

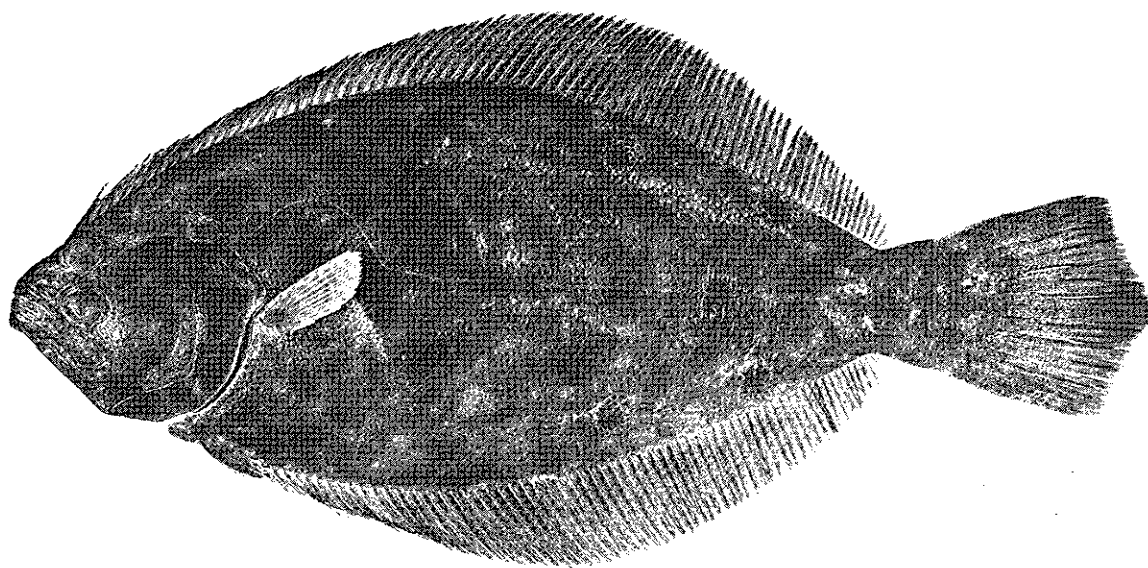
NOT FOR CIRCULATION

LIBRARY COPY

pet

**Field Guide to the Flatfishes of the Family Bothidae
in the Western North Atlantic**

DISCARDED



**UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES**

Circular 263

Cover photo: Paralichthys dentatus, adult, 184 mm. SL (standard length).

UNITED STATES DEPARTMENT OF THE INTERIOR

Stewart L. Udall, *Secretary*

David S. Black, *Under Secretary*

Stanley A. Cain, *Assistant Secretary for Fish and Wildlife and Parks*

FISH AND WILDLIFE SERVICE, Clarence F. Pautzke, *Commissioner*

BUREAU OF COMMERCIAL FISHERIES, H. E. Crowther, *Director*

Field Guide to the Flatfishes of the Family Bothidae in the Western North Atlantic

By

ELMER J. GUTHERZ

Circular 263

Washington, D.C.

October 1967

CONTENTS

	Page
Introduction.	1
Methods of measuring and counting	1
Key to the families of Heterosomata in the western North Atlantic.	2
Key to the subfamilies of Bothidae.	2
Key to the genera of the subfamily Paralichthinae	2
Key to the species of the genus <u>Monolene</u> Goode, 1880.	5
<u>Monolene megalepis</u> Woods, 1961	6
<u>Monolene atrimana</u> Goode and Bean, 1886.	6
<u>Monolene antillarum</u> Norman, 1933	7
<u>Monolene sessilicauda</u> Goode, 1880	8
Key to the species of the genus <u>Paralichthys</u> Girard, 1859.	8
<u>Paralichthys dentatus</u> (Linnaeus, 1766).	9
<u>Paralichthys squamilentus</u> Jordan and Gilbert, 1882.	9
<u>Paralichthys lethostigma</u> Jordan and Gilbert, 1884.	10
<u>Paralichthys tropicus</u> Ginsburg, 1933.	11
<u>Paralichthys albigutta</u> Jordan and Gilbert, 1882	12
<u>Gastropsetta</u> Bean, 1895	12
<u>Gastropsetta frontalis</u> Bean, 1895	12
Key to the species of the genus <u>Ancylopsetta</u> Gill, 1864.	13
<u>Ancylopsetta kumerae</u> Tyler, 1959.	14
<u>Ancylopsetta quadrocellata</u> Gill, 1864.	14
<u>Ancylopsetta antillarum</u> Guthertz, 1966.	15
<u>Ancylopsetta dilecta</u> (Goode and Bean, 1883)	16
<u>Ancylopsetta microctenus</u> Guthertz, 1966.	16
<u>Ancylopsetta cycloidea</u> Tyler, 1959	17
<u>Hippoglossina</u> Steindachner, 1876	18
<u>Hippoglossina oblonga</u> (Mitchill, 1815)	18
<u>Engyophrys</u> Jordan and Bollman, 1889	19
<u>Engyophrys sentus</u> Ginsburg, 1933.	19
Key to the species of the genus <u>Trichopsetta</u> Gill, 1888.	20
<u>Trichopsetta</u> sp. A Anderson and Guthertz, (MS.)	20
<u>Trichopsetta</u> sp. B Anderson and Guthertz, (MS.)	21
<u>Trichopsetta ventralis</u> (Goode and Bean, 1885).	22
<u>Trichopsetta</u> sp. C Anderson and Guthertz, (MS.).	23
Key to the species of the genus <u>Cyclopsetta</u> Gill, 1888.	24
<u>Cyclopsetta decussata</u> Gunter, 1946.	24
<u>Cyclopsetta fimbriata</u> (Goode and Bean, 1885)	25
<u>Cyclopsetta chittendeni</u> Bean, 1895	26
Key to the species of the genus <u>Etropus</u> Jordan and Gilbert, 1882	27
<u>Etropus intermedius</u> Norman, 1933	27
<u>Etropus crossotus</u> Jordan and Gilbert, 1882	28
<u>Etropus microstomus</u> (Gill, 1864)	28
<u>Etropus rimosus</u> Goode and Bean, 1885	29
Key to the species of the genus <u>Citharichthys</u> Bleeker, 1862.	30
<u>Citharichthys arctifrons</u> Goode, 1880.	31
<u>Citharichthys cornutus</u> (Günther, 1880).	31

	Page
<u>Citharichthys</u> <u>dinoceros</u> Goode and Bean, 1886.....	32
<u>Citharichthys</u> <u>macrops</u> Dresel, 1885	33
<u>Citharichthys</u> <u>spilopterus</u> Günther, 1862.....	34
<u>Citharichthys</u> <u>arenaceus</u> Evermann and Marsh, 1900.....	35
<u>Citharichthys</u> <u>uhleri</u> [Jordan] Jordan and Goss, 1889.....	35
Key to the species of the genus <u>Syacium</u> Ranzani, 1840	36
<u>Syacium</u> <u>gunteri</u> Ginsburg, 1933	37
<u>Syacium</u> <u>papillosum</u> (Linnaeus, 1758).....	38
<u>Syacium</u> <u>micrurum</u> Ranzani, 1840	39
Key to the genera of the subfamily Bothinae.....	40
Key to the species of the genus <u>Bothus</u> Rafinesque, 1810	40
<u>Bothus</u> sp. Brockman, Thelma Jutare (MS.).....	40
<u>Bothus</u> <u>ocellatus</u> (Agassiz, 1829).....	41
<u>Bothus</u> <u>ellipticus</u> (Poey, 1860).....	42
<u>Bothus</u> <u>lunatus</u> (Linnaeus, 1758)	42
<u>Bothus</u> <u>maculiferus</u> (Poey, 1860).....	43
Key to the species of the genus <u>Chascanopsetta</u> Alcock, 1894	44
<u>Chascanopsetta</u> <u>lugubris</u> Alcock, 1894	44
<u>Chascanopsetta</u> <u>prorigera</u> Gilbert, 1905	45
Subfamily Scophthalminae	45
<u>Scophthalmus</u> Rafinesque, 1810.....	45
<u>Scophthalmus</u> <u>aquosus</u> (Mitchill, 1815)	45
Acknowledgments	46
Literature cited	46

Field Guide to the Flatfishes of the Family Bothidae in the Western North Atlantic¹

By

ELMER J. GUTHERZ, Fishery Biologist

Bureau of Commercial Fisheries Biological Laboratory
Brunswick, Georgia 31521

ABSTRACT

Keys are presented to facilitate both field and laboratory identification of the 14 genera and 47 species in the family Bothidae from the western North Atlantic, particularly those south of Cape Hatteras, N.C. Illustrations for all species (except Bothus ellipticus), the salient familial and subfamilial characteristics, and short descriptions with geographic and bathymetric ranges are given.

INTRODUCTION

Keys are presented to facilitate the identification of the 14 genera and 47 species of the family Bothidae known to occur in the western North Atlantic Ocean, primarily from Cape Hatteras, N.C., to Brazil. Many new species of flatfishes have been described since Norman's (1934) monumental work on this group, and no paper deals with all species of Bothidae known from the western North Atlantic Ocean. One may start with Norman, but often other works must be consulted before an accurate identification can be made.

The keys given here incorporate information from my examination of both specimens and the literature: Ancylopsetta and Gastropsetta, Guthertz (1966) and Tyler (1959); Bothus, Brockman (MS.)²; Chascanopsetta, Lund and Deubler (MS.)³; Cyclopsetta, Gunter (1946); Engyophrys, Anderson and Lindner (1941); Etropus and Citharichthys, Parr (1931); Monolene, Woods (1961); Paralichthys, Ginsburg (1933, 1952) and Rothschild and Deubler (1960); Trichopsetta, Anderson and Guthertz (MS.)⁴; Norman (1934); and Bigelow and Schroeder (1953).

This is one of a series of guides for field identification of various important groups of fish in the western North Atlantic. An illustration is included for each species except Bothus ellipticus⁵, and for the salient diagnostic familial characteristics. A short description and geographic and bathymetric ranges (when known) are given for each species.

Common names are included for species of Bothidae listed in Bailey, Lachner, Lindsey, Robins, Roedel, Scott, and Woods (1960). Statements concerning pigmentation refer to that of the ocular side, unless otherwise stated. Ambicoloration occurs on some specimens but is not common and does not affect the normal coloration of the ocular side.

METHODS OF MEASURING AND COUNTING

Standard length (SL).--Tip of snout to end of hypural plate (base of caudal fin), on blind side.

Head length (HL).--Tip of snout to posteromost point on fleshy margin of opercle, on ocular side.

¹ Contribution No. 89, Bureau of Commercial Fisheries Biological Laboratory, Brunswick, Ga.

² Jutare, Thelma [Brockman]. Manuscript. Studies on the biology of Bothus ocellatus with a description of a related new species. Masters thesis 1962, University of Miami.

³ Lund, William A., Jr., and Earl E. Deubler. Manuscript. A comparative study of two deepwater flounders (Chascanopsetta Alcock) from the western Atlantic. Lund, W. A., Jr., University of Connecticut, Marine Research Laboratory; Noank, Conn. Deubler, E. E., Jr., University of North Carolina, Institute of Fisheries Research; Morehead City, N. C.

⁴ Anderson, William W., and Elmer J. Guthertz. Manuscript. Revision of the flatfish genus Trichopsetta (Bothidae) with descriptions of three new species. In press, Bull. Mar. Sci.

⁵ B. ellipticus is known only from the type specimen which has been lost. No illustration was included in the original description. A specimen identified as B. ellipticus measuring 4-3/4 in. is in the Museum of Comparative Zoology, Harvard University. However, this specimen is of questionable identity (Norman 1934: 230).

Eye diameter.--Horizontal distance across lower eye, not that of the orbit.

Upper jaw length.--Tip of snout to posterior edge of upper jaw (i.e., maxillary), on ocular side.

Body depth.--Greatest vertical measurement, excluding fin rays.

Snout length.--Tip of snout to anteriormost edge of orbit of lower eye.

Interorbital width.--The least distance between bony orbits.

Gill rakers.--Total number of gill rakers on first arch, unless stated to be only those on lower limb. When counts of both upper and lower limbs are recorded, the upper limb count precedes the lower limb count; e.g., 3 + 8.

Vertebrae.--Counts are recorded as abdominal + caudal; e.g., 10 + 30-32.

KEY TO THE FAMILIES OF HETEROSOMATA IN THE WESTERN NORTH ATLANTIC

- A. Margin of preopercle free, not covered with skin and scales B.
- AA. Margin of preopercle not free, covered with skin and scales C.
- B. Eyes on right side; fig. 1A Pleuronectidae⁶
- BB. Eyes on left side; fig. 1B Bothidae⁶
- C. Eyes on right side; fig. 1C Soleidae
- CC. Eyes on left side; fig. 1D Cynoglossidae

KEY TO THE SUBFAMILIES OF BOTHIDAE

- A. Bases of both pelvic fins short, neither extending forward onto urohyal [origin of pelvic fin base on ocular side may be behind origin of pelvic fin base on blind side, ocular fin base may be on median line]; figs. 2A and AA. Paralichthinae page 2.
- AA. Base of pelvic fin on ocular side long, extending forward onto tip of urohyal, that on blind side shorter, not extending forward onto urohyal; fig. 2B Bothinae page 40.
- AAA. Bases of both pelvic fins long, that on ocular side extending forward onto tip of urohyal, that on blind side onto lateral shaft of urohyal; fig. 2C Scopthalminae page 45.

KEY TO THE GENERA OF THE SUBFAMILY PARALICHTHINAE

Eleven genera known from the western North Atlantic

- A. Lateral line with high arch over pectoral fin on ocular side B.
- AA. Lateral line without a high arch over pectoral fin on ocular side K.
- B. Pectoral fin absent on blind side Monolene page 5.
- BB. Pectoral fin present on blind side. C.
- C. Three to five prominent ocellated spots on ocular side of body, arranged as in one of figures 7, 11 to 19; additional spotting may be present. [A. kumperae has in addition an ocellated spot on pelvic fin of ocular side] D.

⁶ Reversal is not uncommon in some species of Heterosomata and has been reported for Psettonidae, Bothidae, Pleuronectidae, and Soleidae by Norman (1934:27-29) and Gudger (1935:13-23). Only two instances of reversal in an Atlantic bothid (Paralichthys dentatus) have been reported (Gudger, 1936 and Deubler and Fahy, 1958). However, this anomaly is common (40-60% (percent)) in the Pacific bothid species Paralichthys californicus and P. aestuarius and Hippoglossina stomata and H. macrops.

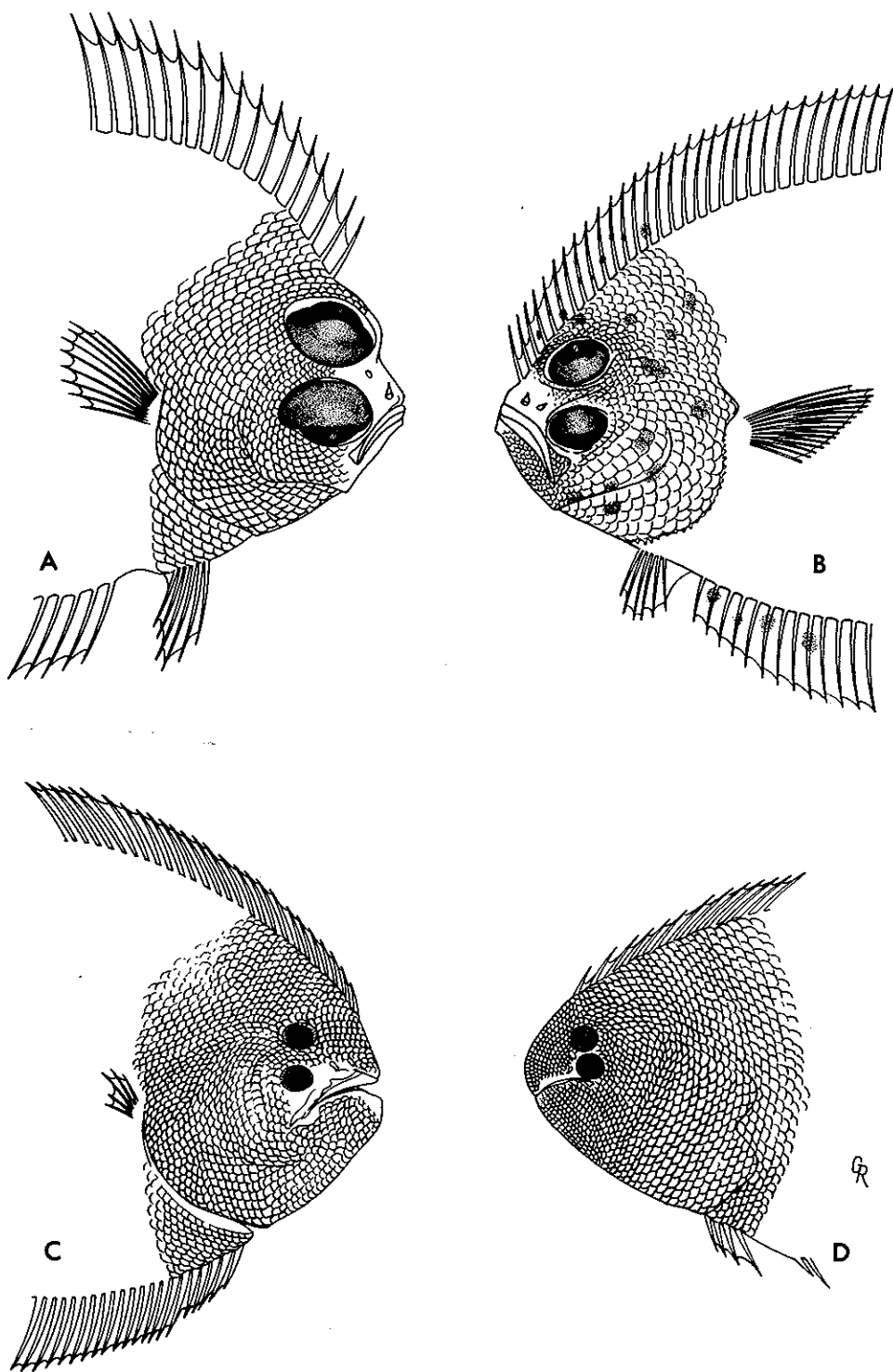


Figure 1.--Heads of: A, *Poecilopsetta albomarginata* (Pleuronectidae); B, *Citharichthys macrops* (Bothidae); C, *Achirus inscriptus* (Soleidae); D, *Symphurus plagusia* (Cynoglossidae); illustrating eyes on right side, A and C, or on left side, B and D; and skin and scales not covering margin of preopercle, A and B, or covering margin of preopercle, C and D.

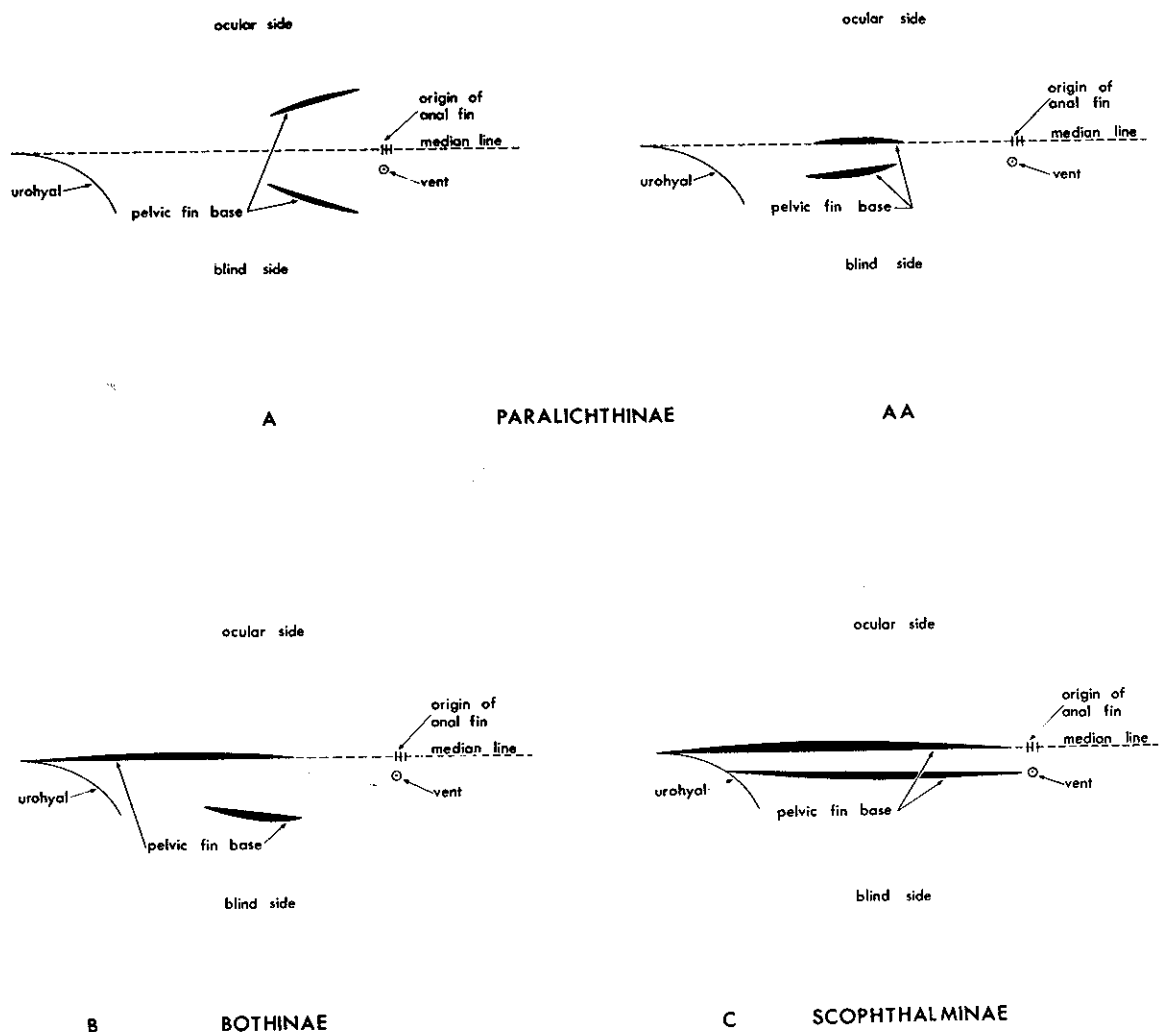


Figure 2.--Diagrammatic representation showing relative lengths of pelvic fin base on ocular and blind side and positions in reference to vent and urohyal. A, Paralichthinae, Paralichthys, Hippoglossina, Ancylosetta, and Gastropsetta; AA, Paralichthinae, Syacium, Citharichthys, Etropus, Cyclopsetta, Trichopsetta, Engyophrys, Monolene; B, Bothinae, Bothus and Chascanopsetta; and C, Scopthalthinae, Scopththalmus.

- CC. Body spotting may be present or absent, when present composed of other than 3 to 5 prominent ocellated spots arranged as in figures 7, 11 to 19. I.
- D. Three large, prominent ocellated spots arranged as in one of figures 11, 12, 15 to 18 [P. dentatus (fig. 7) may have only 3 rather than the usual 5 ocellated spots]. E.
- DD. More than 3 large, prominent ocellated spots G.
- E. Anterior dorsal fin rays not elongate (figs. 7 and 11); pelvic fins equal in length or nearly so. Paralichthys page 8.
- EE. Some anterior dorsal fin rays elongate (figs. 12, 15-18); pelvic fin on ocular side definitely longer than that on blind side. F.
- F. No spot on posterior third of body or on lateral line, antermost spot over arch of lateral line (fig. 12). Gastropsetta page 12.
- FF. Postermost spot immediately in front of caudal peduncle on lateral line, no spot over arch of lateral line (figs. 15-18) Ancylosetta page 13.

- G. Anteromost spot over arch of lateral line (figs. 13 and 14). Ancylopsetta page 13.
- GG. No ocellated spot over arch of lateral line (fig. 19). H.
- H. Four large ocellated spots arranged as in figure 19; eye diameter 25 to 30 percent HL (percent of head length). Hippoglossina page 18.
- HH. Usually 5 (rarely 4, but occasionally more than 5) ocellated spots arranged essentially as in figure 7; eye diameter 15 to 20 percent HL Paralichthys page 8.
- I. Pelvic fin on ocular side inserted on median line; lateral line well developed on ocular side and absent or poorly developed on blind side. J.
- II. Pelvic fin on ocular side not inserted on median line; lateral lines equally well developed on both sides Paralichthys page 8.
- J. Upper jaw very short, 20 to 25 percent HL; spines present on interorbital ridge; tentacles on eyes of males and females [on males tentacles decrease in length with increasing size of specimen and may become lost] (fig. 20) Engyophrys page 19.
- JJ. Upper jaw moderate, 32 to 45 percent HL; no interorbital spines; no tentacles on eyes (figs. 21 - 24) Trichopsetta page 20.
- K. Large round spots on dorsal, anal, and caudal fins, dark blotch on tip of or on side under pectoral fin of ocular side; or body, dorsal and anal fins with 5 or 6 large brown bars or bands, no spots on median or caudal fins (figs. 25 - 27) Cyclopsetta page 24.
- KK. No large round spots on median or caudal fins, no bars or bands across body and fins . L.
- L. Upper jaw very short, about 25 percent HL; maxillary extending posteriorly to anterior edge of lower eye. (figs. 28 - 31). Etropus page 27.
- LL. Upper jaw moderate to long, maxillary usually longer than 35 percent HL, extending posteriorly to at least middle of lower eye [except Citharichthys arctifrons (fig. 32), 27 to 32 percent HL, and an osseous protuberance on snout, not found in Etropus] M.
- M. Gill rakers on lower limb short and stout, 6 to 9; or long and stout, 6 or 7. N.
- MM. Gill rakers on lower limb long and slender, 7 to 16 Citharichthys page 30.
- N. Osseous protuberance on snout, teeth uniserial in both jaws (fig. 32) Citharichthys page 30.
- NN. No osseous protuberance on snout, teeth biserial in upper jaw and uniserial in lower jaw Syacium page 36.

KEY TO THE SPECIES OF THE GENUS Monolene Goode, 1880

- A. Two large, black oval spots midway along outer caudal rays; ventralmost pectoral fin rays about equal in length to dorsalmost or slightly longer; dorsal fin rays 88 to 94; pectoral fin rays 17 to 19; fig. 3 megalepis page 6.
- AA. No large oval spots on outer rays of caudal fin, but a single large, dark blotch or 2 inconspicuous bands on middle caudal fin rays; ventralmost pectoral fin rays shorter than dorsalmost; dorsal fin rays 92 to 125; pectoral fin rays 11 to 15. B.
- B. Pectoral fin black; gill rakers short and stout; dorsal fin rays 119 to 125; anal fin rays 98 to 108; fig. 4 atrimana page 6.

BB. Pectoral fin with variable cross-barred pattern; gill rakers moderately elongate and slender; dorsal fin rays 92 to 109; anal fin rays 76 to 89; figs. 5 or 6.⁷
 antillarum or sessilicauda pages 7 and 8.

Monolene megalepis Woods, 1961

Dorsal fin rays 88 to 94; anal fin rays 67 to 76; pectoral fin rays 17 to 19 (no pectoral fin on blind side); gill rakers on lower limb moderate, longer than wide, 7 to 9; scales in lateral line 56 to 63; vertebrae 10 + 33 to 34. Body depth 35 to 42 percent SL (percent of standard length); head length 20 to 23 percent SL; eye diameter 33 to 39 percent HL; upper jaw length 28 to 34 percent HL, extending posteriorly to a vertical through anterior part of eye. Ocular side tan to brown, with several spots (may be indistinct) on body below dorsal and above anal fins. Pectoral fin mostly black, with variable pattern; an ocellated spot (sometimes indistinct) may be present on distal portion of middle rays. Caudal fin with two large black spots on outer rays.

Snout with a deep concavity anterior to upper eye (giving head a pugnosed appearance). Pectoral fin as long as or slightly shorter than head. Middle pectoral rays may be slightly shorter than upper or lower rays, and lower rays often longer than upper.

Distribution: In the Antilles off Puerto Rico, Haiti, and Jamaica; Caribbean Sea from Honduras to Venezuela; in 40 to 300 fath. (fathoms), 73.2 to 548.6 m.

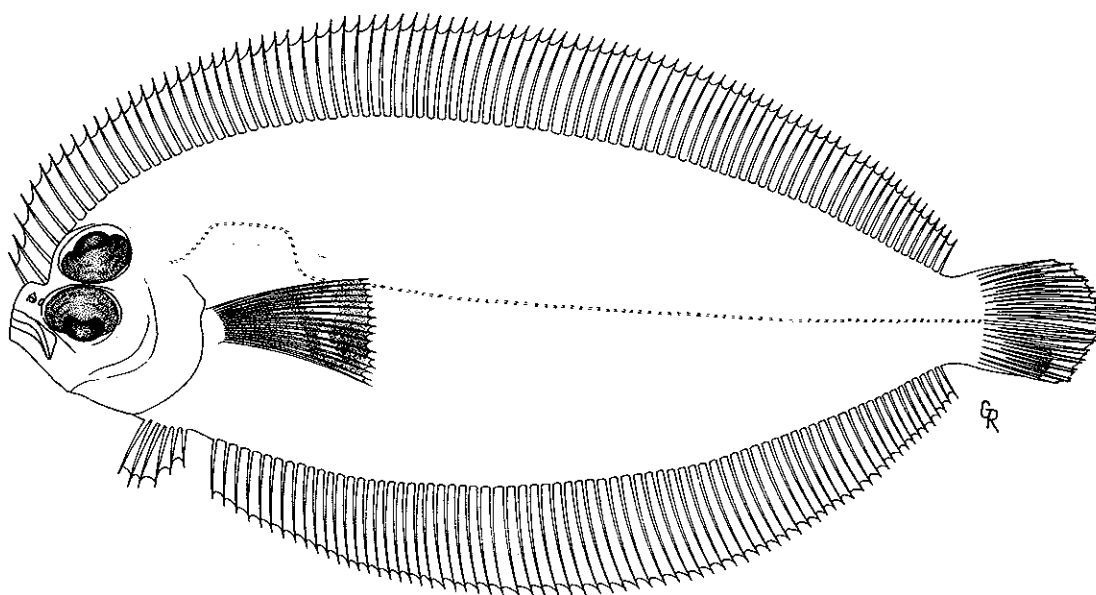


Figure 3.--Monolene megalepis, adult, 79 mm. SL.

Monolene atrimana Goode and Bean, 1886

Dorsal fin rays 119 to 125; anal fin rays 98 to 108; pectoral fin rays 11 to 12 (no pectoral fin on blind side); gill rakers on lower limb short, wider than long, 8; scales in lateral line about 105; vertebrae 10 or 11 + 42. Body depth 31 to 34 percent SL; head length 17 to 21 percent SL; eye diameter 32 to 36 percent HL; upper jaw length 23 to 26 percent HL, extending posteriorly to a vertical through anterior edge of eye. Ocular side tan to brown. Pectoral fin black.

⁷ All characters used in separating M. antillarum from M. sessilicauda overlap. Norman (1933: 204) stated in the type description that M. antillarum is "Readily distinguished from the more northerly M. sessilicauda by the narrow body, larger head, and larger eyes and pectoral fin . . ." Using Norman's distinguishing characters, I identified 10 specimens from North Carolina, Atlantic coast of Florida, and Tortugas as M. antillarum and 11 specimens from the same regions as M. sessilicauda. The color pattern of all M. antillarum and M. sessilicauda examined is essentially similar to that described for M. sessilicauda by Jordan and Evermann (1898: 2691). In view of the general overlap of measurements and counts and similar pigmentation, M. antillarum may be conspecific with M. sessilicauda.

Snout with a moderate concavity anterior to upper eye. Pectoral fin long, about as long as or longer than the head.

Distribution: Atlantic Ocean off Brazil, Surinam and Barbados; Caribbean Sea off Honduras; in 50 to 300 fath. (91.4-548.6 m.) generally found in depths exceeding 150 fath. (274.3 m.).

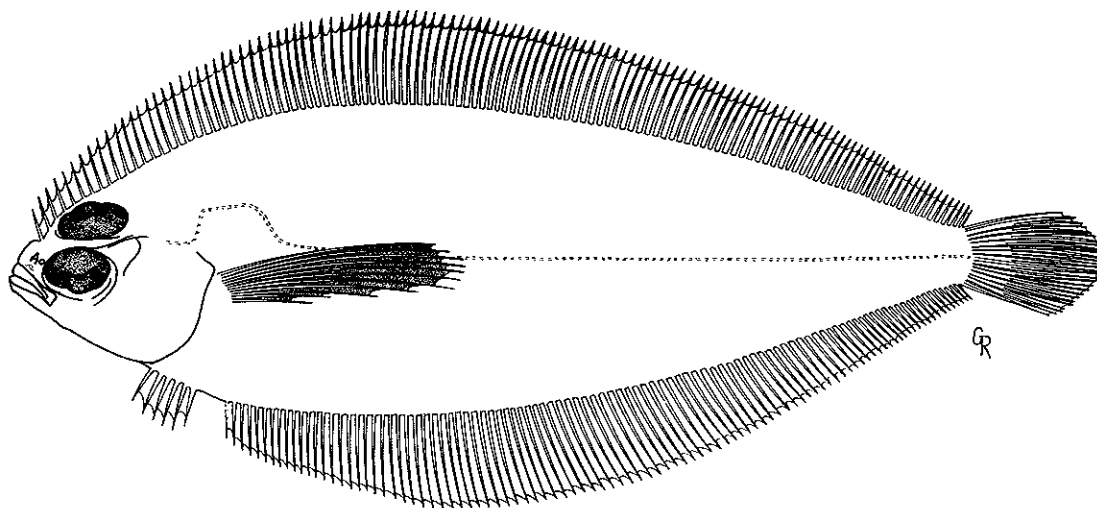


Figure 4.--Monolene atrimana, adult, 107 mm, SL.

Monolene antillarum Norman, 1933

Slim flounder

Dorsal fin rays 103 to 109; anal fin rays 81 to 89; pectoral fin rays 13 to 15 (no pectoral fin on blind side); gill rakers on lower limb moderate, longer than wide, 8 or 9; scales in lateral line 82 to 91; vertebrae 10 or 11 + 37 or 38. Body depth 31 to 35 percent SL (one specimen with 39%); head length 20 to 24 percent SL; eye diameter 27 to 35 percent HL; upper jaw length 30 to 33 percent HL, extending posteriorly to a vertical through anterior part of eye. Pigmentation similar to that described for sessilicauda, with which antillarum may be conspecific (see footnote 7, page 6).

Distribution: Atlantic coast of United States from North Carolina to Florida; Gulf of Mexico; Caribbean Sea from British Honduras and Venezuela; Atlantic coast of South America from Surinam to northern Brazil; in 85 to 300 fath. (155.4-548.6 m.).

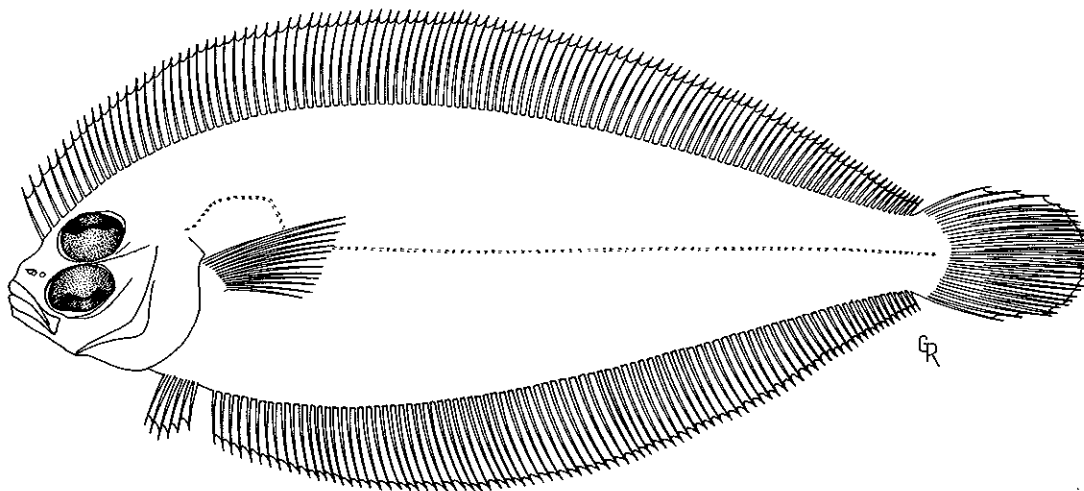


Figure 5.--Monolene antillarum, adult, composite of two, 100 and 121 mm, SL.

Monolene sessilicauda Goode, 1880

Deepwater flounder

Dorsal fin rays 92 to 107; anal fin rays 76 to 84; pectoral fin rays 11 to 14 (no pectoral fin on blind side); gill rakers on lower limb, moderate, longer than wide, 8 to 10; scales in lateral line 88 to 94; vertebrae 10 or 11 + 36. Body depth 30 to 39 percent SL; head length 17 to 22 percent SL; eye diameter 28 to 32 percent HL; upper jaw length 25 to 30 percent HL, extending posteriorly to a vertical through anterior part of eye.

Ocular side tan to brownish with several large blotches arranged as bands across body (banding is dependent on retention of body scales). When present, bands arranged as follows: anteriormost from nape across distal part of opercle, the second under the pectoral fin, the third immediately in front and the fourth immediately beyond midpoint of body, and the fifth in front of penduncle. A large dark blotch on center of caudal fin (may appear as two bands), and several large blotches along dorsal and anal fin bases. Pectoral fin with light base, numerous black spots and blotches forming crossbars on lower half of fin, upper half light. Antillarum, the nominal form preceding, may be a synonym of sessilicauda, (see footnote 7, page 6).

Distribution: Atlantic coast of the United States from New England to Florida; Gulf of Mexico; in 60 to 250 fath. (109.7-457.2 m.).

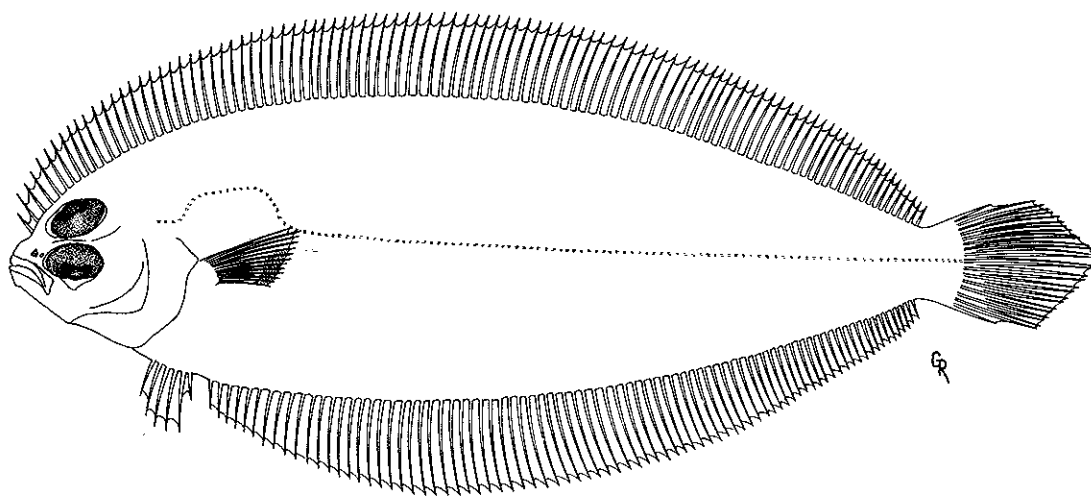


Figure 6.--Monolene sessilicauda, adult, 140 mm. SL.

KEY TO THE SPECIES OF THE GENUS Paralichthys Girard, 1859

- A. Gill rakers on lower limb, 14 or more (rarely 13); fig. 7. dentatus page 9.
- AA. Gill rakers on lower limb, fewer than 13 (one specimen of tropicus with 13) B.
- B. Body depth greater than 47 percent SL (mean 50% SL); blind side on larger specimens dusky; scales in lateral line 104 to 117; fig. 8. squamilentus page 9.
- BB. Body depth 47 percent SL or less (mean 44% SL); blind side immaculate or dusky; scales in lateral line 78 to 100 C.
- C. Anal fin rays 64 or more, occasionally 63; dorsal fin rays 80 to 95; gill rakers on lower limb, 8 to 11; scales in straight portion of lateral line 57 to 68; no ocellated spots [see also CCC]; fig. 9. lethostigma page 10.
- CC. Anal fin rays 57 to 64; dorsal fin rays 73 to 80; gill rakers on lower limb, 10 to 13; scales in straight portion of lateral line 64 to 68; no ocellated spots. [see also CCC]; fig. 10. tropicus page 11.

CCC. Anal fin rays 53 to 63; dorsal fin rays 71 to 85; gill rakers on lower limb, 9 to 12; scales in straight portion of lateral line 47 to 60; ocellated spots or blotches present, prominent to indistinct, most prominent ones arranged in triangular pattern; fig. 11 albigutta page 12.
 albigutta page 12.

Paralichthys dentatus (Linnaeus, 1766)

Summer flounder

Dorsal fin rays 80 to 96; anal fin rays 61 to 73; pectoral fin rays on ocular side 12 to 13; gill rakers 3 to 7 (usually 5 or 6) + 13 to 18 (usually 15 or more); scales in lateral line 91 to 106; vertebrae 11 + 30 or 31. Body depth 41 to 47 percent SL; head length 24 to 33 percent SL; eye diameter 15 to 20 percent HL; upper jaw length 45 to 53 percent HL, extending posteriorly through posterior margin of pupil on specimens about 125 mm. SL, through posterior margin of eye on specimens about 200 mm. SL, and beyond posterior margin of eye on specimens exceeding 300 mm. SL. Ocular side tannish or light to dark brown, with numerous ocellated spots on most specimens, spotting obscure on some larger specimens; five of these spots arranged in two triangles with a common apex on the lateral line.

Distribution: Atlantic coast of United States from Maine to Florida; in depths to 100 fath. (182.9 m.) but generally in 20 fath. (36.6 m.) or less.

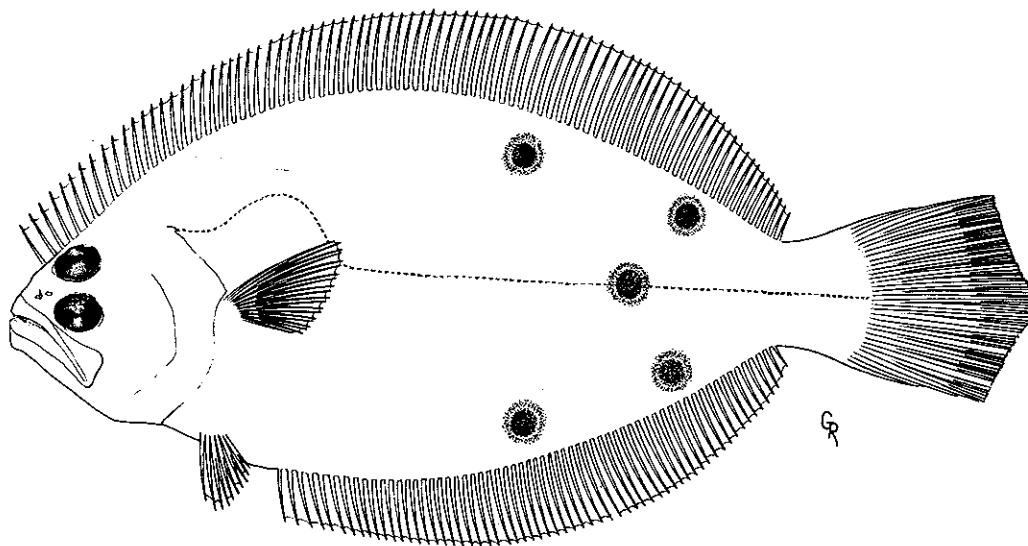


Figure 7.--Paralichthys dentatus, adult, 230 mm. SL.

Paralichthys squamilentus Jordan and Gilbert, 1882

Broad flounder

Dorsal fin rays 76 to 85; anal fin rays 59 to 65; pectoral fin rays on ocular side 11 to 13; gill rakers 3 to 5 (usually 3 or 4) + 9 to 12 (usually 10 to 12); scales in lateral line 104 to 117 (more than in any other western Atlantic Paralichthys); vertebrae 10 + 27 to 29. Body depth 48 to 59 percent SL (greater than in any other western Atlantic Paralichthys); head length 27 to 35 percent SL; eye diameter 25 to 30 percent HL in specimens under about 40 mm. SL, and 18 to 20 percent HL in specimens exceeding 100 mm. SL; upper jaw length 42 to 50 percent HL, extending posteriorly to a vertical through posterior edge of pupil on specimens smaller than about 50 mm. SL and to about posterior edge of eye on larger specimens. Ocular side brown, with nonocellated spots, body tending to darken with increasing size. Broad area along dorsal and ventral edge of ocular side of body characteristically sprinkled with melanophores, middle of body virtually devoid of small melanophores. Blind side dusky.

Distribution: Atlantic coast of United States from North Carolina to Florida and throughout the Gulf of Mexico; large individuals in deep water, but young fish inshore in shallow water, migrating into deeper water with increasing size; in 4 to 125 fath. (7.3 - 228.6 m.).

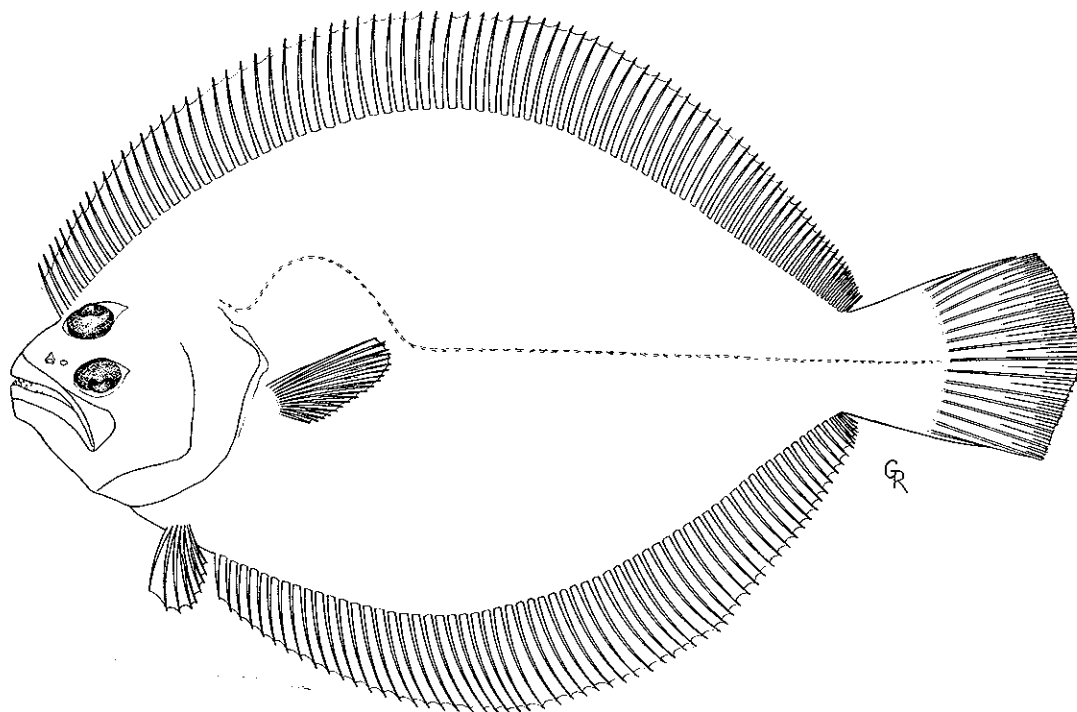


Figure 8.--Paralichthys squamilentus, adult, 155 mm. SL.

Paralichthys lethostigma Jordan and Gilbert, 1884

Southern flounder

Dorsal fin rays 80 to 95; anal fin rays 63 to 74; pectoral fin rays on ocular side 11 to 13; gill rakers 2 or 3 (usually 2) + 8 to 11 (usually 9 or 10); scales in lateral line 85 to 100; vertebrae 10 or 11 + 27 or 28. Body depth 39 to 47 percent SL; head length 24 to 34 percent SL; eye diameter 15 to 19 percent HL (decreasing with increasing size); upper jaw length 47 to 51 percent HL, extending posteriorly to a vertical through posterior margin of pupil on specimens about 35 mm. SL, through posterior margin of eye on specimens between 35 to 100 mm. SL, and beyond posterior margin of eye on specimens over about 100 mm. SL. Ocular side light to dark brown, with diffuse nonocellated spots and blotches which tend to be absent in large specimens. Blind side immaculate or dusky.

Distribution: Atlantic and Gulf coasts of United States, from North Carolina to Texas⁸; generally found along the shores of bays, sounds, and lagoons in comparatively shallow water, at times entering fresh water.

⁸ Norman's (1934: 75) reported range is New York to Trinidad. In specimens examined he lists one (150 mm. SL) from Tobago. Norman's range of anal fin rays is (58) 60 to 74. Ginsburg (1933) described P. tropicus from off Trinidad. The single specimen upon which his description is based has 58 anal fin rays. In none of the 153 specimens of P. lethostigma examined by Ginsburg (1952) were the anal fin rays fewer than 63. P. tropicus is closely related to P. lethostigma (Ginsburg, 1952). For this reason I suspect the Tobago specimen examined and listed as P. lethostigma by Norman (1934) is P. tropicus. Ginsburg (1952: 329-331) established the northernmost distribution of P. lethostigma as North Carolina not New York.

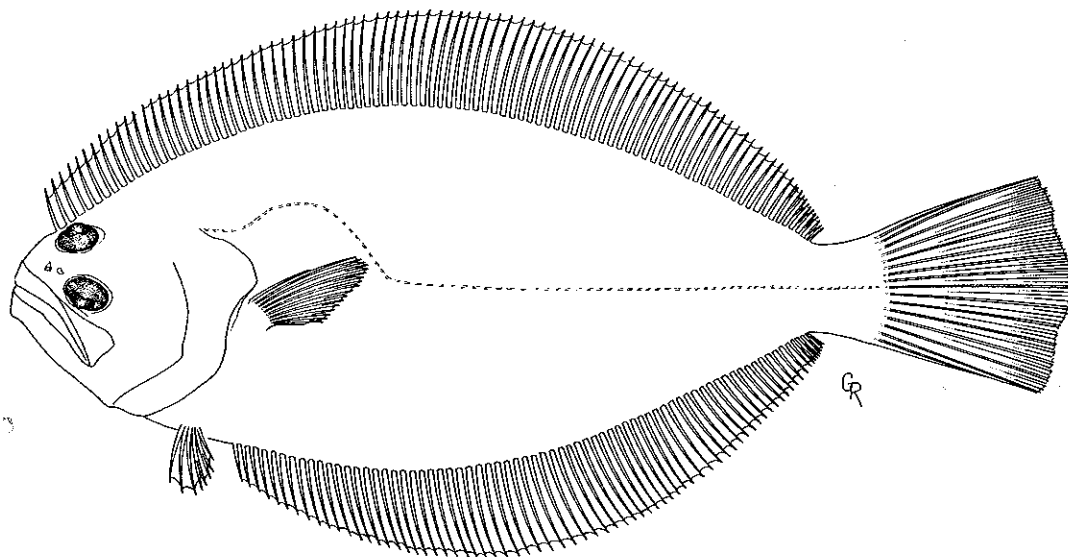


Figure 9.--Paralichthys lethostigma, adult, 165 mm. SL.

Paralichthys tropicus Ginsburg, 1933

Dorsal fin rays 73 to 80; anal fin rays 57 to 64; pectoral fin rays on ocular side 11; gill rakers 2 or 3 + 10 to 13; scales in lateral line 95 to 98, vertebrae 10 + 26. Body depth 43 to 47 percent SL; head length 26 to 29 percent SL; eye diameter 16 to 19 percent HL; upper jaw length 48 to 50 percent HL, extending posteriorly to a vertical through posterior margin of eye or slightly beyond. Ocular side dark brown with diffuse nonocellated spots. Similar to P. lethostigma in general body coloration on ocular and blind sides.

Distribution: Caribbean Sea from Colombia to Venezuela and Trinidad; in 19 to 100 fath. (34.7 - 182.9 m.).

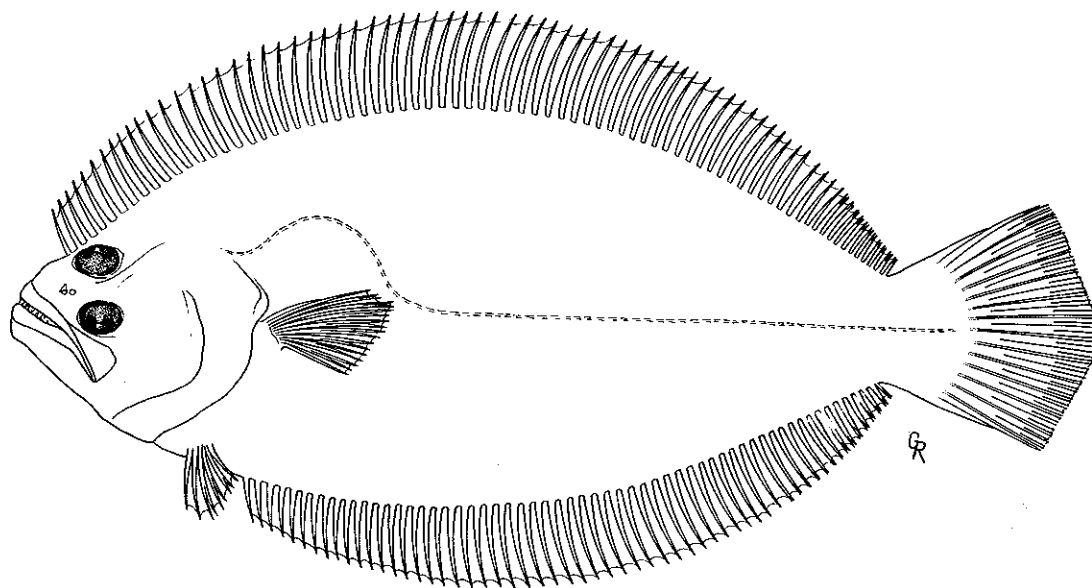


Figure 10.--Paralichthys tropicus, adult, 145 mm. SL.

Paralichthys albigutta Jordan and Gilbert, 1882

Gulf flounder

Dorsal fin rays 71 to 85; anal fin rays 53 to 63; pectoral fin rays on ocular side 10 to 12; gill rakers 2 to 4 (usually 2 or 3) + 9 to 12 (usually 10 or 11); scales in lateral line 78 to 81; vertebrae 10 + 27. Body depth 39 to 47 percent SL; head length 26 to 35 percent SL; eye diameter 17 to 21 percent HL; upper jaw length 46 to 50 percent HL, extending posteriorly to a vertical through posterior margin of eye on specimens up to about 125 mm. SL, and farther beyond on larger specimens (upper jaw length highly variable). Ocular side either light or dark brown, with numerous spots and blotches, three most prominent spots ocellated and arranged in a triangular pattern, usually conspicuous but sometimes faint; other spots faint and usually not ocellated.

Distribution: Atlantic and Gulf coasts of United States from North Carolina to Texas; in depths to 70 fath. (128 m.) generally less than 50 fath. (91.4 m.).

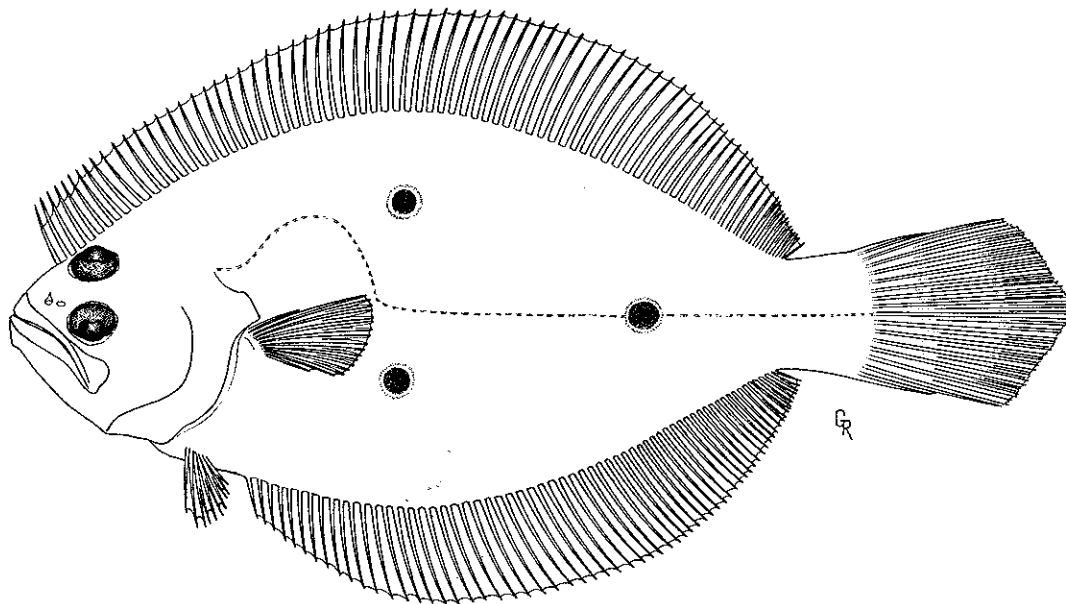


Figure 11.--Paralichthys albigutta, adult, 125 mm, SL.

GASTROPSETTA Bean, 1895

Gastropsetta frontalis Bean, 1895

Shrimp flounder

Dorsal fin rays 58 to 65; anal fin rays 46 to 53; pectoral fin rays on ocular side 10 or 11; gill rakers 3 to 6 + 6 to 8; scales in lateral line 95 to 112; vertebrae 10 + 25 to 28. Body depth 45 to 55 percent SL; head length 23 to 30 percent SL; eye diameter 25 to 31 percent HL; upper jaw length 35 to 43 percent HL, extending posteriorly to a vertical through center of eye. Ocular side light tan to dark brown. Three large ocellated spots, anteriormost above arch of lateral line, posterior two on a vertical slightly posterior to midpoint of body, none on posterior third of body or on lateral line. Broken pigment lines across eyes and interorbital region.

Origin of dorsal fin well in advance of anterior edge of upper eye, beginning above anterior nostril on blind side. Some anterior dorsal fin rays and some pelvic fin rays on ocular side elongate. Anterior profile of head convex.

Distribution: Atlantic coast of United States from North Carolina to Florida; Gulf of Mexico; Bahamas (Great Inagua); Caribbean Sea from Panama and Nicaragua; in 19 to 100 fath. (34.7 - 182.9 m.).

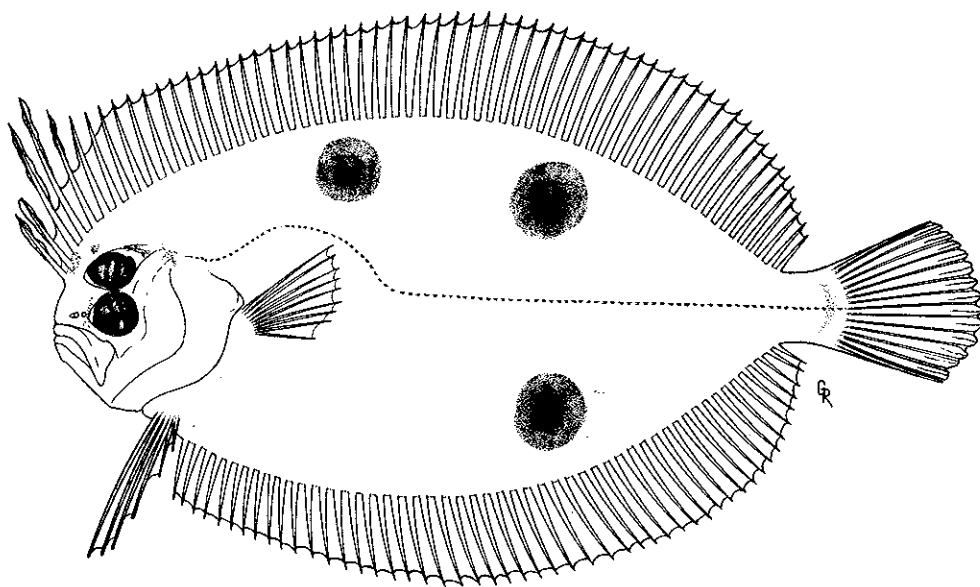


Figure 12.--Gastropsetta frontalis, adult, 176 mm. SL.

KEY TO THE SPECIES OF THE GENUS Ancylopsetta Gill, 1864

- A. Four large ocellated spots; anterior spot above curved portion of lateral line B.
- AA. Three large ocellated spots; no spot above curved portion of lateral line. C.
- B. A dark ocellated spot on distal portion of pelvic fin on ocular side; none of the anterior dorsal fin rays longer than succeeding rays; centers of ocelli dark; fig. 13 kumperae page 14.
- BB. No dark ocellated spot on distal portion of pelvic fin on ocular side; some anterior dorsal fin rays slightly elongate, longer than succeeding rays; centers of ocelli generally whitish; fig. 14. quadrocellata page 14.
- C. Scales on ocular side rough to the touch; ctenii well developed, projecting beyond scale margin D.
- CC. Scales of ocular side smooth to the touch; ctenii microscopic, not well developed, not projecting beyond scale margin E.
- D. First two dorsal fin rays short, next three long (may be longer or shorter than head), succeeding rays short and of about equal length; no prominent fleshy projections on tips of anterior dorsal fin rays; blind side dusky, but less noticeable on some large specimens; dorsal rays between origin of fin and center of dorsal ocellus 29 to 34; fig. 15 antillarum page 15.
- DD. First dorsal fin ray short, second or third longest (never longer than head), succeeding rays gradually decreasing in length through sixth or seventh ray; prominent fleshy projections on tips of some anterior dorsal fin rays; blind side immaculate; dorsal rays between origin of fin and center of dorsal ocellus 38 to 46; fig. 16. dilecta page 16.
- E. First two dorsal fin rays short, next two long; no prominent fleshy projections on tips of anterior dorsal fin rays; blind side dusky; pelvic fin of ocular side less than twice length that of blind side; fig. 17. microctenus page 16.
- EE. First dorsal fin ray short, next three long; prominent fleshy projections on tips of anterior dorsal fin rays; blind side immaculate; pelvic fin of ocular side may be more or less than twice length that of blind side; fig. 18 cycloidea page 17.

Ancylopsetta kumperae Tyler, 1959

Dorsal fin rays 72 to 84; anal fin rays 57 to 63; pectoral fin rays on ocular side 11 to 13; gill rakers 2 + 6 or 7; scales in lateral line 78 to 99; vertebrae 10 + 25 to 27. Body depth 49 to 55 percent SL; head length 24 to 30 percent SL; eye diameter 19 to 26 percent HL; upper jaw length 41 to 45 percent HL, extending posteriorly to a vertical through posterior edge of pupil. Ocular side dark brown with spots and blotches, four large ocellated spots with dark centers on body, a fifth ocellated spot on distal margins of third and fourth pelvic fin rays on ocular side. Blind side dusky.

Anterior dorsal fin rays not elongated. Pelvic fin on ocular side slightly longer than that on blind side. Entire body covered with ctenoid scales, rough to the touch. Inner pelvic fin rays of ocular side extensively branched.

Distribution: Atlantic Ocean and Caribbean Sea from northernmost Brazil to Colombia; in 18 to 50 fath. (32.9 - 91.4 m.).

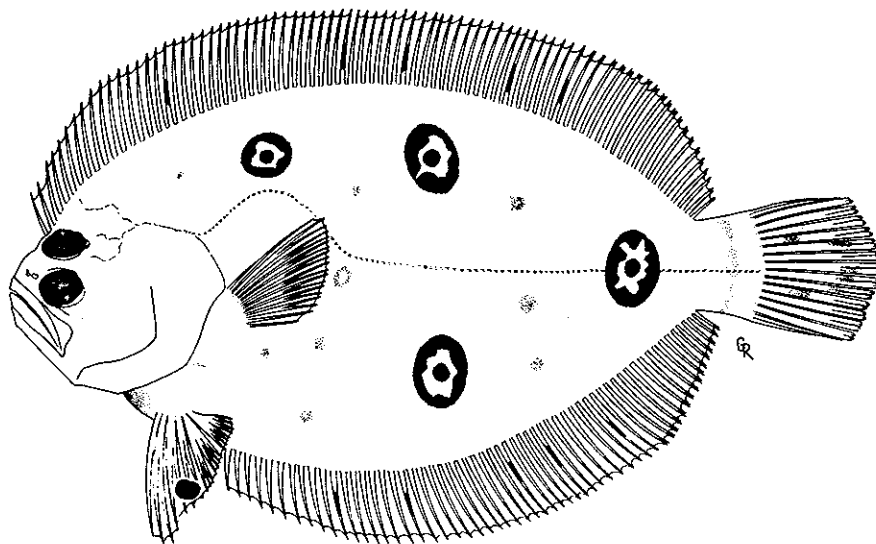


Figure 13.--Ancylopsetta kumperae, adult, 196 mm. SL.

Ancylopsetta quadrocellata Gill, 1864

Ocellated flounder

Dorsal fin rays 67 to 76; anal fin rays 54 to 61; pectoral fin rays on ocular side 10 to 12; gill rakers 2 or 3 + 6 or 7; scales in lateral line 80 to 90; vertebrae 10 or 11 + 25 to 27 (Atlantic specimens 11 abdominal vertebrae; Gulf of Mexico specimens 10). Body depth 53 to 63 percent SL; head length 25 to 32 percent SL; eye diameter 18 to 24 percent HL; upper jaw length 37 to 46 percent HL, extending posteriorly to a vertical through posterior edge of pupil. Ocular side brown, with four large ocellated spots with whitish centers (difficult to discern on some large specimens). No ocellated spot on pelvic fin of ocular side. Blind side immaculate.

Some anterior dorsal fin rays slightly elongate. Pelvic fin rays on ocular side slightly longer than those on blind side. Entire body covered with ctenoid scales, rough to the touch. Inner pelvic fin rays of ocular side not extensively branched.

Distribution: Disjunct, Atlantic and Gulf coasts of United States and Mexico from North Carolina to Jupiter, Fla.; Tortugas; Cape Sable, Fla., to Corpus Christi, Tex.; Campeche, Mexico; in 2 to 90 fath. (3.7 - 164.6 m.), usually less than 25 fath. (45.7 m.).

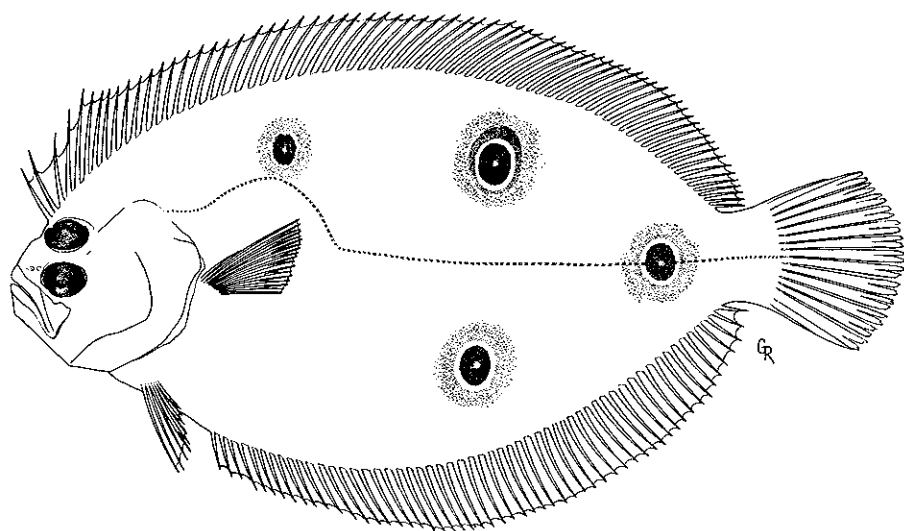


Figure 14.--*Ancylopsetta quadrocellata*, adult, 208 mm. SL.

Ancylopsetta antillarum Gutherz, 1966

Dorsal fin rays 62 to 72; anal fin rays 48 to 56; pectoral fin rays on ocular side 9 to 12; gill rakers 2 to 4 + 6 to 8; scales in lateral line 70 to 80; vertebrae 10 + 25 to 27. Body depth 46 to 55 percent SL; head length 27 to 33 percent SL; eye diameter 25 to 38 percent HL; upper jaw length 42 to 47 percent HL, extending posteriorly to a vertical through center of eye. Ocular side tan to dark brown, with numerous dark spots and blotches, three large ocellated spots arranged in a triangular pattern. Blind side dusky.

Some anterior dorsal fin rays and some pelvic fin rays on ocular side elongate (decreasing in relative length with increasing specimen size). Configuration of anterior dorsal fin rays as follows: first two short, next three elongate, the sixth shorter and about as long as succeeding rays. None of the anterior dorsal fin rays with fleshy projections. Ctenii on scales of ocular side well developed, extending beyond scale margin, rough to the touch.

Distribution: Bahamas; Puerto Rico; Virgin Islands; Caribbean Sea from British Honduras. This species is generally found in greater depths (120 - 250 fath., 219.5 - 457.2 m.) than any other *Ancylopsetta*.

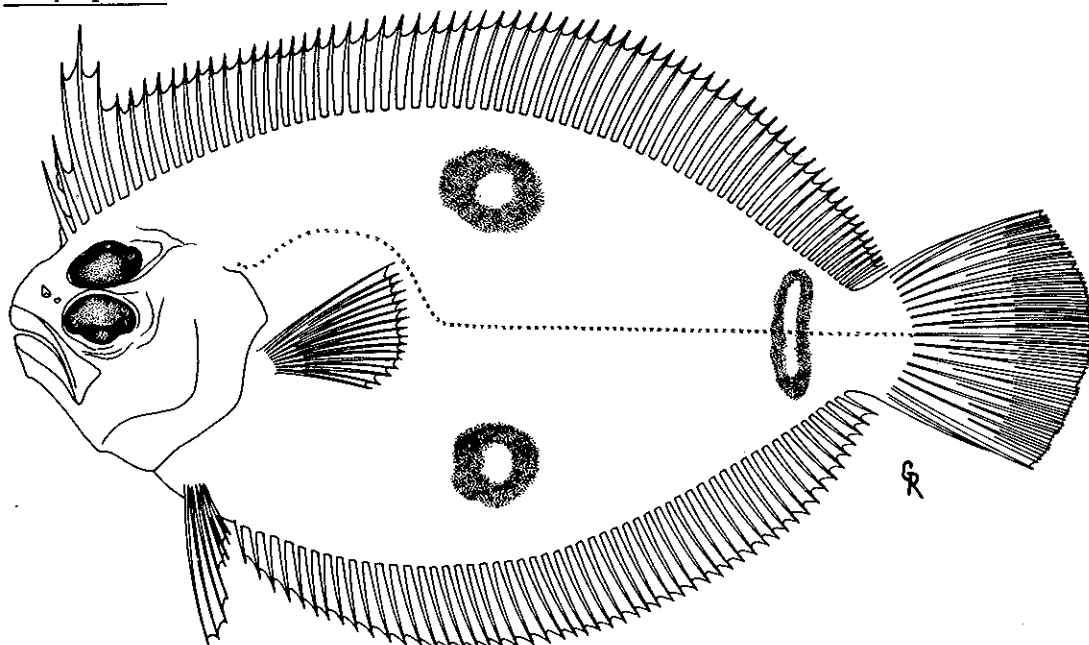


Figure 15.--*Ancylopsetta antillarum*, adult, 296 mm. SL.

Ancylopsetta dilecta (Goode and Bean, 1883)

Three-eye flounder

Dorsal fin rays 68 to 79; anal fin rays 53 to 60; pectoral fin rays on ocular side 10 to 12; gill rakers 1 to 3 + 6 to 9; scales in lateral line 73 to 82; vertebrae 10 + 25 to 27. Body depth 45 to 53 percent SL; head length 25 to 31 percent SL; eye diameter 24 to 32 percent HL; upper jaw length about 40 percent HL, extending posteriorly to a vertical through middle of eye. Ocular side tan to pale brown, with numerous spots and blotches, three large ocellated spots on ocular side arranged in a triangular pattern. Blind side immaculate.

Some anterior dorsal fin rays and some pelvic fin rays of ocular side elongate, dorsal fin rays never longer than the head. Configuration of anterior dorsal fin rays as follows: first ray shorter than next four which are successively reduced in length to the sixth or seventh ray, which is about equal in length to the succeeding rays. Fleshy projections on some anterior dorsal fin rays. Ctenii on scales of ocular side well developed, extending beyond scale margin, scales rough to the touch.

Distribution: Atlantic and Gulf coasts of the United States from North Carolina to Texas; Yucatan, Mexico; in 32 to 200 fath. (58.5 - 365.8 m.).

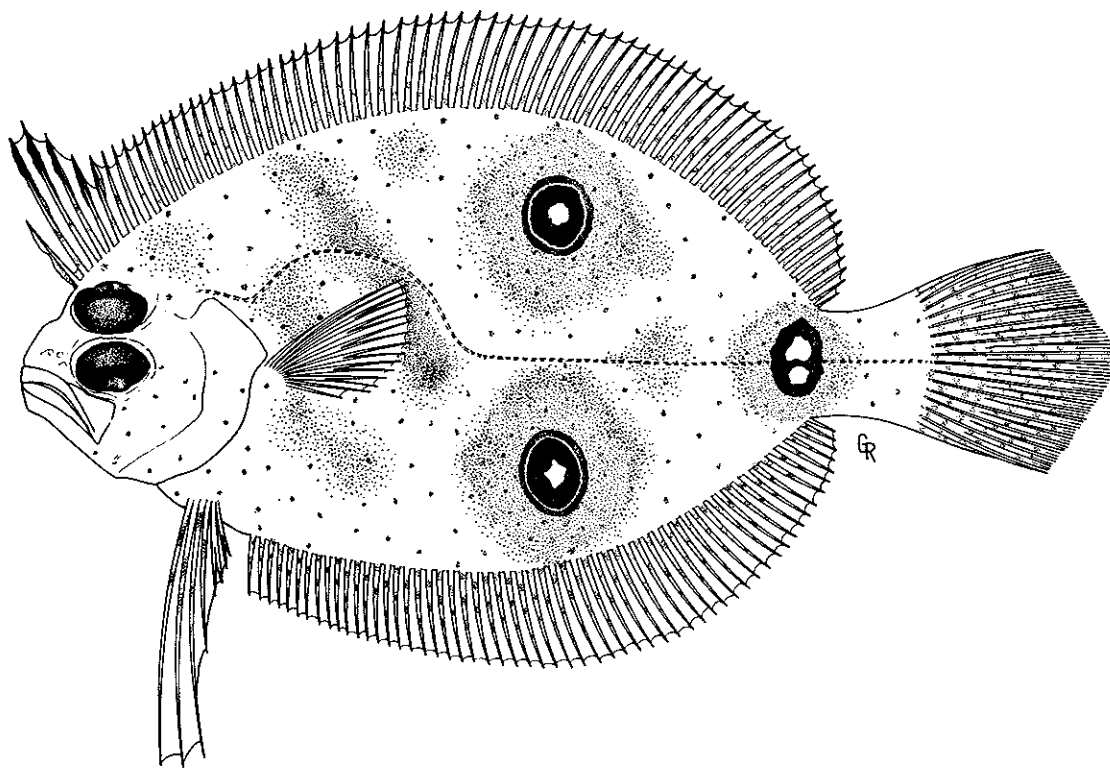


Figure 16.--Ancylopsetta dilecta, adult, 154 mm. SL.

Ancylopsetta microctenus Guthertz, 1966

Dorsal fin rays 64 to 71; anal fin rays 50 to 56; pectoral fin rays on ocular side 10 or 11; gill rakers 2 or 3 + 7 or 8; scales in lateral line 64 to 75; vertebrae 10 or 11 + 24 or 25. Body depth 44 to 50 percent SL; head length 27 to 32 percent SL; eye diameter 25 to 29 percent HL; upper jaw length 43 to 47 percent HL, extending posteriorly to a vertical through posterior edge of pupil. Ocular side tan to pale brown, three large ocellated spots arranged in a triangular pattern. Blind side dusky.

Some anterior dorsal fin rays may exceed head length (decreasing in relative length with increasing specimen size), and some pelvic fin rays on ocular side elongate. Configuration of anterior dorsal fin rays as follows: first two short, next two long, the fifth shorter, slightly

longer than the sixth which is about equal in length to succeeding rays. None of the anterior dorsal fin rays with fleshy projections. Ctenii on scales of ocular side not well developed, not extending beyond scale margin (superficially resembling cycloid scales).

Distribution: Known only from the Caribbean Sea off Honduras and Nicaragua; in 100 to 160 fath. (182.9 - 292.6 m.).

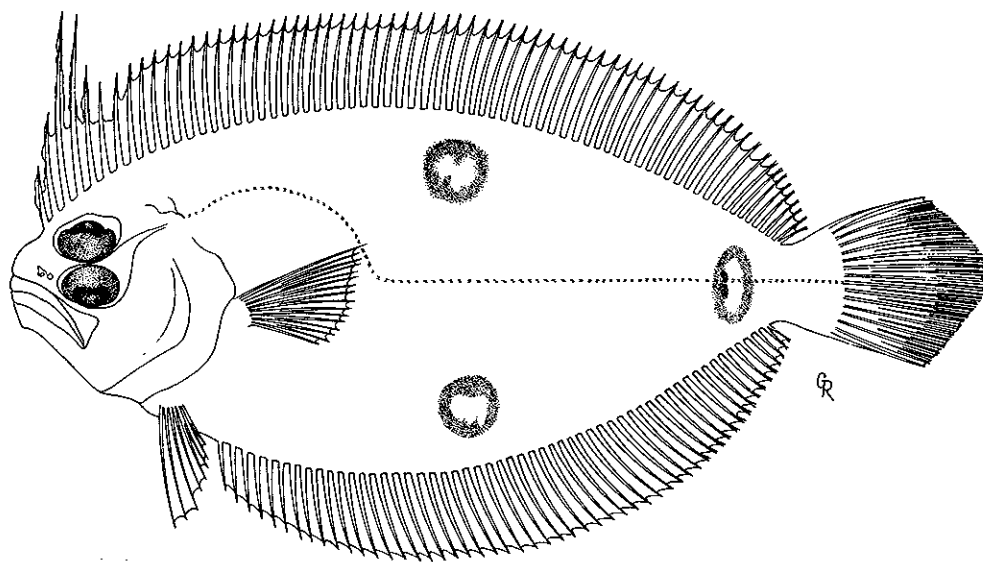


Figure 17.--*Ancylopetta microctenus*, adult, 194 mm. SL.

Ancylopetta cycloidea Tyler, 1959

Dorsal fin rays 62 to 68; anal fin rays 48 to 52; pectoral fin rays on ocular side 10 or 11; gill rakers 1 to 4 + 6 or 7; scales in lateral line 67 to 76; vertebrae 10 + 24 or 25. Body depth 44 to 52 percent SL; head length 28 to 32 percent SL; eye diameter 26 to 32 percent HL; upper jaw length 40 to 49 percent HL, extending posteriorly to a vertical through middle of eye. Ocular side tan to dark brown with numerous spots and blotches, three large ocellated spots arranged in a triangular pattern. Blind side immaculate.

Some anterior dorsal fin rays and some pelvic fin rays of ocular side elongate (decreasing in relative length with increasing specimen size). Elongate pelvic fin rays longer than head on specimens from Brazil, Surinam, and the Guianas in the Atlantic, but considerably shorter than head on specimens from the Caribbean Sea. Configuration of anterior dorsal fin rays as follows: first shorter than the following three which are very elongate, fifth about as long as succeeding rays. Fleshy projections on some of the anterior dorsal fin rays. Ctenii on scales of ocular side not well developed, not extending beyond scale margin (superficially resembling cycloid scales).

Distribution: Atlantic Ocean from Trinidad and Tobago to the Guianas; Caribbean Sea from Venezuela to southern Nicaragua; in 36 to 140 fath. (65.8 - 256.0 m.).

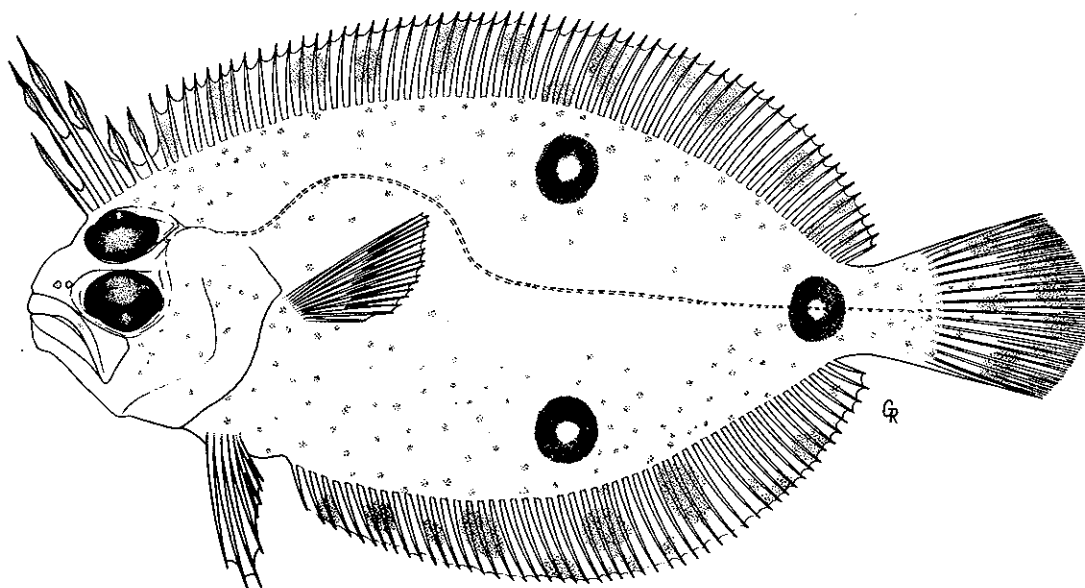


Figure 18.--*Ancylopsetta cyloidea*, adult, 165 mm. SL.

HIPPOGLOSSINA Steindachner, 1876

Hippoglossina oblonga (Mitchill, 1815)

Fourspot flounder

Dorsal fin rays 71 to 86; anal fin rays 58 to 72; pectoral fin rays on ocular side 10 to 12; gill rakers moderately long and stout, 1 or 2 (plus 2 to 5 rudiments) + 7 to 10 (usually 8 or 9); scales in lateral line about 95; vertebrae 11 + 30 or 31. Body depth 38 to 44 percent SL; head length 25 to 29 percent SL; eye diameter 25 to 30 percent HL; upper jaw length 44 to 50 percent HL, extending posteriorly to a vertical through posterior edge of pupil. Ocular side brownish with four prominent ocellated spots arranged in pattern of a trapezoid, anterior two spots slightly in advance of midpoint of body (total length), posterior two just in front of caudal peduncle.

Origin of the dorsal fin behind anterior edge of orbit. Eyes large. Anterior canine teeth enlarged. No accessory scales present.

Distribution: Georges Bank to Tortugas, Fla. This species shows a north-south bathymetric distribution: off Massachusetts, it is found in the sounds, bays, and out to about 15 fath.; off New York beyond the 20-fath. curve; off North Carolina in 20 to 50 fath. (36.6 - 91.4 m.) and off Florida, in depths generally exceeding 150 fath. (274.3m.).

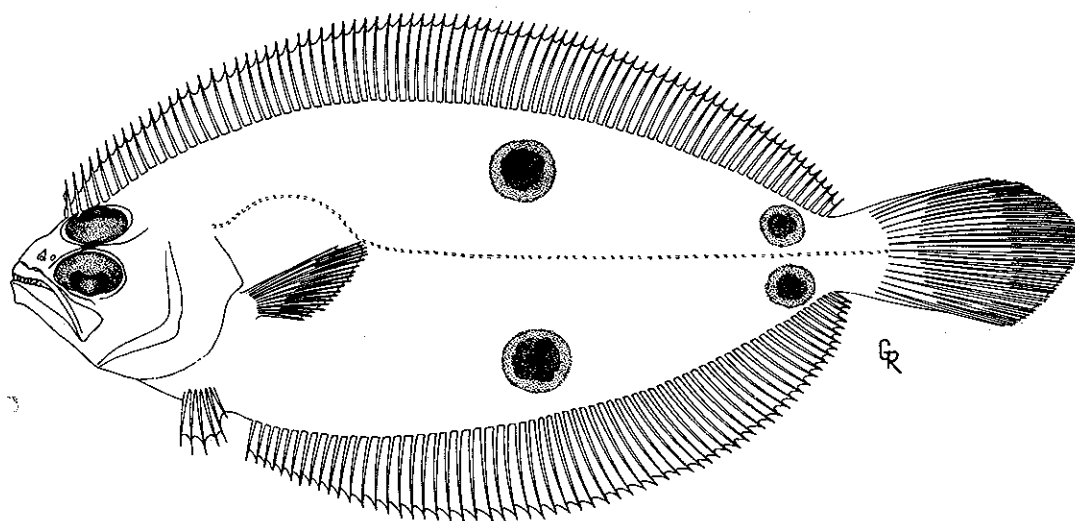


Figure 19.--*Hippoglossina oblonga*, adult, 229 mm. SL.

ENGYPHRYS Jordan and Bollman, 1889

Engyophrys sentus Ginsburg, 1933

Spiny flounder

Dorsal fin rays 74 to 83; anal fin rays 60 to 67; pectoral fin rays on ocular side 8 to 10 (usually 9); gill rakers very short, 0 to 3 + 4 to 7; scales in lateral line about 50; vertebrae 10 + 27 or 28. Body depth 47 to 61 percent SL; head length 19 to 25 percent SL; eye diameter 32 to 43 percent HL (28% on one specimen); upper jaw length 19 to 28 percent HL, extending posteriorly to a vertical through the anterior margin of eye or slightly beyond (on some specimens not reaching anterior margin of eye). Ocular side tan to brownish with dark blotches on lateral line and along dorsal and ventral edges of body. Three blotches on lateral line, one at junction of curved and straight parts, one in front of caudal peduncle, and one between. Females and young immature males with an immaculate blind side; blind side of mature males dusky with three to seven (usually five or six) vertical, dark diffuse bars on anterior third of body.

Upper jaw short. Interorbital spines three to five, other spines present above upper eye and in front of lower eye. Males and females with tentacles on posterior portion of eyes, on males these shorten with increased body size and may be lost.

Distribution: Florida Keys; Bahamas; Gulf of Mexico; Caribbean Sea from Trinidad to Nicaragua; Atlantic coast of South America to Brazil; in 20 to 100 fath. (36.6 - 182.9 m.).

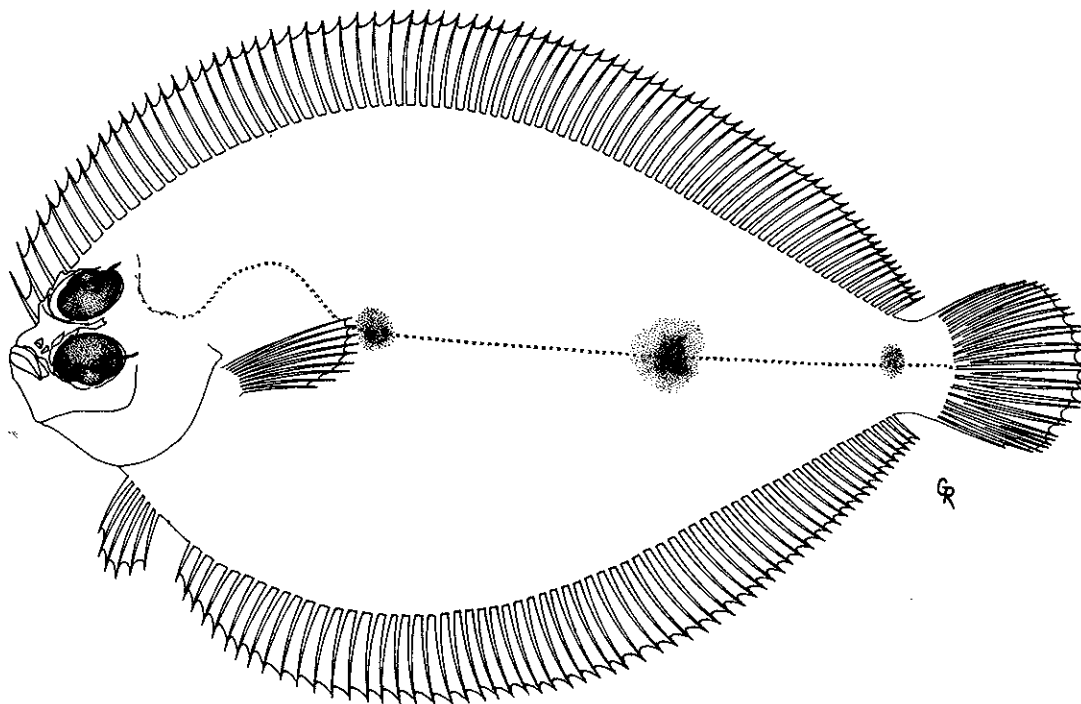


Figure 20.--Engyophrys sentus, adult, 80 mm. SL.

KEY TO THE SPECIES OF THE GENUS Trichopsetta Gill, 1888

- A. Gill rakers on lower limb short and stout, 7 or 8 (including a rudiment); 2 furrows on head, one from anterior nostril on blind side to anterodorsal edge of upper orbit, the second just above anterior third of upper orbit; pectoral fin length on blind side about 50 percent that on ocular side; fig. 21 sp. A page 20.
- AA. Gill rakers on lower limb moderately long and slender, 9 to 11 (including rudiments); no furrows on head; pectoral fin on blind side either longer than on ocular side or exceeding 70 percent its length B.
- B. Scales in lateral line 84 to 94; pectoral fin on ocular side longer than on blind side; blind side dusky; fig. 22 sp. B page 21.
- BB. Scales in lateral line 63 to 79; pectoral fin on ocular side shorter than on blind side; blind side immaculate C.
- C. Scales in lateral line 63 to 68; dorsal fin rays 89 to 95; anal fin rays 69 to 75; fig. 23 ventralis page 22.
- CC. Scales in lateral line 69 to 79; dorsal fin rays 95 to 103; anal fin rays 75 to 82; fig. 24 sp. C page 23.

Trichopsetta sp. A Anderson and Guthertz, (MS.)

Dorsal fin rays 91 or 92; anal fin rays 70 to 73; pectoral fin rays on ocular side 12, on blind side 9 or 10; gill rakers short and broad 0 + 7 or 8 (including a rudiment); scales in lateral line 78 to 80; vertebrae 10 + 30. Body depth 42 to 43 percent SL; head length 24 to 26 percent SL; eye diameter 28 to 29 percent HL; upper jaw length 32 to 33 percent HL, extending posteriorly to a vertical through anterior edge of pupil. Ocular side brown with numerous spots and blotches, three blotches on straight portion of lateral line. Black spot on anterior dorsal fin rays, between the third and seventh rays (may be indistinct). Some dark pigmentation around orbital furrows. Blind side lightly dusky, more noticeable along dorsal and anal fin bases on posterior half of body.

Pectoral fin on blind side about 50 percent of length of fin on ocular side. Furrow from anterior nostril on blind side to anterodorsal edge of upper orbit, another furrow over anterior third of dorsal edge of orbit. Males without elongate pelvic fin rays on blind side and lacking a black spot on anterior anal fin rays. Males with well-developed spine at symphysis of lower jaw, one on snout above upper jaw, and one on anterior orbital rim of lower eye.

Distribution: Known from two specimens, one taken off Nicaragua in 85 fath. (155.4 m.) and the other off western Venezuela in 65 fath. (118.9 m.).

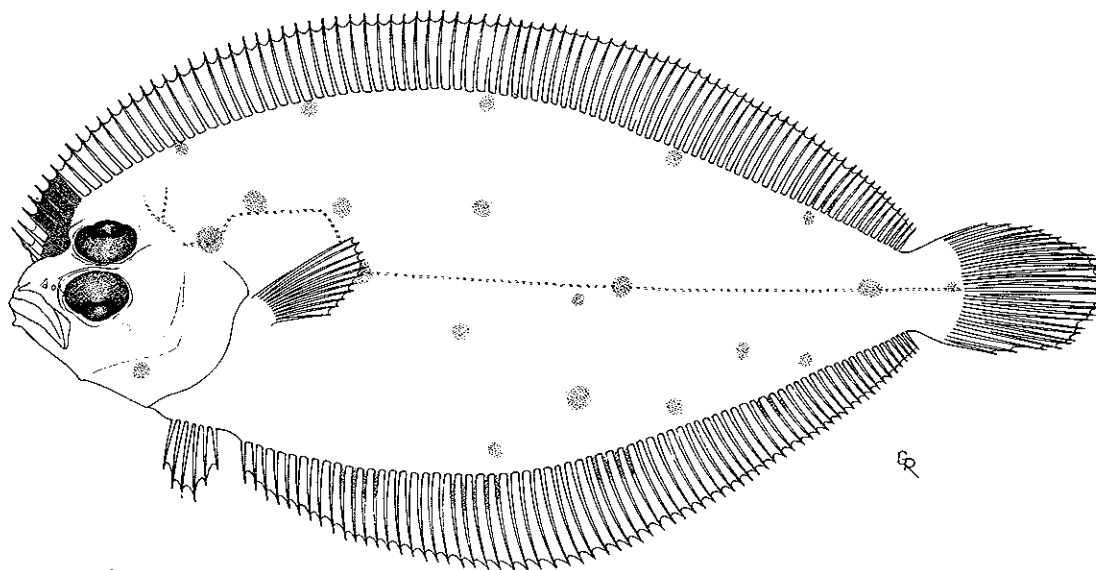


Figure 21.--Trichopsetta sp. A, adult, 117 mm. SL.

Trichopsetta sp. B Anderson and Guthertz, (MS.)

Dorsal fin rays 98 to 104; anal fin rays 80 to 85; pectoral fin rays on ocular side 9 to 13, on blind side 7 to 10; gill rakers moderately long and slender 0 + 9 to 11; scales in lateral line 84 to 94; vertebrae 10 or 11 + 31 to 33. Body depth 39 to 43 percent SL; head length 23 to 29 percent SL; eye diameter 26 to 30 percent HL; upper jaw length 37 to 41 percent HL, extending posteriorly to a vertical through anterior third to middle of pupil. Ocular side tan or straw-colored with fewer spots and blotches on body and fins than in the other three species. Pronounced dark spot at junction of straight and curved portion of lateral line. Males with large black spot on anterior anal fin rays, usually between the first and seventh ray. Blind side straw-colored and dusky.

Pectoral fin on blind side shorter than on ocular side. Males with greatly elongate pelvic fin rays on blind side; spines on symphysis of lower jaw, on snout above upper lip, and on anterior orbital rim of each eye, spines are well developed on large specimens.

Distribution: Known from south Florida and north of the Bahamas; Florida Straits between Andros Island and the tip of Florida; Caribbean Sea from Honduras and Nicaragua; in 75 to 150 fath. (137.2 - 274.3 m.), usually over 100 fath. (182.9 m.).

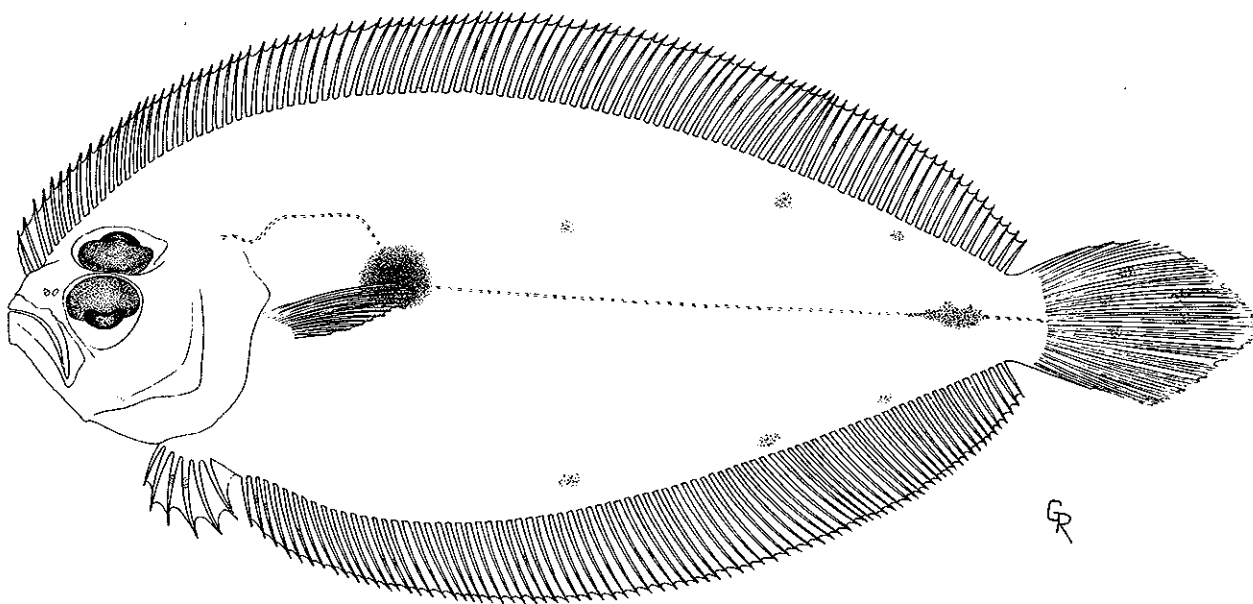


Figure 22.--Trichopsetta sp. B, adult, female, 250 mm. SL.

Trichopsetta ventralis (Goode and Bean, 1885)

Sash flounder

Dorsal fin rays 89 to 95; anal fin rays 69 to 75; pectoral fin rays on ocular side 12 or 13, on blind side 7 to 10; gill rakers moderately long and slender, 0 + 9 to 11; scales in lateral line 63 to 68; vertebrae 10 + 30 or 31. Body depth 42 to 49 percent SL; head length 26 to 29 percent SL; eye diameter 21 to 26 percent HL; upper jaw length about 41 percent HL, extending posteriorly to a vertical near middle of eye. Ocular side brownish with limited spotting on body and fins, three blotches on straight portion of lateral line, may be indistinct or missing. Most males with a dark blotch on the anal fin between about the 4th and 8th to 10th fin ray, blotch poorly developed or absent in some specimens.

Pectoral fin on blind side longer than on ocular side. Males with greatly elongate pelvic fin rays on blind side; spines on head not well developed.

Distribution: Northern Gulf of Mexico; in 18 to 60 fath. (32.9 - 109.7 m.).

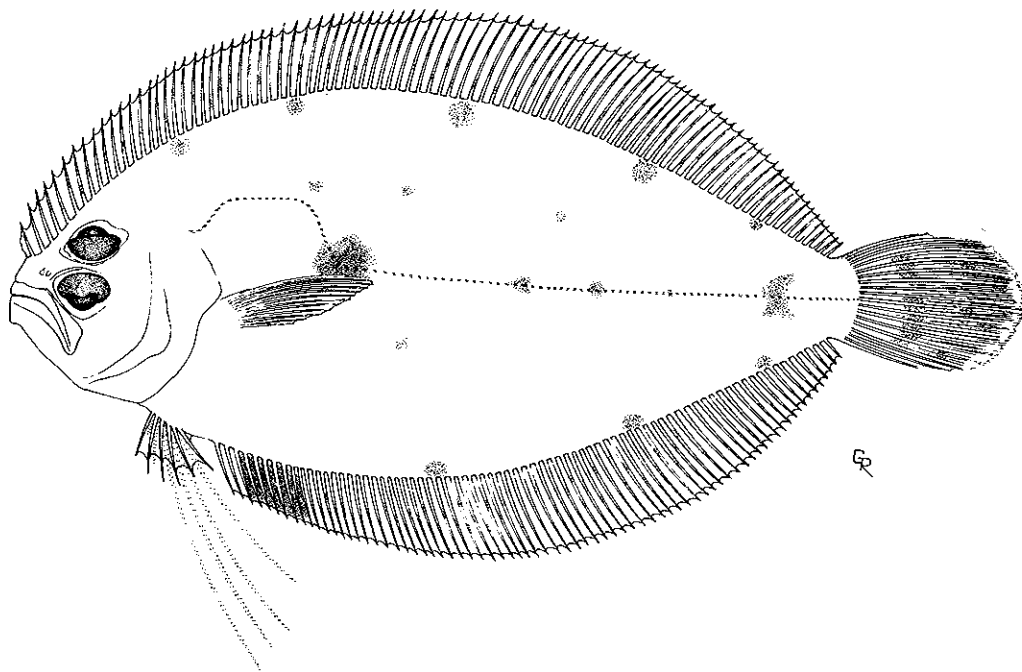


Figure 23.--*Trichopsetta ventralis*, adult, male, 140 mm. SL.
Broken lines represent pelvic fin rays on blind side.

Trichopsetta sp. C Anderson and Guthertz, (MS.)

Dorsal fin rays 95 to 103; anal fin rays 75 to 82; pectoral fin rays on ocular side 11 to 13, on blind side 7 or 8; gill rakers moderately long and slender 0 + 9 to 11; scales in lateral line 69 to 79; vertebrae 10 or 11 + 31 to 33. Body depth 38 to 45 percent SL; head length 26 to 30 percent SL; eye diameter 23 to 29 percent HL; upper jaw length 39 to 43 percent HL, extending posteriorly to a vertical through middle of pupil. Ocular side tan to brown with few to numerous spots and blotches on body and fins. Males generally lack dark spot on anterior anal fin rays. Pair of faint spots usually present at base of caudal fin rays. Blotches on straight portion of lateral line may be distinct, diffuse, or absent. Blind side immaculate.

Pectoral fin on blind side longer than on ocular side. Males with greatly elongate pelvic fin rays on blind side; spines on head not well developed.

Distribution: Caribbean Sea off Jamaica, Panama, and Colombia; in 35 to 150 fath. (64.0 - 274.3 m.)--one catch from the Atlantic off Surinam in 100 fath. (182.9 m.).

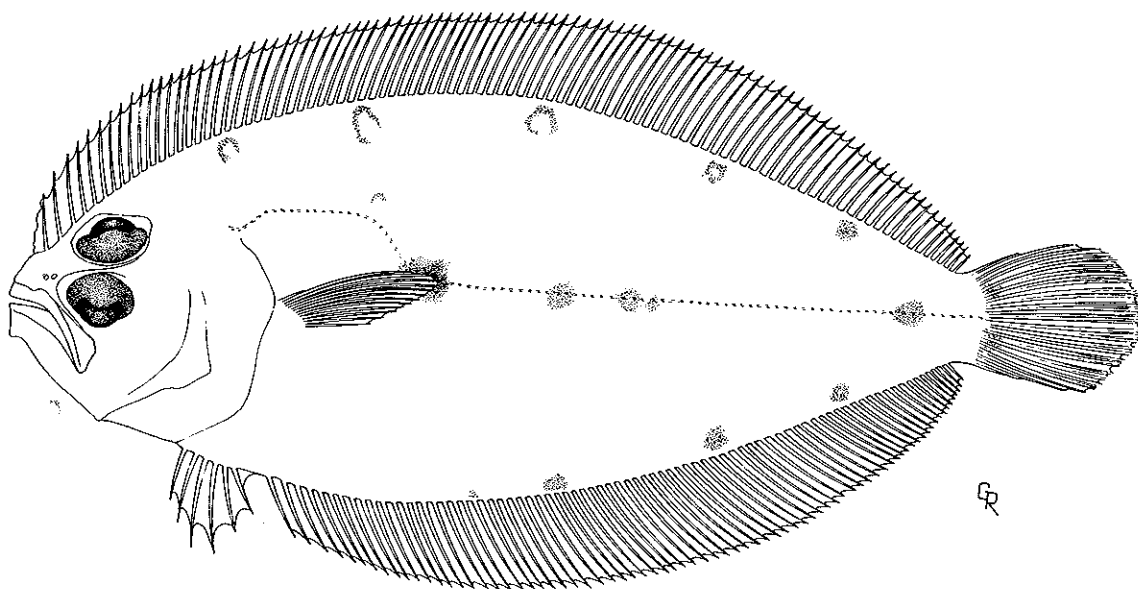


Figure 24.--*Trichopsetta* sp. C, adult, female, 140 mm. SL.

KEY TO THE SPECIES OF THE GENUS *Cyclopsetta* Gill, 1888

- A. Body and dorsal and anal fins with 5 or 6 vertical brown bands or bars; no large spots on dorsal, anal, and caudal fins; fig. 25 *decussata* page 24.
- AA. Body without vertical bands or bars; large round spots on dorsal, anal, and caudal fins B.
- B. Large black spot in center of caudal fin, 3 smaller spots on distal edge of caudal fin (these may be present or absent); large black blotch on distal edge of pectoral fin of ocular side, but no black blotch on body under this fin, distal margin of pectoral fin truncate; pectoral fin rays on ocular side 11 or 12; fig. 26 *fimbriata* page 25.
- BB. No large spot in center of caudal fin, but 3 distinct spots on its distal edge; no blotch on distal edge of ocular pectoral fin, but large black blotch on body under this fin, distal margin of pectoral fin oblique; pectoral fin rays on ocular side 14 to 16; fig. 27 *chittendeni* page 26.

Cyclopsetta decussata Gunter, 1946⁹

Dorsal fin rays 82; anal fin rays 65; pectoral fin rays on ocular side 12; scales in lateral line about 75. Body depth 47 percent SL; head length 29 percent SL; eye diameter 22 percent HL; upper jaw length 53 percent HL, extending posteriorly to a vertical through posterior edge of eye. Ocular side with five or six vertical bands or bars running across the body, dorsal, and anal fins. No spots on the dorsal, anal, caudal, or pectoral fins. This is the only species with vertical bands or bars and no large spots.

Distribution: Known from a single specimen collected about 40 miles south of Port Aransas, Tex., in 26 fath. (47.5 m.).

⁹ I have not seen specimens of this species; the above account is from Gunter's (1946: 27-28) original description, which is based on a mounted specimen.

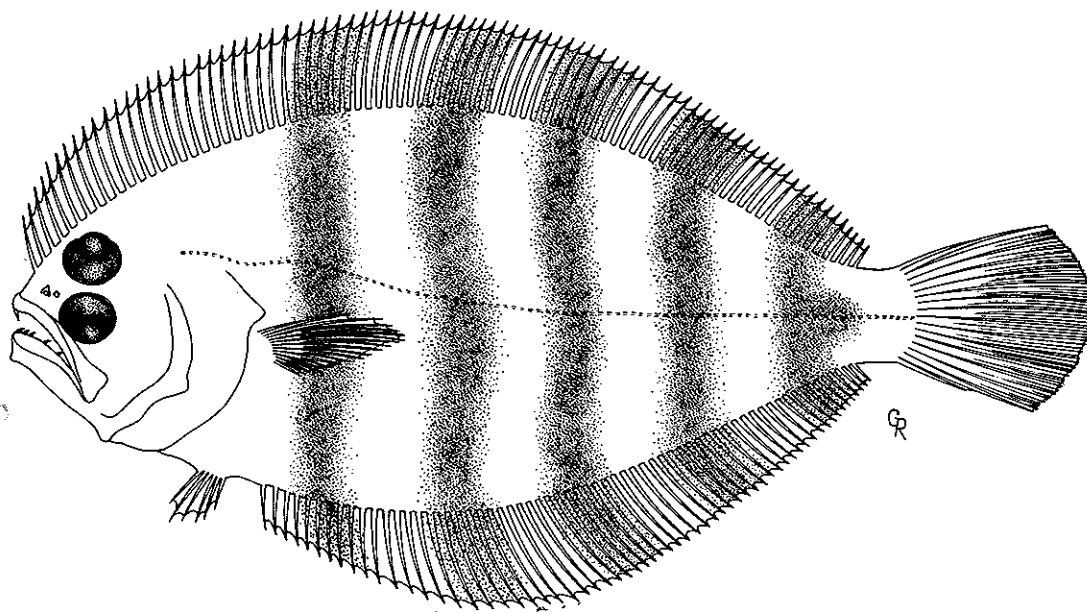


Figure 25.--Cyclopsetta decussata, illustrated from Gunter (1946), adult, 186 mm. SL.

Cyclopsetta fimbriata (Goode and Bean, 1885)

Spotfin flounder

Dorsal fin rays 78 to 87; anal fin rays 59 to 67; pectoral fin rays on ocular side 11 or 12, on blind side 9 or 10; gill rakers 3 or 4 + 9 or 10; scales in lateral line 65 to 75; vertebrae 10 + 26 or 27. Body depth 40 to 50 percent SL; head length 25 to 31 percent SL; eye diameter 17 to 24 percent HL; upper jaw length 48 to 56 percent HL, extending posteriorly to a vertical through posterior edge of pupil or slightly beyond. Ocular side brown, with several large, black spots on dorsal, anal, and caudal fins, and a large, black blotch on distal portion of pectoral fin. Caudal fin with a large, black spot in center, may have up to three small, lighter spots on distal edge of fin.

Teeth moderate (not so large as in C. chittendeni). Anterior profile convex. Pectoral fin on ocular side with a truncate distal margin.

Distribution: Atlantic and Gulf coasts of United States from North Carolina to Texas; Greater Antilles; Caribbean Sea from Honduras to Trinidad; Atlantic coast of South America to British Guiana; in 10 to 125 fath. (18.3 - 228.6 m.).

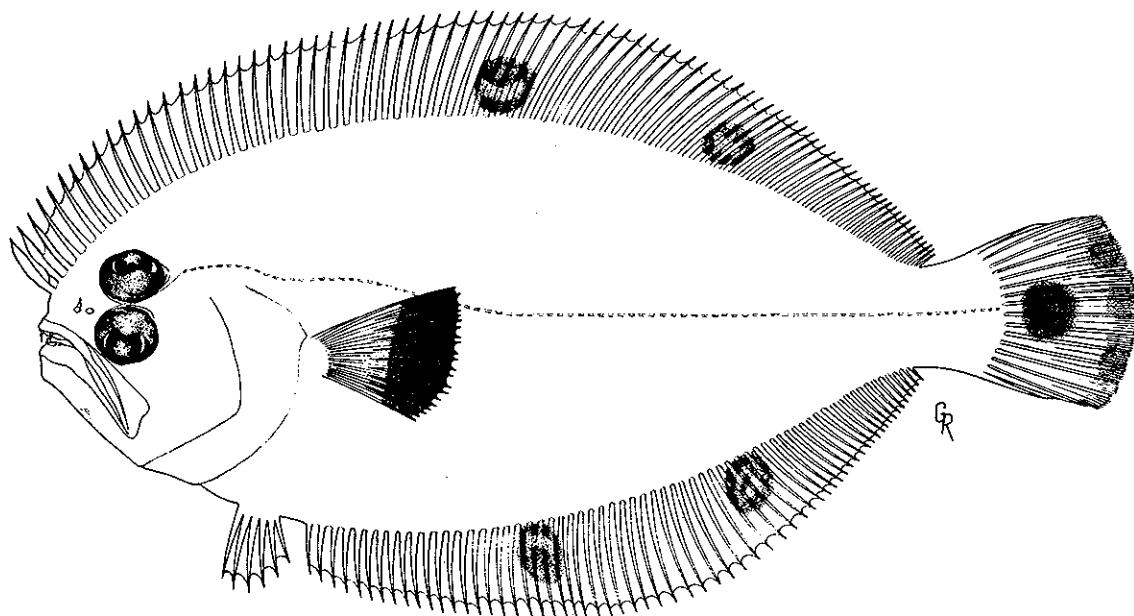


Figure 26.--*Cyclopsetta fimbriata*, adult, 203 mm. SL.

Cyclopsetta chittendeni Bean, 1895

Mexican flounder

Dorsal fin rays 82 to 90; anal fin rays 63 to 69; pectoral fin rays on ocular side 14 to 16, on blind side 11 to 13; gill rakers 3 to 5 + 8 or 9; scales in lateral line 74 to 80; vertebrae 10 + 27 or 28. Body depth 40 to 48 percent SL; head length 26 to 30 percent SL; eye diameter 17 to 20 percent HL; upper jaw length 50 to 57 percent HL, extending posteriorly to a vertical through posterior edge of eye or slightly beyond. Ocular side brown, with several large, black spots on dorsal, anal, and caudal fins, and a large, dark blotch under the pectoral fin. Caudal fin with three large, black spots on the distal edge, none in center of fin.

Large canine teeth. Anterior profile convex. Pectoral fin on ocular side with an oblique distal margin.

Distribution: Gulf of Mexico; Caribbean Sea from Colombia and Venezuela; Atlantic coast of South America to Brazil; in 10 to 75 fath. (18.3 - 137.2 m.).

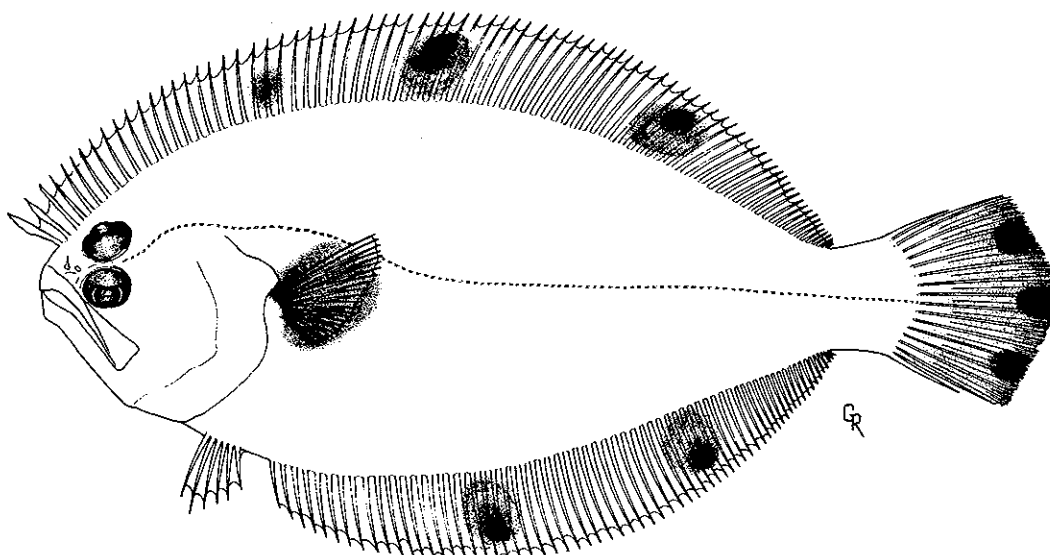


Figure 27.--*Cyclopsetta chittendeni*, adult, 164 mm. SL.

KEY TO THE SPECIES OF THE GENUS Etropus Jordan and Gilbert, 1882

- A. Primary body scales without secondary squamation; gill rakers on lower limb 6 to 9, rarely 6; figs. 28 and 29.....intermedius and crossotus¹⁰ pages 27 and 28.
- AA. Primary body scales with secondary squamation; gill rakers on lower limb 3 to 7, rarely exceeding 5 B.
- B. Primary body scales with single row of secondary squamation; body depth 43 to 51 percent SL, generally less than 50 percent SL; gill rakers on lower limb 4 to 7, usually 5; fig. 30microstomus page 28.
- BB. Primary body scales with dense secondary squamation; body depth 48 to 57 percent SL, generally greater than 50 percent SL; gill rakers on lower limb 3 to 5; fig. 31.....rimosus page 29.

Etropus intermedius Norman, 1933¹¹

Dorsal fin rays 78 to 84; anal fin rays 60 to 67; pectoral fin rays on ocular side 10; gill rakers on lower limb 8 or 9; scales in lateral line about 45. Body depth about 50 percent SL; head length 19 to 24 percent SL; eye diameter about 25 percent HL; upper jaw short, about 25 percent HL, extending posteriorly to a vertical through anterior edge of eye. Ocular side brown, may be faintly mottled, scales mostly with dark edges.

Secondary squamation absent, no scales on snout or on most of interorbital ridge.

Distribution: Atlantic coast of South America from Trinidad to Rio de Janeiro; in about 15 fath. (27.4 m.).

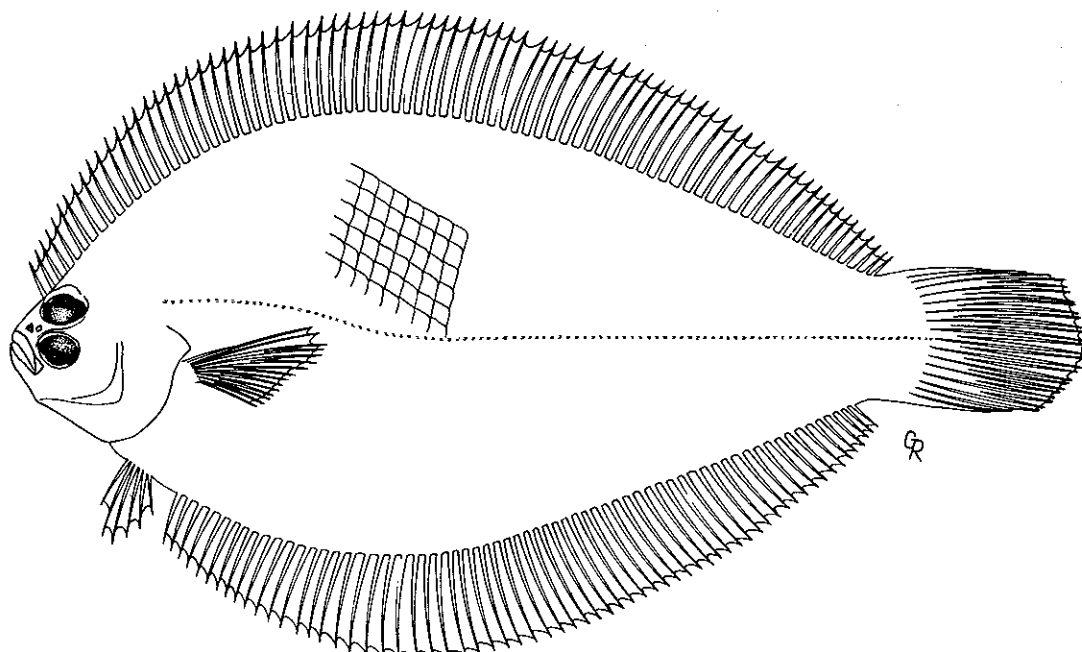


Figure 28.--Etropus intermedius, adult, 116 mm. SL.

¹⁰ Body depth (as % SL), head profile, and elevation of the back are the main characters used in the literature to separate E. intermedius and E. crossotus. Specimens of E. crossotus that I have examined from the south Atlantic region of the United States have body depths ranging from 50 to 58 percent SL, but in E. intermedius the body depth is "about twice in the length" (50% SL) - Norman (1933: 203). The profile of head and elevation of the back are subject to personal interpretation, which renders them poor taxonomic characters. In view of the general overlap in counts and measurements, E. intermedius may be conspecific with E. crossotus.

¹¹ I have not seen specimens of E. intermedius; this account is taken from Norman (1934: 157). See also footnote ¹⁰ page 27.

Etropus crossotus Jordan and Gilbert, 1882

Fringed flounder

Dorsal fin rays 75 to 87; anal fin rays 58 to 68; pectoral fin rays on ocular side 8 to 10, blind side 7 to 9; gill rakers 4 or 5 + 6 to 9 (usually 7 or 8); scales in lateral line 41 to 47; vertebrae 10 + 25. Body depth 50 to 58 percent SL; head length 20 to 25 percent SL; eye diameter about 22 to 28 percent HL; upper jaw length 21 to 27 percent HL, extending posteriorly to a vertical through anterior edge of eye or slightly behind. Ocular side brown, no spotting on body, dorsal and anal fins dusky with dark spots and blotches, caudal fin edged in black on some large specimens.

Body scales deciduous, with no secondary squamation, no scales on snout, or anterior to upper orbit. (See also footnote¹⁰ page 27).

Distribution: Atlantic coast of United States from Chesapeake Bay to Florida; West Indies; Gulf of Mexico; Caribbean and Atlantic coast of South America from Venezuela to French Guiana; in 5 to 35 fath. (9.1 - 64.0 m.).

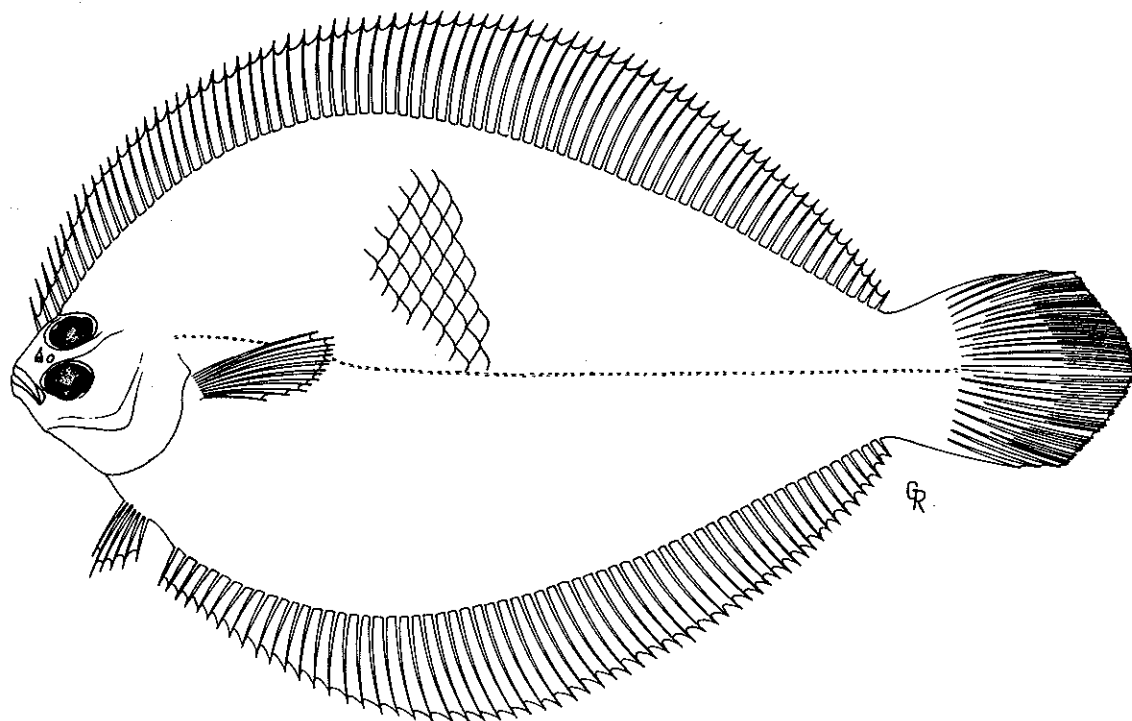


Figure 29.--Etropus crossotus, adult, 111 mm. SL.

Etropus microstomus (Gill, 1864)

Smallmouth flounder

Dorsal fin rays 67 to 82; anal fin rays 50 to 63; pectoral fin rays on ocular side 9 to 12, blind side 8 or 9; gill rakers 3 to 6 + 4 to 7 (usually 5); scales in lateral line 37 to 45; vertebrae 10 + 24 or 25. Body depth 43 to 51 percent SL (mean 48% SL); head length 21 to 27 percent SL; eye diameter 22 to 30 percent HL; upper jaw length 24 to 28 percent HL, extending posteriorly to a vertical through anterior part of eye. Ocular side brown, body without spots or blotches, dark pigmentation between orbits and around mouth.

Primary body scales with a single row of secondary squamation (not so profuse as in E. rimosus); scales deciduous, partially covering snout, and in a single row in front of eyes.

Distribution: Atlantic and Gulf coasts of United States from North Carolina to Mississippi; in depths to 50 fath. (91.4 m.).

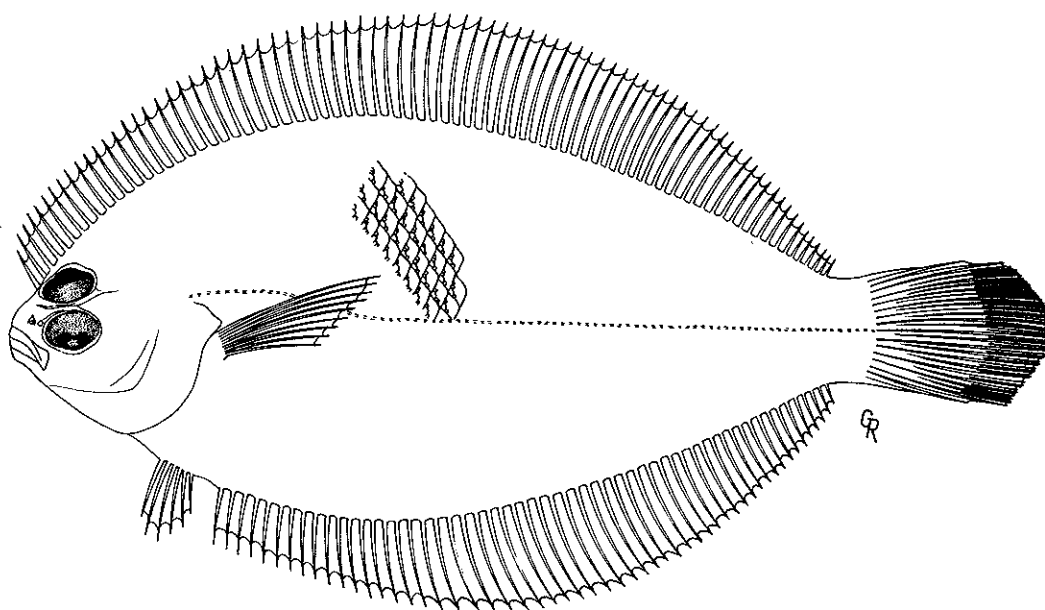


Figure 30.--Etropus microstomus, adult, 75 mm. SL.

Etropus rimosus Goode and Bean, 1885

Gray flounder

Dorsal fin rays 74 to 83; anal fin rays 57 to 63; pectoral fin rays on ocular side 8 to 11, blind side 8 or 9; gill rakers 4 to 8 + 3 to 5; scales in lateral line 37 to 43; vertebrae 10 + 24 or 25. Body depth 48 to 57 percent SL (mean 52% SL); head length 22 to 27 percent SL; eye diameter 22 to 30 percent HL; upper jaw length 23 to 28 percent HL, extending posteriorly to a vertical through anterior edge of eye. Ocular side brownish with spots and blotches when scales are present.

Primary body scales deciduous, those on ocular side almost completely covered by secondary squamation, scales on snout and anterior to upper orbit with coarse heavy ctenii.

Distribution: Atlantic and Gulf coasts of United States from North Carolina to Florida; in 4 to 100 fath. (7.3 - 182.9 m.).

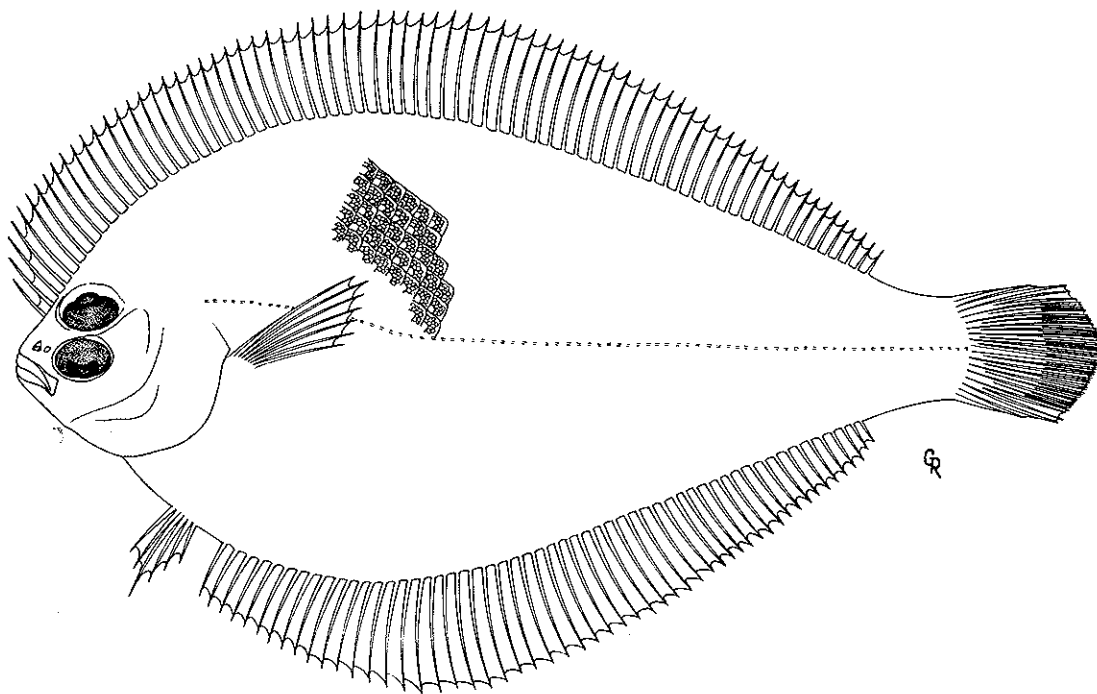


Figure 31.--*Etropus rimosus*, adult, 85 mm. SL.

KEY TO THE SPECIES OF THE GENUS *Citharichthys* Bleeker, 1862

- A. Osseous protuberance on snout; body depth 34 to 43 percent SL (usually less than 40%); fig. 32..... *arctifrons* page 31.
- AA. No osseous protuberance on snout; body depth greater than 40 percent SL..... B.
- B. Cephalic spines on snout and anterior orbital rims; fig. 33..... male *cornutus*¹² page 31.
- BB. No cephalic spines on snout or anterior orbital rims..... C.
- C. Pectoral fin on ocular side greater than 30 percent SL; gill rakers on lower limb 7 to 10 (usually 7 or 8); fig. 34..... *dinoceros* page 32.
- CC. Pectoral fin on ocular side less than 30 percent SL; gill rakers on lower limb 9 to 16 (seldom fewer than 11, except in *spilopterus* where about 30% of the specimens have 9 or 10).... D.
- D. Body and fins profusely covered with regularly arranged dark spots and blotches; fig. 35..... *macrops* page 33.
- DD. Body and fins not profusely covered with regularly arranged dark spots and blotches as in fig. 35..... E.
- E. Eye diameter usually 30 percent HL or greater; pectoral fin on ocular side usually greater than 20 percent SL; fig. 33..... female *cornutus* page 31.
- EE. Eye diameter 25 percent HL or less; pectoral fin on ocular side usually about 15 percent SL..... F.
- F. Dorsal fin rays 75 to 84; anal fin rays 56 to 63; fig. 36..... *spilopterus* page 34.
- FF. Dorsal fin rays 68 to 75; anal fin rays 48 to 55..... G.

¹² An undescribed species closely related to *cornutus* differs from it by the following: No dark spot in axilla of pectoral fin on ocular side; dorsal fin rays 70 to 75 (78); anal fin rays 53 to 58 (63); scales in lateral line 35 to 37; males with large black spot extending over several anal and dorsal fin rays at about mid-point of body; several spines along maxillary groove, extending posteriorly beyond anterior edge of lower eye.

- G. Snout slightly longer than eye diameter; maxillary extending to a vertical through posterior edge of pupil or beyond; fig. 37 arenaceus page 35.
- GG. Snout equal to or shorter than eye diameter; maxillary extending to a vertical through center of eye; fig. 38 uhleri page 35.

Citharichthys arctifrons Goode, 1880

Gulf Stream flounder

Dorsal fin rays 75 to 86; anal fin rays 58 to 67; pectoral fin rays on ocular side 9 to 11; gill rakers short and stout, about 5 + 6 to 8; scales in lateral line 37 to 43; vertebrae 10 or 11 + 26 to 28. Body depth 34 to 43 percent SL (generally less than 40%); head length 23 to 28 percent SL; pectoral fin length on ocular side 16 to 19 percent SL; eye diameter 26 to 29 percent HL; upper jaw length 27 to 32 percent HL, extending posteriorly to a vertical through anterior portion of pupil. Ocular side tan to brown, with no obvious or noticeable color pattern.

Snout with well-developed osseous protuberance, extending horizontally. Length of protuberance increasing with increasing specimen size, not pronounced in small specimens.

Distribution: Atlantic coast of United States from Georges Bank to Florida; Gulf coast of Florida; Yucatan, Mexico; in 25 to 200 fath. (45.7 - 365.8 m.), but occasionally at depths of only 12 fath. (21.9 m.).

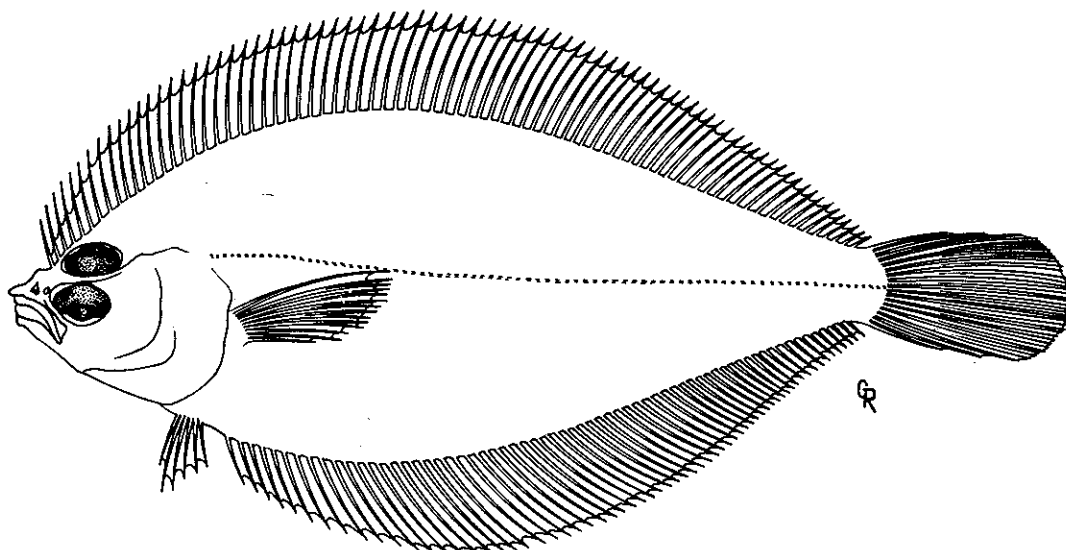


Figure 32.--Citharichthys arctifrons, adult, 95 mm. SL.

Citharichthys cornutus (Gunther, 1880)

Horned whiff

Dorsal fin rays 74 to 83; anal fin rays 59 to 66; pectoral fin rays on ocular side 10 or 11; gill rakers moderately long and slender, 3 to 5 + 11 to 15; scales in lateral line 40 to 45; vertebrae 10 + 25 or 26. Body depth 44 to 50 percent SL (39% in one specimen 40 mm. SL); head length 27 to 31 percent SL; pectoral fin length on ocular side greater than 20 percent SL, on males may be up to about 50 percent SL; eye diameter 34 to 42 percent HL (29% in one specimen); upper jaw length 36 to 44 percent HL, extending posteriorly to a vertical through anterior margin of pupil or slightly beyond. Ocular side tan to brown. A dark area in axilla of pectoral on ocular side. Pectoral fin of ocular side with dark crossbars. Spotting on bases of dorsal and anal fin rays of some specimens.

Adult males with the following conspicuous cephalic spination: single large spine directed horizontally and projecting well beyond margin of head, several large spines projecting from

anterior edge of upper orbital rim, smaller spines on anterior edge of lower orbit, labial spine projecting anteroventrally, and a posteroventrally directed spine at symphysis of lower jaw. In addition, adult males have a greater interorbital width, which remains narrow in females and juvenile males. Females and juvenile males also have the horizontally directed spine as on the males (fig. 33), but it does not protrude beyond the skin. It may appear as an inconspicuous prominence, as may some of the other head spines. Anterior pectoral fin rays on adult males elongate, fragile, and often broken.

Distribution: Atlantic and Gulf coasts of United States from Georgia to Texas; Bahamas; Greater Antilles; Yucatan, Mexico; throughout the Caribbean; Atlantic coast of South America to Brazil; in 15 to 200 fath. (27.4 - 365.8 m.) generally exceeding 75 fath. (137.2 m.).

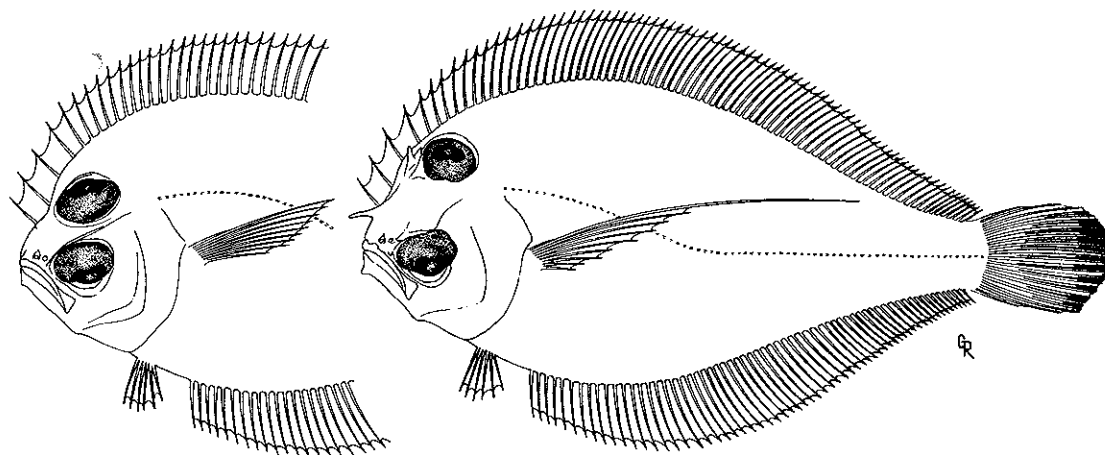


Figure 33.--*Citharichthys cornutus*; adults; female left; male right, 89 mm. SL.

Citharichthys dinoceros Goode and Bean, 1886

Dorsal fin rays 90 to 95; anal fin rays 70 to 76; pectoral fin rays on ocular side 9 or 10; gill rakers long and slender, 3 + 7 to 10; scales in lateral line 48 to 53; vertebrae 10 or 11 + 26 to 29. Body depth 40 to 45 percent SL; head length 27 to 33 percent SL; eye diameter 24 to 35 percent HL; pectoral fin length on ocular side greater than 30 percent SL, on adult males may be considerably more; upper jaw length 39 to 50 percent HL, extending posteriorly to a vertical through middle of eye. Ocular side pale to dark brown with several large spots on dorsal and anal fins (spots may be indistinct). Caudal with or without two large spots; if present, one above and one below median rays.

Labial spine overhanging upper lip. Short spine in front of upper eye. Lower jaw included, several large canines of upper jaw overhanging lower jaw.

Distribution: Atlantic and Gulf coasts of Florida; Greater Antilles; Barbados; Caribbean Sea from British Honduras to Nicaragua; in 100 to 1,000 fath. (182.9 - 1,828.8 m.).

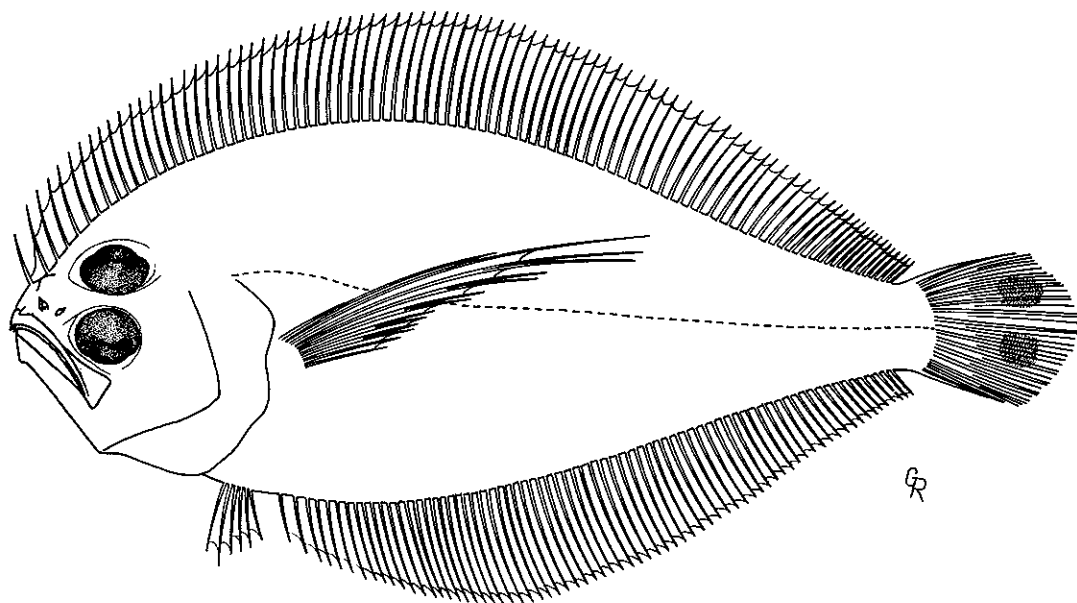


Figure 34.--Citharichthys dinoceros, adult, male, 76 mm. SL.

Citharichthys macrops Dresel, 1885

Spotted whiff

Dorsal fin rays 80 to 85; anal fin rays 56 to 64; pectoral fin rays on ocular side 9 to 12; gill rakers long and slender, 5 or 6 + 13 to 16; scales in lateral line 37 to 44; vertebrae 10 + 24 or 25. Body depth 46 to 51 percent SL; head length 24 to 29 percent SL; pectoral fin length on ocular side about 16 percent SL; eye diameter 23 to 30 percent HL; upper jaw length 34 to 43 percent HL, extending posterior to a vertical near center of eye. Ocular side tan to dark brown with numerous spots and blotches on the body and caudal, dorsal, and anal fins (spots and blotches indistinct when deciduous scales lost).

First dorsal fin ray may be slightly longer than other anterior rays and partially separated from them.

Distribution: South Atlantic and Gulf coasts of United States; in 5 to 50 fath. (9.1 - 91.4 m.).

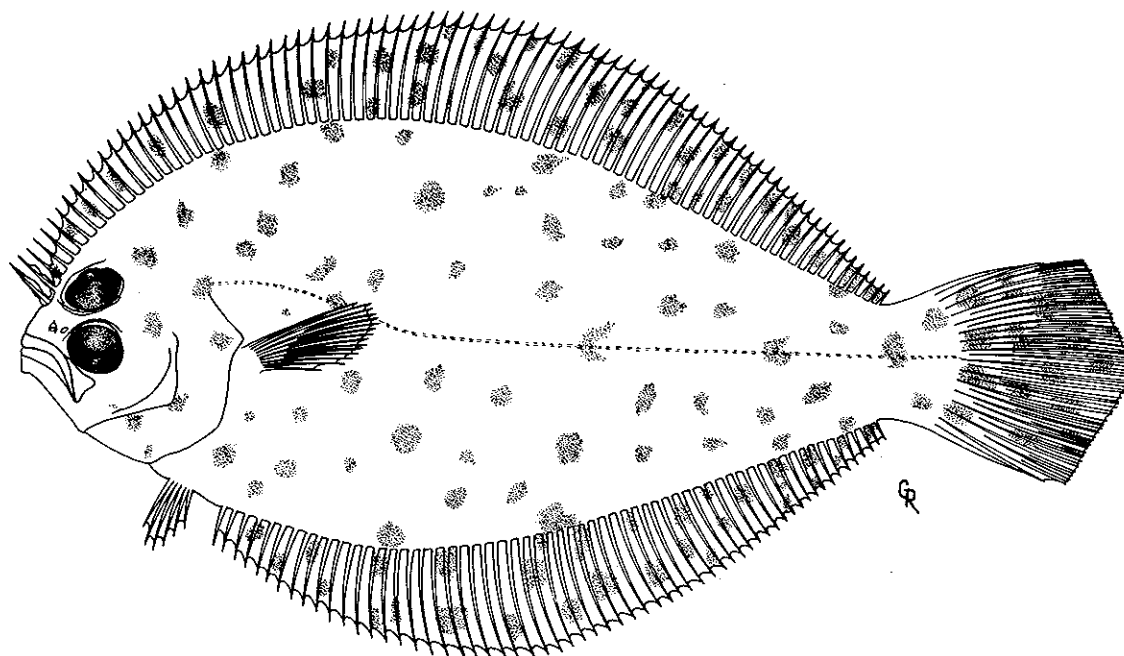


Figure 35.--*Citharichthys macrops*, adult, 118 mm. SL.

Citharichthys spilopterus Günther, 1862

Bay whiff

Dorsal fin rays 75 to 84; anal fin rays 56 to 63; pectoral fin rays on ocular side 9 or 10; gill rakers of moderate length and stoutness, 4 or 5 + 9 to 15; scales in lateral line 41 to 49; vertebrae 10 + 23 to 25. Body depth 41 to 51 percent SL; head length 26 to 29 percent SL; pectoral fin length on ocular side about 15 percent SL; eye diameter 16 to 25 percent HL; upper jaw length 31 to 38 percent HL (generally exceeding 33%), extending posteriorly to a vertical through posterior portion of pupil. Ocular side brownish, with or without spotting.

Profile of head slightly concave. Origin of dorsal fin above anterior nostril of blind side.

Distribution: Atlantic and Gulf coasts of United States; West Indies; Caribbean Sea; Atlantic coast of South America to Brazil; in depths to about 40 fath. (73.2 m.).

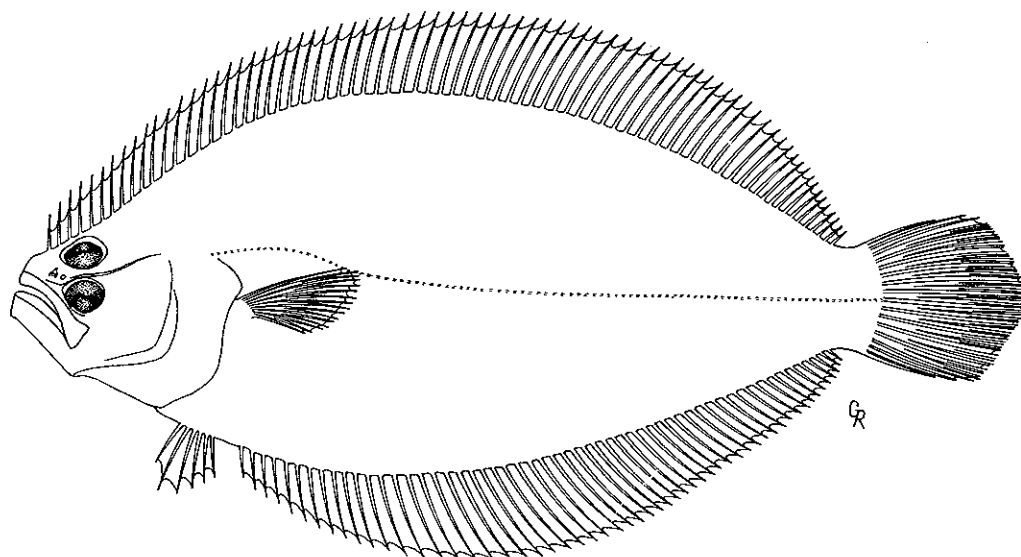


Figure 36.--*Citharichthys spilopterus*, adult, 104 mm. SL.

Citharichthys arenaceus Evermann and Marsh, 1900¹³

Dorsal fin rays 68 to 75; anal fin rays 48 to 55; pectoral fin rays on ocular side about 10; gill rakers moderately long and slender, 6 or 7 + about 13 or 14; scales in lateral line about 50 to 52. Body depth 50 to 55 percent SL; head length 28 to 29 percent SL; pectoral fin length on ocular side about 15 percent SL; eye diameter about 18 percent HL; upper jaw length about 40 percent HL, extending posteriorly to a vertical through posterior portion of pupil. Ocular side brownish with numerous small spots. Dorsal and anal fins spotted (at times giving the appearance of crossbars). Distribution: West Indies southward to Brazil, found in shallow water.

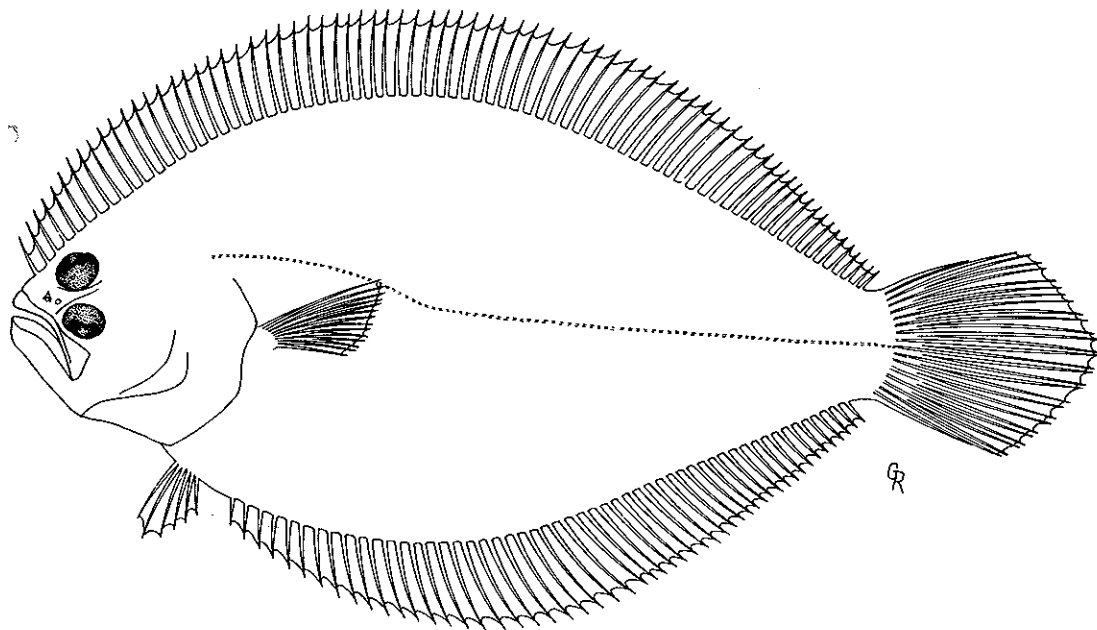


Figure 37.--Citharichthys arenaceus, adult, illustrated from Norman (1934).

Citharichthys uhleri [Jordan] Jordan and Goss, 1889¹⁴

Dorsal fin rays about 68; anal fin rays about 52; pectoral fin rays on ocular side about 10; gill rakers short and slender, about 5 + about 12 or 13; scales in lateral line 52 to 55. Body depth about 50 percent SL; head length about 26 percent SL; pectoral fin length on ocular side about 15 percent SL; eye diameter about 20 percent HL; upper jaw length about 40 percent HL, extending posteriorly to a vertical through center of eye. Ocular side dark brown with whitish spots, dorsal and anal fins spotted. Closely related to C. macrops.

Distribution: Known only from the type, collected off the coast of Haiti.

¹³ I have not seen specimens of this species; this account taken from Norman (1934: 148), Parr (1931: 22), and Evermann and Marsh (1902: 326).

¹⁴ I have not seen specimens of this species; this account taken from Norman (1934: 148) and Parr (1931: 23).

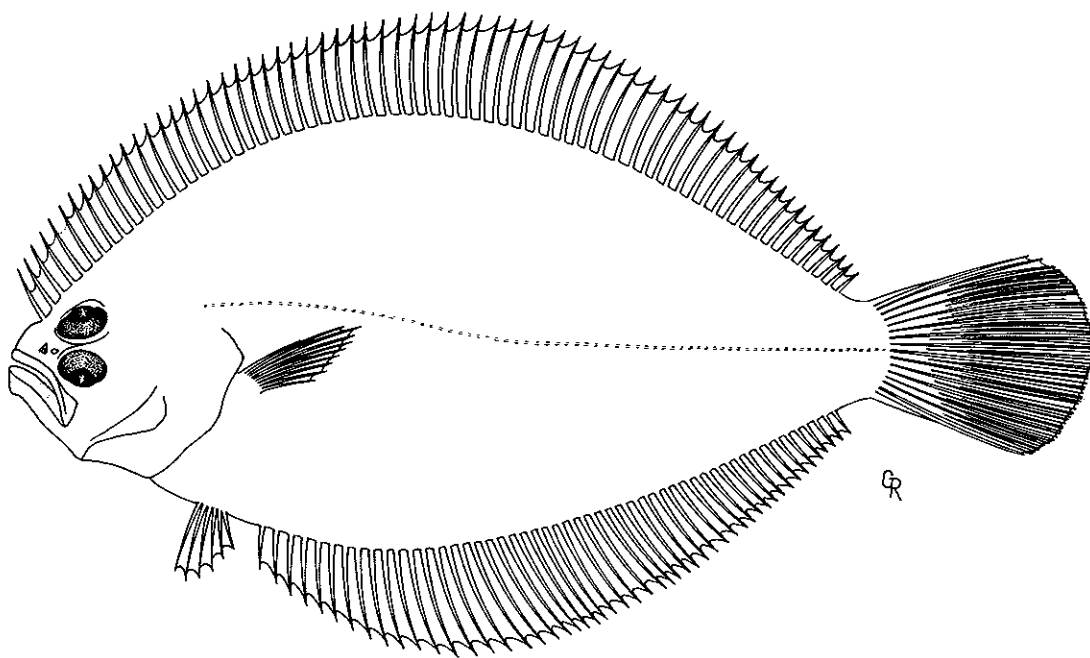


Figure 38.--*Citharichthys uhleri*, adult, illustrated from Norman (1934).

KEY TO THE SPECIES OF THE GENUS *Syacium* Ranzani, 1840

- A. Body depth usually 48 percent SL or greater (45 - 47% on some specimens from the Caribbean); 46 to 55 scales in lateral line; dorsal fin rays 74 to 85; anal fin rays 59 to 68; fig. 39. *gunteri* page 37.
- AA. Body depth usually 45 percent SL or less (rarely to 47%); 47 to 68 scales in lateral line; dorsal fin rays 82 to 94; anal fin rays 64 to 75 B.
- B. Specimens greater than 120 mm. SL. C.
- BB. Specimens less than 120 mm. SL G.
- C. Interorbital width greater than 75 percent of lower eye diameter; [Anterior rays of pectoral fin on ocular side elongate, exceeding 25 percent SL; pigment lines (bluish in life, brown after preservation) running anteroventrally from upper eye, may also be present on interorbital region, lips, mandible, and urohyal; blind side dusky]; fig. 40 male *papillosum* page 38.
- CC. Interorbital width less than 75 percent of lower eye diameter D.
- D. Pectoral fin rays on ocular side not elongate, less than 25 percent SL (females); figs. 40 and 41 E.
- DD. Pectoral fin rays on ocular side elongate, more than 25 percent SL (males); figs. 40 and 41 F.
- E. Interorbital width 25 to 35 percent of lower eye diameter in specimens 120 to 150 mm. SL, increasing to 60 percent in specimens about 220 mm. SL; general body color dark brown, little or no mottling; fig. 40 female *papillosum* page 38.
- EE. Interorbital width about 20 percent lower eye diameter in specimens 120 to 150 mm. SL, increasing to about 27 percent in specimens about 195 mm. SL; general body color light tan to brown, mottling on body and fins, several large black blotches on lateral line; fig. 41 female *micrurum* page 39.

- F. Interorbital width usually 30 to 70 percent of lower eye diameter in specimens 120 to 150 mm. SL, 50 to 90 percent in specimens 150 to 180 mm. SL, and exceeding 75 percent lower eye diameter in larger specimens; fig. 40 male papillosum page 38.
- FF. Interorbital width less than 35 percent of lower eye diameter in specimens 120 to 150 mm. SL, less than 50 percent in specimens 150 to 180 mm. SL, and never exceeding 75 percent lower eye diameter; fig. 41 male micrurum page 39.
- G. Snout length 54 to 74 percent (mean 66%) of shortest distance from tip of snout to orbit of upper eye; interorbital width generally greater than 15 percent of lower eye diameter. papillosum page 38.
- GG. Snout length 80 to 92 percent (2 of 20 with 74%, mean 83%) of shortest distance from tip of snout to orbit of upper eye; interorbital width generally less than 15 percent of lower eye diameter micrurum page 39.

Syacium gunteri Ginsburg, 1933

Shoal flounder

Dorsal fin rays 74 to 85; anal fin rays 59 to 68; pectoral fin rays on ocular side 9 to 11 (usually 11); gill rakers moderately long and thick, 2 to 4 (usually 3) + 6 to 8 (usually 7); scales in lateral line 46 to 55; vertebrae 10 + 23 to 26 (usually 24). Body depth 45 to 55 percent SL (48 - 55% in Atlantic and Gulf specimens, 45 - 53% in Caribbean specimens); head length 25 to 32 percent SL; eye diameter 22 to 29 percent HL; upper jaw length 40 to 43 percent HL, extending posteriorly to a vertical through center of eye. Ocular side tannish; with or without numerous dark spots and blotches on body and dorsal, anal, and caudal fins; generally a large diffuse dark blotch on body just anterior to caudal peduncle; blind side immaculate.

For specimens larger than about 80 mm. SL from the Gulf of Mexico, Atlantic Ocean, and Caribbean Sea, S. gunteri can be separated from S. papillosum and S. micrurum of comparable size by its greater interorbital width. Below about 80 mm. SL interorbital widths of all three species converge. The interorbital on Caribbean specimens of S. gunteri exceeding about 80 mm. SL is slightly narrower than on the Gulf of Mexico or the Atlantic specimens.

Measurements of interorbital width recorded as percent of lower eye diameter are: male gunteri 80 to 90 mm. SL, 25 to 40 percent; 91 to 100 mm. SL, 35 to 55 percent; exceeding 101 mm. SL, greater than 55 percent. Female gunteri 80 to 90 mm. SL, 20 to 35 percent; 91 to 98 mm. SL, 25 to 40 percent; no females exceeding 98 mm. SL were examined. Male and female micrurum and papillosum 80 to 100 mm. SL, less than 20 percent; 101 to 120 mm. SL, less than 40 percent (females 10 to 25%, males 15 to 40%).

For specimens of all sizes from the Gulf of Mexico and the Atlantic, S. gunteri can be separated from S. papillosum and S. micrurum by its greater body depth. There is overlap, however, in body depth between Caribbean specimens of S. gunteri and some specimens of the other two species (47% SL in 25% of S. gunteri and 2% of S. papillosum or S. micrurum, 46% SL in 10% of S. gunteri and 4% of S. papillosum or S. micrurum, and 45% SL in 5% of S. gunteri and 12% of S. papillosum or S. micrurum).

Dorsal fin ray counts on 32 S. papillosum and 28 S. micrurum ranged from 85 to 94. Low counts of 82 for S. papillosum and 83 for S. micrurum are recorded in the literature. Two of 35 S. gunteri had a high count of 85. Anal fin ray counts on S. papillosum and S. micrurum ranged from 64 to 75 (4 of 60 with fewer than 68). One S. gunteri had a high count of 68.

Distribution: Atlantic and Gulf coasts of United States from Florida to Texas; Jamaica; Puerto Rico; the Virgin Islands; the Caribbean Sea from Panama, Colombia, and Venezuela; Atlantic coast of South America to French Guiana; in 5 to 50 fath. (9.1 - 91.4 m.).

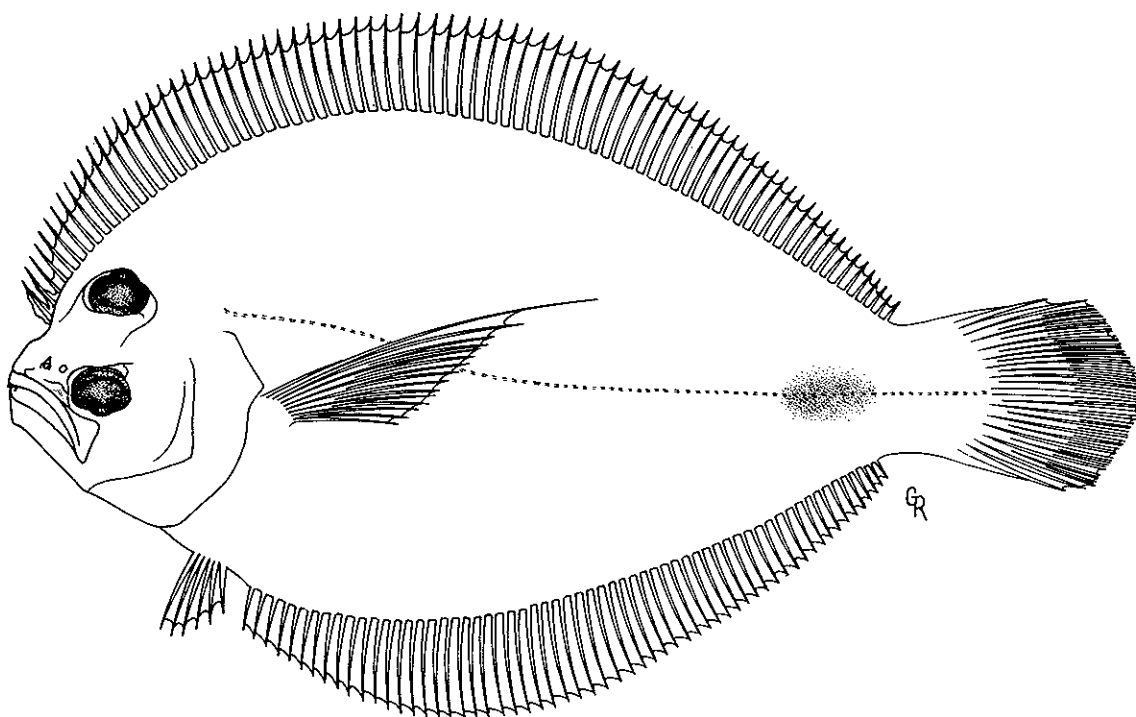


Figure 39.--Syacium gunteri, adult, male, 110 mm. SL.

Syacium papillosum (Linnaeus, 1758)

Dusky flounder

Dorsal fin rays 82 to 94; anal fin rays 64 to 75; pectoral fin rays on ocular side 11 or 12 (usually 11); gill rakers short and stout, 2 + 8 or 9 (usually 8); scales in lateral line 47 to 60; vertebrae 10 + 25 or 26. Body depth 40 to 47 percent SL (mean 44%); head length 26 to 36 percent SL; eye diameter 19 to 29 percent HL; upper jaw length 39 to 42 percent HL, extending posteriorly to a vertical through center of eye. Ocular side brown with little if any spotting; large males with pigment lines from upper eye to snout, along dorsal edge of head, on lips, mandible, and lower jaw to urohyal; blind side dusky on large males and immaculate or slightly dusky on large females.

Large males with wide interorbital; upper rays of pectoral fin on ocular side elongate. Large females with wide interorbital, not so wide as in males of comparable size; none of pectoral fin rays elongate. Intermediate sized papillosum have greater interorbital width than micrurum of same sex and comparable size (see key); however, some overlap does occur in interorbital width between males of micrurum and females of papillosum. Small papillosum (under 120 mm. SL) have snout length 54 to 75 percent (mean 66%) of shortest distance from tip of snout to upper orbit. Little difference in coloration between small papillosum and micrurum. Determination of sex will assist greatly in their identification. See gunteri if specimen is less than 80 mm. SL with a body depth greater than 45 percent SL, and low dorsal and anal fin ray counts.

Distribution: Atlantic coast of United States from North Carolina to Florida; Gulf of Mexico; West Indies; Caribbean Sea; Atlantic coast of South America to Rio de Janeiro; in 5 to 75 fath. (9.1 - 137.2 m.) generally less than 50 fath. (91.4 m.).

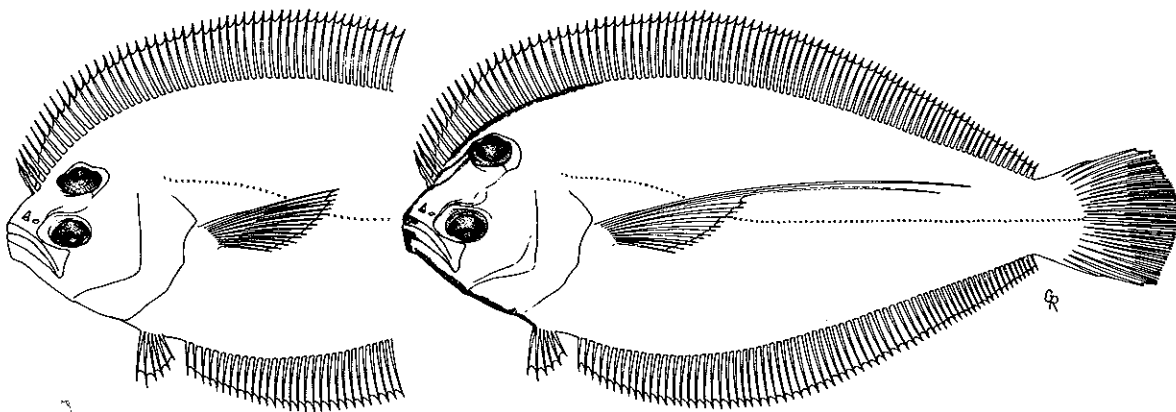


Figure 40.--Syacium papillosum; adults; female left; male right, 185 mm. SL.

Syacium micrurum Ranzani, 1840

Channel flounder

Dorsal fin rays 83 to 92; anal fin rays 64 to 74; pectoral fin rays on ocular side 10 or 11; gill rakers short and stout, 2 + 7 to 9 (usually 8); scales in lateral line 54 to 68; vertebrae 10 + 24 or 25. Body depth 38 to 45 percent SL (mean 42%); head length 27 to 31 percent SL; eye diameter 21 to 29 percent HL; upper jaw length 38 to 40 percent HL, extending posteriorly to a vertical through center of eye. Ocular side tan to brownish, with or without numerous spots or blotches on body and median fins; dark diffuse spot or spots near junction of curved and straight portions of lateral line and in front of caudal peduncle; pectoral fin with diffuse dark crossbars; several broad, dark vertical lines across interorbital region; blind side immaculate.

Males without the dark pigment lines on head as on papillosum; wider interorbitals than females, but not so wide as in male papillosum of comparable size, more nearly similar to females of papillosum; upper rays of pectoral fin on ocular side elongate. Females with narrow interorbital, much narrower than in females of papillosum of comparable size, width generally not exceeding 25 percent diameter of lower eye; upper rays of pectoral fin on ocular side not elongate. Small specimens (under 120 mm. SL) with narrower interorbital than in papillosum, generally less than 15 percent of eye diameter. Snout length 80 to 92 percent (2 of 20 with 74%; mean 83%) of the shortest distance from tip of snout to upper orbit. See S. gunteri if specimen is less than 80 mm. SL with a body depth greater than 45 percent SL, and low dorsal and anal fin ray counts.

Distribution: Atlantic coast of Florida; Gulf of Mexico; Caribbean Sea; West Indies; Atlantic coast of South America to Rio de Janeiro; tropical West Africa; in depths to 225 fath. (411.5 m.), generally less than 50 fath. (91.4 m.).

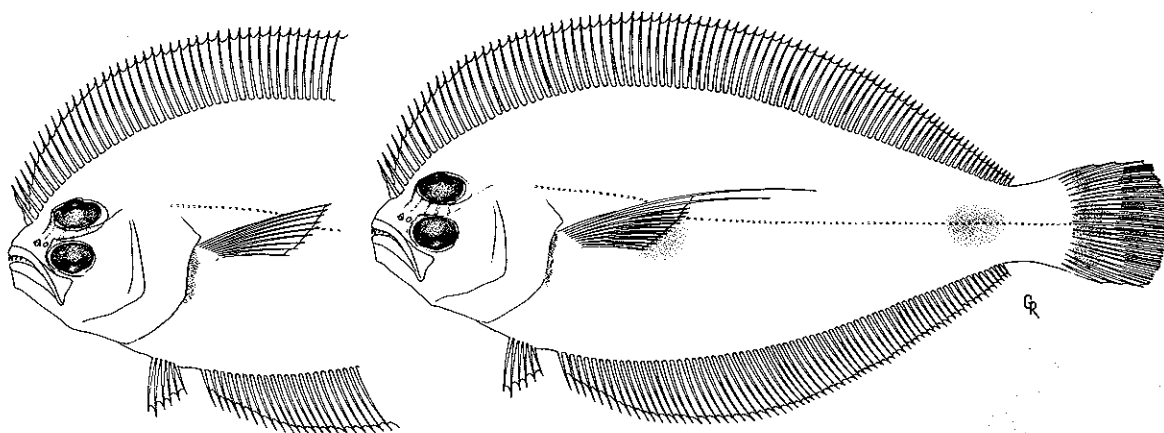


Figure 41.--Syacium micrurum; adults; female left; male right, 148 mm. SL.

KEY TO THE GENERA OF THE SUBFAMILY BOTHINAE

Two genera known from the western North Atlantic

- A. Mouth small or moderate, upper jaw not extending to posterior margin of eye; body depth 50 percent SL or more Bothus page 40.
- AA. Mouth large, upper jaw extending to or well beyond posterior margin of eye; body depth less than 40 percent SL. Chascanopsetta page 44.

KEY TO THE SPECIES OF THE GENUS Bothus Rafinesque, 1810

- A. Body depth greater than 60 percent SL; eye diameter more than 23 percent HL, and longer than snout length. B.
- AA. Body depth 60 percent SL or less; eye diameter less than 23 percent HL, and shorter than snout length (on specimens less than about 50 mm. SL eye diameter is more than 23% HL and is longer than snout). C.
- B. Caudal fin with 2 large spots, one anterior to other; body coloration generally dark, spotting and mottling not so pronounced as in ocellatus; fig. 42 sp.¹⁵ page 40.
- BB. Caudal fin lacking large spots on median rays, if spots present they are arranged one above the other; body spotting and mottling is pronounced; fig. 43. ocellatus page 41.
- C. Dorsal fin rays 105; anal fin rays 80; anterior profile convex ellipticus page 42.
- CC. Dorsal fin rays 90 to 99; anal fin rays 70 to 76. D.
- D. Anterior profile notched in front of lower eye; body depth 54 to 59 percent SL; tentacles on eyes not well developed (in adults); anterior edge of upper eye over posterior edge of lower eye; gill rakers on lower limb 8 to 10 (usually 9); fig. 44 lunatus page 42.
- DD. Anterior profile convex; body depth 50 to 55 percent SL; tentacles on eyes well developed (in adults); anterior edge of upper eye over about middle of lower eye; gill rakers on lower limb 6 to 8 (usually 7); fig. 45 maculiferus page 43.

Bothus sp. Brockman, Thelma Jutare (MS.)

Dorsal fin rays 78 to 90; anal fin rays 59 to 68; pectoral fin rays on ocular side 8 to 11; gill rakers short, 2 to 7 + 5 to 9; scales in lateral line 70 to 77; vertebrae 10 + 26 to 28. Body depth 65 to 76 percent SL; head length 22 to 31 percent SL; eye diameter 24 to 31 percent HL; upper jaw extending posteriorly to a vertical through anterior portion of eye. Ocular side generally dark brown with no spotting, but may be light tan with spotting and mottling. Two large black spots on median rays of caudal fin, one anterior to the other, spots present even on very small specimens.

No fleshy ridge of tissue on either upper or lower eye. Interorbital width greater than eye diameter in adult males and females, less than eye diameter in young specimens.

Distribution: Atlantic coast of United States from North Carolina to Florida; Gulf of Mexico; West Indies; Caribbean Sea; Atlantic coast of South America to Brazil; in 10 to 50 fath. (18.3 - 91.4 m.).

¹⁵ See footnote 2, p. 1.

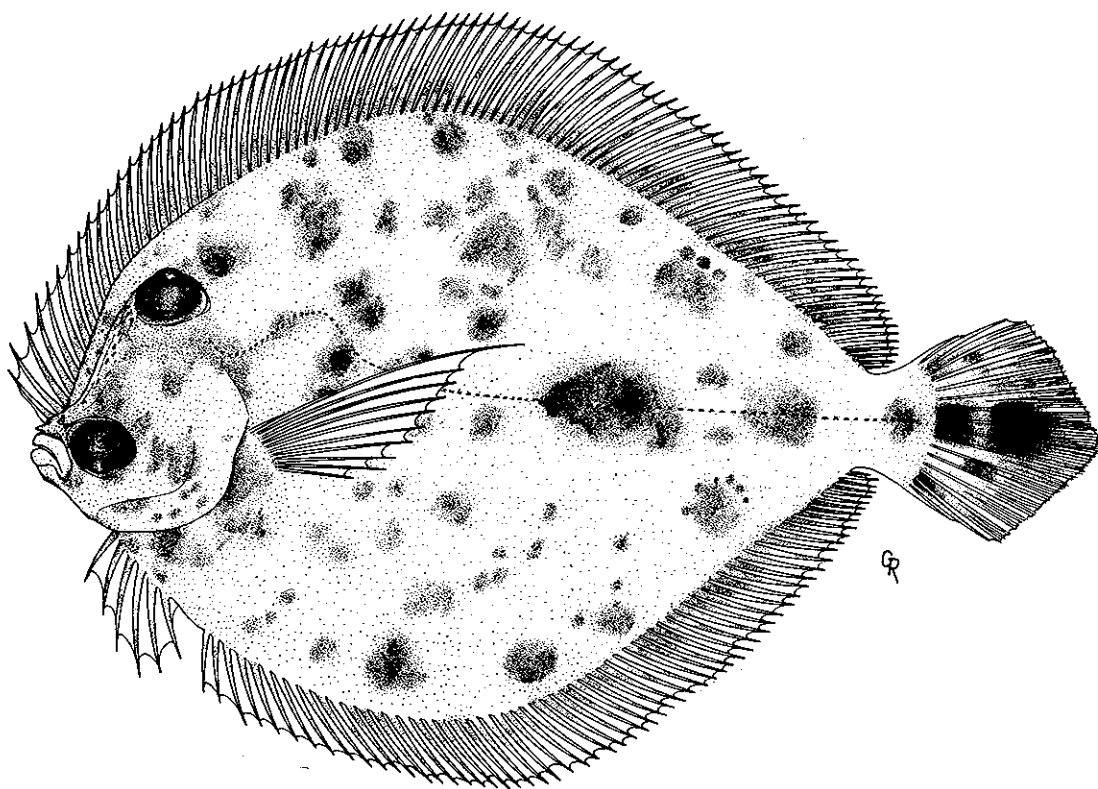


Figure 42.--Bothus sp., adult, male, 117 mm. SL.

Bothus ocellatus (Agassiz, 1829)

Eyed flounder

Dorsal fin rays 76 to 91; anal fin rays 58 to 68; pectoral fin rays on ocular side 8 to 10; gill rakers short, 0 to 6 + 7 to 10; scales in lateral line 70 to 78; vertebrae 10 + 25 to 27. Body depth 64 to 70 percent SL; head length 25 to 30 percent SL; eye diameter 24 to 30 percent HL; upper jaw length 24 to 27 percent HL, extending posteriorly to a vertical through anterior edge of eye or slightly beyond. Ocular side pale brown or gray with spotting and mottling; coloration variable; two dark spots on anterior portion of caudal fin, one above median rays, the other below (spots may be absent or indistinct).

A fleshy ridge on posterodorsal area of upper eye and posteroventral area of lower eye. Interorbital width greater than eye diameter in adult males, but less than eye diameter in adult females.

Distribution: Atlantic coast of United States from Long Island to Florida; West Indies; Caribbean Sea; Atlantic coast of South America to Rio de Janeiro; in 10 to 50 fath. (18.3 - 91.4 m.).

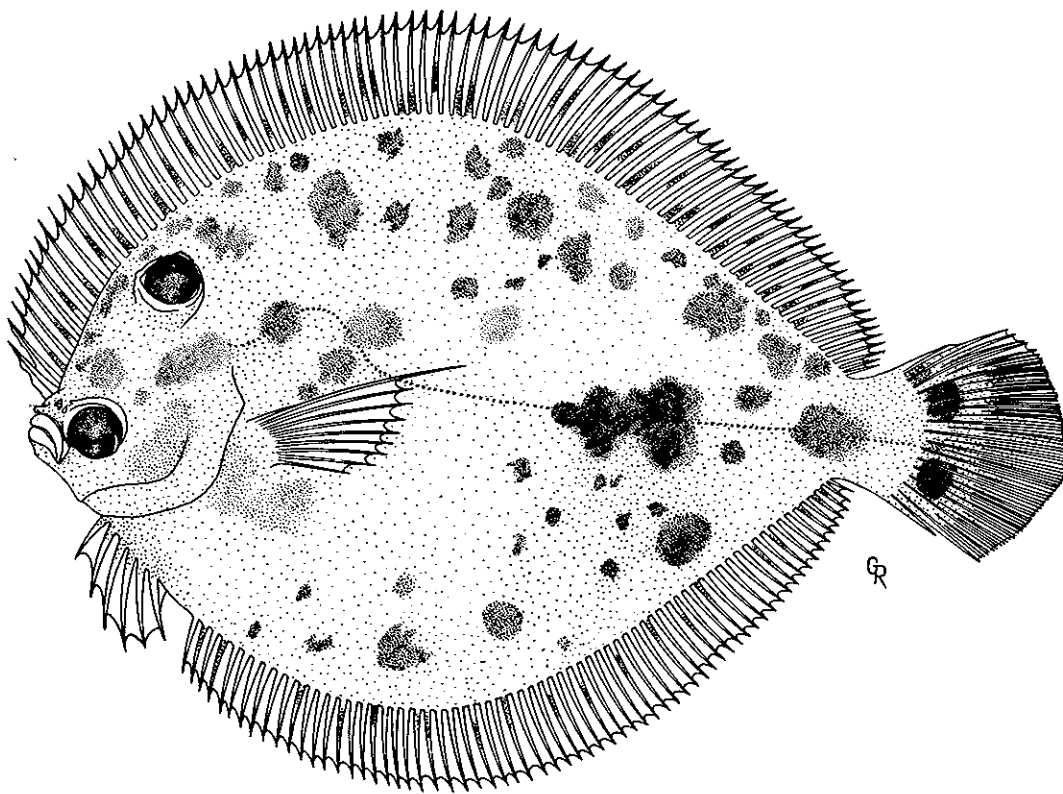


Figure 43.--*Bothus ocellatus*, adult, male, 122 mm. SL.

Bothus ellipticus (Poey, 1860)¹⁶

Dorsal fin rays 105; anal fin rays 80; scales in lateral line 91. Body depth about 55 percent SL; interorbital width about 18 percent of HL. Ocular side grayish, spotted and mottled with whitish.

Distribution: Known only from the type, from off Cuba.

Bothus lunatus (Linnaeus, 1758)

Peacock flounder

Dorsal fin rays 91 to 99; anal fin rays 71 to 76; pectoral fin rays on ocular side 10 to 12 (usually 11); gill rakers on lower limb short, 8 to 10 (usually 9); scales in lateral line 83 to 92; vertebrae 10 + 30. Body depth 54 to 59 percent SL; head length 26 to 31 percent SL; eye diameter 16 to 22 percent HL; upper jaw length 30 to 35 percent HL, extending posteriorly to a vertical through anterior edge of eye or slightly beyond. Ocular side tan to light brown with numerous rings, curved spots and dots, two or three large diffuse blotches on straight portion of lateral line, median fins with or without spots, pectoral with three narrow dark crossbars, specimens as small as 54 mm. SL have adult pigment pattern.

Anterior profile of head notched in front of lower eye. Anterior margin of upper eye over posterior margin of lower eye on specimens larger than about 100 mm. SL; over middle of lower eye on specimens about 50 mm. SL. Tentacles on eyes short, not present on specimens less than about 100 mm. SL. Interorbital in both sexes as wide as or wider than eye diameter on specimens exceeding 50 mm. SL. Interorbital spines reduced in size, not prominent when present. Anterior pectoral fin rays of the adult males greatly produced.

¹⁶ I have not seen specimens of this species, this account taken from Norman (1934: 229); *ellipticus* may be conspecific with *maculiferus*.

Distribution: Florida and the West Indies; Atlantic coast of South America to Brazil; in depths to about 35 fath. (64 m.).

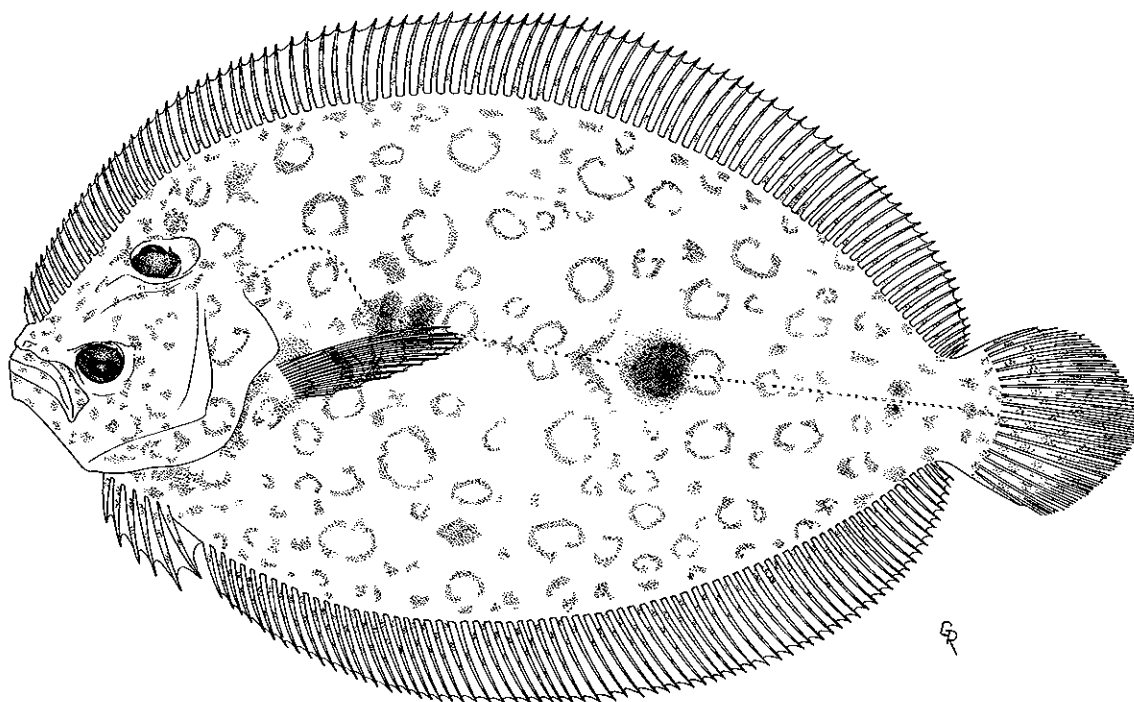


Figure 44.--Bothus lunatus, adult, female, 191 mm. SL.

Bothus maculiferus (Poey, 1860)

Dorsal fin rays 90 to 98; anal fin rays 70 to 76; pectoral fin rays on ocular side 8 to 10 (usually 9); gill rakers on lower limb short, 6 to 8 (usually 7); scales in lateral line 85 to 95; vertebrae 10 + 29 or 30. Body depth 50 to 55 percent SL; head length 26 to 32 percent SL; eye diameter 20 to 25 percent HL (greater than 23% head length on specimens less than about 50 mm. SL); upper jaw length 31 to 35 percent HL, extending posteriorly to a vertical through anterior portion of eye. Ocular side tan to light brown, with numerous spots and rings, only spots on head, two or three diffuse dark blotches on straight portion of lateral line; juvenile specimens, 45 and 53 mm. SL, have pronounced speckling on the body and a lateral spot, general pigmentation not as on the adult.

Anterior profile of head convex, not notched in front of lower eye. Anterior margin of upper eye over middle of lower eye. Tentacles on eyes well developed on all specimens examined, 45 to 215 mm. SL (elongate on some large specimens). Interorbital width in both sexes about equal; equal to or greater than eye diameter in specimens exceeding about 100 mm. SL, but only about half eye diameter in specimens about 50 mm. SL. Well developed interorbital spines on orbital ridge of lower eye of adult males. Anterior pectoral fin rays of adult males greatly produced, extending posteriorly to the caudal region.

Distribution: West Indies; Caribbean Sea; Atlantic coast of South America to Brazil; in depths to about 25 fath. (45.7 m.).

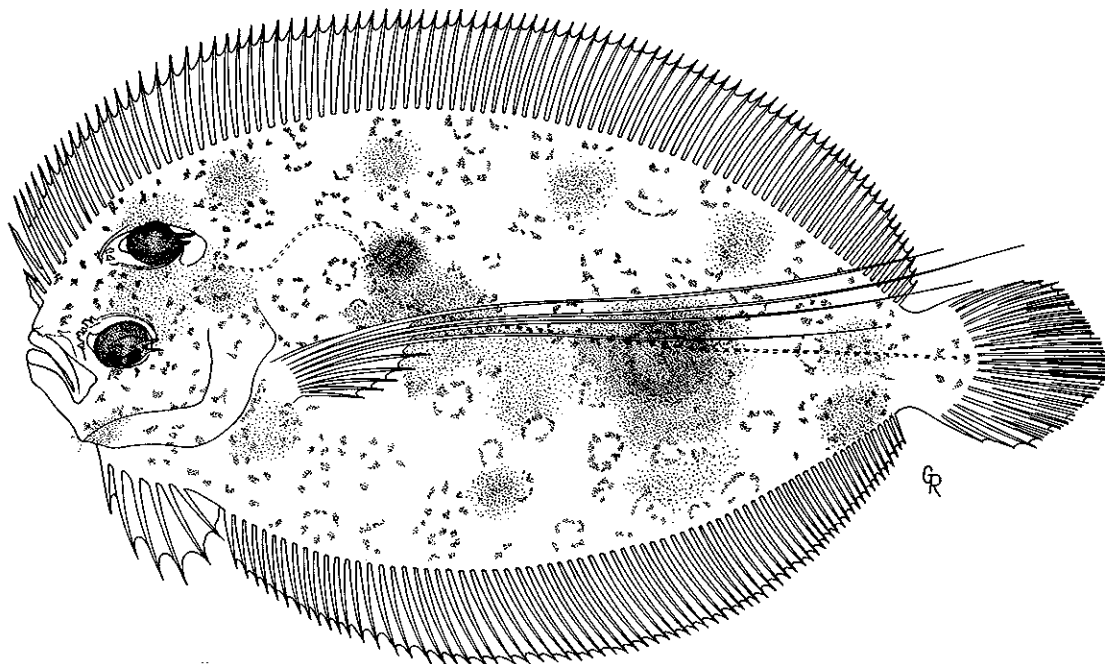


Figure 45.--*Bothus maculiferus*, adult male, 183 mm. SL.

KEY TO THE SPECIES OF THE GENUS *Chascanopsetta* Alcock, 1894

- A. Upper jaw extending well beyond posterior margin of eye, 70 percent HL or greater; gill rakers absent or represented by only 1 or 2 rudiments; fig. 46 *lugubris* page 44.
- AA. Upper jaw extending only to below posterior margin of eye or slightly beyond, about 60 percent HL; gill rakers short, 4 to 8 movable rakers on lower limb; fig. 47. *prorigera* page 45.

Chascanopsetta lugubris Alcock, 1894

Pelican flounder

Dorsal fin rays 114 to 122; anal fin rays 77 to 85; pectoral fin rays on ocular side 14 to 17; gill rakers absent or represented by 1 or 2 rudiments; scales in lateral line small, about 190; vertebrae 17 + 38. Body depth 25 to 33 percent SL; head length 20 to 25 percent SL; eye diameter 24 to 28 percent HL; upper jaw length 70 percent HL or greater, extending posteriorly to a vertical well beyond posterior margin of eye. Ocular side grayish or yellowish brown, with or without numerous small spots. Peritoneum black, color visible through thin abdominal walls.

Anterior profile smooth, convex, only slightly, if at all, notched anterior to upper eye.

Distribution: Atlantic coast of Florida; Gulf of Mexico; Caribbean Sea; Trinidad; Atlantic coast of South America to Brazil; in 125 to 300 fath. (228.6 - 548.6 m.).

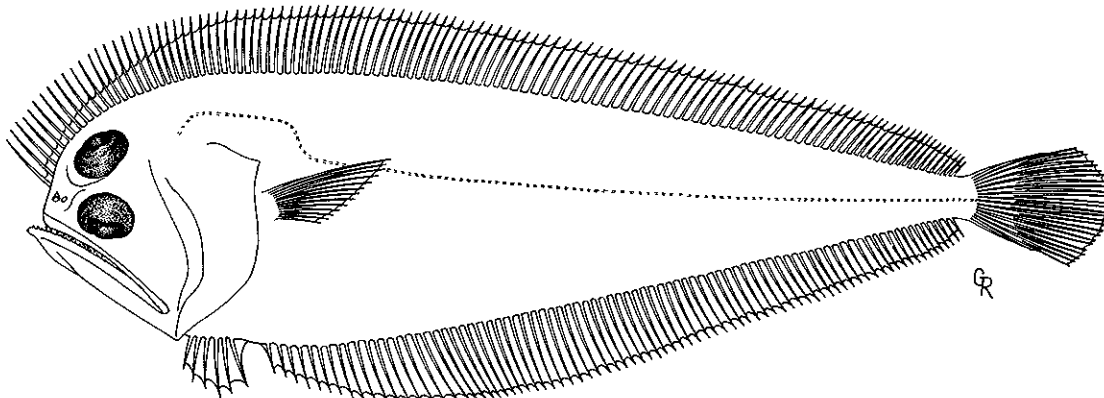


Figure 46.--*Chascanopsetta lugubris*, adult, illustrated from Norman (1934).

Chascanopsetta prorigera Gilbert, 1905

Dorsal fin rays about 125; anal fin rays about 89; pectoral fin rays ocular side about 14; gill rakers on lower limb short, 4 to 8 (movable); scales in lateral line about 140; vertebrae 16 + 39 or 40. Body depth about 34 percent SL; head length about 23 percent SL; eye diameter about 26 percent HL; upper jaw length about 60 percent HL, extending posteriorly to a vertical below posterior margin of eye or slightly beyond. Ocular side pale brownish, covered with numerous small spots. Three dark blotches on straight portion of lateral line, middle one largest, other two inconspicuous. Peritoneum black, color visible through thin abdominal walls.

Anterior profile concave, with well-developed notch anterior to lower eye.

Distribution: Atlantic coast of United States from North Carolina to Florida; Caribbean Sea; in 200 to 250 fath. (365.8 - 457.2 m.).

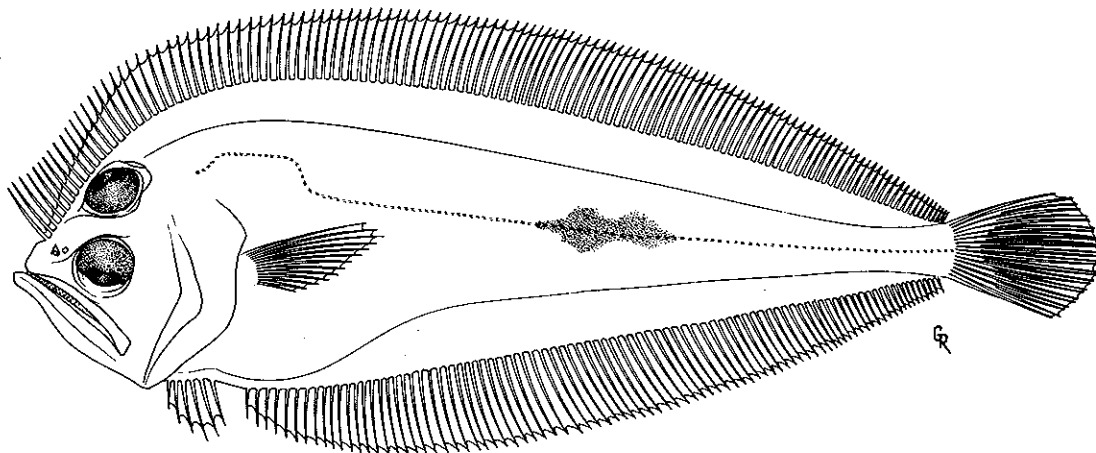


Figure 47.--Chascanopsetta prorigera, adult, illustrated from Norman (1934).

SUBFAMILY SCOPHTHALMINAE

Single genus and species known from the western North Atlantic

Scophthalmus Rafinesque, 1810

Scophthalmus aquosus (Mitchill, 1815). Windowpane

Dorsal fin rays 64 to 71; anal fin rays 48 to 55; pectoral fin rays on ocular side 11; gill rakers long and slender, about 8 + 22 to 26; scales in lateral line 85 to 95; vertebrae 11 + 23 to 25. Body depth 60 to 70 percent SL; head length 25 to 30 percent SL; eye diameter 17 to 25 percent HL; upper jaw length about 45 percent HL, extending posteriorly to a vertical through middle of eye or beyond. Ocular side brown with many small dark spots and numerous larger spots which continue onto the dorsal, anal, and caudal fins; pectoral fin also spotted.

Bases of ventral fins extending forward onto urohyal. Anterior dorsal fin rays branched, slightly longer than succeeding rays.

Distribution: Atlantic coast of North America from Gulf of St. Lawrence, Nova Scotia to Florida; in depths to about 25 fath. (45.7 m.).

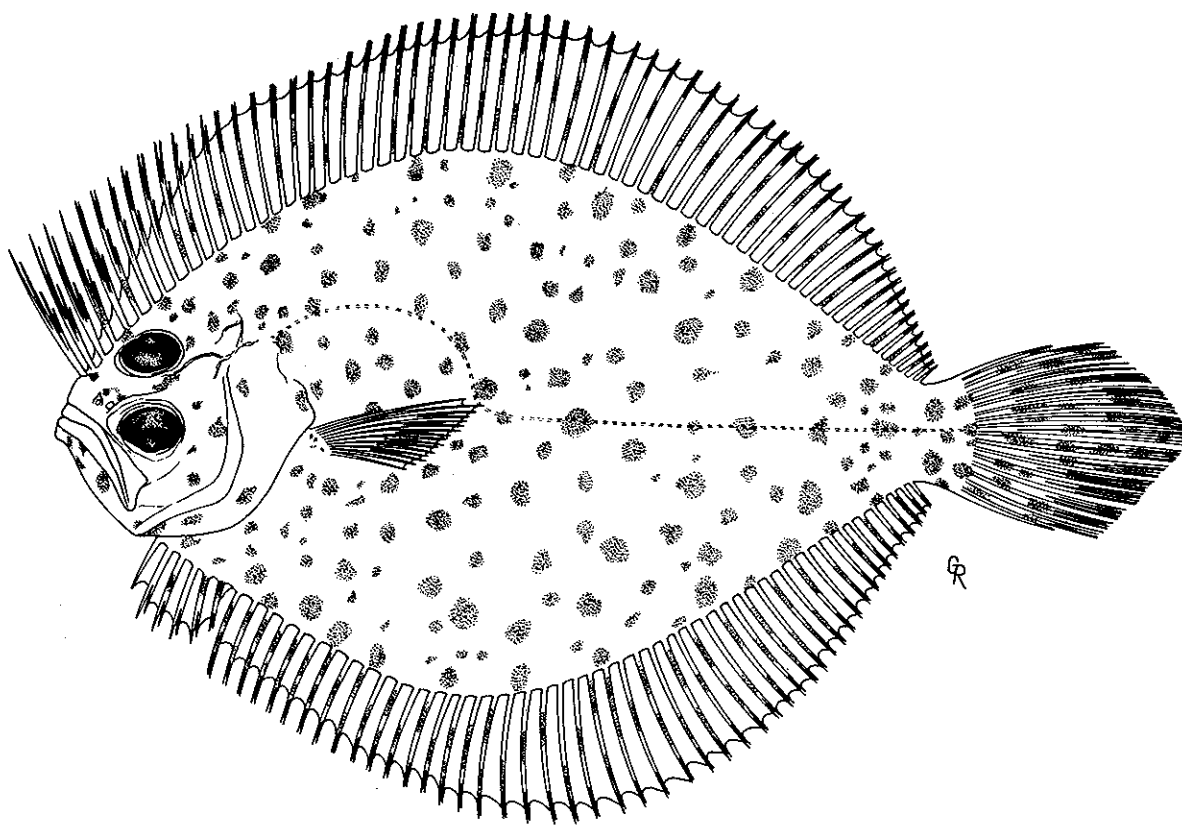


Figure 48.--Scophthalmus aquosus, adult, 130 mm. SL.

ACKNOWLEDGMENTS

James C. Tyler critically reviewed the manuscript, and Grady Reinert prepared the illustrations. C. R. Robins, Institute of Marine Science, University of Miami, and T. S. Austin and F. H. Berry, Bureau of Commercial Fisheries Tropical Atlantic Biological Laboratory, loaned specimens.

LITERATURE CITED

- ANDERSON, WILLIAM W. AND MILTON J. LINDNER
1941. Notes on the flatfish Engyophrys sentus Ginsburg. *Copeia* 1941(1): 23-27.
- BAILEY, REEVE M., ERNEST A. LACHNER, C. C. LINDSEY, C. RICHARD ROBINS, PHIL M. ROEDEL, W. B. SCOTT, AND LOREN P. WOODS.
1960. A list of common and scientific names of fishes from the United States and Canada. *Am. Fish. Soc., Spec. Pub.* 2, 2d ed.: 102 p.
- BIGELOW, HENRY B., AND WILLIAM C. SCHROEDER
1953. Fishes of the Gulf of Maine. U.S. Fish Wildl. Serv., *Fish. Bull.* 53: viii + 577 p.
- DEUBLER, EARL E., JR., AND WILLIAM E. FAHY
1958. A reversed ambicolorate summer flounder, Paralichthys dentatus. *Copeia* 1958(1): p. 55.
- EVERMANN, BARTON W., AND MILLARD C. MARSH
1902. The fishes of Porto Rico. *Bull. U.S. Fish Comm.* 20(1): 49-350.
- GINSBURG, ISAAC
1933. Descriptions of new and imperfectly known species and genera of gobioid and pleuronectid fishes in the United States National Museum. *U.S. Nat. Mus., Proc.* 82 (2961) art. 20: 23 p.

- GINSBURG, ISAAC--Con.
 1952. Flounders of the genus Paralichthys and related genera in American waters. U.S. Fish Wildl. Serv., Fish. Bull. 52: 267-351.
- GUDGER, E. W.
 1935. Abnormalities in flatfishes (Heterosomata). I. Reversal of sides: a comparative study of the known data. J. Morph. 58(1): 39 p.
 1936. A reversed almost wholly ambicolorate summer flounder Paralichthys dentatus. Amer. Mus. Novitates 896: 5 p.
- GUNTER, GORDON
 1946. A new species of flatfish, Cyclopsetta decussata (Pleuronectidae), from the Texas coast. Copeia 1946 (1): 27-28.
- GUTHERZ, ELMER J.
 1966. Revision of the flounder genus Ancylopsetta (Bothidae) with descriptions of two new species from the Antilles and the Caribbean Sea. Bull. Mar. Sci. 16(3): 445-479.
- JORDAN, DAVID S., AND BARTON W. EVERMANN
 1898. The fishes of North and Middle America. U.S. Nat. Mus., Bull. 47(3): xxiv + 2183a-3136.
- NORMAN, J. R.
 1933. Notes on flatfishes (Heterosomata). V. Four new species from the Atlantic coast of America. Ann. Mag. Natur. Hist., Ser. 10, 12: 201-204.
 1934. A systematic monograph of the flatfishes (Heterosomata), vol. 1, Psettodidae, Bothidae, Pleuronectidae. Brit. Mus. (Natur. Hist.): viii + 459 p.
- PARR, ALBERT E.
 1931. A practical revision of the western Atlantic species of the genus Citharichthys (including Etropus). Bull. Bingham Oceanogr. Coll. 4 (art. 1): 24 p.
- ROTHSCHILD, BRIAN J., and EARL E. DEUBLER, JR.
 1960. Paralichthys squamilentus Jordan and Gilbert from North Carolina. Copeia 1960(3): 254-255.
- TYLER, JAMES C.
 1959. Two new flatfishes of the genus Ancylopsetta from the Guiana coast. Copeia 1959(2): 139-148.
- WOODS, LOREN P.
 1961. A new species of flatfish, Monolene megalepis, from Puerto Rico and the western Caribbean Sea. Copeia 1961(2): 192-195.

MS. #1612

Created in 1849, the Department of the Interior--a department of conservation--is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States--now and in the future.



UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES
WASHINGTON, D.C. 20240

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF THE INTERIOR
THIRD CLASS

OFFICIAL BUSINESS

Return this sheet to above address, if you do
NOT wish to receive this material ☐, or if
change of address is needed ☐ (indicate
change including ZIP Code).