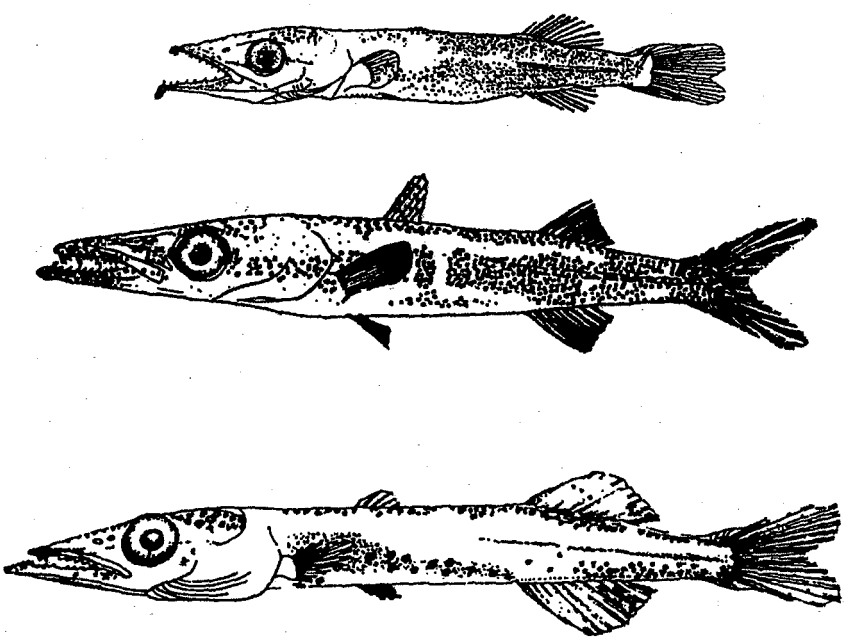
NOAA Technical Memorandum NMFS-SEFSC-422

PRELIMINARY GUIDE TO THE IDENTIFICATION OF THE EARLY LIFE STAGES OF SPHYRAENID FISHES OF THE WESTERN CENTRAL ATLANTIC

BY

J. G. DITTY, R. F. SHAW, AND T. FAROOQI



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National Marine Fisheries Service
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April 1999

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SPHYRAENIDAE

By J.G. Ditty, R.F. Shaw, & T. Farooqi

Barracudas are represented by one extant genus, *Sphyraena*, with about 20 species world-wide. Of these, four or five (*S. barracuda*, *S. borealis*, *S. guachancho*, *S. picudilla*, and *S. sphyraena*) are found in the western North Atlantic Ocean. Some authors consider *Sphyraena picudilla* a synonym of *S. borealis*. *S. sphyraena* is probably rare in the western Atlantic and is definitely known only from the coast of Brasil (de Sylva 1963; Menezes & Figueiredo 1985). Another species, *S. tome* Fowler 1903, occurs off southeast Brasil (Menezes & Figueiredo 1985), but its taxonomic status is unresolved (de Sylva, pers. comm.). *S. tome* is apparently similar to *S. picudilla* from which it reportedly differs by anal fin count and number of lateral line scales (Menezes & Figueiredo 1985). Barracudas are found in both temperate and tropical regions, are pelagic, and primarily occur in shelf waters over hard bottoms. Adults are usually solitary although some may form small schools. Sphyraenids are characterized by abdominal pelvics; well-separate dorsal fins, the first with five spines; an elongate snout with non-protrusible upper jaw; a lower jaw that projects beyond the upper jaw; well-developed, canine teeth; one or two anal spines; and origin of the second dorsal fin opposite the anal fin (Vergara R. 1978). All species have 24 vertebrae and Atlantic species lack gill-rakers (de Sylva 1984). Adults are separated by pigment pattern, presence or absence of a fleshy knob at the tip of the lower jaw, number of lateral line scales, length of the pectoral fin, length of the maxillary in relation to the orbit, placement of the first dorsal fin relative to the pelvic origin, and shape and orientation of teeth (Table SPH-1). There is little variation in meristics among species (Table SPH-2). Larval development is direct (de Sylva 1963; Houde 1972). The early life stages of *S. guachancho*, *S. barracuda*, and *S. borealis* have been described respectively by Matsuura & Suzuki (1997), de Sylva (1963), and Houde (1972); *S. picudilla* larvae are poorly known. Larvae of *S. tome* are described by Matsuura & Suzuki (1997). Larvae of *S. sphyraena* were described from the Mediterranean by Vialli (1956) but illustrations are small and the color plates don't reproduce well. Therefore, Vialli's illustrations are not included. A tentative key to postlarval and juvenile barracuda from the westcentral North Atlantic can be found in de Sylva (1963). Synonymies and other references for *S. barracuda*, *S. guachancho*, and *S. sphyraena* are found in de Sylva (1990).

Table SPH-1. Characters for separating barracuda (family Sphyraenidae) from the western central North Atlantic

Taxa	Relationship of first dorsal to pelvic fin origin	Shape of teeth	Lower jaw with fleshy knob	Pectoral fin reaches origin of pelvics	Maxillary reaching anterior orbit	Larval pigmentation (5-12 mm SL)	Lateral pigmentation juvenile/adult	Tip of snout (dorsal view)	Last dorsal and anal ray elongate
Sphyraena barracuda	behind	flattened, erect, unequal	No	Yes	Yes	Dorsal pigmentation faint, ventral scattered pigments at anal base and isthmus	Bars and blotches of pigments on lower side	rounded	No
borealis	above	conical, spaced, unequal	Yes	No	No	Dorsal pigmentation scattered, caudal base without pigmentation	Longitudinal stripe from snout to eye; also mid laterally to base of caudal fin	slightly pointed	No
guachancho	above or slightly behind	pointed, angle backward	No	Yes	Yes	Dorsal pigmentation as two hourglass shaped crossbands, ventral row of melanophores from isthmus to vent	Chevrons angled forward; blotches of pigments	moderately pointed	Yes
picudilla	above or slightly in front	conical, spaced, unequal	Yes	No	No	Dorsal pigmentation as a line of melanophores up to snout and ventrally a row of pigments between isthmus and pelvic fin caudal base pigmented	No lateral markings	very pointed	No

Table SPH-2. Meristic values for major taxa of the Sphyraenidae

Taxa	Fin Rays						Vertebrae
	1st Dorsal Fin	2nd Dorsal Fin	Anal Fin	Pectoral	Pelvic	Caudal	
Sphyraena							
barracuda	V	I, 9 (8-10)	III (7-9)	11-12	I,5	32	24
borealis	V	I, 8-9	II, 8-9	11-12	I,5	35	24
guachancho	V	I, 9-10	I-II (7-8)	11-12	I,5	36	24
picudilla	V	I, 8-9	II, 8-9	11-12	I,5	35	24

MERISTICS

Vertebrae	
Precaudal	12
Caudal	12
Total	24
Number of Fin Spines and Rays:	
First Dorsal	V
Second Dorsal	I, 9 (8-10)
Dorsal Finlets	None
Total Dorsal Elements	14-16
Anal	I-II, 7-9
Anal Finlets	None
Pectoral	11-12
Pelvic	I, 5
Caudal:	
Dorsal Secondary	8
Principal	9+8
Ventral Secondary	7
Total	32
Gillrakers on First Arch:	Absent
Lateral line scales	80-90
Branchiostegals	7

LIFE HISTORY

Range: Throughout area
Habitat: Marine; pelagic, shelf
ELH patterns: Oviparous, schooling, pelagic eggs and larvae
Spawning:
Season: Apr-Oct
Area: Shelf
Age at First Maturity: 2-3 yrs

LITERATURE

Meek & Hildebrand 1923
Fowler 1936
de Sylva 1963
Martin & Drewry 1978
Okiyama 1988.

EARLY LIFE HISTORY DESCRIPTION

EGGS:

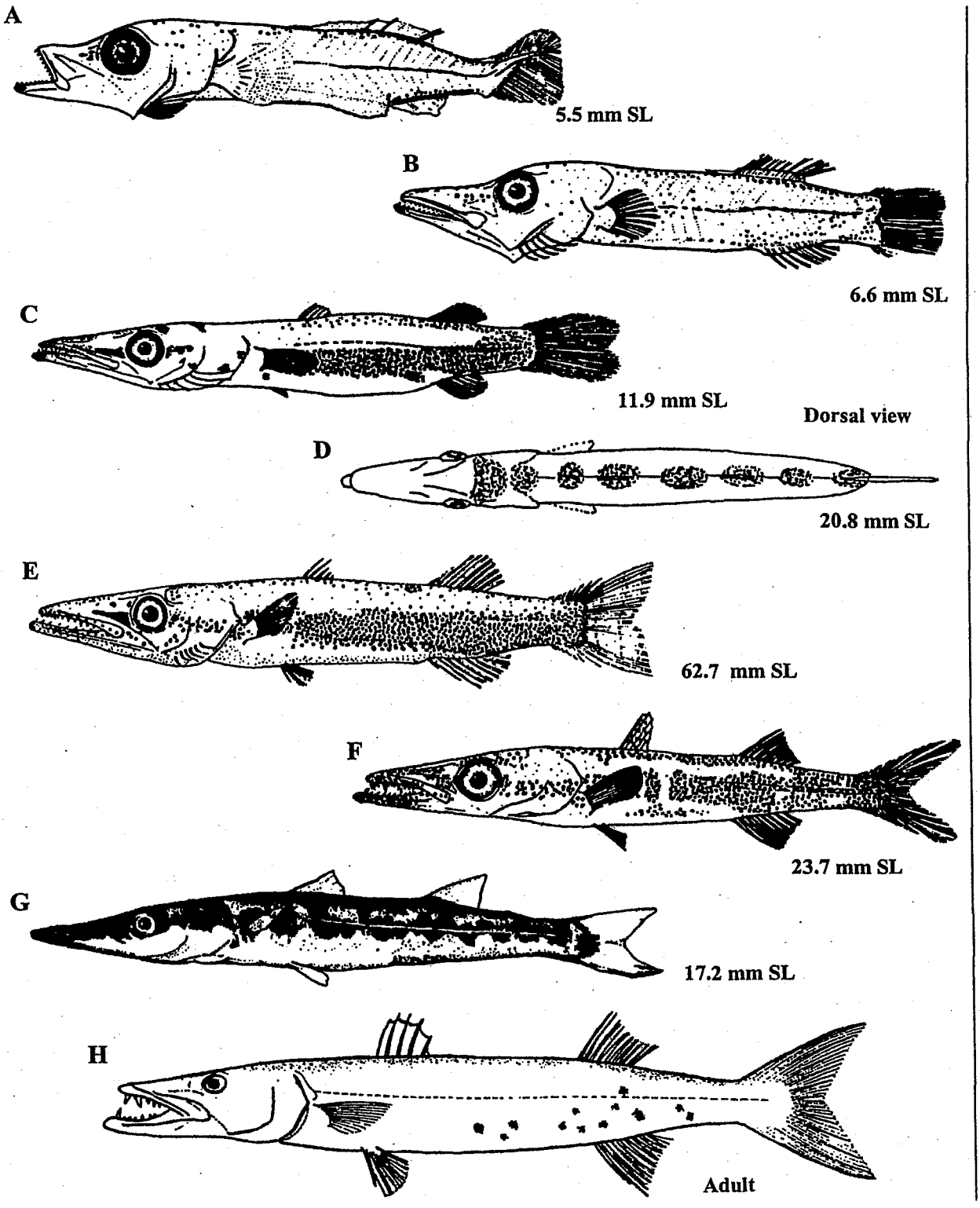
Diameter: 0.74-0.81 mm
No. of Oil Globules: Unknown
Oil Globule Diameter: Unknown

LARVAE:

Length at Flexion: 5-6 mm SL
Length at Transformation: Ca. 12 mm SL
Sequence of Fin Development: Anal and second dorsal-first dorsal-pelvic-pectoral
Pigmentation: Primarily along dorso-, ventro-, and lateral midlines, later forming a horizontal band laterally; distinct blotches dorsally and laterally rather than saddles or vertical bands
Diagnostic: From all other species by lack of fleshy tip on lower jaw; extent of pigmentation along ventral midline of lower jaw and gut; size of melanophores dorso- and ventro-laterally along base of median fins; relationship of dorsal to pelvic origin; length of pectoral fin in relation to pelvic origin (at larger sizes)

ILLUSTRATIONS

A-C and E-G from de Sylva 1963
D from Okiyama 1988
Adult from Vergara R. 1978


A
5.5 mm SL
B
6.6 mm SL
C
11.9 mm SL
Dorsal view
D
20.8 mm SL
E
62.7 mm SL
F
23.7 mm SL
G
17.2 mm SL
H
Adult

MERISTICS

Vertebrae:	
Precaudal	12
Caudal	12
Total	24
Number of Fin Spines and Rays:	
First Dorsal	V
Second Dorsal	I, 9-10
Dorsal Finlets	None
Total Dorsal Elements	15-16
Anal	I-II, 7-8(9)
Anal Finlets	None
Total Anal Elements	9-10
Pectoral	11-12
Pelvic	I, 5
Caudal:	
Dorsal Secondary	10
Principal	9+8
Ventral Secondary	9
Total	36
Gillrakers on First Arch:	Absent
Lateral line scales	108-110
Branchiostegals	7

LIFE HISTORY

Range: Throughout area
Habitat: Pelagic, shelf, generally in shallow, turbid, coastal and estuarine waters over soft bottoms; absent from coral reef areas
ELH Pattern: Oviparous, pelagic larvae
Spawning
Season: Summer
Area: Shelf

LITERATURE

Meek & Hildebrand 1923
Fowler 1936
Martin & Drewry 1978
Matsuura & Suzuki 1997

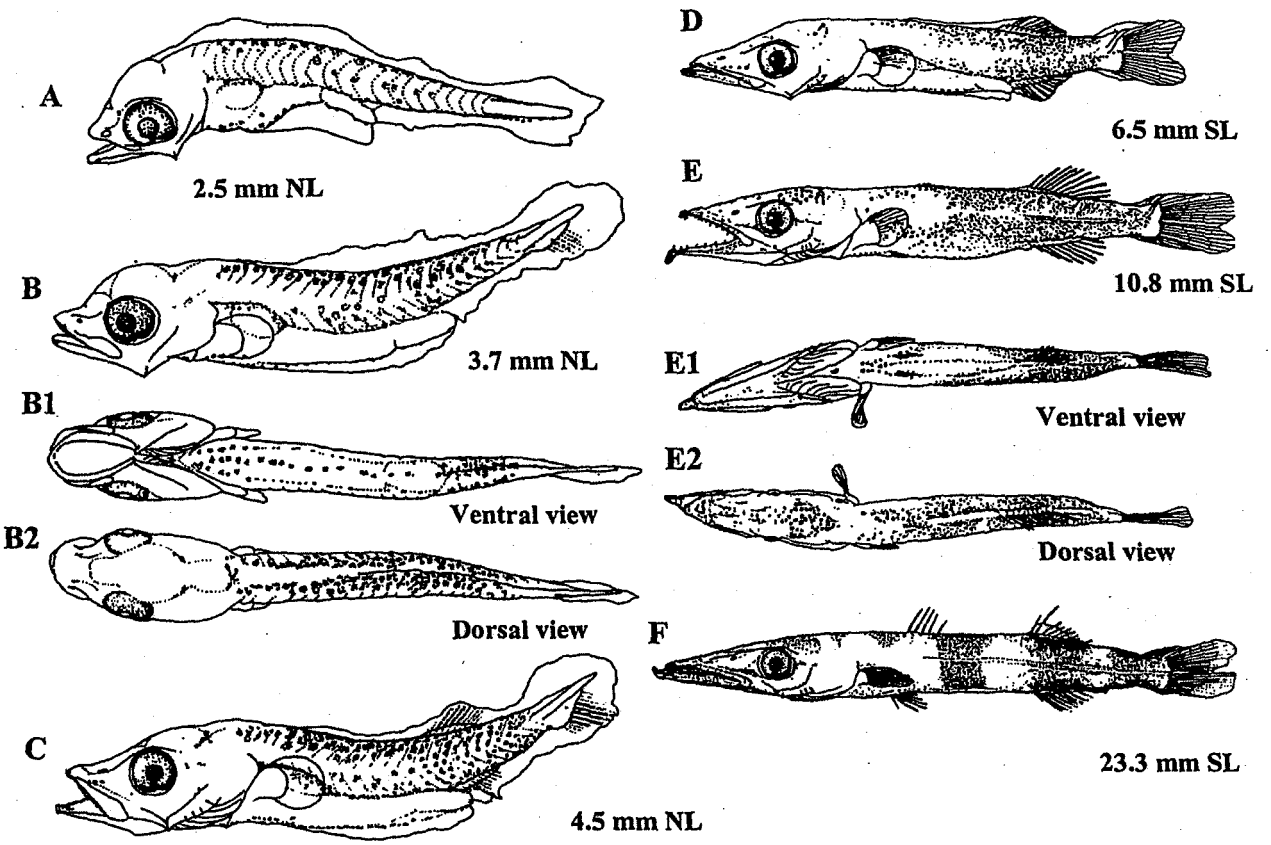
EARLY LIFE HISTORY DESCRIPTION

EGGS: Unknown

LARVAE:
Length at Flexion: 3.7-7.1 mm
Length at Transformation: Begins about 13 mm SL
Sequence of Fin Development: Caudal, anal, second dorsal, pectoral, pelvic, & first dorsal.
Pigmentation: Snout, lower jaw, dorso-, ventro-, and mid-laterally
Diagnostic: From other species by snout shape, extent of pigmentation along ventral midline of gut and on snout, size of melanophores along base of dorsal and anal fins; relationship of dorsal to pectoral fins at larger sizes.

ILLUSTRATIONS

A-E from Matsuura & Suzuki, 1997


A
2.5 mm NL
B
3.7 mm NL
B1
Ventral view
B2
Dorsal view
C
4.5 mm NL
D
6.5 mm SL
E
10.8 mm SL
E1
Ventral view
E2
Dorsal view
F
23.3 mm SL

MERISTICS

Vertebrae:	
Precaudal	12
Caudal	12
Total	24
Number of Fin Spines and Rays:	
First Dorsal	V
Second Dorsal	I, 8-9
Dorsal Finlets	None
Total Dorsal Elements	14-15
Anal	II, 8-9
Anal Finlets	None
Total Anal Elements	10-11
Pectoral	11-12
Pelvic	I, 5
Caudal:	
Principal	9+8
Total	35
Gillrakers on First Arch:	Absent
Lateral line scales	110-120
Branchiostegals	7

LIFE HISTORY

Range: U. S. Atlantic coast, eastern Gulf, Bahamas, Caribbean, Antilles, and South America; absent from Central America and western Gulf of Mexico
Habitat: Marine; pelagic, shelf water along coast, over all substrate types
ELH pattern: Oviparous
Spawning: Unknown

LITERATURE

Meek & Hildebrand 1923
de Sylva 1963
Vergara R. 1978

EARLY LIFE HISTORY DESCRIPTION

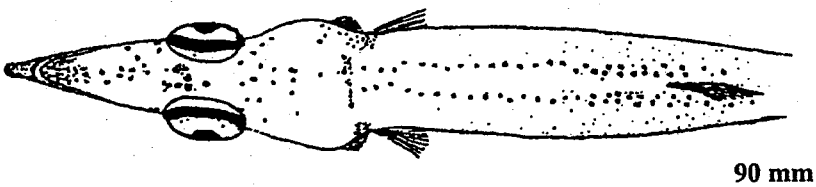
EGGS: Unknown

LARVAE:
Length at Flexion: Unknown
Length at Transformation: Unknown
Sequence of Fin Development: Unknown
Pigmentation: Probably very similar to that of *S. borealis*

ILLUSTRATIONS

C_1-C_2 from de Sylva 1963
Adult from Vergara R. 1978

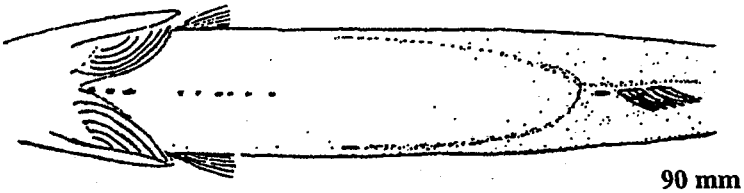
C1



Dorsal view

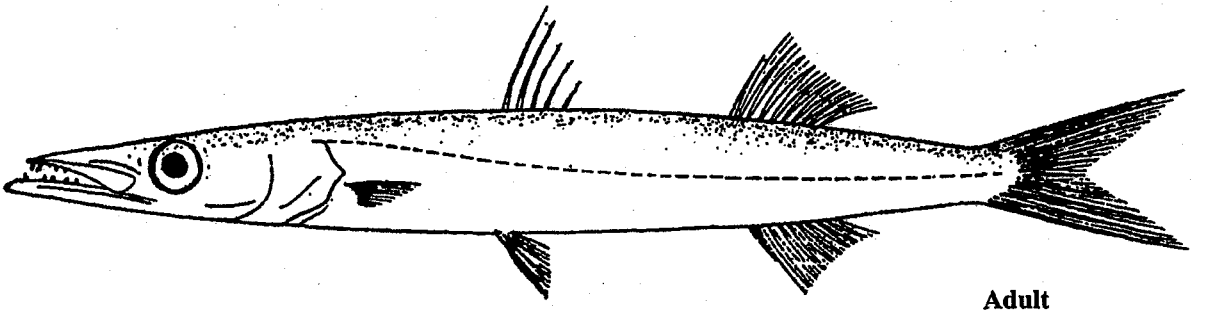
90 mm SL

C2



Ventral view

90 mm SL



Adult

MERISTICS

Vertebrae:	
Precaudal	12
Caudal	12
Total	24
Number of Fin Spines and Rays:	
First Dorsal	V
Second Dorsal	I, 8-9
Dorsal Finlets	None
Total Dorsal Elements	14-15
Anal	I-II,(8-9)
Anal Finlets	None
Total Anal Elements	10-11
Pectoral	11-12
Pelvic	I, 5
Caudal:	
Dorsal Secondary	9
Principal	9+8
Ventral Secondary	9
Total	35
Gillrakers on First Arch:	Absent
Lateral line scales	115-130
Branchiostegals	7

LIFE HISTORY

Range: U. S. Atlantic and Gulf coast south to Panama and Caribbean
Habitat: Marine; pelagic, shelf
ELH Pattern: Oviparous, pelagic larvae
Spawning:
Season: Spring
Area: Shelf

LITERATURE

Meek & Hildebrand 1923
Briggs 1958
Houde 1972
Martin & Drewry 1978

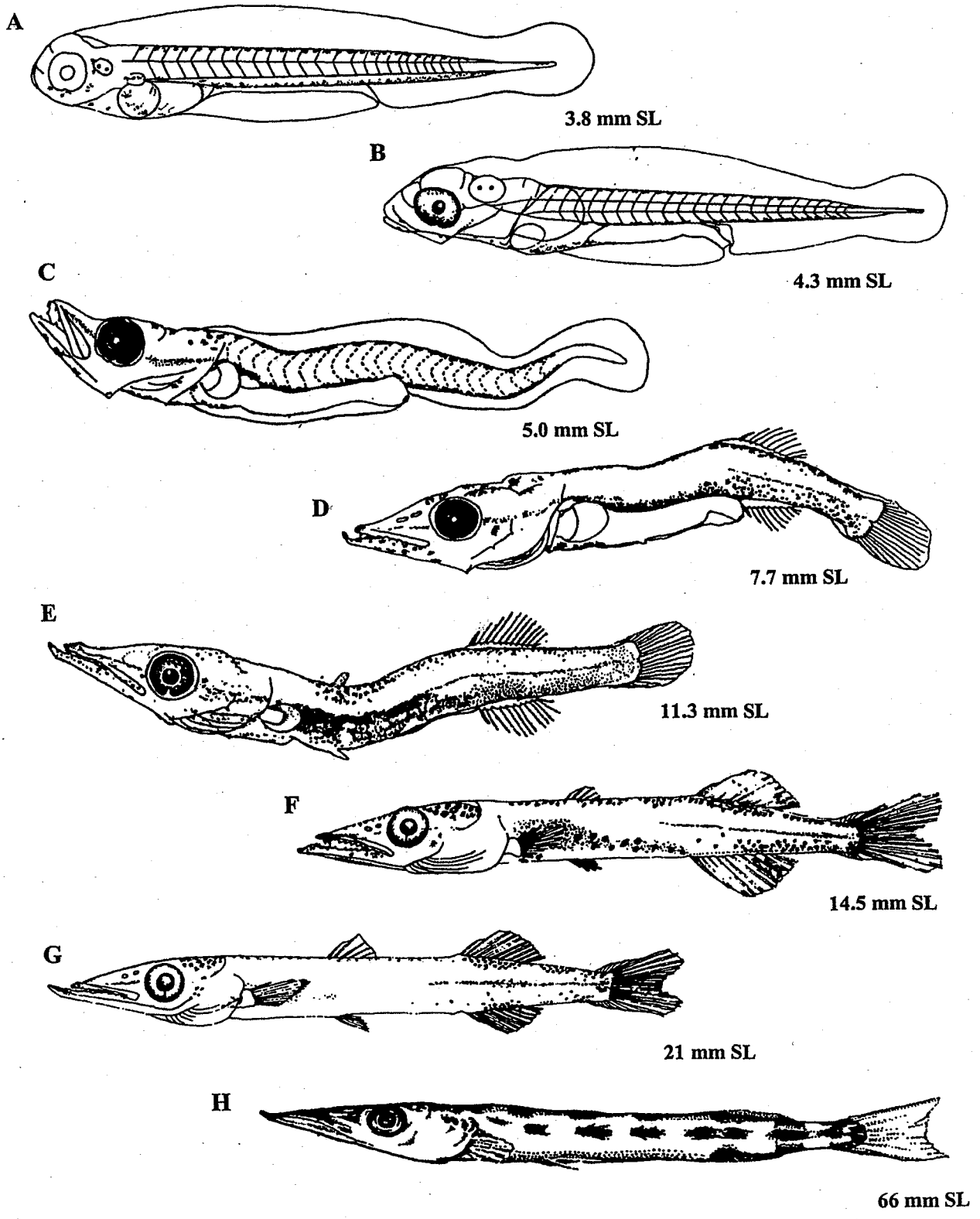
EARLY LIFE HISTORY DESCRIPTION

EGGS:
Diameter: 1.22-1.24 mm
No. of Oil Globules: One
Oil Globule Diameter:
0.27-0.29 mm
Yolk: Lightly-segmented
Shell: Clear, unsculptured
Hatch Size: 2.6 mm SL
Incubation: 20 hrs. at 24°C
Pigmentation: Oil globule

LARVAE:
Length at Flexion: 7.5-10.0 mm SL
Length at Transformation: By 14.5 mm SL
Sequence of Fin Development: Anal and second dorsal-first dorsal-pelvics-pectorals
Pigmentation: Primarily dorso-, ventro-, and mid-laterally in early larvae; tail pigment concentrated below lateral midline, sparse above; pigment later concentrating into saddles dorsally and forming vertical bands on tail
Diagnostic: From *S. barracuda* by presence of fleshy tip on lower jaw; pigment dorsally on notochord tip at <5 mm; from other species by extent of pigmentation along ventral midline of lower jaw and gut, melanophore size along base of dorsal and anal fins; relationship of dorsal to pelvic origin; length of pectoral fin in relation to pelvic origin (at larger sizes)

ILLUSTRATIONS

A-B and F-G from Houde 1972
C-E original
H- de Sylva 1963


A
3.8 mm SL
B
4.3 mm SL
C
5.0 mm SL
D
7.7 mm SL
E
11.3 mm SL
F
14.5 mm SL
G
21 mm SL
H
66 mm SL

MERISTICS

Vertebrae:	
Precaudal	12
Caudal	12
Total	24
Number of Fin Spines and Rays:	
First Dorsal	V
Second Dorsal	I, 9
Dorsal Finlets	None
Total Dorsal Elements	15
Anal	II, 10
Anal Finlets	None
Total Anal Elements	11
Pectoral	13
Pelvic	I, 5
Caudal:	
Principal	9+8
Total	35
Gillrakers on First Arch:	Absent
Lateral line scales	150-160
Branchiostegals	7

LIFE HISTORY

Range: Bermuda (?) and Brasil
Habitat: Marine; pelagic, shelf
ELH Pattern: Oviparous, pelagic larvae
Spawning:
Season: Unknown
Area: Shelf

LITERATURE

Fowler 1936
Vialli 1956
de Sylva 1963
Cadenat 1964
Arias Garcia & Drake Moyano 1990

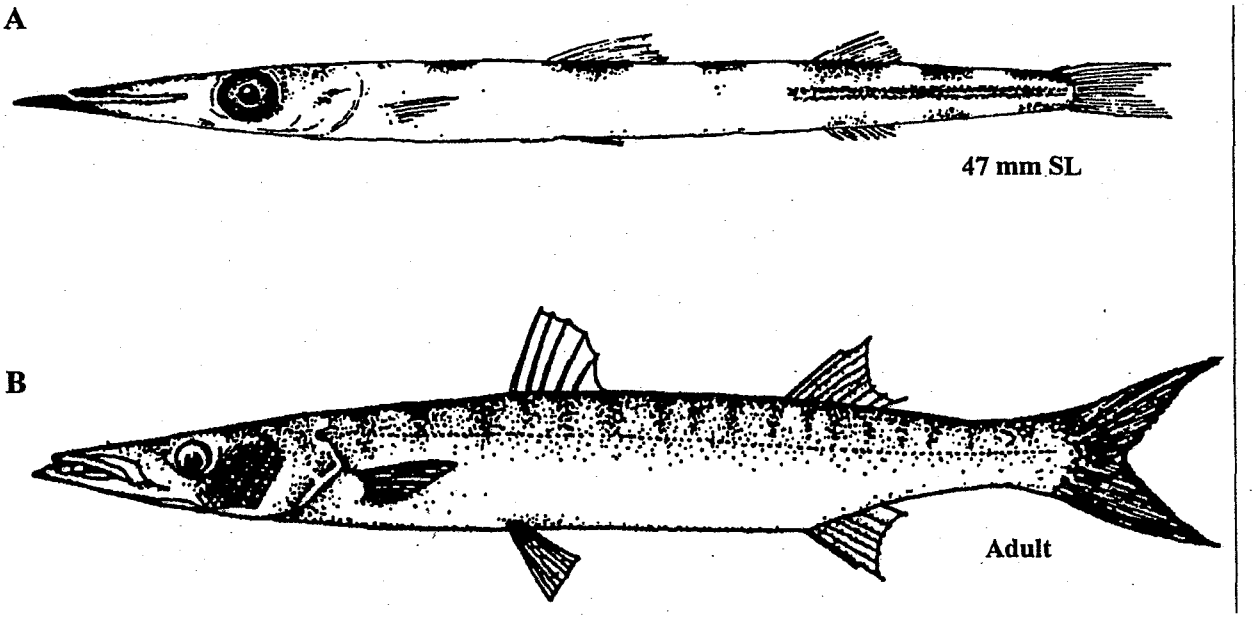
EARLY LIFE HISTORY DESCRIPTION

EGGS: Unknown

LARVAE:
Length at Flexion:
Length at Transformation:
Sequence of Fin Development:
Pigmentation:
Diagnostic: From *S. barracuda* by presence of elongate fleshy tip on lower jaw; from *S. barracuda* and *S. guachancho* by placement of dorsal fin relative to pelvic origin and short pectoral fins

ILLUSTRATIONS

See color plates in Vialli 1956 for larvae
Juvenile from Arias Garcia & Drake Moyano 1990
Adult from Ben-Tuvia 1984


A
47 mm SL
B
Adult

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