

Chapter 1

Elopomorpha

Superorder Elopomorpha

Number of orders	(5) Elopiformes, Albuliformes, Notacanthiformes, Anguilliformes, Saccopharyngiformes
Number of suborders	(7) Albuloidei, Notacanthoidei, Anguilloidei, Muraenoidei, Congroidei, Cyematoidei, Saccopharyngoidei
Number of families	24
Number of genera	156
Number of species	approx. 856

GENERAL LIFE HISTORY

Distribution	Occur worldwide, chiefly marine fishes, few enter estuaries and fresh-water (salinities 0–100%), tolerate a wide pH range (5.9–9.1), some benthic in deep waters.
Relative abundance	Rare to relatively abundant, some important for food and raised by aquaculture, some important in the aquarium trade.
Adult habitat	Tropical, subtropical, and temperate waters, some nocturnal: hiding during the day, some benthic found burrowing on muddy bottoms, in and around coral reefs and rock outcrops, on sandy bottoms, to deep benthic waters, solitary or in colonies.

EARLY LIFE HISTORY

Mode of reproduction	Oviparous or presumed oviparous.
Knowledge of ELH	Few eggs are known, larvae known for most species.

ELH Characters: **Eggs:** planktonic.

Larvae: leptocephalus: laterally compressed and transparent, V- or W-shaped myomeres, elongate and slender bodied, few deep bodied, guts long and tubular some with swellings or loops. Many with melanophores laterally, finely scattered or in patterns of blotches. Dorsal, caudal, and anal fins usually confluent (except in postflexion Elopiformes and Albuliformes). Similar in appearance but may be distinguished by myomere counts and position of the nephros, morphological and pigmentation characters.

REFERENCES Eschmeyer 1998, Forey et al. 1996, Greenwood et al. 1966, Nelson 1994, Smith 1989d.

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Order Elopiformes

Suborder	None
Family	Elopidae (Tenpounders, Ladyfishes)
Number of genera	1
Number of species	5

GENERAL LIFE HISTORY

Distribution	Tropical and subtropical waters.
Relative abundance	Good gamefish on light tackle.
Adult habitat	Chiefly marine; enter estuaries and freshwater, juveniles commonly found in salt marshes, canals, and tidal streams. Little detailed knowledge exists of its biology.

EARLY LIFE HISTORY

Mode of reproduction	Oviparous.
Knowledge of ELH	Larvae known for many species.
ELH Characters:	Eggs: buoyant (planktonic).

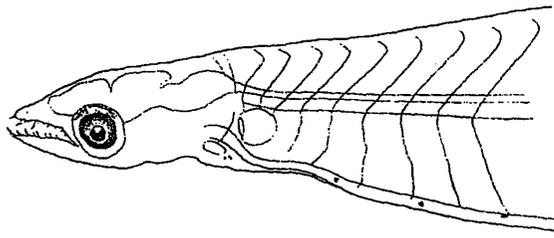
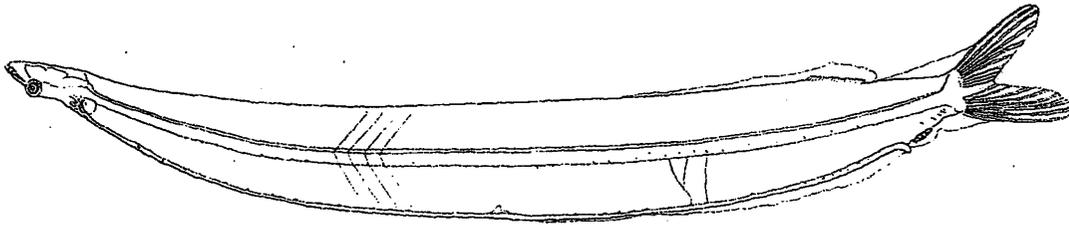
Larvae: laterally compressed and transparent (leptocephalus), fewer than 100 myomeres (74–86), midlateral pigment, depressed head, W-shaped myomeres, older larvae with dorsal, anal, and a forked caudal fin, larval dorsal and anal fins overlap.

Example species:	<i>Elops hawaiiensis</i> (Indo-Pacific: throughout Western Central Pacific. Currently treated as a single species, status should be considered provisional. Further studies may reveal a complex of closely related species, as in the case of <i>Albula</i>).
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Meristics:	D: 23–27, A: 14–18, P2: 12–16, V: 64–68.
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REFERENCES	Charter and Moser 1996a, Froese and Pauly eds. 2009, Mochioka 1988a, Nelson 1984, Smith 1999a.
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Elopiformes/Elopidae
Elops hawaiiensis
from: Mochioka 1988a



whole body and head 33.5 mm

Order Elopiformes

Suborder	None
Family	Megalopidae (Tarpons)
Number of genera	1
Number of species	2

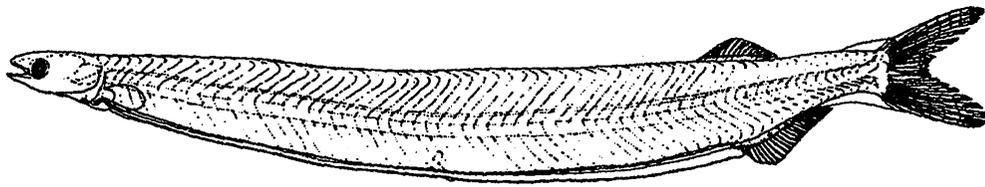
GENERAL LIFE HISTORY

Distribution	Tropical and subtropical waters.
Relative abundance	Popular sportfishes.
Adult habitat	Chiefly marine; entering fresh water, tolerate a wide pH range (5.2-9.1) and salinities from 0 to 100, can tolerate oxygen-poor water by inhaling air into lung-like swim bladder. Adults are generally found at sea.

EARLY LIFE HISTORY

Mode of reproduction	Oviparous.
Knowledge of ELH	Larval stage leptocephalic, both species known. Young inhabit river mouths, inner bays, and mangrove forests.
ELH Characters:	Eggs: planktonic, unknown, presumed buoyant. Larvae: laterally compressed and transparent (leptocephalus), fewer than 100 myomeres (53-59), W-shaped myomeres, midlateral pigment, older larvae with dorsal, anal, and a forked caudal fin, larval dorsal and anal fins overlap.
Example species:	<i>Megalops cyprinoides</i> (Indo-Pacific: throughout Western Central Pacific).
Meristics:	D: 16-21, A: 23-31, P2: 9+, V: 67-69.
REFERENCES	Froese and Pauly eds. 2009, Mochioka 1988a, Nelson 1984.

Elopiformes/Megalopidae
Megalops cyprinoides
from: Uchida et al. 1958



whole body 30.0 mm

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Order Albuliformes

Suborder Albuloidi
 Family **Albulidae (Bonefishes: 2 subfamilies, Albulinae and Pterothrissinae)**

Number of genera 2

Number of species 5

GENERAL LIFE HISTORY

Distribution Occur worldwide in tropical waters.

Relative abundance One of the most important game fishes worldwide.

Adult habitat Marine, brackish water, tropical shallow waters, occur primarily in shallow, coastal waters on sand or mud bottoms, in areas of relatively high salinity.

EARLY LIFE HISTORY

Mode of reproduction Oviparous.

Knowledge of ELH Larvae known for many species. Further studies may reveal a complex of closely related species.

ELH Characters: **Eggs:** planktonic, unknown.

Larvae: laterally compressed and transparent (leptocephalus), fewer than 100 myomeres, W-shaped myomeres, no midlateral pigment, dorsal and anal fins do not overlap, older larvae with dorsal, anal, and a forked caudal fin.

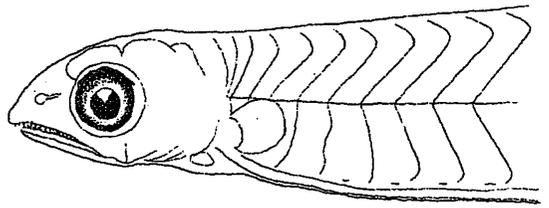
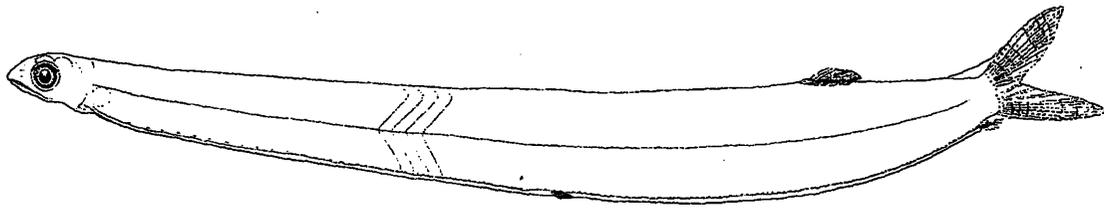
Example species: *Albula vulpes* (Gulf of Mexico).

Meristics: D: 15–19, A: 7–9, V: 65–76.

REFERENCES

Alexander 1961, Eldred 1967, Fahay 1983, Froese and Pauly eds. 2009, Mochioka 1988a, Smith 1979, 1989p.

Albuliformes/Albulidae
Albula vulpes
from: Mochioka 1988a



whole body and head 61.5 mm

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Order Notacanthiformes

Suborder	Notacanthoidei
Family	Notacanthidae (Deep-sea Spiny Eels)
Number of genera	3
Number of species	10

GENERAL LIFE HISTORY

Distribution	Global distribution in deep waters.
Relative abundance	Uncommon.
Adult habitat	Marine; benthic in deep waters (125–3500 m).

EARLY LIFE HISTORY

Mode of reproduction	Oviparous (<i>Notacanthus chemnitzii</i> individuals with nearly ripe eggs have been found in late autumn off Iceland).
Knowledge of ELH	Planktonic eggs unknown; few larvae known tentatively associated with adults.
ELH Characters:	Eggs: planktonic, unknown.

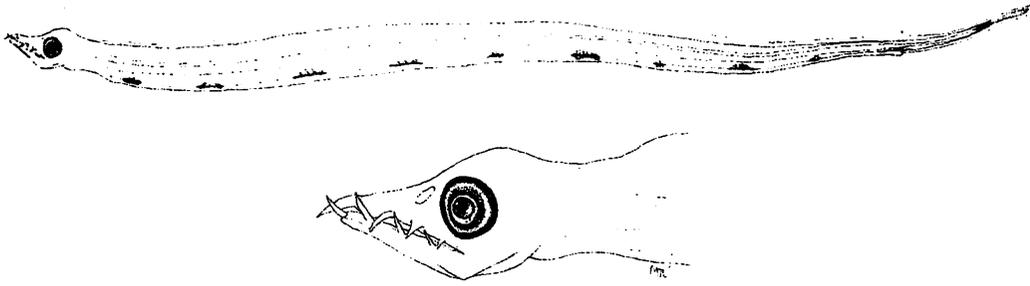
Larvae: laterally compressed and transparent, extremely large leptocephalus, 1–2 m in length, body almost threadlike posteriorly, with pigmented swellings, caudal fin absent, myomeres 300+ and V-shaped, simple tubular gut ending near tip of tail, short-based dorsal fin, small pectoral fin, and pelvic fins present on larger specimens.

Example species:	<i>Leptocephalus giganteus</i> (Eastern Pacific: central California to Peru. Southwest Pacific: Chathams Island, New Zealand. Occurs worldwide).
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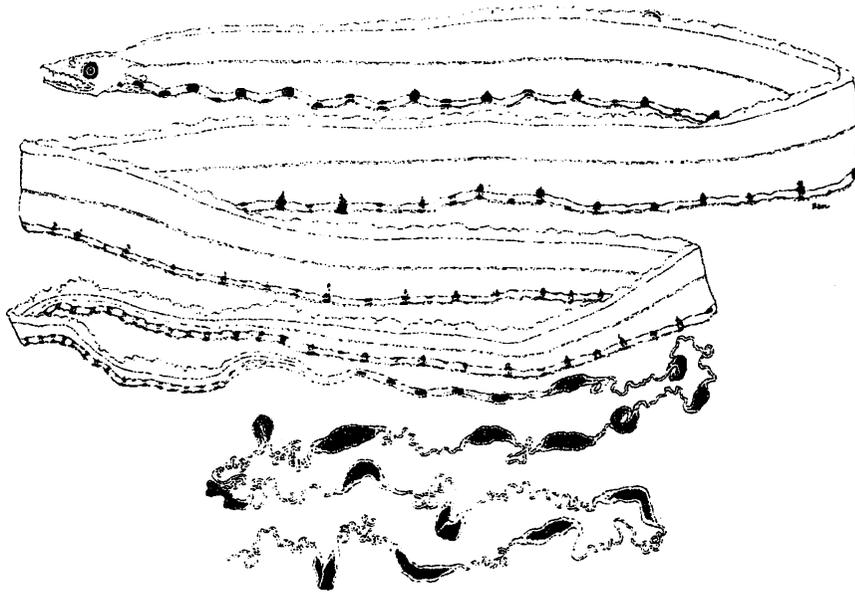
Meristics:	(<i>N. chemnitzii</i>) D: IV–XII, 2, A: XIV–XVII, 104–145, P1: 14–16, P2: III–IV, 6–7, V: 225 – 239, C: 5.
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REFERENCES	Hart 1973, Moser and Charter 1996a, Smith 1979, 1989o.
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Notacanthiformes/Notacanthidae
Leptocephalus giganteus
from: Moser and Charter 1996a



whole body and head 22.0 mm



whole body, head, and gastric region 314 mm

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Order Anguilliformes

Suborder	Anguilloidei
Family	Anguillidae (Freshwater Eels)
Number of genera	1
Number of species	15

GENERAL LIFE HISTORY

Distribution	Usually catadromous; juveniles and adults occur in fresh and brackish waters, mature adults and larvae inhabit marine waters; all stages occur in tropical and temperate waters worldwide except eastern Pacific and south Atlantic.
Relative abundance	Relatively abundant; all species are important food fishes and are sold fresh, smoked, or canned, several species are raised by aquaculture.
Adult habitat	Adults are nocturnal, active at night and hide during the day.

EARLY LIFE HISTORY

Mode of reproduction	Oviparous.
Knowledge of ELH	Eggs of most unknown; many larvae are known.
ELH Characters:	Eggs: planktonic, unknown (<i>Anguilla anguilla</i> buoyant, spherical, smooth, not sticky, transparent, yellow oil globule, in later stages of development, dendritic melanophores appear over anterior hemisphere of the oil globule). Larvae: laterally compressed and transparent (leptocephalus), small to moderate-sized, simple, straight, long gut without swellings or loops, near three-quarter SL, species separated by myomere counts.

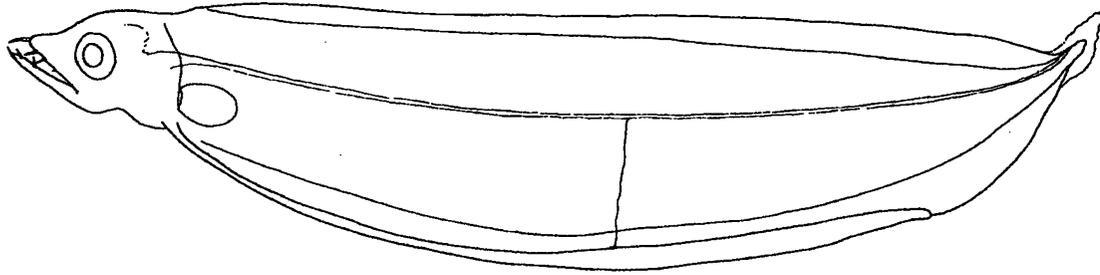
Example species: *Anguilla rostrata* (Northwest to Western Central Atlantic: Greenland south along the Atlantic coast of Canada and the USA to Panama, and throughout much of the West Indies south to Trinidad).

Meristics: D and A confluent with C, P1: 14–20, V: 103–112.

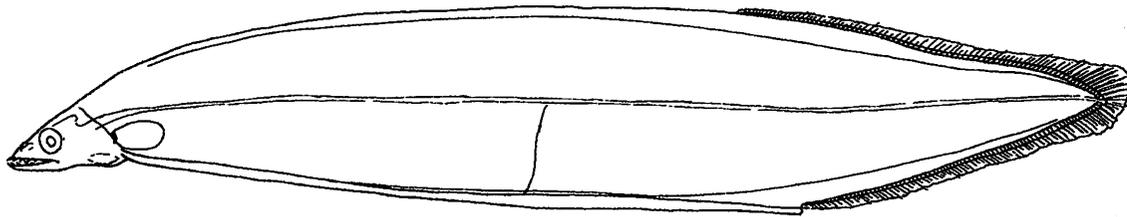
REFERENCES

Allardi and Keith 1991, Bertolini et al. 1956, Bigelow and Schroeder 1953, Davis and Louder 1969, Fahay 1983, Froese and Pauly eds. 2009, Maitland and Campbell 1992, Marinaro 1971, Marquet 1992, McCleave et al. 1998, McEwan and Hecht 1984, Merrick and Schmida 1984, Muus and Dahlström 1968, Nelson 1994, Papisissi 1989, Scotton et al. 1973, Shrestha 1990, Smith 1968, 1979, 1989a, h, 1999b, Tabeta 1988a, Tesch 1991, Tsukamoto et al. 1992.

Anguilliformes/Anguillidae
Anguilla rostrata
from: Smith 1979



whole body 10.0 mm



whole body 44.0 mm

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Order Anguilliformes

Suborder	Anguilloidei
Family	Moringuidae (Worm or Spaghetti Eels)
Number of genera	2
Number of species	6

GENERAL LIFE HISTORY

Distribution	Benthic eels, tropical Indo-Pacific and Western Atlantic; rarely in fresh-water.
Relative abundance	Adults rare in collections.
Adult habitat	Benthic, live in burrows. <i>Neoconger</i> prefers mud bottoms, <i>Moringua</i> prefers sand.

EARLY LIFE HISTORY

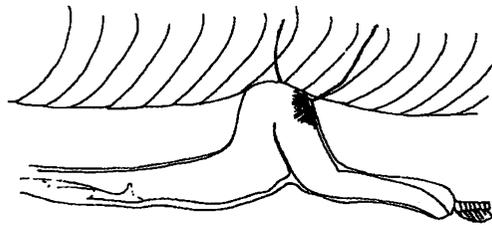
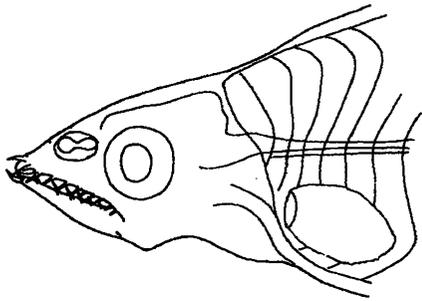
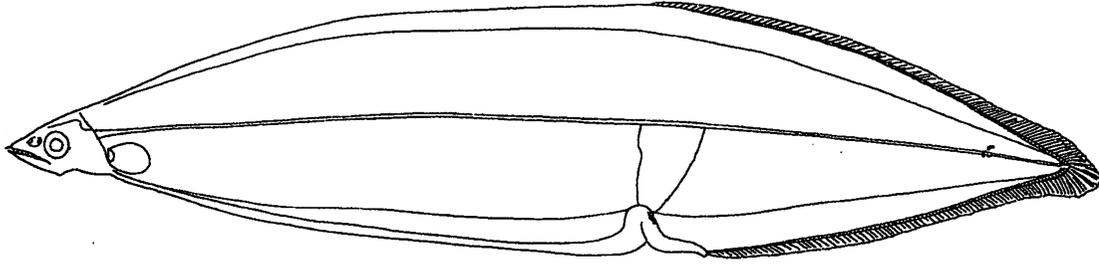
Mode of reproduction	Oviparous.
Knowledge of ELH	Larvae known for many species.
ELH Characters:	Eggs: planktonic, eggs unknown.

Larvae: laterally compressed and transparent (leptocephalus), midlateral pigment, may be limited to the caudal region, gut with a single pigmented prominent arch just before anus.

Example species:	<i>Neoconger mucronatus</i> (Gulf of Mexico).
Meristics:	D: 134–197, A: 125–168 (adult D and A: appearing as low folds, posteriorly and united with caudal fin), P1: 15–34, weakly developed when present, V: 93–108.

REFERENCES	Froese and Pauly eds. 2009, Nelson 1994, Smith 1979, 1989b, f, Smith and Castle 1972.
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Anguilliformes/Anguilloidei/Moringuidae
Neoconger mucronatus
from: Smith 1979



whole body, head, and gastric region 33 mm

Order Anguilliformes

Suborder	Muraenoidei
Family	Chlopsidae (False Moray Eels)
Number of genera	8
Number of species	18

GENERAL LIFE HISTORY

Distribution	Benthic, warm shallow waters. Occur worldwide.
Relative abundance	Adults rare in collections.
Adult habitat	Benthic and solitary species in warm shallow waters. Occurring in and around coral reefs and rocky shores, cryptic in reef areas.

EARLY LIFE HISTORY

Mode of reproduction	Oviparous.
Knowledge of ELH	Larvae known for many species.
ELH Characters:	Eggs: planktonic, unknown.

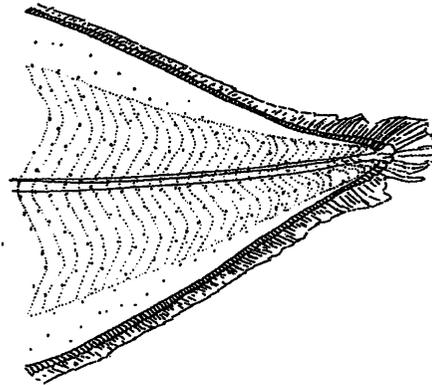
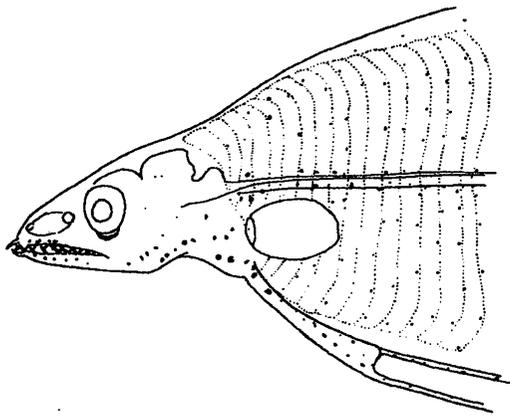
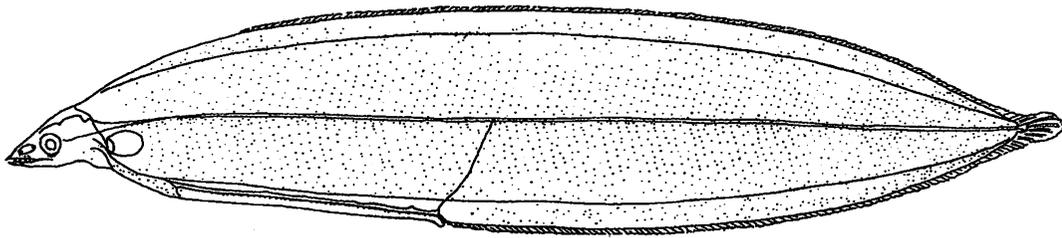
Larvae: laterally compressed and transparent (leptocephalus), small to moderate-sized, moderately deep, intestinal pigment present, pectoral fin well developed (in larvae), no pigment on top of notochord, simple relatively short gut, long dorsal fin, lateral pigment very variable: restricted to midlateral line to scattered over lateral surface, singly or in clusters.

Example species: *Kaupichthys hyoprroides* (Gulf of Mexico). Indo-Pacific: East Africa to the Marquesan and Society islands, north to the Ryukyu and Hawaiian islands; throughout Micronesia. Western Atlantic: southeastern Florida (USA), Bahamas, and Yucatan, Mexico to the Antilles and Venezuela. According to Tighe (1993), the Indo-Pacific species *K. diodontus*, may be distinct from *K. hyoprroides* of the Atlantic.

Meristics: D: approx. 350, D and A confluent with C, P1: 10–19, lacking in some species, V: 109–123.

REFERENCES Smith 1979, 19891, Tabeta 1988b.

Anguilliformes/Muraenoidei/Chlopsidae
Kaupichthys hyoproroides
from: Smith 19891 (modified from Smith 1979)



whole body, head, and caudal region 39.0 mm

Order Anguilliformes

Suborder	Muraenoidei
Family	Muraenidae (Moray Eels: 2 subfamilies, Uropteryginae and Muraeninae)
Number of genera	15
Number of species	200+ (due to the difficulty in collecting adults, associating leptocephali with adults, and incomplete taxonomy, changes at both the generic and specific levels are likely to occur).

GENERAL LIFE HISTORY

Distribution	Occur in brackish water as well as worldwide in tropical and temperate seas.
Relative abundance	Relatively abundant; Brock et al. (1979) reported muraenids compose 50% of the Hawaiian fish biomass. Harvested, especially in southern Europe, although large morays have resulted in ciguatoxic poisoning in the Indo-Pacific. Scavengers and predators; will bite if provoked; commonly displayed in aquariums.
Adult habitat	Adults benthic, many species more active at night and hide in holes and crevices during the day, generally in shallow water among rocks and coral heads, some taken above sand or mud bottoms to depths of 500 m.

EARLY LIFE HISTORY

Mode of reproduction	Oviparous.
Knowledge of ELH	Most eggs unknown; most larvae are known, epipelagic, widespread and abundant.

ELH Characters: **Eggs:** planktonic, most eggs have not been described. (*Gymnothorax nigromarginatus* smooth, yolk diameter 1.5–2.0 mm, pigment present on the spinal cord of the embryo).

Larvae: laterally compressed and transparent (leptocephalus), small to moderate-sized; tail broadly rounded, a simple, long, tubular gut without swellings or loops, half to three-quarter SL, genera and species may be separated by pigmentation, myomere counts, and fin positions. Uropteryginae dorsal and anal fin restricted to tail tip, Muraeninae dorsal and anal fin origin by anus.

Example species: Uropteryginae: *Anarchias similis* (N.W., Western and Eastern Atlantic) *Channomuraena vittata* (Circumtropical).
Muraeninae: *Gymnothorax mordax* (Eastern Pacific from California, USA to Baja California, Mexico, and Galapagos Islands), *Monopenchelys acuta* (Eastern Atlantic: Ascension Island; Western Atlantic: Bahamas to

the Carribean. Hawaii; Western Indian Ocean).

Meristics:

D and A confluent with C, P1: small, then absent, P2: absent, *A. similis* D: 23-37, A: 11-22, V: 104-113, *C. vittata* D: 70-86, A: 60-93, V: 145-157, *G. mordax* D: 367, A: 226, V: 146-154, *M. acuta* D: 128-154, A: 210-238, V: 124-135.

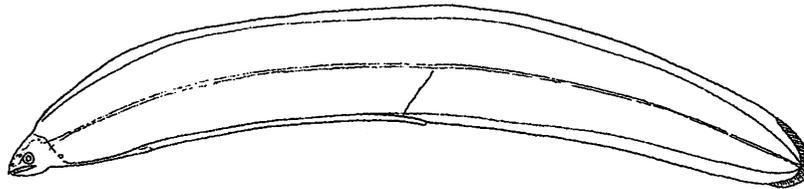
REFERENCES

Bertolini et al. 1956, Breder and Rosen 1966, Brothers and Thresher 1985, Castle 1984a, 1984b, Charter and Moser 1996b, Eldred 1969, Fishelson 1992, Marinaro 1971, Papisissi 1989, Smith 1979, 1989i.

Anguilliformes/Muraenidae/Uropteryginae

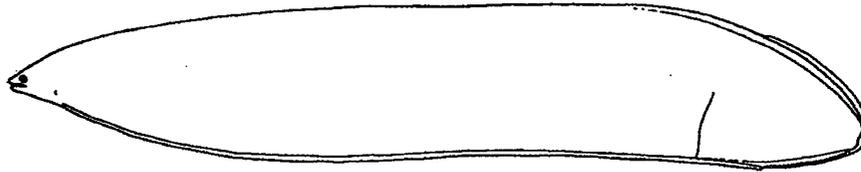
Anarchias

A. similis 43.0 mm
(Smith 1979)



Channomuraena

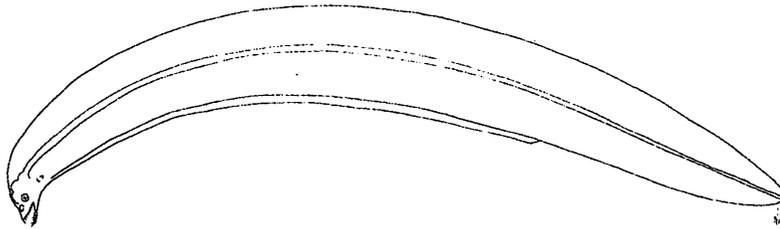
C. vittata 124 mm
(metamorphosing)
(Smith 1979)



Anguilliformes/Muraenidae/Muraeninae

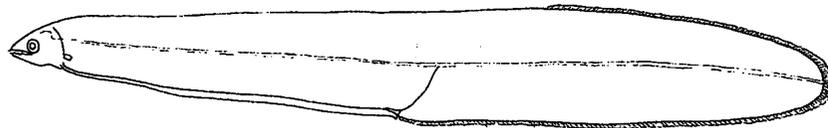
Gymnothorax

G. mordax 44.1 mm
(Charter and Moser 1996b)



Monopenchelys

M. acuta 43.0 mm SL
(Smith 1979)



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Order Anguilliformes

Suborder	Congroidei
Family	Synaphobranchidae (3 subfamilies: Simenchelyinae, Snubnose Parasitic Eels; Synaphobranchinae, Cutthroat Eels; and Ilyophinae, Arrowtooth Eels)

Number of genera	10
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Number of species	26
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GENERAL LIFE HISTORY

Distribution	Deep benthic eels. Occur worldwide in marine waters, not recorded in eastern Pacific.
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Relative abundance	Rare in collections.
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Adult habitat	Benthic in deep waters, prefers muddy bottoms, often off mouths of large rivers. Ilyophinae can live in burrows in shelf and upper slope waters.
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EARLY LIFE HISTORY

Mode of reproduction	Oviparous.
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Knowledge of ELH	Larvae known for some species.
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ELH Characters:	Eggs: planktonic, eggs unknown.
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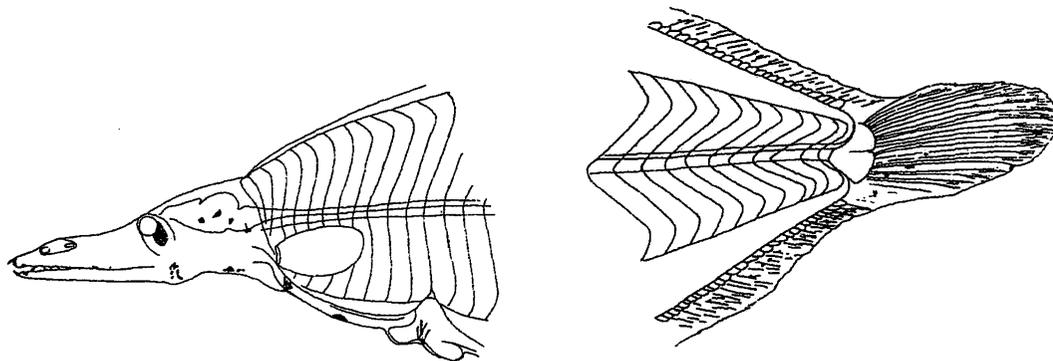
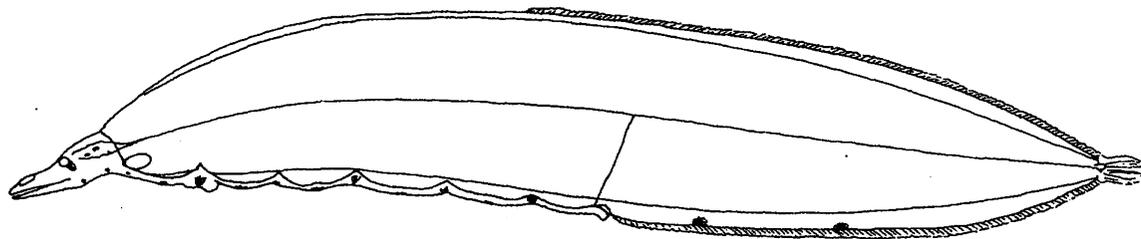
Larvae: laterally compressed and transparent (leptocephalus), telescopic eyes, with or without rostral filament. Synaphobranchinae, gut a simple straight tube without intestinal and lateral pigment, although when present a single diffuse spot before anus, Ilyophinae with intestinal and with or without lateral pigment, gut with small irregular swellings.

Example species:	<i>Dysomma anguillare</i> (Gulf of Mexico).
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Meristics:	D and A confluent with C, P1: 10–11, absent in few species, C: 10–12, V: 118–130.
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REFERENCES	Nelson 1994, Smith 1979, 1989e, Tabeta 1988c.
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Anguilliformes/Congroidei/Synaphobranchidae
Dysomma anguillare
from: Smith 1989e



whole body, head, and caudal region 55.0 mm

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Order Anguilliformes

Suborder Congroidei
 Family **Ophichthidae (2 subfamilies: Myrophinae, Worm Eels and Ophichthinae, Snake Eels)**

Number of genera 52
 Number of species 250

GENERAL LIFE HISTORY

Distribution Benthic, occur worldwide. Spawn in open sea.
 Relative abundance Abundant in collections.
 Adult habitat Benthic in all tropical to warm temperate coastal waters, some entering rivers, most spend their time buried in sand, some have considerable regenerative powers. Myrophinae with flexible tail tip inhabit seagrass beds in bays, mangroves and offshore reefs, Caught for bait fishery using ichthyotoxic plants (e.g. 'cunabi') along the north Brazilian coast. Ophichthinae with hard or fleshy finless tail tip, taken at depth between 0–15 m over a rock-tide pool, and sand bottom.

EARLY LIFE HISTORY

Mode of reproduction Oviparous.
 Knowledge of ELH Larvae known for many species.
 ELH Characters: **Eggs:** planktonic, eggs unknown.

Larvae: laterally compressed and transparent (leptocephalus), liver with 2 connected (Ophichthinae) or 3 unconnected (Myrophinae) lobes, nephros 0–15 myomeres before anus, gut has many thickenings or loops, with associated pigment.

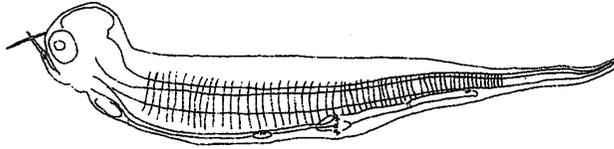
Example species: Myrophinae: *Myrophis punctatus* (Gulf of Mexico).
 Ophichthinae: *Letharchus aliculatus* (Gulf of Mexico).

Meristics: D and A confluent with C, P1: absent in some species, *M. punctatus* V: 141–154, *L. aliculatus* A: absent, V: 155–164.

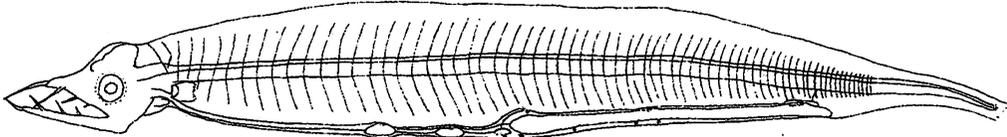
REFERENCES

Barletta et al. 1999, Böhlke and Chaplin 1993, Castle 1984b, Eldred 1966, Froese and Pauly eds. 2009, Leiby 1984a, 1989, McCosker et al. 1989, Smith 1979.

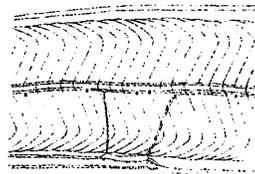
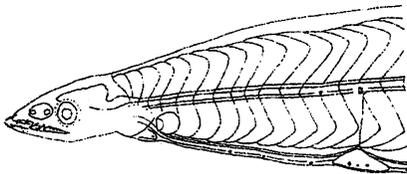
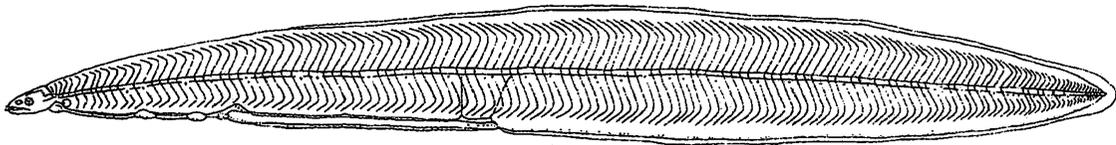
Anguilliformes/Ophichthidae/Myrophinae (worm eels)
Myrophis punctatus
from: Smith 1979



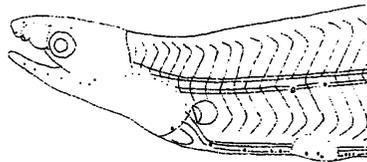
whole body, new hatch 3.0 mm



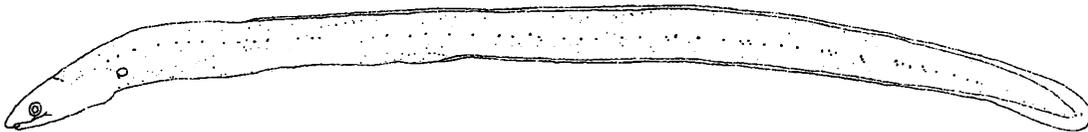
whole body 8.0 mm



whole body, head, and gastric region 70.0 mm



head, metamorphosing specimen 74.0 mm

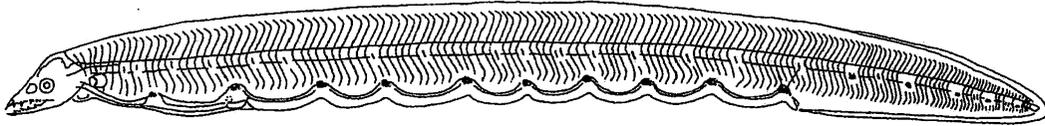


whole body and head 48.0 mm

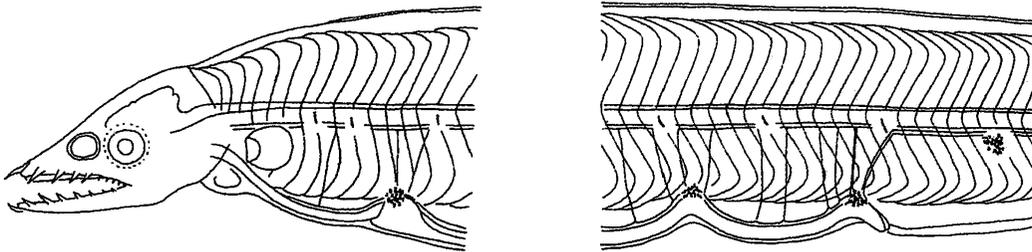
Anguilliformes/Ophichthidae/Ophichthinae (snake eels)

Letharchus aliculatus

from: Smith 1979



whole body 33.0 mm



head and gastric region 39.0 mm

Chapter 1

Order Anguilliformes

Suborder Congroidei
Family **Congridae (Conger Eels: 3 subfamilies, Heterocongrinae, Garden Eels, Bathymyrinae, and Congrinae)**

Number of genera 32

Number of species 150

GENERAL LIFE HISTORY

Distribution Benthic, tropical to temperate waters, valued as food fishes. Occur worldwide, found on soft bottoms, some species entering rivers.

Relative abundance Abundant in collections.

Adult habitat Benthic. Heterocongrinae found in colonies, live in vertical burrows, protruding to feed on plankton, rarely leaving them.

EARLY LIFE HISTORY

Mode of reproduction Oviparous.

Knowledge of ELH Larvae known for many species.

ELH Characters: **Eggs:** planktonic, unknown.

Larvae: laterally compressed and transparent (leptocephalus), liver with 2 or 3 lobes in some species, gut may be a simple tube, prominently looped, or trailing, nephros more than 15 myomeres before anus, lateral pigment, when present, may be oblique lines on myosepta, subcutaneous, confined to midlateral region, or scattered over side of body, species identified by pigment, myomere count, and position of nephros.

Example species: *Rhynchoconger flavus* (Gulf of Mexico).

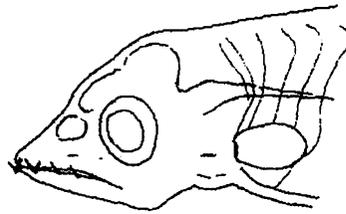
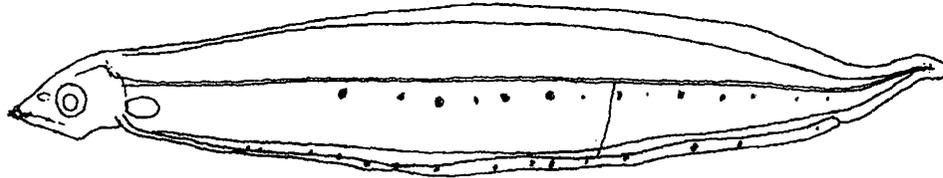
Meristics: D and A confluent with C, P1: 12, absent in some species, V: 159-172.

REFERENCES Castle and Smith 1999, Froese and Pauly eds. 2009, McEachran and Fechhelm 1998, Smith 1979, 1989c, g.

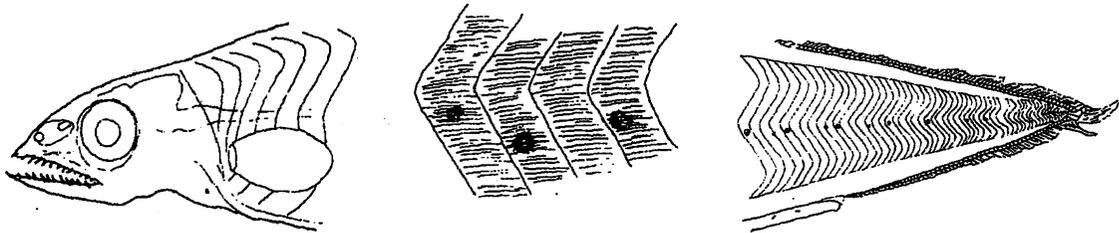
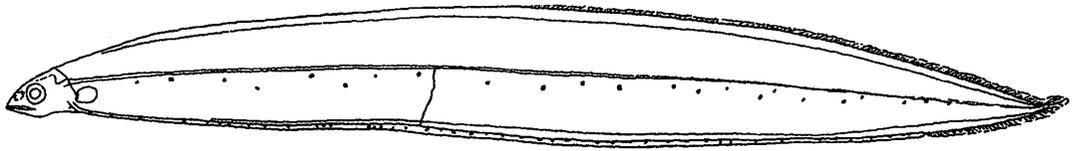
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Anguilliformes/Congroidei/Congridae
Rhynchoconger flavus



whole body and head 15.0 mm
(Smith 1979)



whole body, head, lateral body wall and caudal regions 73.0 mm
(Smith 1989g)

Chapter 1

Order Anguilliformes

Suborder Congroidei

Family **Derichthyidae (Longneck Eels)**

Number of genera 2

Number of species 3

GENERAL LIFE HISTORY

Distribution Meso- to bathypelagic in Atlantic, Indian, and Pacific oceans.

Relative abundance Rare.

Adult habitat Marine, adults meso- to bathypelagic, whole life in open ocean. No commercial importance.

EARLY LIFE HISTORY

Mode of reproduction Oviparous.

Knowledge of ELH Eggs and larvae planktonic.

ELH Characters: **Eggs:** planktonic (*Derichthys serpentinus* buoyant [pelagic], ca. 2.3 mm, segmented yolk, multiple oil globules, wide perivitelline space).

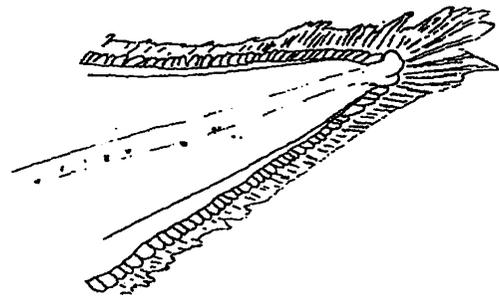
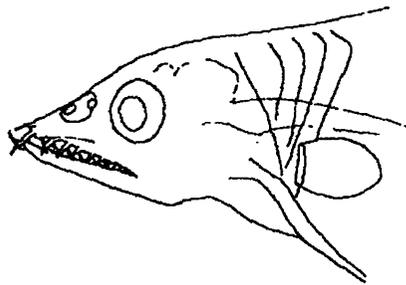
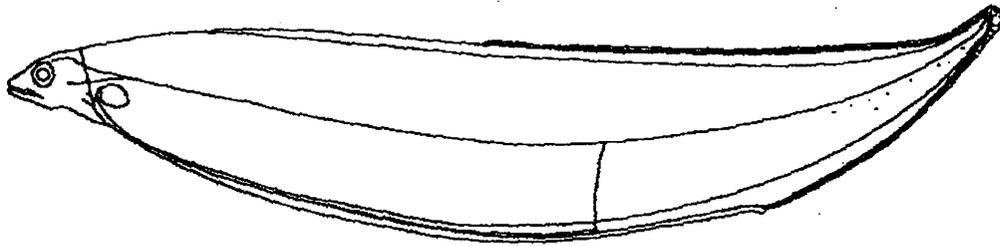
Larvae: laterally compressed and transparent (leptocephalus), moderate-sized leptocephali, caudal region curved in preserved specimens, simple gut, distinctively pigmented postanal series (minute), just below the lateral midline, genera and species separated by head and snout, body, and gut lengths, as well as myomere counts, similar to Serrivomeridae, may be separated by a more posterior nephros.

Example species: *Derichthys serpentinus* (Circumglobal: in tropical to temperate waters, not recorded in the Indian Ocean), *Nessorhamphus ingolfianus* (Temperate and subtropical latitudes of Atlantic and Indian oceans, and S.W. Pacific).

Meristics: D and A confluent with C, P2: absent in adults, *D. serpentinus* D: 226–262, A: 155–180, P1: 11–18, V: 126–136, C: 9–11. *N. ingolfianus* P1: 12–13, V: 147–160, C: 10–12.

REFERENCES Bekker et al. 1982, Charter 1996a, Mochioka 1988b, Nelson 1984, Smith 1979, 1989j, 1999c.

Anguilliformes/Derichthyidae
Derichthys serpentinus
from: Smith 1979



whole body, head, and caudal region 42.0 mm

No

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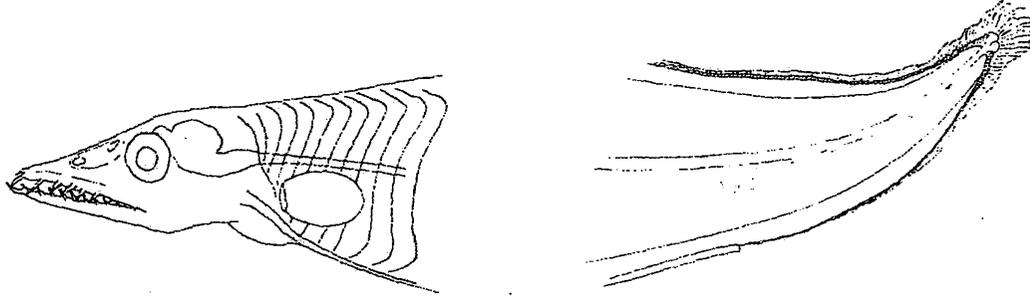
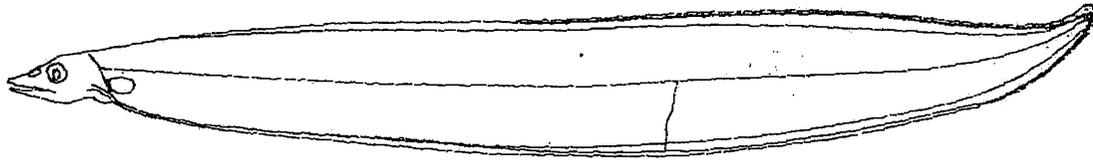
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Anguilliformes/Derichthyidae
Nessorhamphus ingolfianus
from: Smith 1979



whole body, head, and caudal region 51.0 mm

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Order Anguilliformes

Suborder	Congroidei
Family	Nemichthyidae (Snipe Eels)
Number of genera	3
Number of species	9

GENERAL LIFE HISTORY

Distribution	Bathypelagic and mesopelagic: Atlantic, Indian, and Pacific oceans.
Relative abundance	Uncommon.
Adult habitat	Marine; Bathypelagic and mesopelagic.

EARLY LIFE HISTORY

Mode of reproduction	Oviparous.
Knowledge of ELH	Eggs unknown; most larvae are known.
ELH Characters:	Eggs: buoyant (planktonic).

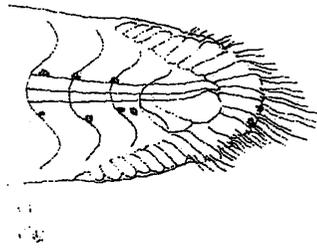
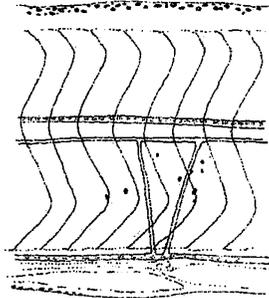
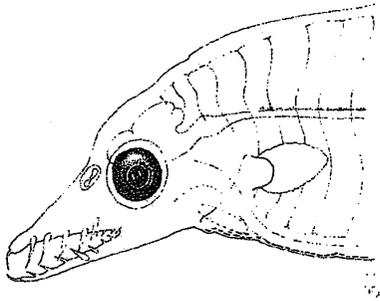
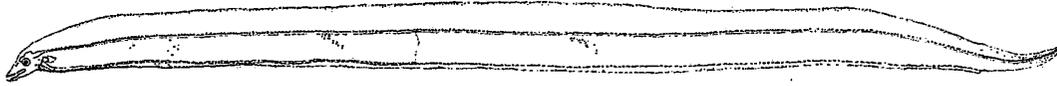
Larvae: laterally compressed and transparent (leptocephalus), long to extremely long, slender bodied to 300–400 mm, a simple, long, tubular gut without swellings or loops, ending near the tail (in adults the anus is under the pectoral fin or a short distance behind it), diagnostic series of melanophores lying on top of the notochord and patches of melanophores laterally. [*Nemichthys* species have filiform tails and high myomere counts (300–750+). *Avocettina* and *Labichthys* species have attenuate tails and fewer myomeres (170–220)].

Example species:	<i>Avocettina bowersi</i> (California Current Region) (nephros at about myomere 62 [60–64]), <i>Nemichthys scolopaceus</i> (California Current Region) (nephros at about myomere 85 [81–88]).
Meristics:	D and A confluent with C, <i>A. bowersi</i> D: 233–333, A: 208–297, P1: 15–19, V: 177–195, C attenuate, <i>N. scolopaceus</i> D200: 170–253, A200: 186–273, P1: 10–14, V: 350+, C: filiform, (D 200 and A 200 refer to counting to the 200th vertebra).

REFERENCES

Charter 1996b, Froese and Pauly eds. 2009, Hart 1973, Larsen 1979, Matarese et al. 1989, Mochioka 1988c, Muus and Nielsen 1999, Nelson 1994, Nielsen and Smith 1978, Smith 1979, 1989k.

Anguilliformes/Nemichthyidae
Avocettina bowersi
from: Charter 1996b



whole body, head, gastric and caudal regions 88.7 mm

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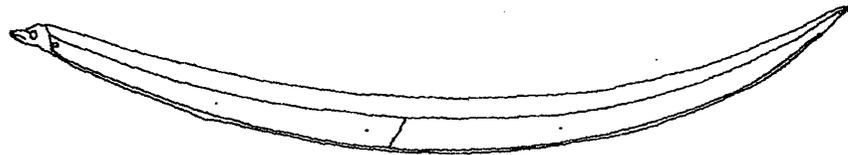
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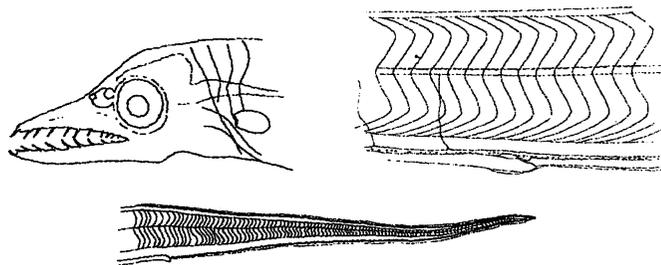
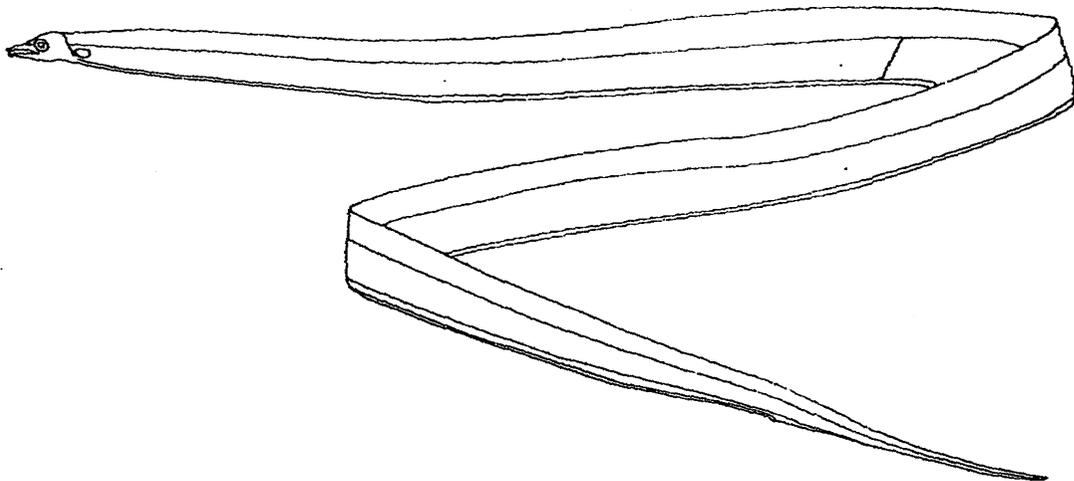
Anguilliformes/Nemichthyidae
Nemichthys scolopaceus
from: Smith 1979



whole body 15.0. mm



whole body 72.0 mm



whole body, head, gastic and caudal regions 182 mm

Chapter 1

Order Anguilliformes

Suborder	Congroidei
Family	Serrivomeridae (Sawtooth Eels)
Number of genera	2
Number of species	10

GENERAL LIFE HISTORY

Distribution	Atlantic, Indian, and Pacific oceans at depths of 500–1000 m.
Relative abundance	Uncommon to rare.
Adult habitat	Marine, adults are midwater eels. No commercial importance.

EARLY LIFE HISTORY

Mode of reproduction	Assumed to be oviparous.
Knowledge of ELH	Eggs presumed planktonic, and larvae planktonic.
ELH Characters:	Eggs: unknown.

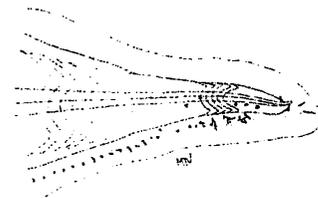
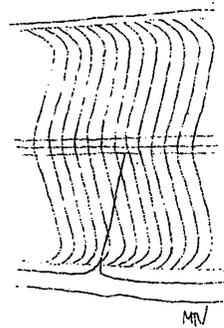
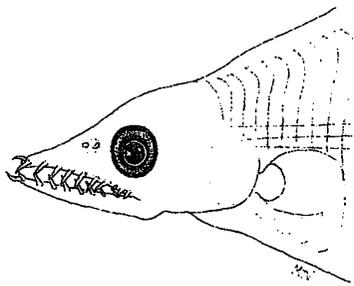
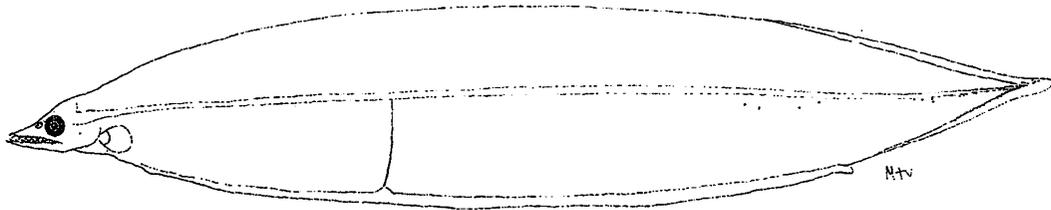
Larvae: laterally compressed and transparent (leptocephalus), small to moderate-sized leptocephali, pointed tail, lateral pigmentation on some species, lateral caudal pigment on all species. Genera and species separated by pigmentation and myomere counts. Similar to Derichthyidae, may be separated by a more anterior nephros.

Example species:	<i>Serrivomer sector</i> .
Meristics:	D and A confluent with C, D: 145–148, A: 143–152, P1: reduced, V: 151–153, C: 6.

REFERENCES	Charter 1996c, Hart 1973, Smith 1999d, Tighe 1989.
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Anguilliformes/Serrivomeridae
Serrivomer sector
from: Charter 1996c



whole body, head, gastric and caudal regions 46.5 mm

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Order Saccopharyngiformes

Suborder	Cyematoidei
Family	Cyematidae (Bobtail Eels)
Number of genera	2
Number of species	2

GENERAL LIFE HISTORY

Distribution	Bathypelagic, depths of 1500–3000 m: Atlantic, Indian, and Pacific oceans.
Relative abundance	Uncommon.
Adult habitat	Marine, bathypelagic.

EARLY LIFE HISTORY

Mode of reproduction	Presumed oviparous.
Knowledge of ELH	Eggs unknown; <i>Cyema atrum</i> larvae known (myomeres 72–83); <i>Leptocephalus holti</i> (myomeres 95–120) may be the larva of <i>Neocyema erythrosoma</i> , but not confirmed.

ELH Characters: **Eggs:** unknown.

Larvae: laterally compressed and transparent (leptocephalus), deep bodied with a long tubular gut (about 60–75% SL) with several prominent loops, melanophores present above and sometimes on lateral or ventral surfaces of gut, head and snout long and pointed.

Example species: *Cyema atrum* (California Current Region), *Leptocephalus holti* (N.E. Atlantic, Sargasso Sea, equatorial Atlantic, S. Pacific, and N. Pacific from the central water mass East).

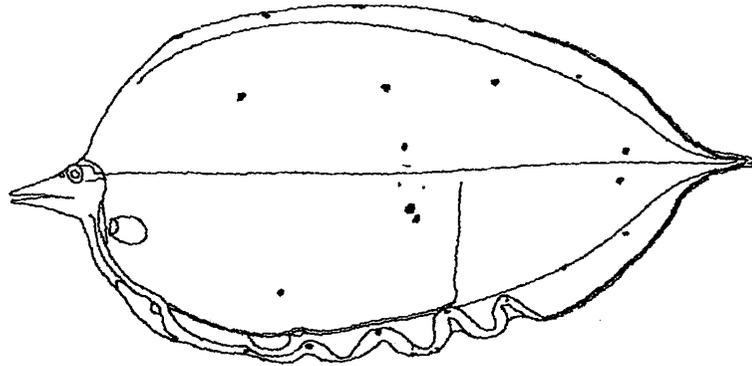
Meristics: D and A confluent with C, *C. atrum* D: 85–93, A: 72–86, P1: 12–15, V: 70–80, C: 4.

REFERENCES Charter 1996d, Nelson 1994, Raju 1974, Smith 1989m.

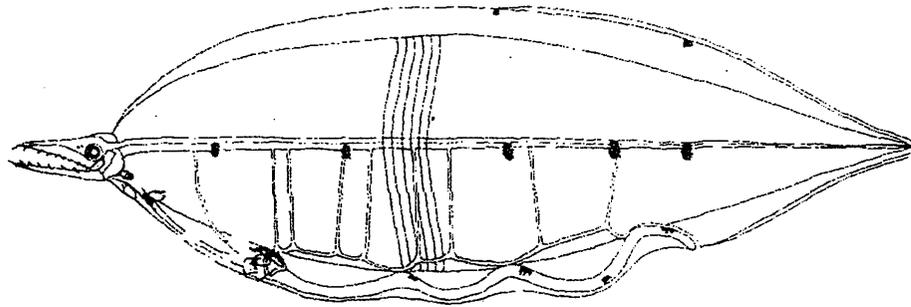
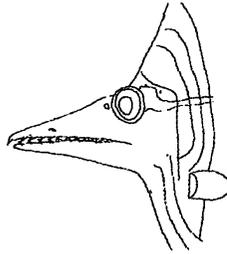
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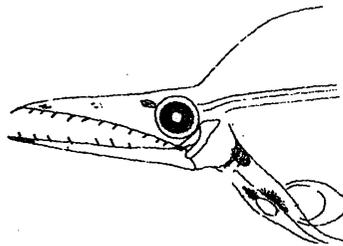
Saccopharyngiformes /Cyematidae



Cyema
C. atrum 42.0 mm
whole body and head
(Smith 1979)



Leptocephalus
L. holti 40.0 mm
whole body and head
(Smith 1979)



Order Saccopharyngiformes

Suborder	Saccopharyngoidei
Family	Saccopharyngidae (Swallowers)
Number of genera	1
Number of species	9

GENERAL LIFE HISTORY

Distribution	Cosmopolitan; Atlantic, Indian, and Pacific oceans.
Relative abundance	Uncommon.
Adult habitat	Marine; meso- to bathypelagic.

EARLY LIFE HISTORY

Mode of reproduction	Oviparous.
Knowledge of ELH	Eggs unknown; larvae known for some species.
ELH Characters:	Eggs: unknown.

Larvae: laterally compressed and transparent (leptocephalus), elongate suspensorium, deep bodied; medium length gut with a single pigmented swelling, no lateral pigment, similar to *Eurypharynx pelecánoides*, may be separated by greater number of myomeres 170–240 vs. 103–125, and fewer gill slits, 4 vs. 6.

Example species: *Saccopharynx lavenbergi* (Eastern Central Pacific: ranges from northern California, USA to Peru).

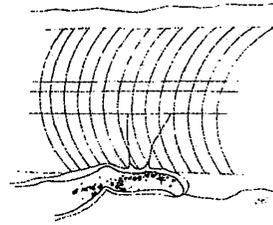
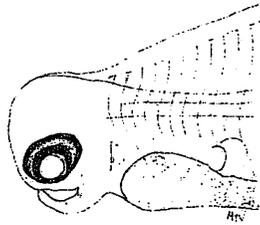
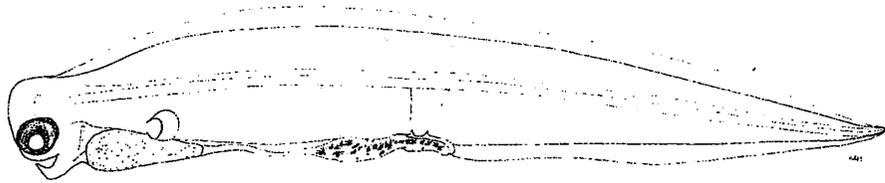
Meristics: D: 224–285, A: 235–284, P1: 33–36, V: 175–220, C: tail ending in a vertically expanded lanceolate to spatulate luminous caudal organ in adults.

REFERENCES Bertelsen et al. 1989, Charter 1996e, Nielsen and Bertelsen 1985, Orton 1963.

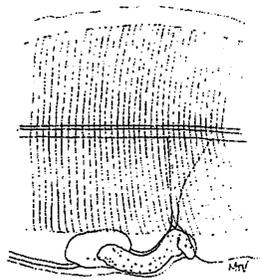
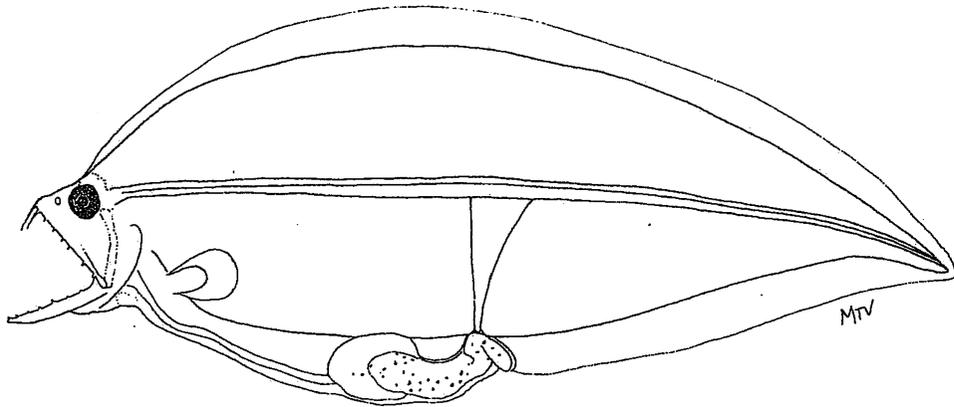
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Saccopharyngiformes/Saccopharyngidae
Saccopharynx lavenbergi
from: Charter 1996e



whole body, head, and gastric region 10.4 mm



whole body and gastric region 24.2 mm

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Order Saccopharyngiformes

Suborder	Saccopharyngoidei
Family	Eurypharyngidae (Gulpers)
Number of genera	1
Number of species	1

GENERAL LIFE HISTORY

Distribution	All temperate and tropical seas; Atlantic, Indian, and Pacific oceans.
Relative abundance	Uncommon.
Adult habitat	Deep water.

head
(Smit)

EARLY LIFE HISTORY

Mode of reproduction	Oviparous.
Knowledge of ELH	Larvae known.
ELH Characters:	Eggs: planktonic.

Larvae: laterally compressed and transparent (leptocephalus), elongate suspensorium, deep bodied, medium length gut with a single pigmented swelling higher arched than *Saccopharynx* spp., no lateral pigment, similar to *Saccopharynx* spp., may be separated by fewer number of myomeres 103–125 vs. 170–240, and greater number of gill slits, 6 vs. 4.

whole
(Smit)

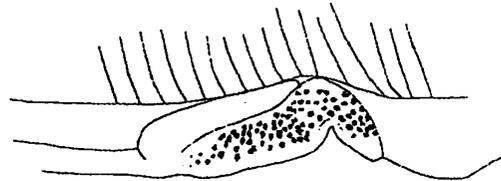
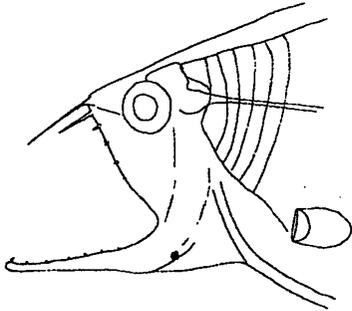
Example species: *Eurypharynx pelecanoioides* (Circumglobal: in tropical to temperate waters).

Meristics: D: 155–196, A: 118–147, C: absent, tail attenuated and ending in an expanded, luminous caudal organ, P1: 11, V: 97–125.

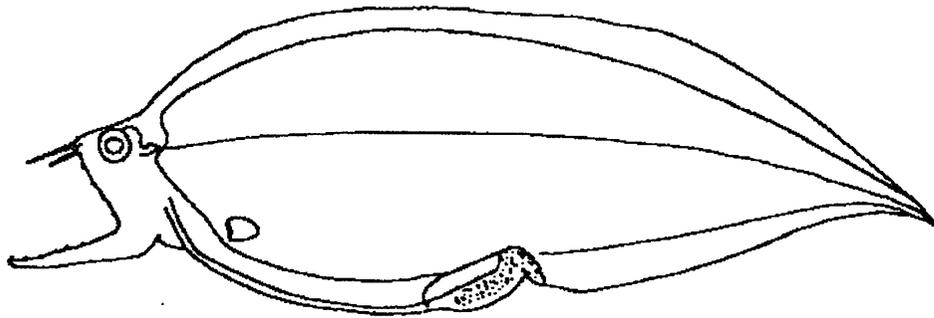
REFERENCES Bertelsen et al. 1989, Charter 1996f, Nelson 1994, Raju 1974.

whole
(Raju)

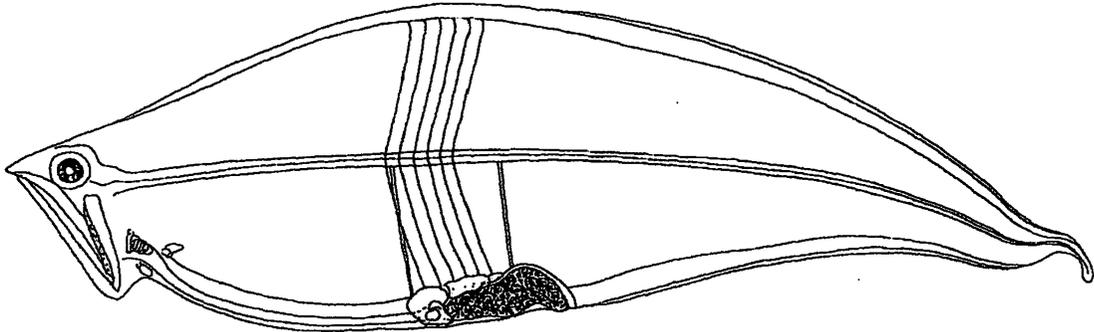
Saccopharyngiformes/Eurypharyngidae
Eurypharynx pelecanooides



head and gastric region 14.0 mm
(Smith 1979)



whole body 19.0 mm
(Smith 1979)



whole body 27.0 mm
(Raju 1974)

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Chapter 1

Order Saccopharyngiformes

Suborder Saccopharyngoidei

Family **Monognathidae (Monognathids)**

Number of genera 1

Number of species 15

GENERAL LIFE HISTORY

Distribution Atlantic and Pacific oceans.

Relative abundance Rare.

Adult habitat Marine; most species taken below 2,000 m.

EARLY LIFE HISTORY

Mode of reproduction Unknown.

Knowledge of ELH Eggs unknown; metamorphic larvae known for some species.

ELH Characters: **Eggs:** unknown.

Larvae: laterally compressed and transparent (leptocephalus), elongate suspensorium, maxilla and premaxilla absent, medium length gut with a single slightly looped pigmented swelling, series of 5–6 large melanophores along the midlateral line, short series of melanophores dorsally and ventrally.

Example species: *Monognathus* sp. (Central and N.W. Pacific).

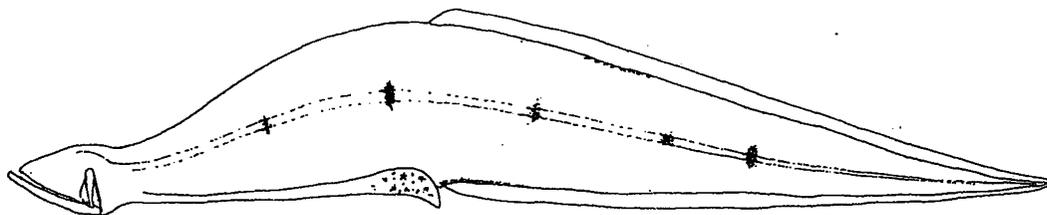
Meristics: N.W. Pacific: *Monognathus isaacsi* D: 80, A: 52, P1: absent; *Monognathus ozawai* D: 96, A: 66, P1: absent.

REFERENCES Bertelsen and Nielsen 1987, Bertelsen et al. 1989, Froese and Pauly eds. 2009, Raju 1974, Smith 1989n.

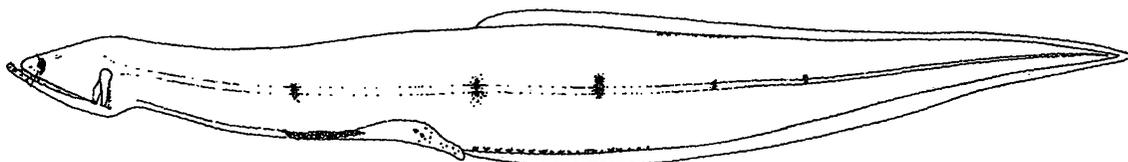
Saccopharyngiformes/Monognathidae

Monognathus sp.

from: Raju 1974



whole body 42.0 mm



whole body 48.0 mm

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IDENTIFICATION OF EGGS AND LARVAE OF MARINE FISHES
edited by Arthur W. Kendall, Jr.

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Establishing the identity of fish eggs and larvae: Arthur W. Kendall, Jr.

Methods and equipment for morphological identification of fish eggs and larvae:

Arthur W. Kendall, Jr.

Identification of fish eggs: Ann C. Matarese and Deborah M. Blood

Methods to identify fish larvae: Arthur W. Kendall, Jr.

Chapter 1 1

Elopomorpha: Sharon R. Charter

Elopiiformes: Sharon R. Charter and Denice Drass

Elopidae: *Elops hawaiiensis*

Megalopidae: *Megalops cyprinoides*

Albuliformes: Denice Drass and Sharon R. Charter

Albulidae: *Albula vulpes*

Notacanthiformes: Sharon R. Charter and Denice Drass

Notacanthidae: *Leptocephalus giganteus*

Anguilliformes

Anguillidae: Sharon R. Charter and Denice Drass: *Anguilla rostrata*

Moringuidae: Denice Drass and Sharon R. Charter: *Neoconger mucronatus*

Chlopsidae: Denice Drass and Sharon R. Charter: *Kaupichthys hyoprroides*

Muraenidae: Sharon R. Charter and Denice Drass

Uropteryginae: *Anarchias similis*, *Channomuraena vittata*

Muraeninae: *Gymnothorax mordax*, *Monopenchelys acuta*

Synphobranchidae: Denice Drass and Sharon R. Charter: *Dysomma anguillare*

Ophichthidae: Denice Drass and Sharon R. Charter

Myrophinae: *Myrophis punctatus*

Ophichthinae: *Letharchus aliculatus*

Congridae: Denice Drass and Sharon R. Charter: *Rhynchoconger flavus*

Derichthyidae: Sharon R. Charter and Denice Drass: *Derichthys serpentinus*,
Nessorhamphus ingolfianus

Nemichthyidae: Sharon R. Charter and Denice Drass: *Avocettina bowersii*, *Nemichthys scolopaceus*

Serrivomeridae: Sharon R. Charter and Denice Drass: *Serrivomer sector*

Saccopharyngiformes: Sharon R. Charter and Denice Drass

Cyematidae: *Cyema atrum*, *Leptocephalus holti*

Saccopharyngidae: *Saccopharynx lavenbergi*

Eurypharyngidae: *Eurypharynx pelecanooides*

Monognathidae: *Monognathus* sp.

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Clupeiformes: Morgan S. Busby

Engraulidae: *Engraulis mordax*

Clupeidae: *Clupea pallasi*

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