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SAND-DWELLING EELS

of the Western Indian Ocean and the Red Sea

by

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SAND-DWELLING EELS

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(With Plates 63-68).

by J. L. B. SMITH

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The Western Indian Ocean has been found to be notably rich in marine eels. The Moray eels have been treated earlier (Bulletin No 23). In the present revision are described eels of the families OPHICHTHIDAE, ECHELIDAE, MORINGUIDAE, and NEENCHELIDAE, which are chiefly sand-dwelling forms, normally not free swimming by day. Some favour muddy areas where the water is turbid, and are found in estuaries, sometimes in or near fresh water. None of these eels are of any economic importance in the Western Indian Ocean though some are eaten by the natives in parts of the region. Only few attain any size, the majority are small and seldom encountered by the ordinary fisherman, in many cases they have been unknown to the local inhabitants. Our specimens were obtained chiefly by rotenone poisoning of suitable areas, mainly intertidal.

The peculiar HETEROCONGRIDAE, the so-called Garden-eels, known from the Pacific and the Atlantic have recently been found at the Andamans by Klausewitz, 1959. They probably occur in the Western Indian Ocean and it can be expected that they will be discovered there with increasing underwater exploration.

KEY TO FAMILIES

- A. Tip of caudal projects as sharp stiff point, free from fin rays..... **Ophichthidae**
- B. Tip of caudal with rayed fin.
 - I. Tail longer than body.
 - a. Hind nasal opening in upper lip, facing downwards **Echelidae**
 - b. Hind nasal opening before eye **Neenchelidae**
 - II. Tail much shorter than body **Moringuidae**

Family Ophichthidae

Elongate vermiform scaleless body, rarely compressed. Dorsal and anal usually poorly developed but always ending before tip of tail, which is a hard sharp point, no caudal fin. Pectorals present, rudimentary, or absent. Mouth large, cleft usually beyond eye, snout sharp, pointed and long or fairly short and blunt. Teeth variable, strong and fanglike, or small and pointed, or blunt and granular, uniserial to polyserial in jaws. Tail longer or shorter than body. Eye small. Hind nostril a slit in upper lip, facing downwards, front nostril a tube on the side or front of snout. Gillopenings variable, slit-like or rounded, lateral or ventral. Numerous genera and species, mostly small, but some grow to a large size, found in most temperate and tropical seas, penetrating estuaries and even fresh water. They live mostly concealed by day in mud and sand and have the curious power of burrowing tail first, which they do at astonishing speed. They are all carnivorous, some quite pugnacious, biting fiercely. Some leave their refuges by night and swim free hunting prey. Preyed on by birds and other fishes, when swallowed whole and alive some revenge themselves on their captors by using the hard pointed tail to bore through the intestines. Encapsulated **Ophichthid** eels have been found in the peritoneal cavities of fishes. 31 species described in 10 genera recorded from the Western Indian Ocean, two new species described.

KEY TO GENERA

- A. Pectorals present B
- AA. No pectorals D
- B. Dorsal origin clearly on head C
- BB. Dorsal origin above or behind gillopening E

C. Lips normal	1. Myrichthys
CC. Lips with fringe of barbels	2. Jenkinsiella
D. Dorsal origin on head	3. Callechelys
DD. Dorsal origin behind head	4. Caecula
E. Distinct fang-like teeth present	F
EE. No long fangs	G
F. Lips with small villi. Eye much nearer snout tip than rictus	5. Brachysomophis
FF. Lips smooth. Eye about midway along mouth	6. Ophisurus
G. Hind nostril with flap	H
GG. Hind nostril a plain slit	I
H. Front nostril tubular	7. Leiuranus
HH. Front nostril an opening with flaps	8. Phyllophichthus
I. Teeth granular, in bands	9. Pisoodonophis
II. Teeth conical	10. Ophichthus

1. **Myrichthys** Girard, 1859

Type **Myrichthys tigrinus** Girard, 1859 (E. Pacific). Dorsal originates on head, well before gilloopening. Pectorals present, small. Snout rather short, teeth blunt, biserial in jaws, on vomer and intermaxillary. Front nostrils tubular at front of snout, hinder a slit in upper lip with flap. Few species, sand dwellers of tropical seas, 2 in the Indo-Pacific, widely distributed, easily distinguished by markings.

A. With black rings round body	colubrinus
B. With rounded black spots only	maculosus

MYRICHTHYS COLUBRINUS (Boddaert, 1781) (PI 63, B & C). **Muraena colubrina** Boddaert, 1781, 56, PI 2, fig 3 (Pacific). **Ophisurus fasciatus** Pollen 1868, No 82 (rec. Madagascar). Bleeker & Pollen 1875, 63 (rec. Maur). **Ophichthus colubrinus** Gunther 1870, 81 (Red Sea). Klunzinger 1871, 611 (Red Sea). Peters 1876, 446 and 1883, 57 (Mauritius). Pfeffer 1893, 41 and 169 (East Africa). Pellegrin 1904, 543, (Somaliland). Gunther 1910, 410 (Red Sea). Gudger 1929, 523 (rec. Maur). **Chlevastes colubrinus** Fowler 1956, 118 (Red Sea). **Leiuranus colubrinus** Bleeker & Pollen 1875 and Bleeker 1879, 22 (rec. Maur). **Myrichthys colubrinus** Smith 1949, 509, fig 1099b (Inhaca). Fourmanoir 1952, 188 and 1957, 301 (Moz. Channel): and 1954, 232 (Comores). Smith 1957, 834 (Aldabra): and 1958, 135, PI XI, fig 4 (Inhaca). Baissac 1957, 19 (Mauritius common name ANGUILLE DEUX TACHES). Depth 48-55 in total length, 2.6-3 in head. Head 17.5-20 in total length, 8-9.7 in trunk. Tail 1.82-1.94 in total length, 1.2-1.4 times trunk. Snout to anus 1.1-1.24 in tail. Snout tip to rictus 3-3.8 in head, to dorsal origin about 2 in head. Pectorals mere rudiments. Rictus below hind edge eye. A few blunt teeth on intermaxillary, 1-2 rows along vomer, biserial on side of each jaw. Dorsal height about $\frac{1}{3}$ body depth, anal ends well before tip of tail, dorsal to near tip. In life milky yellow with 25-32 narrow black rings round body, mostly meeting ventrally; with age circular black spots may develop between the rings. Numerous specimens 300-880mm from Inhaca northwards over whole W. Indian Ocean and at most islands to Seychelles, nowhere abundant, seldom more than one found in any area. Schultz 1953, 53, 54 accepts **semicinctus** Bleeker, 1864 and **elaps** Fowler 1912, as distinct from **colubrinus**. My numerous specimens do not support this view, which is likely the result of inadequate material.

MYRICHTHYS MACULOSUS (Cuvier, 1817) (PI 63, A). **Muraena maculosa** Cuvier 1817, 232 (E. Indies). **Muraena tigrina** Ruppell 1828, 118, PI 30, fig 2 (Red Sea). **Ophisurus maculosus** Richardson 1844, 102, PI 6, fig 2 (Madag). Pollen 1863, 69 (Madag). **Pisoodonophis maculosus** Kaup 1856, 21 (Madagascar). **Pisoodonophis maculatus** Guichenot 1863, 30 (Rec. Reunion). **Ophisurus ophis** (non Lac) Bleeker & Pollen 1875, 72 (Rec. Mad). **Ophichthus maculosus** Klunzinger 1871, 611 (Red Sea). Sauvage 1875, 527 (rec. Mad: Indian Oc.). **Myrichthys maculosus** Fowler 1956, 118 (Red Sea). Smith 1957, 834 (E. Africa, Aldabra). Depth 35-50 in total length, 2.8-3.6 in head. Head 12(J)-16(A) in total length, 3.6(J)-5.2(A) in trunk. Tail 1.7 in total length, 1.8 times trunk. Snout to anus 1.5-1.7 in tail. Snout tip to rictus 2.8-3.6 in head, to dorsal origin about 2 in head. Rictus opposite hind edge eye. A few obtuse teeth on intermaxillary, acute low teeth biserial on vomer and



PLATE 63

A. *Myrichthys maculosus* (Cuvier), 480mm (Shimoni). B. & C. *Myrichthys colubrinus* (Bodd), B. 1400mm (Pinda) C. 760mm (Pinda). D. *Leiuranus semicinctus* (Lay & Bennett), 650mm (Inhaca).

on sides of jaws. Dorsal and anal low, end near caudal. Pectoral short, rudimentary. Pale with large and small rounded black blotches, pattern more or less constant, the small young have no spots but 24-30 black saddles much like **Leiuranus semicinctus**, but may at once be distinguished by having the dorsal origin on the nape. Described from numerous specimens 130-503mm from 15°S in East Africa northwards and at most islands to Aldabra, rather rare. My specimens agree with dimensions of Pacific material, but Schultz 1943, 12 gives "tip of snout to dorsal 16.4 in head", for Phoenix island fish.

2. **Jenkinsiella** Jordan & Evermann, 1905.

Type **Microdonophis macgregori** Jenkins, 1904 = **playfairii** Gunther, 1870. Pectorals well developed. Dorsal origin on head. Mouth cleft far behind eye. Fringe of barbels on upper lip. No fang-like teeth. Differs from related **Cirrhimuraena** Kaup, 1856 in position of dorsal origin, in shorter pectorals, and eye midway along mouth. Two species in the Western Indian Ocean, easily distinguished, one new.

- A. Tail 1.7-2 times rest of fish. Pectoral 3.5-3.8 in head.
Head 3-3.8 in trunk **playfairi**
- B. Tail 2.3 times rest of fish. Pectoral 1.8-2 in head.
Head 2-2.15 in trunk **inhacae nov**

JENKINSIELLA PLAYFAIRI (Gunther, 1870) (PI 64, A). **Ophichthys playfairii** Gunther 1870, 76 (Zanzibar). Sauvage 1891, 527 (Rec. on Gunther). **Cirrhimuraena playfairii** Barnard 1925, 205, and Smith 1949, 389 (Delagoa Bay). Fowler 1956, 122 (Red Sea). **Jenkinsiella playfairii** Smith 1957, 840, PI 28, A, (Aldabra, Malindi, Pinda). **Ophichthys arenicola** Klunzinger 1871, 609 (Red Sea). Borsieri 1904, 219 (Eritrea). **Cirrhimuraena macgregori** Weed & Howarth 1961, 357 (Ceylon). Depth 35-40 in total length, 2.7(Ad)-3.7(J) in head. Head 11(J)-14(Ad) in total length, 2.8(J)-3.8(Ad) in trunk. Tail about 1.5 in total length, 1.7-2.0 times rest of fish, and 2.4-2.6 times trunk. Gape 2.8-2.9, snout 4-5, snout to dorsal origin 1.4-1.6, pectoral 3.5-3.8 all in head. Snout conical, fairly sharp, projects well beyond lower jaw, eye slightly nearer rictus than snout tip. Upper lip with cirrhi, from 4(J)-11(Ad) behind hind nostril and 4-5 before. Fine sharp teeth in a cluster on intermaxillary, similar teeth in 1-2 series in each jaw and on vomer in juvenile (120mm), increase with age to 3-4 series in larger specimens, but variable. Dorsal origin on nape about midway between pectoral base and eye. Olive brown, lighter below, fins light. Described from 4 specimens 120-387 mm, Inhaca (2), Pinda, Aldabra, from sandy pools. **Microdonophis macgregori** Jenkins (Bull. U.S. Fish Comm. 1902, XXII, 422, fig 2) from Hawaii, is almost certainly identical. The original description differs from my specimens in only 2 characters, viz. head stated as "5 in trunk and teeth uniserial" (repeated by Jordan & Evermann 1903, XXIII, 82) but the original 1902, fig 2 shows head 3.8 in trunk, and Gosline 1951, 315 redescribing this species (from Oahu: Hawaii) states teeth to be pluriserial. Weed (*loc cit* above) records **macgregori** from Ceylon, but his description, like that of Gosline, clearly points to **playfairi**, which is probably of wide distribution in the Indo-Pacific.

Jenkinsiella inhacae n.sp. (PI 66, D & E)

Ophichthys chinensis (non Kaup), Pellegrin, 1907, 201 (Madag).

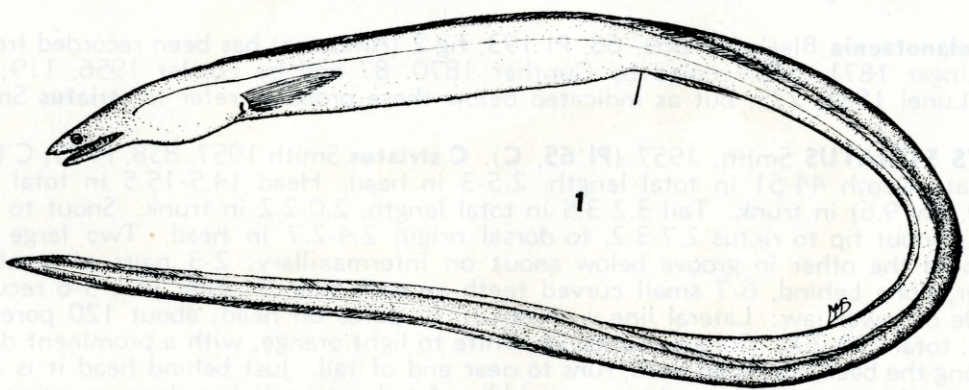


Fig. 1. **Jenkinsiella inhacae n.sp.** Type, 183mm (Inhaca).

Described from the type, 183mm, Inhaca and from a 228mm specimen from Madagascar, Paris Museum No 07/11, kindly lent by Dr. J. Guibe, Paris Museum, this described by Pellegrin 1907, 201 as **O. chinensis** Kaup, 1856. Dimensions of the type given first. Depth 30,28 in total length, 3.0,2.8 in head. Head 9.5,10 in total length, 2.0,2.15 in trunk. Tail 1.45,1.44 in total length, 2.3, 2.3 times rest of fish and 3.3,3.3 times trunk. Gape 2.8,3, snout 6.0, 7.0, snout to dorsal origin 1.1, 1.1, pectoral 2.0,1.8, all in head. Eye about 2 in snout. Snout long and pointed, projects slightly beyond lower jaw. Eye distinctly nearer snout tip than rictus. 18,21 cirrhi behind nostril and 4,4 in front, teeth very small, pointed, a cluster on intermaxillary, a narrow band of 2-3 series along each side of upper jaw, vomerine teeth mostly uniserial irregularly biserial behind. Smaller teeth in very narrow band along each side of lower jaw. Dorsal origin on head very slightly in advance of gill-opening, pectorals long and pointed. 40 lateral line pores on trunk. Colour as preserved uniform dark brown, the back densely covered with minute black specks from head to midway along tail, lighter below. While closely resembling **chinensis** in most features **inhacae** differs significantly in the much shorter head and trunk, 2.3 in tail as compared with 1.7-1.8 in tail for **chinensis**, as well as in the narrower series of vomerine teeth, also in having 14 rays in the pectoral, Kaup 1856, 28 states 9. The dorsal and anal end slightly before tip of caudal.

3. **Callechelys** Kaup, 1856

Type **C. bonaparti** Kaup, 1856 (Tahiti) = **marmoratus** Bleeker, 1852. Tail shorter than rest of body. Front nostrils near tip of snout shortly tubular, hind nostrils in upper lip, face downwards. Pectorals absent. Dorsal origin well forward on head. Vertical fins end before bare pointed tip of tail. Gill-openings small, lateral. Lateral line a series of pores, begins on head close below front of dorsal, curves down over end of head to below mid side, thence to caudal base. Few species of tropical seas, most in the Indo-Pacific, widely distributed but rather rare, appear to live mostly hidden in sand. They are a problem to the systematist partly because they are so rarely seen that in only a few cases are adequate series of growth stadia available for study, many are indeed known only from the type. Some species are plainly very widely distributed, others appear to be local forms. When specimens from widely separated areas show distinct dimensional variations it is sometimes difficult to decide whether they are conspecific or not. The Western Indian Ocean is notably rich in these rare fishes, 4 species have been found there, more than in any other comparable area.

A. Tail not more than half trunk.

- | | |
|--|-----------------------|
| I. Depth 44-51, head 14.5-15.5 in total length | striatus |
| II. Depth 55-76, head 16.5-20 in total length | (melanotaenia) |

B. Tail more than half trunk.

- | | |
|---|----------------------|
| I. With dark band along body. Tail 1.4-1.5, head 8-9 in trunk. Tail 2.5-2.6, head 14.6-15.9 in total length | bitaeniatus |
| II. Spotted or marbled. | |
| a. Tail 1.5-1.7, head 6-8 in trunk. Tail 2.8, head 10-14 in total length | marmoratus |
| b. Tail 1.2-1.3, head 7.7-8 in trunk. Tail 2.4-2.5, head 14.7-15.2 in total length | nebulosus nov |

Callechelys melanotaenia Bleeker, 1864, 66, Pl 193, fig 2 (Amboina) has been recorded from the Red Sea by Klunzinger 1871, 612, copied by Gunther 1870, 87 and by Fowler 1956, 119; also from Mauritius by Lunel 1881, 275, but as indicated below these probably refer to **striatus** Smith, 1957.

CALLECHELYS STRIATUS Smith, 1957 (Pl 65, C). **C. striatus** Smith 1957, 858, Pl 27, C (Seychelles, Aldabra, Pinda). Depth 44-51 in total length, 2.5-3 in head. Head 14.5-15.5 in total length (Av 15.2), 9.4-9.9 (Av 9.6) in trunk. Tail 3.2-3.5 in total length, 2.0-2.2 in trunk. Snout to anus 2.24-2.5 times tail. Snout tip to rictus 2.7-3.2, to dorsal origin 2.4-2.7 in head. Two large recumbent fangs one behind the other in groove below snout on intermaxillary: 2-3 pairs of small teeth on front of vomer, none behind, 6-7 small curved teeth on each side of upper jaw, 5-6 recurved short teeth each side of lower jaw: Lateral line with about 10 pores on head; about 120 pores on trunk and 70 on tail, total 190-200. Colour: Yellowish white to light orange, with a prominent dark brown-black band along the back, starts on head, runs to near end of tail. Just behind head it is about two-fifths of body depth, remains subequal to near middle of tail, where it broadens, covering more than half of side, tapers posteriorly. Body along base of dorsal narrowly white to tip of tail. On head the band starts above angle of mouth, joining its fellow across the nape before the dorsal origin. Most

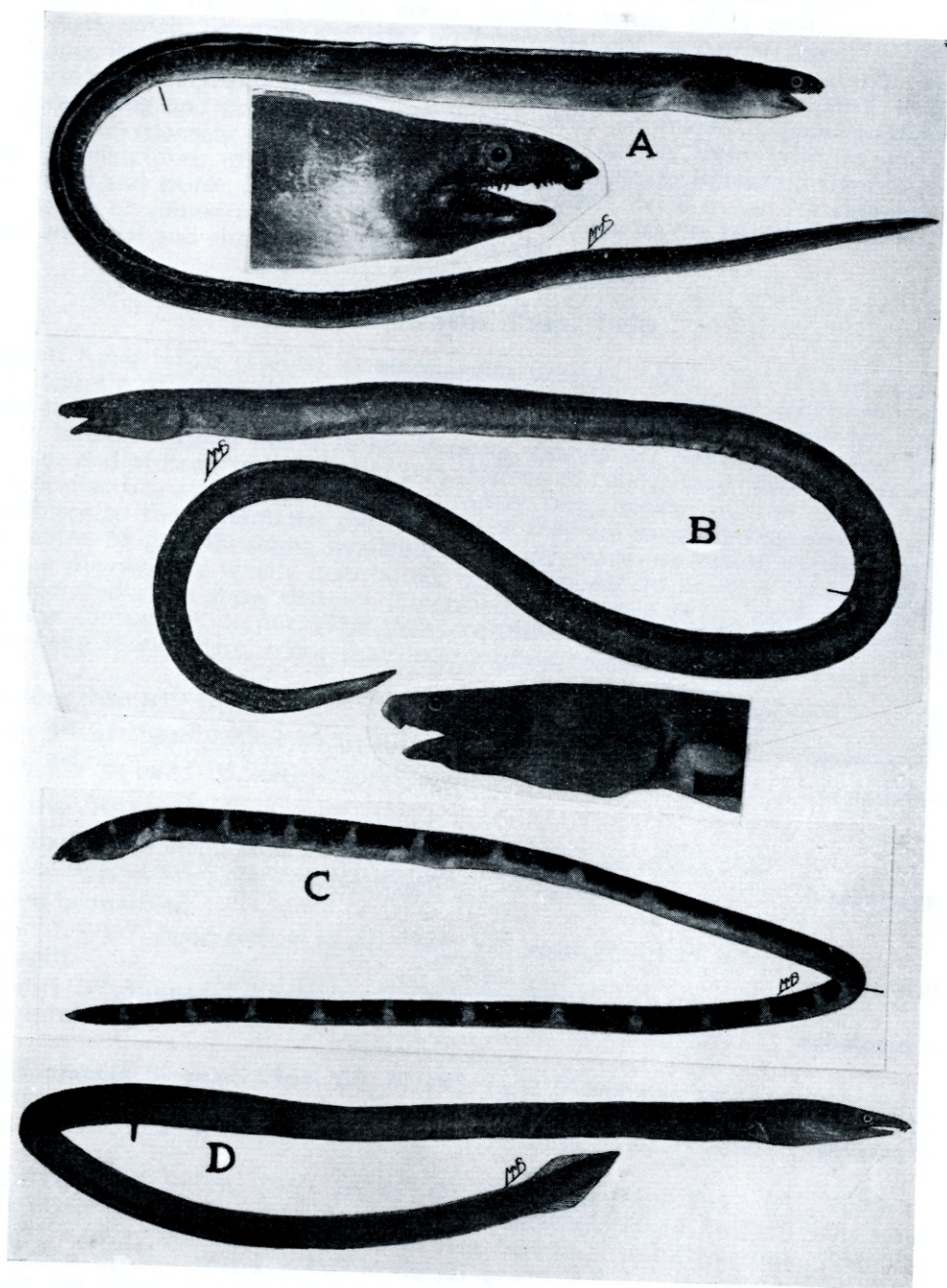


PLATE 64

A. *Jenkinsiella playfairi* (Gnthr), 290mm (Aldabra). B. *Ophichthus marginatus* (Peters), 480mm (Inhaca). C. *Leiuranus phoenixensis* (Schultz), 466mm (Aldabra). D. *Phyllophichthus xenodontus* Gosline, 231mm (Aldabra).

specimens have a curved series of small white spots in the band on the head, and there is an irregular dark band across the throat. Three light brown crossbars over head, the first over front of snout before eye, the second with eye in its front part, the hindmost obliquely back from predorsal, the angle of the mouth in its front edge. These bars on head fade variably on preservation. Dorsal basally white, margin narrowly black in half to one-third length from tip of tail. Anal light. 4 specimens 380-570mm total length, from Seychelles, Aldabra and Pinda (Moz), the type 480mm, Pinda, all from sandy rubble in tide pools. The above description differs in some details from the original. In the field identified as **melanotaenia** Bleeker, which it closely resembles, separated only after long study of descriptions of that species. From what I have deduced **melanotaenia** Bleeker, 1864 is probably confined to the Pacific. **striatus** appears to be differentiated as follows:

	melanotaenia	striatus
Depth in length	55-76	44-51
Head in length	16.5-20	14.5-15.5
Head in trunk	10-12	9.4-9.9
Intermaxillary teeth	3 or 4	Only 2.

The head in **striatus** is slightly but constantly longer than in **melanotaenia** and all my specimens have only 2 large fangs, one behind the other on the intermaxillary. Storey 1939, fig 2 shows 2 pairs of 2, Schultz 1943, 13, in a description of a 595mm Canton Island fish states 1 + 2, but his diagnosis is suspect as he states "tip of snout to anus 1.2 in total length (and snout 7.8 in total length)" which do not agree with the diagnosis of **melanotaenia** Blkr.

CALLECHELYS BITAENIATUS (Peters, 1877) (PI 65, A & B). **Ophichthys bitaeniatus** Peters 1877, 556, Plate, fig 2 (Mombasa). **Callechelys canaliculatus** Smith 1957, 836, PI 27, A, B (E. Africa). Depth 48-58 in total length, 2.4-3.1 in head. Head 14.6-15.9 in total length, 8-9 in trunk. Tail 2.5-2.64 in total length, 1.42-1.52 in trunk. Snout tip to rictus 3.3-3.8 in head, snout tip to dorsal origin 2.6-2.9 in head. Dorsal origin distinctly behind rictus, fin height a little more than $\frac{1}{3}$ body depth. Lateral line of 12 pores on head, about 100 on trunk and 80-90 on tail, total about 200. Intermaxillary with 2 pairs of recumbent fangs. 3-5 pairs of smaller teeth on front of vomer, odd teeth often missing. On each side of the upper jaw 5-8 small teeth, 9-10 similar teeth each side of lower jaw, a few near symphysis enlarged. Colour: Milky yellow, along dorsal base the upper two-fifths of the body with a dark brown stripe which extends right up to the base of the dorsal. This starts on the head below the dorsal origin and runs to the caudal base, broadening on the posterior third or fourth of the caudal where it covers the whole side. The lower edge of the dark band somewhat irregular, with fine nebulous patches along the lower margin. A few light spots in the dark area on head below dorsal origin. Upper surface of head greyish yellow. Flanks and lower surfaces of body yellowish white. The dorsal basally yellowish white, the distal two-fifths dark brown to black, extending to the hindmost extremity of the fin. The anal light, in males the margin is irregularly dusky over the anterior two-thirds of its length. Described from 5 specimens, 685-820mm, 3 from Pinda, one from Mozambique Island, one from Malindi, all from weedy sand in pools with rotenone. Originally I considered these to be distinct, but by kindness of Dr. K. Deckert I have been able to examine Peter's 300mm type from Mombasa, and this leaves no doubt that the specimens described above are the adults of this previously little known species. It doubtless occurs over all the East African region, probably endemic there.

CALLECHELYS MARMORATUS Bleeker, 1852. (PI 67, A). **Dalophis marmoratus** Bleeker 1852, 37 (Siboga). **Ophichthys marmoratus** Gunther 1910, 404 (Mauritius). **Callechelys marmoratus** Smith 1955, 26, PI III, fig 3 (Moz. Zanz.) and 1957, 838 (Aldabra). Depth 31-42 in total length, 2.5-3 in head. Head 10.2(J)-14(Ad) in total length, 6(J)-8(Ad) in trunk. Tail 2.8 in total length, 1.5-1.7 in trunk. Snout to anus 1.8 times tail. Snout tip to rictus 3.3-3.7, to dorsal origin 3-3.2 in head. Dorsal origin distinctly behind rictus. Lateral line with 10 pores on head, about 95 on trunk and 70 on tail, about 175-180 total. Skin longitudinally striated. Dentition with minor variations: intermaxillary with 1 or 2 recumbent canines in front, always a pair behind. An elongate series on vomer, biserial in front, tapers to a uniserial point behind. On each side of upper jaw 7-9 sharp teeth. 10-12 similar teeth in one series on side of lower jaw. Yellowish white, spotted and speckled darker. In the young the snout is immaculate, the hind half of the head with variable blotches. The body is mainly dark with variable blotches. The adults vary somewhat, in all most of the body is covered with chiefly more than eye size dark blotches, sometimes coalesced, but a good deal of light background remains. The head varies from mostly light with fine dark dots to densely covered with dark spots almost forming reticulations, and mostly dark. In all specimens the dorsal has dark blotches and a dark margin, the

anal similar but dark in lesser degree. Described from 7 specimens, 154-570mm, Bazaruto, Pinda, Zanzibar, Aldabra, sandy rubbly pools with rotenone. This is either a variable species, or occurs as regional races or sub-species. In this genus the head is relatively longer in the young, probably why the Western Indian Ocean specimens differ from descriptions of Pacific material in having a relatively longer head, and a dark margin to the vertical fins and may merit distinction. Closely related and probably identical are **guichenoti** Kaup, 1856 from Tahiti and **luteus** Snyder, 1904, (Molokai). The following table indicates the variations mentioned:

	Total length mm	Head in length	Head in trunk	Tail in trunk
Type (Siboga)	873	14.1	8.25	1.7
Weber & de Beaufort, 1916	868	15-16	8.5-9.5	1.6
Type guichenoti	475	17.5	10.0	1.55
Type luteus	830	16.9	9.3	1.4
Bikini, Schultz, 1953	440	14-16	8.3	1.4
Pinda fish	154	10.2	6.0	1.6
Pinda fish	309	12.3	7.0	1.6
Zanzibar fish	540	13.6	7.3	1.55

The last three are unquestionably conspecific.

Callechelys nebulosus n.sp. (Pl 65, D)

Callechelys bitaeniatus (non Peters) Smith 1957, 835, Pl 27, D, (Pinda, Aldabra). Data in brackets juveniles, the other adults. Depth 40-45 (35-37) in total length, about 3 in head. Head 14.7-15.2 in total length, 7.7-8 (5.7-6.5) in trunk. Tail 2.4-2.47 (2.5-2.55) in total length, 1.23-1.31 (1.22-1.34) in trunk. Snout tip to rictus 3.3-3.5 (3.3-4) in head, snout tip to dorsal origin 1.68-1.71 (1.65-1.70) in head. Snout tip to anus 1.4-1.47 (1.5-1.55) times tail. In front of upper jaw 2 small retrorsely recumbent canines in front, behind these a much larger similar pair, well separated, at the head of the vomer 2 small similar canines, no other teeth on vomer. On each side of the upper jaw 9-10 small incurved sharp teeth, in lower jaw a single series of 12-14 similar small teeth each side. Black edged pores on head, 3 along side of snout, last above eye, a median pore on interorbital, 3 in a line down behind eye, 2 below eye. Four pores each side of chin below, and 2 behind rictus. Lateral line starts on head close below front of dorsal, runs up to dorsal base, then down to shoulder, to slightly below mid side, 11-12 pores on head, about 80 on trunk and 65 on tail, total 150-158. Dorsal and anal low, about $\frac{1}{3}$ body depth, end close before end of tail. Colour: The markings change with growth. The young are light olive with a narrow brown band along the back from head to tail, not reaching up to dorsal base. With growth the band broadens first on the body, breaking up into minute brown spots which cover most of the head and body, the band still visible on tail portion to a length of about 370mm. The largest specimen, 470mm length, is dusky generally, with close set not very distinct darker brown spots, most not larger than eye. Front half of head lighter, with small vague darker blotches, pores dark-edged and angle of mouth conspicuously black. Most of dorsal mainly white, with variable dusky cloudings and narrow dark margin, which fades on hind half of tail. Anal dusky white. Six specimens 110-470mm, 5 from Pinda Mozambique, one 155mm, Aldabra, weedy sand in tide pools, the type 470mm, Pinda. The head is relatively larger in the smaller specimens. Originally I considered these to be **bitaeniatus** Peters, but re-examination establishes them as clearly distinct from all known species, both in markings and body dimensions.

4. **Caecula** Vahl, 1794

Type **C.apterygera** Vahl (Atlantic). Vertical fins rudimentary or absent, pectorals absent. Dorsal origin never on head. Front nostrils short tubes below front of snout, hind nostril a slit in lip below eye. Anus more or less in middle of length. Gilloopenings sometimes ventral. Teeth mostly uniserial, no canines. Rather feeble smallish sand-dwellers of most tropical and temperate seas, some in deeper water, not many species, 7 in the Western Indian Ocean.

A. Head 3-4 in trunk.

- I. Tail about equals rest of body.
 - a. Gill membranes simple. Dorsal and anal absent **acuticeps**
 - b. Gill membranes oblique with fold. Dorsal and anal distinct **orientalis**
- II. Tail 1.2 times rest of body. Head about 11 in total length **fusca**
- III. Tail about equals trunk. Head 8-9 in total length **polyophthalmus**

B. Head 5-9 in trunk.

I. Head 5.2 in trunk, 13 in total length **natalensis**

II. Head 8-9 in trunk.

a. Tail shorter than rest. Head 15 in total length **omanensis**

b. Tail longer than rest. Head about 20 in total length **kirki**

CAECULA ACUTICEPS (Barnard, 1925) (**Plate 66, A**). **Sphagebranchus acuticeps** Barnard 1925, 206 (Natal coast, 37 fms). Depth about 34 in total length and 3.5 in head. Head 9 in total length, 3.5 in trunk. Tail 1.95 in total length, 1.04 times rest of fish and 1.35 times trunk. Gape about 3, snout about 6 in head. Eye about 3 in snout and about midway along mouth cleft. Gillslits purely ventral, longitudinal, sub-parallel, about 5 in head, membranes simple. Dorsal and anal absent, or vestigial as low fold in groove. Lips smooth. Recurved sharp teeth uniserial in each jaw, 3 on intermaxillary, a single row of 9 larger teeth on vomer. Uniform brownish. Known only from the 188mm holotype from 37 fms off Tugela mouth, Zululand. This appeared identical with **orientalis** McClelland, but examination of the type indicates **acuticeps** as distinct from all other known species by dimensions and ventral longitudinal gillslits.

CAECULA ORIENTALIS (McClelland, 1844). (**PI 66, C**). **Dalophis orientalis** McClelland 1844, 213 (India). **Ophichthys orientalis** Sauvage 1891, 501 (Madag). Not seen, compiled. Depth about 25 in total length, about 3 in head. Head about 9 in total length, about 3.5 in trunk. Tail about equals rest of fish, 1.3 times trunk. Snout sharply pointed, eye nearer rictus than snout tip. Teeth acute, uniserial on jaws and on vomer. Dorsal and anal very low, dorsal origin little behind gillopenings, which are ventral, with fold in front. Olive above, lighter below, sometimes small white spots on side of occiput. Stated as common on Indian shores, extends to Pacific. Reported from Madagascar by Sauvage, not found elsewhere in the Western Indian Ocean.

CAECULA FUSCA (Zuiew, 1793) (**PI 66, B**). **Muraena fusca** Zuiew 1793, 296, PI 7, fig 1 (Madagascar): **Ophichthys fuscus** Gunther 1870, 85 and Sauvage 1891, 500, PI 49c, figs 4, 4a (Madag). **Sphagebranchus fuscus** Bleeker & Pollen 1875, 72 (Rec. Mad.). **Sphagebranchus brevirostris** Peters 1855, 273 (Mozambique): Pollen 1863, 69 (Rec. Mad.). **Caecula brevirostris** Smith 1949, 389, fig 1097 (Mozamb). Fourmanoir 1954, 233 (Comores) and 1957, 301 (Grande Comore; Nosy Iranja). Not seen, compiled. Depth about 35 in total length, 3.5 in head. Head about 11 in total length, 3.7 in trunk. Tail 1.8 in total length, 1.2 times rest of body and 1.55 times trunk. Gape 2.5, snout 8 in head. Snout to dorsal origin 1.6 times head. Small sharp teeth uniserial in each jaw and on vomer. Dorsal and anal very low, dorsal origin more than half head length behind gillopening. Uniform olive brownish. The type (Peters) 260mm from 23°S in Mozambique channel, one (Sauvage) 170mm from Madagascar, not found elsewhere.

CAECULA POLYOPHTHALMUS (Bleeker, 1853). (**PI 66, G**). **Sphagebranchus polyopthalmus** Bleeker 1853, 299 (E. Indies): Baissac 1957, 20 and 1957a, p. iii (Rec. Mauritius). Not seen, compiled. Depth about 30 in total length, about 4 in head. Head 8-9 in total length, 3-4 in trunk. Tail about 2.2 in total length, about equals trunk. Eye 2.5 in snout which is about 6 in head. Gape 3 in head, eye about midway along. Gillopenings mostly ventral, oblique, the membrane with extra fold, distance apart equals length. Pointed recurved teeth uniserial in jaws and on vomer, 5 on intermaxillary. Dorsal and anal distinct, low, dorsal origin half body depth behind gillopening. In life greenish with a series of light spots along the body, a yellow transverse streak over nape, which is dark. Attains 325mm, chiefly East Indies and Pacific, reported from Mauritius by Baissac, on specimen "identified by Norman, British Museum as **polyopthalmus** Bleeker, 1853".

CAECULA NATALENSIS Fowler, 1934. (**PI 66, H**). Fowler 1934, 416, fig 5 (Natal). Smith 1949, 389, fig 1096 (on Fowler). Not seen. Compiled. Depth 41 in total length, 3.2 in head. Head 13 in total length, 5.2 in trunk. Tail 2.3 in total length, 1.3 in rest of fish and 1.15 in trunk. Eye about 2 in snout which is 7 in head. Gape 3 in head, eye little nearer snout tip than rictus. Dorsal and anal feeble but distinct, dorsal origin over front of gillopening. Teeth very small, uniserial on jaws, biserial on vomer. Gillopenings apparently ventro-lateral, little wider than space between. Olive, with fine dark dots, brownish below, dusky specks on side of head, short transverse darker line behind rictus and black specks on side of mandible. Known only from the 303mm type from Umgeni lagoon, Natal. Apparently distinct from all other species in dimensions alone. Dr. J. Bohlke has kindly confirmed data from the type.

CAECULA OMANENSIS (Norman, 1939) (PI 66, F). **Sphagebranchus omanensis** Norman 1939, 43, fig 16 (Gulf of Oman). Not seen, compiled. Depth 55 in total length, about 4.5 in head. Head 15.4 in total length, 8 in trunk. Tail 2.4 in total length, 1.4 in rest of body and 1.24 in trunk. Snout about twice eye, 9 in head, eye nearer snout tip than rictus. Gilloopenings mostly ventral, transverse, wider than distance between them. Teeth sharp, recurved, uniserial in each jaw, 4 larger teeth on intermaxillary, teeth on vomer biserial in front, uniserial behind. Dorsal and anal well developed behind, dorsal origin behind vent. Grey brown, paler below, head variegated with dark brown. Known only from the 230mm holotype, from 73 metres in Gulf of Oman. Clearly distinct from all other known species by dimensions alone.

CAECULA KIRKI (Gunther, 1870). (Plate 68, B & C). **Ophichthys kirkii** Gunther 1870, 89 (Rovuma Bay, E. Afr.); Picaglia 1894, 35 (rec. Aden). Regan, 1908, 243 (rec. Zululand), Gilchrist & Thompson 1917, 302; (ref & syn). Barnard 1925, 204 (S.Africa). **Ophichthus kirki** Fowler, 1956, 120 (Aden). **Caecula kirki** Smith 1949, 389 (S. Afr.). An unusually long slender body, the depth 70-90 in total length, 3-4 in head. Head 20 in total length, 8.5 in trunk. Tail 1.90 in total length, 1.08-1.12 times rest of fish, about 1.2 times trunk. Gape 4.5, snout to dorsal origin 1.6-1.8 in head. Eye about 3 in snout, midway between snout tip and rictus. Snout fairly pointed, extends well beyond lower jaw. Teeth small, slender, uniserial on jaws and on vomer. Dorsal origin on head about midway between gilloopening and rictus. Gilloopenings sublateral, wide. Olive or brownish above, lighter below. Described from two specimens, kindly sent by Mr. G. Palmer of the British Museum, one a paratype, 357mm, No. B.M. 1864.1.9.50-51 from Rovuma Bay, the second 542mm, No B.M. 1906. 11.19.38, from Kosi Bay, Zululand, a ripe female, body full of eggs. Appears to be distinct from all other species in the long slender body and short head.

5. **Brachysomophis** Kaup, 1856

Type **B. horridus** Kaup, 1856 (Mauritius) = **crocodilinus** Bennett, 1833 (Maur). Body robust, rod-like. Dorsal origin behind head. Pectorals present. Lips fringed. Fang-like teeth present. Front nostril a short tube on front of side of snout, hind nostril a slit in upper lip close behind. Mouth large, eye far forward, much nearer snout tip than rictus. Anus in about middle of length. Eels with peculiar head, few species, need critical study, only one in the Western Indian Ocean.

BRACHYSOMOPHIS CROCODILINUS (Bennett, 1833) (PI 67, G). **Ophisurus crocodilinus** Bennett 1833, 32 (Mauritius). Telfair 1835, 523 (Rec. Maur). **Brachysomophis horridus** Kaup 1856, 9, fig 6 (Mauritius). **Ophichthys crocodilinus** Gunther 1870, 64 (Mauritius). Gunther 1910, 398 (Maur). Sauvage 1875, 527 (Rec. Maur). **Brachysomophis crocodilinus** Bleeker & Pollen 1875, 72 (Rec. Maur). Bleeker 1879, 22 (Rec. Maur.). Weber & de Beaufort 1916, 314 (Maur). Smith 1957, 842 (Mafia, Aldabra). Depth 19 in total length, 2.7 in head. Head 7.2 in total length, 2.8 in trunk. Tail 2.15 in total length, 1.2 times trunk. Snout to anus 1.12 times tail. Snout tip to rictus 2.9 in head, to dorsal origin 1.4 times head. Pectoral 10 in head. Head lizard-like, snout very short, eyes prominent. Teeth fang-like, biserial on side of upper jaw, inner series larger, 5 on intermaxillary, the median the largest, uniserial on vomer, smaller posteriorly: slender uniserial on lower jaw, a few in front larger. Lips with a single row of short fleshy processes. Gilloopenings fairly wide, about 6 in head, own width apart. Lateral line starts on nape, ends some distance from tip of tail: about 50 pores on trunk. Dorsal origin well behind head. Uniform brown, fins light. Described from a specimen, 136 mm, Aldabra, from sandy pool. Widely distributed in the tropical Indo-Pacific, clearly rare in the Indian Ocean, first found at Mauritius, most later records from there based on the original, we found only 2 specimens (Mafia: Aldabra) among numerous sanddwellers taken over a wide area of the W. Indian Ocean. A comparative analysis of **B. sauropsis** Schultz, 1943 from Phoenix and Samoa area, Pacific, reveals no characters of importance to justify distinction from **crocodilinus** Bennett.

6. **Ophisurus** Lacepede, 1800

Type **Muraena serpens** Linn, 1758 (Atlantic). Body very elongate. Pectorals well developed. Dorsal origin behind head. Snout long and pointed. Distinct fang-like teeth present in front of jaws and on vomer. Lips smooth. Front nostril a low tube on side of snout. The type species in South Africa, extends to Southern Mozambique, and one from the Gulf of Aden, easily distinguished.

- A. Small dark spots above. Tail shorter than rest of fish. Head 7 in total length **multiserialis**
- B. Uniform greenish. Tail longer than rest of fish. Head 11-13 in total length **serpens**

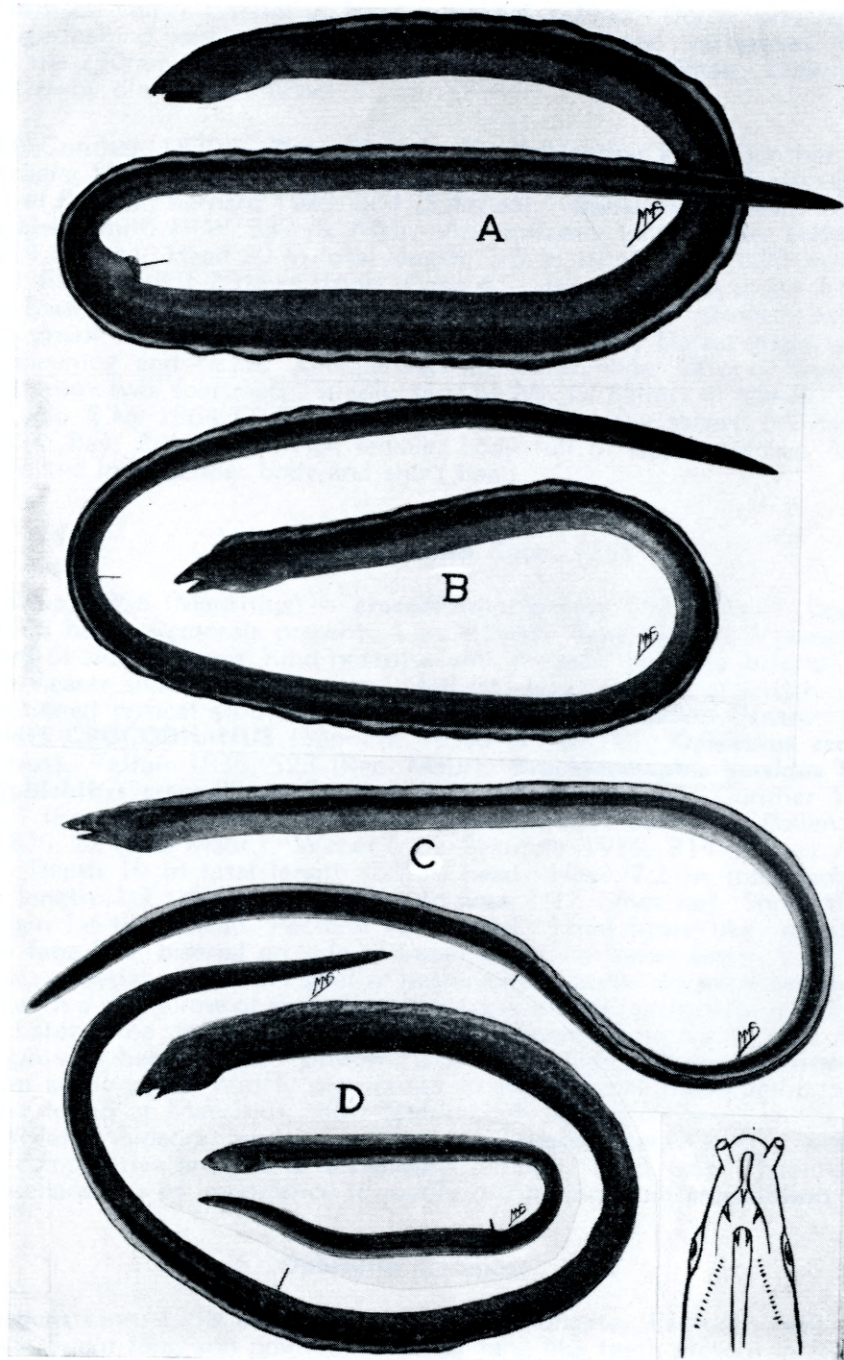


PLATE 65

A. & B. *Callechelys bitaeniatus* (Peters), A. female 780mm (Pinda). B. male 820mm (Pinda). C. *Callechelys striatus* Smith. Type 473mm (Pinda). D. *Callechelys nebulosus* n.sp. Type 470mm (Pinda). Inner, 145mm (Pinda).

OPHISURUS MULTISERIALIS (Norman, 1939) (PI 67, C). **Ophichthus multiserialis** Norman 1939, 42, fig 15 (Gulf of Aden). Not seen, compiled. Depth about 22 in total length, about 2.8 in head. Head about 7 in total length, about 2.8 in trunk. Tail somewhat shorter than rest of fish. Gape about 2.6 in head, extends well beyond eye. Pectoral about 3.5 in head. Dentition as shown in Plate 67. Dorsal origin about half pectoral length behind pectoral tip. Yellow brown, many small dark spots along back, smaller and closer on head. Known only from the type, 625mm, taken in 220 metres in the Gulf of Aden.

OPHISURUS SERPENS (Linn., 1766) (PI 68, A). **Muraena serpens** Linnaeus 1766, 425 (Atlantic). **Leptorhynchus capensis** Smith 1849, PI VI. Bleeker 1860, 56 (Name only). Castelnau 1861, 73 (Cape). **Ophichthus serpens** Gunther 1870, 65. Gilchrist 1902, 154; Thompson 1916, 77, and Barnard 1925, 202 (South Africa). **Ophisurus serpens** Smith 1949, 391, PI 99, fig 1106 (S. Afr). Depth 40-60 in total length, 3.5-5 in head. Head 11.5-13 in total length, 3.4-4 in trunk. Tail 1.5-1.6 in total length, 2.1-2.4 times trunk, 1.6-1.9 times rest of fish. Gape 2.0-2.6 in head. Eye 2.5-3 in snout, this 3.8-5.3 in head. Gape to almost 2 eye diameters behind eye. Pectoral 4-5 in head. Snout long and pointed, apex often spatulate (crocodile-like), lower jaw with fleshy papillate tip. In front of upper jaw a canine on each side, in lower 5-6 canines each side in front, a single row of 2-3 smaller and 4-5 larger fangs behind on vomer. Smaller sharp teeth on sides of jaws, upper mostly biserial, lower uniserial. Front nostril a short tube on side of snout little closer to eye than snout tip, hinder an ovoid opening with skinny rim expanded above forming a flap that covers the aperture in lip, between eye and front nostril. Dorsal origin 1-2 pectoral lengths behind pectoral tip. 9-10 L.I. pores on side of head, 68-70 on trunk to anus. In life greenish or olive to brownish above, lighter below, pores on head black. Described from numerous specimens 300-960mm, Walvis Bay to Durban, and one, 1175mm, from 30 fathoms off Inhambane (23°S), this the first record from Mozambique. Lives in sand, mostly concealed by day, emerges and moves about freely at night, at which time also many may be seen with only the heads out waiting for prey. Not uncommonly taken on baited hooks and often caught by sea-birds, with whom larger specimens wage fierce battles, sometimes breaking free. Clearly one of the most successful eels, has colonised vast stretches of ocean shores. Reported, described and figured from the Mediterranean, eastern Atlantic, South Africa, Japan and Australia, curiously enough not from India. Dimensional ratios of South African specimens agree with those from the Mediterranean and Japan. When swallowed alive by fishes bores through intestines, we have had several encapsulated mummified specimens found in the peritoneal cavity of larger fishes, one from **Johnius hololepidotus** (Lac)-.

7. **Leiuranus** Bleeker, 1853

Type **L. lacepedii** Blkr, 1853 (Sumatra) = **semicinctus** Lay & Bennett, 1839 (Pacific). Elongate rodlike body little compressed. Dorsal origin close behind gillopenings. Pectoral present. Anus about midway in length. Teeth pointed, not caniniform, on vomer present or absent. No barbels on lips. Lateral line present. Front nostril a tube at tip of snout. Hind nostril with flap in front. Tropical Indo-Pacific, only 2 species, distinguished by markings.

LEIURANUS SEMICINCTUS (Lay & Bennett, 1839) (PI 63, D). **Ophisurus semicinctus** Lay & Bennett 1839, 66 (Polynesia). **Leiuranus colubrinus** Kaup 1856, 2 (Mauritius). **Leiuranus semicinctus** Gudger 1929, 522 (Mauritius). Smith 1949, 509, PI 103, fig 1099a (Inhaca) and 1957, 834 (Aldabra). Baissac 1957, 20 (Mauritius). Depth 70(J)-38(A) in total length, 2.8(A)-6(J) in head. Head 11.5(J)-14.5(A) in total length, 5.5(J)-7.2(A) in trunk. Tail 1.9-2.1 in total length, 1.06-1.34 times trunk. Snout to anus 0.9-1.16 in tail. Snout tip to rictus 3-3.5 in head. Pectoral 5-10 in head. Dorsal origin variable from above pectoral base to behind pectoral apex. Mouth to well behind eye. A few conical teeth on intermaxillary, a few similar teeth on head of vomer, sometimes absent in young, more prominent in adults, uniserial sharp conical teeth on side of each jaw. 24-29 black saddles, only those on tail meeting below, 1st over snout, 2nd behind eyes: most about twice interspaces. Numerous specimens 105-660mm, from Inhaca northwards over whole Western Indian Ocean and at all islands to Seychelles, by day in sand. Moves easily and rapidly through the damp sand. Got by digging or by rotenone. One of the commonest and most widespread of the sand dwellers, easily recognised

LEIURANUS PHOENIXENSIS Schultz, 1943. (PI 64, C). **L.phoenixensis** Schultz 1943, 16, PI 1 and fig 2c (Canton Is). Smith 1957, 834, PI 28, C (Aldabra). Depth about 50 in total length, 3.6 in head. Head 14.5 in total length, 6.25 in trunk. Tail 2.15 in total length, 1.2 times trunk. Snout to anus 1.03 in tail. Snout tip to rictus 3.2 in head. Pectoral 5 in head. Dorsal origin over hind third of pectoral. Angle of mouth little behind hind margin of eye. A few blunt conical teeth on

intermaxillary, 1-4 similar teeth on head of vomer. Uniserial sharper teeth on side of each jaw. 24 broad black saddles, at least 3 times as wide as pale interspaces, only last 2 at tip of tail meet below. Delagoa Bay and Aldabra, described from 466mm specimen from Aldabra. Very close to **semicinctus** but probably a valid species, extends to Pacific.

8. **Phyllophichthus** Gosline, 1951.

Type **P. xenodontus** Gosline, 1951 (Hawaii). Elongate rod-like body little compressed. Dorsal origin behind gilloopening. Pectoral present. Anus midway in length. Teeth feeble, biserial in front, uniserial on jaws, none on vomer. No barbels. Front nostril wide with fleshy processes and skinny flaps. Hind nostril a slit with flap in front. Only the type species.

PHYLLOPHICHTHUS XENODONTUS Gosline, 1951, (PI 64, D). Gosline 1951, 316, fig 17 (Hawaii). Smith 1957, 841 PI 28, D and fig 1 (Inhaca, Pinda, Aldabra). Weed & Howarth 1961, 357 (Seychelles). Depth about 40 in total length, 3.5-3.6 in head. Head 10.7 in total length, 4.3-4.4 in trunk. Tail 1.95-2.04 in total length, about 1.2 times trunk. Snout to anus about equals tail. Snout tip to rictus 2.6 in head. Small cutaneous villi over head except chin. Front nostril an opening in lower surface of snout, with low rim, 3 fleshy finger-like processes and large skinny flap behind. Hind nostril an opening in roof of mouth with flap in front. Lateral line distinct, about 75 pores from gilloopening to vent. Pointed snout projects well beyond mouth. 8-10 small pointed teeth biserial on intermaxillary, outside mouth, 7-8 small sharp uniserial recurved teeth on side of each jaw, 20-26 fine teeth uniserial on side of lower jaw, vomer edentate. Dorsal origin over about mid pectoral, dorsal and anal low, expanded near tip of tail. Pectoral of 10 rays, broadly rounded, 4.2-5.2 in head. Olive yellow, covered with minute dark dentritic specks, under head lighter. Fins light. Described from 5 specimens 231-405mm, Inhaca, Pinda, Shimoni, Aldabra; extends to Pacific.

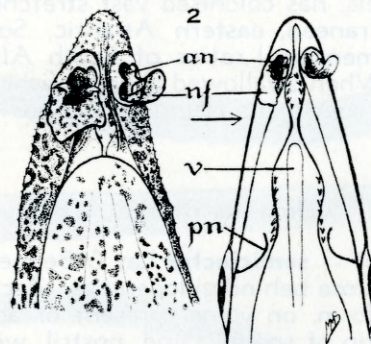


Fig. 2. **Phyllophichthus xenodontus** Gosline, 231mm

Left: underside of snout showing anterior nostrils. Right diagram of palate. **an**: anterior nostrils, **nf**: nasal flap, **pn**: posterior nostril, **v**: vomerine ridge. The arrows shows level of tip of lower jaw.

9. **Pisoodonophis** Kaup, 1856

Type **Ophisurus cancrivorus** Richardson, 1844 (China). Dorsal origin behind head. Pectorals present. Anus variably behind or before midway in elongate body. Hind nostril before eye, front nostril a tube on snout. Teeth granular, mostly in bands in jaws and on vomer. Lips not fringed. Rather large robust eels, mostly in sheltered or turbid water, often in estuaries, widely distributed in the tropical Indo-Pacific, few species, 2 in the Western Indian Ocean.

- A. Origin of dorsal above pectorals **cancrivorus**
- B. Origin of dorsal well behind head **boro**

PISOODONOPHIS CANCRIVORUS (Richardson, 1844). **Ophisurus cancrivorus** Richardson 1844, 97, PI 50, figs 6-9 (Singapore). **Ophichthys cancrivorus** Gunther 1870, 78 (Mauritius). Sauvage 1891, 527 (Rec. Maur). **Pisoodonophis cancrivorus** Guichenot 1863, 30 (Reunion). Bleeker & Pollen 1875, 72 (Rec. Mad. and Maur). Bleeker 1879, 22 (Rec. Maur). Smith 1949, 510, fig 1100a (Inhaca, Moz).

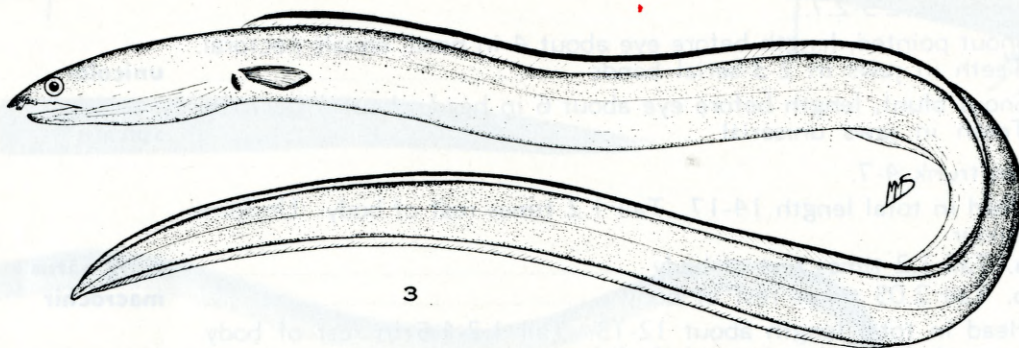


Fig. 3. **Pisoodonophis cancrivorus** (Rich). 550mm (Inhaca).

Depth 28 in total length, 3.1 in head. Head 9.2 in total length, 2.8 in trunk. Tail 1.72 in total length, 1.9 times trunk. Snout to anus 1.4 in tail. Snout tip to rictus 3.2 in head, to dorsal origin 1.1 times head. Pectoral 3.8 in head. Dorsal origin over front of pectoral, median fins low, less than half body depth, end before tip of tail. Rictus to beyond hind edge eye. Granular teeth in a patch on intermaxillary, in a band on side of upper jaw, larger teeth in a band on side of lower jaw, together almost forming upper pavement, more acute teeth in band on side of lower jaw. A small papilla on upper lip each side before eye, and another below eye. Described from a specimen 550mm length, from muddy reef at Inhaca. Though reported from Madagascar and Mauritius it is apparently rare in the Western Indian Ocean, we found it only in this one locality. It is probable that the inadequately described **Conger flavipinnatus** of Bennett 1831, 168 (also recorded by Telfair 1835, 360) from Mauritius is this species, in which case that name would have priority. Gunther 1870, 79 mentions a specimen of **cancrivorus** acquired from the collections of the Zoological Society, origin not known, which he suspects was the type of **flavipinnatus** Bennett, but the matter cannot be settled.

PISOODONOPHIS BORO (Hamilton-Buchanan, 1822). **Ophisurus boro** Hamilton-Buchanan 1822, 20 (Ganges). **Pisoodonophis boro** Fowler 1929, 248 (Zululand). Smith 1937, 171 (Zululand): and 1949, 389, fig 1100 (S. Africa).

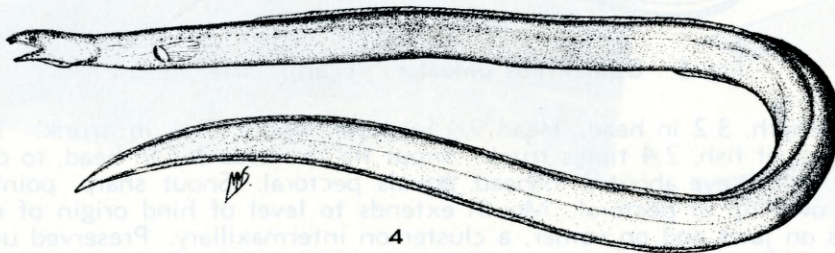


Fig. 4. **Pisoodonophis boro** (Ham. Buch). 500mm. (Zululand).

Depth 30-36 in total length, 2.6-3.6 in head. Head 9-12.1 in total length, 3-3.6 in trunk. Tail 1.6-1.8 in total length, 1.9-2.1 times trunk. Snout to anus 1.45-1.65 in tail. Snout tip to rictus 3.6-3.8 in head, to dorsal origin 1.4-1.6 times head. Pectoral 4-5 in head. Dorsal origin about half head length behind head, vertical fins low, end near tip of tail. Rictus well behind eye. A single papilla on lower lip behind front tubular nostril. Granular teeth in fairly wide bands on intermaxillary, on vomer and sides of both jaws. Uniform brownish olive above, lighter below. Widely distributed in the Indo-Pacific. Specimens 350-800mm from as far south as Knysna estuary (34°S), Pondoland (31°S), St. Lucia estuary (28°S), Zululand (27°S), Delagoa Bay (26°S), Sabaki River (Kenya), Zanzibar, Aldabra, mostly in estuaries or turbid water, penetrates to fresh water.

10. **Ophichthus** Ahl, 1789

Type **Muraena ophis** Linn., 1758 (Atlantic). Elongate rod-like body. Pectorals present. Dorsal origin behind head. Teeth conical, none fang-like, lips plain. Front nostril shortly tubular, near front of snout, hind nostril a slit in underside of lip below front of eye. Anus variably at, before, or behind mid length. Dorsal and anal of moderate height. Eye small. All tropical seas, many species named from the Indo-Pacific, some widespread, 7 in the Western Indian Ocean.

- A. Head in trunk 2.3-2.7.
- I. Snout pointed, length before eye about 4 in head, equals pectoral. Teeth in jaws in 2-3-serial bands **unicolor**
 - II. Snout blunt, length before eye about 6 in head, about $\frac{1}{2}$ pectoral. Teeth in jaws uniserial **apicalis**
- B. Head in trunk 4-7.
- I. Head in total length 14-17. Tail 1.2 times rest of body. Uniform colour
 - a. Tail 1.2 times rest of body **marginatus**
 - b. Tail 2.05 times rest of body **macrochir**
 - II. Head in total length about 12-13. Tail 1.2-1.5 in rest of body. Large dark blotches over whole fish.
 - a. Pectoral 3.6 in head **retifer**
 - b. Pectoral 7 in head **bonaparti**
 - III. Head in total length 10.5, 4.8 in trunk. Tail 1.1-1.2 in rest of body. Many large darker blotches with central ocellus **polyophthalmus**

OPHICHTHUS UNICOLOR Regan, 1908 (PI 67, E). *Ophichthys unicolor* Regan 1908, 250, fig 1; and Barnard 1925, 203 (off Algoa Bay). *Ophichthys algoensis* Barnard 1925a, 498; and 1925, 203 (Algoa Bay). *Ophichthys unicolor* Smith 1949, 390, fig 1102 (Algoa Bay).

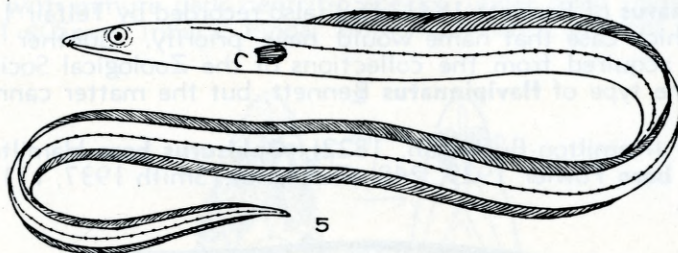


Fig. 5. *Ophichthys unicolor* (Regan). After Regan.

Depth 30 in total length, 3.2 in head. Head 9.4 in total length, 2.4 in trunk. Tail 1.6 in total length, 1.7 times rest of fish, 2.4 times trunk. Snout tip to rictus 3.2 in head, to dorsal origin 1.25 times head. Snout before eye about 4 in head, equals pectoral. Snout sharp, pointed, about twice eye. Dorsal origin over tip of pectoral. Mouth extends to level of hind origin of eye. Sharp teeth in 2-3 serial bands on jaws and on vomer, a cluster on intermaxillary. Preserved uniform brownish. Described from the 300mm type of *algoensis* Barnard, 1925 (Algoa Bay), S.A.M. 12776. I cannot find any feature to justify the retention of *algoensis* as distinct from *unicolor* Regan. This species is remarkably close to *celebicus* Bleeker, 1856 from the East Indies, with which it agrees in all dimensions but has a shorter pectoral.

OPHICHTHUS APICALIS (Bennett, 1830). (PI 67, F). *Ophisurus apicalis* Bennett 1830, 692. *Centrurrophis spadiceus* Kaup 1856, 2 (Madagascar). *Muraenopsis spadiceus* Pollen 1863, 69 (Madagascar). *Ophichthys spadiceus* Bleeker & Pollen 1875, 72 (Rec. Mad). *Ophichthys apicalis* Gunther 1870, 70 (Indian Ocean). Sauvage 1891, 527 (Rec. Mad). Barnard 1925, 204 (Natal & Zululand). *Ophichthys unicolor* (non Regan, part) Fowler 1934, 416 (Richards Bay, Natal). *Ophichthys apicalis* Smith 1949, 390, PI 99, fig 1103 (S & E Africa). Depth 26-33 in total length, 2.6-3.2 in head. Head 8.8-9.8 in total length, 2.3-2.7 in trunk. Tail 1.6 in total length, 2.1-2.4 times trunk, and 1.5-1.6 times rest of fish. Eye 1.7 in snout, which is about 6 in head. Snout tip to rictus 3.5-4 in head, snout tip to dorsal origin 1.15 times head. Pectoral 2.2-2.5 in head. Snout rather blunt, mouth extends little or not beyond hind margin of eye, sharp small teeth in a cluster on intermaxillary, in one row each side of each jaw, irregularly biserial on vomer. Dorsal origin over about middle of pectoral, dorsal and anal expanded near end of tail. Preserved light brown yellow, fins light. Described from 7 specimens, two, 153- and 177mm length from Inhaca, four ex S.A.M. No. 12778 from 12 fathoms off Tugela River (29°S), 387-450mm, and one 345mm trawled in 12 fathoms off Malindi, Kenya. African specimens agree in almost every respect with descriptions and illustrations of Pacific material.

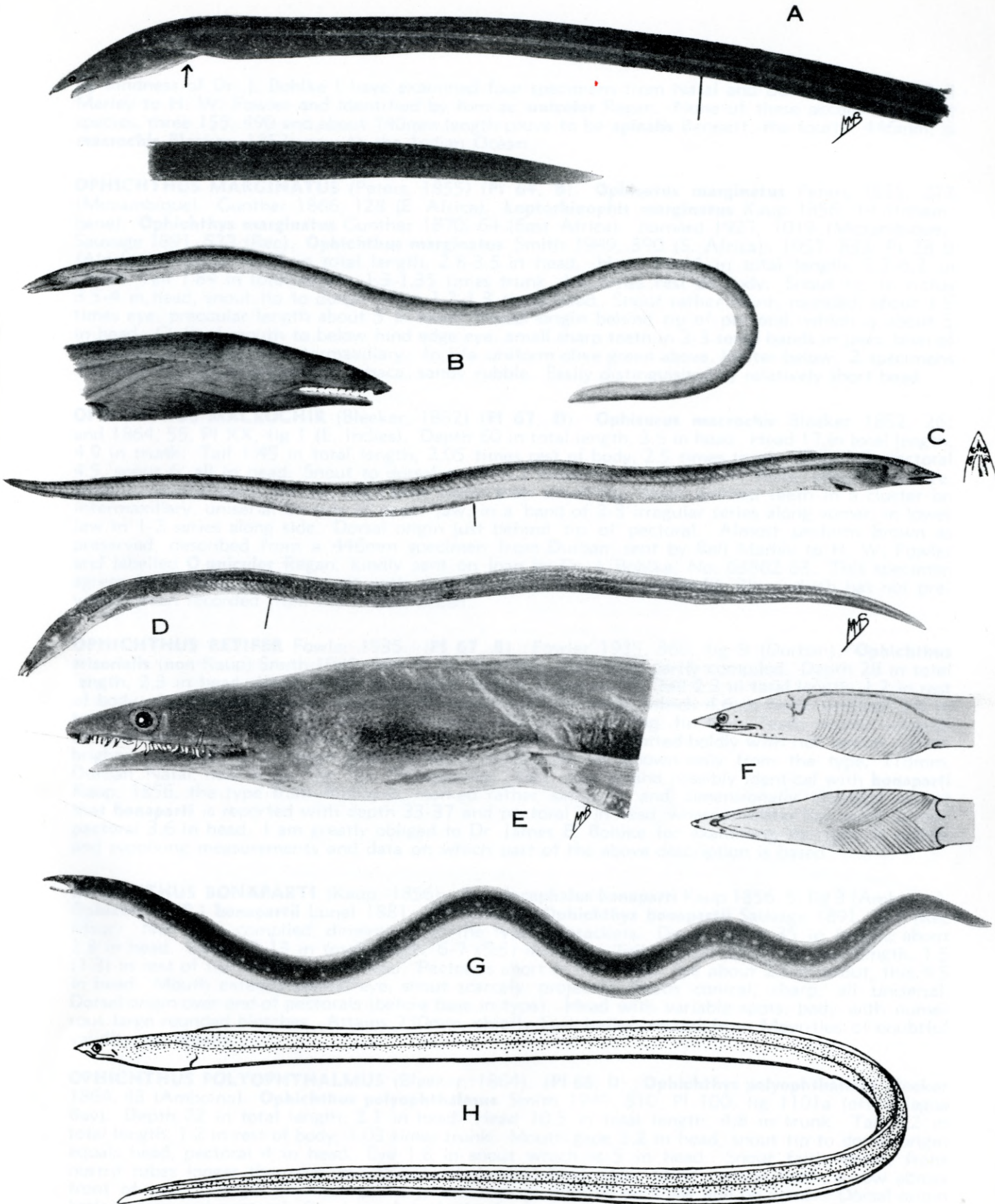


PLATE 66

A. *Caecula acuticeps* (Barnard). Type 188mm (broken tail below). B. *Caecula fusca* (Zuiew), (After Sauvage). C. *Caecula orientalis* (McClelland). (After Day). D. & E. *Jenkinsiella inhacae* n.sp. 228 mm (Madag). F. *Caecula omanensis* (Norman). (After Norman). G. *Caecula polyophthalmus* (Bleeker). (After Bleeker). H. *Caecula natalensis* Fowler. Type. (After Fowler).

By kindness of Dr. J. Bohlke I have examined four specimens from Natal and Zululand, sent by Bell Marley to H. W. Fowler and identified by him as **unicolor** Regan. None of these accord with that species, three 155, 490 and about 740mm length prove to be **apicalis** Bennett, the fourth, 446mm, is **macrochir** Bleeker, 1852, new to the Indian Ocean.

OPHICHTHUS MARGINATUS (Peters, 1855) (PI 64, B). **Ophisurus marginatus** Peters 1855, 272 (Mozambique). Gunther 1866, 128 (E. Africa). **Leptorhinophis marginatus** Kaup 1856, 14 (Inhambane). **Ophichthys marginatus** Gunther 1870, 64 (East Africa). Barnard 1927, 1019 (Mozambique). Sauvage 1891, 527 (Rec). **Ophichthys marginatus** Smith 1949, 390 (S. Africa); 1957, 833, PI 28 B (Aldabra). Depth 43-48 in total length, 2.8-3.5 in head. Head 14-16 in total length, 5.2-6.2 in trunk. Tail 1.84 in total length, 1.3-1.35 times trunk, 1.2 times rest of body. Snout tip to rictus 3.5-4 in head, snout tip to dorsal origin 1.2-1.3 times head. Snout rather blunt, rounded, about 1.5 times eye, preocular length about 5 in head. Dorsal origin behind tip of pectoral, which is about 5 in head. Cleft of mouth to below hind edge eye, small sharp teeth in 2-3 serial bands in jaws, biserial on vomer, a cluster on intermaxillary. In life uniform olive green above, lighter below. 2 specimens 195 and 470mm, Aldabra and Inhaca, sandy rubble. Easily distinguished by relatively short head.

OPHICHTHUS MACROCHIR (Bleeker, 1852) (PI 67, D). **Ophisurus macrochir** Bleeker 1852, 26: and 1864, 55, PI XX, fig 1 (E. Indies). Depth 60 in total length, 3.5 in head. Head 17 in total length, 4.9 in trunk. Tail 1.45 in total length, 2.05 times rest of body, 2.5 times trunk. Gape 3.6, pectoral 4.5, snout 6, all in head. Snout to dorsal origin 1.2 times head. Snout fairly sharp, about twice eye, projects beyond lower jaw tip, eye nearer rictus than snout tip. Small pointed teeth in a cluster on intermaxillary, uniserial on side of upper jaw, in a band of 2-3 irregular series along vomer, in lower jaw in 1-2 series along side. Dorsal origin just behind tip of pectoral. Almost uniform brown as preserved, described from a 446mm specimen from Durban, sent by Bell Marley to H. W. Fowler and labelled **O.unicolor** Regan, kindly sent on loan by Dr. J. Bohlke, No. 63862-63. This specimen agrees in virtually every respect with descriptions of E. Indian **macrochir** Blkr, which has not previously been recorded from the Indian Ocean.

OPHICHTHUS RETIFER Fowler 1935. (PI 67, B). Fowler 1935, 368, fig 9 (Durban). **Ophichthys triserialis** (non Kaup) Smith 1949, 360, PI 99, fig 1101. Not seen, partly compiled. Depth 28 in total length, 2.3 in head. Head about 12 in total length, 5.5 in trunk. Tail 2.2 in total length, 1.2 in rest of body, about equals trunk. Gape 2.2 in head. Eye 2 in snout, which 4.6 in head, pectoral 3.6 in head. Dorsal origin slightly in advance of upper edge of gillopening, fin low. Teeth mostly uniserial on jaws and vomer. Jaws almost equal. In life "pale yellow, spotted boldly with rich brown, yellow brighter on head" as in Smith 1949 PI 99, F. 1101. So far known only from the type, 718mm, Durban, Natal, now in Ac. Nat. Sci. Philadelphia. Very close to and possibly identical with **bonaparti** Kaup, 1856, the type from Amboyna, marked rather similarly, and dimensionally identical except that **bonaparti** is reported with depth 33-37 and pectoral 7 in head, whereas **retifer** has depth 23 and pectoral 3.6 in head. I am greatly obliged to Dr. James E. Bohlke for examining the type of **retifer** and supplying measurements and data on which part of the above description is based.

OPHICHTHUS BONAPARTI (Kaup, 1856). **Poecilocephalus bonaparti** Kaup 1856, 5, fig 3 (Amboyna). **Ophichthys (P.) bonapartii** Lunel 1881, 275 (Maur). **Ophichthys bonapartii** Sauvage 1891, 527 (Rec Maur). Not seen, compiled, dimensions of the type in brackets. Depth about 35 in length, about 2.8 in head. Head 12-13 in total length, 6-7 (5.5) in trunk. Tail 2.2-2.5 (2.18) in total length, 1.5 (1.3) in rest of fish. Gape 2.5 in head. Pectorals short 6-7 in head. Eye about 2.5 in snout, this 4.5 in head. Mouth extends behind eye, snout scarcely projects. Teeth conical, sharp, all uniserial. Dorsal origin over end of pectorals (before base in type). Head with variable spots, body with numerous large rounded blotches. Attains 750mm, chiefly East Indies, record from Mauritius of doubtful validity, no details.

OPHICHTHUS POLYOPHTHALMUS (Bleeker, 1864). (PI 68, D). **Ophichthys polyopthalmus** Bleeker 1864, 43 (Amboyna). **Ophichthys polyopthalmus** Smith 1949, 510, PI 100, fig 1101a (off Delagoa Bay). Depth 22 in total length, 2.1 in head. Head 10.5 in total length, 4.8 in trunk. Tail 2.2 in total length, 1.2 in rest of body, 1.03 times trunk. Mouth gape 3.2 in head, snout tip to dorsal origin equals head, pectoral 4 in head. Eye 1.8 in snout which is 5 in head. Snout fairly blunt, front nostril tubes longer than eye, mouth extends beyond hind edge. Stout conical teeth, a row across front of jaw, 2 larger on intermaxillary, uniserial on sides of each jaw and on vomer. Dorsal origin little before mid pectoral, fin about $\frac{1}{3}$ body depth, higher along tail, little more than half depth below, anal lower. Alive as Smith 1949, PI 100, fig 1101a, light salmon red, with yellow centred

spots on head and widely dark margined yellowish ocelli on body. Preserved, yellow brown, with the same markings. Described from a 500mm specimen, taken on a line in about 20 fathoms off Delagoa Bay, an interesting record, for very few specimens have ever been found, the others all Pacific. My specimen agrees in all particulars with descriptions of Pacific material and with Bleeker's 1864 illustration.

Family Echelidae

Worm-like elongate scaleless body, sometimes compressed. Dorsal and anal present, of variable extent but confluent round caudal. Pectoral present or absent. Mouth large, cleft to beyond eye, which is variable in size. Teeth mostly small, pointed, in one or more series, sometimes absent from the vomer. Tail longer than the body, gillopenings usually small, lateral. Hind nasal opening in upper lip, facing down, with flap or valve, front opening a tube on snout. Rather degenerate small fishes of tropical seas, living in reefs, sand and mud, mostly concealed by day, nowhere abundant, most are rarities and none grow to any size. Not many genera and there is considerable divergence of opinion among systematists about the precise limits of this family, they differ in views about the systematic relations of various genera. Only five species in 2 genera in the Western Indian Ocean.

- 1. Pectorals present **Myrophis**
- 2. No pectorals **Muraenichthys**

Myrophis Lutken, 1851

Type **M. punctatus** Lutken, 1851 (Atlantic). Elongate cylindrical body, little compressed. Pectorals present. Anus before middle of length. Dorsal origin between gillopening and vent, dorsal and anal confluent with small caudal. Front nostrils tubular, hinder in lip below eye. Snout projects beyond lower jaw, mouth not shutting completely, cleft of mouth to beyond eye. Teeth fang-like, on intermaxillary and vomer, partly biserial on jaws. Lateral line present. Gillopenings small, lateral, below pectoral base. **Paramyrus** Gunther, 1870, recognised by some authors, differs from **Myrophis** in that the dorsal commences close behind gillopening, far behind in **Myrophis sensu stricto**, but this is scarcely a generic feature in these eels, e.g. in comparable **Muraenichthys** Bleeker, 1853 the dorsal origin varies widely along the back. Small feeble worm-like eels of shallow water, living in sand, previously known only from tropical Atlantic and Pacific, at most 2 in the Indo-Pacific, not before reported from the Indian Ocean.

MYROPHIS UROPTERUS (Temminck & Schlegel, 1842). **Conger uropterus** Temminck & Schlegel, 1842, 261 (Japan). **Echelus microchir** Bleeker 1864, 30, Pl 189, fig 4 (E. Indies).

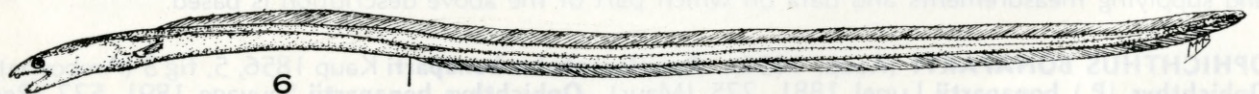


Fig. 6. **Myrophis uropterus** (T & S), 170mm (Pinda).

Depth about 40 in total length, about 4.5 in head. Head 8-9.8 in total length, 1.9-2.2 in trunk. Tail 1.5-1.52 in total length, 2.5-3 times trunk. In length of head: snout tip to rictus 2.7-3.4, pectoral 5-6. Front nostrils tubular, upper margin with small flap, hind nostril in lip below front of eye. Lateral line runs along mid side, ends before end of tail. Median fins about half body depth, dorsal origin over tip of pectoral, both dorsal and anal expanded near tip of tail. Corner of mouth to slightly behind hind edge of eye, lower jaw shorter, mouth not shutting completely, 9-10 relatively long fangs on intermaxillary, on side of upper jaw sharp slender teeth biserial in front, uniserial behind: 2 larger teeth on front of vomer, uniserial small teeth in a row behind. In lower jaw small sharp slender teeth irregularly biserial in front, uniserial behind. Uniform olive greenish, as preserved yellow-brown, fins light, no black on anal. Two specimens, one, 135mm Pinda, the other 170mm Aldabra, sandy pools. Previously known only from Japan, the East Indies and central Pacific, not outside the Pacific, this is a notable extension of distribution. Despite the lack of dimensional data in the original description there appears little doubt that **uropterus** T & S and **microchir** Bleeker are identical and my specimens agree well with Bleeker's and later descriptions of Pacific material.

Muraenichthys Bleeker, 1853

Type **Muraena gymnotus** Bleeker, 1853 (E. Indies). Elongate cylindrical body. Dorsal origin variably near head or far posterior. Vertical fins low, confluent round caudal. Hind nostril in upper lip, with flap, anterior a tube on side near front of snout. Tail longer than body. Gillopenings very small, lateral. Lateral line present. Indo-Pacific only, moderate number of species, all small, mostly sand-dwellers, five found in the Western Indian Ocean and the Red Sea.

Key to species

- A. Dorsal origin nearer head than vent **macropterus**
- B. Dorsal origin nearer vent than head.
 - I. Snout sharp. Dorsal origin about half head length behind vent **gymnotus**
 - II. Snout bluntly rounded.
 - a. Head more than half trunk. Teeth in bands in lower jaw **schultzei**
 - b. Head less than half trunk. Lower teeth uniserial.
 - 1. Dorsal origin less than head length before vent **laticaudata**
 - 2. Dorsal origin not less than head length before vent **xorae**

MURAENICHTHYS MACROPTERUS Bleeker, 1857. **M. macropterus** Bleeker 1857a, 91 (Amboina). Weber & de Beaufort 1916, 275 (E. Indies, Australia). Depth about 40 in total length, 4 in head. Head about 10 in total length, 2.8-3 in trunk. Tail 1.6-1.7 in total length, 2.2 times trunk. Snout to anus 2.5-2.6 in total length, 1.6 in tail. Gape about 4.5 in head. Eye 2-3 in snout. Dorsal origin about a head length behind head, both vertical fins low, expanded near end of tail. Fine sharp teeth in a cluster on intermaxillary, irregularly biserial on side of upper jaw, uniserial on vomer and on side of lower jaw. Dull olive green, belly yellow. Described from 2 specimens, 100 and 120mm, from a sandy tide pool at Pinda, Mozambique. Previously known only from the Pacific, this is the first record for the Indian Ocean.



Fig. 7. **Muraenichthys macropterus** Blkr. 120mm (Pinda).

MURAENICHTHYS GYMNOTUS Bleeker, 1864. **M. gymnotus** Bleeker 1864, 33, Pl 50, fig 3 (Amboina). Klunzinger 1871, 608 (Red Sea). Barnard 1934, 228 (Cape Coast). Smith 1949, 400, fig 1135 (S Africa). Depth about 40 in total length, 4-5 in head. Head 9-10 in total length, 3-3.5 in trunk. Tail 1.7 in total length, 1.6-1.7 times trunk. Snout to anus 1.3-1.4 in tail. Gape about 4 in head. Eye 3 in snout. Dorsal origin about half head length behind anus, dorsal and anal low. Snout pointed, projects well beyond lower jaw. 5-6 slender sharp teeth on intermaxillary, biserial on side of upper jaw, irregularly biserial in front of vomer, uniserial behind and on lower jaw. Olive green above, belly yellow. Described from 3 specimens 130-170mm all from South Africa, not found in East Africa. Schultz 1953, 76, Pl 10 describes and figures **gymnotus** Bleeker from the Bikini area, Pacific, but his illustration shows head about 7 in total length and 2.2 in trunk, whereas from the description head is 9-10 in total length and 3.3 in trunk. Bleeker's original illustration 1864, Pl 150, fig 3 shows snout to anus 1.1 in tail.

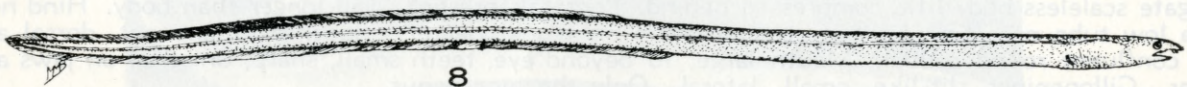


Fig. 8. **Muraenichthys gymnotus** Blkr. 330mm (Pinda).

MURAENICHTHYS SCHULTZEI Bleeker, 1857. **M. schultzei** Bleeker 1857, 366 (Java). Bamber 1915, 479 (rec. Red Sea). Fowler 1956, 117 (Red Sea). Smith 1958, 58 (Aldabra, Pinda). Compiled. Depth about 20-25 in total length, 3.5 in head. Head about 7 in total length, about 1.8 in

trunk. Tail 1.6 in total length, 2.4 times trunk. Dorsal origin slightly behind level of vent. Snout rounded, blunt, gape about 3.5 in head, to well beyond eye. Small teeth in rather broad bands on side of each jaw and on vomer. Olive green. Attains 130mm. Known from a wide area of the Western Pacific, recorded from the Red Sea. The record by Smith 1958, 58 was based on two small specimens which cannot now be found.

MURAENICHTHYS LATICAUDATA (Ogilby, 1897). *Myropterura laticaudata* Ogilby 1897, 247 (Fiji). *Muraenichthys godeffroyi* Regan 1909, 439 (Queensland). *Muraenichthys laticauda* Smith 1958, 58 (Aldabra). *Muraenichthys laticaudata* Smith 1958a, 127 (South Africa). Depth 25-35 in total length, 3-4 in head. Head 9-10 in total length, 3-3.5 in trunk. Tail 1.8 in total length, 1.5-1.6 times trunk. Snout to anus about 1.2 in tail. Gape 3-4 in head. Eye about 3 in snout. Dorsal origin from about 4/5 head length before anus to slightly behind anus, dorsal and anal well developed, anal higher half body depth. Gape to below hind edge eye. Teeth rather slender, sharp, variably arranged, few on intermaxillary, mostly biserial on side of upper jaw, uniserial in lower; irregularly biserial on front of vomer, uniserial behind. Greenish olive, above, vertical fins reddish. Numerous specimens 120-350mm from 33°S in South Africa (rare) at numerous localities northwards over Western Indian Ocean to Aldabra. *godeffroyi* Regan is held distinct by Schultz in that the dorsal origin is before the anus, but my material shows wide variation in this position among specimens, otherwise clearly identical: Previously known from the Pacific, not before described from the Indian Ocean.



Fig. 9. *Muraenichthys laticaudata* (Ogilby) 330mm (Pinda).

MURAENICHTHYS XORAE Smith, 1958a, 126, fig 1 (S. Africa).

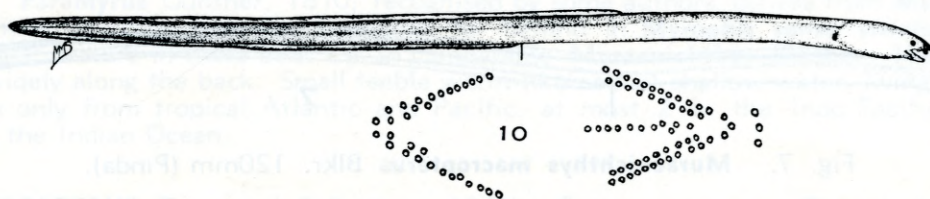


Fig. 10. *Muraenichthys xorae* Smith, Type. 247mm (Xora).

Depth about 35mm in total length, about 3-4 in head. Head 9-10 in total length, 3.2-3.3 in trunk. Tail 1.8 in total length, 1.6 times trunk. Snout to anus 1.2 in tail. Snout tip to rictus about 3.6 in head. Eye 3 in snout. Dorsal origin slightly more than head length before anus. Mouth large, cleft to behind eye, snout projects. Three conical teeth in a row across intermaxillary and a cluster of 3 behind. Small sharp teeth biserial in upper, uniserial on side in lower jaw, biserial in front. A single row on vomer, irregularly biserial in front. Gillopening equals eye, lateral. Body olive yellow grades to orange head. Tip of tail and snout also orange. Belly just behind head greenish. Attains 250mm. At present known from various localities over 31-34°S in Southeast Africa, tide pools.

Family Neenchelidae

Elongate scaleless body little compressed behind. Pectorals present. Tail longer than body. Hind nostril a low tube near tip of snout. Dorsal origin on trunk, nearer gillopening than vent, dorsal and anal confluent round caudal. Mouth large, to beyond eye, teeth small, sharp, uniserial on jaws and vomer. Gillopenings slit-like, small, lateral. Only the type genus.

Neenchelys Bamber, 1915

Type *N. microtretus* Bamber, 1915 (Suez). With the family characters. Two species, one from Suez, another very closely related from the East Indies.

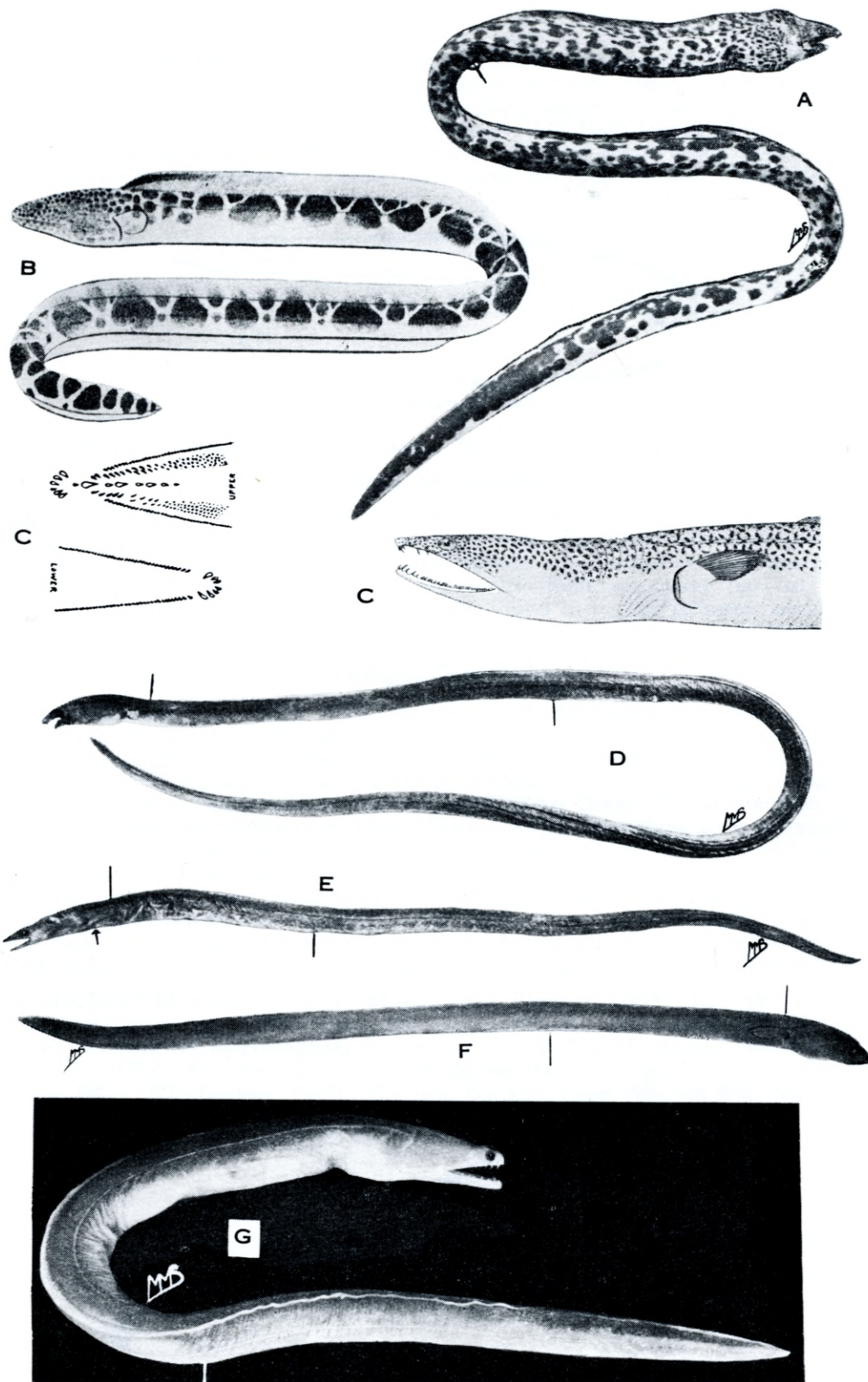


PLATE 67

A. *Callechelys marmoratus* (Blkr), 465mm (Bazaruto). B. *Ophichthus retifer* Fowler. (After Fowler). C. *Ophisurus multiserialis* (Norman). (After Norman). D. *Ophichthus macrochir* (Bleeker), 446mm (Durban). E. *Ophichthus unicolor* (Regan). Type of *algoensis* Brnrd 300mm (Algoa Bay). F. *Ophichthus apicalis* (Bennett), 450mm (Zululand). G. *Brachysomophis crocodilinus* (Bennett), 136mm (Al-dabra).

NEENCHELYS MICROTRETUS Bamber, 1915. **N. microtretus** Bamber 1915, 479, Pl 46, fig 3. Not seen, compiled. Depth about 25 in total length, about 3 in head. Head 9 in total length, about 2.8 in trunk. Tail 1.7 in total length, 1.85 times trunk. Gape about 4 in head, to beyond eye. Pectoral small, about 1/7 of head, less than snout. Dorsal origin 2/3 head length behind head, vertical fins well developed but low, confluent round caudal. Snout pointed, small sharp teeth uniserial in jaws and on vomer. Live colour unknown. Known only from the type, 185mm, Suez.

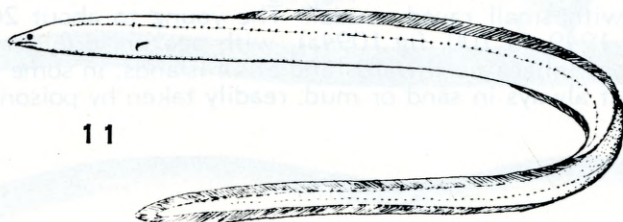


Fig. 11. **Neenchelys microtretus** Bamber. Redrawn after Bamber.

Family Moringuidae

Elongate scaleless cylindrical body. Dorsal and anal reduced to feeble skin folds, with visible rays only near the end of the tail. Tail much shorter than body. Pectorals rudimentary or absent. Snout rather blunt, cleft of mouth to beyond eye, which is minute. Jaws equal or lower jaw projecting, teeth small, pointed, uniserial on jaws and vomer. Gillopenings small, on lower part of side. Only one genus widespread in the tropical Indo-Pacific, usually found in muddy or sandy areas, also in estuaries.

Moringua Gray, 1831.

Type **Moringua raitaborua** Ham-Buch., 1822 (India). With the family characters. There is considerable confusion about these eels. Some workers such as Schultz (1953) recognise numerous species, his differentiation however based on questionable variation in unreliable characters. Others such as Gosline and Strasburg (1956) are not satisfied that recognition of multiplicity of species is sound. Only one variable species is recognised in the Western Indian Ocean. Great numbers of this type of eel were found over the whole Western Indian Ocean; while these show wide variation in characters such as length of head, presence or absence and size of pectoral, and position and shape of vertical fins, it is impossible to find a sound basis for separating these into different species. It is obvious that changes take place with age, notably in the relative length of the head. It is difficult to find any known species with which the Western Indian Ocean form agrees exactly if only because previous workers have not recognised the high variation which occurs. It is therefore provisionally identified as **M. microchir** Bleeker, 1853 as the oldest name applicable to species of this type.

MORINGUA MICROCHIR Bleeker, 1853. **M. microchir** Bleeker 1853, 124 (E. Indies). **Moringua javanica** Smith 1949, 508, fig 1094a, Plate 100 (Juv) (Inhaca); and 1958, 57 (Aldabra). Morrow 1954, 805 (Rec. Kenya). **M. macrocephala** Fourmanoir 1954, 232 (Comores). Baissac 1957, 21 (Rec. Maur). Fourmanoir 1957, 87 (Rec. Comores). **M. abbreviata** Loveridge 1925, 74 (Rec. Pemba). **M. ferruginea** Bliss 1883, 57; Gudger 1929, 522 and Borodin 1934, 44, (all Rec. Mauritius).

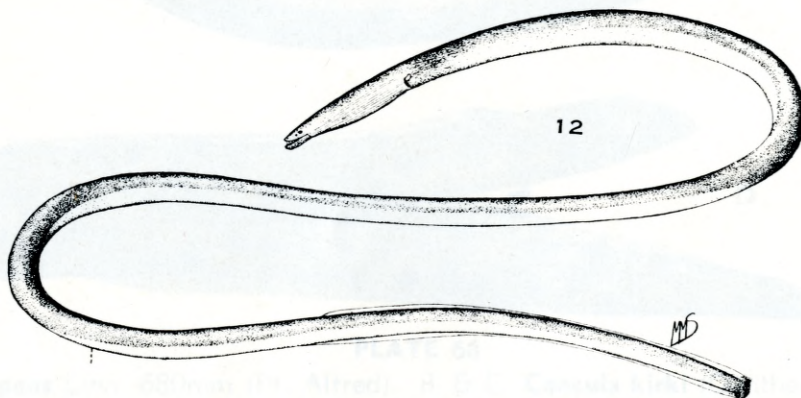


Fig. 12. **Moringua microchir** Bleeker, 1205mm (Inhaca).

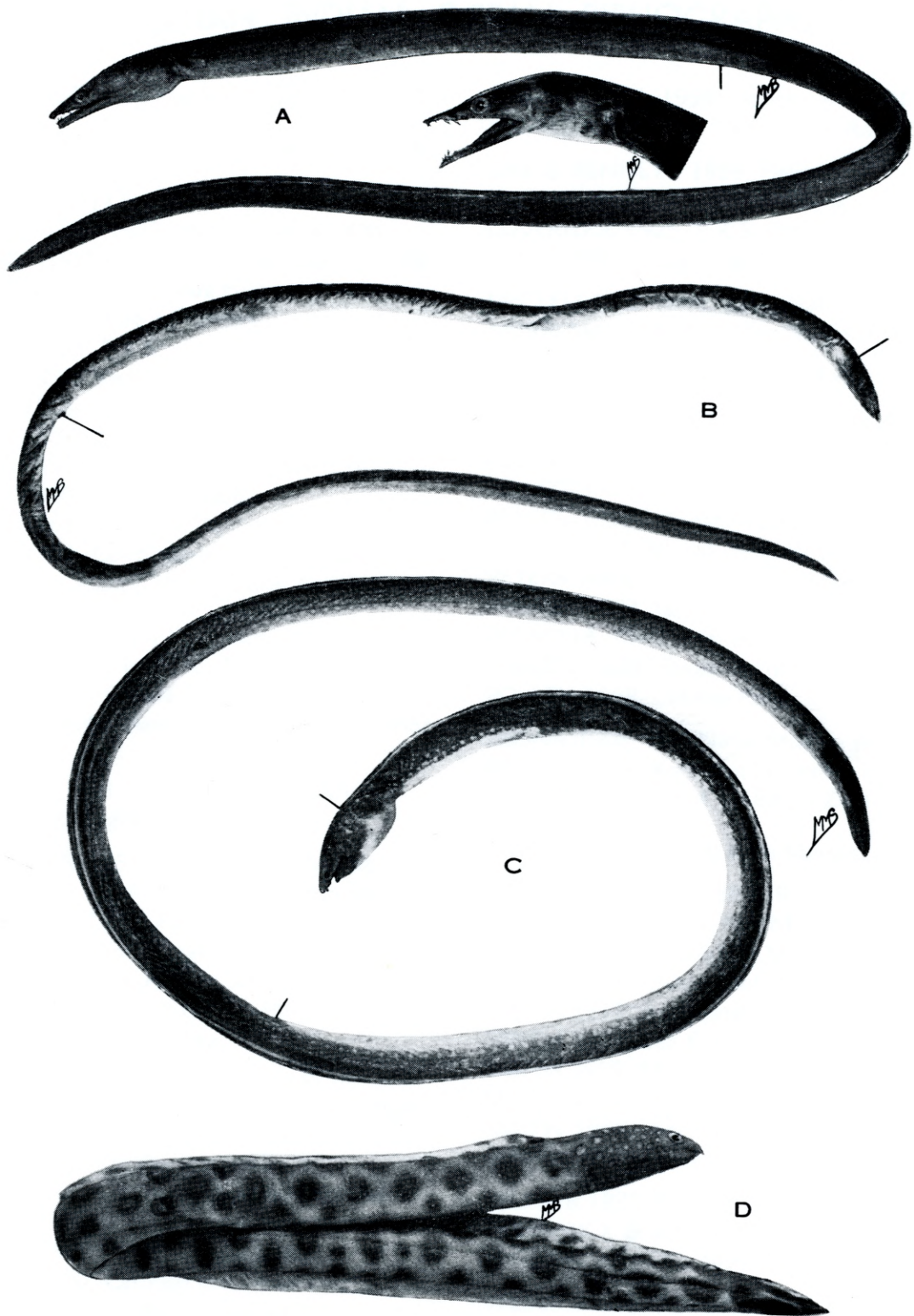


PLATE 68

A. *Ophisurus serpens* Linn, 680mm (Pt. Alfred). B. & C. *Caecula kirki* (Gunther). B. 357mm (Rovuma). C. 450mm, ripe female (Zululand). D. *Ophichthus polyophthalmus* (Bleeker), 500mm (Delagoa Bay).

WESTERN INDIAN OCEAN BIBLIOGRAPHY

- BAISSAC 1957, Proc.Roy.Soc.Art.Sci.Maur. **11**, pt.1.
 BAISSAC 1957a, Ann.Rep.Fisheries for 1955. App.B.
 BAMBER 1915, J.Linn.Soc. **31**.
 BARNARD 1925-1927, Ann.S.A.Mus. XXI.
 BARNARD 1925a, Ann.Mag.Nat.Hist. (9) **15**.
 BARNARD 1934, Ann.Mag.Hist. (10) **12**.
 BENNETT 1830, Life of Raffles.
 BENNETT 1833, P.Z.S.
 BLEEKER 1852, Verh.Batav.Gen. XXV.
 BLEEKER 1853, Nat.Tijds.Ned.Ind. IV.
 BLEEKER 1857, Nat.Tijds.Ned.Ind. XIII.
 BLEEKER 1857a, Act.Soc.Sc.Indo-neerl. II.
 BLEEKER 1860, Visch.v.d.Kaap.
 BLEEKER 1864, Atlas Ich.IV.
 BLEEKER 1879, Contr.faune ich. Maurice.
 BLEEKER & POLLEN 1875, Faune de Madagascar.
 BLISS 1883, Trans.Roy.Soc.Maur.
 BODDAERT 1781, in Pallas N. nord Beytr. II.
 BORODIN 1934, Copeia No.1.
 BORSIERI 1904, Ann.Mus.Civ.Stor.Nat.Genoa (4) **3**.
 CASTLENAU 1861, Mem.Poiss.Afr.Austr.
 CUVIER 1817, Regne anim. II.
 FOURMANOIR 1952, Mem.Inst.Sci.Madag. A.
 FOURMANOIR 1954, Ich.et Peche Comores.
 FOURMANOIR 1957, Poiss.Can.Moz.
 FOWLER 1929, Ann.Natal Mus.VI pt.2.
 FOWLER 1934, Proc.Ac.Nat.Sci.Philad. 86.
 FOWLER 1935, Proc.Ac.Nat.Sci.Phil. 87.
 FOWLER 1956, Fish.Red Sea.
 GILCHRIST 1902, Mar.Invest. S. Afr. I.
 GILCHRIST & THOMPSON 1917, Ann.Durb. Mus. 1.
 GOSLINE 1951, Rep.Pac.Sci.V No. 4.
 GUDGER 1929, Bull.Amer.Mus.Nat.Hist. **58**.
 GUICHENOT 1863, Faun.Ich. Reunion.
 GUNTHER 1866, Fishes of Zanzibar.
 GUNTHER 1870, Cat.Fish.Brit.Mus. VIII.
 GUNTHER 1910, Fische der Sudsee III.
 HAMILTON-BUCHANAN 1822, Fish Ganges.
 KAUP 1856, Cat.Apodal Fish.
 KLAUSEWITZ 1959, Senck. Mus. **40**.
 KLUNZINGER 1871, Syn.Fische Roth Meer.
 LAY & BENNETT 1839, Fishes.
 LINNAEUS 1758, Syst.Nat.Ed. X.
 LOVERIDGE 1925, P.Z.S. Lond.
 LUNEL 1881, Liste especes poiss. nouv. Maurice.
 McCLELLAND 1844, Journ.Nat.Hist.Calcutta V.
 MORROW 1954, Ann.Mag.Nat.Hist. (12) **7**.
 NORMAN 1939, John Murray Exp.
 OGILBY 1897, Proc.Linn.Soc.N.S.W. XXII.
 PELLEGRIN 1904, Bull.Mus.Hist.Nat.Paris **10**.
 PELLEGRIN 1907, Bull.Mus.Hist.Nat. Paris **13**.
 PETERS 1855, Monat.Akad.Wiss.Berl.
 PETERS 1876, Monat.Akad.Wiss.Berl.
 PETERS 1883, Trans.Roy.Soc.Maur.
 PFEFFER 1893, Jahrb.Wiss.Anstalt Hamburg. **10**.
 PICAGLIA 1894, Atti.Soc.Nat.Modena (13) 3.
 POLLEN 1863, Enum.Anim.Vert.Madag.
 POLLEN 1868, Cat.Esp.Poiss. . . Nossi-Be.
 REGAN 1908, Ann.Natal Mus. I. pt.3.
 REGAN 1909, Ann.Mag.Nat.Hist. (8) **4**.
 RICHARDSON 1844 (-1848), Zool. "Erebus & Terror".
 RUPPELL 1828, Fisch.Roth.Meeres.
 SAUVAGE (1875-) 1891, Poiss. Madagascar.
 SCHULTZ 1943, U.S. Nat.Mus. Bull. **180**.
 SCHULTZ 1953, U.S.Nat.Mus. Bull. **202**.
 SMITH 1849, Illustr.Zool. S.A.Fish.
 SMITH 1937, Ann.Natal Mus. VIII.
 SMITH 1949, Sea Fishes of S. Africa.
 SMITH 1955, Mem.Mus.Dr. Alvaro de Castro. **3**.
 SMITH 1957, Ann.Mag.Nat.Hist. (12) **10**.
 SMITH 1958, Ann.Mag.Nat.Hist. (13) **1**.
 SMITH 1958a, S.A.J.Sci. **54** No. 5.
 TELFAIR 1835, Fische v.d. Insel Moritz.
 TEMMINCK & SCHLEGEL 1842, Fauna Japonica.
 THOMPSON 1916, Mar.Biol.Rep. III.
 WEBER & de BEAUFORT 1916, Fishes Indo-Aus. Archip. III.
 WEED & HOWARTH 1961, Copeia No. 3.
 ZUIEW 1793, Nov.Act.Sco.Petrop. VII.

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