

Coal-measure fish of which Prof. Young gave the first description, and which is now so widely known under the name which he applied to it. But as the law of priority is now-a-days considered to be inexorable, I must, though much to my regret, propose the abolition of "*Amphicentrum*," retaining, however, "*pes-ranæ*," M'Coy, and "*granulosum*," Young, as distinct species of the genus *Cheirodus*.

EXPLANATION OF PLATE III.

- Fig. 1.* Palatal aspect of a skull of *Dipterus* from Thurso, in the Hugh-Miller collection. *n*, anterior nasal notch; *n'*, posterior nasal notch; *pt*, palato-pterygoid; *pa.sph*, parasphenoid; *qu*, quadrate; *x*, facet for mandibular articulation; *n.ch*, notochordal opening; *f. m*, foramen magnum; *b*, one of the marginal plates of the external cranial buckler, seen from its inner surface.
- Fig. 2.* Mandible of *Dipterus*, seen from above, a large amount of the matrix being left between the rami. Hugh-Miller collection. *d*, dentary; *ag*, angular; *ar*, articular; *sp*, splenial, with its dental plate.
- Fig. 3.* The same specimen, seen from below. *y, y*, lateral labial fossæ; the other letters as in fig. 2.
- Fig. 4.* The same specimen, seen from the right side. Lettering as in the preceding figures.
- Fig. 5.* *Palædaphus insignis*, Van Ben. & De Kon., seen from above; one fourth natural size, and taken from a plaster cast. Lettering as in the figures of *Dipterus*.
- Fig. 6.* The same, seen from below.
- Fig. 7.* The same, seen from the left side. Compare this figure especially with the similar view of the mandible of *Dipterus*, fig. 4.

II.—*Preliminary Notices of Deep-Sea Fishes collected during the Voyage of H.M.S. 'Challenger.'* By Dr. ALBERT GÜNTHER, F.R.S., Keeper of the Zoological Department, British Museum.

As some time must elapse before the second part of the Ichthyology of H.M.S. 'Challenger' (which will contain an account of the deep-sea and pelagic forms) can be published, it is proposed, with the sanction of the Lords Commissioners of H.M. Treasury, to publish preliminary diagnoses of the genera and species which are new to science. The materials collected have proved to be far more extensive than was at first anticipated; and the author has great pleasure on this occasion to express his gratification at the admirable manner in which the specimens have been preserved by the gentlemen intrusted with their care, and at the clear and simple method in which all necessary particulars connected with their capture have been noted.

Scyllium canescens.

The nasal valves are separate from each other, the distance between them being less than the length of a nasal opening; each is provided with a cirrus. Length of the præoral portion of the snout much less than its width or than the width of the mouth. Labial fold very short. The posterior dorsal slightly longer than the anterior. The anal terminates below the middle of the second dorsal, its base being longer than that of the latter fin and equal to its distance from the caudal. Uniform greyish; all the fins, except the caudal, tipped with white behind.

South-west coast of South America (Station 310), 400 fathoms.

BATHYDRACO, g. n. Trachin.

Body elongate, subcylindrical; tail tapering; head depressed, with the snout much elongate, spatulate; mouth wide, horizontal, with the lower jaw prominent; eyes very large, lateral, close together. Scales very small, imbedded in the skin. Lateral line wide, continuous. One dorsal fin; ventrals jugular; the lower pectoral rays branched. Teeth in the jaws in villiform bands; none on the vomer or the palatine bones. Opercles unarmed; ten branchiostegals; the gill-membranes free from the isthmus and but slightly united in front. Air-bladder none.

Bathhydraco antarcticus.

D. 36. A. 31. P. 23. V. 1/6.

South of Heard Island (Station 152), 1260 fathoms.

Haloporphyrus rostratus.

B. 7. D. 4 | 51-56. A. 38-39. V. 6.

This species is readily distinguished by the peculiarly produced snout, which forms a short, triangular, pointed lamina, sharply keeled on the sides, and overreaching the cleft of the mouth.

Deep sea, midway between the Cape of Good Hope and Kerguelen's Land; east of the mouth of Rio Plata. (Stations 146 and 320.) 600 and 1375 fathoms.

This fish differs in some important points from *Haloporphyrus*, as the form of the snout, backward position of the vent, imperfect division of the anal, in which latter respect it approaches *Mora*; therefore it may be regarded as the type of a distinct subgenus *Antimora*.

Haloporphyrus australis.

D. 9 | 50-52. A. 53. V. 8.

This species is in general appearance similar to *Haloporphyrus lepidion*, but has a shorter and stouter body. The length of the head is one fourth of the total without caudal, the depth of the body two fifths.

Puerto Bueno, Magellan Straits, 55-70 fathoms.

MELANONUS, g. n. Gadid.

Head and body rather compressed, covered with cycloid scales of moderate size, and terminating in a long tapering tail, without caudal. Eye of moderate size; mouth anterior and lateral; both jaws with narrow bands of villiform teeth; vomer and palatines with very narrow stripes of minute teeth. Barbel none. One short anterior dorsal; the second commences immediately behind the first, and has the anterior rays well developed; it is continued to the end of the tail. Anal like the second dorsal. The outer gill-rakers of the first branchial arch strong and long, longer than the gill-laminae. Ventrals composed of several rays, slightly in advance of the pectorals. Bones flexible; mucous cavities of the head small.

Allied to *Strinsia*, but with different dentition.

Melanonus gracilis.

Entirely deep black.

Antarctic (Station 156), 1975 fathoms.

Lotella marginata.

D. 7-8 | 65. A. 62. V. 5.

Head of moderate length, two ninths of the total, the caudal fin not included. Eye very large, more than one third of the length of the head, and equal to that of the postorbital portion; consequently the snout is short, though its length much exceeds the width of the interorbital space. The maxillary extends only to below the middle of the eye; jaws with an outer series of distinctly larger teeth. Barbel very small.

Pacific coast of South-western South America (Stations 305-308), 120 to 345 fathoms.

Sirembo Messieri.

Head oblong, deeper than broad, the snout being rather produced, rounded, overlapping the lower jaw. Eye of mode-
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rate size, one sixth of the length of the head, its diameter being two thirds of the length of the snout, and less than the width of the flat interorbital space. The maxillary extends behind the eye; præoperculum without spines. Scales minute, leaving the snout naked. Vertical fins rather low, the dorsal beginning above the extremity of the pectoral. The distance between the vent and root of the ventrals is much more than the length of the head; the ventrals are inserted behind the angle of the præoperculum, very close together, and do not extend so far backwards as the pectorals. Uniform brown, with black fins.

Off Middle Island, Messier Strait (Station 306), 345 fathoms.

BATHYNECTES, g. n. Ophidiid.

Anterior part of the body rather compressed, posterior produced into the long tapering tail, without caudal. Snout not swollen, with the jaws equal or nearly equal in front. Mouth very wide, with the teeth in villiform bands in the jaws, on the vomer and palatine bones. Barbel none. Ventrals reduced to simple or bifid filaments, placed close together and near to the humeral symphysis. Gill-membranes not united. The gill-laminæ are remarkably short; the middle pieces of the first branchial arch have the gill-rakers of the outer series much elongate, stiff. Bones of the head soft and cavernous. Operculum with a very feeble spine above.

A true deep-sea form allied to *Sirembo*.

Bathynectes laticeps.

Head slightly, body and tail more strongly compressed, low; the latter produced into a moderately long filament. Eye rather small, its diameter being one seventh of the length of the head, two thirds of that of snout, and two fifths of the interorbital space, which is convex. The posterior nostrils are wide; the muciferous channel of the infraorbital ring shows in its course five or six wide sinuses, and opens in front by a wide aperture. Mouth very wide, extending far behind the eye, with the extremity of the maxillary much dilated. Vomerine band of teeth V-shaped, with the two arms of the figure straight; palatine band narrow.

Mid-Atlantic (Station 104), 2500 fathoms.

Bathynectes compressus.

Head and the entire body and tail strongly compressed. Snout somewhat swollen. Eye very small, on the border

between the first and second fourth of the length of the head. Nostrils open, openings oval. Mouth very wide, extending far behind the eye, with the bands of teeth externally visible. Vomerine band V-shaped, with the two arms of the figure curved; palatine bands long, nearly as wide as those of the intermaxillary. The distance of the vent from the root of the ventrals is about equal to the length of the head.

South-east of New Guinea; Mid-Atlantic, 1075-2500 fathoms.

Bathynectes gracilis.

Head and the entire body and tail compressed and low; the latter produced into a long filament. Eye of moderate size, its diameter being contained five and a half times in the length of the head, and once and a half in that of the snout and in the width of the interorbital space, which is somewhat convex. The posterior nostrils especially are wide; and the muciferous channel of the infraorbital ring shows in its course five or six wide sinuses. Mouth very wide, extending far behind the eye, with the extremity of the maxillary much dilated. Vomerine band of teeth V-shaped, with the two arms of the figure straight; palatine band narrow. The distance of the vent from the root of the ventrals is more than the length of the head.

South of New Guinea (Station 184), 1400 fathoms.

TYPHLONUS, g. n. Ophidiid.

Head large, compressed, with most of the bones in a cartilaginous condition; the superficial bones with large muciferous cavities not armed. Snout a thick protuberance, projecting beyond the mouth, which is rather small, inferior. Trunk very short, the vent being below the pectoral; tail thin, strongly compressed, tapering, without separate caudal. Eye externally not visible, reduced to a minute rudiment hidden below the skin. Bands of villiform teeth in the jaws, on the vomer and palatine bones. Barbel none. Ventrals reduced to simple filaments, placed close together on the humeral symphysis. Gill-openings very wide, the gill-membranes being but slightly united in front. Gills four; gill-laminæ rather short, gill-rakers of moderate length. Scales thin, deciduous, small.

Typhlonus nasus.

The head of this most remarkable form is somewhat compressed, deep, as thick in the rostral as in the opercular

portion ; its length is rather more than one fourth of the total. Protuberances formed by projecting portions of the cranium occupy the upper and lateral surfaces of the head ; and, more especially, one in front and another on each side of the snout are very conspicuous.

North-east of Australia (Stations 181 and 198), 2440 and 2150 fathoms.

APHYONUS, g. n. Ophidiid.

Head, body, and tapering tail strongly compressed, enveloped in a thin, scaleless, loose skin. Vent far behind the pectoral. Snout swollen, projecting beyond the mouth, which is wide. No teeth in the upper jaw ; small conical teeth in the lower, pluriserial in front and uniserial on the side. Vomer with a few rudimentary teeth ; palatine teeth. Nostrils close together, small. No externally visible eye. Barbel none. Ventrals reduced to simple filaments, placed close together and near to the humeral symphysis. Gill-membranes not united. Four branchial arches, the posterior without gill-laminæ ; the anterior with very short gill-rakers and with rather short gill-laminæ. Head covered with a system of wide muciferous channels and sinuses, the dermal bones being almost membranaceous, whilst the others are in a semicartilaginous condition. Notochord persistent, but with a superficial indication of the vertebral segments (as in some *Leptocephalus* forms).

Aphyonus gelatinosus.

The head, in the preserved specimen, is compressed, rather deep, and enveloped in loose skin ; especially on the upper-side of its anterior half the skin forms a large loose bag, which during life is probably filled and distended with mucus. Transparent, colourless, like a *Leptocephalus*.

Deep sea between North-eastern Australia and New Guinea (Station 184), 1400 fathoms.

ACANTHONUS, g. n. Ophidiid.

Head large and thick, armed in front and on the opercles with strong spines ; trunk very short, the vent being below the pectoral ; tail thin, strongly compressed, tapering, without caudal. Eye small. Mouth very wide, with the teeth in villiform bands in the jaws, on the vomer and palatine bones, and along the hyoid. Barbel none. Ventrals reduced to simple filaments, placed close together on the humeral symphysis. Gill-membranes not united. The gill-laminæ are

remarkably short, the gill-rakers long, lanceolate, stiff. Scales extremely small. Bones of the head soft.

Acanthonus armatus.

The head of this remarkable fish appears of an extraordinary thickness compared with the thin and compressed trunk and tail; it is very broad across the frontal region, and not much longer than high, the small eye being much nearer to the end of the snout than to the gill-opening. The snout would be truncated in front; but its upper portion projects, terminating in two short acute spines. The large mouth is slightly oblique, the maxillary extending backwards beyond the middle of the length of the head. The jaws are equal in front. Two sharp edges run along each ramus of the mandible, to receive between them a wide muciferous channel.

North of New Guinea, 1075 fathoms.

BATHYGADUS.

Snout not projecting beyond the mouth. Mouth wide, anterior and lateral. Eye small or of moderate size. Teeth in both jaws villiform, in narrow bands, which occupy the whole length of the jaws. Barbels present or absent. The two dorsal fins are almost continuous; and the anterior rays of the second are not shortened, but gradually diminish in length in the narrow posterior portion of the tail. Anal rays feeble. Bones of the head cavernous, soft, without prominent ridges. Scales small, cycloid, deciduous.

Bathygadus cottoides.

The head is large, thick, and, in the nuchal region, of considerable depth.

Deep sea between New Zealand and Kermadec Island (Stations 169-171), 520-700 fathoms.

Macrurus longirostris.

Allied to *Macrurus trachyrhynchus*. The snout is produced into a long flattened process, pointed anteriorly, and not quite twice as long as the large eye. Scales of the body with smooth surface, but with from three to seven spinelets on the margin. They are rather irregularly arranged, there being four in a transverse series between the lateral line and dorsal fin. A series of projecting triangular spines along each side of the neck and the base of the anterior portion of the dorsal fin; a similar series along each side of the base of the anal

extends much further backwards than the dorsal series, and, anteriorly, is lost on the side of the abdomen. These spines have smooth edges (not denticulated as in *M. trachyrhynchus*).

North-east of New Zealand (Station 169), 700 fathoms.

Macrurus holotrachys.

Snout not much produced, as long as the eye, which is large, its vertical diameter being considerably more than the width of the interorbital space. Anterior edge of the snout with three tubercles, one in the middle and one on each side. Each scale with a median series of spinelets, and with two or more isolated spinelets besides. Upper and lateral portions of the head covered with irregular rough scales, lower naked. There are five scales in a transverse series between the first dorsal spine and lateral line. Distance between the two dorsal fins scarcely equal to the length of the base of the first. Second dorsal spine with small barbs anteriorly; outer ventral ray produced into a filament. No scaleless fossa on the temple. Barbel very small. No bands or spots.

Deep sea, east of the mouth of the Rio Plata (Station 320), 600 fathoms.

Macrurus fasciatus.

Snout not much produced, shorter than the eye, which is very large, its vertical diameter being considerably more than the width of the interorbital space. Scales with from eight to ten subparallel keels. Upper and lateral portions of the head covered with small rough scales, lower naked. There are four scales in a transverse series between the first dorsal spine and lateral line; distance between the two dorsal fins equal to the length of the base of the first. Outer ventral ray produced into a filament. No scaleless fossa on the temple. Barbel small. Whitish, with broad irregular blackish bands across the back.

West-coast of the southern extremity of South America (Stations 305, 309, 311), 120-245 fathoms.

Coryphaenoides rudis.

Snout obtusely conical, projecting beyond the mouth, which extends backwards to below the middle of the eye. The outer series contains stronger teeth in both jaws. Barbel about as long as the eye. Scales equally rough over the whole of their surface, the spinelets being subequal in size, densely packed, and not arranged in series. There are eight scales in a transverse series between the first dorsal and the lateral

line. Anterior margin of the second dorsal spine armed with barbs placed at some distance from each other. The second dorsal fin commences at a distance behind the first scarcely inferior to the length of the base of the first. The outer ventral ray produced into a long filament.

Pacific, north of Kermadec Island (Stations 170, 171), 500-650 fathoms.

Coryphænoides æqualis.

Snout conically projecting beyond the mouth, with rather obtuse upper edge; the cleft of the mouth extends nearly to below the centre of the eye. The teeth of the outer series are visibly stronger than the remainder. Barbel slender, but not so long as the eye. The interorbital space is flat, its width being considerably less than the diameter of the eye. The scales are equally rough over the whole of their surface, the spinelets being subequal in size, densely packed, but arranged in from 8 to 12 series, the middle series not being more prominent than the others (as is the case in *Macrurus sclerorhynchus*). The entire margin of the scale is spinous. There are eight scales in a transverse series between the first dorsal and the lateral line. Second dorsal spine somewhat produced, armed along its anterior edge with barbs pointing upwards and rather closely set. The second dorsal fin commences at a distance from the first which is less than the length of the head.

Deep-sea, south of Portugal, 600 fathoms.

Coryphænoides crassiceps.

Head very large, especially the anterior portion. Snout excessively broad and high, short, but longer than the eye, which is small. Mouth small, inferior, extending beyond the vertical from the centre of the eye. Teeth villiform, in narrow bands in both jaws. Barbel minute. Trunk of the body very short, the vent being immediately behind the vertical from the root of the pectoral. The scales are small, studded with very fine curved spinelets, which give the body the appearance of being covered with short villosities. A series of larger scales runs along each side of the base of the second dorsal fin. The second dorsal spine is very slender, obsoletely denticulated in front; the second dorsal fin commences at a very short distance behind the first.

North of Kermadec Island (Stations 170, 171), 520 and 650 fathoms.

Rem. This fish is closely allied to, and represents in the southern hemisphere, *C. norvegicus*.

Coryphænoides microlepis.

Snout short, obliquely truncated, slightly projecting beyond the mouth ; eye exceeding in length that of the snout and the width of the interorbital space. Head much compressed, high. The cleft of the mouth does not quite extend to below the middle of the eye. Teeth of the outer series visibly stronger than the remainder. Barbel as long as the eye. *Scales* small, cycloid. There are thirteen scales in a transverse series between the first dorsal and the lateral line. Second dorsal spine armed in front with distant barbs ; the distance between the two dorsal fins equals the length of the head without snout. Trunk very short.

Feejee Islands (Station 173), 215 fathoms.

Coryphænoides Murrayi.

Snout short, but longer than the eye, which is small, its width being much less than that of the interorbital space. Canthus rostralis obtuse, without median tubercle. The cleft of the mouth extends to below the middle of the eye. Teeth of the outer series much stronger than the remainder. Barbel longer than the eye. *Scales* with five to seven crenulate radiating keels, some of which project beyond the rounded posterior margin of the scale. There are seven or eight scales in a transverse series between the first dorsal and the lateral line. Second dorsal spine slightly prolonged, armed with distant barbs pointing upwards. The second dorsal fin commences at a considerable distance from the first, which, however, is rather less than the length of the head.

Deep sea, east of New Zealand (Station 168), 1100 fathoms.

Coryphænoides serrulatus.

The projecting part of the snout is short, with an obtuse upper edge, and with a rough tubercle in the middle. The cleft of the mouth extends to below the middle of the eye, which is comparatively large. The teeth of the outer series are visibly stronger than the remainder. Barbel about as long as the eye. The interorbital space is flat, its width rather less than the vertical diameter of the eye. The *scales* are equally rough over the whole of their surface, the spinules being subequal in size, densely packed, closely adpressed to the scale, and not arranged in series. There are seven scales in a transverse series between the first dorsal and the lateral line. Second dorsal spine finely and closely serrate in front. The second dorsal fin commences at a considerable

distance from the first, the distance being equal to the length of the head.

North-east of New Zealand (Station 169), 700 fathoms.

Coryphænoides filicauda.

Snout considerably projecting beyond the mouth, pointed in the middle; it is twice as long as the eye, which is unusually small, only half as wide as the interorbital space. Mouth rather wide, extending beyond the centre of the eye. Teeth villiform, in very narrow bands. Barbel minute. Præoperculum with the angle produced backwards, broadly rounded and crenulate on the margin. The terminal portion of the tail is prolonged into a long filament, more slender than in any of the other species. Scales thin, *cycloid*, and deciduous, six or seven in a transverse series between the first dorsal spine and the lateral line. The second dorsal spine slender, with the barbs in front very inconspicuous and sometimes entirely absent. The distance between the two dorsal fins is less than the length of the head.

Deep sea on both sides of the South-American continent; Antarctic Ocean. (Stations 157, 299, 325.) 1800–2650 fathoms.

Coryphænoides variabilis.

Snout obtusely conical, projecting beyond the mouth, the cleft of which extends behind the middle of the eye. The teeth of the outer series are visibly stronger than the remainder. Barbel nearly as long as the eye. The interorbital space is flat, its width being much more than the diameter of the eye, which is comparatively small. The scales are provided with five ridges, each ridge composed of several spines, and the central ridge being the strongest. There are eight scales in a transverse series between the first dorsal and the lateral line. Lower limb of the præoperculum scaleless. Second dorsal spine armed with barbs in front, which are rather distantly set. The second dorsal fin commences at a distance from the first which is less than the length of the head.

Midway between Cape of Good Hope and Kerguelen's Land; South of Australia; Mid-Pacific; south-west of Juan Fernandez. (Stations 146, 157, 246, 271, 300.) 135–2425 fathoms.

Coryphænoides affinis.

Snout obtusely conical, projecting beyond the mouth, the cleft of which extends behind the middle of the eye. The

teeth of the outer series are visibly stronger than the remainder. Barbel shorter than the eye. The interorbital space is flat, its width being equal to the diameter of the eye, which is comparatively large. The *scales* are provided with five ridges, each ridge composed of several small spines, and the central ridge being the strongest. There are eight scales in a transverse series between the first dorsal and the lateral line. Præoperculum with the posterior margin slightly excised above the angle, and with the lower margin crenulate; both limbs of the præoperculum scaly. The second dorsal spine is armed with barbs which are rather closely set. The second dorsal fin commences at a distance from the first which is not much more than one half of the length of the head.

Deep sea, east of the mouth of the Rio Plata (Station 323), 1900 fathoms.

Coryphænoides carinatus.

Snout obtusely conical, projecting beyond the mouth, the cleft of which reaches nearly to below the middle of the eye. Teeth in the upper jaw "en cardes," those in the lower in a single series. Barbel well developed, but much shorter than the eye. Interorbital space flat, much narrower than the large eye, the diameter of which equals the length of the snout. The *scales* are provided with a very strong median keel, terminating in a projecting spine, and with several short and low ridges, which converge towards the median keel or run nearly parallel to it. There are six scales in a transverse series between the first dorsal and the lateral line. Præoperculum with hind margin undulated and with limbs scaly. The second dorsal spine is armed with rather small and somewhat closely set barbs. The distance between the two dorsal fins equals the length of the base of the first.

Deep sea near Prince Edward's Island (Station 145), 500 fathoms.

[To be continued.]

III.—*Stromatopora as distinguished from Millepora.*

By Dr. DAWSON, F.R.S. &c.

THE April number of the 'Annals' reached me not long after the completion of a series of careful microscopic studies of the *Stromatopora* and allied forms, which abound in all our American formations from the Black-River Limestone to the Corniferous Limestone inclusive, and in which I had en-



Günther, Albert C. L. G. 1878. "Preliminary notices of deep-sea fishes collected during the voyage of the H.M.S. "Challenger"." *The Annals and magazine of natural history; zoology, botany, and geology* 2, 17-28.

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