T. Jenkins must be acknowledged, and also my sense of the courteous assistance which I met in the British Museum at the hands of Mr. G. A. Boulenger.

Family TRYGONIDAE.

Trygon uarnak (Forskål).

Mem. Ind. Mus., ii, p. 22.

Bleeker's specimen of *T. undulatus* (one of the types of that "species") in the British Museum (specimen M in Günther's Catalogue) appears to be a young example of *T. uarnak* in which the spots have already begun to coalesce. At this stage I am unable to distinguish the colour variety *variegatus* from the typical form. Several of the synonyms in the Catalogue must undoubtedly be transferred from this species to *T. gerrardii*; but a more careful examination of Bleeker's specimens than I had time to undertake in Europe would be necessary to elucidate this point fully. *T. pareh* seems to me to be distinct from either species, although it is probably identical with my own *T. alcockii*, which of course, should this prove to be the case, must be sunk as a synonym. It may be noted that in dried or shrivelled specimens of *T. alcockii* the flat scales on the dorsal surface become more conspicuous than is the

case in fresh specimens. They do not, however, even in a dried skin assume the regular pattern with well-defined outlines so characteristic of *T. gerrardii* and *T. bleekeri*.

The measurements of the disk of the young specimen of *T. uarnak* given on page 30 of my report are unusual, the disk being broader than is commonly the case. The following measurements were taken from a single batch of somewhat older specimens in which the spots had already begun to coalesce and the ground colour of the back to darken:—

	♂	♂	♀	♀	♀	♀
Length of disk	40·0 cm.	38·75 cm.	35·0 cm.	37·5 cm.	40·0 cm.	38·75 cm.	41·25 cm.
Breadth of disk	50·0 ,,	48·0 ,,	42·5 ,,	46·25 ,,	50·0 ,,	48·75 ,,	51·25 ,,

Trygon gerrardii, Gray.

Mem. Ind. Mus., ii, p. 24.

Two species are confused under this name in the British Museum Catalogue, a half-grown specimen from Japan being certainly distinct from the types of the species. The latter are young stuffed specimens, but I am pretty sure that they are identical with what I call *T. gerrardii*.[1] In *T. gerrardii* the spots never extend to the anterior half of the disk, as they do in the half-grown Japanese specimen, in which there are traces of a mid-dorsal row of spines resembling those of *T. akajei*.

A large adult male of *T. gerrardii* was recently captured off the Madras coast which had the ventral surface suffused with dark pigment. Its measurements were as follows:—

Breadth of disk	86·25 cm.
Length of disk	72·5 ,,
Length from mouth to vent	43·75 ,,
Breadth between eyes	12·5 ,,
Length of snout	7·5 ,,

This is by far the largest specimen of the species I have seen, but the pale spots, which were confined to the posterior margin of the disk, were quite distinct.

Trygon fluviatilis (Ham. Buch.).

(Plate i, fig. 1.)

Size fairly large (a female from the sea measured 4 ft. 7½ in. across the disk).

Disk slightly broader than long without the pelvic fins, very flat, with the lateral angles very broadly and gradually rounded, so that the whole body, including the

[1] But see Dr. Günther's remarks in his "Fische der Südsee," pt. ix, p. 492 (1910). He is of the opinion that the species of these type specimens cannot be recognized. It is only after comparing large numbers of specimens in different conditions of preservation that I venture to differ from him.

pelvic fins, has an oval outline. The snout acutely pointed and much produced, more than twice as long as the distance between the eyes.

Colour.—Dorsal surface a dark livid purplish grey, changing to dull ochraceous in the middle of the disk. Ventral surface white with a broad, irregular, deeply pigmented margin, which is more or less interrupted in front.

Eyes small, not very prominent.

Skin tough; the entire dorsal surface (except that of the pelvic fins) and a considerable part of the ventral covered by small indistinctly stellate scales, the projecting points of which are for the most part blunt. These scales are larger for the most part on the head than on the rest of the disk, but on the posterior half of the body some of them are markedly larger than the rest and bear sharp, straight spines; on the fins and on the ventral surface they are very small.

This species is closely allied to Blyth's *T. marginatus*, from which its produced and pointed snout will at once distinguish it. It also occurs in the R. Ganges, and is evidently the species named by Hamilton *Raja fluviatilis*. On this point I shall have more to say on another occasion.

A specimen was taken off the Madras coast from between 20 and 30 fathoms in November, 1909. Its measurements were as follows:—

Breadth of disk	138·75 cm.
Length of disk	135·0 ,,
Breadth between eyes	20·0 ,,
Breadth of mouth	12·5 ,,
Length from mouth to vent	83·75 ,,

The tail had unfortunately been removed before the specimen was brought to the Museum, but we have recently obtained another specimen in which the tail was apparently complete, but was less than twice as long as the body.

Urogymnus asperrimus, Müller and Henle.

(Plate ii, figs. 1, 1*a*, 1*b*.)

Mem. Ind. Mus., ii, p. 37.

Another large female specimen of this fish was taken off the Madras coast in September, 1909. Curiously enough its tail was mutilated in exactly the same way as was the case in the individual of the same species previously described. Its measurements were as follows:—

Breadth across disk	120·0 cm.
Length of disk	121·25 ,,
Breadth between eyes	23·75 ,,
Breadth of mouth	16·25 ,,
Mouth to vent	100·0 ,,

This specimen had on the floor of the mouth, in addition to three finger-like processes in the centre, a shorter process on either side.

On the same voyage as that on which the large individual was taken, a young one, perhaps born from it prematurely, was also captured. It differed from the adult in the total absence of scales from the pectoral fins and snout and in possessing only blunt scales on the body and tail. Although there was no trace of a spine on the latter, the place in which it would have been in a *Trygon* was occupied by a distinct naked groove (pl. ii, fig. 1*b*)—an interesting piece of evidence as regards the descent of *Urogymnus* from a genus such as *Trygon* with a poison-spine on the tail. On the snout a few soft tubercles were visible, which appeared to be developing spines with a flat base.

Family MYLIOBATIDAE.

Aëtobatis narinari (Euphrasen).

(Plate ii, fig. 2.)

A. narinari, *Mem. Ind. Mus.*, ii, p. 55 (♀).

A. guttata, *ibid.*, p. 56 (♂).

It becomes clear from an examination of specimens from localities outside the Bay of Bengal and of individuals taken recently by the "Golden Crown" off the Madras coast, that I was wrong in two particulars as regards the species of *Aëtobatis*; firstly, in thinking that the form I called *A. narinari* was peculiar to the Atlantic, and secondly, in regarding it as specifically distinct from the common Indian form. For some reason all the specimens I had examined in a fresh condition were males, in which the snout appears to be normally more pointed than it is in females; and it is evident that the coloration of the species is more variable than I realized. In Edinburgh and London there are Indian specimens that agree closely with American and South Sea specimens in the British Museum, while an old female from the Madras coast differs in more respects than one from all other specimens I have seen. It appears, however, that if very old and very young individuals, in both of which the spots are obscure or absent, are omitted from consideration, three colour varieties may be distinguished as follows:—

Var. A.—Entire dorsal surface of disk, including the snout, spotted.

Var. B.—Spots on the dorsal surface confined to the post-spiracular part of the disk.

Var. C.—Spots confluent into short transverse streaks.

Var. B is the common variety in the northern parts of the Bay of Bengal, but is by no means confined to Indian seas Var. A is found off the Coromandel and Malabar coasts as well as in the Atlantic and South Pacific; while var. C is probably liable to occur in diverse places as an individual sport.

The large female recently taken by the "Golden Crown" is practically devoid of spots, which appear to have become almost obsolete. Very young individuals are also unspotted; but in them the spots are just commencing to appear. For the following measurements of the large specimen I am indebted to Dr. Jenkins

and Mr. G. H. Tipper. They were taken on the fresh fish, while I have only been able to examine the skin in spirit. Unfortunately the snout was not measured, but it has evidently been extremely broad, short, and blunt. The measurements of young males were taken from two specimens captured together in the Bay of Bengal and preserved in spirit. Unfortunately the snout is much distorted in the smaller of the two, which was probably born prematurely:—

	♀	♂ (juv.)	♂ (juv.)
Breadth of disk	205·0 cm.	23·2 cm.	20·4 cm.
Length of disk	132·5 ,,	13·7 ,,	12·4 ,,
Length of tail	275·0 ,,	57·0 ,,	47·5 ,,
Mouth to vent	..	9·6 ,,	8·5 ,,
Breadth of snout at base	..	12·7 ,,	..
Length of snout	..	12·6 ,,	..

The length of disk includes that of the snout.

The large female differs not only in its inconspicuous coloration, very large size and short rounded snout from other specimens sent to the Museum from the "Golden Crown," but also in having the dorsal surface and the whole of the tail covered with small, star-shaped denticles. On the head these are sufficiently close together to form a regular pavement, while on the tail they have a spinous character. Müller and Henle have noticed that the tail of very large specimens of *A. flagellum* is sometimes rough (*Plagiostomen*, p. 180), and I am inclined to think that this is a character denoting extreme old age. The teeth in the "Golden Crown" specimen are transverse, and not pointed at the tip in the lower jaw; the nasal flap is nearly straight; there is no trace of a serrated spine on the tail. It is evident, therefore, that neither the shape of the tooth-band of the lower jaw, the outline of the snout, that of the nasal flap, nor the number of spines present on the tail can be regarded as characters of specific importance.

PART III.—PLECTOGNATHI AND PEDICULATI.

By N. ANNANDALE, *D.Sc., F.A.S.B., Superintendent, Indian Museum, and* J. T. JENKINS, *B.Sc. (Lond.), D.Sc. (Wales), Ph.D. (Kiel), Superintendent, Lancashire and Western Sea Fisheries, late Fishery Adviser, Government of Bengal.*

INTRODUCTION.

As comparatively few sharks and dog-fish have been taken by the "Golden Crown," and as the collection of Selachians in the Indian Museum is by no means complete, we have thought it best to defer the consideration of this group. Moreover, to describe the Teleostei in the collection of the "Golden Crown" in an adequate manner will mean little less than a revision of the Indian representatives of all the families of which specimens have been obtained, and this work cannot yet be undertaken as regards the larger groups. We have therefore decided to deal, in the first instance, with those groups that are compact and of moderate size without reference to their exact systematic position. As a beginning we here discuss the suborders Plectognathi and Pediculati, in our arrangement of which we follow Mr. Boulenger's account of the Teleostei in the *Cambridge Natural History*, vol. vii (1904).

Most of the specimens of these suborders that Day has figured in his *Fishes of India* are in the collection of the Indian Museum, including the types of several species. In the "Golden Crown" collection the Triacanthidae and Tetrodontidae of the Bay of Bengal are fairly well represented, but the Balistidae, Diodontidae and Pediculati poorly. The Balistidae and Diodontidae are mainly species which frequent coral reefs, but coral reefs do not occur in the northern part of the Bay of Bengal, and it is only near the southern limits of the trawler's cruises, that is to say, off the Madras coast, that Balistidae have been taken. Their presence there is probably due to the large masses formed by molluscs of the genera *Siliquaria* and *Spiroglyphus* and almost comparable to coral reefs in growth. The Indian Pediculati, on the other hand, are mostly deep-sea forms; the majority of the species that belong to our fauna have been described by Col. Alcock or by Capt. Lloyd from the "Investigator" collections, the types being in the Indian Museum.

We must express our obligations to Prof. Max Weber of Amsterdam for valuable notes on the genera *Triacanthus* and *Halieutaea*.

I.—Suborder *PLECTOGNATHI*.

LIST OF THE PLECTOGNATHI OF INDIAN SEAS.

[The names of species not represented in the collection of the Indian Museum are printed in italics. Those of species taken by the "Golden Crown" are distinguished

by a *, those of species of which the types are in the Indian Museum with a †, and those of species not recorded or recognized as distinct by Day in the "Fauna" with a §.]

SCLERODERMI.

Fam. TRIACANTHIDAE.

1. Triacanthus brevirostris.*
2. ,, oxycephalus.*§
3. ,, strigilifer.*
4. ,, weberi.*§†
5. Triacanthodes ethiops.§†
6. Halimochirurgus centriscoides.§†

Fam. TRIODONTIDAE.

7. *Triodon bursarius.*

Fam. BALISTIDAE.

8. Balistes stellaris.*
9. ,, maculatus.
10. ,, vetula.
11. ,, niger.
12. ,, mitis.
13. *Balistes conspicillum.*
14. Balistes viridescens.
15. ,, fuscus.
16. ,, flavimarginatus.
17. *Balistes ellioti.*
18. Balistes aculeatus.
19. ,, rectangulus.
20. ,, undulatus.
21. *Balistes buniva.*
22. Balistes erythrodon.
23. Monacanthus oculatus.§
24. *Monacanthus nematophorus.*§
25. ,, *setifer.*
26. Monacanthus choerocephalus.
27. ,, tomentosus.
28. Aluteres monoceros.*
29. ,, scriptus.*
30. *Aluteres nasicornis.*§
31. Anacanthus barbatus.

Fam. OSTRACIONTIDAE.

32. Ostracion gibbosus.*
33. ,, cubicus.
34. Ostracion punctatus.
35. ,, nasus.*
36. ,, cornutus.
37. *Ostracion fornasini.*§

GYMNODONTES.

Fam. TETRODONTIDAE.

38. Tetrodon lunaris.*
39. ,, inermis.*
40. ,, sceleratus.
41. ,, hypselogenion.
42. ,, oblongus.*
43. ,, spinosissimus.§
44. ,, patoca.*
45. ,, cutcutia.
46. ,, immaculatus.*
47. ,, nigropunctatus.
48. ,, stellatus.*
49. ,, reticularis.*
50. ,, hispidus.
51. ,, leopardus.†
52. ,, viridipunctatus.†
53. ,, fluviatilis.
54. Tropidichthys investigatoris, sp. nov.§†
55. *Tropidichthys valentini.*§
56. ,, *bennettii.*§
57. Tropidichthys margaritatus.*

Fam. DIODONTIDAE.

58. Diodon hystrix.
59. *Diodon maculatus.*
60. Diodon orbicularis.*§

Fam. MOLIDAE.

61. *Orthagoriscus*, sp.

Of the 61 species in the above list, only 17 have been taken by the "Golden Crown," although 34 of the 54 Batoidei known from Indian seas were obtained. This is evidently due to the fact that the great majority of the Plectognathi are reef-haunting species not found in water suitable for the operations of a trawler. Three species in the list (*Triacanthodes ethiops*, *Halimochirurgus centriscoides* and *Ostracion fornasini*) have been added to the Indian fauna by Col. Alcock,[1] while five have recently been recorded from the south-western limits of the Indian seas by Mr. Tate Regan in his account of the fish taken off the Maldives and in other parts of the Indian Ocean by Prof. Stanley Gardiner.[2] These five species, only the first of which is represented in the collection of the Indian Museum, are *Monacanthus oculatus*, *M. nematophorus*, *Aluteres nasicornis*, *Tropidichthys valentini* and *T bennettii*. Two additional species have recently been taken by the R.I.M.S. "Investigator" in fairly deep water, both new to the fauna, namely, *Tetrodon spinosissimus* and *Tropidichthys investigatoris*, sp. nov. The former was described by Mr. Tate Regan from the Saya de Malha Bank in the Indian Ocean, and is represented in the Indian Museum by several specimens from the Gulf of Martaban and from Hongkong. Two species of *Triacanthus* and one of *Diodon*, not recognized by Day, have been taken by the "Golden Crown." Most of the forms dealt with in this paper are, however, well known; only two new species are described here (*Tropidichthys investigatoris* and *Halieutaea indica*), while a third (*Triacanthus weberi*) has recently been described by Mr. B. L. Chaudhuri.

The families and genera of the Plectognathi have so often been discussed that in most cases it will be unnecessary for us to describe their peculiarities, which are fully described in Günther's *Catalogue of the Fishes in the British Museum*, vol. viii.

Sclerodermi.

Key to the Families and Indian Genera of Sclerodermi.

Family I, TRIACANTHIDAE.

Skin covered with small scales; body compressed; a spinous dorsal fin consisting of at least two spines; a pair of stout moveable ventral spines.

A.—Snout moderately produced; teeth small, conical, in a double series	*Triacanthodes.*
B.—Snout moderately produced; teeth of the outer series incisor-like . .	*Triacanthus.*
C.—Snout produced into a long, curved, perfectly tubular organ	*Halimochirurgus.*

[1] *Journ. Asiat. Soc. Bengal* (ii), vol. lxiii, p. 137, pl. vii, fig. 6 (1894), and vol. lxv, p. 338 (1896); *Proc. Asiat. Soc. Bengal*, 1899, p. 78; *Illustr. Zool. R.I.M.S.* "*Investigator*," Fishes, pl. xv, fig. 9, and pl. xxxi, fig. 3.

[2] Gardiner's *Fauna and Geogr. Maldive and Laccadive Arch.*, vol. i, p. 279, and *Trans. Linn. Soc. London* (2), xii, p. 252.

Family II, BALISTIDAE.

Skin rough or with moveable scales; body compressed; not more than three spines in the dorsal; ventral reduced to a single spine or absent.

A.—Three dorsal spines present .. .. *Balistes.*

B.—One perfect and usually one rudimentary dorsal spine.

(*b*) Ventral spine present or absent; no barbel; less than 40 rays in the anal fin .. .. *Monacanthus.*

(*b'*) No ventral spine; no barbel; more than 40 rays in the anal fin .. .. .. *Aluteres.*

(*b''*) No ventral spine; a fleshy barbel on the lower jaw .. .. *Anacanthus.*

Family III, OSTRACIONTIDAE.

The scales modified into a firm and inflexible carapace formed of mosaic-like scutes; spinous dorsal and ventral fins absent.

Teeth small, slender, in a single series .. .. *Ostracion.*

The above key is based on the one given by Günther in his Catalogue (vol. viii, p. 208), but only Indian forms are included and certain modifications have been rendered necessary by more recent work on Oriental ichthyology.

Family TRIACANTHIDAE.

Genus TRIACANTHUS, Cuvier.

Key to the Indian species of Triacanthus.

A.—Second dorsal spine much more than half as long as the first.

First dorsal spine shorter than the head; membrane of the dorsal fin tipped with black .. *T. strigilifer.*

B.—Second dorsal spine less than half as long as the first.

(*b*) Membrane of dorsal fin entirely pale; first dorsal spine distinctly longer than the head; snout fairly stout; dorsal profile of head sinuous .. *T. oxycephalus.*

(*b'*) Membrane of dorsal fin black; first dorsal spine not longer than the head; snout stout, with the dorsal profile nearly straight .. *T. brevirostris.*

(*b*″) Membrane of dorsal fin edged with black; first dorsal spine not or barely longer than the head; snout slender, with the dorsal profile distinctly concave and the ventral profile sinuous .. *T. weberi.*

Triacanthus strigilifer, Cantor.

Day, Faun. Brit. Ind., Fishes, vol. ii, p. 472.

This species, which does not appear to be quite so common in the Bay of Bengal as *T. brevirostris*, is easily distinguished by the length of the second dorsal spine. Should this spine be broken, as is sometimes the case, the characteristic form of the snout, midway between that of *T. brevirostris* and *T. weberi*, will serve as diagnostic.

T. strigilifer has been taken on both sides of the Bay by the "Golden Crown" and is represented in Day's collection.

Triacanthus oxycephalus, Bleeker.

Bleeker, Atlas Ichthyologique, vol. v, p. 90, pl. ccxx, fig. 3.

This species is regarded by Günther as synonymous with *T. biaculeatus*, but is apparently distinguished from the latter not only by the outline of its snout and the great length of the anterior dorsal spine, but also by distinct differences in coloration and in form of body. Prof. Max Weber has been kind enough to compare a specimen with Bleeker's original specimens.

T. oxycephalus is not represented in Day's collection. It has been taken off the coast of Orissa by the "Golden Crown" and also occurs off that of Lower Burma as well as in the Malay Archipelago.

Triacanthus brevirostris, Temm. and Schleg.

Day, Faun. Brit. Ind., Fishes, vol. ii, p. 471.

T. brevirostris is perhaps the commonest species of the genus in the Bay of Bengal. In Lake Chilka it occurs in brackish water. It is easily distinguished from other species by its comparatively stout snout and by the almost complete blackness of the membrane of the dorsal fin.

Triacanthus weberi, Chaudhuri.

T weberi, *Chaudhuri, Journ. Asiat. Soc. Bengal* (N.S.), vol. vi, p. 497, pl. xxxii (1910).

This species is not represented in Day's collection; indeed, all the specimens in the collection of the Indian Museum were taken by the "Golden Crown." Possibly it inhabits rather deeper water than the other species.

The peculiar form of the snout, which it is difficult to express accurately by means of measurements, will at once distinguish the species. The dark pigment on the snout, moreover, forms a narrower and better defined band on the sides than is the case in *T. strigilifer*, *T. brevirostris* or *T. oxycephalus*.

Family BALISTIDAE.

Genus BALISTES, Lacépède.

Balistes stellaris, Bloch and Schneid.

This is the only species of the genus that has been taken by the "Golden Crown." It is apparently not uncommon on the *Siliquaria* grounds off the Madras coast at a depth of from 20 to 30 fathoms.

Genus MONACANTHUS, Cuvier.

No species of this genus (*sensu stricto*) has been taken by the "Golden Crown." As, however, two new species have recently been added to the Indian fauna, the following key may prove useful. All the Indian species are fully described in Günther's Catalogue:—

Key to the Indian species of Monacanthus.

A.—Ventral spine moveable; the ventral protuberance not extending beyond it.	
(*a*) Upper profile of snout concave; scales minute, each with four or five spines on the margin	*M. tomentosus.*
(*a'*) Upper profile of snout concave; scales minute, not very rough, sometimes mixed with minute cirri	*M. setifer.*
(*a''*) Upper profile of snout nearly straight; skin velvety, with long fringed filaments	*M. nematophorus.*
B.—Ventral spine absent.	
Body subcircular, marked with purplish ocelli	*M. oculatus.*

Genus ALUTERES, Bleeker.

Key to the Indian species of Aluteres.

A.—Dorsal spine not in front of the orbit.	
(*a*) Dorsal profile of snout convex; caudal fin much shorter than the head	*A. monoceros.*
(*a'*) Dorsal profile of snout concave; caudal fin nearly as long as or longer than the head	*A. scriptus.*
B.—Dorsal spine distinctly in front of the orbit.	
Dorsal profile of snout convex; dorsal spine nearly as long as the head	*A. nasicornis.*

Aluteres monoceros (Osbeck).

Monacanthus monoceros, *Day, Faun. Brit. Ind.*, Fishes, vol. ii, p. 482.

This species has been taken by the "Golden Crown" on several occasions. It appears to be not uncommon, together with *Balistes stellatus*, on the *Siliquaria* grounds off the Madras coast.

An abnormal specimen in the collection, while agreeing in other respects with typical examples, shows no trace of the dorsal spine.

Aluteres scriptus (Osbeck).

Monacanthus scriptus, *Day, op. cit.*, p. 483.

At least one specimen was taken by the "Golden Crown" on the same grounds as the last species.

Family OSTRACIONTIDAE.

Genus OSTRACION, Artedi.

The only species of this genus taken by the "Golden Crown" are *O. gibbosus* (the *O. turritus* of Day's books) and *O. nasus*. The two species do not appear to have quite the same distribution in the Bay of Bengal, for while *O. nasus* has been taken in considerable numbers in the muddy waters opposite the mouths of the Ganges, *O. gibbosus* appears to be characteristic rather of the *Siliquaria* grounds off the Madras coast and the rocky bottom off Arakan. Both species occur, however, in the Andamans.

Alcock (*Journ. Asiat. Soc. Bengal* (ii), vol. lxv, p. 338) has added *O. fornasini*, a species widely distributed in the Indian Ocean, to the fauna of British India; but we have been unable to find his specimen, which was taken off Ceylon in 34 fathoms, in the collection of the Indian Museum. The species is easily distinguished from its ally *T. cornutus* by its much shorter superciliary spines, which are parallel or slightly convergent, and by the fact that it possesses a large, conical, compressed spine in the middle of the back.

Gymnodontes.

The families here recognized are clearly distinguished by Day as "groups, except that he does not separate the Diodontidae, which have only a single tooth in each jaw, from the Tetrodontidæ, which have two.

Family TETRODONTIDAE.

Considerable difference of opinion exists among ichthyologists as to the number of genera that should be recognized in this family. We are able to distinguish three among the Indian forms, as follows: –

A.—Back rounded or flat; nostrils conspicuous.
- (*a*) Dorsal and anal fins with more than 20 rays each — *Xenopterus.*
- (*a'*) Dorsal and anal fins with not more than 16 rays each — *Tetrodon.*

B.—Back compressed into a ridge; nostrils very inconspicuous.
- Dorsal and anal fins with not more than 16 rays each .. — *Tropidichthys.*

Genus TETRODON, Linn.

Tetrodon inermis, Schlegel.

A specimen of this species was taken by the "Golden Crown" off the mouth of the Eastern Channel (R. Hughli), in November, 1909. The sides of the fresh specimen are of a bright golden-green colour.

Tetrodon lunaris, Bloch and Schneid.

There seems to be every gradation between *T. lunaris* and *T. spadiceus*, Richardson. The only difference is the extent to which the spines on the dorsal surface extend backwards. *T. lunaris* is one of the commonest species in the Bay and was frequently taken on the "Golden Crown." Young individuals from 2 cm. in length were taken in large numbers on the shore at Puri at the commencement of February, 1909. In fresh specimens the back is dark bluish or greenish grey, sometimes obscurely marbled with a paler shade. The sides and belly are white.

Tetrodon oblongus, Bloch.

A common species in the Bay of Bengal frequently recorded on the "Golden Crown."

The length of the largest specimen is 28 cm.

Tetrodon spinosissimus (Tate Regan).

(Plate i, fig. 2.)

Spheroides spinosissimus, *Tate Regan, Trans. Linn. Soc. Lond.* (2) Zool., vol. xii, part iii, p. 253, pl. 31, fig. 5.

There are two specimens in the collection of the Indian Museum from the Gulf of Martaban, taken by the "Investigator" from a depth of 100 fathoms. They differ from Tate Regan's figure in having very much shorter spines, and one of them has numerous small black dots on the tail.

Several specimens from Hongkong agree closely with the original figure.

The species may be distinguished from all those described by Day, in the group with two nasal apertures on each side, by the uniform pale brown coloration of its dorsal surface.

Tetrodon patoca, Ham. Buch.

Two large specimens were taken by the "Golden Crown," one off the Orissa coast in August, 1908, the other off Gopalpur (Madras Presidency) in September, 1909, the latter measuring 14½ inches in length. The species is common in the estuaries of the Ganges.

There are also several small specimens from Karachi in the collection. In these the pale spots are somewhat obscure. This, however, may be due to the fact that they were originally preserved in formalin.

Tetrodon viridipunctatus, Day.

This appears to be a species of doubtful validity, as Day's descriptions and figures differ from those of *T. patoca* mainly as regards markings. The type is a painted skin, and no other example is known; moreover, the artificial markings on the type do not at all agree with Day's figure. The specimen, therefore, is hardly even of historical value.

Tetrodon immaculatus, Bloch and Schneid.

Several specimens have been recorded from both sides of the Bay. The largest specimen in the collection is 21·5 cm. long. The spines in this species are covered with a thick cuticular investment. None of the specimens in the collection have barred sides.

Tetrodon nigropunctatus, Bloch and Schneid.

This species was not recorded on the "Golden Crown."

There are two specimens in the collection. One is covered with fairly long spines, the other almost naked. In the latter the skin is covered with small, closely set, soft tubercles.

The spiny specimen has no history: the other is from Port Blair in the Andamans.

Tetrodon stellatus, Bloch and Schneid.

Recorded from the "Golden Crown" on several occasions.

In a series of specimens it does not seem possible to draw any real distinction between Günther's varieties α and β, except that variety α probably consists of old and variety β of young individuals.

Of Günther's var. γ (the *Crayracion astrotaenia* of Bleeker), we have examined two small specimens; but we do not feel justified in expressing an opinion, in the absence of intermediate forms, as to its distinctness.

Tetrodon fluviatilis, Ham. Buch.

This species, which appears to be entirely littoral, estuarine and fluviatile, was not obtained by the "Golden Crown," but a large series of specimens has been examined.

There are two well-marked varieties in the river Ganges and on the Indian coasts.

In var. A (figured by Hamilton in his *Fishes of the Ganges*) there are well-defined pale bars across the back, and the caudal fin is more or less definitely spotted or barred. The ventral surface is usually unpigmented.

In var. B (figured by Day in his *Fishes of India*) the markings are much less distinct, the dorsal surface being marbled rather than barred. The ventral surface is usually pigmented.

Var. B has not yet been examined by us from fresh water, but var. A occurs on the Orissa coast as well as far up the Ganges (Sara Ghat).

The two varieties were taken together in a trawl on December 6th, 1909, in brackish water in the Sattermukhi River, Ganges delta.

Genus Tropidichthys, Bleeker.

Key to the Indian species of Tropidichthys.

A.—A large black ocellus present at the base of the dorsal fin.	
(*a*) Pale ocelli on the snout, sides and caudal fin	*T margaritatus.*
(*a'*) Pale ocelli absent from the caudal fin	*T bennettii.*
B.—No dark ocellus at the base of the dorsal fin.	
(*b*) Dark markings consisting solely of delicate longitudinal and transverse lines; no pale ocelli	*T investigatoris.*
(*b'*) Somewhat irregular dark bands present; sides with pale ocelli	*T valentini.*

Bleeker in 1854 referred those species with ridged back and inconspicuous nasal organs to a genus *Tropidichthys*. In 1865 he called the species with these characters *Psilonotus*. Günther regarded them as a subgenus of *Tetrodon* under the name of *Anosmius*, Peters, 1855; and Day treated them as a division of *Tetrodon*.

Tropidichthys margaritatus, Rüpp.

(Plate i, fig. 3.)

There are four specimens in the Museum, all taken by the "Golden Crown" off the Madras coast. The lines under the eye are nearly horizontal, and not radiating. There are no horizontal lines on the lower part of the head, and the small ocelli on the tail show a tendency to run together and form ventral bars. Those on the ventral surface are very faint, if they can be distinguished at all.

Tropidichthys investigatoris, sp. nov.

(Plate i, fig. 4.)

Two specimens from the Andamans (St. 239 of the "Investigator") at a depth of 55 fathoms.

D. 9-10. P. 15. A. 10. C. 11.

Outline of back distinctly angular, the highest point being just above the gill-opening. Depth of body very variable. The whole of head and body, except the tail, covered with small spines which lie parallel to the skin. Each spine with two roots.

No dark spot at base of dorsal fin. Fins practically colourless. Back and sides pale brown. Three narrow somewhat sinuous dark lines crossing the snout in front of the eye, the two posterior ones bending inwards towards the orbit; a fourth line joining the orbits near the centre; at least one similar line across the

back; two or three transverse lines on upper part of each side behind the pectoral; several short vertical lines beneath the eye. Ventral surface cream-coloured.

II.—Suborder *PEDICULATI.*

LIST OF THE PEDICULATI OF INDIAN SEAS.

Fam. LOPHIIDAE.

1. Lophius indicus.†§
2. ,, gracilimanus.†§
3. ,, mutilus.†§[1]
4. ,, lugubris.†§
5. ,, triradiatus.†§

Fam. CERATIIDAE.

6. Lophodolus indicus.†§
7. Melanocoetus sp.§
8. Ceratias bispinosus.§
9. Oneirodes glomerosus.†§

Fam. ANTENNARIIDAE.

10. Chaunax pictus.§
11. ,, apus.†§
12. Antennarius hispidus.*
13. ,, nummifer.
14. ,, commersonii.§

Fam. MALTHIDAE.

15. Malthopsis lutea.†§
16. ,, triangularis.†§
17. Halieutaea indica.*†§
18. ,, nigra.†§
19. ,, coccinea.†§
20. ,, stellata.*†§
21. ,, fumosa.†§
22. Halicmetus ruber.†§
23. Dibranchus nasutus.†§
24. ,, micropus.†§
25. ,, nudiventer.†§

Of the Indian Pediculati, out of a total of 25 species, 20 are deep-sea forms. Only three have been taken by the "Golden Crown," *viz.*, *Antennarius hispidus*, *Halieutaea stellata* and *H. indica*. The last is described as a new species. All the Indian species are, however, represented in the collection of the Indian Museum. The deep-sea forms of which the types are in this collection are fully described either in Col. Alcock's *Descriptive Catalogue of Deep-Sea Fishes in the Indian Museum*, or in Capt. Lloyd's appendix,[2] and are figured in the *Illustrations of the Zoology of the R.I.M.S. "Investigator."*

Key to the Indian Families and Genera of Pediculati.

I.—Head and body depressed, more or less disk-like.

A.—Gill opening in lower axil of pectoral.

Family I, LOPHIIDAE.

Genus *Lophius*.

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[1] This and other species of Lophiidae which have the second portion of the spinous dorsal obsolescent are placed by Goode and Bean in a new genus *Lophiodes*: see "Oceanic Ichthyology," *Bull. U. S. Nat. Mus.*, 1895, p. 537.

[2] *Mem. Ind. Mus.*, vol. ii, No. 3 (1909).

B.—Gill opening above pectoral.

Family II, MALTHIDAE.

a.—A soft dorsal present.

(*a*) Palate edentulous; 2 gills — *Dibranchus.*

(*a'*) Palate edentulous; $2\frac{1}{2}$ gills — *Halieutaea.*

(*a''*) Teeth on palate and vomers — *Malthopsis.*

b.—No soft dorsal — *Halicmetus.*

II.—Head and body compressed or rounded.

A.—Pectoral fin straight.

Family III, CERATIIDAE.

a.—Skin smooth.

(*a*) A pair of cephalic spines; a jointed dorsal filament situated behind the head . — *Lophodolus.*

(*a'*) Dorsal filament on snout . . — *Melanocoetus.*

(*a''*) Two dorsal filaments — *Oneirodes.*

b.—Skin covered with minute prickles .. — *Ceratias.*

B.—Pectoral fin distinctly elbowed.

Family IV, ANTENNARIIDAE.

(*a* Body not much compressed; spinous dorsal consisting of 1 or 2 unprotected tentacles — *Chaunax.*

(*b*) Body compressed and elevated; spinous dorsal consisting of 3 spines, of which the first is tentacular . — *Antennarius.*

Family MALTHIDAE.

Genus HALIEUTAEA, Cuv. & Val.

Key to the Indian species of Halieutaea.

I.—Under surface of disk covered with perfectly smooth, glandular, nearly transparent skin.

Five rays in the dorsal fin — *H. fumosa.*

II.—Under surface of disk bearing minute stellate spines or granules covered with skin which is opaque or slightly translucent.

A.—Four rays in the dorsal fin.

(*a*) Roof of tentacular cavity extending forward as far as the edge of the disk; caudal and pectoral fins not edged with black — *H indica.*

(*a'*) Roof of tentacular cavity not extending to the margin of the disk; caudal and pectoral fins edged with black	*H. stellata.*
B.—Five rays in the dorsal fin.	
(*b*) Disk flat	*H. nigra.*
(*b'*) Disk distinctly convex in front ..	*H. coccinea.*

Halieutaea indica, sp. nov.

(Plate ii, fig. 4.)

H. stellata, *Day* (nec *Kühl*), *Faun. Brit. Ind.*, Fishes, p. 234, fig. 85.

D. 4. V. I, 5. A. 4. P. 13. C. 9.

Tail, excluding the caudal fin, from $\frac{1}{4}$ to $\frac{1}{3}$ length of disk. Caudal usually slightly longer than the tail, occasionally of the same length. Length and width of disk approximately equal. Dorsal surface covered with numerous strong subequal spines, many of which are bifid; at the edge many are trifid. Most of the spines have four roots; at the edge of the disk they project freely and are accompanied by delicate cuticular processes. The anterior extremity of the roof of the tentacular cavity reaches or is slightly in advance of the anterior extremity of the disk, and the aperture of the cavity is vertical, so that the cavity is concealed from above. The strong spine at each side of it projects beyond the margin of the disk. Superciliary ridge with strong spines. Interorbital space equals or slightly exceeds diameter of eye. The ventral surface with minute scattered spines.

Colour (in spirit). Dorsal surface white, densely covered with very minute black dots, which are grouped together in places to form thin lines and reticulated patterns. Ventral surface white (somewhat translucent) with scattered minute black and opaque white dots. Pectoral fins colourless, caudal fin clouded with grey, occasionally with white, vertical bands. Colour of dorsal surface of living specimens pink.

This is undoubtedly the species figured by Day as *H. stellata* of Kühl, but it differs from the latter species, amongst other characters, in the following points:—

(1) The spines on the dorsal surface are less strongly developed.
(2) The extremity of the roof of the tentacular cavity extends at least as far forwards as the edge of the disk.

Professor Max Weber, who has been kind enough to examine a specimen, agrees with us in regarding this species as distinct.

Halieutaea stellata, Kühl.

(Plate ii, fig. 3.)

D. 4. V. I, 5. A. 4. P. 13. C. 9.

Tail, excluding the caudal fin, $\frac{1}{3}$ length of disk. Caudal fin nearly the same length as the tail.

Disk distinctly broader than long. Dorsal surface covered with stout stellate spines, most of which have more than four roots. They vary considerably in size, but none are very small. Over the greater part of the disk the spines are single At the edge, where they are accompanied by numerous cuticular processes, they have at least four sharp points. The anterior extremity of the roof of the tentacular cavity *does not reach the edge* of the disk. The *aperture of the cavity slopes downwards and forwards*, so that it is partly visible from above. The disk is much flatter than in *H. coccinea*. Superciliary ridge with strong simple spines. Interorbital space distinctly broader than diameter of eye. Ventral surface with very minute and widely scattered spines.

Colour (in spirit). Dorsal surface pinkish grey with numerous black spots, the centre of each of which is much darker than the periphery. These spots tend to be arranged in eight groups, four on each lateral half of the disk. The most marked group is that on each side of the centre of the mid-dorsal region. The whole of the dorsal surface is covered with minute pigment cells; the ventral surface white. In life the ground colour of the dorsal surface is a deep red.

Pectoral and caudal fins white, broadly edged with black. Dorsal fin black, edged with white.

This species appears to reach a much larger size than *H. indica*. In some respects it resembles *H. coccinea*, but the disk is much flatter, the spines on the dorsal surface are stouter, and those on the ventral surface are smaller or more widely scattered. The coloration is also different, and there are only 4 rays in the dorsal.

We had proposed to describe this species as new, but notes that Prof. Max Weber has been kind enough to send convince us that we would have been wrong in so doing.

Family ANTENNARIIDAE.

Genus ANTENNARIUS, Cuv.

Key to the Indian species of Antennarius.

I.—Skin devoid of spines	
Skin bearing numerous foliaceous processes	*A. marmoratus.*
II.—Skin covered with minute spines.	
A.—Sides pale with numerous dark streaks, which radiate from the eye and from the pectoral fin	*A. hispidus.*
B.—Sides variously mottled or spotted.	
(*b*) First dorsal spine (tentacle) longer than the second	*A. commersonii.*
(*b'*) First dorsal spine not longer than the second	*A. nummifer.*

Antennarius hispidus, Bloch and Schneid.

Two specimens have been taken by the "Golden Crown" off the Ganjam coast. There are several others in the collection of the Indian Museum, one of which from

Dhappa near Calcutta (if the locality is correct) must have been taken in brackish water.

The series examined exhibit considerable variation as regards marking, but all the specimens differ from Günther's figure,[1] in that the markings on the posterior part of the sides of the body take the form of streaks instead of spots. There is considerable variation in the length of the tentacles and in the form and size of the tuft at its extremity. Day's figure is taken from a shrivelled and distorted specimen still in the collection of the Indian Museum. The body is much deeper than he represents it.

Antennarius nummifer, Cuv.

(Plate i, fig. 5.)

If Günther[2] is correct as to the synonymy of this species, Day's figure in the *Fishes of India*[3] represents not it but a variety of *A. commersonii*, Günth. There is, however, a specimen in the collection of the Indian Museum that agrees fairly well with Bleeker's figure[4] of *A. coccineus*, which Günther regards as a representation of the true *A. nummifer*. It is by no means improbable that these three forms, as well as several others,[5] will ultimately prove to be conspecific.

Antennarius commersonii (Lacép.).

Day's specimen in the collection of the Indian Museum, although apparently not the one he figured as *A. nummifer* in the *Fishes of India*, belongs perhaps to Günther's *A. commersonii* var. B. The spots, however, are less numerous than in the individuals figured by the latter author. There are several young specimens in the collection (length from 28 to 42 mm.) which agree fairly well with the definition and figure of var. A of the same species, except that the first dorsal spine is distinctly shorter than the second. Perhaps they are the young of that form. These specimens are from Bombay.

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[1] "Die Fische der Südsee," vol. v, *Journ. Mus. God.*, Hamburg, 1876—81, pl. 99, fig. A.

[2] *Ibid.*, p. 163, pls. 100—106.

[3] Plate lix, fig. 2.

[4] *Atlas Ichthyologique*, vol. v, pl. cxcvii, fig. 2 (1865).

[5] Notably *A. tridens* (Schlegel); see Pietschmann in *Ann. k. k. Naturh. Hofmus.*, vol. xxiii, p. 1, pl. i (Vienna, 1909).

PART IV.—ON A COLLECTION OF INDIAN PLEURONECTIDAE.

By J T. JENKINS, *D.Sc. (Wales), Superintendent, Lancashire and Western Sea Fisheries.*

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 araeometer 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 $\frac{2}{1}\frac{1}{4}\frac{2}{2}$	Off Elephant Pt., Arakan Coast, "Golden Crown"	18·5 cms.
F $\frac{3}{1}\frac{4}{4}\frac{3}{8}$	Puri beach, Dr. N. Annandale	20·8 cms.
F $\frac{3}{1}\frac{4}{4}\frac{3}{9}$	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 $\frac{3}{1}\frac{4}{4}\frac{4}{0}$	Balasore Bay, "Golden Crown"	24·9 cms.
F $\frac{3}{1}\frac{4}{4}\frac{4}{2}$	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 $\frac{3}{1}\frac{4}{4}\frac{4}{3}$	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 $\frac{2}{1}\frac{1}{4}\frac{4}{5}$ or F $\frac{3}{1}\frac{4}{4}\frac{4}{2}$, P_4) 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 $\frac{21\frac{4}{1}3}{1}$	Off Elephant Point, Arakan Coast, "Golden Crown"	12·9 cms.
F $\frac{3441}{1}$	Puri beach, Dr. N. Annandale	16·6 cms.
F $\frac{3442}{1}$	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	*P. arsius*, Bleeker.
	Dorsal fin rays 70 or less	*P. javanicus*, Bleeker.
Teeth minute	Longest dorsal rays at commencement of posterior half of fin ..	*P. russellii*, Gray.
	Anterior dorsal rays elevated	*P. triocellatus*, 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	*P. arsius.*
3438	208	90	2·3	71	6	,,
343915	271	120	2·2	74	6	,,
,, 15*a*	246	104	2·4	75	6	,,
,, 15*b*	258	108	2·4	75	6	,,
,, 15*c*	261	115	2·3	73	6	,,
,, 15*d*	233	95	2·5	74	6	,,
,, 15*e*	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	*P. arsius.*
,, 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	*P. javanicus.*
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	*P. russellii.*

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 3426*a*,	♀	,, ,, ,, ,, ..	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 Alcock[1] 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 Johnstone[3] 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 $\frac{41}{1}\frac{83}{}$, 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 Alcock[4] 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 3436*a*	,, ,, ,, ...	10·1 ,,
F $\frac{41}{1}\frac{80}{}$, $\frac{41}{1}\frac{81}{}$, $\frac{41}{1}\frac{82}{}$, $\frac{41}{1}\frac{84}{}$,	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, 4*a*, 4*b*.)

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

D. 76. V 5. P. 11. A. 61. L.l. *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 $\frac{41}{1}\frac{79}{}$, Quilon, Trivandrum Museum, R. S. N. Pillay coll.
F $\frac{41}{1}\frac{86}{}$, 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.

	Length.
F $\frac{82}{1}\frac{5}{}$, Off Malabar Coast, 68 fathoms, Marine Survey	12·6 cms.

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.

		Length.
F 3431,	Ganjam Coast, "Golden Crown," March, 1909.	19·7 cms.
F 3431*a*,	,, ,, ,,	16·2 ,,

Plagusia marmorata, Bleeker.

F $\frac{41}{1}\frac{77}{}$, 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 $\frac{11}{1}\frac{40}{}$, Station 332, Indian Marine Survey, 279 fathoms.
Lat. N. 10° 21′ Long. E. 92° 46¼′

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, Feb., 1909	Length. 31·5 cms.
F 3445, Off Puri, Orissa Coast, September, 1908	23·0 ,,
F 3445*a*, ,, ,, ,, ,,	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 $\frac{41}{1}\frac{85}{}$, Trivandrum, Trivandrum Museum.
F $\frac{41}{1}\frac{87}{}$, ,, ,, ,,

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 $\frac{41}{1}\frac{88}{}$) 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 $\frac{41}{1}\frac{78}{}$, Trivandrum, Trivandrum Museum.

F $\frac{41}{1}\frac{88}{}$, ,, ,, ,, (var. *punctatus*).