

Anguilliformes and Saccopharyngiformes

Selected meristic characters in species belonging to the orders Anguilliformes or Saccopharyngiformes whose adults or larvae have been collected in the study area. Classification sequence follows Böhlke, 1989. Characters pertain to leptocephali, unless otherwise indicated. Sources: Smith, 1989a; 1989b (and all chapters therein); vert = vertebrae.

Family <i>Species</i>	Total Myomeres	Preanal Myomeres	Predorsal Myomeres	Last Vertical Blood Vessel @ Myomere #	No. of Gut Loops or Swellings
Anguilliformes – Anguillidae					
<i>Anguilla anguilla</i>	111–119	–	–	–	0
<i>Anguilla rostrata</i>	103–111	68–73	61–66	44–47	0
Moringuidae					
<i>Neconger mucronatus</i>	93–109	49–61	39–56	50–59	1
<i>Moringua edwardsi</i>	109–123	72–82	79–87	70–79	1
Muraenidae					
<i>Anarchias similis</i>	105–114	52–59	96–104	53–57	0
<i>Gymnothorax funebris</i> (adult)	137–142	–	–	–	–
<i>Gymnothorax miliaris</i>	120–125	69–74	68–73	64–69	0
<i>Gymnothorax moringa</i>	137–143	66–74	52–61	60–72	0
<i>Gymnothorax ocellatus</i>	136–150	85–101	22–32	77–87	0
<i>Gymnothorax vicinus</i>	131–142	60–68	53–63	60–67	0
<i>Monopenchelys acuta</i>	128–134	54–57	78–82	60–62	0
<i>Uropterygius macularius</i>	118–123	71–77	107–114	65–67	0
Synaphobranchidae					
<i>Dysomma anguillare</i>	118–128	57–62	45–48	60–64	6
<i>Ilyophis brunneus</i> (adult)	145–151 vert	–	–	–	–
<i>Leptocephalus dolichorhynchus</i>	128–136	61–71	–	–	1
<i>Leptocephalus proboscoideus</i>	128–134	72–79	69	59–62	0
<i>Simenchelys parasiticus</i> (adult)	115–117 vert	–	–	–	–
<i>Synaphobranchus affinis</i>	128–139 vert	–	–	–	–
<i>Synaphobranchus bathybius</i> (adult)	126–140 vert	–	–	–	–
<i>Synaphobranchus capensis</i> (adult)	164–173 vert	–	–	–	–
<i>Synaphobranchus kaupi</i>	143–154	98–107	(see species)	68–73	0
<i>Synaphobranchus</i> sp.	131–140	83–101	74–80	68	0
Ophichthidae					
<i>Ahlia egmontis</i>	152–168	67–75	65–76	67–75	5 (low)
<i>Aplatophis chauliodus</i>	108–116	63–69	50–56	–	9
<i>Apterichtus ansip</i>	127–136	64–70	114–125	64–70	9 (low)
<i>Apterichtus kendalli</i>	137–148	69–74	121–135	69–74	6–9 (low)
<i>Bascanichthys bascanium</i>	174–194	101–114	11–17	101–114	2+ (low)
<i>Bascanichthys scuticaris</i>	161–169	87–99	12–16	87–99	7 (low)
<i>Callechelys guineensis</i>	174–184	112–121	6–10	111–120	11
<i>Callechelys muraena</i>	138–148	82–89	9–16	81–88	7 (high)
<i>Gordiichthys irretitus</i>	192–214	112–128	13–21	–	11 (low)
<i>Gordiichthys leiby</i>	167–175	102–107	13–18	104–109	low or absent
<i>Ichthyapus ophioneus</i>	130–139	50–54	117–130	–	5–8 (low)
<i>Letharchus aliculatus</i>	153–163	100–109	7–11	–	10
<i>Letharchus velifer</i>	133–145	85–95	8–13	–	8–10
<i>Myrichthys breviceps</i>	166–181	67–72	11–17	70–75	7 (high)
<i>Myrophis platyrhynchus</i>	140–149	51–58	21–27	51–58	5 (low)
<i>Myrophis punctatus</i>	137–152	53–62	30–38	53–62	3 (low)

Anguilliformes and Saccopharyngiformes

Selected meristic characters in species belonging to the orders Anguilliformes or Saccopharyngiformes.

Family <i>Species</i>	Total Myomeres	Preal Myomeres	Predorsal Myomeres	Last Vertical Blood Vessel @ Myomere #	No. of Gut Loops or Swellings
Ophichthidae (Continued)					
<i>Ophichthus cruentifer</i>	145–154	70–76	47–56	65–71	9
<i>Ophichthus gomesii</i>	138–152	67–76	60–73	59–68	8
<i>Ophichthus melanoporus</i>	176–193	69–76	42–53	65–72	9
<i>Ophichthus menezesi</i>	150–156	66–70	60–65	–	7
<i>Ophichthus puncticeps</i>	129–140	69–77	49–58	63–71	9 (low)
<i>Phaenomonas longissima</i>	208–219	141–149	11–17	143–152	low or absent
<i>Quassiremus ascensionis</i>	135–138	68–70	56–58	–	6
Congridae					
<i>Acromycter perturbator</i>	159–162	100–104	116–117	–	10
<i>Ariosoma anale</i>	147–155	131–140	131–141	90–103	0
<i>Ariosoma balearicum</i>	121–136	90–126	About equal to preanal	62–72	0
<i>Ariosoma selenops</i>	169–174	160–169	About equal to preanal	96–103	0
<i>Bathyroconger vicinus</i>	176–187	94–95	59–66	59–64	0
<i>Conger oceanicus</i>	140–148	113–124	67–81	51–55	0
<i>Conger triporiceps</i>	150–158	124–133	65–78	54–70	0
<i>Gnathophis bathytopos</i>	126–141	101–125	72–102	43–47	0
<i>Heteroconger halis</i>	159–167	82–94	20–30	63–69	0
<i>Heteroconger luteolus</i>	137–148	79–87	21–30	62–68	0
<i>Pseudophichthys splendens</i>	131–137	79–84	83–85	56–59	0
<i>Rhechias dubia</i>	127–144	85–103	51–60	44–53	0
<i>Rhynchoconger flavus</i>	153–170	102–132	49–62	44–51	0
<i>Rhynchoconger gracilior</i>	172–182	102–130	48–59	43–49	0
<i>Uroconger syringinus</i>	216–227	154–175	64–77	65–75	0
<i>Xenomystax congroides</i>	189–221	120–148	99–101	52–67	0
Derichthyidae					
<i>Derichthys serpentinus</i>	125–135	67–83	45–50	59–61	0
<i>Nessorhamphus ingolfianus</i>	149–160	117–121	62	77	0
Nemichthyidae					
<i>Avocettina infans</i>	192–201	132–178	162–171	72–77	0
<i>Labichthys carinatus</i>	179–182	130–157	153	73–74	0
<i>Nemichthys scolopaceus</i>	about 300–400+	93–257	232–242	83–94	0
<i>Nemichthys curvirostris</i>	about 300–400+	116–320	294–307	85–107	0
Chlopsidae					
<i>Chilorhinus suensoni</i>	97–104	40–47	20–27	footnote ¹	0
<i>Chlopsis bicolor</i>	126–136	46–50	20–23	–	0
<i>Chlopsis dentatus</i>	114–119	38–39	19	–	0

¹ The last vertical blood vessel arises from the end of the nephros in the Chlopsidae (as it does in the leptocephali of several other families). In most species, the nephros end is at the level of the anus (or slightly anterior to it in *Kaupichthys nuchalis*) and the last vessel enters the aorta about 3–5 myomeres posterior to the anus.

Anguilliformes and Saccopharyngiformes

Selected meristic characters in species belonging to the orders Anguilliformes or Saccopharyngiformes.

Family <i>Species</i>	Total Myomers	Preanal Myomeres	Predorsal Myomers	Last Vertical Blood Vessel @ Myomere #	No. of Gut Loops or Swellings
Chlopsidae (Continued)					
<i>Kaupichthys hyoproroides</i>	113–120	38–44	14–19	–	0
<i>Kaupichthys nuchalis</i>	121–125	50–54	22–24	–	0
<i>Robinsia catherinae</i>	125–137	43–47	17	–	0
Serrivomeridae					
<i>Serrivomer beanii</i>	153–164	84–95	73–89	31–39	0
<i>Serrivomer lanceolatoides</i>	156–163	89–97	80–88	30–36	0
Nettastomatidae					
<i>Facciolella</i> species B	240–254	57–61	15–16	57–61	Irregular
<i>Facciolella</i> species C	253–264	43–47	18–20	43–47	Irregular
<i>Hoplunnis tenuis</i>	232–251	44–48	11–18	46–47	2
<i>Hoplunnis diomediana</i>	222–232	50–54	13–17	55–56	2
<i>Hoplunnis macrura</i>	221–252	51–58	9–13	54–58	2
<i>Nettenchelys inion</i>	209–226	59–64	33–43	49–54	2
<i>Nettenchelys pygmaea</i>	220–251	49–56	26–34	49–54	2
<i>Nettastoma melanura</i>	186–211	60–70	39–48	61–62	1 (liver)
<i>Saurenchelys cognita</i>	201–209	59–64	17–19	61–62	2
<i>Venefica procera</i> (adult)	200–205 vert	57–62 vert	6–8 vert	–	–
Saccopharyngiformes – Cyematidae					
<i>Cyema atrum</i>	72–79	37–46	37–46	36	Liver + 4
Saccopharyngidae					
<i>Saccopharynx</i> sp.	170–240	38–54	–	50	1–2
Eurypharyngidae					
<i>Eurypharynx pelecanooides</i>	103–125	34–41	19–24	35	1–2

Anguilliformes and Saccopharyngiformes

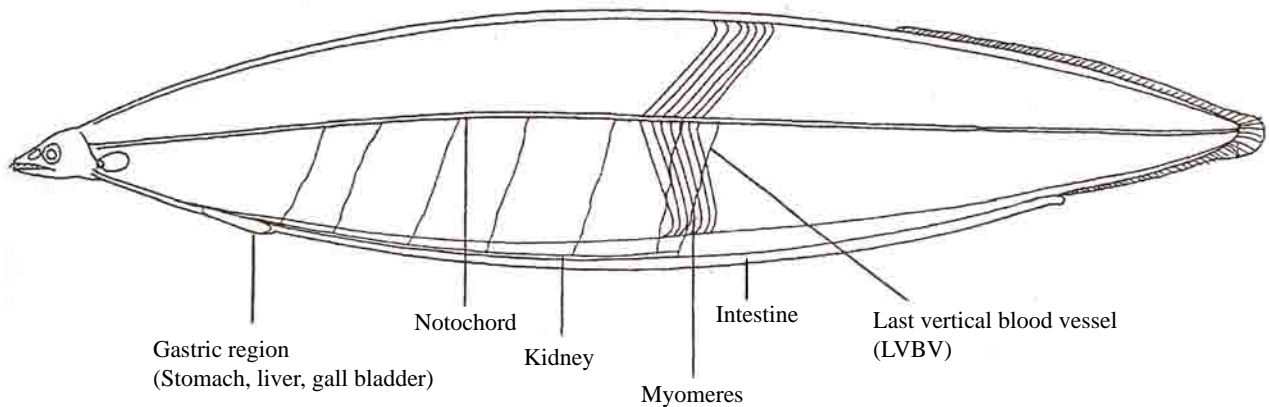
- See following 12 pages for general features of leptocephalus larvae, key to families of anguilliforms based on larval characters, and synopses of leptocephalus characters by family.
- Also see Appendix (Volume Two) for a table containing myomere proportions for all leptocephalus larvae treated in this monograph, arranged by ascending number of total myomeres. Also listed are numbers of preanal myomeres, predorsal myomeres and position of last vertical blood vessel.

Anguilliformes and Saccopharyngiformes

Leptocephalus Larvae

General features:

- Body elongate, compressed and transparent, with small head
- Myomeres (muscle segments) are visible along the lateral surface of body
- Gut (usually long) positioned along ventral margin of body; a simple tube or with swellings or convolutions
- Kidney elongate, lying along top of gut
- Vertical blood vessels extend between gut and aorta adjacent to notochord at body midline
- No pelvic fins
- Dorsal and anal fins short to long (usually), always confluent with caudal fin
- Pectoral fin rays are late-forming; may be reduced or absent in some taxa
- Caudal fin rays 5–11; fin may be lost in some Ophichthidae
- Larval teeth are fang-like; early larvae (engyodontic stage) characterized by few needle-like teeth, each tooth shorter than the one anterior to it; later larvae (euryodontic stage) characterized by shedding of engyodontic teeth and replacement by three series of teeth in each jaw, shorter and broader based than the former; all larval teeth lost (presumably resorbed) at transformation to juvenile stage



Important identifying features: (Figure from Smith, 1989b)

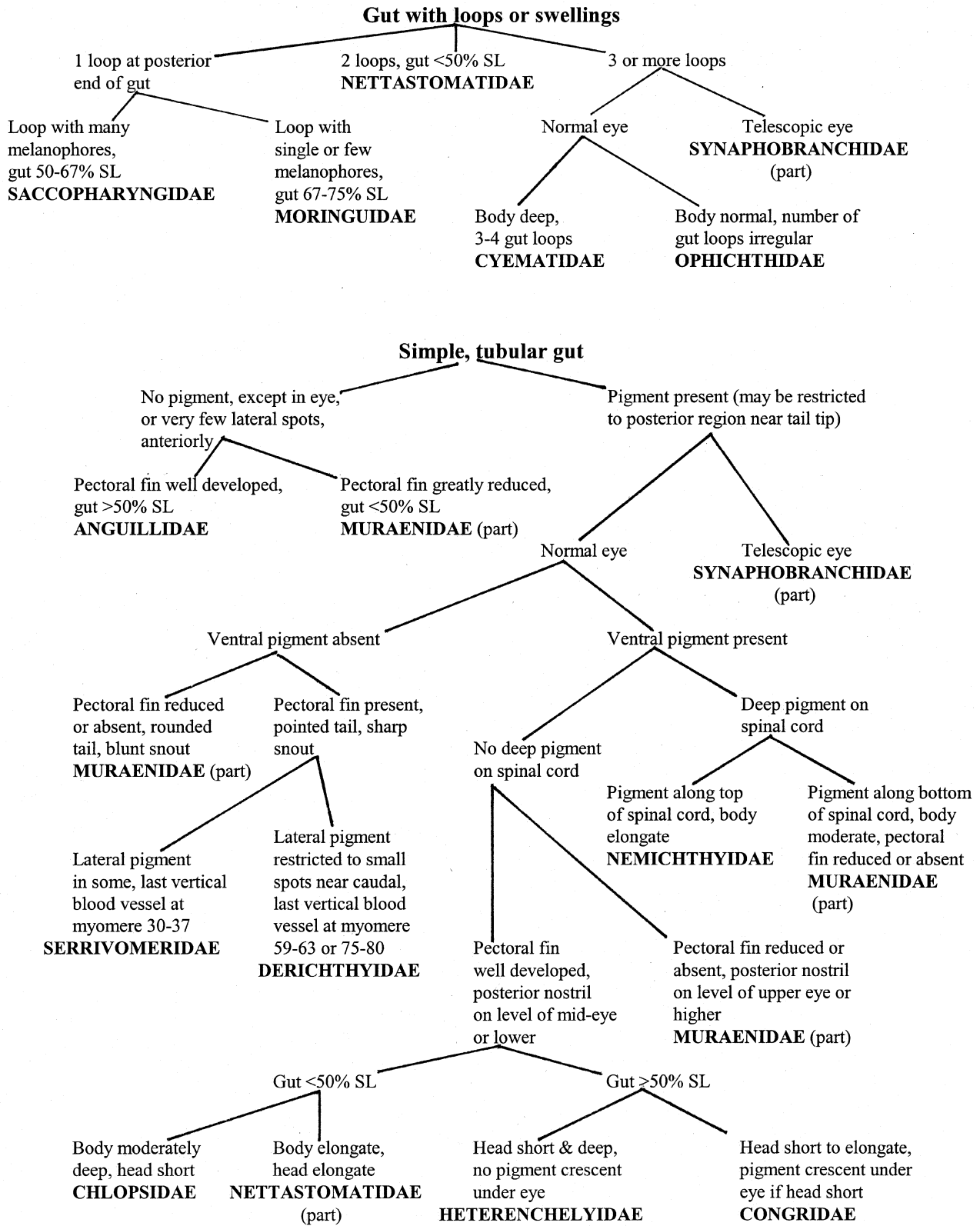
- Relative shapes of body, head, snout, and tail tip
- Relative length and form of gut, including morphology of internal organs
- Number of myomeres (total, preanal, predorsal, nephric)
- Nephric myomeres are all those anterior to the terminus of the kidney
- Position of vertical blood vessels
- Location, extent and nature of melanophores
- Size and position of nasal organ
- Maximum size before transformation to juvenile stage

See Diagrammatic Family Key to Leptocephalus Larvae (after Smith, 1979; Fahay, 1983) on next page

Note: Leptocephalus larvae are also found in the orders Elopiformes and Notacanthiformes. Elopiform larvae have large, forked caudal fins. Notacanthiform larvae replace the caudal fin with a long filament and have a short, anteriorly placed dorsal fin, separated from the caudal fin.

Diagrammatic Key to Families

Anguilliformes and Saccopharyngiformes



Anguilliformes and Saccopharyngiformes

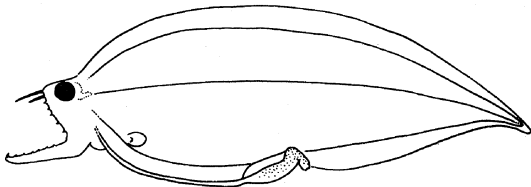
Leptocephali described in this guide have been collected in the study area (e.g. north of 35°N, west of 40°W). However, because these specialized larvae are capable of drifting for great distances after they are spawned, the potential for collecting additional species exists. In particular, the Gulf Stream has been the source of many of the species described herein, and may be expected to produce more species in the future. The following pages briefly summarize characters of leptocephali in a number of families. For more detail at lower taxonomic levels, readers are referred to the recently published volume of "*Fishes of the Western North Atlantic*" (Böhlke, 1989; Smith, 1989a; 1989b).

Synopsis of Family Characters

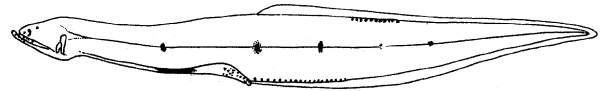
Leptocephali with gut loops or swellings

Saccopharyngiformes (Monognathidae, Saccopharyngidae, Eurypharyngidae)

- One gut swelling at posterior end of gut, preceded by long esophagus
- Gut length 50–67% SL
- Body short and deep, or moderately elongate
- Tail pointed
- Head short and deep, with elongate hyomandibular
- Maximum leptocephalus size 39–40 mm
- Myomeres 100–250
- Dorsal fin origin near level of vent
- Ventral pigment restricted to gut swelling
- Large lateral spots in Monognathidae (not included in this guide), absent in other 2 families



Eurypharynx pelecanooides (Smith, 1979)

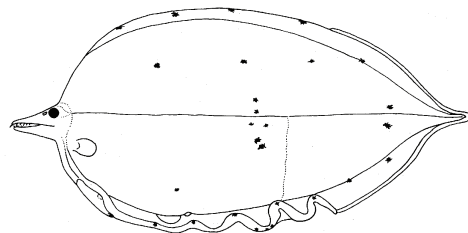


Monognathidae (Raju, 1974)

Saccopharyngiformes (Cyematidae)

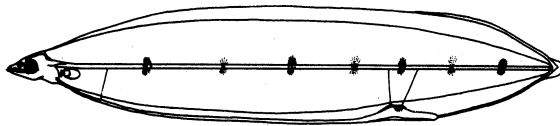
- 3 or 4 swellings in posterior part of gut
- Gut length about 67% SL
- Body very deep; tail pointed
- Head long and sharply pointed
- Maximum leptocephalus size 60–70 mm
- Myomeres about 80
- Dorsal fin origin near level of anus
- ut pigment on each swelling; several lateral melanophores scattered or on midline

Cyema atrum
(Smith, 1979)

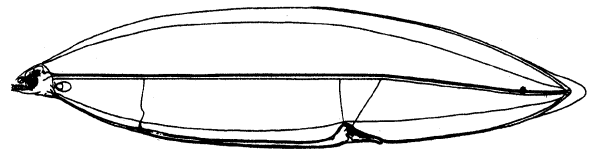


Anguilliformes and Saccopharyngiformes**Synopsis of Family Characters****Leptocephali with gut loops or swellings****Moringuidae**

- 1 gut swelling at posterior end of gut
- Gut length 67–75% SL
- Body moderately deep
- Tail moderately blunt
- Head moderately short
- Maximum leptocephalus size 60–70 mm
- Myomeres 96–122
- Dorsal fin origin near level of anus
- Ventral pigment restricted to area of gut swelling
- 1 lateral melanophore near caudal fin, or large spots on alternate sides of body



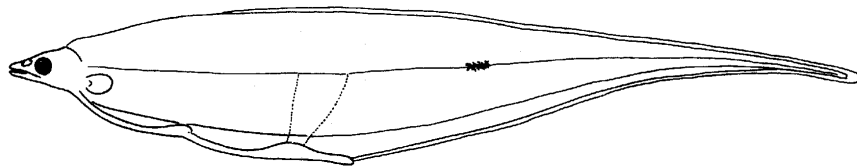
Moringua edwardsi
(Eldred, 1968b)



Neoconger mucronatus
(Eldred, 1967a)

Nettastomatidae (except *Facciolella*)

- 2 swellings in gut
- Gut length <50% SL
- Body deep (except in *Hoplunnis*)
- Tail pointed and elongate
- Head moderately long
- Maximum leptocephalus size 200+ mm
- Myomeres 186–211 in *N. melanurum*
- Dorsal fin origin usually not far behind head
- Ventral and lateral pigment variable



Nettastoma sp.
(Smith, 1979)

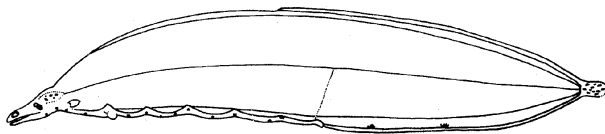
Anguilliformes and Saccopharyngiformes

Synopsis of Family Characters

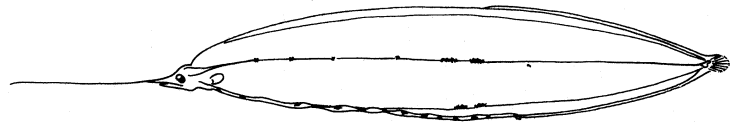
Leptocephali with gut loops or swellings

Synphobranchidae (Subfamily Dysomminae)

- Several swellings along gut
- Gut length 50–67% SL
- Body moderately elongate
- Tail moderately blunt
- Head elongate (or short with long rostral filament)
- Maximum leptocephalus size about 100 mm
- Myomeres 119–204
- Dorsal fin origin anterior to anus
- Gut pigmented with rather large melanophores
- Lateral pigment absent or limited to few spots
- Eye telescopic

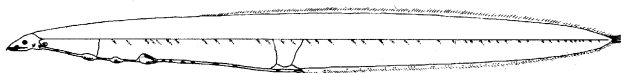


Dysomminae
(Smith, 1979)

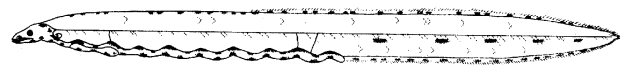


Ophichthidae

- 3 or more gut swellings
- Gut length 50–67% SL
- Body moderately elongate
- Tail moderate to blunt (caudal fin absent in subfamily Ophichthinae)
- Head moderate to elongate
- Maximum leptocephalus size 80–180 mm
- Myomeres 100+
- Dorsal fin origin variable
- Ventral pigment tends to concentrate on gut swellings
- Lateral pigment variable
- 3rd gut swelling largest, kidney expanded over anus in subfamily Myrophinae
- 2nd gut swelling largest, kidney not expanded in subfamily Ophichthinae



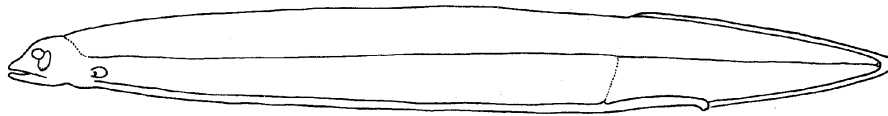
Myrophinae (*Myrophis punctatus*)
(Fahay and Obenchain, 1978)



Ophichthinae (*Ophichthus cruentifer*)
(Fahay and Obenchain, 1978)

Anguilliformes and Saccopharyngiformes**Synopsis of Family Characters****Leptocephali with simple, tubular guts****Synaphobranchidae** (subfamily Synaphobranchinae)

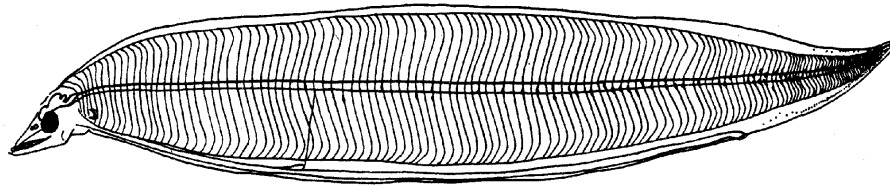
- Gut length about 75% SL
- Body moderately elongate
- Tail moderate
- Head short and pointed
- Maximum leptocephalus size 130–170 mm
- Myomeres 126–151
- Dorsal fin origin anterior to anus
- No ventral pigment
- Lateral pigment usually restricted to tail tip
- Central portion of myomeres more opaque than dorsal or ventral portions
- Eye telescopic



Synaphobranchinae
(Smith, 1979)

Serrivomeridae

- Gut length 67–75% SL
- Body moderate
- Tail pointed
- Head sharp, slightly concave
- Maximum leptocephalus size about 60 mm
- Myomeres 150–170
- Dorsal fin origin anterior to anus
- No ventral pigment
- Lateral pigment none or few small melanophores on midline
- Preanal myomeres about 89–125
- Small nasal organ close to eye
- Last vertical blood vessel at myomere 30–37



Serrivomer beani (as *Leptocephalus lanceolatus*)
(Bauchot, 1959)

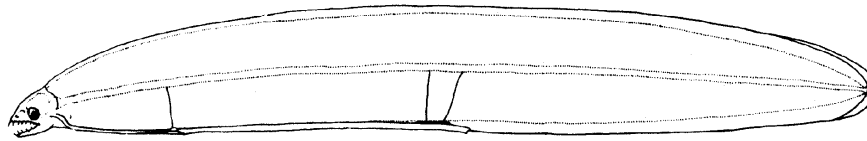
Anguilliformes and Saccopharyngiformes

Synopsis of Family Characters

Leptocephali with simple, tubular guts

Muraenidae (*Anarchias*)

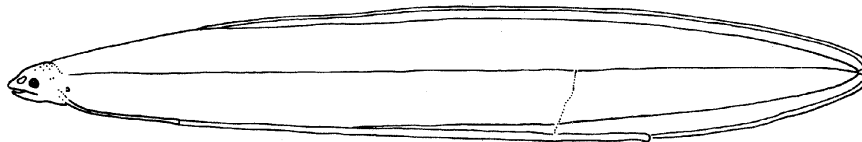
- Gut length <50% SL
- Body moderate
- Tail blunt
- Head short with blunt snout
- Maximum leptocephalus size about 50 mm
- Myomeres 107–114
- Dorsal (and anal) fin origin in extreme posterior region
- No ventral pigment
- Few internal melanophores near head
- Pectoral fin greatly reduced or absent



Anarchias similis
(Eldred, 1968a)

Muraenidae

- Gut length 50–75% SL
- Body moderately deep
- Tail broadly rounded
- Head short with blunt snout
- Maximum leptocephalus size about 60–70 mm
- Myomeres about 114–174
- Dorsal fin origin variable (confined to extreme posterior region in some)
- Gut pigment present
- No lateral pigment
- Pectoral fin greatly reduced or absent

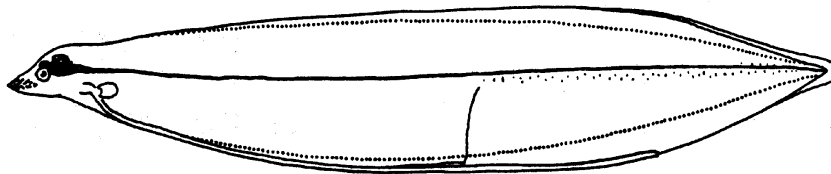


Gymnothorax nigromarginatus
(Smith, 1979)

Note: The leptocephalus of *Gymnothorax funebris* was originally described by Eldred (1970a). Largely based on this description, the species was included in two subsequent publications that were focused on larval fishes of the present study area (Hardy, 1978; Fahay, 1993). Smith (1989b) questioned the original identification, indicating a mis-match in myomere characteristics. Therefore, verifiable larvae of this species have not been collected north of 35°N. However, two adults have been reported from Canadian waters (Scott and Scott, 1988) and are the basis for the inclusion of this species in the checklist of species and in the table of meristic characters (Anguilliformes Introduction).

Anguilliformes and Saccopharyngiformes**Synopsis of Family Characters****Leptocephali with simple, tubular guts****Derichthyidae (*Derichthys*)**

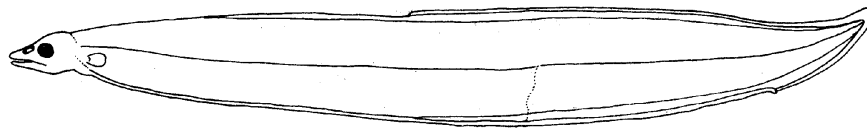
- Gut length about 75% SL
- Body moderate
- Tail sharp
- Head short and slightly concave
- Maximum leptocephalus size 50–60 mm
- Myomeres 126–134
- Dorsal fin origin anterior to midbody
- No ventral pigment
- Few lateral melanophores near tail tip
- Preanal myomeres 76–83
- Last vertical blood vessel at myomere 59–63



Derichthys serpentinus
(Castle, 1970b)

Derichthyidae (*Nessorhamphus*)

- Gut length to 90% SL
- Body deepest behind midbody
- Tail sharp and pointed
- Head rather long
- Maximum leptocephalus size 70–80 mm
- Myomeres 149–159
- Dorsal fin origin near midbody
- No ventral pigment
- Few lateral melanophores near tail tip
- Preanal myomeres >100
- Last vertical blood vessel at myomere 75–80



Nessorhamphus ingolfianus
(Smith, 1979)

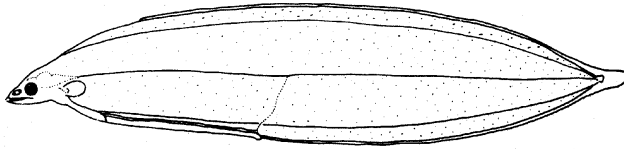
Anguilliformes and Saccopharyngiformes

Synopsis of Family Characters

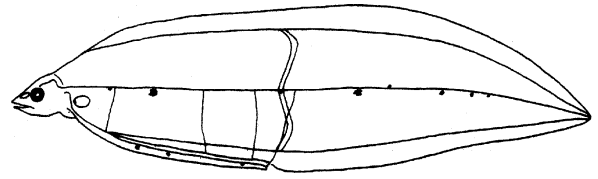
Leptocephali with simple, tubular guts

Chlopsidae

- Gut length <50% SL
- Body moderately deep
- Tail moderate
- Head moderately short
- Maximum leptocephalus size about 90 mm
- Myomeres 98–141
- Dorsal fin origin 1–2 head lengths behind head
- Gut pigment variable
- Lateral pigment variable
- Last vertical blood vessel posterior to anus
- Crescentic pigment sometimes occurs under eye



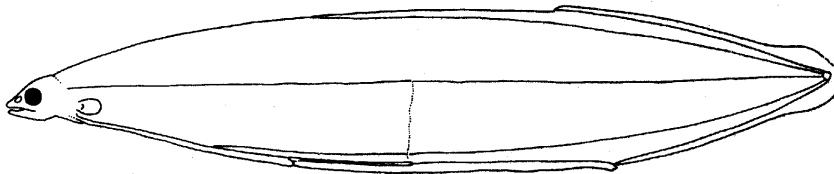
Kaupichthys hyoprroides
(Smith, 1979)



Robinsia catherinae
(Smith, 1979)

Anguillidae

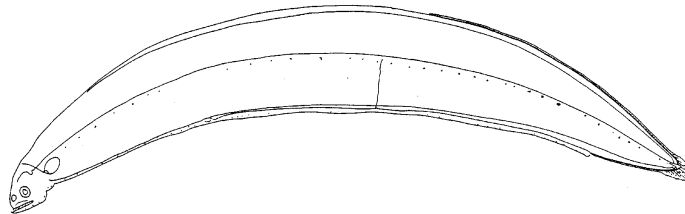
- Gut length about 67% SL
- Body moderately deep
- Tail moderate
- Head with rather short snout
- Maximum leptocephalus size about 80 mm
- Myomeres 104–111 or 111–119
- Dorsal fin origin anterior to anus
- Last vertical blood vessel at myomere 44–47 in *A. rostrata*
- No pigment



Anguilla rostrata
(Smith, 1979)

Anguilliformes and Saccopharyngiformes**Synopsis of Family Characters****Leptocephali with simple, tubular guts****Heterenchelyidae**

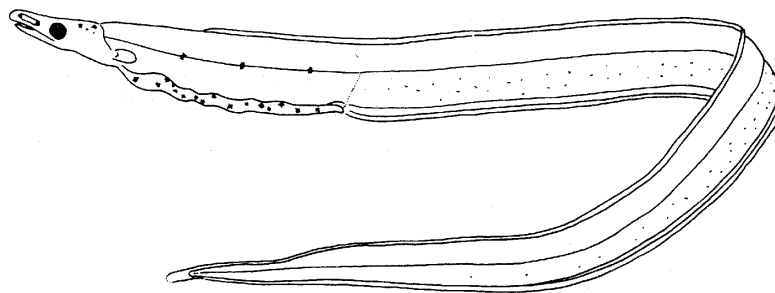
- Gut length 80–90% SL
- Body moderately elongate, tail moderately blunt
- Head short and deep, snout becomes blunt with growth
- Maximum leptocephalus size 60–70 mm
- Myomeres about 108–109
- Dorsal fin origin at about midbody
- Gut pigment present
- Single row of lateral melanophores
- A single species occurs in the western North Atlantic, south of the study area, (*Pythonichthys sanguineus*), but its larvae have not been collected or described. Adults have 110–111 vertebrae.



Pythonichthys microphthalmus
(Smith, 1989b)

Nettastomatidae (*Facciolella*)

- Gut simple and thickened
- Gut length <50% SL
- Body elongate, tail sharp
- Head long and pointed
- Maximum leptocephalus size about 200 mm
- Myomeres 235–250
- Dorsal fin origin shortly behind head
- Pigment scattered over gut
- Lateral pigment scattered over lower side
- Nasal organ large, not located near eye



Facciolella sp.
(Smith, 1979)

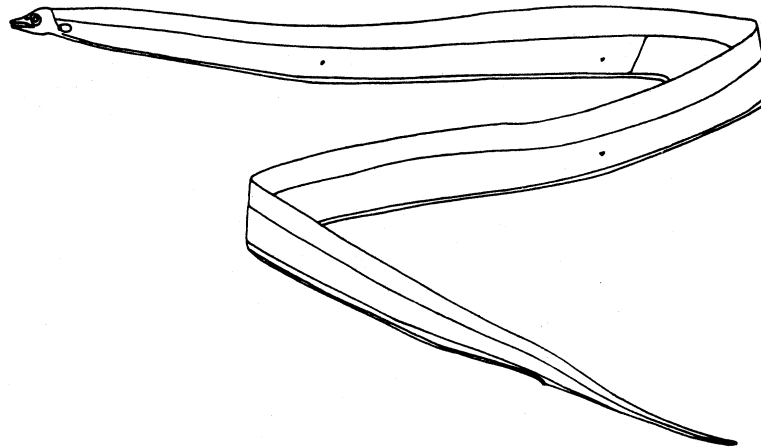
Anguilliformes and Saccopharyngiformes

Synopsis of Family Characters

Leptocephali with simple, tubular guts

Nemichthyidae

- Gut length about 90% SL
- Body elongate
- Tail moderate to sharp
- Snout sharp, upper profile concave
- Maximum leptocephalus size 300–400 mm
- Myomeres 170–300+
- Dorsal fin origin anterior to anus
- Gut pigment on bottom of gut anteriorly, top of gut posteriorly
- Lateral pigment absent, or few widely spaced melanophores below midline
- Melanophores along top of spinal cord
- Small nasal organ close to eye



Nemichthys scolopaceus
(Smith, 1979)

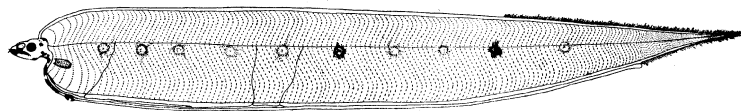
Congridae

- Gut length 75% SL or more
- Body moderate to elongate
- Tail moderate
- Head moderately elongate
- Maximum leptocephalus size about 100 mm in most, but up to 200–300 mm in some
- Wide range in myomere number
- Dorsal fin origin variable
- Gut pigment always present
- Lateral pigment variable, sometimes absent
- See diversity in congrid leptocephalus morphology on next page

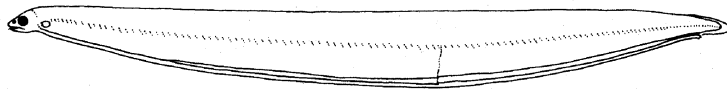
Anguilliformes and Saccopharyngiformes**Synopsis of Family Characters****Leptocephali with simple, tubular guts****Congridae**

- Leptocephali in this family exhibit a wide diversity in morphology.
- *Acromycter perturbator* occurs in the study area, but its larva is undescribed. The leptocephalus of a congener is characterized by a gut with 10 prominent loops, as in the Ophichthidae. See discussion of this form in Smith and Leiby (1980) and Smith (1989b).

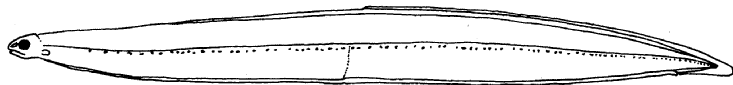
Xenomystax congroides
(Fahay, 1976)



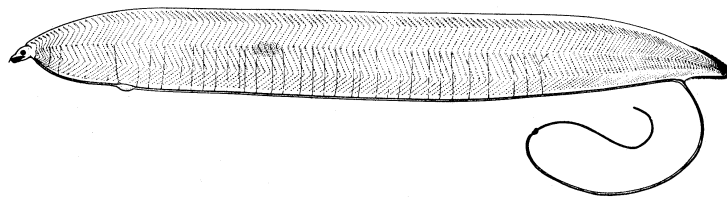
Ariosoma balearicum
(Smith, 1979)



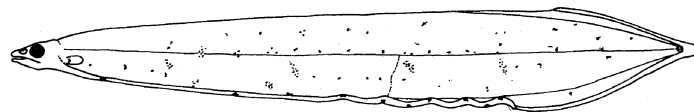
Uroconger syringinus
(Smith, 1979)



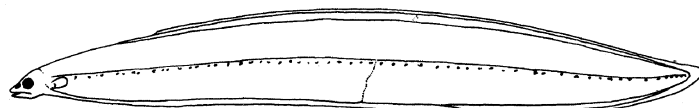
Ariosoma anale
(Bathymyrinae)
(Fahay, 1983)



Pseudophichthys splendens
(Smith, 1979)



Heterocongrinae
(Smith, 1979)



Anguilla rostrata* (Lesueur, 1817)*Anguillidae****American eel**

Range: Western North Atlantic Ocean from Greenland to West Indies; most abundant in Atlantic drainages of United States and southern Canada

Habitat: Rivers, streams, lakes, small ponds, coastal lagoons, estuaries; tolerate a wide range of temperature, salinity, turbidity; after up to 20 years living in inshore habitats, adults undertake an oceanic migration to the Sargasso Sea for spawning. This migration also entails a morphological transformation during which the eye enlarges, internal organs atrophy, and pectoral fin changes shape.

Spawning: Based on distribution of smallest leptocephali, most reproduction is believed to occur south and southwest of Bermuda (between 20° and 30°N; and between 60° and 75°W). Leptocephali drift north and west from this area and transform into glass eels at sea, before entering inlets and river mouths throughout their range. Glass eels arrive in North American estuaries in spring, then transform into elvers.

Eggs: – Undescribed

Larvae:

- Gut straight and long, preanus length about 72–85% TL, shortens at transformation
- Gut a simple tube, without loops or swellings
- Nephros ends just behind mid-point of gut
- Pectoral fin rays form late
- Maximum size before transformation to glass eel stage: about 80 mm
- Body moderately deep (about 20% TL)
- Head and snout moderately short
- Lower jaw protrudes in glass eel, elver and adult
- Pigmentation: none except in eye, until glass eel stage when some internal pigment is present along notochord

Early Juvenile:**F. 57.5 mmTL (Elver)**

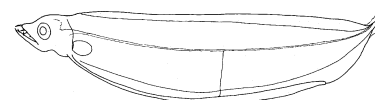
- Note:**
1. The European eel, *Anguilla anguilla*, is similar and leptocephali may be collected within the study area. Characters of larvae are the same as in *A. rostrata* except myomeres total 111–119
 2. The only other unpigmented leptocephali that may be collected in the study area are those of *Anarchias similis* and *Monopenchelys acuta* (Muraenidae)
 3. Experiments in the Sargasso Sea demonstrate that larvae <5 mm occur in depths between 50 and 330 m both day and night (possibly coinciding with strata where the eggs are spawned). Larger larvae migrate vertically on a diel basis: those >20 mm occur between 125 and 275 m during day, 30 and 70 m at night. See Castonguay and McCleave (1987).

Figures: Adult: H. L. Todd; Early larva: Smith, 1989b; **A–B:** Vladykov, 1955 (redrawn); **C–E:** Schmidt, 1916 (**E** redrawn); **F:** Susan Kaiser (Able and Fahay, 1998)

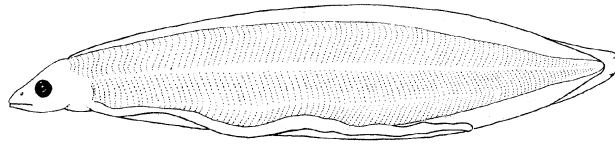
References: Smith, 1968; Eldred, 1968e; 1971; Vladykov and March, 1975; Fahay, 1978; Helfman *et al.*, 1987; Haro and Krueger, 1988; Able and Fahay, 1998; Smith, 1989b

**Meristic Characters**

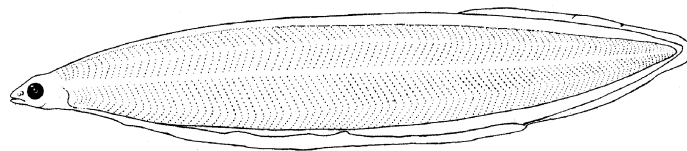
Myomeres:	103–111
Vertebrae:	103–111
Dorsal fin rays:	–
Anal fin rays:	–
Pectoral fin rays:	14–20
Pelvic fin rays:	none

**Early Larva, 10.0 mmTL**

Anguilla rostrata



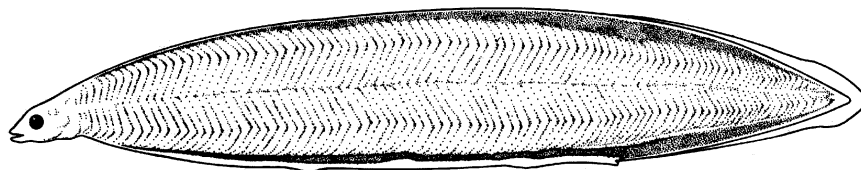
A. 19.6 mmTL Last vertical blood vessel at myomere 44-47



B. 26.7 mmTL

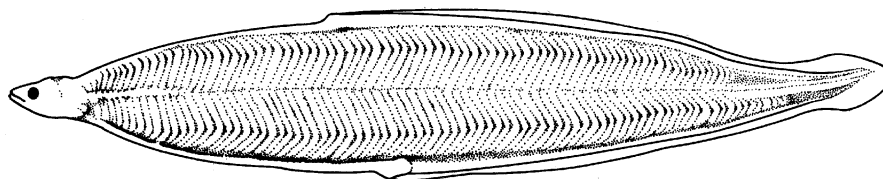
Pigment lacking

Predorsal myomeres 61-66



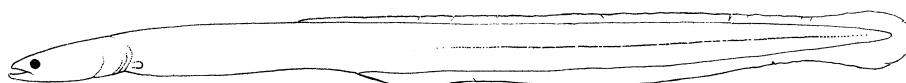
C. 60.0 mmTL

Preanal myomeres 68-73



D. 58.0 mmTL

Dorsal fin origin, anus and anal fin origin migrate forward at transformation



E. 61.0 mmTL (Glass Eel) May be some internal pigment along notochord

Moringua edwardsi* (Jordan and Bollman, 1889)*Moringuidae****Spaghetti eel**

- Range:** Tropical western North Atlantic Ocean from Bermuda, the Bahamas and southern Florida to Brazil, including Gulf of Mexico and Caribbean Sea
- Habitat:** Clear oceanic water over sandy bottoms, from surface to 22 m. Adults mostly free-swimming, juveniles fossorial, burrowing head-first into sandy substrates
- Spawning:** Occurs between Bermuda and the West Indies, perhaps year-round. Leptocephali have been collected in study area (as far north as 39°N), primarily in the fall; a few in Apr; larval duration is about 3½ months
- Eggs:** – Undescribed
- Larvae:**
- A single gut loop on intestine immediately anterior to anus
 - Prominent melanophore on gut loop
 - Predorsal myomeres 5–7 more than preanal myomeres
 - Dorsal fin origin equal or slightly posterior to anus
 - Several (7–8) stellate melanophores on body midline, alternately on two sides of body
 - Smaller spots sometimes around nasal capsule, on lower jaw, behind eye
 - Maximum leptocephalus size: about 50 mmSL
 - Adult males have 109–117 vertebrae; females have 116–123; leptocephali also demonstrate bimodality, with modes of myomere counts at 113–114 and 119–120
 - Transformation occurs between 40 and 50 mm TL
- Early Juvenile:** Newly transformed juveniles are fossorial, and remain buried in an "aphthalmichthys" stage until they reach about 110–150 mm in males, or 200–500 mm in females. Duration of this stage unknown.

**Meristic Characters**

Myomeres:	109–123
Vertebrae:	109–123 (sexes differ)
Dorsal fin rays:	–
Anal fin rays:	–
Pectoral fin rays:	–
Pelvic fin rays:	none

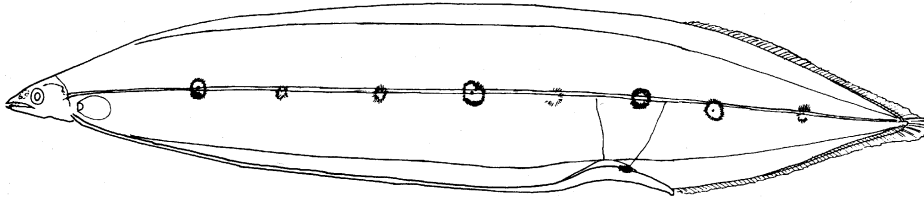
Figures: Adult: Janice Fechhelm (M^cEachran and Fechhelm, 1998); **A:** Mary Fuges (Smith, 1989b); **B–C:** Smith, 1979

References: Eldred, 1968b; Castle and Böhlke, 1976; Castle, 1979; Smith, 1989b

Moringua edwardsi

Predorsal myomeres 79-87

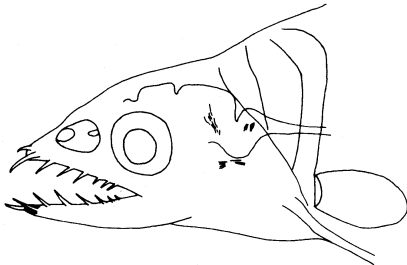
Total myomeres 109-123



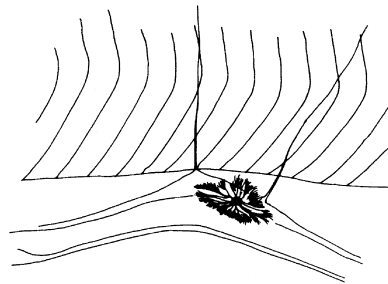
A. 37 mmSL

Preanal myomeres 72-82

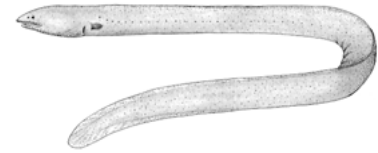
Last vertical blood vessel at myomere 70-79



B. Head detail



C. Gut loop and anus

Neoconger mucronatus* Girard, 1858*Moringuidae****Ridged eel**

- Range:** Western North Atlantic ocean from Gulf of Mexico and Caribbean Sea to Brazil
- Habitat:** A fossorial species, burrowing into bottom sediments, usually soft mud
- Spawning:** Sep–Dec in Gulf of Mexico; leptocephali have been collected as far north as 40°04'N (Nov)
- Eggs:** – Undescribed
- Larvae:**
- A single gut loop on intestine immediately anterior to anus
 - Prominent melanophore on gut loop
 - Predorsal myomeres about 4–8 fewer than preanal myomeres
 - Dorsal fin origin slightly anterior to anus
 - A single, small melanophore on midline of body near caudal fin (may be lacking in small specimens)
 - A smaller melanophore sometimes occurs on ventral surface of anterior gut
 - Maximum leptocephalus size: 51 mmSL
 - Larvae of 3 populations differ slightly:

Meristic Characters

Myomeres:	93–109
Vertebrae:	96–107 (Precaudal 49–58)
Dorsal fin rays:	151–153
Anal fin rays:	133
Pectoral fin rays:	9–13
Pelvic fin rays:	none

	Gulf of Mexico	Caribbean to Guianas	Eastern Caribbean to Brazil
Total myomeres	93–103	97–108	95–109
Predorsal myomeres	44–51	41–56	39–53
Preanal myomeres	52–57	52–60	49–61
Anterior gut melanophore	Absent	Present	Present
Gut loop	Rounded	Rounded	Flattened

- Transformation size undescribed

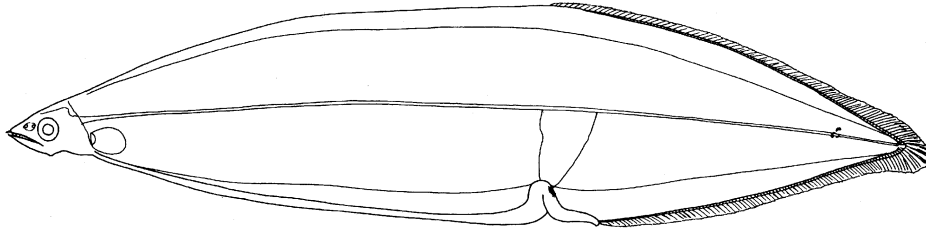
Figures: Adult: Janice Fechhelm (M^cEachran and Fechhelm, 1998); **A,C:** Mary Fuges (Smith, 1989b); **B:** Smith, 1979

References: Eldred, 1967a; Smith and Castle, 1972; Smith, 1989

Neoconger mucronatus

Predorsal myomeres 39-56

Total myomeres 93-109

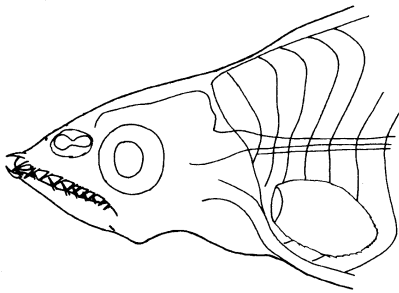


A. 33 mmSL

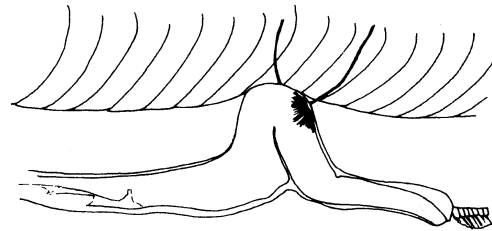
Preanal myomeres 49-61

Nephric myomeres 48-55

Last vertical blood vessel at myomere 50-59



B. Head detail



C. Gut loop and anus

***Anarchias similis* (Lea, 1913)**
Muraenidae
 Pygmy moray



Range: Western North Atlantic Ocean from Bermuda, Georgia to Florida, West Indies to Brazil

Habitat: On or near bottom among algae-covered rocks and eel grass; most collections between 26 and 97 m, rarely in shallow water.

Spawning: Not fully understood. Larvae not uncommonly collected in study area, primarily Jun–Nov; reproductive activity may be at peak during summer, decreases during fall; evidence suggests a migration by adults to area between Sargasso Sea and Bermuda where spawning occurs.

Eggs: – Undescribed

Larvae:

- Gut a long, simple tube, without swellings or loops
- Origin of anal fin distinct from anus (unusual for family)
- Body moderately deep
- Dorsal and anal fins restricted to extreme posterior part of body
- Tiny pectoral fin
- Tail and caudal broadly rounded
- Posterior nostril near level of upper margin of eye
- No pigment except few tiny melanophores near base of brain
- Maximum leptocephalus size 46–56 mmSL

Note:

1. The only other unpigmented leptocephali in the study area are those of *Monopenchelys acuta* (Muraenidae) and the anguillids *Anguilla anguilla* and *A. rostrata*.
2. This leptocephalus is widely distributed throughout the western North Atlantic and is often found in open ocean, far from land
3. Experiments in the Sargasso Sea demonstrated that leptocephali are usually concentrated in upper 100 m of water column at night. Not many collected during the day, suggesting net avoidance. (See Castonguay and McCleave, 1987.)

Meristic Characters

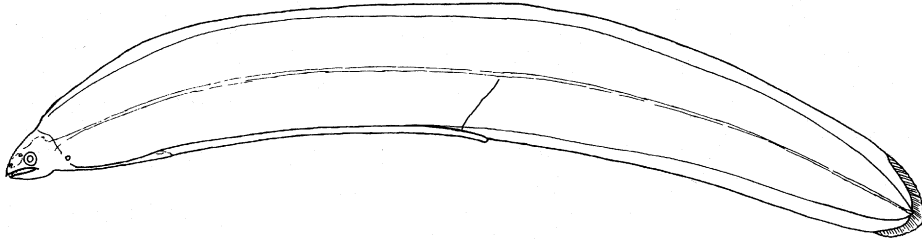
Myomeres:	105–114
Vertebrae:	104–113
Dorsal fin rays:	23–34
Anal fin rays:	11–12
Pectoral fin rays:	–
Pelvic fin rays:	none

Figures: Adult: Steven Gigliotti (Böhlke *et al.*, 1989); A: Mary Fuges (Smith, 1989b); B–C: Smith, 1979

References: Lea, 1913; Eldred, 1968a; Smith, 1989b

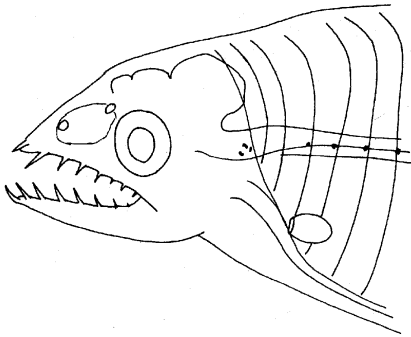
Anarchias similis

Predorsal myomeres 96-104
Total myomeres 105-114

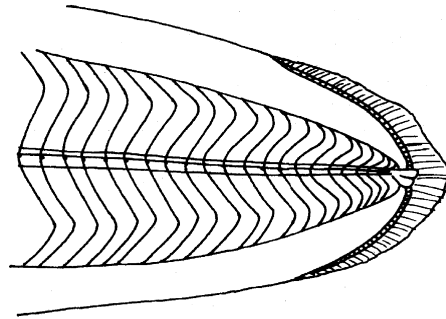


A. 43 mmSL

Preanal myomeres 52-59
Last vertical blood vessel at myomere 53-57



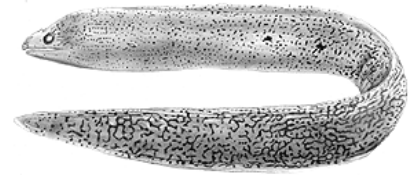
B. Head detail



C. Caudal area

Pigment lacking

***Gymnothorax miliaris* (Kaup, 1856)**
Muraenidae
 Goldentail moray



Range: Western North Atlantic Ocean from Bermuda and the Bahamas to Brazil including Florida Keys, West Indies and Central America

Habitat: Coral reef and rocky areas; islands and reefs in depths to 60 m

Spawning: Undescribed; may take place throughout the year; leptocephali have been collected in study area May–Oct

Eggs: – Undescribed

Larvae:

- Gut a long, simple tube, without swellings or loops
- Origin of anal fin adjacent to anus
- Body moderate; deepest point behind mid-length
- Tiny pectoral fin
- Tail and caudal broadly rounded
- Internal melanophores along underside of spinal cord
- Tiny melanophores at bases of dorsal, caudal and anal fins, mostly posterior
- Posterior nostril near level of upper margin of eye
- Distinguished by group of melanophores forming bar through eye
- No pigment along gut
- Maximum leptocephalus size about 79 mm

Meristic Characters	
Myomeres:	120–125
Vertebrae:	117–126
Dorsal fin rays:	293–326
Anal fin rays:	195–231
Pectoral fin rays:	none
Pelvic fin rays:	none

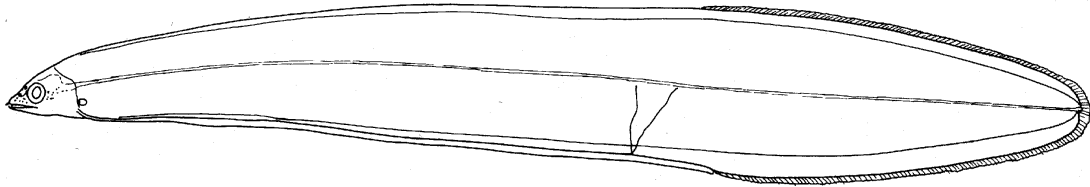
Figures: Adult, Mary Fuges (Böhlke *et al.*, 1989); **A,C:** Mary Fuges (Smith, 1989b); **B:** Smith, 1979

References: Eldred, 1969a (as *Rabula acuta*); Smith, 1989b

Gymnothorax miliaris

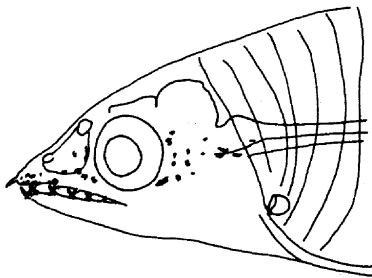
Predorsal myomeres 68-73

Total myomeres 120-125

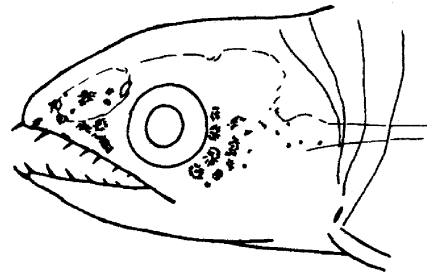


A. 52 mmSL

Preanal myomeres 69-74
Last vertical blood vessel at myomere 64-69

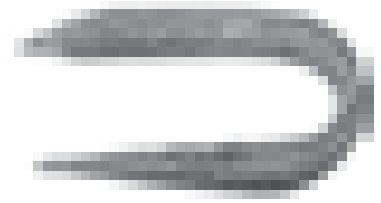


**B. 52 mmSL
(Head detail)**



**C. 64 mmSL
(Head detail)**

***Gymnothorax moringa* (Cuvier, 1829)**
Muraenidae
 Spotted moray



Range: Western North Atlantic Ocean from South Carolina and Bermuda to Brazil, including Gulf of Mexico and Caribbean Sea. Possibly the most common moray eel in western North Atlantic.

Habitat: Shallow waters to 90 m (rarely to 200 m), typically in reef, rock and seagrass habitats; often aggressive

Spawning: Undescribed; ripe individuals have been observed at various times throughout the year; larvae not uncommonly collected in study area, primarily Jul–Nov (1 record in Apr)

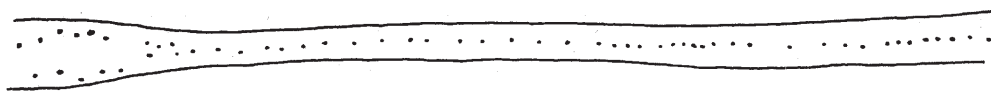
Eggs: – Undescribed

Larvae:

- Gut a long, simple tube, without swellings or loops
- Origin of anal fin adjacent to anus
- Body moderately deep
- Fewer than 15 myomeres between dorsal fin origin and anus
- A complete series of melanophores on ventral surface of esophagus (Fig. E)
- Tiny pectoral fin
- Tail and caudal broadly rounded
- Palate unpigmented
- Series of melanophores along dorsal surface of gut, between liver and anus
- Small melanophores at base of dorsal, caudal and anal fin rays
- Series of melanophores along dorsal midline from about 11th myomere to dorsal fin origin
- Few, scattered melanophores in throat region
- Posterior nostril near level of upper margin of eye
- Maximum leptocephalus size 70–80 mmSL

Note:

1. One of the most abundant muraenid leptocephali in western North Atlantic (with *G. ocellatus*)
2. Location of melanophores along ventral surface of esophagus, between location of pectoral fins (left) and gastric region (right). Compare to pattern in *Gymnothorax vicinus* and *Gymnothorax* species E.



E. Ventral esophagus

Meristic Characters	
Myomeres:	137–143
Vertebrae:	134–142
Dorsal fin rays:	333–356
Anal fin rays:	244–266
Pectoral fin rays:	–
Pelvic fin rays:	None

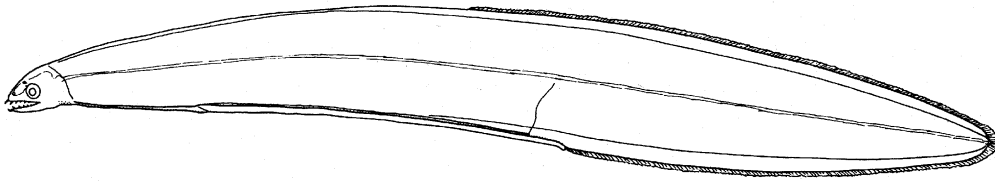
Figures: Adult: S.P. Gigliotti (Böhlke *et al.*, 1989); **A,E:** Mary Fuges (Smith, 1989b); **B–D:** Smith, 1979

References: Eldred, 1970b; 1970c; Smith, 1989b

Gymnothorax moringa

Predorsal myomeres 52-61

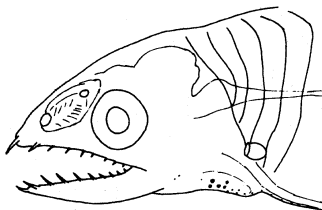
Total myomeres 137-143



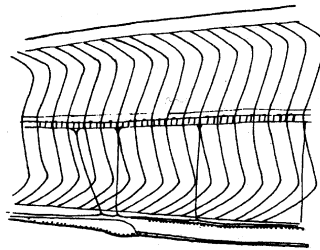
A. 56 mmSL

Preanal myomeres 66-74

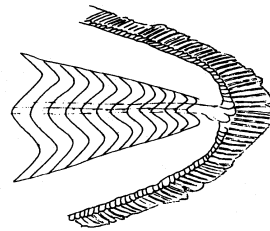
Last vertical blood vessel at myomere 60-72



**B. 56 mmSL
(Head Detail)**



**C. 56 mmSL
(Gastric Region)**



**D. 56 mmSL
(Caudal Area)**

Gymnothorax ocellatus* Agassiz, 1831*Muraenidae****Ocellated moray**

- Range:** Western Atlantic Ocean from Caribbean Sea and coasts of Central and South America as far south as southern Brazil
- Habitat:** Commonly taken by trawl in depths ranging from 15–90 m (and as deep as 160 m)
- Spawning:** Probably spring–summer in NW Gulf of Mexico based on larval collections; larvae occur year-round in southern Gulf of Mexico and Caribbean; duration of larval life estimated to be about 3 months; larvae not uncommonly collected in study area, primarily Jul–Nov, suggesting an origin in the Gulf of Mexico

Meristic Characters

Myomeres:	136–150
Vertebrae:	136–151
Dorsal fin rays:	–
Anal fin rays:	–
Pectoral fin rays:	none
Pelvic fin rays:	none

- Eggs:** – Undescribed
- Larvae:**
- Gut a long, simple tube, without swellings or loops
 - Origin of anal fin adjacent to anus
 - Body moderately deep
 - Dorsal fin long, beginning far forward (at myomere 22–32)
 - Pigment present on dorsal and ventral surfaces of intestine (Fig. C)
 - Tiny pectoral fin
 - Tail and caudal broadly rounded
 - Palate pigmented
 - Small melanophores scattered on top of head and internally near base of brain and nasal capsule
 - Internal pigment present along ventral side of spinal cord
 - A line of small spots (vertical to slightly oblique) from near pectoral fin base to heart region
 - Series of small melanophores on ventral midline between heart and anus; a series of small spots on dorsal surface of gut from liver to anus
 - Small melanophores on bases of dorsal, caudal and anal rays
 - Posterior nostril near level of upper margin of eye
 - Maximum leptocephalus size 80–90 mmSL
- Note:** 1. Because of broadly overlapping meristic characters (myomeres/vertebrae) the larvae of this species probably can not be distinguished from those of *G. saxicola* or *G. nigromarginatus*

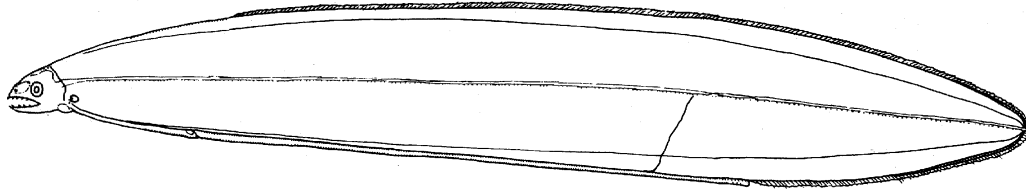
Figures: Adult: G.H. Jensen (Böhlke *et al.*, 1989); A–C: Mary Fuges (Smith, 1989b)

References: Eldred, 1969b; Smith, 1989b

Gymnothorax ocellatus

Predorsal myomeres 22-32

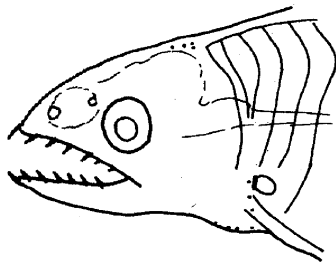
Total myomeres 136-150



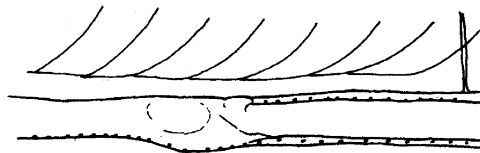
A. 52 mmSL

Preanal myomeres 85-101

Last vertical blood vessel at myomere 77-87



**B. 52 mmSL
(Head Detail)**



**C. 52 mmSL
(Gastric region and detail
of ventral pigment)**

***Gymnothorax* species E**
Muraenidae

(Adult Unknown)

Range: Western North Atlantic Ocean in Gulf Stream south of Grand Banks (leptocephali)

Habitat: Pelagic

Spawning: Undescribed

Eggs: – Undescribed

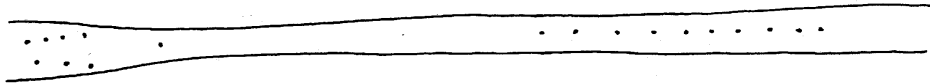
Larvae:

- Gut a long, simple tube, without swellings or loops
- Origin of anal fin adjacent to anus
- Body moderately deep
- Dorsal fin origin about 35 myomeres anterior to anus
- Incomplete row of melanophores on ventral surface of esophagus (see below)
- Tiny pectoral fin
- Tail and caudal broadly rounded
- No pigment on dorsal midline anterior to dorsal fin
- Scattered pigment on top of head and before and behind eye
- Pigment present on palate
- Posterior nostril near level of upper margin of eye
- Few small pigment spots on top of gut, beginning posterior to liver
- Small melanophores on bases of anal fin rays
- Maximum leptocephalus size unknown; largest known larva is 48 mmSL

Meristic Characters

Myomeres:	136–140
Vertebrae:	–
Dorsal fin rays:	–
Anal fin rays:	–
Pectoral fin rays:	–
Pelvic fin rays:	–

- Note:**
1. Known from 2 specimens (MCZ 64501; MCZ 78089) collected in Aug–Sep
 2. Location of melanophores along ventral surface of esophagus, between bases of pectoral fins (left) and gastric region (right); compare to pattern in *Gymnothorax moringa*

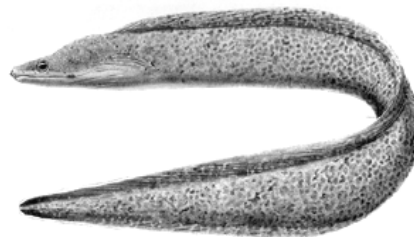


C. Ventral esophagus

- This esophagus pigment pattern is also found in the leptocephalus of *Gymnothorax vicinus* (larvae not illustrated). Leptocephali of this species are characterized by 131–142 total myomeres; 60–68 preanal myomeres; 53–63 predorsal myomeres; last vertical blood vessel at myomere 60–67.

***Gymnothorax vicinus* (Castelnau, 1855)**
 Purplemouth moray

A few leptocephali have been collected in study area during Jun–Oct

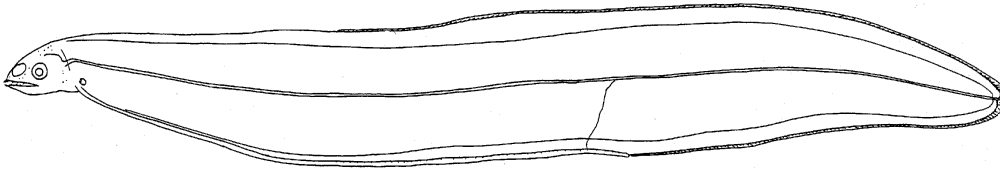


Figures: A–C: Mary Fuges (Smith, 1989b); Adult *G. vicinus*: Steven Gigliotti (Böhlke *et al.*, 1989)
References: Eldred, 1970c; Smith, 1989b

Gymnothorax species E

Predorsal myomeres 40

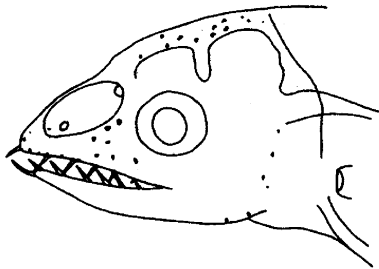
Total myomeres 136-140



A. 48 mmSL

Preanal myomeres 73-75

Last vertical blood vessel at myomere 72-73



**B. 48 mmSL
(Head Detail)**

***Monopenchelys acuta* (Parr, 1930)**
Muraenidae
 Redface eel



Range: Worldwide in tropical waters; in the western North Atlantic from the Bahamas, Lesser Antilles, Mexico, Grand Cayman and Ascension islands

Habitat: Coral heads and rocky ledges at depths of 13–45 m; infrequently collected

Spawning: Undescribed; the few larvae that have been collected in the study area have occurred Jul–Sep

Eggs: – Undescribed

Larvae:

- Gut a long, simple tube, without swellings or loops
- Origin of anal fin adjacent to anus
- Body moderately deep, deepest behind mid-length
- Dorsal fin origin 20–25 myomeres posterior to anus (closer to anus than to tail tip)
- Pigment is lacking (except in eye)
- Tiny pectoral fin
- Tail and caudal fin broadly rounded
- Palate unpigmented
- Posterior nostril near level of upper margin of eye
- Maximum leptocephalus size 47 mmSL

Meristic Characters	
Myomeres:	128–134
Vertebrae:	124–135
Dorsal fin rays:	128–154
Anal fin rays:	210–238
Pectoral fin rays:	none
Pelvic fin rays:	none

Note: 1. This leptocephalus lacks pigmentation, as do the leptocephali of *Anarchias similis* (Muraenidae) and the anguillids *Anguilla anguilla* and *A. rostrata*.

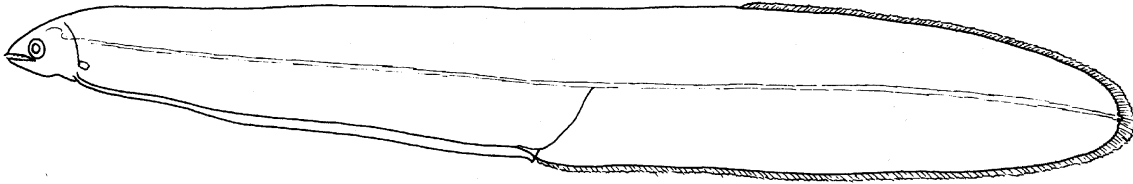
Figures: Adult: Steven Gigliotti (Böhlke *et al.*, 1989); **A:** Mary Fuges (Smith, 1989b)

References: Eldred, 1969a; Smith, 1989b

Monopenchelys acuta

Predorsal myomeres 78-82

Total myomeres 128-134



A. 43 mmSL

Preanal myomeres 54-57

Last vertical blood vessel at myomere 60-62

Pigment lacking

Uroterygius macularius* (Lesueur, 1825)*Muraenidae****Marbled moray**



- Range:** Western North Atlantic Ocean from Bermuda and the Bahamas through the Caribbean Sea to Brazil
- Habitat:** Coral or rocky areas from nearshore to depths of 137 m, mostly between 15 and 30 m; possibly fossorial
- Spawning:** Undescribed; possibly throughout the year. The several leptocephali collected in study area occurred Jul–Oct (1 collection in April).
- Eggs:** – Undescribed
- Larvae:**
- Gut a long, simple tube, without swellings or loops
 - Origin of anal fin distinct from anus (unusual for family)
 - Body moderately deep
 - Dorsal and anal fins restricted to extreme posterior end of body
 - Tiny pectoral fin
 - Tail and caudal fin broadly rounded
 - Posterior nostril near level of upper margin of eye
 - Series of melanophores along dorsal midline from 18th myomere to point behind anus
 - Series of melanophores along ventral midline, anus to anal fin origin
 - Scattered pigment on top of head
 - Pigment spots along bottom of gut from liver to anus
 - Some internal pigment between base of brain and pectoral fin and a series on bottom of notochord
 - Maximum leptocephalus size about 57 mm

Meristic Characters

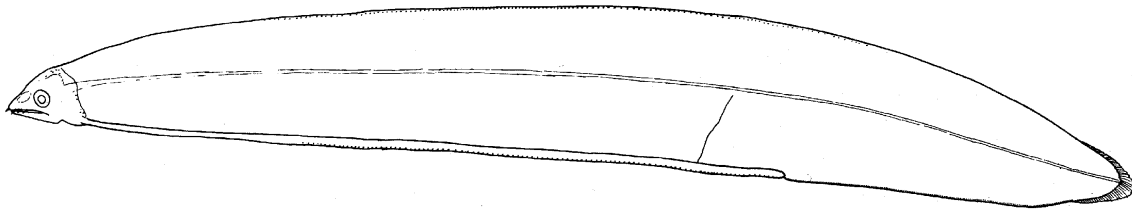
Myomeres:	118–123
Vertebrae:	117–126
Dorsal fin rays:	32–37
Anal fin rays:	20–27
Pectoral fin rays:	none
Pelvic fin rays:	none

Figures: Adult: Steven Gigliotti (Böhlke *et al.*, 1989); **A:** Mary Fuges (Smith, 1989b)

References: Eldred, 1968c; Smith, 1989b

Uropterygius macularius

Predorsal myomeres 107-114
Total myomeres 118-123



A. 37 mmSL

Preanal myomeres 71-77
Last vertical blood vessel at myomere 65-67

Dysomma anguillare* Barnard, 1923*Synaphobranchidae**

No common name



Range: Western North Pacific and western North Atlantic oceans; in the latter ocean, known from Gulf of Mexico, Florida and Caribbean Sea

Habitat: Usually in shallow warm waters, at depths of <100 m.

Spawning: Undescribed, but probably prolonged; larvae rarely collected in study area Aug–Sep, fairly common elsewhere in all seasons

Eggs: – Undescribed

Larvae:

- Preanus length >50% SL; gut with a series of 6 low loops
- A single melanophore on each gut loop, and between each loop on venter of gut tube
- Head and snout long and pointed; no rostral filament
- Preanus length 50–73% SL
- Body moderately deep, tail not sharply pointed
- Eye telescopic
- Dorsal fin origin just anterior to level of anus
- Midlateral pigment absent
- 2 prominent melanophores posterior to anus between myomeres and anal fin ray bases
- Head pigment includes small spots lateral to brain, at angle of lower jaw, and below heart
- Maximum leptocephalus size 64 mmSL

Meristic Characters

Myomeres:	118–128
Vertebrae:	119–130
Dorsal fin rays:	–
Anal fin rays:	–
Pectoral fin rays:	10–11
Pelvic fin rays:	none
Caudal fin rays:	10–12

Note: 1. Relatively low number of myomeres

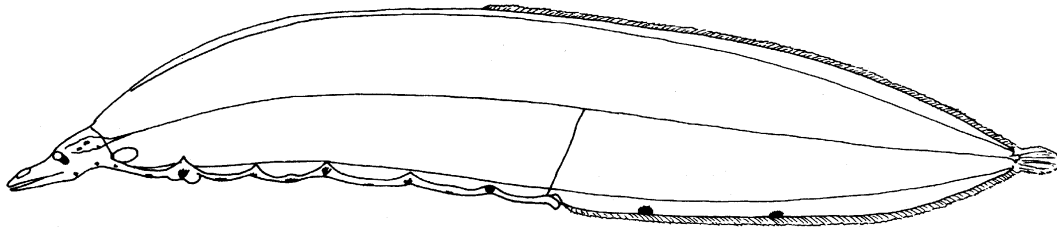
Figures: Adult: Mary Fuges (Robins and Robins, 1989); A–C: Mary Fuges (Smith, 1989b)

References: Smith, 1979, 1989b; Sulak and Shcherbachev, 1997

Dysomma anguillare

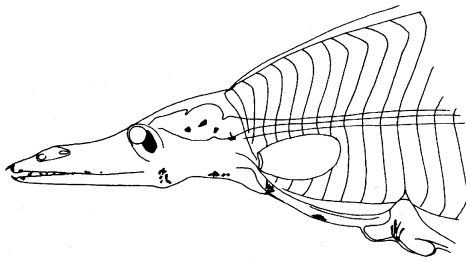
Predorsal myomeres 45-48

Total myomeres 118-128

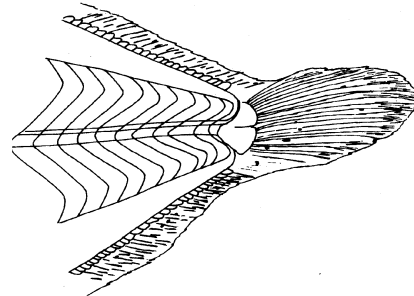


A. 55 mmSL

Preanal myomeres 57-62
Last vertical blood vessel at myomere 60-64



**B. 55 mmSL
(Head Detail)**



**C. 55 mmSL
(Caudal Area)**

Leptocephalus dolichorhynchus* Lea, 1913*Synaphobranchidae**

No common name

(Adult Unknown)

Range: Known from the North Atlantic Ocean southwest of the Azores, northern Bahamas, and Gulf Stream south of Grand Bank. MCZ specimens collected over continental slope south of Georges Bank

Habitat: Pelagic

Spawning: Undescribed; MCZ specimens collected Aug–Oct

Eggs: – Undescribed

Larvae:

- Gut a long tube with a prominent swelling near the anterior end
- Body moderately deep
- Head short (9–12% SL), not including a long, slender rostral filament
- Preanus length 67–71% SL
- Eye telescopic
- Conspicuous pigment consists of 5 or 6 prominent melanophores ventral to the lateral midline
- Midlateral melanophores are all superficial, beginning slightly posterior to mid-length
- Series of melanophores occurs along gut
- Melanophores present behind eye, on lower jaw, and at base of rostral filament
- Largest reported leptocephalus size 33 mm

Meristic Characters

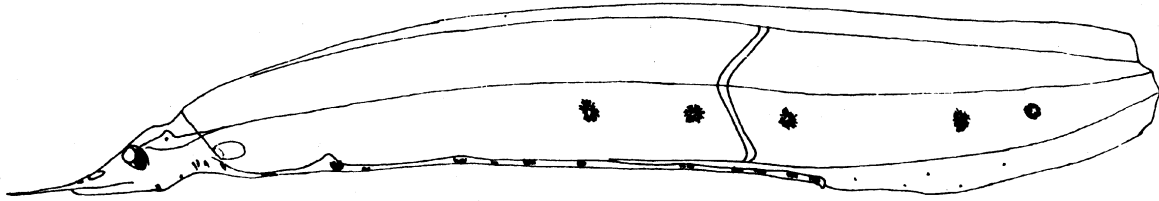
Myomeres:	128–136
Vertebrae:	–
Dorsal fin rays:	–
Anal fin rays:	–
Pectoral fin rays:	–
Pelvic fin rays:	none

Figures: A: Smith, 1974

References: Lea, 1913; Smith, 1989b

Leptocephalus dolichorhynchus

Total myomeres 128-136



A. 26 mmSL

Preanal myomeres 61-71

Leptocephalus proboscideus
Synaphobranchidae

No common name

(Adult Unknown)

Range: Western North Atlantic Ocean from the Gulf Stream and various locations including Straits of Florida, West Indies, central Caribbean Sea; Central Atlantic from Bermuda to Azores and Canary Islands. In present study area as far north as 40°N

Habitat: Pelagic

Spawning: Undescribed. Larvae have been collected in study area Jul–Aug

Eggs: – Undescribed

Larvae:

- Gut a long tube, with very low swellings, each with a melanophore
- Body moderately deep, tail not sharply pointed
- Dorsal fin origin just anterior to level of anus
- Head short (9–12% SL) not including a long, rostral filament
- Preanus length 64–71% SL
- Eye telescopic
- A fleshy 'tab' may be present at the tip of the rostral filament
- About 8 pigment spots along midlateral line from head to just posterior to anus; most short and subcutaneous, but 2 near mid-length of body large and on the surface
- 1 or 2 ventrolateral melanophores anterior to level of anus
- Melanophores also occur behind eye near base of brain, at base of rostral filament, and tip of lower jaw
- Maximum leptocephalus size 85 mmSL

Meristic Characters

Myomeres:	128–134
Vertebrae:	–
Dorsal fin rays:	–
Anal fin rays:	–
Pectoral fin rays:	–
Pelvic fin rays:	none
Caudal fin rays:	13

Note: 1. These larvae may provisionally be referred to *Dysommima rugosa*, but identity can not be verified

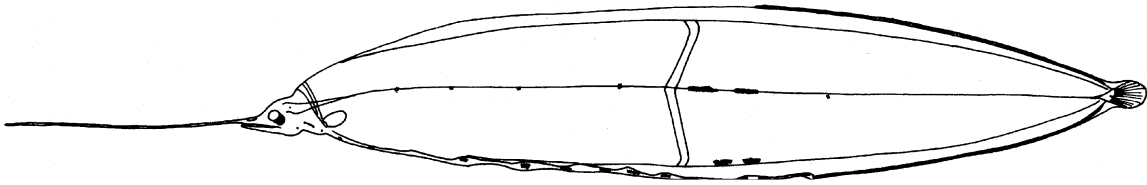
Figures: A–B: Smith, 1974

References: Smith, 1974; 1989b

Leptocephalus proboscideus

Predorsal myomeres 69

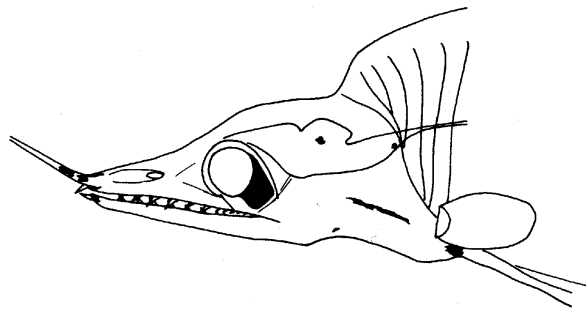
Total myomeres 128-134



A. 67 mmSL

Preanal myomeres 72-79

Last vertical blood vessel at myomere 59-62



**B. 67 mmSL
(Head Detail)**

Synaphobranchus kaupi* Johnson, 1862*Synaphobranchidae****Northern cutthroat eel**

- Range:** Worldwide in cold seas; in the western North Atlantic from Davis Strait south through the Middle Atlantic Bight, where it is abundant; southern limit to distribution not well-defined, perhaps to Bahamas and Brazil; apparently absent from Gulf of Mexico
- Habitat:** Demersal on continental slope in depths as shallow as 131 m, mostly 800–2,000 m; deepest record 3,500 m; collected in temperatures as low as 3.12°C
- Spawning:** Peak in ripe individuals noted Feb–Apr; smaller numbers of ripe individuals year-round; most recorded larvae have been collected in study area (as far north as 45°N) and have occurred in Jun–Sep

Eggs: – Undescribed

- Larvae:**
- Gut a long, simple tube, without swellings or loops
 - Body moderately elongate, tail not sharply pointed
 - Dorsal fin origin just anterior to level of anus
 - Preanus length 75–80% SL
 - Head rather short (8–11% SL)
 - Eye telescopic
 - Pigment very light, perhaps confined to group of small spots near base of caudal fin
 - Central area of myomeres more opaque than dorsal or ventral parts, presenting appearance of a broad, white stripe along notochord
 - Maximum leptocephalus size about 130 mmSL

- Note:**
1. Leptocephali appear to have a larval duration of about 18 months before transforming
 2. Small leptocephali are limited to areas west of 65°W; large leptocephali occur east of 30°W and north of 40°N. Therefore it appears spawning is limited to western Atlantic and larvae drift eastward as they grow, as in *Anguilla anguilla*. How these young eels then recruit to areas in the western North Atlantic is unknown

Meristic Characters

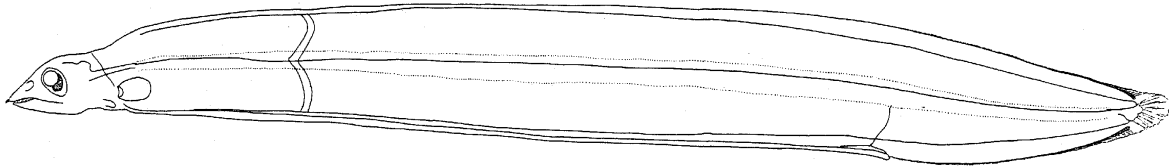
Myomeres:	143–154
Vertebrae:	144–152
Dorsal fin rays:	–
Anal fin rays:	–
Pectoral fin rays:	14–17
Pelvic fin rays:	None
Caudal fin rays:	13

Figures: Adult: Mary Fuges (Robins and Robins, 1989); A–C: Mary Fuges (Smith, 1989b)

References: Bruun, 1937b; Keller, 1976; Smith, 1989b; Sulak and Shcherbachev, 1997

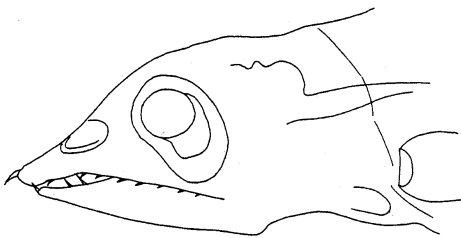
Synphobranchus kaupi

Predorsal myomeres 12-19 fewer than preanal myomeres
Total myomeres 143-154

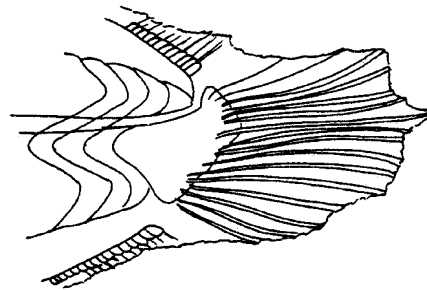


A. 54 mmSL

Preanal myomeres 98-107
Last vertical blood vessel at myomere 68-73



**B. 54 mmSL
(Head Detail)**



**C. 54 mmSL
(Caudal Area)**

Note telescopic eye

Synaphobranchus* sp.*Synaphobranchidae**

No common name

(Adult Unknown)

Range: Mostly restricted to western Atlantic Ocean; only 2 (large) specimens collected east of 40°W; smallest leptocephali found near Bahamas and Greater Antilles; larger leptocephali have been collected as far north as 47°26' N

Habitat: Pelagic

Spawning: Larvae <30 mmSL collected in Dec–Mar, indicating a fall-winter spawning season

Eggs: – Undescribed

Larvae:

- Gut a long, simple tube, without swellings or loops
- Body moderately elongate, tail not sharply pointed
- Dorsal fin origin just anterior to level of anus
- Preanus length 69–81% SL
- Head rather short (9–13% SL)
- Eye telescopic
- Pigment light, confined to group of spots at base of caudal fin
- Central area of myomeres more opaque than dorsal or ventral parts, presenting appearance of broad, white stripe along notochord
- Maximum leptocephalus size about 90 mmSL
- These leptocephali are most likely the larvae of *Synaphobranchus affinis*, a very common species on the continental slope of the eastern United States, but *S. brevidorsalis* and *S. bathybius* can not be eliminated. See full discussion of larval evidence in Smith (1989b).

Meristic Characters

Myomeres:	131–140
Vertebrae:	–
Dorsal fin rays:	–
Anal fin rays:	–
Pectoral fin rays:	–
Pelvic fin rays:	none
Caudal fin rays:	16–17

Synaphobranchus affinis Günther, 1877
(Adult)



- Note:**
1. Small (<30 mm) larvae collected in Dec–Mar reach lengths of 80–90 mm by summer, thus grow much faster than leptocephali of *Synaphobranchus kaupi*, and also have a much shorter larval duration (possibly only 7–8 months).
 2. See full discussion of these larvae, and those collected and analyzed by Bruun (1937b), in the Synaphobranchidae account in "*Fishes of the Western North Atlantic*" (Smith, 1989b).

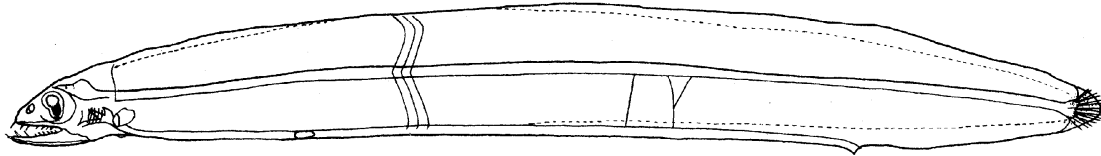
Figures: Adult (*S. affinis*): Mary Fuges (Robins and Robins, 1989); A–C: Okiyama, 1988

References: Bruun, 1937b; Keller, 1976; Smith, 1989b; Sulak and Shcherbachev, 1997

Synphobranchus sp.

Predorsal myomeres 74-80

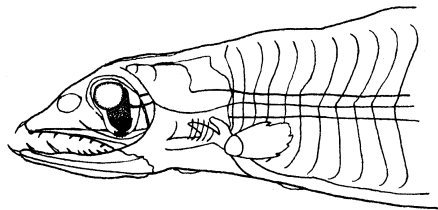
Total myomeres 131-140



A. 30 mmTL

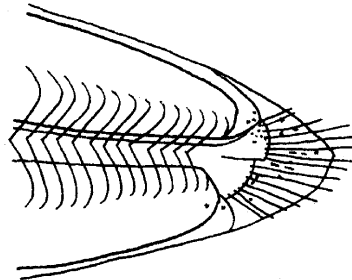
Last vertical blood vessel at myomere 68

Preanal myomeres 83-101



**B. 30 mmTL
(Head Detail)**

Note telescopic eye



**C. 34 mmTL
(Caudal Area)**

Note light pigment spots
at base of caudal fin rays

Fig. A-C. Based on specimens collected in the Pacific Ocean, possibly referable to *Synphobranchus bathybius*, but described as *Synphobranchus* sp. (Okiyama, 1988). Meristic characters presented above refer to *Synphobranchus* sp. from the western Atlantic Ocean (Smith, 1989b), but they are coincident with those of the Pacific specimens.