

Dimensions of the type, an adult female in alcohol, somewhat elongated by compression in the stomach of its original collector:—

Head and body 120 millim., tail 68, hind foot 21, ear (above crown) 12; heel to front of last foot-pad 9·3; length of last foot-pad 2·2; hairy part of sole 7.

Skull: basal length 26·5, tip of nasals to back of interparietal 27; greatest breadth 16; nasals, length 9·1, breadth 3·7; interorbital breadth 4; interparietal, length 4, breadth 8·3; diastema 8; length of upper molar series 6·9; anterior palatine foramina 6.

Hab. Kia-ting-fu, West Sze-chuen (*A. E. Pratt, Esq.*).

XV.—*Natural History Notes from H.M. Indian Marine Survey Steamer 'Investigator,' Commander R. F. Hoskyn, R.N., commanding.*—Series II., No. 1. *On the Results of Deep-sea Dredging during the Season 1890-91.* By J. WOOD-MASON, Superintendent of the Indian Museum, and Professor of Comparative Anatomy in the Medical College of Bengal, and A. ALCOCK, M.B., Surgeon I.M.S., Surgeon-Naturalist to the Survey.

[Continued from p. 34.]

Family **Macruridæ.**

MACRURUS, Bl.

Subgenus **CÆLORHYNCHUS, Giorna.**

24. *Macrurus quadricristatus*, sp. n.

B. 6. D. 11. A. circ. 90. P. 16. V. 7.

Head like that of *Trachyrhynchus* and much exceeding the rest of the trunk in all three dimensions; tail very low, compressed, and tapering.

The head is more than three times the rest of the trunk in length, and nearly one third the total. The depressed snout is exceedingly long and acutely triangular; its length, which is nearly half that of the head, is more than twice the major diameter of the large oval eye and twice the width of the interorbital space across the middle; six sevenths of its total

extent is preoral. The suborbital crest is strongly salient and serrated and terminates acutely at the preopercular angle. The posterior half of the head is longitudinally traversed on each side by two strongly serrated ridges, which are either bony crests or the modified spines of scales that are indetachably adherent to the bones beneath; one extends from the interorbital space to the occiput, the other from the supra-orbital ridge to the shoulder.

Nostrils situated immediately in front of the eye; the posterior is very large.

The mouth is a small, completely inferior, crescentic orifice; its front limit is in the vertical through the anterior nostril, and the maxilla reaches a little behind the vertical through the middle of the eye. Villiform teeth in bands in the jaws, the outer row in the upper jaw slightly enlarged. Barbel slender, less than half the eye in length.

Gill-opening rather wide, the membranes united quite anteriorly; first gill-cleft very narrow; the gill-rakers are small tubercles; pharyngo-branchial membrane quite black.

Body and head except the glosso-hyal region covered with acutely spinigerous scales; those on the body are of one uniform size throughout, measuring rather over 2 millim. in either diameter in the specimen examined.

A scale from the head bears about three longitudinal serrate or spinate carinæ; one from the side of the body bears five slightly divergent antero-posterior ridges, which are armed with long imbricating aculeate spines, the last in each ridge projecting far beyond the edge of the scale. There are 6 or $6\frac{1}{2}$ scales in a row between the posterior limit of the first dorsal fin and the lateral line. No scaleless fossa on the nape. The first spine of the first dorsal fin is very small, the second is smooth throughout. The interval between the first and the very inconspicuous second dorsal is hardly half the extent of the base of the first. Pectorals narrow and pointed, their length slightly exceeds that of the postorbital portion of the head. Ventrals with the outer ray prolonged.

Stomach large, siphonal; many long slender cæca in a thick cluster round the pylorus; apparently no air-bladder.

Colours in life:—Chocolate; body and tail with numerous broad black cross bands, which do not reach the mid-abdominal line.

Two specimens, measuring one 7, the other 4.5 inches, from Station 115, 188 to 220 fathoms, and a third small specimen from Station 116, 405 fathoms.

Subgenus *MACRURUS*, Bl.

25. *Macrurus nasutus*, Gthr.

Macrurus nasutus, Günther, 'Challenger' Deep-sea Fishes, p. 132, pl. xxx. fig. B.

A specimen of this Japanese form was taken in the Laccadive Sea, Station 107, at 738 fathoms.

26. *Macrurus Wood-Masoni*, Alcock.

Macrurus Wood-Masoni, Alcock, Ann. & Mag. Nat. Hist., Oct. 1890, p. 301.

A male nearly 18 inches long from Station 109, 738 fathoms.

27. *Macrurus investigatoris*, Alcock.

Macrurus investigatoris, Alcock, Ann. & Mag. Nat. Hist., Nov. 1889, p. 391.

Numerous specimens from Station 115, 188 to 220 fathoms, and from Station 120, 240 to 276 fathoms.

28. *Macrurus semiquincunciatus*, Alcock.

Macrurus semiquincunciatus, Alcock, Ann. & Mag. Nat. Hist., Nov. 1889, p. 392.

One specimen from Station 120, 240 to 276 fathoms.

29. *Macrurus macrolophus*, Alcock.

Macrurus macrolophus, Alcock, Ann. & Mag. Nat. Hist., Nov. 1889, p. 394.

Two fine specimens from Station 120, 240 to 276 fathoms.

The type appears to have sustained an injury to the tail, as the relative length of the head to the body in these specimens is about 1 : 4½.

30. *Macrurus Petersonii*, sp. n.

B. 7. D. 10-11. A. circ. 135. P. 18-20. V. 8.

Length of head about one fifth total and about seven ninths of the entire head and trunk. The length of the subtriangular snout is equal to the major diameter of the eye, slightly in excess of the width of the interorbital space, and slightly over one fourth the length of the head.

Mouth inferior, large, the maxilla reaching behind the

vertical through the middle of the orbit. Villiform teeth in a broad band in the upper and a narrow band in the lower jaw, the outer row in the upper jaw considerably enlarged. Barbel a little longer than the eye.

Gill-openings wide, the gill-membranes separate; pharyngo-branchial membrane partially pigmented.

Body and head, except the glosso-hyal region, covered with thin, imbricating, deciduous scales of uniform size, which are spinigerous except in a small area situated immediately behind the base of the first dorsal fin, where they are enlarged, circular, and quite smooth. A scale from the side of the body bears from 15 to 30 equal, distant, semi-erect spinelets in a shallow quincuncial arrangement. There are six rows of scales between the posterior border of the first dorsal fin and the lateral line.

The dorsal fins are separated by an interval equal to at least twice the basal extent of the first; the first spine of the first dorsal is rudimentary, the second, which is hardly prolonged, is closely and finely serrated. The anal fin begins immediately behind the vertical through the last ray of the first dorsal. Pectorals narrow, pointed; their length equals that of the postorbital portion of the head. Ventrals short, only a little longer than the barbel.

The vent is situated between the ventrals immediately behind their base, the intestine forming a wide loop behind it.

Colours in the fresh state:—Head and iris silvery; body chocolate, with an underlying silvery lustre; throat and belly black; first dorsal fin black, with white base and tip.

Two specimens (one an adult ovigerous female), 9.5 inches long, from Station 115, 188 to 220 fathoms.

I have named this species after Mr. Peterson, the gunner of the 'Investigator,' whose unabating zeal on behalf of our zoological collections led on one occasion to his getting his fingers almost amputated by the dredging-wire, and on another occasion to his falling overboard almost into the mouth of a shark.

Subgenus *MYSTACONURUS*, Gthr.

31. *Macrurus heterolepis*, Alcock.

Macrurus heterolepis, Alcock, Ann. & Mag. Nat. Hist., Nov. 1889, p. 396.

Very numerous specimens of all sizes were taken at Station 115, 188 to 220 fathoms.

There are seven branchiostegal rays; the mouth-cleft

reaches nearly to the vertical through the posterior border of the orbit; the pectorals reach to the sixth anal ray.

Colours in life:—Head and iris silvery; body pinkish brown, with a silvery sheen; throat and abdomen black, first dorsal, ventrals, and pectorals with black base and white tips, second dorsal and anal white.

Subgenus MALACOCEPHALUS, Gthr.

32. *Macrurus levis*, Lowe.

One specimen of this widely ranging deep-sea form was taken at Station 115, in 188 to 220 fathoms.

It measures a little more than a foot in length.

BATHYGADUS, Gthr.

33. *Bathygadus longifilis*, Goode & Bean.

Bathygadus longifilis, G. & B., Proc. U. S. Nat. Mus. viii. p. 599; and Günther, 'Challenger' Deep-sea Fishes, p. 157.

Hymenocephalus longifilis, Vaillant, Exp. Sci. Trav. et Talism., Poiss., pp. 218-221, pl. xxiii. fig. 1.

Bathygadus longifilis, Alcock, Ann. & Mag. Nat. Hist., Oct. 1890, p. 202.

A very fine and perfect male specimen, 13.25 inches long, was taken at Station 113, in 683 fathoms. It has the formula

B. 7. D. 12/130. P. 14. V. 8. L. lat. 150.

L. tr. 25 through vent.

The barbel is nearly two thirds the length of the head and much longer than the barbel of the large female specimen caught last year in the Laccadive Sea.

Family Ateleopodidæ.

ATELEOPUS, Schleg.

34. *Ateleopus indicus*, sp. n.

B. 8. D. 8. A. + C. 76. P. 12. V. 2.

Soft tissues almost gelatinous, skeleton cartilaginous.

Head broad and acutely conical, body and tail much compressed and tapering.

The length of the head is equal to that of the rest of the trunk and is contained about $5\frac{3}{4}$ times in the total; the

greatest height of the body, at the shoulder, is three fourths the length of the head.

The broad, depressed, projecting, marginally inflated snout is one third of the head in length and twice the major diameter of the oval eye; at least half its extent is preoral. The mouth is a small, quite inferior, crescentic orifice, in width equal to the diameter of the eye, its angle barely reaching the vertical through the anterior border of the orbit, though the maxilla reaches nearly to the vertical through the middle of the orbit; it is strongly protractile downwards, and looks as if adapted for suction. There appears to be a narrow band of very minute teeth in the inner aspect of the upper jaw; but the lower jaw is quite toothless.

The nostrils, which are very large, are situated superiorly immediately in front of the eye.

The gill-openings are narrow, the membranes being united to the isthmus anteriorly; gill-rakers short, coarse, cartilaginous.

Head, body, and fins uniformly invested with a soft, thick, gelatinous, scaleless skin.

A single dorsal fin, the base of which is about three fourths

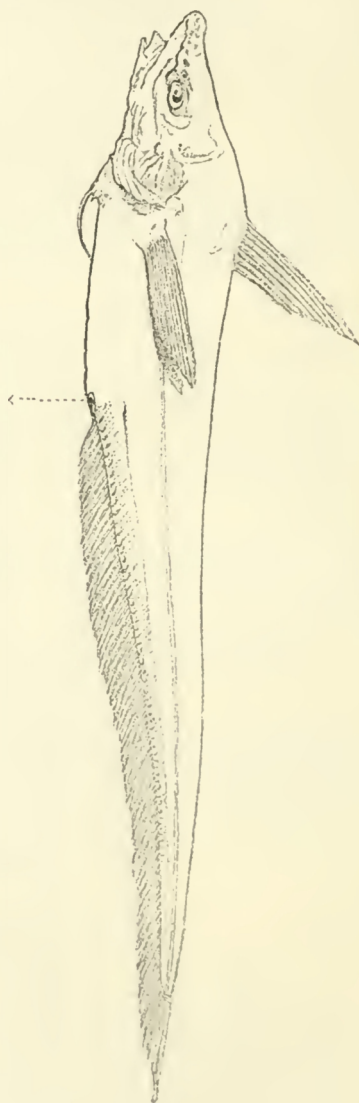


Fig. 3.

of a snout-length in extent, beginning almost in the vertical through the base of the pectoral; its height, which about equals the length of the latter, is six sevenths of the length of the head. The anterior rays of the anal fin are barely two thirds the body-height at their origin, the succeeding rays slightly increase in length to the confluence with the caudal; the latter is a little more than half a head-length in extent. The ventrals are jugular; each is in the form of a stiff, slightly flexible, cartilaginous rod, which is formed of two stout rays coherent throughout their whole extent, and not reaching halfway to the vent; a small detached tubercle posterior to this represents a rudimentary third ray.

Stomach long, simple; intestine short and wide; no pyloric cæca; no air-bladder.

Colours in the fresh state:—Mottled dark brown to purple-black; fins black, except the ventral.

One specimen, a foot long, from Station 115, 188 to 220 fathoms.

It will be remembered that the family Ateleopodidæ has hitherto been represented by a single species, *Ateleopus japonicus*, Schleg., from Japan. It is therefore highly interesting to find another and very closely allied species in the Bay of Bengal.

Family Pleuronectidæ.

APHORISTIA, Kaup.

35. *Aphoristia septemstriata*, sp. n.

D. 97. A. 80. C. 12. V. 4. L. lat. 92-94.

L. tr. 40.

The length of the head is not quite one fifth, the height of the body a little more than one fourth, of the total length, without caudal. The length of the snout is about $\frac{2}{3}$ that of the head. Eyes situated almost in contact and almost between the same verticals in the anterior third of the head, their diameter being about one eighth the length of the head. On the left side is a conspicuous tubular nostril on the upper lip, and a small circular nostril in front of the interorbital space; on the right side no nostrils are visible.

Cleft of mouth slightly oblique, its angle hardly reaches behind the vertical through the anterior border of the lower orbit; small teeth on the blind side only.

Gill-openings very narrow; branchiostegal rays and membrane prolonged beyond the opercular edge.

Entire body and head, including the snout, jaws, and eyes up to the corneal margin, covered with small, adherent, ctenoid scales; no lateral line.

The dorsal fin begins above the middle of the upper eye: its longest rays, which are just in advance of the middle of the fin, are a little more than two fifths of the body-height in length and not quite so long as the corresponding anal rays. The distance from the tip of the snout to the origin of the anal fin is about equal to the body-height. The length of the caudal is contained about $7\frac{1}{2}$ times in the total. The ventrals are separated from the anal by an interval equal to the length of the snout.

Colours in the fresh state:—Left side warm brown, with seven complete rather broad cross bands.

Two specimens, nearly 4 inches long, from Station 115, 188 to 220 fathoms.

Order PHYSOSTOMI.

Family Sternoptychidæ.

ARGYROPELECUS, Cocco.

36. *Argyropelecus*, sp. prox. *hemigymnus*, Cocco.

A small specimen was taken at Station 118, in 1803 fathoms; it agrees very closely with *Argyropelecus hemigymnus*, Cocco, from which it differs most conspicuously in having the luminous spots in a continuous unbroken series from the head almost to the base of the caudal; the tail also is not so abruptly constricted off from the abdomen.

This, so far as I know, is the first record of *Argyropelecus* from the Indo-Pacific.

POLYIPNUS, Gthr.

37. *Polyipnus spinosus*, Gthr.

Polyipnus spinosus, Gthr., 'Challenger' Deep-sea Fishes, p. 170, pl. li. fig. B.

Polyipnus spinosus, Alcock, Ann. & Mag. Nat. Hist., Nov. 1889, p. 398.

Eight fine specimens were taken at Station 115, in 188 to 220 fathoms. They have the formula

B. 6. D. 12-13. A. 15-16,

and their length ranges from 2 to 2.5 inches. The scales are quite membranous: one from the side of the trunk measures

7.5 millim. in its vertical and about 2.5 millim. in its antero-posterior diameter; one from the middle of the tail measures about 6.25 millim. in its vertical and not quite 2 millim. in its antero-posterior diameter.

GONOSTOMA, Rafinesque.

38. *Gonostoma elongatum*, Gthr.

Gonostoma elongatum, Günther, 'Challenger' Deep-sea Fishes, p. 173, pl. xlv. fig. B.

One fine mature male was taken at Station 107, in 738 fathoms. It measures 7.75 inches in length. It has the formula

D. 13. A. 30. P. 12. V. 8.

There are no scales, and the fish in the fresh state is uniformly enveloped in thick tenacious mucus. In addition to the luminous organs described by Dr. Günther there is an elliptical organ of moderate size in the middle of the posterior border of the preoperculum on each side, and one of similar shape and size on each side of the mandibular symphysis. There are six large pyloric cæca.

Colours in the fresh state:—Jet-black; luminous organs bright rose-pink, with silvery margins.

CHAULIODUS, Bl. Schn.

39. *Chauliodus Sloani*, Bl. Schn.

Fine specimens of this well-known bathybial, or nocturnal pelagic, type were taken in the Laccadive Sea, the Andaman Sea, and the Bay of Bengal. One specimen taken at Station 109, 738 fathoms, was a mature female with the enlarged ovaries extending on each side along the entire length of the abdominal cavity, the ova being smallish (a little over half a millimetre in diameter) and very numerous.

The stomach of this specimen was deeply siphonal, the cæcal prolongation extending more than one third the length of the body-cavity. There were three moderate-sized pyloric cæca.

Family Scopelidæ.

HARPODON, Le Suer.

40. *Harpodon squamosus*, sp. n.

B. 17. D. 12-14. A. 13-15. P. 10. V. 9.

Tissues extremely delicate; the paired fins long, feathery, fragile.

The length of the head, measured to the edge of the operculum and not to the end of the produced branchiostegal rays and membrane, is about one fifth, the height of the body between one sixth and one seventh of the total, without the caudal. The vertex of the head with numerous mucous pores.

Snout broad, depressed; its tip is formed by the projecting lower jaw, and its length, including the mandibular element, slightly exceeds the major diameter of the eye, which is about one eighth the length of the head as above limited. The width of the flat interorbital space is twice the vertical diameter of the eye.

Mouth-cleft oblique, wide; the maxilla is nearly two thirds the length of the head as above limited. Introrsely-depressible cardiform teeth in bands in both jaws; one series in the lower jaw enlarged, with barbed hastate tips, and one series in the upper jaw less enlarged; in each palatine an outer irregularly-double row of teeth, of which the anterior and external are enlarged, and a very short inner irregularly-double row; hyoid bone and all the branchial arches toothed.

Gill-openings extremely wide; the branchiostegal rays and membrane much produced beyond the operculum.

Body, posterior part of head, and cheeks covered with deciduous cycloid scales, which are less deciduous on the posterior half of the tail.

The dorsal fin arises within the anterior half of the body (measured with the caudal) just posterior to the vertical through the base of the ventrals. The anal arises about an eye-length behind the vent, which is nearly twice as far from the gill-opening as from the base of the caudal. The fimbriated adipose dorsal is situated far back, above the posterior half of the anal. Caudal deeply forked, with an inconspicuous median lobe. Ventrals long, delicate, and feathery, the longest (middle) rays almost reach to the vent in the adult. Pectorals very narrow and fragile; they arise almost on the same plane with the eyes, and their longest (middle) rays do not quite reach to the dorsal fin.

Stomach with a very long caecal sac; eighteen large pyloric caeca in a pectinate arrangement.

Colours in life:—Hyaline grey; paired fins and caudal black, visceral peritoneum black, buccal and branchial cavities partially and slightly pigmented.

Numerous specimens, of which several are mature females with gravid ovaries and two appear to be sexually mature males, from Station 120, 240 to 276 fathoms.

The mature females are from 9 to 10·5 inches long, the males from 7·5 to 8·5 inches long.

BATHYPTEROIS, Gthr.

41. *Bathypterois Guentheri*, Alcock.

Bathypterois Guentheri, Alcock, Ann. & Mag. Nat. Hist., Dec. 1889, p. 450.

One well-preserved specimen from Station 112, 561 fathoms.

SCOPELUS, Gthr.

42. *Scopelus engraulis*, Gthr.

Scopelus engraulis, Günther, 'Challenger' Deep-sea Fishes, p. 197, pl. li. fig. C.

Two specimens (one young, the other a mature female nearly 5.5 inches long) from Station 115, 188 to 220 fathoms.

There are seven large pyloric cæca, and an air-bladder is apparently absent.

In the young specimen, which is not quite 2.5 inches long, the diameter of the eye is still contained $4\frac{1}{2}$ times in the length of the head, and is greater than the width of the inter-orbital space.

NEOSCOPELUS, Johnson.

43. *Neoscopelus macrolepidotus*, Johnson.

Neoscopelus macrolepidotus, Johnson, P. Z. S. 1863, p. 44, pl. vii.

Scopelus macrolepidotus, Günther, Cat. Fish. v. p. 414, and 'Challenger' Deep-sea Fishes, p. 196.

Four fine specimens from Station 115, 188 to 220 fathoms, all sexually mature.

Colours in the fresh state:—Head, iris, sides of tongue, and belly burnished silver, dorsum of body plum-purple, flanks golden.

Family Stomiatiidæ.

STOMIAS, Cuvier.

44. *Stomias elongatus*, sp. n.

D. 19. A. 21. P. 6. V. 6.

Body compressed, low, its height being one fifteenth of the total without the caudal; the length of the head measured from the tip of the mandible is about one tenth of the same.

Eye circular, its diameter not quite one fourth of the head-length, and equal to the width of the interorbital space.

The widely-distensible mandible projects much beyond the upper jaw. Five large, distant, fixed fangs in each premaxilla, as well as a freely movable one near the symphysis; a few minute, inconspicuous, distant denticulations in the maxillæ; eight or nine moderate-sized laterally-projecting fangs on each limb of the mandible, decreasing in size from before backwards; a fang on each side of the vomer, and two small, distant, incurved teeth on each palatine.

The barbel, which is as long as the caudal fin, is trifid at its extremity. Opercular bones membranaceous.

No scales; the body, which is coated with tenacious mucus, is mapped out into silvery hexagonal areolæ. There are on each side along the ventral surface of the body two rows of small luminous organs; the internal extends from the mandibular symphysis to the base of the caudal, but, owing to the denudation of the integuments of the tail, the number of its constituents cannot be determined beyond the origin of the anal fin, up to which point there are 57, namely, to the base of the pectorals 9, to the base of the ventrals 51, to the origin of the anal 57; the external extends from the base of the pectoral to the origin of the anal, and numbers 45. There is a single luminous organ on the barbel and a row along the base of the branchiostegal rays. The dorsal fin arises at the level of the third anal ray. Caudal pointed, its length is about one twelfth of the total. The pectorals, which arise near the ventral profile, are equal in length to the caudal. The ventrals are very long, reaching to the sixth anal ray.

Colours in the fresh state:—Jet-black, with silvery hexagonal markings.

One specimen, a little over 5 inches long, from Station 107, 738 fathoms.

Family Clupeidæ.

BATHYCLUPEA, gen. nov.

Head and body compressed, the former with the mucous cavities highly developed. Abdomen neither serrated nor keeled. Mouth with the lower jaw strongly prominent. Small teeth in the jaws, palatines, and vomer. Gill-openings very wide, the membranes entirely separate; 7 branchiostegals; pseudobranchiæ large. Body covered with large deciduous scales; lateral line distinct. Dorsal fin situated in the posterior half of the body, arising behind the origin of the elongate anal. Pectorals very large, entire. Ventrals small or rudimentary, *subjugular in position*. Caudal forked. Pyloric appendages in moderate number.

45. *Bathyclupea Hoskynii*, sp. n.

B. 7. D. 10. A. 33. P. 29. V. 6. L. lat. circ. 33.

Soft tissues fragile, bones thin.

Head and body compressed; the height of the latter almost exactly equals the length of the former, which is one third the total without the caudal. The median abdominal line is neither keeled nor serrated. The mucous cavities of the skull are large.

Snout rectangular, formed in front by the lower jaw, which in repose is almost vertical; its length, including the mandibular element, is not quite equal to the diameter of the large lateral circular eye, which is one third the length of the head; the width of the flat interorbital space is half the diameter of the eye. Nostrils small, almost superior.

Mouth wide, its cleft antero-lateral and nearly vertical. The upper jaw, the length of which is two thirds that of the head, has five sixths of its margin formed by the premaxillæ and one sixth by the maxillæ on each side. The last are formed of three parallel longitudinal plates, of which the posterior is slightly movable. Lower jaw excavated beneath by a deep wide mucous channel. Villiform teeth in narrow bands in the premaxillæ, mandible, and palatine, and in an inconspicuous V-shaped patch on the vomer. Tongue large, bilobed.

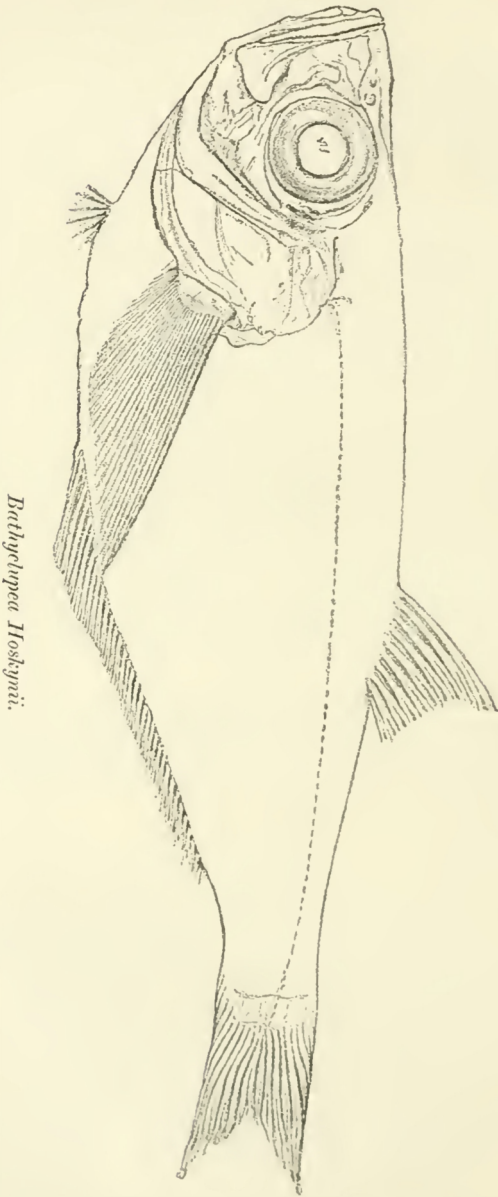
Gill-cleft very wide, the membranes entirely ununited; all the opercular bones well-developed, and the horizontal border of the preoperculum sharply serrated; four gills; the middle gill-rakers on the outer side of the first arch considerably elongated; pseudobranchiæ large.

Head naked.

Body and nape covered with large cycloid scales, deciduous everywhere except on the lateral line. In the largest specimen a scale from the flank measures 10 millim. in the vertical and 7.5 millim. in the antero-posterior diameter. Each scale of the lateral line has a deep pocket on its inner side which opens externally by numerous fine pores.

The dorsal fin commences almost exactly midway between the tip of the snout and the tip of the upper lobe of the caudal fin; the length of its base is equal to that of the snout; it is roughly triangular and its height is a fifth greater than the diameter of the eye. No adipose dorsal. The anal commences about an eye-diameter in advance of the dorsal and extends to within a very short distance (equal to three fourths of an eye-diameter) of the base of the caudal. Caudal

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forked, its length about one sixth of the total. Pectorals



Bathylagepa Hoskynii.

Fig. 4.

very large and long (wing-like), extending to the twelfth

anal ray. Ventrals small or rudimentary, in close contact with one another; the short pubic bones, which are in close apposition throughout, are attached to the under surface of the clavicle above the coracoid articulation and pass downwards with such very slight obliquity that the ventral fins come to have a subjugular position.

Stomach large, with a caecal sac and a bunch of large pyloric appendages. A large air-bladder, from which posteriorly a comparatively long pneumatic duct passes forwards and downwards to the fundus of the (distended) stomach.

Nine abdominal and twenty-two caudal vertebræ.

Colours silvery grey, becoming black on dorsum.

Four specimens (one male and three females), all sexually mature and with the reproductive glands distended, from Station 115, 188 to 220 fathoms. The male is 6.5 inches, the largest female 8 inches in length.

The stomachs of all four distended with small Penæids.

The abnormal position of the ventral fins caused me long to hesitate before bringing this fish within the Physostomous relationship, notwithstanding its unmistakable external and internal Clupeoid characters. It is to be borne in mind, however, that the ventral fins are, if not exactly rudimentary, at any rate very much degenerated organs—the degeneration of the ventrals, the shortening of the abdomen, and the conspicuous hypertrophy of the pectorals being perhaps directly interconnected changes. In this case there is nothing more remarkable in the fact of a degenerated organ having undergone a slight change in position than there is in such an organ finally disappearing, as it has in another Clupeoid, namely *Pristigaster*.

Bathyclupea is further remarkable as being the first Clupeoid reported from the deep-sea; its structural modifications are typically bathybial.

The position of *Bathyclupea* in the family Clupeidæ appears to be between the Clupcina and the Dussumierina.

Family Alepocephalidæ.

ALEPOCEPHALUS, Risso.

46. *Alepocephalus bicolor*, sp. n.

B. 6. D. 21. A. 2S. P. 10. V. 8. L. lat. 62.

L. tr.* $\frac{8}{9}$.

The length of the low head is a little over one fourth, the

* At level of vent.

height of the compressed body nearly one fifth the total without the caudal. The length of the obtusely-pointed depressed snout is contained about $3\frac{1}{2}$ times in that of the head. The eyes, which converge anteriorly, are between one fifth and one sixth of the head-length in diameter, and are more than their own diameter apart. The large nostrils are situated close together immediately in front of the eye.

Mouth-cleft slightly oblique; the maxilla reaches just behind the vertical through the anterior border of the orbit. A row of small teeth in each jaw and on the palatines.

Gill-openings very wide, the membranes entirely separate and overlapping broadly; a great part of the gill-cover is formed by the broad flat branchiostegal rays, which are uncovered by the opercle from their very bases; the opercular bones, which are extremely thin, are invested by the same tough black skin that covers the head; the gill-laminae are coarse and the gill-rakers on all the arches long and lamellar; pseudobranchiae small.

Head naked, body covered with large cycloid scales, which are deciduous everywhere but on the lateral line; small scales also invest the bases of all the fins. A scale from the flank measures about 7.5 millim. in the horizontal and about 5.5 millim. in the vertical diameter.

The dorsal and anal fins arise just in advance of the posterior third of the body (measured without the caudal), and the base of the former, which begins a little in advance of the latter, is two thirds that of the latter in extent. Caudal deeply forked, with very numerous rudimentary rays at its base. Pectorals broad, in length a little more than the post-orbital portion of the head. The ventrals arise just abaft of midway between the pectorals and anal; they are broad and reach more than halfway to the anal.

Stomach small, siphonal. The intestine, which, when unravelled, is about $2\frac{1}{2}$ times the entire length of the fish, consists of two portions, which both in structure and arrangement are quite different from one another: the anterior five sixths is thin-walled and of small calibre, and is intricately coiled in a globular mass situated in the anterior fourth of the abdomen, the coils being held by a long mesentery; the posterior sixth is wide, but with walls so thick as to almost block the lumen (in the contracted state), the mucosa in this condition being thrown into numerous wide longitudinal folds; it passes straight down the middle of the abdominal cavity unsupported by mesentery. There are nine large long pyloric caeca in a pectinate arrangement.

In a female with much-enlarged ovaries containing ova

nearly 4 millim. in diameter the ovaries extend back to the wide genital pore, through which they open to the exterior.

Colours in life :—Head, including sclerotic and iris, black; body uniform dull slate-blue; pharyngo-branchial mucous membrane and parietal peritoneum black.

Note on the histology of the hind-gut.—In transverse section the appearance somewhat resembles that of the human vas deferens. Externally there is a thin fibrous coat containing blood-vessels, and internal to this and intimately adherent to it is a thin layer of longitudinally-arranged muscular fibres. Inside this is a layer, averaging about half a millimetre in thickness, of dense, circularly-arranged, muscular fibres. Internal to this is a submucous layer thrown into numerous wide longitudinal folds, and invested by a single row of long columnar epithelium, with numerous large goblet-cells. The submucous coat in all the sections made is everywhere infiltrated with round or oval, deeply-pigmented, highly granular corpuscles, which measure from $\frac{1}{100}$ to $\frac{2}{100}$ of an inch in diameter; in shape they resemble large leucocytes, but they are so granular that no nucleus can in any instance be detected.

The thick muscular coat, the dense infiltration of the submucosa with these pigmented granular corpuscles, and the large and numerous goblet-cells of the mucosa characterize this part of the intestine.

Several mature males and females were taken at Station 120, 240 to 276 fathoms. The males are a good deal smaller than the females, of which the largest specimen measures 11.75 inches.

Family Murænidæ.

CONGROMURENA, Kaup.

47. *Congromurena longicauda*, Alcock.

Congromurena longicauda, Alcock, Ann. & Mag. Nat. Hist., Dec. 1889, p. 455.

A large specimen from Station 120, 240 to 276 fathoms.

NETTASTOMA, Rafinesque.

48. *Nettastoma teniola*, Alcock.

Gavialiceps teniola, Wood-Mason. MS., Ann. & Mag. Nat. Hist., Dec. 1889, p. 460.

This species was described from immature individuals and

was included with *Gavialiceps microps* in a new genus. The examination of full-grown individuals in good preservation shows that this species has no place in the genus *Gavialiceps*, which is a true Nemichthyine form without pectoral fins, but that it ought to be ranked with *Nettastoma*. The following description applies to the adult:—

Head and snout depressed, body cylindrical, tail long and tapering. The length of the head is contained about $1\frac{2}{3}$ times in that of the rest of the trunk, the length of the tail is nearly twice that of the combined head and trunk. The snout forms a long, depressed, tapering beak, from $4\frac{1}{2}$ to $4\frac{3}{4}$ times the length of the eye and a little more than one third the length of the head; and, owing to the projection of the suddenly-expanded head of the elongated vomer beyond the abruptly ending maxillæ, it appears bilaterally notched near the tip.

There is an oval nostril situated laterally nearly midway between the eye and the tip of the snout, and in front of it a subtubular one. Mucous cavities of the head much developed and opening by large pores on the vertex, snout, and cheek.

Mouth with a wide cleft extending behind the level of the posterior border of the orbit. The upper jaw projects beyond the lower, which latter, after tapering gradually, becomes suddenly expanded near the symphysis, in the same way as does the head of the vomer. Small, sharp, close-set teeth in both jaws in several fairly regular longitudinal series, those at the mandibular symphysis enlarged and recurved; three rows of more distant teeth on the elongate limb of the vomer, those of the outer rows being inconspicuous and those of the middle row much enlarged; and a patch of small close-set teeth on the spatulate head of this bone. Tongue fleshy, fixed.

Gill-openings of moderate size, almost meeting in the mid-abdominal line; $3\frac{1}{2}$ gills.

Head and body covered with a thick, velvety, scaleless, deciduous, jet-black skin. Lateral line a row of large pores. The dorsal fin commences a little in advance of the level of the gill-opening.

Stomach with a very long caecal sac.

Numerous sexually mature males and females nearly 2 feet in length and several young ones, from Station 120, 240 to 276 fathoms.

The young ones are silvery, with pigment only in scattered specks.

All the specimens were alive and very active on reaching the surface.

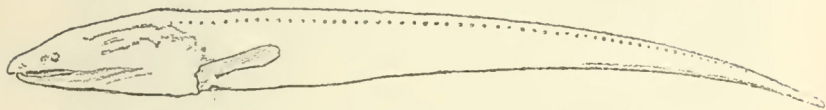
DYSOMMA, Alcock.

49. *Dysomma bucephalus*, Alcock.

Dysomma bucephalus, Alcock, Ann. & Mag. Nat. Hist., Dec. 1889, p. 459.

A single specimen from Station 120, 240 to 276 fathoms. It was alive on reaching the surface.

Fig. 5.



Dysomma bucephalus, $\times \frac{1}{2}$.

DYSOMMOPSIS, gen. nov.

Allied to *Dysomma*.

Tail of great relative length, the vent being close to the gill-opening. Eyes small, deeply subcutaneous. Snout studded with pores. Nostrils large, lateral. Mouth wide. Small sharp teeth in a single row in the lower and a double row in the upper jaw; a short row of enlarged teeth in the vomer. Four gills; gill-clefts wide; gill-openings small, situated close together near mid-abdominal line. Heart between the gills. Skin scaleless. Vertical fins confluent, the dorsal beginning a short distance behind the gill-opening. No pectorals.

50. *Dysommopsis muciparus*, sp. n.

Head a little inflated in the branchial region, tapering anteriorly; its length a little more than one eighth of the total. Body compressed and narrow, its greatest height, immediately behind the gill-opening, about two fifths the length of the head. The vent lies with the genital pore in an unpigmented circular depression, which is situated at a distance from the gill-opening equal to the length of the postrostral portion of the head; the tail, which tapers very slightly, is therefore more than four times the combined head and trunk in length.

Snout acutely pointed, overhanging the upper jaw; its length is one fifth that of the head and $2\frac{1}{2}$ times that of the small deeply subcutaneous eye; its surface is densely crowded, like the lips, with minute pores. Nostrils large; the

anterior, which is tubular, is situated near the tip of the snout, the posterior is a valved foramen lying immediately before the angle of the eye.

Mouth wide, its cleft being nearly half the head in length; small, sharp, close-set teeth in a single row in the mandible and a double row in the maxilla; vomer with three large teeth in a longitudinal row.

Gill-openings small, close together near mid-abdominal line; the gill-covers are formed of tough skin, in which branchiostegal rays are faintly apparent; branchial arches weak, gill-laminæ broad.

Skin scaleless, enveloped in thick, very tenacious mucus. Lateral line a row of indistinct pores. Vertical fins confluent, the dorsal beginning halfway between the gill-opening and the vent, the anal immediately behind the vent. No pectoral fins.

The abdominal cavity extends almost to the tip of the tail, its posterior part being occupied solely by the genital glands and air-bladder.

Stomach with a long tapering cæcal sac reaching some distance behind the vent, and with the œsophageal and pyloric openings almost on the same level; intestine forming a single loop, the convexity of which embraces the gastric cæcum. Air-bladder a long nacreous tube extending from the occiput almost to the tip of the tail; much inflated anteriorly and tapering posteriorly to a fine thread.

Colours in life deep purple-black.

Two specimens, 9 and 10 inches long, from Station 120, 240 to 276 fathoms.

They were alive on reaching the surface.

EXPLANATION OF THE PLATES.

PLATE VII.

- Fig. 1.* *Dibranchus nasutus*.
Fig. 2. *Dibranchus macropus*, dorsal view.
Fig. 2 a. Ditto, ventral view.
Fig. 2 b. Ditto, end-on view.
Fig. 3. *Saccogaster maculata*, ♀.

PLATE VIII.

- Fig. 1.* *Halimetus ruber*, dorsal view.
Fig. 1 a. Ditto, ventral view.
Fig. 1 b. Ditto, lateral view of tail.
Fig. 2. *Malthopsis luteus*, dorsal view.
Fig. 2 a. Ditto, ventral view.

[To be continued.]