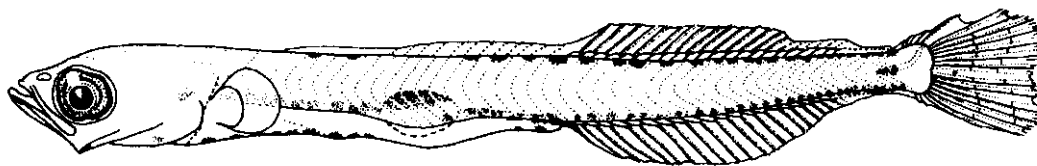




PRELIMINARY GUIDE TO THE IDENTIFICATION OF THE EARLY LIFE HISTORY STAGES OF THE GOBIOID
FISHES OF THE FAMILIES MICRODESMIDAE AND PTERELEOTRIDAE OF THE WESTERN CENTRAL NORTH
ATLANTIC

BY

WILLIAM WATSON, H. J. WALKER, JR., DAVID G. SMITH, CHRISTINE THACKER, AND GARY P. OWEN



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This report will be posted on the Bethune Cookman College NOAA Cooperative web site in 2001 at URL: <http://208.152.233.21/NOAA/> and will also appear on the SEFSC web site at URL: <http://www.sefsc.noaa.gov/> It will be chapters entitled Microdesmidae and Ptereleotridae in the "Guide to the early life history stages of fishes of the western central Atlantic".

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MICRODESMIDAE: Wormfishes

By W. Watson, H. J. Walker, Jr., D. G. Smith, C. Thacker, & G. P. Owen

In recent years the family Microdesmidae commonly has been considered to comprise two subfamilies: Microdesminae, the wormfishes; and Ptereleotrinae, the dartfishes (e.g., Hoese 1984; Birdsong et al. 1988; Nelson 1994). However, monophyly of the family has been questioned, and it has been suggested that the two subfamilies may not be closely related (e.g., Harrison 1989). Thacker (2000) in a revision clearly showed that the Microdesmidae are separate from the Ptereleotridae, now considered a separate gobioid family. Consequently the two western Atlantic ptereleotrid species are removed from consideration here and are treated separately. Approximately eight microdesmid species are known from the western central North Atlantic: *Cerdale fasciatus*, *C. floridana*, *Microdesmus bahianus*, *M. carri*, *M. lanceolatus*, *M. longipinnis*, *M. luscus*, and at least one undescribed species (Smith & Thacker 2000; Watson and Walker, unpubl. data).

The eggs of the western Atlantic microdesmids are unknown. Eggs of other genera are demersal, smooth, relatively small, and are spherical (*Gunnellichthys*: Smith 1958) or oval (*Clarkichthys*: Dawson 1974). The hatching larvae are unknown for the western Atlantic species, but probably are near 2 mm long (our smallest specimen is 1.9 mm), with pigmented eyes and a small yolk sac (c.f., *Gunnellichthys*: Leis and Rennis 2000). The larvae of the western Atlantic species are heretofore largely unknown, except for late stages (Ruple 1984; Smith & Thacker 2000) and a meeting presentation¹ showing nearly complete larval development of *Cerdale floridana* and three *Microdesmus* species.

In general, microdesmid larvae are elongate with a tubular gut ending slightly beyond midbody. All possess a large swim bladder, initially located near midgut, which migrates posteriorly with development to near the anus. The head is relatively long with an

initially short, rounded snout that elongates and becomes more acute during development. The lower jaw extends beyond the snout and it becomes large and bulbous late in the postflexion stage. The eye initially is large and round but decreases in size relative to larval length as development proceeds. There are no spines on the head or pectoral girdle. The larvae have 44–71 myomeres.

Microdesmids undergo notochord flexion between 3 and 5 mm and settle from the plankton in approximately the 20–30 mm size range. The principal caudal-fin rays form during notochord flexion and the first few segmented dorsal- and anal-fin rays form at the end of flexion. The pectoral-fin rays form next, followed by the pelvic-fin rays, during the postflexion stage.

Larval pigmentation is largely limited to the dorsal and ventral margins, and to the dorsum of the swim bladder and gut. In *Microdesmus* the pigmentation on the dorsal margin commonly increases from little or none initially, to extend along much of the length of the tail, or trunk and tail, in the flexion stage, then decreases and typically is limited to the posterior few myomeres by the late postflexion stage. *Microdesmus* commonly develops a short, midlateral streak on the caudal peduncle in the postflexion stage; *Cerdale* lacks the midlateral streak.

Microdesmids have no apparent specializations to larval life although the typical postflexion larva has an emarginate caudal fin, and dorsal and anal fins that are not continuous with the caudal fin, in contrast to the adults. The largest larval *Cerdale* and *Microdesmus* examined are 27 and 35 mm, respectively (Smith and Thacker 2000). Gilbert (1966) illustrated a 33 mm “unpigmented” specimen of *M. carri*. Dawson (1974) reported adult body coloration for a 19 mm *C. floridana*.

Microdesmids are distinguished by their elongate shape, prominent swim bladder, and tubular gut ending about midbody. They are most similar to gobiid, eleotridid, and ptereleotrid larvae, but generally have more dorsal- and anal-fin rays than those families. The microdesmids also have more

¹Walker, H. J., Jr., W. Watson, and G. P. Owen. Larval development of wormfishes (Microdesmidae) from Puerto Rico. Early Life History Section, American Fisheries Society, Fifteenth Annual Larval Fish Conference, Los Angeles, California, 23–26 June 1991.

myomeres (44–71 vs 25–37, commonly 26–27). Larvae of some gonostomatids (e.g., *Cyclothone*, *Gonostoma*) may resemble microdesmids, but they generally lack dorsal pigment, have more principal caudal-fin rays (10+9 vs 7+6), have fewer dorsal-fin rays (< 20 vs > 20), and they usually occur farther from shore than microdesmid larvae. Most other (e.g., Paralepididae).

elongate larvae are readily distinguished from microdesmids by having a much shorter gut (e.g., Labrisomidae), a much longer gut (e.g., Clupeiformes), or much different pigment patterns

Table Microdesmidae 1. Meristic characters for the described microdesmid species that occur in the western central North Atlantic. All species have 5 branchiostegal rays, 7+6 principal caudal-fin rays and I,3 pelvic-fin rays. Counts were obtained from various authors plus original data.

Species	Fin Rays			Vertebrae
	Dorsal	Anal	Pectoral	
<i>Cerdale floridana</i>	XII–XIV, 30–34	28–33	13–15	19–21 + 23–26 = 44–46
<i>Microdesmus bahianus</i>	IX–XII, 26–30	24–28	10–12	21–26 + 25–26 = 46–52
<i>M. carri</i>	XXIV–XXVII, 42–47	33–40	13	33–38 + 30–32 = 65–69
<i>M. lanceolatus</i>	XI–XIII, 51–61	48–56	12–13	21–23 + 38–44 = 60–67
<i>M. longipinnis</i>	XIX–XXIII, 40–58	36–52	12–14	29–32 + 30–39 = 59–71
<i>M. luscus</i>	XII–XIII, 37–38	35	13–14	21 + 29 = 50

MICRODESMIDAE

MERISTICS

Vertebrae:

Precaudal	19-21
Caudal	23-26
Total	44-46

Number of Fin Spines and Rays:

Dorsal Spines	XII-XIV
Dorsal Soft-Rays	30-34
Total Dorsal Elements	43-47
Anal	28-33
Pectoral	13-15
Pelvic	1,3
Caudal	
Principal	7+6
Branchiostegals	5

LIFE HISTORY

Range: Bermuda, Bahamas, southern Florida, Caribbean Sea.

Habitat: Coral reef or open coast, depth to 30 m.

ELH Pattern: Oviparous; planktonic larvae.

LITERATURE

Dawson 1974

EARLY LIFE HISTORY DESCRIPTION

EGGS: Unknown

Hatch size: <2.2 mm

LARVAE:

Length at Flexion: 3.2-4.0 mm

Length at Transformation: ca. 20 mm

Sequence of Fin Development: C, D & A, P₁, P₂

Pigmentation: None on head except usually a melanophore in otic capsule by ~6 mm. Melanophores form dorsally on last few myomeres at ~3 mm. Row of 7-13 melanophores ventrally on tail through flexion stage, increasing during postflexion stage & at ~6 mm separating into paired series (ca. 27-29 pairs by ~8 mm) along anal-fin base, except posteriormost 1-2 remain on margin & more intense than others. Dense covering of melanophores dorsally on gas bladder. 35 melanophores dorsally on hindgut through flexion stage, decreasing to 1 by ~6 mm & none by 7-12 mm. 14 melanophores anteriorly on ventral margin of gut, in postflexion stage becoming short, V-shaped patch with apex forward & not extending posterior to tip of appressed P₁ fin.

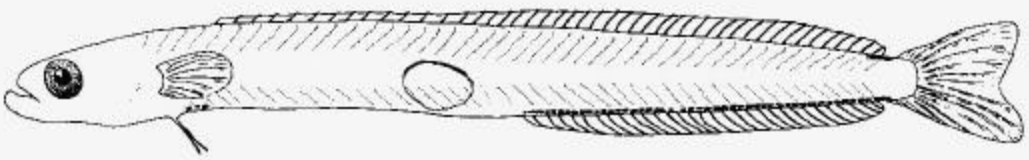
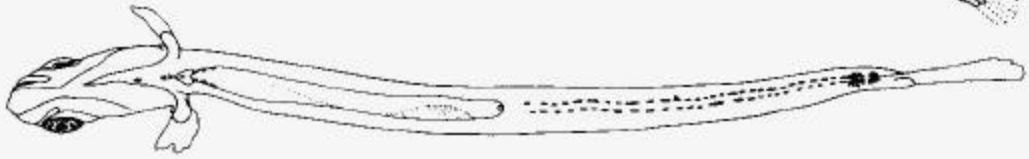
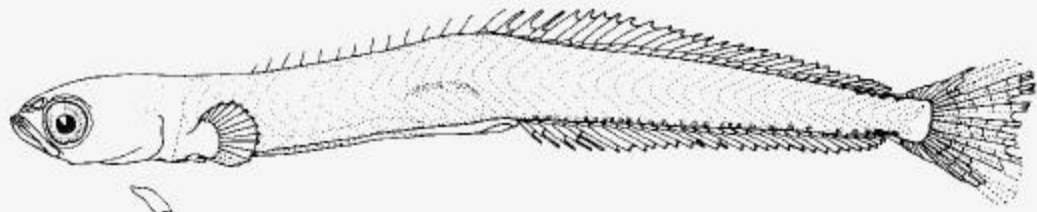
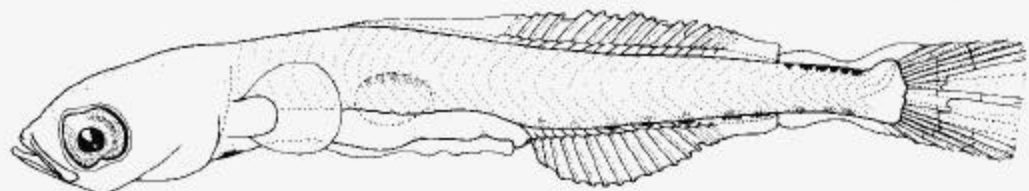
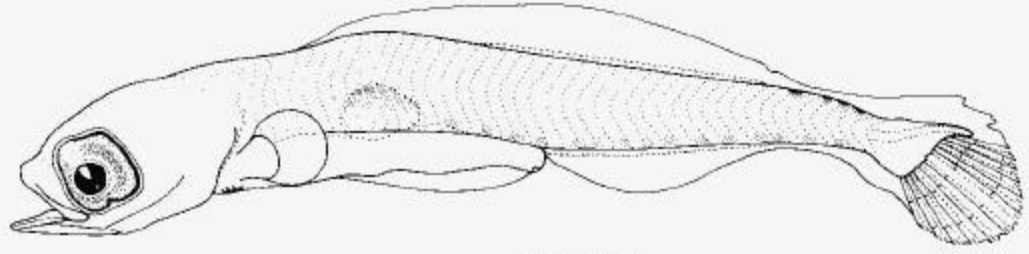
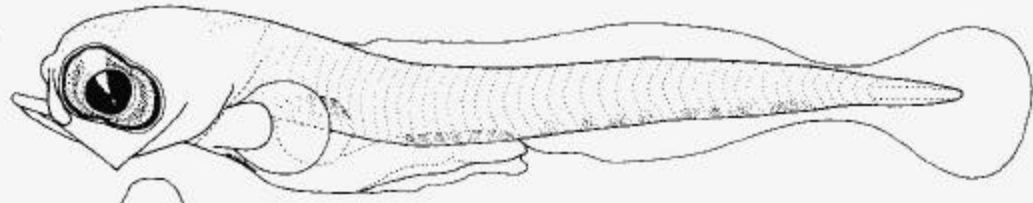
Diagnostic Characters: Myomeres 44-46 (usually 19-20 preanal); D & A meristics; dorsal pigment restricted to last few myomeres & ventral gut pigment to level of P₁ fins; ≤13 ventral melanophores on tail through flexion stage; no mid-lateral black streak on caudal peduncle in postflexion stage; fresh, late-postflexion stage specimens with orange patch on caudal peduncle.

JUVENILES:

Diagnostic Characters: Ground color tan with freckling of melanophores dorsally & ventrally; gill opening restricted, opening in front of lower part of pectoral fin.

ILLUSTRATIONS

A-G: original [W. Watson]; **H:** Smith & Thacker 2000. **A-B** PREPA 061, RO230S2N; **C** PREPA001, CO250M2; **D-E** PREPA001, RO230M1; **F-G** PREPA 001, RO230S2N.



MICRODESMIDAE

MERISTICS

Vertebrae:

Precaudal	21-26
Caudal	25-26
Total	46-52

Number of Fin Spines and Rays:

Dorsal Spines	IX-XII
Dorsal Soft-Rays	26-30
Total Dorsal Elements	36-42
Anal	24-28
Pectoral	10-12
Pelvic	1,3
Caudal	
Dorsal Procurent	6-7
Principal	7+6
Ventral Procurent	5-7
Branchiostegals	5

LIFE HISTORY

Range: Coast of Central & South America from Belize to Bahia, Brazil; also known from Martinique; larvae in Puerto Rican waters.

Habitat: Coral reef or open coast, from shallow tidepools to at least 20 m.

ELH Pattern: Oviparous; planktonic larvae.

LITERATURE

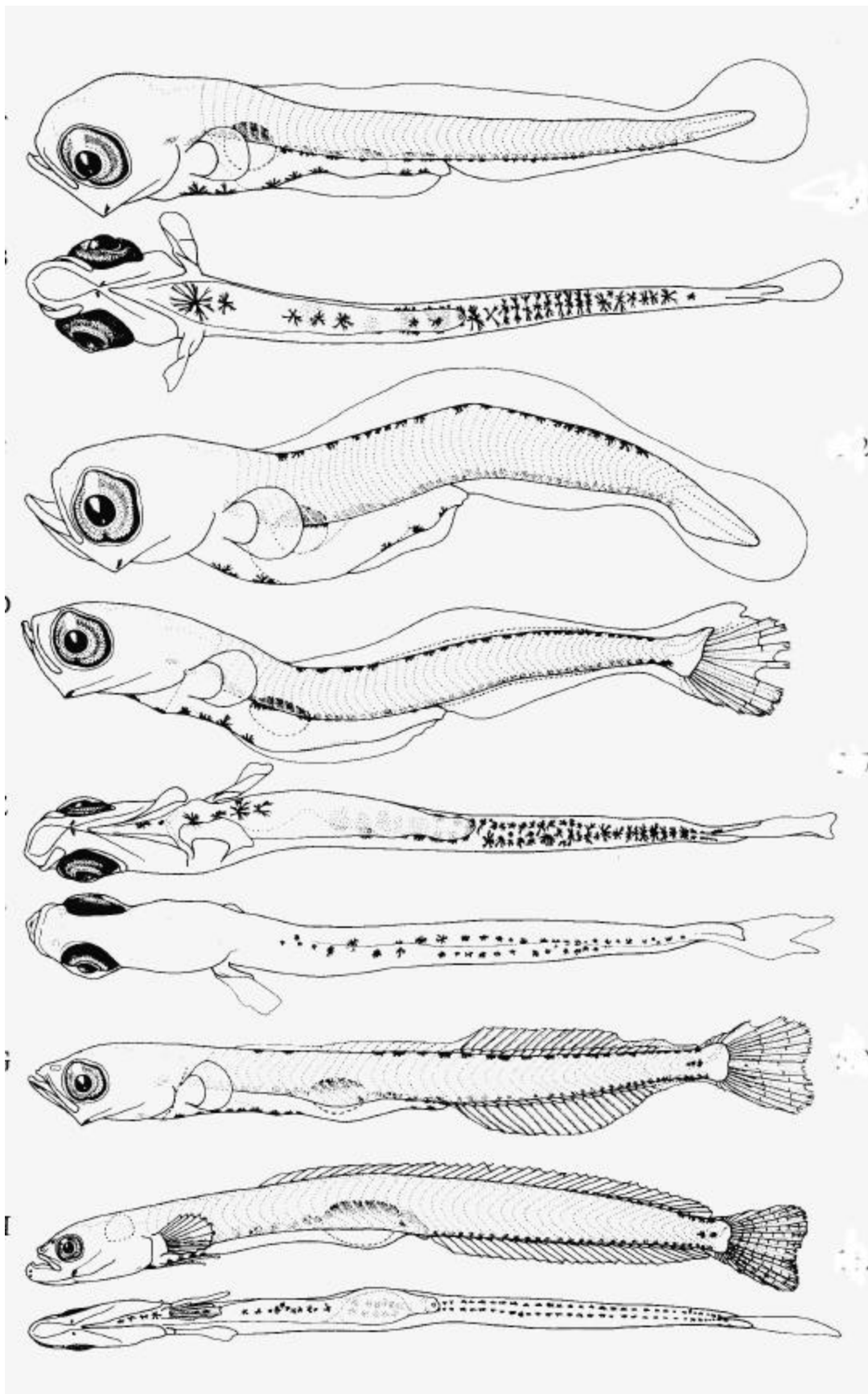
Dawson 1973

JUVENILES:

Diagnostic Characters: D-fin origin posterior to tip of appressed P₁ fin; midlateral stripe from snout to caudal peduncle; total D-fin elements 36-42.

ILLUSTRATIONS

A-I: original [W. Watson]; **A-B** PREPA 068, RO230S2; **C** PREPA 001, RO230M2N; **D-G** PREPA 080, RO230M2; **H-I** PREPA 114, CO250M1N.



***Microdesmus bahianus* Dawson 1973**

EARLY LIFE HISTORY DESCRIPTION

EGGS: Unknown

Hatch size: <2.0 mm

LARVAE:

Length at Flexion: 3.2-4.0 mm

Length at Transformation: ca. 15-16 mm

Sequence of Fin Development: C, D & A, P₁, P₂

Pigmentation: Usually melanophore at angle lower jaw, 1 under hindbrain, 1-2 on gular area by ~3 mm, & 1-2 on isthmus by 2.7-7 mm; usually 1-2 near lower jaw tip by flexion stage, may increase in postflexion stage; usually 1 in otic capsule by 5.7 mm. Dorsum of trunk & tail unpigmented initially; ca. 15-20 melanophores form dorsally from near level of gas bladder to ca. myomere 40-48 between 2.0-2.5 mm, increase early in postflexion stage & form 2 rows, usually sparser anteriorly, from myomere 5-10 to end of D fin, with 1 to few in single row on caudal peduncle. Dorsal pigment disappears beginning anteriorly at ~8-10 mm, remaining only at bases of last 1-2 fin-rays & on caudal peduncle in late postflexion stage. Single row of 20-25 melanophores ventrally on tail to last myomere (usually none on notochord tip) in preflexion stage, forming 2 rows along A-fin base during postflexion stage. 1-2 midlateral melanophores on caudal peduncle by 5.7 mm. Melanophores dorsally on gut from level of cleithra to terminus, 1-few dorsolaterally posterior to gas bladder in some larvae ≥5.7 mm. Gas bladder pigmented dorsally. Initially row of 5-10 melanophores ventrally on gut from level of cleithra to terminus, usually sparser posteriorly; may increase to 15-25 in postflexion stage, with 0-few posterior to gas bladder; short V-shaped patch ventral to P₁ fin in late larvae. Melanophores proximally on middle & lower C-fin rays in postflexion stage.

Diagnostic Characters: Myomeres 20-22+27-29; D & A meristics; Dfin origin posterior to tip of appressed P₁ fin; melanophores along most of dorsal margin from ~2 mm through ~8-10 mm; midlateral streak on caudal peduncle in postflexion stage; usually ≥20 melanophores ventrally on tail; ventral melanophores on gut mostly on anterior half.

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MICRODESMIDAE

MERISTICS

Vertebrae:

Precaudal	33-38
Caudal	30-32
Total	65-69

Number of Fin Spines and Rays:

Dorsal Spines	XXIV-XXVII
Dorsal Soft-Rays	42-47
Total Dorsal Elements	67-72
Anal	33-40
Pectoral	13
Pelvic	1,3
Caudal	
Dorsal Procurrent	
Principal	7+6
Ventral Procurrent	
Total	28
Branchiostegals	5

LIFE HISTORY

Range: Western Gulf of Mexico & western Caribbean.

Habitat: Shallow, inshore areas, sandy bottom.

ELH Pattern: Oviparous; planktonic larvae.

LITERATURE

Gilbert 1966

***Microdesmus carri* Gilbert 1966**

EARLY LIFE HISTORY DESCRIPTION

EGGS: Unknown

LARVAE:

Length at Flexion:

Length at Transformation: ca. 27 mm

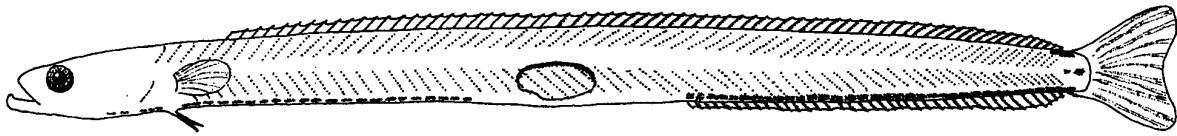
Sequence of Fin Development:

Pigmentation: In late postflexion-stage larvae: Elongate melanophores midventrally from isthmus to about half head length anterior to gas bladder, in single row anterior to level of P₁-fin base, diverging into paired series posteriorly; paired series of melanophores along A-fin base, followed by 2-3 on midventral line just behind A fin; short middorsal series on caudal peduncle; 1-2 midlateral melanophores on posterior end of caudal peduncle; melanophores on proximal portion of middle C-fin rays & distally on ventral rays; melanophores dorsally on gas bladder & posteroventrally on neurocranium; fresh specimens with broad orange patch on lateral surface of caudal peduncle.

Diagnostic Characters: Meristics; in late postflexion-stage larvae: midlateral streak of 1-2 melanophores on caudal peduncle; double row of small melanophores along midventral line between P₁-fin base & gas bladder; fresh specimens with orange on caudal peduncle.

ILLUSTRATIONS

Smith & Thacker 2000.



27 mm

MICRODESMIDAE

MERISTICS

Vertebrae:

Precaudal	21-23
Caudal	38-44
Total	60-67

Number of Fin Spines and Rays:

Dorsal Spines	XI-XIII
Dorsal Soft-Rays	51-61
Total Dorsal Elements	62-73
Anal	48-56
Pectoral	12-13
Pelvic	1,3
Caudal	
Dorsal Procurrent	6-7
Principal	7+6
Ventral Procurrent	6-7
Total	25-27
Branchiostegals	5

LIFE HISTORY

Range: Known from Gulf of Mexico to Guianas.

Habitat: Offshore at depths of ca. 20-40 m, sand or mud bottom.

ELH Pattern: Oviparous; planktonic larvae.

LITERATURE

Dawson 1962

ILLUSTRATIONS

A-F, H: original [W. Watson]; **G:** Smith & Thacker 2000. **A** PREPA 047, CO230M2; **B-D** PREPA 007, RO230B2; **E-F** PREPA 007, RO250S2; **H** no collection data.

Microdesmus lanceolatus Dawson 1962

EARLY LIFE HISTORY DESCRIPTION

EGGS: Unknown

Hatch size: <2.0 mm

LARVAE:

Length at Flexion: ca. 4.0 mm

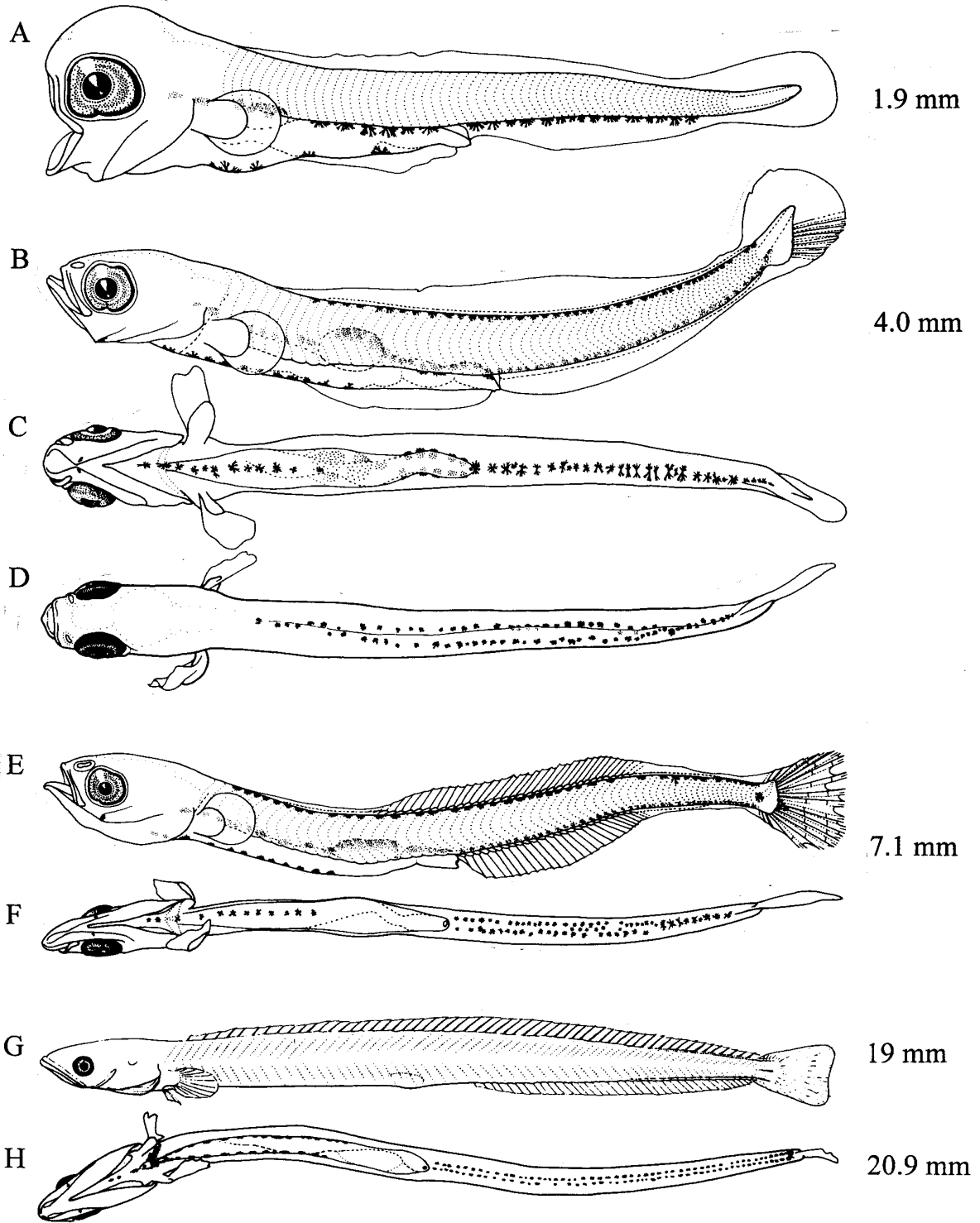
Length at Transformation: Unknown, at least 22 mm

Sequence of Fin Development: C, D & A, probably P₁, P₂

Pigmentation: Initially none on head; usually melanophore at lower jaw angle after 2.2 mm; occasionally 1 on gular area, 1-2 anteriorly on lower jaw by 2.7 mm, & 1-2 on isthmus at end of preflexion stage; 1 in otic capsule by 7.1 mm. Dorsum unpigmented initially; 2 irregular rows of melanophores at myomeres 5-15 through 50-60 by 2.2 mm, extend full length by early postflexion stage, with up to ca. 45 pairs along D-fin base plus 1-2 on caudal peduncle, decreasing after ~7.1 mm & absent except posteriorly on D-fin base & caudal peduncle by 8.8 mm. Ventral row of ca. 15-18 on tail (none on last 4-8 myomeres), increasing to 20-30 through flexion stage (none on last 1-10 myomeres) & separating into double row along A-fin base in postflexion stage. Midlateral melanophore on hypural area by 7.1 mm, up to 4-5 more may be added on caudal peduncle. Melanophores dorsally on gut from level of hindbrain to terminus, decreasing after 8 mm to none by 17 mm. Gas bladder pigmented dorsally. Row of 5-15 melanophores ventrally on gut, usually sparse or absent on posterior third, through early postflexion stage; 2 ventrolateral rows on anterior 2/3's, converging anteriorly at about level of P₁ fin, by 17 mm. Few melanophores proximally on lower or middle C-fin rays in postflexion stage.

Diagnostic Characters: Myomeres 60-69 (usually 62-66; 21-25 preanal); fin meristics; melanophores on most of dorsal margin in larvae ~2.2-7.1 mm; midlateral streak on caudal peduncle in postflexion stage; ≥15 melanophores ventrally on tail; melanophores ventrally on gut usually on anterior 50-70%, double row from level of P₁-fin base to gas bladder in late-postflexion.

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MICRODESMIDAE

MERISTICS

Vertebrae:

Precaudal	29-32
Caudal	30-39
Total	59-71

Number of Fin Spines and Rays:

Dorsal Spines	XIX-XXIII
Dorsal Soft-Rays	40-58
Total Dorsal Elements	62-80
Anal	36-52
Pectoral	12-14
Pelvic	I,3
Caudal	
Dorsal Procurrent	7-8
Principal	7+6
Ventral Procurrent	7-8
Total	27-29
Branchiostegals	5

LIFE HISTORY

Range: Widely distributed in western Atlantic, from Bermuda & northern Gulf of Mexico south through Caribbean & along coast of South America to Brazil; also from West Africa.

Habitat: Inshore & shallow offshore areas, sandy or muddy bottoms.

ELH Pattern: Oviparous; planktonic larvae.

LITERATURE

Dawson 1962; Robins & Manning 1958

JUVENILES:

Diagnostic Characters: Melanophores scattered dorsally & laterally on body, with mottling extending onto face; single stripe on dorsum & poorly defined thin lateral stripe, extending from head to caudal peduncle.

ILLUSTRATIONS

A-I: original [W. Watson]; **A** PREPA 027, RO250M1; **B** PREPA 007, CO250M2 **C-G** PREPA 007, RO250M1; **H-I** PREPA 068, CO230BIN.

Microdesmus longipinnis (Weymouth 1910)

EARLY LIFE HISTORY DESCRIPTION

EGGS: Unknown

Hatch size: <1.9 mm

LARVAE:

Length at Flexion: >3.2-4.7 mm

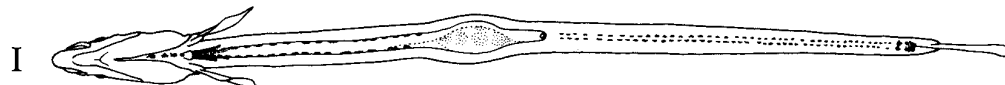
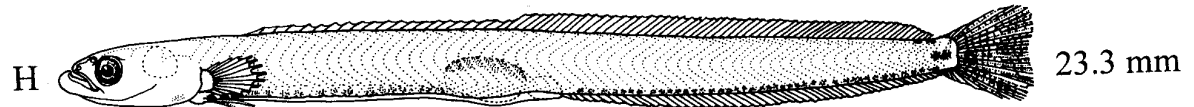
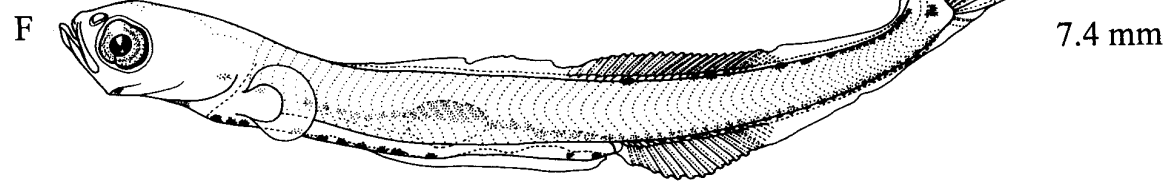
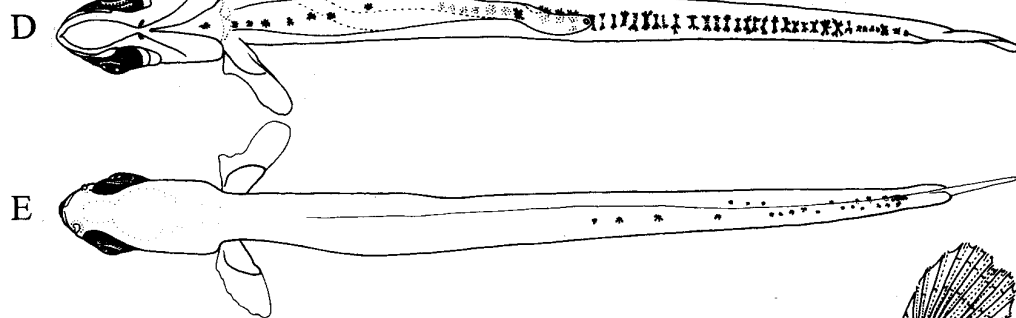
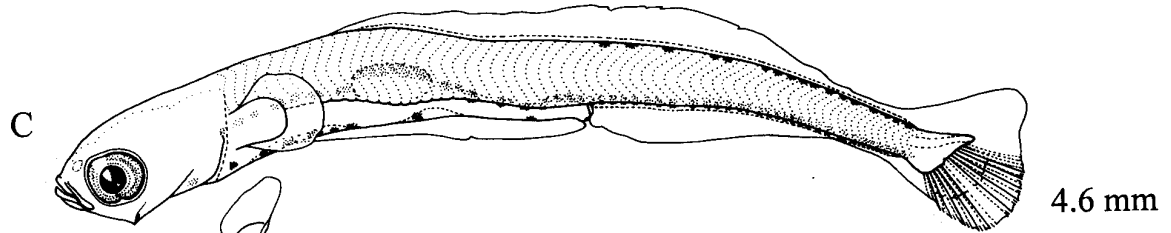
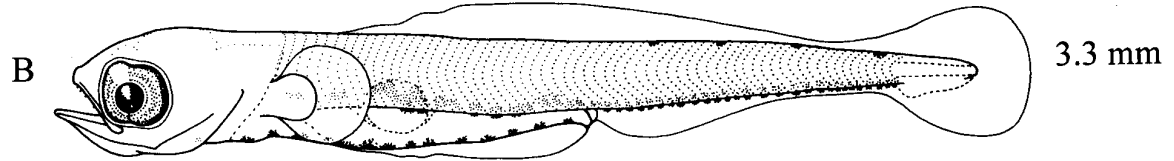
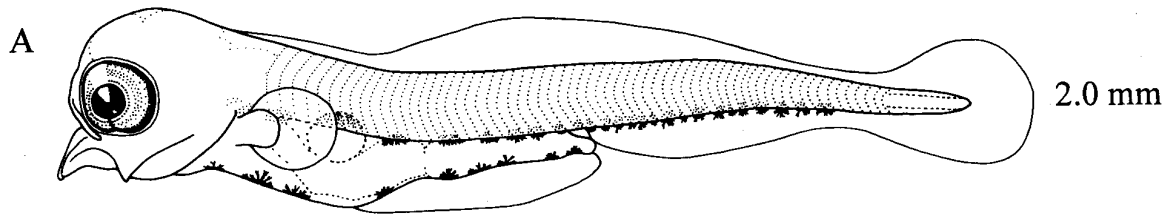
Length at Transformation: ca. 20-24 mm

Sequence of Fin Development: C, D & A, P₁, P₂

Pigmentation: Head initially unpigmented; melanophore at lower jaw angle by 2.4 mm, 1 in otic capsule by 4.7 mm. Initially none on dorsum; melanophore at mid-tail by 2.4 mm, increasing to 18-19 in mixed single/double row on full length of tail by ~5 mm, disappearing beginning anteriorly at ~9 mm & restricted to last few myomeres by ~19 mm. Initially, row of 16-18 melanophores ventrally on tail, increasing to ca. 30-40 by postflexion stage, separating into double row by ~7.4 mm, except last 1-4 single & more intense than others. 1-6 midlateral melanophores on caudal peduncle by ~7.4 mm. 9-19 melanophores dorsally on gut through 7.4 mm, disappearing posterior to gas bladder by 8.9 mm & absent entirely by 24.3 mm. Gas bladder heavily pigmented dorsally. 9-20 melanophores in single ventral row along full length of gut, gradually disappearing posteriorly after ~9 mm; late postflexion larvae with single series anterior to level of P₁-fin base, diverging into double row posteriorly. Small melanophores proximally on middle C-fin rays in postflexion stage.

Diagnostic Characters: Myomeres 63-70 (29-31 preanal); fin meristics; few to several dorsal melanophores on most of tail in larvae ~3-9 mm; several ventrally, full length of gut, through ~9 mm, double row from level of P₁-fin base to gas bladder in late postflexion stage; ca. 16-40 melanophores ventrally on tail (number increasing with larval length); midlateral streak on caudal peduncle; fresh, late-postflexion stage specimens with yellow patch on caudal peduncle.

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MICRODESMIDAE

MERISTICS

Vertebrae:

Precaudal	24
Caudal	44
Total	68

Number of Fin Spines and Rays:

Dorsal Spines	XIV
Dorsal Soft-Rays	61-64
Total Dorsal Elements	75-78
Anal	59-61
Pectoral	
Pelvic	I,3
Caudal	
Dorsal Procurrent	
Principal	
Ventral Procurrent	

LIFE HISTORY

Range: Known from Belize.

Habitat: Unknown, probably shallow water.

ELH Pattern: Planktonic larvae.

LITERATURE

Smith & Thacker 2000

***Microdesmus* sp.**

EARLY LIFE HISTORY DESCRIPTION

EGGS: Unknown

LARVAE:

Length at Flexion:

Length at Transformation: ca.30 mm

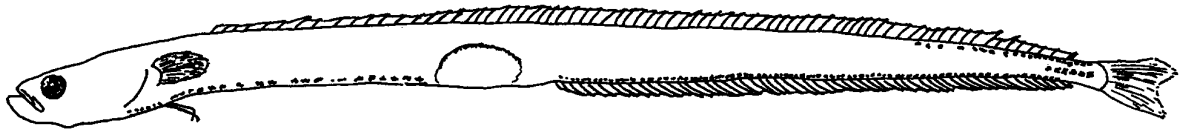
Sequence of Fin Development:

Pigmentation: 2 rows of melanophores ventrally on gut, converging anteriorly near level of P₁ fin. Melanophores midventrally along A-fin base & middorsally at posterior D-fin base. Few melanophores laterally on caudal peduncle.

Diagnostic Characters: Meristics; midlateral streak on caudal peduncle; double row of small melanophores along midventral line between P₁-fin base & gas bladder.

ILLUSTRATIONS :

Smith & Thacker 2000.



30 mm

LITERATURE CITED

- Birdsong, R. S., E. O. Murdy & F. L. Pezold. 1988. A study on the vertebral column and median fin osteology in gobioid fishes with comments on gobioid relationships. *Bull. Mar. Sci.* 42: 174–214.
- Dawson, C. E. 1962. A new gobioid fish, *Microdesmus lanceolatus*, from the Gulf of Mexico with notes on *M. longipinnis* (Weymouth). *Copeia* 1962(2): 330–336.
- Dawson, C. E. 1973. *Microdesmus bahianus*, a new western Atlantic wormfish (Pisces: Microdesmidae). *Proc. Biol. Soc. Wash.* 86(17): 203–210.
- Dawson, C. E. 1974. A review of the Microdesmidae (Pisces: Gobioidae) 1. *Cerdale* and *Clarkichthys* with descriptions of three new species. *Copeia* 1974(2): 409–448.
- Dawson, C. E. 1977. A new western Atlantic wormfish (Pisces: Microdesmidae). *Copeia* 1977(1): 7–10.
- Gilbert, C. R. 1966. Two new wormfishes (family Microdesmidae) from Costa Rica. *Copeia* 1966(2): 325–332.
- Harrison, I. J. 1989. Specialization of the gobioid palatoquadrate complex and its relevance to gobioid systematics. *J. Nat. Hist.* 23: 325–353.
- Hoese, D. F. 1984. Gobioidae: Relationships. Pages 588–591 in Moser, H. G., W. J. Richards, D. M. Cohen, M. P. Fahay, A. W. Kendall, Jr., & S. L. Richardson (eds.) *Ontogeny and systematics of fishes*. Amer. Soc. Ichthyol. Herpetol. Spec. Pub. No. 1. 760 p.
- Leis, J. M. & D. S. Rennis. 2000. Microdesminae (wormfishes). Pages 624–627 in Leis, J. M. & B. M. Carson-Ewart (eds.) *The larvae of Indo-Pacific coastal fishes: An identification guide to marine fish larvae*. Fauna Malesiana Handbook 2. Brill, Leiden. 850 p.
- Nelson, J. S. 1994. *Fishes of the world*. Third edition. John Wiley and Sons, N. Y. 600 p.
- Robins, C. R. & R. B. Manning. 1958. The status and distribution of the fishes of the family Microdesmidae in the western Atlantic. *J. Wash. Acad. Sci.* 48(9): 301–304.
- Ruple, D. 1984. Gobioidae: Development. Pages 582–587 in Moser, H. G., W. J. Richards, D. M. Cohen, M. P. Fahay, A. W. Kendall, Jr., & S. L. Richardson (eds.) *Ontogeny and systematics of fishes*. Amer. Soc. Ichthyol. Herpetol. Spec. Pub. No. 1. 760 p.
- Smith, D. G. & C. E. Thacker. 2000. Larvae of the Atlantic wormfishes (Teleostei: Gobioidae: Microdesmidae). *Bull. Mar. Sci.* 67: 997–1012.
- Smith, J. L. B. 1958. The gunnellichthid fishes with description of two new species from East Africa and of *Gunnellichthys* (*Clarkichthys*) *bilineatus* (Clark) 1936. *Ichthyol. Bull. Rhodes Univ.* 9: 123–129.
- Thacker, C. 2000. Phylogeny of the wormfishes (Teleostei: Gobioidae: Microdesmidae). *Copeia* 2000(4): 940–957.

PTERELEOTRIDAE: Dartfishes
By W. Watson and H. J. Walker, Jr.

The Family Ptereleotridae (dartfishes) has been considered a subfamily of the Microdesmidae by Hoese (1984), Rennis & Hoese (1987) & Nelson (1994), but several authors questioned that placement (e.g. Harrison 1989) and Thacker (2000) has shown that family status is warranted, though both microdesmids & ptereleotrids are placed *incertae sedis* within Gobioidi. The family comprises five genera of which one (*Ptereleotris* with two species: *P. calliurus* & *P. helenae*) occurs in our area. The *Ptereleotris* species were assigned to the gobiid genus *Ioglossus* for many years.

The eggs are unknown, but an apparently recently hatched 1.7 mm larva of a Pacific species (*Ptereleotris microlepis*) had partially pigmented eyes, functional mouth, and no yolk (Leis and Carson-Ewart 2000).

Ptereleotrids have 26 myomeres and elongate bodies with a short caudal peduncle similar in depth to the trunk and tail. The gut is straight, about half the body length with weak striations and a distinct constriction posteriorly. The gas bladder is large and conspicuous as with most gobioids, and in *P. microlepis* it has been shown to migrate posteriorly (Leis & Carson-Ewart 2000). Ptereleotrids probably undergo notochord flexion in about the same size range as microdesmids (i.e., about 3-5 mm); size at transformation from the larval

stage is unknown. A 1.7-18 mm larval series of *P. microlepis* from the western Pacific is illustrated in Leis and Carson-Ewart (2000). D. Ruple (pers. commun., unpubl. ms.) illustrated 3.4 mm & 9.1 mm specimens of *Ptereleotris* sp., but the illustrations depict too many myomeres. However, a cleared & stained series (8.6-10.4 mm) had 26 vertebrae. Meristic characters for the two local species are nearly identical, so Ruple could not make specific determinations.

Larval ptereleotrids are most similar to gobiid, eleotridid, and microdesmid larvae, but generally have more dorsal- and anal-fin rays than the gobiids and eleotridids, and fewer than the microdesmids (Table Ptereleotridae 1). Some of the more elongate myctophid larvae (e.g., *Ceratoscopelus*, *Lepidophanes*) superficially resemble ptereleotrids, but all have more myomeres (> 30 vs 26), fewer dorsal-fin rays (< 20 vs > 20), and more principal caudal-fin rays (10+9 vs 8+7) than *Ptereleotris*. Most of the myctophid larvae also have little or no dorsal pigment. Larval scarids resemble larval ptereleotrids, but have oval (vertically elongate) eyes vs round eyes, 25 vs 26 myomeres, fewer principal caudal-fin rays (7+6 vs 8+7), and fewer dorsal- and anal-fin rays (totals of 19 and 11–12 elements, respectively, vs 28–31 and 20–24 elements).

Table Ptereleotridae 1. Meristic characters for the described ptereleotrid species that occur in the western central North Atlantic. Both have 5 branchiostegal rays, 8+7 principal caudal-fin rays, 9 (*P. helenae*) or 10 (*P. calliurus*) + 9 procurrent caudal-fin rays, and I,4 pelvic-fin rays. Counts were obtained from various authors plus original data.

Species	Fin Rays			Vertebrae
	Dorsal	Anal	Pectoral	
<i>Ptereleotris calliurus</i>	VI + I, 21–23	I, 19–22	20–21	10–12 + 14–16 = 26
<i>Ptereleotris helenae</i>	VI + I, 22–24	I, 21–23	20–22	10–11 + 15–16 = 26

PTERELEOTRIDAE

MERISTICS

Vertebrae:

Precaudal	11
Caudal	15
Total	26

Number of Fin Spines and Rays:

Dorsal Spines	VI
Dorsal Soft-Rays	I,21-23
Total Dorsal Elements	28-30
Anal	I,21
Pectoral	19-21
Pelvic	I,4
Caudal	
Dorsal Procurrent	
Principal	8+7
Ventral Procurrent	
Total	
Branchiostegals	5

LIFE HISTORY

Range: Gulf of Mexico & Caribbean.

Habitat: Adult *P. calliurus* & *P. helenae* occur over reefs or sandy bottom, depth to ca. 20 m.

ELH Pattern: Oviparous; planktonic larvae.

LITERATURE

D. Ruple (unpub. ms.)

Ptereleotris sp.

EARLY LIFE HISTORY DESCRIPTION

EGGS: Unknown

LARVAE:

Length at Flexion: ca. 3-4 mm

Length at Transformation:

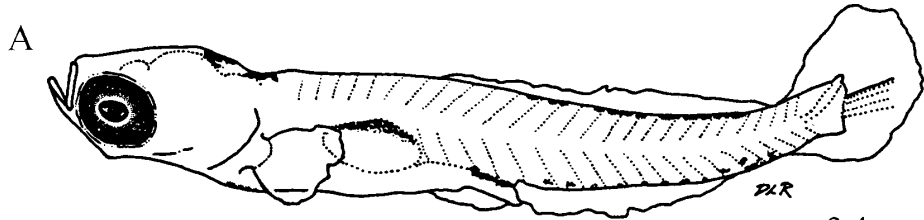
Sequence of Fin Development:

Pigmentation: Melanophores over mid- & hindbrain, gas bladder, and hindgut, anteroventrally on gut, & on dorsal & ventral margins of tail. In postflexion stage: row of melanophores along each side of A- & D₂-fin bases & some at base of D₁; melanophore(s) on otic capsule.

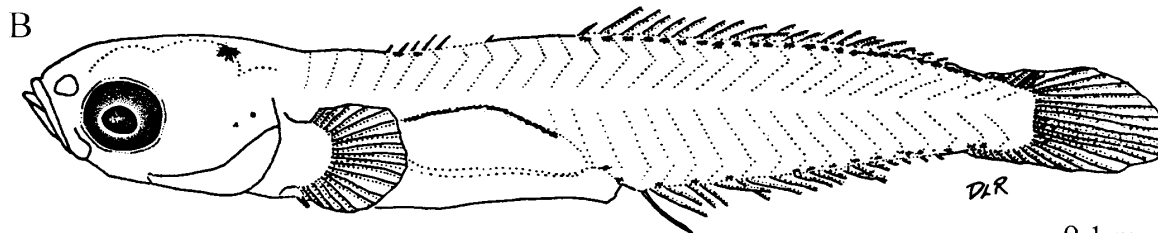
Diagnostic Characters: 26 myomeres; fin meristics; 2 rows of melanophores along dorsal & ventral margins of tail in flexion & postflexion stages.

ILLUSTRATIONS:

A-B: from unpublished manuscript by D. Ruple.



3.4 mm



9.1 mm

LITERATURE CITED

- Harrison, I. J. 1989. Specialization of the gobioid palatoquadrate complex and its relevance to gobioid systematics. *J. Nat. Hist.* 23: 325–353.
- Hoese, D. F. 1984. Gobioidae: Relationships. Pages 588–591 in Moser, H. G., W. J. Richards, D. M. Cohen, M. P. Fahay, A. W. Kendall, Jr., and S. L. Richardson (eds.) *Ontogeny and systematics of fishes*. Amer. Soc. Ichthyol. Herpetol. Spec. Pub. No. 1. 760 p.
- Leis, J. M. & B. M. Carson-Ewart. 2000. Ptereleotrinae (dartfishes). Pages 628–632 in Leis, J. M. and B. M. Carson-Ewart (eds.) *The larvae of Indo-Pacific coastal fishes: An identification guide to marine fish larvae*. Fauna Malesiana Handbook 2. Brill, Leiden. 850 p.
- Nelson, J. S. 1994. *Fishes of the world*. Third edition. John Wiley and Sons, N. Y. 600 p.
- Rennis, D. S. & D. F. Hoese. 1987. *Aioliops*, a new genus of pterelotrine fish (Pisces: Gobioidae) from the tropical Indo-Pacific with descriptions of four new species. *Records Aust. Mus.* 39: 67–84.
- Thacker, C. 2000. Phylogeny of the wormfishes (Teleostei: Gobioidae: Microdesmidae). *Copeia* 2000 (4): 940–957.

