

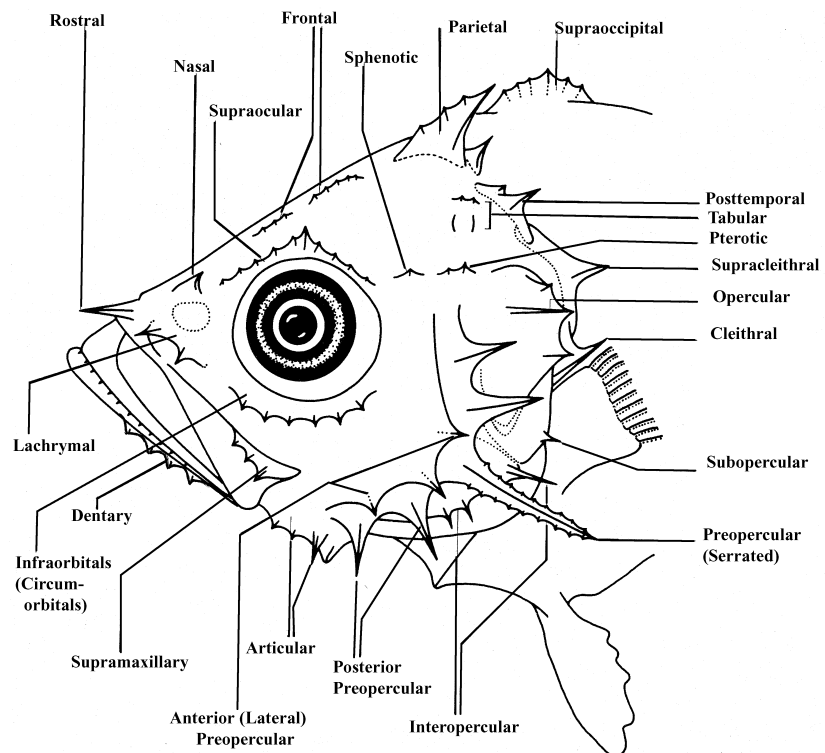
Perciformes

The monophyly of this order, the largest and most diverse of the Percomorpha (= Acanthopterygii of some authors), has never been established, or seriously challenged, although several efforts were included within a recent symposium convened for that purpose (Johnson and Anderson, 1993). Furthermore, within the Perciformes, the suborder Percoidei has been characterized as nothing more than a convenient repository for perciform families that do not fit into one of the other suborders (G. D. Johnson, 1984). As is the case in most of the present publication, the classification of Eschmeyer (1990) is followed, acknowledging the very real potential that Perciformes is paraphyletic and the Percoidei is polyphyletic (e.g. G. D. Johnson, 1993; Johnson and Patterson, 1993). As presently understood, the order Perciformes contains >9,000 species arranged in 18 suborders and 148 families (Nelson, 1994). A great many of these occur in nearshore, or neritic, regions of the world's oceans, although their over-all range is greater, and most are well-known. Although no synapomorphies have been proposed to unite perciform fishes, general characters in most include: presence of spines in the dorsal and anal fins, 1 spine and 5 or fewer rays in the pelvic fin, lack of an adipose fin, presence of 17 or fewer principal caudal rays arranged on 5 or fewer hypural bones (plus the parhypural), presence of 7 or fewer branchiostegal rays and 4 gill arches.

Fishes belonging to 64 families of perciforms (as presently understood) occur in the present study area. About 40% of these families (n = 27) currently reside in the suborder Percoidei, and the remaining families (n = 37) reside in 13 other suborders (see tables on next pages). In addition, three genera listed as *incertae sedis* by G. D. Johnson (1984) are also frequently collected within the study area, and these are here included in the Percoidei, each in a family whose name is based on that of the genus.

Larval morphology has contributed little to a resolution of problems associated with phylogeny of perciforms, although ontogenetic studies offer much promise in this area. Families whose larvae are more highly specialized (or at least are recognizable as being unique) belong to one of several nominal suborders, whereas families in the suborder Percoidei usually have relatively unspecialized larvae. If the present, accepted classification were based on larval morphology alone, it might resemble the *status quo*, although recent expositions of ontogenetic characters (e.g. G. D. Johnson, 1984) suggests that significant advances in our understanding of perciform inter- and intra-relationships might result from further studies of ontogeny.

Many perciform larvae have spines on the head, arising from various skull bones. Head spination is not present in all suborders, however. In the Percoidei, head spines range from barely noticeable to pronounced, although spines are absent in the larvae of two percoiid families that occur in the study area (Echeneidae and Mullidae) and in *Epigonus*. This introduction to the Perciformes summarizes head spination characters for the families contained therein, and a checklist of head spine characters is included on each species page. A very generalized pattern of head spines, including terminology, is included here, but patterns (and terminology) may vary with some suborders. Figure modified after Neira *et al.* (1998)



Perciformes

List of perciform suborders and families reported to occur in the study area, either as adults or larvae, or both. Included are ranges of selected meristic characters, fin sequence and larval head spination characters in each family *based solely on those species whose adults or larvae have been collected in the study area*. Families (including 3 problematic genera) are listed alphabetically within each suborder in order to avoid inferences of relationships based on sequence. This classification differs little from that proposed by G. D. Johnson (1984), Eschmeyer (1990) and Nelson (1994) and should be regarded as an interim arrangement, pending future analysis. Most have Pelvic Fin: I,5; Caudal Fin PrC: 9+8 (8+7 branched). Abbreviations: Fr – Frontal; Inter – Interopercle; Op – Opercle; Postt – Posttemporal; Preop – Preopercle; Pter – Pterotic; Scl – Supracleithral; Subop – Subopercle; see families for others. Fin formation sequence: **A**: C – D₂, A – D₁ – P₂ – P₁ **B**: C – D₁, P₂ – D₂, A – P₁ **C**: P₁ – C – P₂ – D₂, A – D₁ **D**: P₁ – C – D₂, A – D₁ – P₂ **E**: C – D₂, A – P₂ – P₁ – D₁ **F**: P₂ – C, D₂, A – D₁, P₁ (P₂ large, precocious) **G**: C – D₂, A – D₁, P₁ – P₂ **H**: C, P₁ – D, A – (P₂) (sometimes no pelvics) **I**: C – D, A – P₁ – (P₂) (sometimes no pelvics) **J**: P₂, D and A spines **K**: P₁, P₂, D₁ spine – C, D₂, A **L**: D₁, P₂ – P₁ – A, D₂, C **M**: D₁ – D₂, P₁ – A – C

Suborder/ Family	Vertebrae (range)	Dorsal Fin (range)	Anal Fin (range)	Pectoral Fin (range)	Fin Formation (range)	Larval Head Spination
Percoidaei						
Acropomatidae	25	VIII–IX, I, 8–9	II–III, 7–8	13–17	A	Extensive (see family)
Apogonidae	24	VI, I, 9	II, 8	12	A (rarely B)	Restricted to few bones
Bathyclupeidae	30–32	I, 8–9	I, 29–30	24	Unknown	Unknown
Bramidae	36–52	(No spines) 31–54	23–47	18–23	C (rarely D)	Restricted to Preop and (rarely) Inter
Carangidae	24–27	III–VIII, 18–40	II, I, 15–30	16–24	A (rarely D)	Extensive (see family)
Caristiidae	35–40	(No spines) 26–35	15–23	16–19	A	Preop, small
Cirrhitidae	26	X, 16	III, 6	14	A	Preop, small
Coryphaenidae	30–34	(No spines) 52–66	23–31	18–21	E	Fr, Preop, Postt, Pter
Echeneidae	26–30	(No spines) 117–45	19–41	16–30	E	Absent
Epigonidae	25	VII–VIII, I, 9–11	II, 8–10	15–23	Unknown	Absent in most
Gerreidae	24	IX, 10	III, 7–8	15	A	Preop, weak
Haemulidae	26	XII–XIII, 14–17	III, 7–13	16–19	A	Preop, weak
Howellidae (<i>Howella</i>)	26	VIII, I, 9	III, 7	13–15	A	Several (see family)
Kyphosidae	26	IX–XII, 11–15	III, 10–13	17–20	A	Several small, weak
Lobotidae	24	XII, 15–16	III, 11–12	16	Unknown	Extensive (see family)
Lutjanidae	24	IX–XII, 10–14	III, 7–9	15–19	B	Extensive (see family)
Malacanthidae	24–26	VII–VIII, 14–27	I–II, 13–24	16–18	A	Extensive (see family)
Moronidae	25	VII–XI, 9–14	III, 7–13	10–19	A	Preop, weak
Mullidae	24	VII–VIII, I, 8	I, 7	13–17	A	Absent
Polyprionidae (<i>Polyprion</i>)	27	XI–XII, 11–12	III, 9–10	17–18	A	Extensive (see family)
Pomatomidae	26	VII–VIII, I, 23–28	II, 24–29	16–17	A	Preop, weak

¹ Spines modified into suction disk on top of head

Perciformes

Ranges of selected meristic characters in families belonging to the order Perciformes, based solely on those species whose adults or larvae have been collected in the study area. (See table heading for abbreviations.)

Suborder/ Family	Vertebrae (range)	Dorsal Fin (range)	Anal Fin (range)	Pectoral (range)	Fin Formation (range)	Larval Head Spination
Percoidei						
Priacanthidae	23	X, 10–15	III, 9–16	16–19	A	Extensive (see family)
Rachycentridae	25	VII–VIII, I, 26–34	I–II, 22–28	20–21	E	Fr, Preop, Postt, SCl
Sciaenidae	24–27	IX–XII, 19–41	I–II, 5–13	16–18	A (rarely B)	Restricted to few bones
Serranidae	24–26	IX–XI, 9–18	III, 6–13	14–20	A or B	Differs by subfamily (weak to extensive)
Sparidae	24	X–XIII, 9–16	III, 7–15	14–17	A	Most few (see family)
(<i>Symphysanodon</i>)	25	VIII–IX, 9–11	III, 7	16–18	A	Extensive
Mugiloidei						
Mugilidae	24	IV, I, 8	III, 8–9	15–18	A	Absent or very weak
Polynemoidei						
Polynemidae	24	VII–VIII, I, 11–13	III, 11–14	22–25	A	Absent
Labroidei						
Labridae	25–36	VIII–XVIII, 9–13	III, 9–12	11–16	A or D	Absent
Pomacentridae	26	XIII, 13	II, 12	16–20	F	Few spines or extensive
Scaridae	25	IX, 10	III, 8–9	13–17	G	Absent
Zoarcoidei						
Cryptacanthodidae	85–86	73–77 (all spines)	47–50	11–12?	H	Absent
Anarhichadidae	72–82	69–80 (all spines)	42–48	18–23	All early	Absent
Pholidae	86–98	80–91 (all spines)	II, 42–46	10–12	G	Absent
Stichaeidae	45–85	43–85 (all spines)	I–II, 30–62	13–19	H	Absent
Zoarcidae	83–146	81–150+	69–124	10–24	All early	Absent
Notothenioidei						
Nototheniidae ¹	54–55	IX–XI, 26–30	26–30	24–26	Unknown	Absent
Trachinoidei						
Ammodytidae	62–76	52–67	26–35	11–16	I	Absent
Chiasmodontidae	33–46	VI–XIV, 18–30	I, 17–29	10–15	D	Weak, few locations
Percophidae	27–30	VI, 14–17	17–18	22–26	H	Absent
Uranoscopidae	25–28	0–V, 12–15	12–17	19–24	Poorly known	Absent
Blennioidei						
Blenniidae	31–36	X–XIII, 13–20	II, 14–20	11–15	D	Weak, few locations

¹ Included based on the collection of a single adult in study area (Møller, Nielsen and Fossen, 2003)

Perciformes

Ranges of selected meristic characters in families belonging to the order Perciformes, based solely on those species whose adults or larvae have been collected in the study area. (See table heading for abbreviations.)

Suborder/ Family	Vertebrae (range)	Dorsal Fin (range)	Anal Fin (range)	Pectoral Fin (range)	Fin Formation Sequence	Larval Head Spination
Gobiesocoidae						
Gobiesocidae	25–26	9–12	8–10	21–23	I	Absent
Callionymoidei						
Callionymidae	18–22	IV, 6–10	4–9	16–23	I	Absent
Draconettidae	23	III, 14	13	24–26	I (putative)	Op, Subop
Gobioidei						
Gobiidae	26–27	VI–VIII, 9–16	I, 9–16	15–23	G	Absent
Ptereleotridae	26	VI, I, 21–23	I, 21–22	19–21	G	Absent
Eleotridae	27	VIII, 8	I, 10	13–15	E	Absent
Microdesmidae	63–66	XIX–XXII, 66–74	41–47	11–14	G	Absent
Acanthuroidei						
Acanthuridae	22	IX, 23–28	III, 21–26	15–17	J	Serrate Ridges typical
Chaetodontidae	24	XII–XIII, 18–21	III, 16–17	14–15	I?	Expanded "shields"
Ephippidae	24	IX, 21–23	III, 17–18	17–18	A	Several (see family)
Luvaridae	23	II, 12–13	13–14	17–20	K	Serrate Ridges typical
Pomacanthidae	24	IX, 31–33	III, 23–25	19–20	I	Extensive, including serrate ridges
Sphyraenoidei						
Sphyraenidae	24	V, I, 8–10	I–III, 7–9	11–12	G	Absent
Scombroidei						
Gempylidae	31–61	VIII–XXXVI, 10–41	I–III, 10–35	12–17	L	Preop, few others
Istiophoridae	24	38–50+5–7	XI–XVII, 5–7	17–21	I	Few, prominent spines
Scombridae	31–64	IX–XXVII, 10–20	11–20	19–36	A (varies)	Absent to extensive
Scombrabrachidae	30	XII, 15–16	III, 15–17	18–19	A	Strong, few locations
Trichiuridae	98–168	III–XLI, 54–140	II, 44–108	11–13	M	Weak, mostly Preop
Xiphiidae	25–27	38–45+4–5	12–16	16–19	I	Strong, few locations
Stromateoidei						
Ariommatidae	30–32	XI–XII, 14–18	II–III, 12–16	20–24	A?	Preop, very weak
Centrolophidae	24–25	III–IX, 19–46	III, 15–24	18–23	H	Very small or absent
Nomeidae	30–42	IX–XIII, 15–32	I–III, 14–31	16–24	Varies	Very small or absent
Stromateidae	29–33	II–IV, 38–49	II–III, 35–45	17–24	I	Absent or weak
Tetragonuridae	44–58	XIV–XXI, 10–17	I–II, 9–15	14–21	G	Preop, small

Perciformes

Egg and larval characteristics of suborders in the order Perciformes

Character	Percoidei	Mugiloidei	Polynemoidei	Labroidei
Eggs (type)	Pelagic	Pelagic	Undescribed	Pelagic or demersal
Egg shape	Spherical	Spherical	–	Round or elliptical
Chorion	Smooth, transparent (most)	Etched, striated	–	Smooth or with adhesive filaments
Yolk	Homogeneous most	Homogeneous	–	Homogeneous
Oil globules	Single	Single	–	Single or none
Larvae – Shape	Moderately elongate (most); some deep	Moderately stocky	Moderately stock	Elongate (most); some stocky
Vertebrae	24–26 (most); 53 (max)	24	24	24–26 (most) 36 (max)
Supraneurals	Many patterns (see percoid families)	–	0/0/2/1+1/ or: 0/0/0+2/1+1/	–
Preanus length	50–60% SL (most)	<70% SL	~ 60% SL	50–60% SL
Gut character	Coiled	Bulky, thick	Coiled, voluminous	Long, then coils
Eyes	Round (most)	Round	Round	Round to oval
Head spines	None to extensive	Weak, preopercle	None or very weak, preopercle	None
Transformation	Gradual (most)	Gradual	Gradual	Gradual
Special pelagic-juvenile stage	Present in some	"Querimana"	None	None
Fin elements	Spines, rays	Spines, rays	Spines, rays	Spines, rays
Early forming fins	Caudal (most)	Caudal	Caudal	Caudal
Pelvic fins form	Mid-late; thoracic	Late, Abdominal	Late, thoracic	Late (most), thoracic
Pectoral fins form	Late (most)	Late, high on body	Late	Late
Dorsal fin	2 in most	2 (1 st short)	2, become separated	1 or 2
Anal fin	Single	Single	Single	Single
Caudal fin (PrC)	9+8 (most)	7+7	9+8	9+8, 7+6, 8+7, 7+7
Species in study area	137	2	1	13

Perciformes

Egg and larval characteristics of suborders in the order Perciformes

Character	Zoarcoidei	Notothenoidei	Trachinoidei	Blennioidei
Eggs (type)	Demersal	Pelagic, large	Pelagic or demersal	Demersal
Egg shape	Spherical	Spherical	Round to irregular	Round to elliptical
Chorion	Adhesive (some)	Undescribed	Smooth to sculpted	Smooth
Yolk	Homogeneous	–	Homogeneous	Segmented
Oil globules	Single or many	–	Single to many	Many
Larvae – Shape	Elongate	Elongate	Elongate to stubby	Elongate
Vertebrae	45–146	54–55	25–46 (most); 76 (max)	31–36
Supraneurals	–	–	–	–
Preanus length	30–<50% SL	–	Very short (<40% SL) to 60–70% SL	35–45% SL
Gut character	Long, little coiling	–	Long, straight to coiled	Coiled
Eyes	Round	Round	Round (most)	Round
Head spines	None	–	None to few	Few, preopercle
Transformation	Gradual	–	Gradual	Gradual
Special pelagic–juvenile stage	None	–	"Gargaropteron" or none	None
Fin elements	Spines or rays	Spines and rays	Spines and rays	Spines and rays
Early forming fins	Caudal	–	Pectoral (some)	Pectoral
Pelvic fins form	Reduced or none	–	Early (some) or absent	Late, thoracic
Pectoral fins form	Late	–	Early to late	Early
Dorsal fin	1, all spines or all rays	2	1 or 2	1, spines and rays
Anal fin	Single	Single	Single	Single
Caudal fin (PrC)	Undescribed	9+8	8+7, 7+6, 9+8	7+6
Species in study area	36	1	16	4

Perciformes

Egg and larval characteristics of suborders in the order Perciformes

Character	Gobiesocoi	Callionymoidei	Gobioidei	Acanthuroidei
Eggs (type)	Demersal	Pelagic	Demersal	Pelagic
Egg shape	Round to elliptical	Spherical (small)	Spherical to irregular	Spherical
Chorion	Corrugated	Sculpted	Adhesive	–
Yolk	Granular	–	–	–
Oil globules	Many	–	Multiple	Single
Larvae – Shape	Elongate	Elongate to stocky	Moderately to very elongate	Deep-bodied (most)
Vertebrae	25–26	21–23	26–27 (1@ 63–66)	22–24
Supraneurals	–	–	None	Several patterns
Preanus length	about 60% SL	about 50% SL	50–65% SL	50–60% SL (most)
Gut character	Long, thick	Coiled	Straight, uncoiled	Coiled
Eyes	Round	Round	Round	Round
Head spines	None	Few, opercular	None	Extensive spiny ridges or flat plates
Transformation	Gradual	Gradual	Gradual	Marked
Special pelagic – juvenile stage	None	Settle at small size, or long pelagic stage	None	"Acronurus" "Tholichthys" "Hystricinella"
Fin elements	Soft rays	Spines and rays	Spines and rays	Spines and rays
Early forming fins	None	Caudal	Caudal	Pelvic (some)
Pelvic fins form	Late, suction disk	Early in some, thoracic	Late (disk in some)	Early to late, thoracic
Pectoral fins form	Late	Late	Late	Late
Dorsal fin	Single, short	2, 1 st short	2, 1 st short	2
Anal fin	Single, short	Single	Single	Single
Caudal fin (PrC)	10+12 (total)	5+5, 6+6	9+8	8+8, 9+8
Species in study area	1	5	14	9

Perciformes

Egg and larval characteristics of suborders in the order Perciformes

Character	Sphyraenoidei	Scombroidei	Stromateoidei
Eggs (type)	Pelagic	Pelagic	Pelagic
Egg shape	Spherical	Spherical	Spherical
Chorion	Smooth, transparent	Smooth, transparent	Smooth, often colorful
Yolk	Lightly segmented	Homogeneous	Homogeneous or segmented
Oil globules	Single	Single	Single
Larvae – Shape	Elongate	Elongate to deep-bodied	Elongate, many deepen
Vertebrae	24	24, 31–64, 31–168	24–25, 30–42, 44–58, 29–33
Supraneurals	3, interdigitate dorsally	None	Many patterns
Preanus length	65–75% SL	37–80 % SL; usually increases in development	36–65% SL; increases in most, decreases in some
Gut character	Long, straight, thick	Tightly or loosely coiled; can be thick in some	Coiled (most), long, straight, thick in a few
Eyes	Round	Round	Round
Head spines	None	Extensive	None or very weak, preopercle
Transformation	Gradual	Gradual	Gradual, air bladder regresses
Special pelagic – juvenile stage	None	None (spines can be exaggerated in some)	Usually none; see <i>Nomeus</i>
Fin elements	Spines and rays	Spines and rays	Spines and rays
Early forming fins	Caudal	Caudal (D ₁ and P ₂ in Gempylidae)	Caudal (most)
Pelvic fins form	Late, thoracic	Late (usually), thoracic	Late (most); early in some nomeids; absent in stromateids
Pectoral fins form	Late	Late	Late (most)
Dorsal fin	2, widely separated	1 or 2, finlets in some	1, usually divided
Anal fin	Single, short	Single, finlets in some	Single
Caudal fin (PrC)	9+8	9+8 (none in 1 trichiurid)	9+8
Species in study area	3	37	17

Perciformes**Suborder Percoidei Part I – Families Acropomatidae through Coryphaenidae**

Selected meristic characters in species belonging to the percoid families Acropomatidae through Coryphaenidae whose adults or larvae have been collected in the study area. Classification sequence is alphabetical. See species accounts for sources.

Family <i>Species</i>	Vertebrae	Dorsal Fin	Anal Fin	Caudal (Procurrent, Dorsal + Ventral)	Pectoral Fin
Acropomatidae					
<i>Bathysphyraenops simplex</i> ¹	10+15	VIII, I, 9	III, 7	–	13–14
<i>Synagrops bellus</i>	10+15	IX, I, 8–9	II, 7–8	9–13 + 9–13	15–17
<i>Synagrops spinosus</i>	10+15	IX, I, 9	II, 7–8	9–13 + 9–13	15–17
Apogonidae					
<i>Apogon maculatus</i>	10+14	VI, I, 9	II, 8	6–10 + 5–10	12
<i>Apogon pseudomaculatus</i>	10+14	VI, I, 9	II, 8	6–10 + 5–10	12
Bathyclupeidae					
<i>Bathyclupea argentea</i>	30–32	I, 8–9	I, 29–30	9 + 8	I, 23
Bramidae					
<i>Brama brama</i>	41–43	35–38	29–32	7–8 + 7–8	20–23
<i>Brama caribbea</i>	36–38	32–35	27–30	–	19–21
<i>Brama dussumieri</i>	40–43	33–35	27–28	–	19–21
<i>Pteraclis carolinus</i>	49–52	48–54	42–47	–	18–20
<i>Pterycombus brama</i>	48–51	48–53	38–43	–	20–23
<i>Taractes asper</i>	41–42	31–34	23–26	7–8+7–8	18–20
<i>Taractichthys longipinnis</i>	44–47	33–38	27–30	5 + 5 (?)	20–22
Carangidae					
<i>Alectis ciliaris</i>	24	VII–VIII, I, 18–19	II, I, 15–16	9–10+9	19–22
<i>Caranx bartholomaei</i>	24	VIII, I, 25–28	II, I, 21–24	8–9+7–9	21–22
<i>Caranx crysos</i>	24	VII–VIII, I, 22–25	II, I, 19–21	8–9+8–9	19–23
<i>Caranx hippos</i>	24	VII–VIII, I, 19–21	II, I, 16–17	8–9+8	20–21
<i>Caranx latus</i>	24	VIII, I, 19–22	II, I, 16–18	8–9+8	19–21
<i>Caranx ruber</i>	24	VIII, I, 26–30	II, I, 23–26	7–9+7–8	19–22
<i>Chloroscombrus chrysurus</i>	24	VIII, I, 26–28	II, I, 25–27	8–9+7–9	19–20
<i>Decapterus macarellus</i>	24	VIII, I, 31–37	II, I, 27–30	9–10+9–10	22–24
<i>Decapterus punctatus</i>	25	VIII, I, 29–34	II, I, 25–30	8–9+8–9	19–21
<i>Decapterus tabl</i>	24	VIII, I, 29–34	II, I, 24–27	–	21–23
<i>Elagatis bipinnulata</i>	24	VI, I, 25–30	I, I, 18–22	10–11+10–11	19–22
<i>Naucrates ductor</i>	25–26	III–VI, I, 24–29	II, I, 15–18	9–12+8–11	18–20
<i>Oligoplites saurus</i>	26	III–V, I, 19–21	II, I, 18–21	9–10+8–10	16–18
<i>Selar crumenophthalmus</i>	24	VIII, I, 24–27	II, I, 20–23	7–8+7–8	19–23
<i>Selene setapinnis</i>	24	VIII, I, 21–24	II, I, 16–19	8–9+7–8	19–20
<i>Selene vomer</i>	24	VIII, I, 21–23	II, I, 18–20	7–9+7–8	21–22
<i>Seriola dumerili</i>	24	VII, I, 30–35	II, I, 19–22	10–11+10–11	20–23
<i>Seriola fasciata</i>	24	VIII, I, 30–32	II, I, 19–20	–	20–22

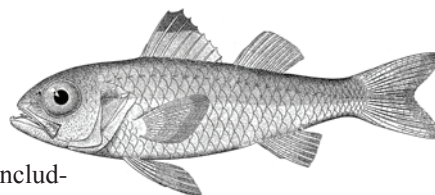
Perciformes

Suborder Percoidei Part I – Families Acropomatidae through Coryphaenidae

Selected meristic characters in species belonging to the percoid families Acropomatidae through Coryphaenidae whose adults or larvae have been collected in the study area. Classification sequence is alphabetical. See species accounts for sources.

Family <i>Species</i>	Vertebrae	Dorsal Fin	Anal Fin	Caudal (Procurement Dorsal+Ventral)	Pectoral Fin
Carangidae (cont.)					
<i>Seriola rivoliana</i>	24	VII(VIII), I, 28–32	II, I, 19–22	11–13+8–12	20–23
<i>Seriola zonata</i>	24	(VII)VIII, I, 33–40	II, I, 27–30	10–11+9–10	19–22
<i>Trachinotus carolinus</i>	24	V–VI, I, 22–27	II, I, 20–23	8+7–8	18–20
<i>Trachinotus falcatus</i>	24	VI, I, 18–20	II, I, 17–18	7+8	19–21
<i>Trachinotus goodei</i>	24	VI, I, 19–20	II, I, 16–18	7–8+7	17–20
<i>Trachurus lathami</i>	24	VIII, I, 28–33	II, I, 26–30	9–10+9–10	22–23
<i>Uraspis secunda</i>	24	VIII, I, 27–32	II, I, 19–23	–	24
Caristiidae					
<i>Caristius groenlandicus</i>	35–37	32–34	18–21	–	16–17
<i>Caristius japonicus</i>	–	–	–	–	–
<i>Caristius macropus</i>	39–40	33–35	21–23	6–7+6	17–19
<i>Caristius maderensis</i>	35–36	26–31	15–20	6–8 + 7	16–18
<i>Platyberyx opalescens</i>	–	28–31	17–19	–	18
Cirrhitidae					
<i>Amblycirrhitus pinos</i>	26	X, 16	III, 6	9–14 + 10–13	14
Coryphaenidae					
<i>Coryphaena equiselis</i>	33–34	52–59	23–29	10–13+10–14	18–21
<i>Coryphaena hippurus</i>	30–31	58–66	25–31	10–14+11–14	18–21

¹ *Bathysphyraenops simplex* is here provisionally included in Acropomatidae. Larvae are undescribed, but the species most likely belongs in Howellidae (G. D. Johnson, pers. comm., October, 2006).

Synagrops bellus* (Goode and Bean, 1896)*Acropomatidae****Blackmouth bass**

Range: Western Atlantic Ocean from Banquereau Bank to northern Argentina, including Gulf of Mexico and Caribbean Sea; also eastern Atlantic from Guinea to Nigeria

Habitat: Benthopelagic along edges of continental shelf and margins of islands in depths of 60–1,000+ m

Spawning: Possibly bi-modal; Apr–Jun and Sep–Jan

Eggs: – Undescribed, presumably pelagic

Larvae: – Larvae initially thick through the pectoral region, then taper posteriorly; bodies are laterally compressed; later larvae have thicker caudal peduncle
 – Head length 33–35% SL; eye large; mouth large, almost vertically oriented
 – Flexion occurs at lengths of 3.4–4.2 mm
 – Head with several series of spines and ridges; see checklist below
 – Sequence of fin ray formation: C, D₁, D₂, A – P₂, P₁; all fin rays complete by 8.0 mm
 – Anterior edges of D₁, A and P₂ spines smooth throughout development (serrated in *Synagrops spinosus*)
 – Pigmentation includes saddles of melanophores on upper body along dorsal fin base; other pigment occurs on nape, tip of snout, and over gut; older larvae develop pigment on inner surface of opercle, along entire dorsum of body, and on both edges of caudal peduncle

Meristic Characters

Myomeres:	25
Vertebrae:	10+15=25
Dorsal fin rays:	IX, I, 8–9
Anal fin rays:	II, 7–8
Pectoral fin rays:	15–17
Pelvic fin rays:	I, 5
Caudal fin rays:	9+8 (PrC)

Head spine checklist:

Supraoccipital:	strongly serrated ridge
Frontal:	small, serrated ridge
Supraocular:	serrated ridge
Preopercle:	well developed, serrated spine at angle, plus several shorter spines
Subopercle:	spines on edge
Opercle:	small spines along edge
Posttemporal:	small, serrated ridge
Dentary:	short series of spines

Head spines are more clearly depicted in the illustration of the head of *Synagrops japonicus* from the western Pacific Ocean (Fig. E). Note, however, the absence of spines on the opercle and dentary in this species. *Synagrops japonicus* is considered to be a senior synonym of *S. bellus* by some authors.

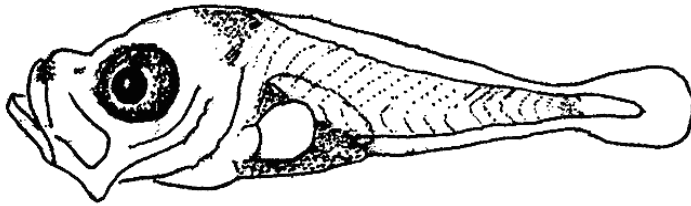
**E. 10.7 mmSL**

Note: Some authors include the acropomatids in the Percichthyidae or "oceanic percichthyids" (*sensu* Gosline, 1966). Monophyly has not been established for the Percichthyidae, but the acropomatids do not share the characters that presently define it (e.g. G.D. Johnson, 1984). Also see similar larvae in *Symphysanodon berryi* (Symphysanodontidae) which some authors include within the Acropomatidae (e.g. G. D. Johnson, 1984; Nelson, 1994)

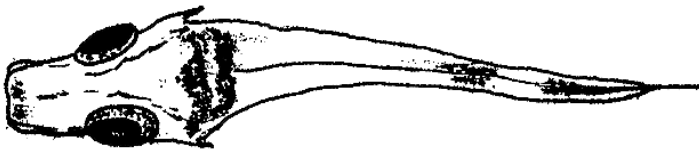
Figures: Adult: H. L. Todd (Goode and Bean, 1896); **A–D:** Ruiz–Carus, 2003; **E:** Okiyama, 1988

References: G. D. Johnson, 1984; Okiyama, 1988; Mejia *et al.*, 2001; Ruiz–Carus, 2003

Synagrops bellus



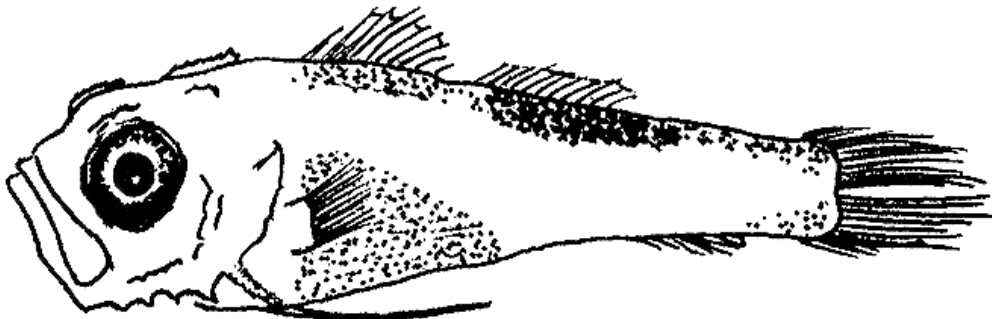
A. 2.7 mmSL (*Synagrops* sp.)



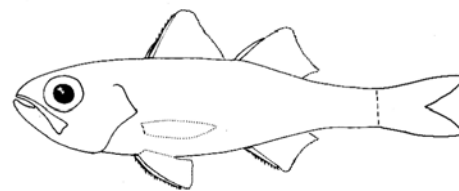
B. 2.7 mmSL (*Synagrops* sp.)
(Dorsal View)



C. 6.0 mmSL



D. 7.7 mmSL

Synagrops spinosus* Shultz, 1940*Acropomatidae****Keelcheek bass**

Range: Western North Atlantic Ocean from North Carolina to Suriname, including Gulf of Mexico and Caribbean Sea; also several records from continental slope of Georges Bank as far east as 68°57'W; juveniles reported from Canadian waters as far east as 40°51'N, 61°34'W (Banquereau Bank); also occurs in western Pacific Ocean

Habitat: Benthopelagic along edges of continental and island shelves and slopes in depths of 87–544 m

Spawning: Possibly bi-modal; Apr–Jun and Sep–Jan

Eggs: – Undescribed

Larvae:

- Larvae initially thick through the pectoral region, then taper slightly posteriorly; bodies are laterally compressed; later larvae have thicker caudal peduncle
- Head length 33–35% SL; eye large; mouth large, almost vertically oriented
- Flexion occurs at lengths of 3.5–4.5 mm
- Sequence of fin ray formation: C, D₁, D₂, A–P₂, P₁; all fin rays complete by 8.0 mm
- Anterior edges of 2nd spine of D₁, 2nd spine of A and 1st spine of P₂ serrated beginning in late larvae (see adult figure); all of these spines are smooth in *Synagrops bellus*
- Pigmentation includes saddles of melanophores on upper body along dorsal fin base; other pigment occurs on nape, tip of snout, base of caudal fin rays and over gut; older larvae develop pigment along entire dorsum of body and have pigment on both edges of caudal peduncle
- Pigment at base of D₂ and on caudal peduncle is darker than similar pigment in *S. bellus*
- Head spines are generally better developed than those in *S. bellus*

Meristic Characters

Myomeres:	25
Vertebrae:	10+15=25
Dorsal fin rays:	IX, I, 9
Anal fin rays:	II, 7–8
Pectoral fin rays:	15–17
Pelvic fin rays:	I, 5
Caudal fin rays:	9+8 (PrC)

Head spine checklist:

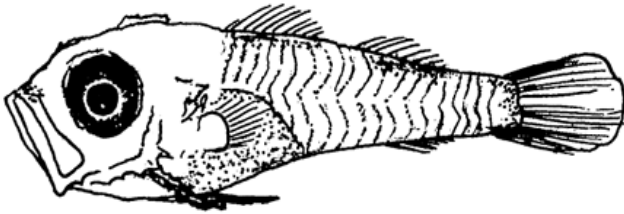
Supraoccipital:	strongly serrated ridge
Frontal:	small, serrated ridge
Supraocular:	serrated ridge
Preopercle:	very well developed, serrated spine at angle, plus several shorter spines
Subopercle:	spines on edge
Opercle:	small spines along edge
Posttemporal:	small, serrated ridge

Note: Some authors include the acropomatids in the Percichthyidae or "oceanic percichthyids" (*sensu* Gosline, 1966). Monophyly has not been established for the Percichthyidae, but the acropomatids do not share the characters that presently define it (e.g. G. D. Johnson, 1984). Also see similar larvae in *Symphysanodon berryi* (Symphysanodontidae) which some authors include within the Acropomatidae (e.g. G.D. Johnson, 1984; Nelson, 1994)

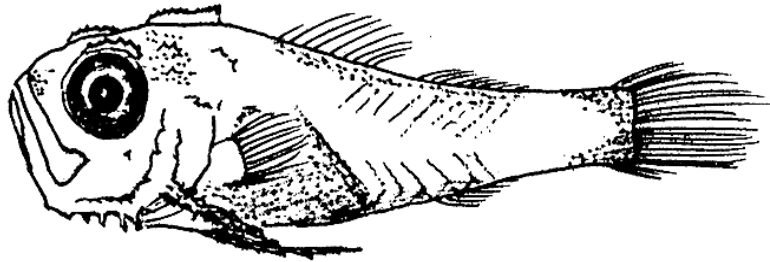
Figures: Adult: Uyeno *et al.*, 1983 (modified); A–C: Ruiz–Carus, 2003; D: Betsy Washington (G.D. Johnson, 1984)

References: Scott and Scott, 1988; Mochizuki, 1989; Mochizuki and Gultneh, 1989; Moore *et al.*, 2003

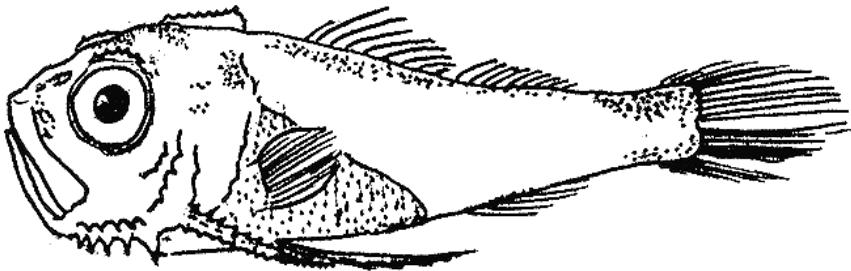
Synagrops spinosus



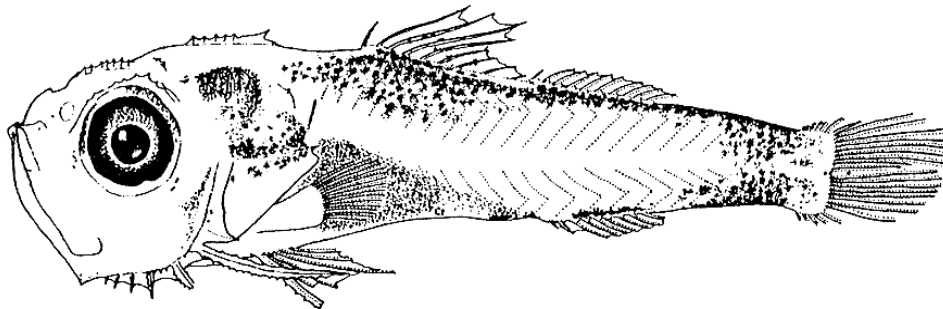
A. 6.0 mmSL



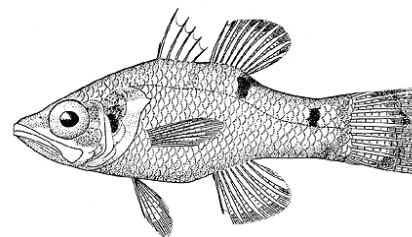
B. 7.2 mmSL



C. 8.1 mmSL



D. 8.5 mmSL

Apogon maculatus* (Poey, 1860)*Apogonidae****Flamefish**

Range: Western Atlantic Ocean from Massachusetts to Brazil, including the Bahamas and Gulf of Mexico; primarily in tropical waters; larvae have been collected from Canadian waters as far north as 43°20'N, 62°20'W (off Scotian Shelf and Emerald Bank)

Habitat: Demersal, nocturnal, typically associated with coral reefs, caves, crevices

Spawning: Elaborate courtship, mouth brooders; males incubate the eggs (75–100) in their oral cavities

Eggs: – Undescribed

Larvae: – Larvae of western North Atlantic species undescribed (but see Note 4); characters below pertain to a late larva undergoing transformation to juvenile stage (Fig. A)

- Body shape characteristic: short-based D_1 , D_2 and A fins combined with a long caudal peduncle and relatively long caudal fin rays; 2 dorsal fins well-separated
- Note relatively large head; head length almost 50% of SL
- Head spines present but not pronounced; see checklist below
- Dorsal and anal fin rays form relatively early (about 5.0 mm); dorsal spines relatively long; note low number of fin rays in anal fin
- Pigment includes a saddle of melanophores on flank under the D_2 fin, a belt of melanophores completely covering the posterior part of the caudal peduncle, an accumulation of spots forming a bar through the eye from snout to opercle, and a scattering of pigment on top of the head.

Meristic Characters

Myomeres:	24
Vertebrae:	10+14=24
Dorsal fin rays:	VI, I, 9
Anal fin rays:	II, 8
Pectoral fin rays:	12
Pelvic fin rays:	I, 5
Caudal fin rays:	6–10+9+8+5–10
Supraneurals:	Patterns vary

Head spine checklist:

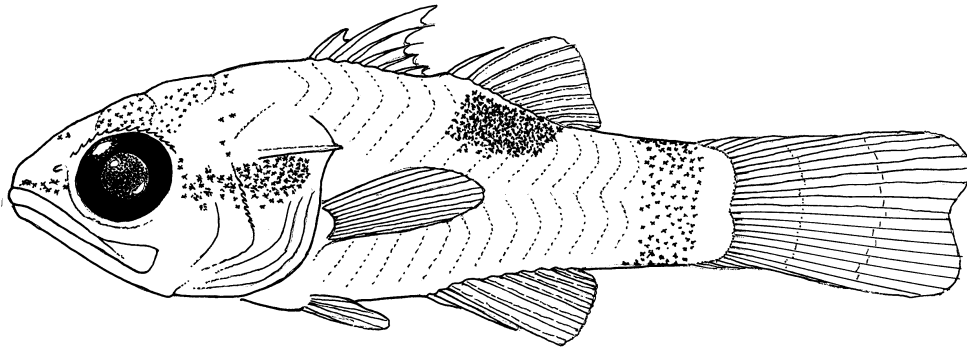
Supraocular: series of very small spines
 Preopercle: posterior edge very finely serrate
 Opercle: a relatively pungent spine crosses upper part

- Note:**
1. Larvae of *Apogon pseudomaculatus* are similar. Meristic characters coincide with those of *A. maculatus*. Pigment is also similar but melanophores on the caudal peduncle are restricted to the dorsal part. See illustration in Lara (2006a).
 2. See Okiyama (1988) for larval series of 11 species of *Apogon* (plus 4 unidentified *Apogon* sp. larvae) from the western Pacific Ocean. All of these demonstrate similar head spination consisting of a series of small spines along the edge of preopercle (more pronounced in some species), a pungent spine across the upper opercle, and posttemporal spines in a few. The larva of one species has a single spine in the supraoccipital position. See figures for variation in these spines. Pigment patterns vary distinctly between the larvae of these 15 species and are presumably useful in western Atlantic larvae as well.
 3. Head spination varies in the Apogonidae, with some spines occurring on the following bones in some or a few species: supraoccipital, frontal (supraocular), preopercle, opercle, subopercle and posttemporal (G. D. Johnson, 1984). In *Apogon*, (small) spines occur most commonly on opercle and preopercle, less commonly on the posttemporal.
 4. Illustrations and descriptions of 15 apogonid species (plus a few not identified to species), primarily concentrating on late larvae or early juveniles that occur in tropical waters south of the present study area, are presented in Lara (2006a).

Figures: Adult: (*Apogon pseudomaculatus*) U.S. National Museum; **A:** Redrawn from Fahay, 1975; **B–G:** Okiyama, 1988

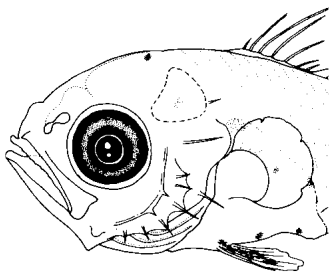
References: Coleman, 1966; Fahay, 1983; Thresher, 1984; G.D. Johnson, 1984; Okiyama, 1988

Apogon maculatus

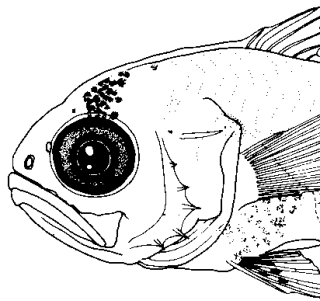


A. 22.0 mmFL

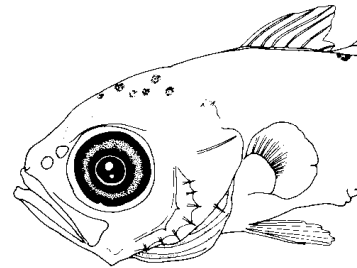
Examples of head spination in larvae of *Apogon* from the western Pacific Ocean



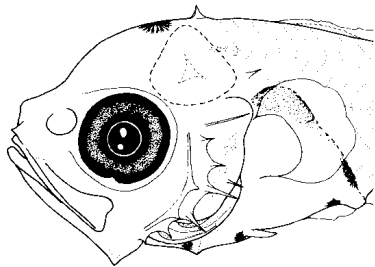
B. 5.5 mmSL *A. bifasciatus*



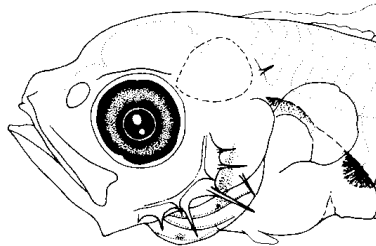
C. 8.5 mmSL *A. coccineus*



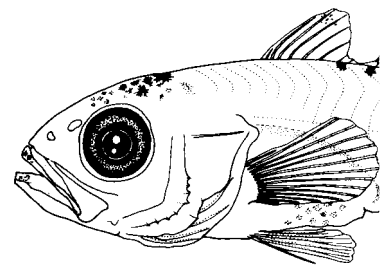
D. 7.5 mmSL *A. kiensis*



E. 4.5 mmSL *A. lineatus*



F. 4.7 mmSL *Apogon* sp. 3



G. 14.9 mmSL *A. semilineatus*

For color images of larvae, see “Larval Fishes from Carrie Bow Cay, Belize - National Museum of Natural History - Division of Fishes” at <http://www.nmnh.si.edu/vert/larval/apogon.html>
 Included in the above website is a color image of a 12-mm *Apogon maculatus* larva (USNM 353961). Pigment is similar to the 22-mm specimen (Fig. A).

Brama brama* (Bonnaterre, 1788)*Bramidae****Atlantic pomfret**

Range: North Atlantic Ocean and Mediterranean Sea; in the western North Atlantic from Grand Bank to northern South America; also temperate South Pacific Ocean

Habitat: Epi- to mesopelagic in depths of 0–400 m

Spawning: Summer, pelagic eggs and larvae

Eggs: – Pelagic; chorion smooth; diameter 1.55–1.60 mm; 1 large, oval oil globule 0.40×0.32 m; yolk homogeneous

Larvae:

- Early larvae have fairly slender body (body depth about 28% SL), but body then becomes deep, especially through pectoral region
- Body becomes laterally compressed early in development
- Teeth form early on premaxilla
- Flexion occurs at 6.5–7.0 mmSL
- Note long fin rays in P_1 and P_2 fins
- Sequence of fin ray formation: $P_1 - C_1 - P_2 - D$ and A and C_2
- Early forming spinous scales on body; all scales complete by 15 mm
- Head spines restricted to edge of preopercle; appear at smallest size, evenly spaced along edge in early larvae, then become a more pronounced cluster at lower angle
- Pigmentation concentrated on head, branchiostegals and gut in early larvae; gut cavity becomes heavily pigmented

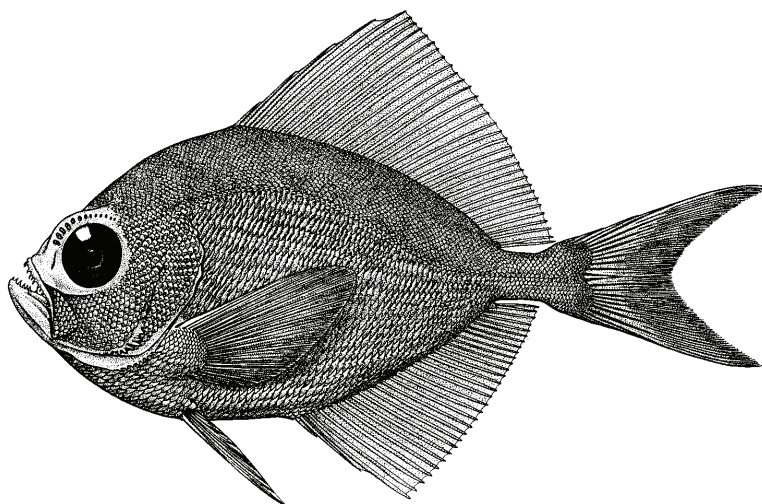
Meristic Characters

Myomeres:	41–43
Vertebrae:	16–17+24–25=41–43
Dorsal fin rays:	35–38
Anal fin rays:	29–32
Pectoral fin rays:	20–23
Pelvic fin rays:	I, 5
Caudal fin rays:	9+8 PrC
Supraneurals:	0/0/0/P/P/

Head spine checklist:

Preopercle: series of spines along edge becomes a cluster at lower angle

Note: 1. All larval bramids are characterized by high number of myomeres and large, voluminous fins with weak (or no) spines. Head spines may also occur on opercle, subopercle and interopercle in some species (G. D. Johnson, 1984)

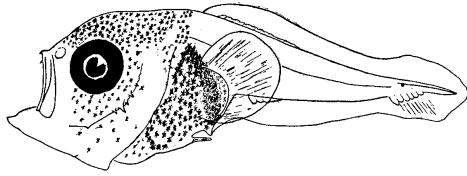
Early Juvenile:

G. 42.7 mmSL

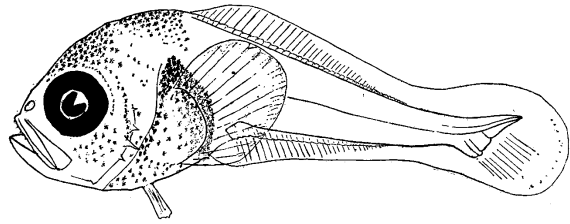
Figures: Adult: N. Strekalovsky (Mead, 1972); A–B, E: Schmidt, 1918; C–D, F–G: N. Strekalovsky (Mead, 1972)

References: Schmidt, 1918; Sanzo, 1928; Mead, 1972; G. D. Johnson, 1984; Scott and Scott, 1988

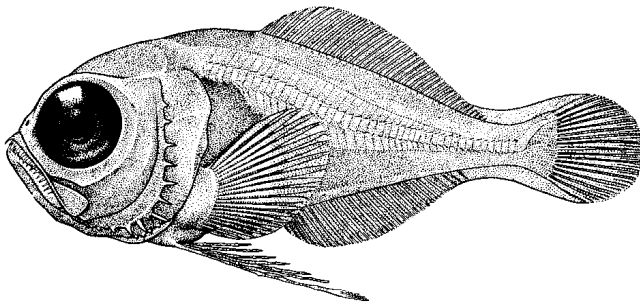
Brama brama



A. 5.25 mmSL

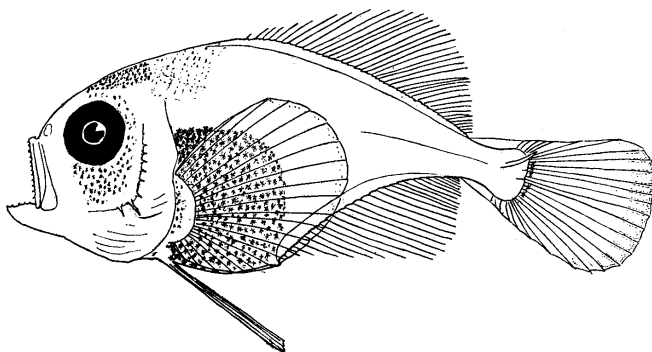
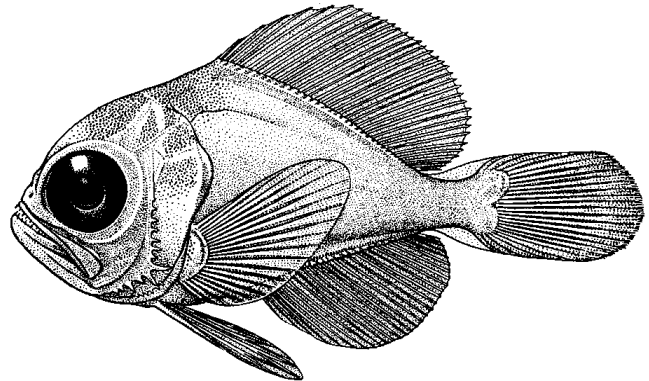


B. 7.0 mmSL

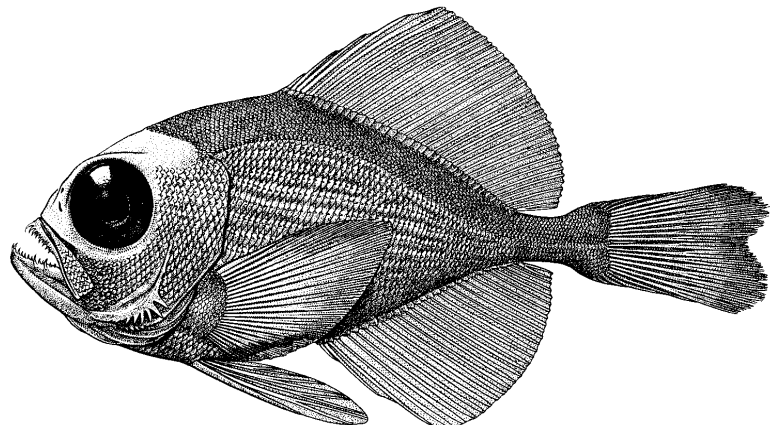


C. 7.5 mmSL

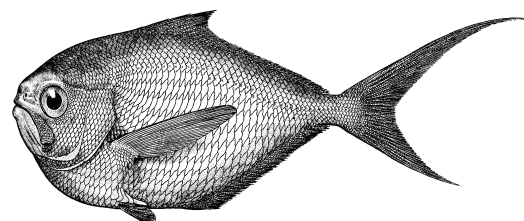
D. 9.5 mmSL



E. 14.0 mmSL



F. 19.7 mmSL

Brama caribbea* Mead, 1972*Bramidae****Caribbean pomfret**

Range: Western North Atlantic Ocean, primarily in Gulf of Mexico and Caribbean Sea to northern South America; small juveniles barely reach study area in Gulf Stream off Cape Hatteras

Habitat: Epi- to mesopelagic; oceanic, but associated with land masses and islands

Spawning: Aug–May, through the winter

Eggs: – Undescribed

Larvae:

- Body deep, especially through the pectoral region; becomes laterally compressed; later larvae and juveniles have disc-shaped body
- Teeth form early on premaxilla
- Flexion occurs at size <5.0 mmSL
- Note moderately long fin rays in P₁ and P₂ fins
- Sequence of fin ray formation: P₁ – P₂ – D₂ – A – D₁ – C
- Early forming spinous scales on body; all scales complete by 12.8 mmSL
- Head spines restricted to edge of preopercle where they are almost uniform in size, slightly longer at lower angle of preopercle; spines become obscured at 17–25 mm; see checklist below
- Pigmentation in early larvae includes clusters of melanophores on top of head, dorsally on peritoneum, and on preopercle behind the eye; in later larvae pigment concentrated on anterior rays of dorsal fin

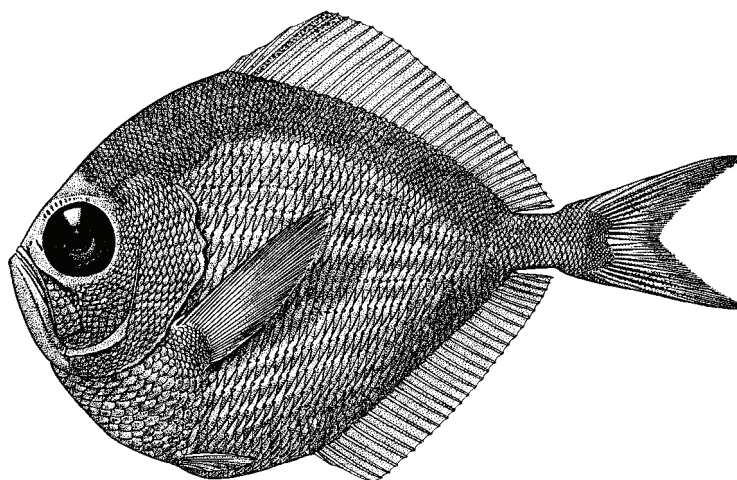
Meristic Characters

Myomeres:	36–38
Vertebrae:	15–16+20–21=36–38
Dorsal fin rays:	32–35
Anal fin rays:	27–30
Pectoral fin rays:	19–21
Pelvic fin rays:	I, 5
Caudal fin rays:	9+8 PrC
Supraneurals:	0/0/0/P/P/

Head spine checklist:

Preopercle: series of spines, longest at angle, graduated and smaller on upper and lower edges

Note: 1. All larval bramids are characterized by high number of myomeres, and large, voluminous fins, with weak (or no) spines. Head spines may also occur on opercle, subopercle and interopercle in some species (G. D. Johnson, 1984)

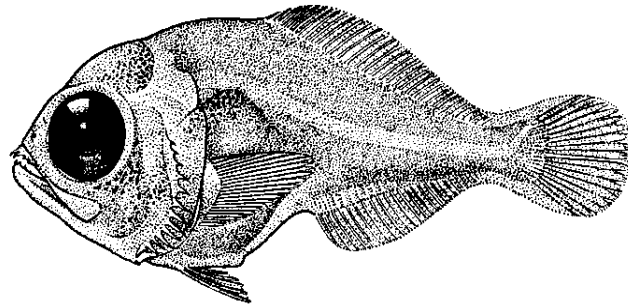
Early Juvenile:

D: 38.0 mmSL

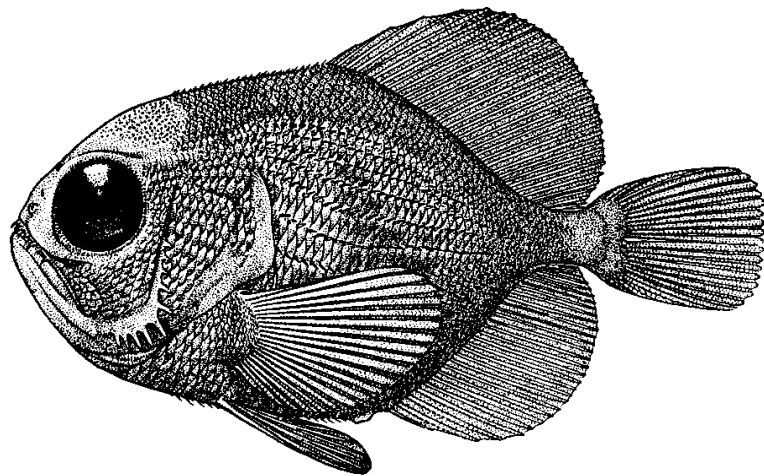
Figures: Adult: N. Strekalovsky (Mead, 1972); A–D: N. Strekalovsky (Mead, 1972)

References: Mead, 1972; G.D. Johnson, 1984

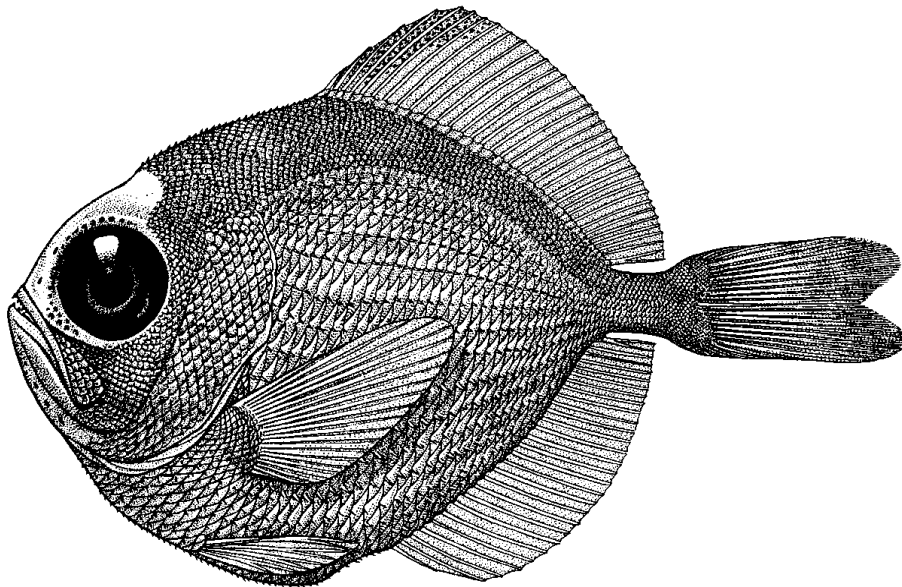
Brama caribbea



A. 4.8 mmSL



B. 9.2 mmSL



C. 17.0 mmSL

Brama dussumieri* Cuvier, 1831*Bramidae****Lowfin pomfret**

Range: Worldwide, mostly in tropical waters; in the western North Atlantic Ocean from North Carolina to northern South America, including Gulf of Mexico and Caribbean Sea; small juveniles barely reach study area in Gulf Stream off Cape Hatteras

Habitat: Pelagic, oceanic; most common in open ocean, far from land

Spawning: Undescribed; possibly prolonged or year-round

Eggs: – Undescribed

Larvae:

- Body deep, especially through the pectoral region; becomes laterally compressed
- Teeth form early on premaxilla and anterior mandible
- Flexion begins at about 4.2–5.3 mm
- Note long fin rays in P_1 and P_2 fin (especially P_1)
- Sequence of fin ray formation: $P_1 - C_1 - P_2 - D$ and $A - C_2$
- Early forming spinous scales appear at about 7.5 mm; scales complete by 12.0 mm
- Head spines restricted to edge of preopercle where they are of approximate equal length; most disappear, leaving small cluster at angle of preopercle; see checklist below
- Pigmentation in early larvae includes melanophores over the brain and peritoneum; a dark bar extends ventrally and posteriorly from the eye; scattered pigment covers the branchiostegal membrane; entire body is dusky anterior to level of the dorsal fin origin; contrast between dark anterior and pale posterior body becomes more conspicuous with growth; in sizes >18.0 mm, a dark bar forms through center of dorsal fin and on most of caudal fin

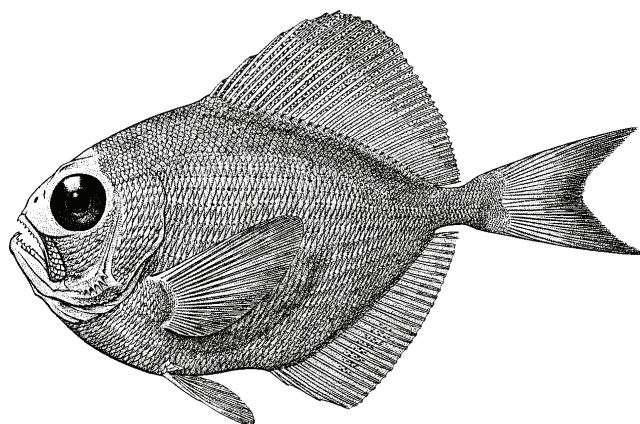
Meristic Characters

Myomeres:	40–43
Vertebrae:	14–17+24–26=40–43
Dorsal fin rays:	33–35
Anal fin rays:	27–28
Pectoral fin rays:	19–21
Pelvic fin rays:	I, 5
Caudal fin rays:	9+8 PrC
Supraneurals:	0/0/0/P/P/

Head spine checklist:

Preopercle: series of spines along edge, almost equal in length; later larvae with small cluster of spines at angle

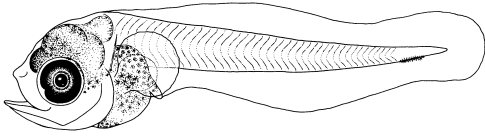
Note: 1. All larval bramids are characterized by high number of myomeres, and large, voluminous fins, with weak (or no) spines. Head spines may also occur on opercle, subopercle and interopercle in some species (G. D. Johnson, 1984)

Early Juvenile:**F. 38.7 mmSL**

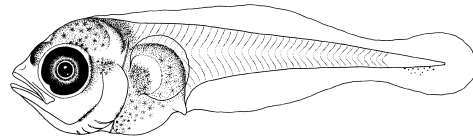
Figures: Adult: N. Strekalovsky (Mead, 1972); A–C: Barbara Sumida McCall (Moser and Mundy, 1996; D–F: N. Strekalovsky (Mead, 1972)

References: Mead, 1972; G. D. Johnson, 1984; Moser and Mundy, 1996

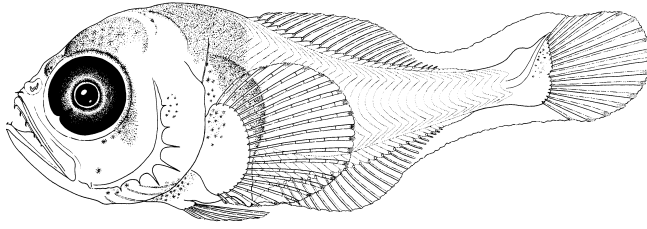
Brama dussumieri



A. 3.4 mmSL

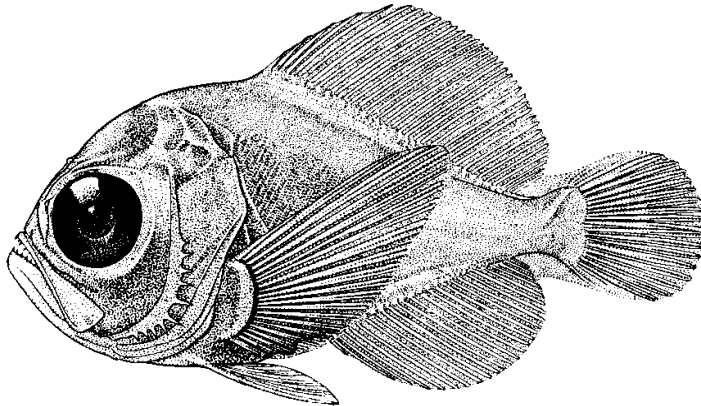


B. 3.8 mmSL

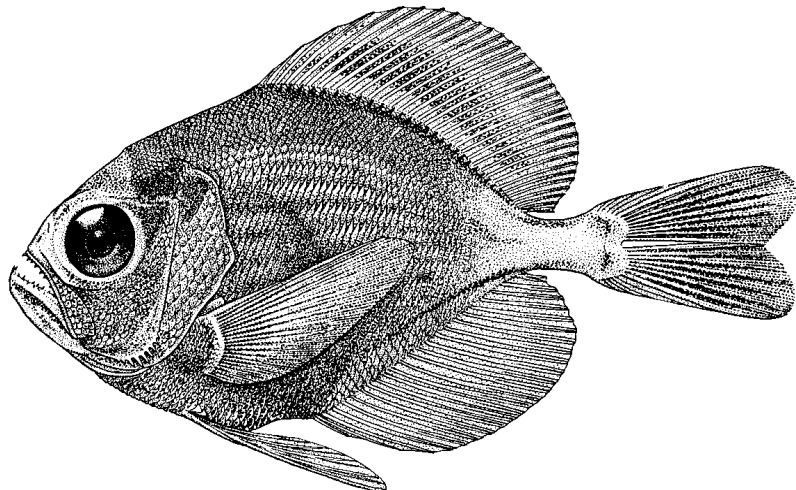


C. 5.0 mmSL

Note melanophores under tip of notochord in early stages



D. 6.5 mmSL



E. 18.1 mmSL

Pteraclis carolinus* Valenciennes, 1833*Bramidae****Fanfish**

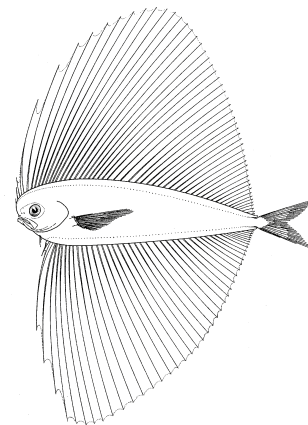
Range: Western North Atlantic Ocean, especially the Sargasso Sea; larger juveniles have occurred in the study area at least as far north as 37°04'N, 50°57'W

Habitat: Epi- to mesopelagic, strongly oceanic, concentrated in a belt across the North Atlantic Ocean between 20° and 40°N

Spawning: Undescribed

Eggs: – Undescribed

- Larvae:**
- Body deep, especially through the pectoral region; does not become as disc-shaped as other bramids
 - Curved, fang-like teeth form anteriorly in both jaws at small size
 - Flexion occurs at size of 4.8–6.0 mmSL
 - Note long fin rays in P₁ and P₂ fins; pelvic fin rays very long in juvenile
 - Sequence of fin ray formation: P₁ – P₂ – D₂ – A – D₁ – C
 - Origins of dorsal and anal fins migrate forward during development; dorsal fin origin final position anterior to level of eye; anal fin origin final position under mid-eye
 - Pelvic fin rays extend beyond anal fin origin at all sizes; 2nd ray becomes long and filamentous
 - Early forming spinous scales begin at about 8.0 mm
 - Head spines restricted to edge of preopercle; 4 equal-sized spines in early stages; more spines added in later larvae, but the 4 at angle of preopercle remain the most prominent; see checklist below
 - Pigmentation in earliest stages restricted to top of head, branchiostegal membrane (where it is dense) and peritoneum; pigment on anterior parts of dorsal and anal fins begins at about 8–10 mm, spreads posteriorly, but posterior ends of both remain unpigmented at 25 mm; pigment at tips of elongate pelvic fin rays present between 10 and 25 mm; caudal fin unpigmented at all sizes;

**Meristic Characters**

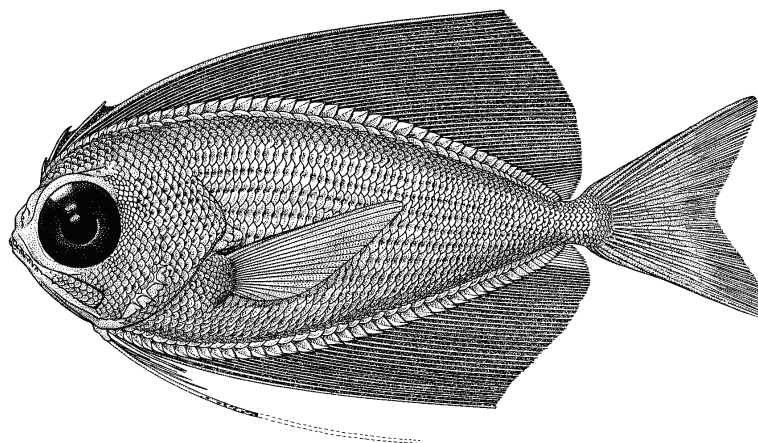
Myomeres:	49–53
Vertebrae:	23–25+24–27=49–52
Dorsal fin rays:	48–54
Anal fin rays:	42–47
Pectoral fin rays:	18–20
Pelvic fin rays:	1,5
Caudal fin rays:	9+8 PrC
Supraneurals:	none

Head spine checklist:

Preopercle: four prominent spines at angle, few smaller ones on upper limb

Early Juvenile:

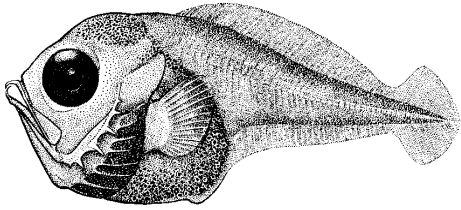
G. 24.6 mmSL



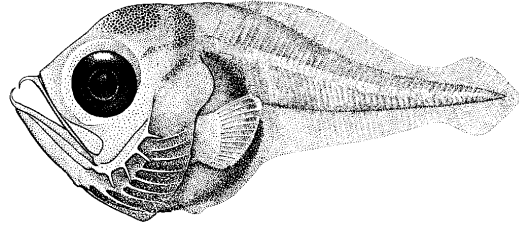
Figures: Adult: D. Bourne (Mead, 1972); A–G: N. Strekalovsky (Mead, 1972)

References: Mead, 1972; G.D. Johnson, 1984

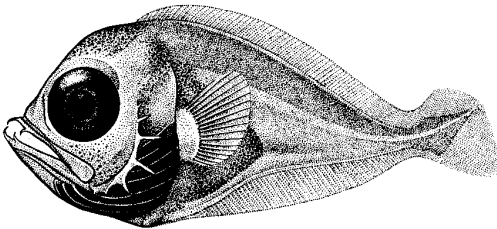
Pteraclis carolinus



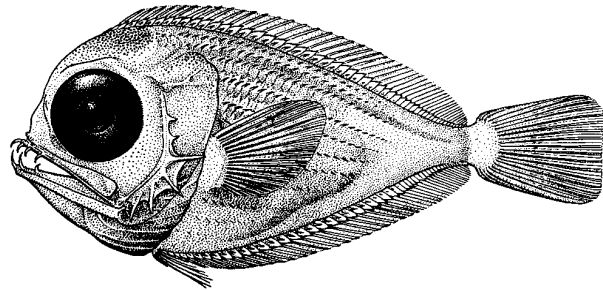
A. 3.5 mmSL



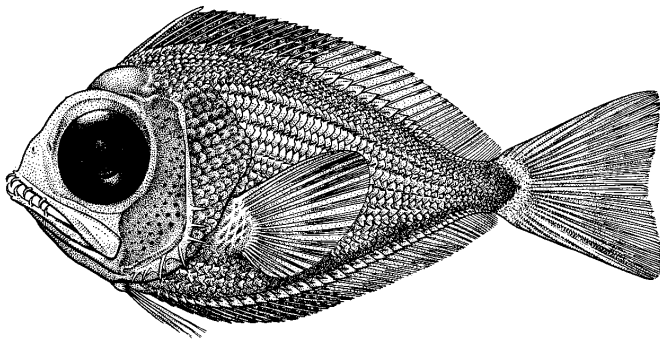
B. 4.2 mmSL



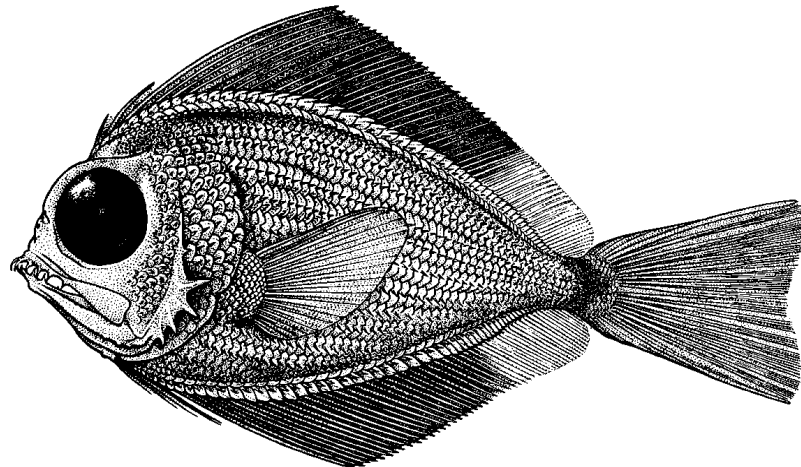
C. 5.5 mmSL



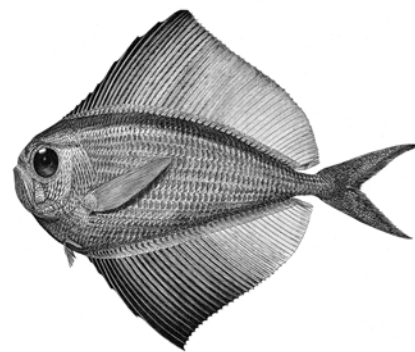
D. 8.0 mmSL



E. 10.0 mmSL



F. 12.5 mmSL

Pterycombus brama* Fries, 1837*Bramidae****Atlantic fanfish**

Range: North Atlantic Ocean and Mediterranean Sea; in the western North Atlantic from Newfoundland, Grand Bank and Flemish Cap to Caribbean Sea

Habitat: Epi- to mesopelagic in depths of 25–300 m

Spawning: Undescribed

Eggs: – Undescribed

Larvae:

- Body deep, especially through the pectoral region
- Teeth restricted to several anterior, recurved canines at tips of both jaws in early larvae; teeth form on posterior part of mouth at sizes >12 mm
- Flexion occurs between 4.4 and 5.4 mm
- Note long fin rays in P₁ and P₂ fins
- Sequence of fin ray formation: P₁ – P₂ – D₂ – A – D₁ – C
- Dorsal fin origin migrates forward to final position over posterior rim of eye; anal fin origin moves anteriorly from posterior end of gut cavity to level of pectoral fin base; dorsal and anal fins lack elevated lobes until transformation to adult stage
- Early forming spinous scales complete by 10 mm
- Head spines restricted to edge of preopercle where they are small, graduated in size, and form more of a fringe than discrete spines (see figures); see checklist below
- Pigmentation in early larvae covers the top of head, nape, peritoneum and pelvic fin rays; pigment spreads posteriorly, and anteriorly from a new center on caudal peduncle at 12 mm; dorsal fin lacks all pigment at sizes <15 mm, in later stages pigment forms on proximal part of fin, then spreads; anal fin lacks all pigment at sizes <14 mm, in later stages pigment forms on proximal part of fin (rays 2–10), then spreads; pelvic fin darkly pigmented; caudal fin unpigmented at all sizes

Meristic Characters

Myomeres:	48–50
Vertebrae:	21–23+24–27=48–51
Dorsal fin rays:	48–53
Anal fin rays:	38–43
Pectoral fin rays:	20–23
Pelvic fin rays:	I, 5
Caudal fin rays:	9+8 PrC
Supraneurals:	None

Head spine checklist:

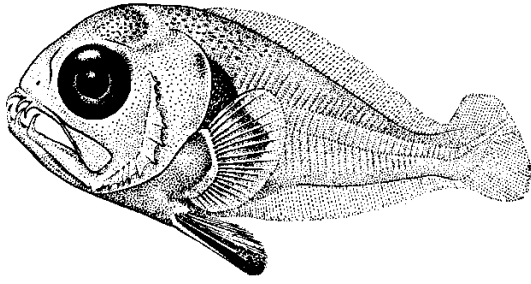
Preopercle: series of small, graduated spines forming a fringe-like edge; spines disappear at about 15 mm

Note: 1. All larval bramids are characterized by high number of myomeres, and large, voluminous fins, with weak (or no) spines. Head spines may also occur on opercle, subopercle and interopercle in some species (G. D. Johnson, 1984).

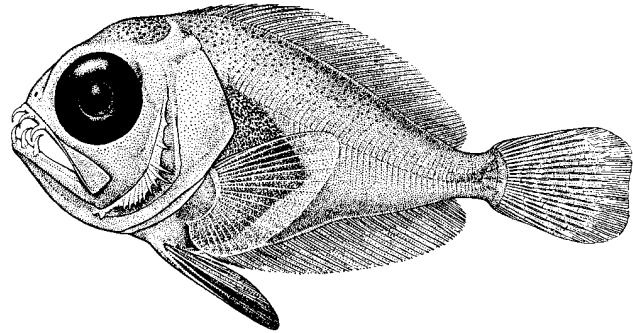
Figures: Adult: N. Strekalovsky (Mead, 1972); **A–D:** N. Strekalovsky (Mead, 1972)

References: Mead, 1972; G. D. Johnson, 1984; Scott and Scott, 1988

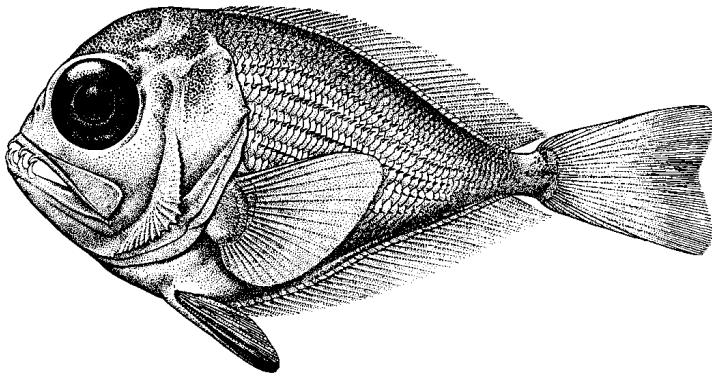
Pterycombus brama



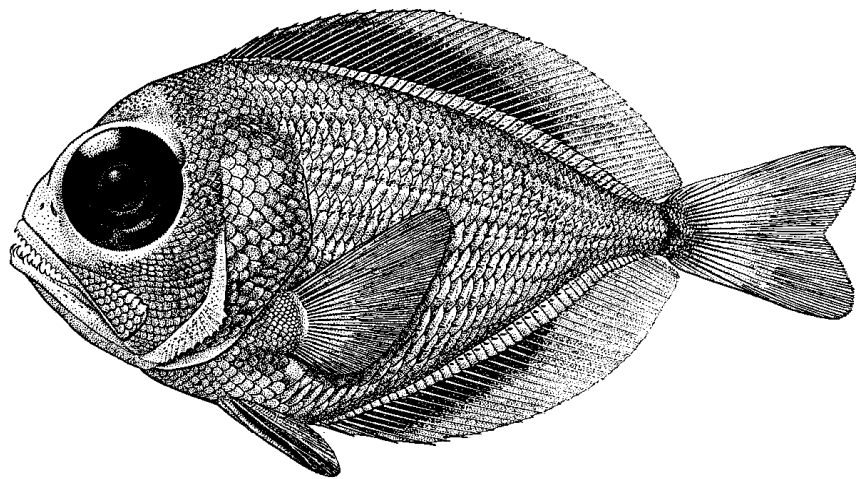
A. 5.4 mmSL



B. 7.5 mmSL



C. 9.7 mmSL



D. 16.9 mmSL

Taractes asper* Lowe, 1843*Bramidae****Rough pomfret**

Range: Eastern North Atlantic Ocean from Norway to 30°N; in the western North Atlantic rare in southern Sargasso Sea and a single record from 40°34'N, 67°01'W; also Pacific and Indian oceans

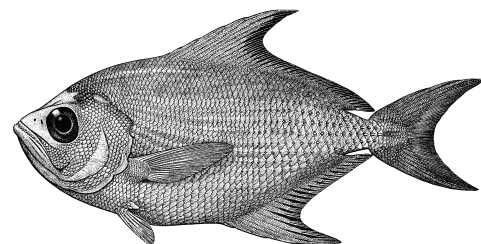
Habitat: Epi- to mesopelagic

Spawning: Undescribed

Eggs: – Undescribed

Larvae:

- Body deep, especially through the pectoral region
- Teeth on both jaws almost uniform in size; no enlarged teeth at anterior tip of either jaw
- Flexion size unknown
- Note long fin rays in P₁ and P₂ fins
- Sequence of fin ray formation: P₁ – P₂ – D₂ – A – D₁ – C; all fin rays complete by 9.1 mm
- Early forming spinous scales; size at completion unknown
- Head spines present on preopercle and interopercle; see checklist below
- Pigmentation undescribed; dorsal and anal fins described as unpigmented <15 mm; both fins may acquire banded pigment pattern in juveniles

**Meristic Characters**

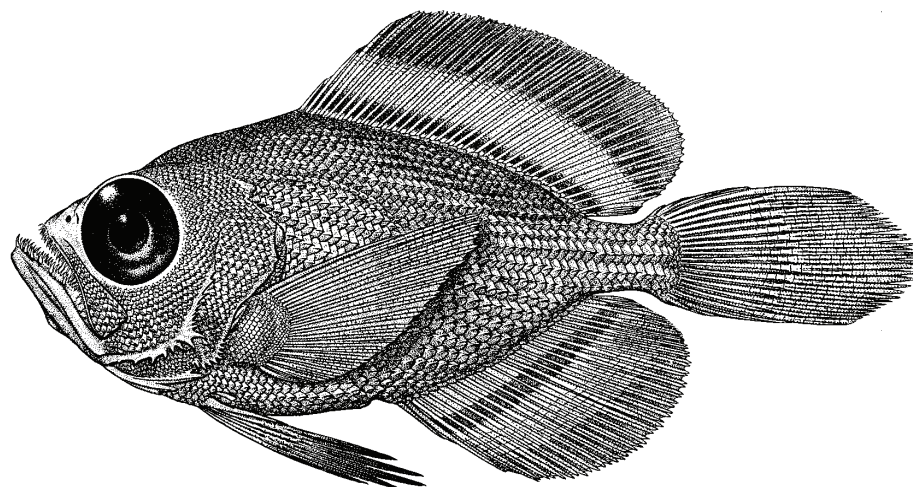
Myomeres:	41–42
Vertebrae:	17–18+22–23=41–42
Dorsal fin rays:	31–34
Anal fin rays:	23–26
Pectoral fin rays:	18–20
Pelvic fin rays:	I, 5
Caudal fin rays:	7–8+9+8+7–8
Supraneurals:	0/0/0/P/P/

Head spine checklist:

Preopercle: series of small spines on both limbs with cluster of enlarged spines at angle; spines on upper limb are small and uniform

Interopercle: series of small spines at lower angle in larger larvae and juveniles

Note: 1. All larval bramids are characterized by high number of myomeres, and large, voluminous fins, with weak (or no) spines. Head spines may also occur on opercle, subopercle and interopercle in some species (G. D. Johnson, 1984).

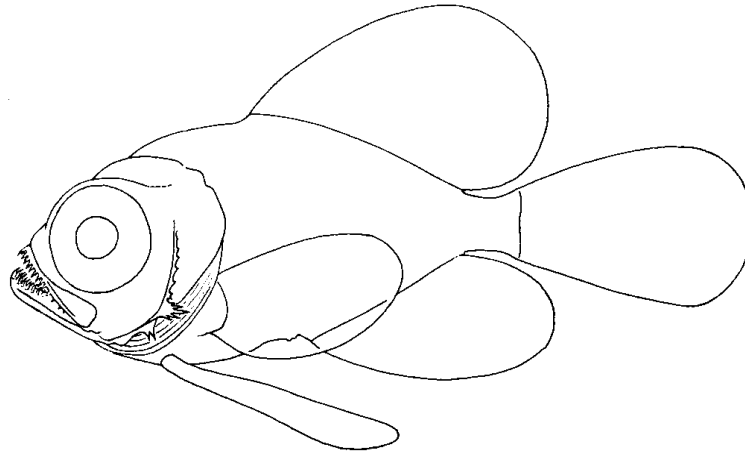
Early Juvenile:

B. 55.7 mmSL

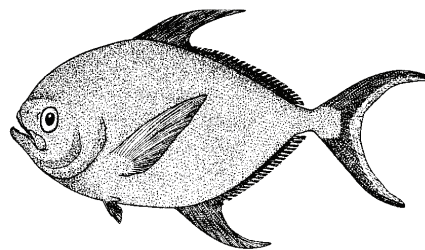
Figures: N. Strekalovsky (Mead, 1972); **A–B:** N. Strekalovsky (Mead, 1972)

References: Mead, 1972; G.D. Johnson, 1984; Moore *et al.*, 2003

Taractes asper



A. 14.9 mmSL

Taractichthys longipinnis* (Lowe, 1843)*Bramidae****Bigscale pomfret**

Range: Atlantic Ocean; in the western North Atlantic from Browns Bank to Gulf of Mexico and Caribbean Sea

Habitat: Epi- to mesopelagic in depths of 0–300 m; possibly schooling

Spawning: Undescribed; possibly during summer based on condition of ovaries

Eggs: – Undescribed

Larvae:

- Body deep, especially through the pectoral region; head large and broad
- Teeth restricted to 3–4 long recurved canines at anterior end of both jaws; teeth in posterior portion absent until 10–15 mmSL
- Flexion occurs between 5.5 and 6.5 mmSL
- Note long fin rays in P₁ and P₂ fins; pelvic fin rays do not extend beyond anal fin origin
- Sequence of fin ray formation: P₁ – P₂ – D₂ – A – D₁ – C; dorsal and anal fin rays complete at 6 mmSL
- Early forming spinous scales; scale formation complete at 8–9 mmSL
- Head spines; opercular area is "saw-toothed" in larvae; see checklist below
- Pigmentation forms on anterior parts of body first; caudal peduncle and fin remain unpigmented; pelvic fin unpigmented until transformation to adult stages

Meristic Characters

Myomeres:	44–47
Vertebrae:	19–21+24–25=44–47
Dorsal fin rays:	33–38
Anal fin rays:	27–30
Pectoral fin rays:	20–22
Pelvic fin rays:	I, 5
Caudal fin rays:	7–8+9+8+7–8
Supraneurals:	0/0/0/P/P/

Head spine checklist:

Preopercle: spines along edge almost uniform in size; form a fringed plate (not isolated spines) at <7.0 mm
 Interopercle: tiny spines situated at lower angle

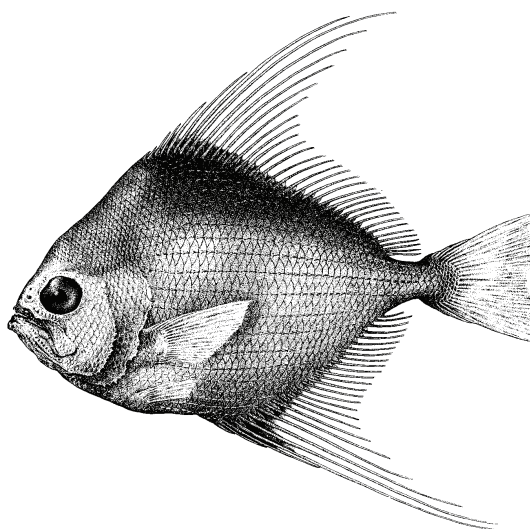
Note: 1. All larval bramids are characterized by high number of myomeres, and large, voluminous fins, with weak (or no) spines. Head spines may also occur on opercle, subopercle and interopercle in some species (G. D. Johnson, 1984)

Early Juvenile:

Edge of opercular in juvenile resembles edge of preopercle, with barely visible spines

In juveniles and adults, the 1st 5 or 6 dorsal rays are thick and unbranched; the remaining fin rays are thinner and branched

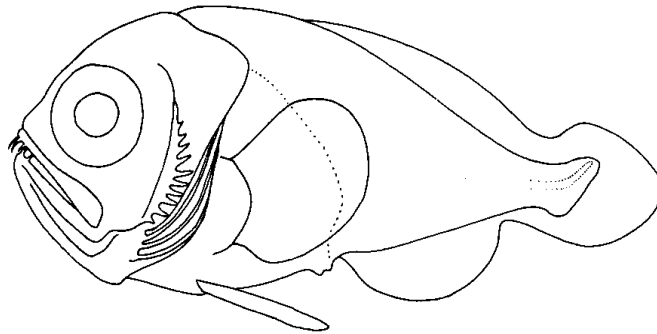
C. 74.0 mmSL



Figures: Adult: Thompson, 2002; A–B: N. Strelakovsky (Mead, 1972); C: J. Roemhild (Mead, 1972)

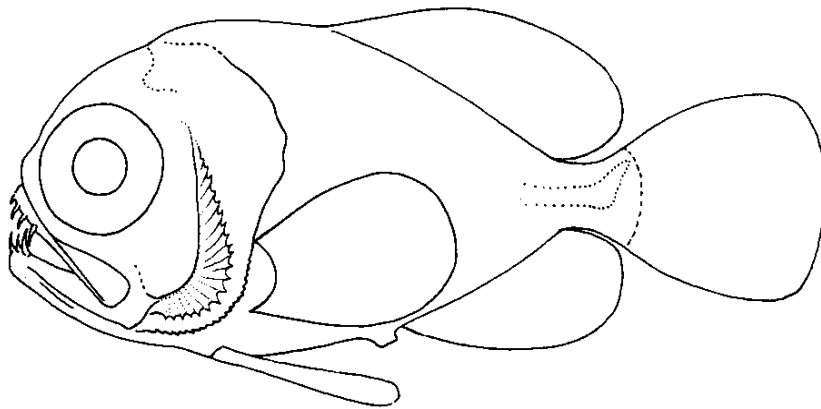
References: Mead, 1972; G. D. Johnson, 1984; Scott and Scott, 1988; Thompson and Russell, 1996; Thompson and Klein-M^{ac}Phee, 2002

Taractichthys longipinnis



A. 5.5 mmSL

Pigment over-all is dark,
with unpigmented caudal
peduncle and fin



B. 10.0 mmSL

Note broad head in this species at sizes between 5.1 and 30.0 mmSL;
the interorbital width is equal to or greater than the eye diameter