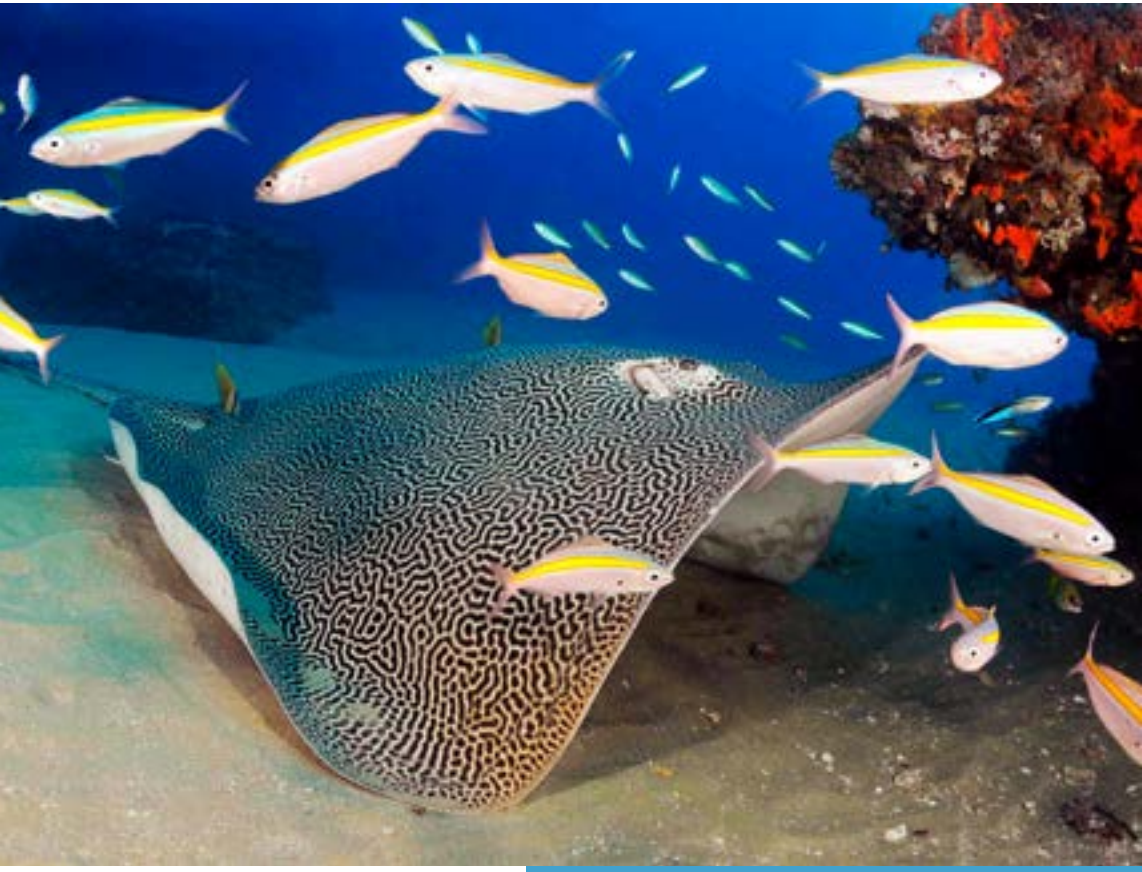
COASTAL FISHES OF THE WESTERN INDIAN OCEAN:

A Longstanding Vision Realized



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A Longstanding Vision Realized

Origins

In 1949, not long after the publication of *The Sea Fishes of Southern Africa,* JLB Smith was offered the directorship of the Natal Museum in Pietermaritzburg. He turned the offer down, as he wanted to focus on a book on the fishes of the Western Indian Ocean, which he said would take him a year or two. The vision was never fulfilled.

In 1986, the final successor to *The Sea Fishes of Southern Africa,* Margaret Smith and Phil Heemstra's Smiths' Sea Fishes, was published. Margaret died in 1987. Some 10 years later, Phil resurrected JLB's idea of a book on the fishes of the Western Indian Ocean. And now, 20 years after the re-birth of JLB Smith's idea, this is about to become a reality.

The Western Indian Ocean (WIO) is home to one of the richest biotas of marine fishes on the planet, comprising some 3600 species, or about 20% of the world's marine fish fauna. Although the WIO region is the site for most of the earliest scientifically valid descriptions of Indo-Pacific fishes, the extent of its fish fauna is still poorly known. Despite considerable effort by ichthyologists over the past two centuries, many new species of fishes are described each year: of the 329 new marine species described between 2002 and 2012, 140 were from the WIO.

Who put the book together?

Coastal Fishes of the Western Indian Ocean, with main editors Philip Heemstra, Elaine Heemstra, David Ebert, Wouter Holleman and John Randall, is to be published early in 2018. It is the culmination of the work of more than 100 authors, photographers and illustrators, of editors, proofreaders, reviewers and others, over a period of more than 20 years. Amongst the major contributors are Phil Heemstra, Dave Ebert, Dave Smith, Bruce Collette, Stuart Poss, Jack Randall, Gerry Allen, Helen Larson, Danny Hensley and Kunio Amaoka, Eric Anderson and Keiichi Matsuura.

Coverage and contents

The resulting publication, far more substantial than JLB Smith could have imagined, arranged in six volumes, covers species that occur in waters generally shallower than 200 m. In this work, the Western Indian Ocean includes the Red Sea and Persian Gulf and extends to Cape Point, South Africa, and Kanyakumari, the southernmost tip of India. Some authors have included fishes from the Gulf of Mannar and wider Sri Lanka.

Volume 1	Introductory chapters which include the oceanography of the WIO, the origins of coral reefs, an account of the people who laid the foundations of our knowledge of the WIO's fishes, and more. The remainder of the volume covers the agnaths and condrichthyans of the area.
Volume 2	This volume includes a brief overview of the evolution of bony fishes, their anatomy and a key to the orders. Then follows accounts of families of the Orders Elopiformes to Mugiliformes.
Volume 3	The remainder of the non-perciforms teleosts, from the Atheriniformes to the Scorpaeniformes.
Volume 4	A key to the families of Perciformes, and the families Latidae to Chaetodontidae
Volume 5	The key to the families, and the families Oplegnathidae to Draconettidae.
Volume 6	The key to the families, and the families Gobiidae to Molidae, and the Latimeriidae.

Each taxon has its appropriate keys and, for several of the families, a glossary of terms used in the account has been included. The volumes are well illustrated, with black-and-white illustration in keys and for species, where appropriate, and colour plates of the species. The inside back and front covers of each volume will have various maps of the Western Indian Ocean.

Format and cost

The book will measure about 220mm wide x 280mm deep. Consideration is being given to both hard-cover and soft-cover binding. The cost for a hard-cover will be in the region of R3500 per set ($270, €240) and soft-cover R2000 ($150, €130).

Expression of interest

If you are interested in this publication, please **1)** access the reply form on our website http://www.saiab.ac.za/coastal-fishes-of-the-western-indian-ocean.htm and complete the online form, ***OR*** **2)** complete the form below, scan and mail it to WIO@saiab.ac.za, ***OR*** **3)** post it to:

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CLASS Osteichthyes *(Bony Fishes)*

museum specimens. Presently reported from Japan, Vietnam and the northwestern Indian Ocean around Socotra and the Error Seamounts. Depth range: 200-900 m.

Beryx mollis: 21 cm SL (off Somalia; from Kotlyar 1993).

Beryx splendens
Slender alfonsino

Beryx splendens Lowe, 1834: 142 (text only, figure is of *B. decadactylus*) (type locality: Madeira).
Beryx splendens: Lowe, 1843a: 49; Günther, 1887: 33; McCulloch, 1929: 130; Fowler, 1936a: 542*; Smith, 1949: 150*; Krefft, 1961: 24; Abe, 1972: 525; Kotlyar, 1973: 221; Woods & Sonoda, 1973: 286* Krefft, 1976: 74*; Busakhin, 1982: 6*; Masuda et al., 1984: 108* ; Hayashi, 1986: 410*; Maul, 1986: 741*; Kotlyar, 1987: 73; Ivanin, 1989: 159; Dubischkin & Kotlyar, 1989: 1; Mundy, 1990: 257*; Smale et al., 1995: 78*; Adam et al., 1998: 11*.

D III–V, 12–15; A IV, 25–32; P 14–19; V I, 9–13; LL continuous, 65–70 (69–82 total); GR 5–7/16–21; pyloric caeca 23–34. Depth 29–37% SL; head 29–36; length dorsal-fin base 15–22; length anal-fin base 26–34; predorsal 37–46; preanal 50–67; distance dorsal-fin insertion to caudal-fin base 36-44; snout 20–26% HL; eye 29–40. Scales with wedge-shaped rows of triangular ctenii not formed into ridges; disc-shaped pad on inner surface; scales on D and A bases enlarged; fulcral scale in pelvic axil present. Cheek scales in 5–6 rows. Single pair of head spines set lateral to anterior nostril. Anal-fin origin on vertical with dorsal soft rays 10–11. Pelvic-fin origin slightly anterior to vertical through pectoral-fin insertion. Pectoral fins longer than pelvic fins in adults.

Head, iris, back, fins, mouth and gill chambers bright red, sides of body silvery-pink. Attains 70 cm TL.

Tropical to subpolar waters of all three major oceans. Depth range: 25–1240 m.

Beryx splendens: 24 cm (South Africa; from SSF).

GENUS *Centroberyx* Gill, 1862

Dorsal-fin base longer than anal-fin base. No ctenii on scales; posterior margin with minute spinules. No head spines. Dorsal-fin spines 5–7; anal soft rays 12–16; pelvic rays 7; LL 36–62 (total). Anterior edge of nasal bone with spinules. Five species, 2 in WIO. *Trachichthades* Gilchrist, 1903 and *Austroberyx* McCulloch, 1911 are synonyms of *Centroberyx*.

KEY TO WIO SPECIES

1a. LL 40–47; transverse scale rows between LL and anal-fin origin 15; total GR 30–34 . . . . . *C. spinosus*
1b. LL 53–62; transverse scale rows between LL and anal-fin origin 18; total GR 26–29 . . . . . *C. druzhinini*

Centroberyx druzhinini

Trachichthades druzhinini Busakhin, 1981: 1728* (type locality: Saya de Malha Bank).
Centroberyx druzhinini: Busakhin, 1982: 9, 14-15*; Masuda et al., 1984: 109* ; Kotlyar, 1993: 190; Masuda & Kobayashi, 1994: 60*.

D V–VII, 12–15; A IV, 15–17; P 13; V I, 7; LL continuous, not extending onto caudal-fin rays, 53–62; GR 5–9/ 16–23. Depth 39–42% SL; head 31-36; length dorsal-fin base 34–35; length anal-fin base 28–29; predorsal 42–47; preanal 58–64; caudal-fin 39–42; snout 23–28% HL; eye 31–34. Posterior margin of scales with uniform-sized denticles, no ctenii. Cheek scale rows 5. Small fulcral scale in pelvic axil. No head spines, but rough areas around eyes and on cheeks. Dorsal-fin origin on vertical through origin of pelvic fins. Anal-fin origin on vertical through middle of dorsal fin. Pectoral fins longer than pelvic fins.

Top of head, back and caudal fin bright red, rest of body silvery-pink, other fins pink or red. Attains 25 cm.

Tropical Indo-West Pacific, recorded from Japan, Philippines, the South China Sea and western Indian Ocean at Saya de Malha Bank and Madagascar. Depth range: 100–200 m.

Centroberyx druzhinini: ~14 cm SL (Mauritius; O. Alvheim, IMR).

Centroberyx spinosus
Short alfinsino

Trachichthodes spinosus Gilchrist, 1903: 204, pl. 13 (type locality: off Kei River mouth [Cape Morgan], South Africa); Bernard, 1925a: 363*; Fowler, 1936: 374; Smith, 1949: 152*.
Centroberyx spinosus: Busakhin, 1982: 14*; Hayashi, 1986: 410*; Smale et al., 1995: 78.

D V–VI, 14–15; A IV, 14–16; P 13; V I, 7; LL continuous, not extending onto caudal-fin rays, 40–47; GR 10–11/ 20–22. Depth 47–53% SL; head 33–40; length dorsal-fin base 38–43; length anal-fin base 32–34; predorsal 38–44; preanal 58–64; caudal-fin 28–33; snout 15–20% HL; eye 31–47. Posterior margin of scales with denticles of varying lengths, no ctenii. Cheek scales 3. Fulcral scale in pelvic axil well developed. No head spines. Dorsal-fin origin on vertical through pelvic-fin origin. Anal fin origin on vertical through middle of dorsal fin. Pectoral fins longer than pelvic fins.

Top of head, iris, back and caudal fin bright red, body golden. Caudal fin with white margin and white base, the latter area wider in juveniles than adults. Dorsal, anal and paired fins unpigmented in young, paired fins becoming yellow or golden in adults.

Known only from west of Mossel Bay (Cape Barracouta), South Africa, north to off Durban. Busakhin's (1982) statement, mistakenly citing Fowler (1935 [not 1936]) as the source, that the species occurs north of Durban is probably correct, but currently unverified by specimens. Depth range: 24–366 m.

Centroberyx spinosus: 6cm (South Africa; from SSF).

FAMILY Anoplogasteridae
Fangtooths

by M. Eric Anderson

Body oval, thick anteriorly, compressed posteriorly with a slender peduncle; head deepen than long. Mouth huge, oblique, upper jaw protrusile, juveniles with small depressible teeth; adult with long well-separated fangs on jaws; the longest pair at lower jaw symphysis received into sockets of orbital cavity when mouth is closed; tongue fills oral cavity when mouth is closed; palatines with or without teeth, maxilla extending well past the eye; eye diameter subequal to greatest depth of maxilla. Gill-rakers long and slender in juveniles, but short, with 1–3 spinules in adults. Branchiostegal rays 8 or nine. Dorsal fin single, set midway between head and tail, its base more than three times that of anal fin; caudal fin emarginate, with 17 branched rays; pectoral fins paddle-shaped, shorter than head; pelvic fins origin below rear end of pectoral-fin base; no fin spines except for procurrent caudal-fin rays at base of fin. Scales with a spiny saucer-like plate fused to a short pedicel connecting to a thin plate embedded in the skin. Lateral line an open groove crossed by well-separated bridges of scaly skin. Vertebrae without lateral projections; ribs not attached to centra; neural spines of abdominal vertebrae depressed. Adults bathypelagic in 700 to 5000 m; juveniles epipelagic and mesopelagic. One genus, *Anoplogaster* Cuvier, with 2 species, one in WIO.

Anoplogaster cornuta
Fangtooth

D 16–20; A 7–9 ; P1 13–16 ; P2 7; BD 1.8–2.2, HL 2.5–2.9 in SL; eye diameter much smaller than interorbital width. Juveniles < 20 mm SL with a pair of horn-like spines on top of head, and another pair (one on each preopercle) extending ventrally.

Adult body, head, fins and inside of mouth dark brown to black. Attains 16 cm SL. Worldwide in tropical and temperate seas. No commercial importance.

Anoplogaster cornuta: 16 cm SL (off New Jersey; Woods & Sonoda 1973).

ORDER Beryciformes

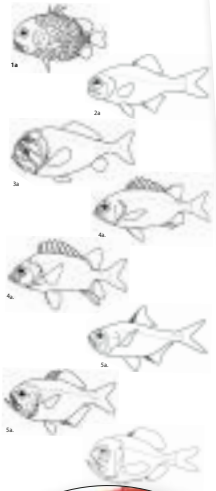
This is a poorly understood group that currently is considered to include seven families: Berycidae, Holocentridae, Anoplogasteridae, Trachichthyidae, Anomalopidae, Diretmidae, and Monocentridae. They are probably an artificial assemblage of unrelated taxa.

Most species live in deep marine waters and avoid bright light, although may come closer to the surface at night. The Holocentridae, which have their greatest diversity on coral reefs, are largely or entirely nocturnal. The have relatively large eyes. During the day they tend to remain hidden in crevaces, in case or under ledges.

Diagnosis: fin spines usually well developed (rudimentary or absent in anoplogasterids, and in the dorsal and anal fins of diretmids); pelvic fins with a strong spine and 6–12 soft rays (only 3 or 4 rudimentary rays in Monocentridae); caudal fin with true (unpaired) small procurrent spines at base of caudal fin and 18 or 19 principal caudal-fin rays. Six families that can be recognised as coastal fishes occur in the WIO.

KEY TO FAMILIES

1a. Pelvic fins with 1 huge spine (which can be locked erect) and 2 or 4 rudimentary rays; scales enlarged, with sharp ridges and spines, forming a bony armour resembling a pineapple . . . . . MONOCENTRIDAE
1b. Pelvic fins with 1 spine and 6|12 soft rays; body not encased in bony armour 2
2a. Prominent luminous organ immediately below eye . . . . . ANOMALOPIDAE
2b. No light organ beneath eye 3
3a. Jaws with large, fang-like teeth; dorsal-fin base 2 to 4 times as long as anal-fin base . . . . . ANOPLOGASTERIDAE
3b. Jaws with minute teeth; dorsal and anal-fin bases subequal 4
4a. Dorsal fin with 10–13 strong spines . . . . . HOLOCENTRIDAE
4b. Dorsal fin with 3–8 spines 5
5a. Anal fin with 4 spines and 12–20 soft rays, each myomere with 2 supramarginal . . . . . BERYCIDAE
5b. Anal fin with 2 or 3 spines, 8–12 rays; one supramarginal . . . . . TRACHICHTHYIDAE



FAMILY Monocentridae
Pineapple fishes

by Phyllip C. Heemstra

Body oval but somewhat compressed, with enlarged, bony, plate-like scales , bearing a sharp, carinate spine and fused to form a solid, bony armour. Two dorsal fins, first with 4–7 stout, ridged spines without interconnecting membranes; second dorsal fin with 11–12 soft (segmented) rays connected by a translucent membrane; anal fin similar to soft dorsal fin; caudal fin forked, the lobes short, with rounded tips, branched rays 17; pelvic fins with a large spine and 3–4 tiny soft rays: the pelvic fin can be locked erect and and fit into a groove along sides when depressed. Snout short, bluntly rounded; light lower jaw. Solitary, demersal.

Pineapple fishes live in 3–400 m. An Indo-P with 2 genera and 4 species; 1 species in WIO. Th Cleidopus gloriamaris is endemic to Australia. H strongly curved, narrow suborbital space, and is on the side of the lower jaw (hidden when mou

GENUS *Monocentris* Bloch & Schneider, 1801

jaws straight; light organ containing luminescent front of lower jaw under chin. Three species, 1 in W

Monocentris japonica
Pineapplefish

Gasterosteus japonicus Houttuyn 1782: 328, pl. 2 (Nagasaki, Japan).
Monocentris japonicus Smith, SFSA*; Smith, 1986*; Kotlyar 1986*; Randall 1995*; Kotlyar 1996*; Michel 1996*; Fyvie 1999.
Heemstra & Heemstra 2004*

D IV–VII / 9–12; A 10–11; P 13–15; LL 12–17; GR 5–7 / 11–14. BD 1.3–1.9, HL 1.8–2.4 in SL. Vertebrae 11+15. Jaws straight with villiform teeth on jaws and palatines, none on vomer. Head, body and fins yellow, the scales outlined in black; head naked.

A nocturnal species, found in caves and under ledges on coral and rocky reefs, also on sand near wrecks and reefs. Juveniles in shallow water, adults have been trawled in deeper water (157 m). Occasionally thrown ashore in rough seas. Light organs on lower jaw are used to locate prey (benthic crustaceans). Attains 17 cm.

Indo-West Pacific: Red Sea to South Africa (south to Mossel Bay), India, Mauritius Oman, Saya de Malha Bank, Sri Lanka, Somalia, Yemen to Indonesia, Australia, Philippines, Taiwan, China, Japan and New Zealand.

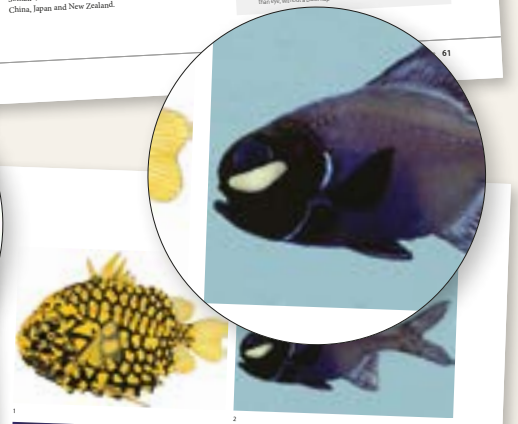
KEY TO GENERA

1a. D single, continuous; mid-ventral scutes discontinuous; luminous organ longer than eye, with a black eyelid-like flap that can be raised to cover the organ . . . . . *Photoblepharon*
1b. D divided into separate spinous and soft-rayed fins; mid-ventral scutes continuous; light organ shorter than eye, without a black flap to cover it . . . . . *Anomalops* Kner, 1868

PLATE XX

FAMILY Holocentridae

1 *Sargocentron caudimaculatum*: 18 cm SL (Red Sea; from CFSA). 2a *Sargocentron diadema*: 7 cm SL juvenile (Comoros). 2b *Sargocentron diadema*: 15 cm SL (South Africa; from CFSA). 3 *Sargocentron inaequilis*: 7 cm SL (Chagos). 4 *Sargocentron ittodai*: 13 cm SL (South Africa). 5 *Sargocentron macrosquamis*: 7 cm SL (Comoros). 6 *Sargocentron mariyamii*: 12 cm SL (Red Sea). 7 *Sargocentron melanospilos*: 11 cm SL (Seychelles). 8 *Sargocentron microtomus*: 13 cm SL (Comoros). 9 *Sargocentron praslin*: 14 cm SL (Solomon Ids). 10 *Sargocentron punctatissimum*: 10 cm SL (Mauritius). 11 *Sargocentron rubrum*: 13 cm SL (Red Sea).



1 *Monocentris japonica*: 13 cm (South Africa; from CFSA). 2 *Photoblepharon steinitzi*: 7 cm SL (Comoros; PCH.). 3 *Beryx decadactylus*: 25 cm FL (Madeira; PCH). 4 *Beryx splendens*: 19 cm SL (Mozambique; PCH). 5 *Centroberyx druzhinini*: 21 cm SL (South Africa; L. Scott). 6 *Centroberyx spinosus*: 20 cm adult; 4 cm juvenile (South Africa; from CFSA).

CLASS CHONDRICHTHYES — *Cartilagenous Fishes*

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GENUS *Photoblepharon* Weber, 1902

Body deep. D single, continuous; 1 anal spine; pelvic spine absent; mid-ventral scutes discontinuous; LL scales enlarged; 25–30 GR on first arch. Light organ large, longer than eye, with a black eyelid-like flap that can be raised to cover the organ. Two species. 1 in WIO; the other, *P. palpebratus* (spelt *palpebratus* by most authors), is widely distributed from central Indonesia to the central Pacific.

KEY TO SPECIES

1a. Anteriormost lateral-line pore preceded by a large white spot on dorsal corner of opercle; pelvic rays typically 7 . . . . . *P. palpebratus*

1b. White spot on dorsal corner of opercle absent; pelvic rays 6 . . . . . *P. steinitzi*

Photoblepharon steinitzi
Flashlight fish

Photoblepharon sp. Fridman 1972: 1 (notes on the ecology of a "new species" from the Gulf of Eilat).

Photoblepharon palpebratus steinitzi Abe & Haneda (sic) 1973: 57, Figs. 1–4 (type locality, Ras Burka, Red Sea); McCosker, 1986: 417*.

Photoblepharon palpebratus non Boddaert: McCosker & Lagios 1975: 2 (biology of Cuttoro Island specimens).

Photoblepharon steinitzi: McCosker & Rosen/Matt 1987: 161 (*steinitzi* elevated to specific rank).

D II–III, 16–18; A I–II, 13–14; P 15–17; V I, 5–6; GR (7–8) + 21–22). Depth 2.3–2.6; head 1.9–2.1; eye 3.4 in head. Body and fins dark brown to grey-black. Attains 10 cm TL.

Known from Red Sea and Isle Grande Comore, occupies crevices and caves of deep reef diurnally and transits to shallow water nocturnally to feed, particularly during new moon. Most probably more widely distributed but undiscovered elsewhere in western Indian Ocean.

Photoblepharon steinitzi. ~10cm; the white area below the eye is luminous (Comoros; from SSF).

FAMILY Berycidae
Alfonsinos

by M. Eric Anderson

Body ovoid, compressed. Head about 3 in SL; eye large, rounded, snout short and steep. Nostrils usually large. Mouth large, oblique; maxilla naked, 2 supramaxillae, jaw teeth small, in bands; teeth present on vomer and palatines. Dorsal fin triangular, often with first to third soft ray greatly prolonged, with 3–7 spines and 12–20 rays; anal fin with 3–4 spines and 12–30 soft rays. Pectoral fin wedge-shaped, rays 13–19. Pelvic fin with 1 spine and 7–13 soft rays. Caudal fin forked, with 16–17 branched rays. Scales large, thin, ctenoid; fleshy disc often present on inner surface in *Beryx*. Branchiostegal rays 7–8. Lateral line single, complete, pored LL scales 36–82. Anterior part of head with few spines (*Beryx*), or spines absent (*Centroberyx*). Gill rakers well developed, 22–34 on first arch. Vertebrae 10 + 14–15. Pyloric caeca 20–100. Gas bladder present.

Medium-sized fishes of the shelf-slope break and upper slope (about 200–600 m), may shoal up in shallower depths especially at night. Two genera with eight species. Two species of *Beryx* are locally abundant and taken commercially in the WIO in moderate quantities and reduced to fishmeal and oil or sold fresh. More highly prized as food fish in the orient.

KEY TO GENERA

1a. Dorsal-fin base shorter than anal-fin base; ctenii cover exposed surface of scale; no V-shaped scales (ventral scutes) on belly between pelvic fins and anus; head with 1–4 pairs of spines; dorsal-fin spines 3–5; anal fin spines 3–4 (usually 3), soft rays 25–30; pectoral-fin rays 14–19; pelvic-fin rays 9–13; LL 61–82 . . . . . *Beryx*

1b. Dorsal-fin base longer than anal-fin base; no scale ctenii, posterior margin of scale with spinules only; row of midventral scutes on belly between pelvic fins and anus; head without spines; dorsal-fin spines 5–7; anal-fin spines 4, soft rays 12–16; pectoral-fin rays 13–14; pelvic-fin rays 7; LL 36–62 . . . . . *Centroberyx*

GENUS *Beryx* Cuvier, 1829

Head spines present; ctenii cover exposed surface of scales; no enlarged scales with ridges on abdomen; usually a fleshy, disc-shaped pad on inner surface of scales; dorsal base shorter than anal base; some specimens with prolonged dorsal-fin ray; anterior edge of nasal bone without spinules; D III–V, 12–20; A III, 25–30; V I, 9–13; total LL 61–82. Three species, all in WIO.

62 ORDER Beryciformes

KEY TO WIO SPECIES

1a. Inner surface of scale with ovoid, cartilaginous pad near posterior margin; anal fin origin before a vertical with insertion of D; pyloric caeca 23–100 2

1a Inner surface of scale from *Beryx splendens* with ovoid pad near posterior margin (from Busakhin 1982).

caeca 74–100 . . . . . *B. mollis*

ecadactylus with four spines on head.

pair of spines on head in front of eye; dorsal soft rays 13–15; LL 65–
n 29–40% SL; pyloric caeca 23–34 . . . . . *B. splendens*

dactylus

caudal-fin base 30–37; snout 23–26% HL; eye 37–46. Scales with irregular vertical rows of ctenii formed into low, parallel ridges; disc-shaped pad on inner surface of scales; scales on D and A bases enlarged; fulcral scale present in pelvic axil; cheek scales in 4–5 rows. Head spine lengths decrease with age. Anal fin origin on vertical with dorsal soft rays 8–9. Pelvic fin origin beneath pectoral fin insertion. Pelvic fins may be elongate in young.

Top of head, jaws, iris, back and fins bright red. Gill cover and sides of body silvery-pink. Attains 60 cm TL.

Found in coastal and open ocean seamount areas throughout the Atlantic, southern Indian, western and central Pacific oceans. Depth range 7–1000 m.

decadactylus: 26 cm (Madeira; from Woods & Sonoda 1973).

Beryx mollis

Beryx mollis Abe, 1959: 157* (type locality: Sagami Bay, Japan); Zama & Yasuda, 1979: 149; Busakhin, 1982: 8*; Kotlyar,1993: 187–190*.

D IV, 12–14; A IV–V, 24–31; P 15–19; V I, 10–11; LL continuous, 64–77 (total); GR 6–7/ 16–20; Pyloric caeca 12–20. Depth 35–45% SL; head 31–38; length dorsal-fin base 16–22; length anal-fin base 28–37; Predorsal 45–52; Preanal 56–64; distance dorsal-fin insertion to caudal-fin base ca. 40–45; snout 16–25% HL; eye 33–47. Scales with rows of triangular ctenii and no disc-shaped pad on inner surface; scales on D and A bases enlarged; fulcral scales in pelvic axil well developed. Cheek scales in 6–7 rows. Single pair of head spines set lateral to anterior nostril. Anal fin origin on vertical with dorsal fin insertion. Pelvic fin origin slightly anterior to vertical through pectoral fin insertion. Pelvic fin about as long as pectoral fin in adults.

Body and fins pinkish red with silvery tones on side, general colour lighter than the other two species of *Beryx*; caudal fin lobes darker than body. Attains 41 cm TL. Probably widespread in tropical and temperate Indo-West Pacific. This species was lost in synonymy with *B. splendens* for 20 years (Zama and Yasuda, 1979; Busakhin, 1982), so there may be many misidentified

PLATE 7

Family **CETORHINIDAE**, Basking shark

Family **MEGACHASMIDAE**, Megamouth shark

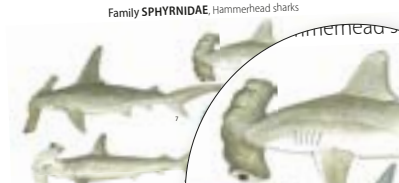
1 *Cetorhinus maximus*, basking shark (no size or locality).

2 *Megachasma pelagios*, megamouth shark, 1.9 m TL juvenile (Eastern Indian Ocean).

Family **LAMNIDAE**, Mackerel sharks

3 *Carcharodon carcharias*, white shark, ~4 m TL mature male (South Africa; from Heemstra & Heemstra 2004). **4** *Isurus oxyrinchus*, shortfin mako, ~2.5 m TL female (South Africa; from Heemstra & Heemstra 2004). **5** *Isurus paucus*, longfin mako, 2.3 m TL (Japan). **6** *Lamna nasus*, porbeagle, 94 cm TL immature male (NE Atlantic).

Family **SPHYRNIDAE**, Hammerhead sharks



7 *Eusphyra blochii*, winghead shark, 1.8 m TL (N Australia). **8** Sph
9 *Sphyrna zygaena*, smooth hammerhead, ~70 cm TL immature fe
great hammerhead, 2.4 m TL (Red Sea).

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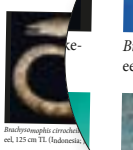
Family **OPHICHTHIDAE**

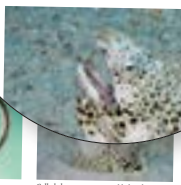
Apterichtus flavicaudus, yellowtail sand-eel, 80 cm TL (Hawaii; JER).



Brachysomophis cirrocha eel, 125 cm TL (Indonesia;

Brachysomophis henshawi, reptilian snake-eel, 78 cm TL (Oman; JER).

Callechelys catostoma, striped snake-eel, 54 cm TL (Marshall Ids; JER).



Callechelys marmorata, marbled snake-eel (Red Sea; SV Bogorodsky).

Callechelys marmorata, marbled snake-eel, 32 cm TL (Maldives; JER).

Cirrhimuraena playfairii, fringelip snake-eel, 24 cm TL (South Africa; JER).

Ichthyapus vulturis, vulture snake-eel, 21 cm TL (Hawaiian Ids; JER).

Lamnostoma orientalis, oriental snake-eel, 21 cm TL (Indonesia; JER).

Leiuranus semicinctus, halfbanded snake-eel, 42 cm TL (Maldives; JER).

Muraenichthys schultzei, bluntnose worm-eel, 9 cm TL (Eritrea; SV Bogorodsky).

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Brachysomophis crocodilinus, crocodile snake eel, 44 cm TL (Rodrigues; PCH).

2

3 4 5 6 7 8

FAMILY Holocentridae

1 *Neoniphon sammara*: M43 mangrove 1-12-09 (Mozambique; R. Bills). 2 *Ostichthichus acanthorhinus*: 18 cm (Gulf of Aqaba; D. Golani). 3 *Ostichthyscion hypsipterygium*: 21 cm (Red Sea; JER). 4 *Sargocentron seychellense*: 15 cm SL (Mauritius; O. Ahrlenius, IMR/ASCLME). 5 *Sargocentron spiniferum*: 30 cm (Marshall Ids; JER). 6 *Sargocentron tiere*: 22 cm (Maldives; JER). 7 *Sargocentron tiereoides*: 15 cm (Maldives; JER). 8 *Sargocentron violaceum*: 34 cm (Maldives; JER).

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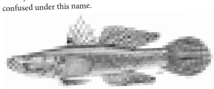
Glossogobius giuris: Smith 1959b (in part)*; Smith & Smith 1963 (in part); Hoese & Winterbottom 1979; Hoda 1980*; SSF No. 240.44*; Maugé 1986a; Keith *et al.* 1999*.

Second dorsal fin 8 or 9 rays; anal fin 7–9 rays; pectoral fins 17–23 rays; LS 29–35; TRB 8½–11. Predorsal scales 14–25, reaching forward to or just behind eyes. Opercle with patch of cycloid scales dorsally; preopercle naked or with small patch of scales behind eye in large adults. In adults, 1st dorsal fin may have at least 2nd spine filamentous, but not greatly so.

Head and body light brown to yellowish brown, with 4–7 rounded to elongate dark brown blotches along side and large dark brown triangular to elongate blotch on caudal-fin base, partly extending onto fin; 1st dorsal fin with distinct dark brown to blackish spot near base of 1st spine, specimens about 55 mm SL or smaller with black band across tips of 1st dorsal-fin spines or black blotch over top of fin, black pigment remains on spines only in adults. Attains 35 cm SL.

Distribution Indo-West Pacific: East African coast to South Africa (Umtata River mouth), Aldabra, Madagascar, Pakistan, Red Sea, Réunion and Seychelles to Japan to northern Australia.

Remarks Widely distributed, enters estuaries and freshwater river systems, extending well inland. Several species are likely confused under this name.



Glossogobius giuris, 23 cm SL (South Africa; from SSF).

Glossogobius kokius (Valenciennes 1837)

Mauritius flathead goby

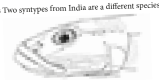
Gobius kokius Valenciennes *in* Cuv. & Val. 1837: 68 (Mauritius, Malabar and Pondicherry, India).
Gobius filosus Valenciennes *in* Cuv. & Val., 1837: 78 (Mauritius); Smith 1959b.
Glossogobius kokius: Akihito & Meguro 1975*; Maugé 1986a; Fricke 1999.

Second dorsal fin 9–10 rays; anal fin 8 or 9 rays; pectoral fins 17–20 rays; LS 24–33; TRB 9–10. Predorsal scales cycloid, 14–17, reaching to just in front of rear edge of preopercle. Cheek naked; opercle naked or with very small patch of cycloid scales anterodorsally. Second dorsal-fin spine longest, filamentous in large males.

Head and body brownish with darker brown spots and mottling; mid-side of body with five X-shaped (some doubled) dark brown blotches; 1st dorsal fin with rows of dark spots forming indistinct bands; base of caudal fin with short vertical dark bar or crescent, which may coalesce with posteriormost mid-side X-shaped blotch. Attains 95 mm SL.

Distribution WIO: a poorly known species (only type specimens examined), recorded only from Mauritius (20 syntypes).

Remarks Two syntypes from India are a different species.



Glossogobius kokius, syntype (Mauritius).

Glossogobius tenuiformis (Fowler 1934)

Natal flathead goby

PLATE 13

Glossogobius tenuiformis Fowler 1934b: 496–497, Fig. 49 (St Lucia Lake, 32 km from mouth, northern KwaZulu-Natal, South Africa).
Glossogobius giuris: Hoese 1986b (in part).
Glossogobius callidus: Whitfield 1998 (in part)*.

Second dorsal fin 9 rays; anal fin 8 rays; pectoral fins 18–21 rays; LS 28–30; TRB 9–10. Predorsal scales cycloid, 11–16, reaching above, or just in front of, rear preopercular margin. Cheek and opercle naked. First dorsal fin with 2nd spine filamentous.

Head and body yellowish brown to light brown, with 4–8 (usually 4) pairs of small dark brown vertically elongate blotches along side, may be smaller brown spots interspersed, and small dark brown blotch at caudal base and two similar spots on base of fin, may coalesce to form Y-shaped blotch; 1st dorsal fin without black blotch or band distally; irregular dusky band along base which may form dark spot at base of 1st spine. When alive, dorsolateral part of head and body covered in fine orange to red speckles. Attains 74 mm SL.

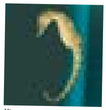
Distribution WIO: endemic to South Africa (Zotsha River mouth to Richards Bay, KwaZulu-Natal).

Remarks Found in estuaries and freshwaters. Has been confused with *G. callidus* and *G. giuris* in South African river systems. A specimen resembling this species has been collected from Réunion.

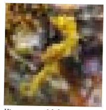
Family SYNGNATHIDAE, Seahorses, pipefishes

Hippocampus borboniensis, Réunion seahorse, 60 mm TL male (Seychelles; JER).

Hippocampus cameleopardalis, giraffe seahorse, 52 mm SL (S Mozambique; PCH).



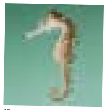
Hippocampus capensis, Knysna seahorse (South Africa; J Lockyear).



Hippocampus debelius, softcoral seahorse, female (Red Sea; S Kahlbrock).

Hippocampus debelius, softcoral seahorse, male (Red Sea; S Kahlbrock).

Hippocampus fuscus, drab seahorse, 55 mm TL (Red Sea; SV Bogorodsky).



Hippocampus jayakari, spiny seahorse, 73 mm TL (Gulf of Aqaba; JER).

Hippocampus kuda, yellow seahorse, 137 mm TL (Mozambique; O Alvheim, IMR).

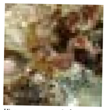
Hippocampus natalensis, cryptic seahorse (S Mozambique; V Fraser).

Hippocampus suezensis, Egyptian seahorse, 35 mm SL (Persian Gulf; JER).

Hippocampus tyro, 61 mm TL female holotype (Seychelles; JER).

Hippocampus sp. 1, African prickly seahorse (South Africa; G de Valle).

Hippocampus sp. 3, Sodwana puff seahorse (South Africa; N Ayliffe).



Hippocampus sp. 3, Sodwana puff seahorse (South Africa; C van Jaarsveld).

Kyonemichthys rumengani, pygmy pipedragon (Red Sea; SV Bogorodsky).

Lissocampus bannwarthi, Suez pipefish, 134 mm SL (Egypt; JER).

1 *Paramonocanthus arabicus*, Gulf filefish, 7 cm SL (Oman). **2** *Paramonacanthus frenatus*, wedgetail filefish, 6 cm SL (S Mozambique)
3 *Paramonacanthus nematophorus*, seagrass filefish, 9 cm SL (Red Sea). **4** *Paramonocanthus pusillus*, blackstriped filefish (Mozambique).
5 *Pervagor aspricaudus*, orangetail filefish, 9 cm SL male (Mauritius). **6** *Pervagor janthinosoma*, redtail filefish, **(a)** 8 cm SL (Mauritius),
(b) 5 cm SL (S Mozambique). **7** *Pervagor randalli*, Randall's filefish, 4 cm SL (Red Sea). **8** *Stephanolepis auratus*, porky, 19 cm SL (South Africa).
9 *Stephanolepis diaspros*, reticulated filefish, ~11 cm SL (Oman). **10** *Thamnaconus arenaceus*, sandy filefish, 31 cm TL (South Africa).
11 *Thamnaconus erythraeensis*, Aqaba filefish, 19 cm SL (Red Sea). **12** *Thamnaconus fajardoi*, spotted filefish, 16 cm TL (Mauritius).
13 *Thamnaconus melanoproctes*, Oman filefish, ~19 cm TL (Oman). **14** *Thamnaconus modestoides*, drab filefish, 32 cm SL (Kenya).

Family GOBIIDAE, Gobies

1 *Trimma anaima*, pallid pygmy goby (Maldives). **2** *Trimma annosum*, greybeard pygmy goby, 23 mm SL male paratype (Vietnam). **3** *Trimma avidori*, Avidor's pygmy goby, 19 mm SL (Yemen). **4** *Trimma barralli*, Barrall's pygmy goby (Red Sea). **5** *Trimma bisella*, twosaddle pygmy goby, 24 mm SL (Mauritius). **6** *Trimma corallinum*, polkadot pygmy goby, 20 mm SL (South Africa). **7** *Trimma dalerocheila*, hotlips pygmy goby, 17 mm SL paratype (Chagos). **8** *Trimma emeryi*, Emery's pygmy goby, 17 mm SL (New Caledonia). **9** *Trimma filamentosus*, longspine pygmy goby (Red Sea). **10** *Trimma fishelsoni*, Fishelson's pygmy goby, 27 mm SL (Red Sea). **11** *Trimma flavicaudatum*, yellowtail pygmy goby **(a)** 24 mm SL, **(b)** 24 mm SL (both Red Sea). **12** *Trimma flammeum*, flame pygmy goby, 20 mm SL (South Africa). **13** *Trimma griffithsi*, Griffith's pygmy goby, 17 mm SL female paratype (Chagos). **14** *Trimma haima*, cutface pygmy goby, 21 mm SL (Rodrigues). **15** *Trimma halonevum*, pimple pygmy goby (Maldives). **16** *Trimma hoesei*, Hoese's pygmy goby, 21 mm SL female holotype (Chagos). **17** *Trimma mendelssohni*, Mendelssohn's pygmy goby, 22 mm SL (Rodrigues). **18** *Trimma naudei*, Naude's pygmy goby, 27 mm SL male (Comoros). **19** *Trimma omanensis*, crescentwing pygmy goby (Oman). **20** *Trimma sheppardi*, Sheppard's pygmy goby (Red Sea).