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BEAUFORT, NORTH CAROLINA 28516

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AND

# FISHERY INDUSTRIES

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# UNITED STATES

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AND THE SUPERINTENDENT OF THE TENTH CENSUS

BY

GEORGE BROWN GOODE

ASSISTANT DIRECTOR OF THE U. S. NATIONAL MUSEUM

AND A STAFF OF ASSOCIATES

## SECTION I

## NATURAL HISTORY OF USEFUL AQUATIC ANIMALS

WITH AN ATLAS OF TWO HUNDRED AND SEVENTY-SEVEN PLATES

## PLATES

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FIGS. 4, 5. The Spider Crabs. Fig. 4, *Libinia emarginata* Leach; male. Fig. 5, *Libinia dubia* Edwards; male. Both three-fourths natural size ..... 778
FIG. 6. The Sand Bug or Bait Bug, *Hippa talpoida* Say; enlarged about two diameters ..... 779
FIG. 7. The Hermit Crab, *Eupagurus bernhardus* Brandt; about natural size ..... 780
Drawings by J. H. Emerton.

270. The Spiny Lobster or Rock Lobster, *Panulirus interruptus* Randall; somewhat smaller than natural size ... 780
Drawing by H. L. Todd, from specimen obtained on the coast of California.

271. The American Lobster, *Homarus americanus* Edwards; male, much below natural size ..... 781
Drawing by J. H. Emerton, from specimen obtained at Eastport, Maine, 1882.

272. The River Cray-fish, *Cambarus affinis* Erichson; one and one-half times the natural size ..... 812
Drawing by H. L. Todd, from specimen obtained at Havre de Grace, Maryland.

273. The Southern Shrimp, *Penæus setiferus* Edwards; about one-fifth larger than natural size ..... 821
Drawing by J. H. Emerton, from specimen obtained on the coast of Louisiana.

274. The Mantis Shrimp, *Squilla empusa* Say; natural size ..... 823
Drawing by H. L. Todd, from No. 3752, U. S. National Museum. Wood's Holl, Massachusetts, V. N. Edwards.

275. FIG. 1. The Common Shrimp, *Crangon vulgaris* Fabr.; male, natural size ..... 816
FIG. 2. The Common Prawn, *Palæmonetes vulgaris* Stimpson; male, enlarged one and one-half diameters.
FIG. 3. The Deep water Prawn, *Pandalus Montagui* Leach; slightly smaller than natural size.
FIG. 4. The Beach-Flea, *Orchestia agilis* Smith; male, enlarged five diameters.
FIG. 5. The Scud, *Gammarus locusta* Gou'd; male, enlarged two diameters.
FIG. 6. The Boring Amphipod, *Chelura terebrans* Phillipi; enlarged about fourteen diameters.
FIG. 7. The Gribble, *Limnoria lignorum* White; enlarged ten diameters.
FIG. 8. The Salve Bug, *Ægapsora* Kröyer; young specimen, enlarged three diameters.
FIG. 9. The Horse-Shoe Crab, *Limulus Polyphemus* Latreille; much smaller than natural size.
Drawings by J. H. Emerton, S. I. Smith, and O. Harger.

276 Marine Annelids, used as bait ..... 832
FIGS. 1, 2, 3. *Nereis pelagica* Linné. Fig. 1, larger figure, female; smaller, male; natural size. Fig. 2, head. Fig. 3, proboscis, enlarged.
FIG. 4. *Nereis limbata* Ehlers; male, anterior part of body, head, and extended proboscis, enlarged.
FIGS. 5, 6. *Diopatra cuprea* Claparéde. Fig. 5, head and anterior part of body, showing part of the branchiæ, side view. Fig. 6, ventral view, showing the mouth open and jaws thrown back, enlarged.
FIGS. 7, 8, 9. *Clymenella torquata* Verrill. Fig. 7, entire animal, side view, natural size. Fig. 8, head and extended proboscis, front view, enlarged. Fig. 9, posterior and caudal segments, dorsal view, enlarged.
Drawings mostly by J. H. Emerton.

277. FIG. 1. The Sea-Cucumber, *Pentacta frondosa* Jæger; much smaller than natural size ..... 840
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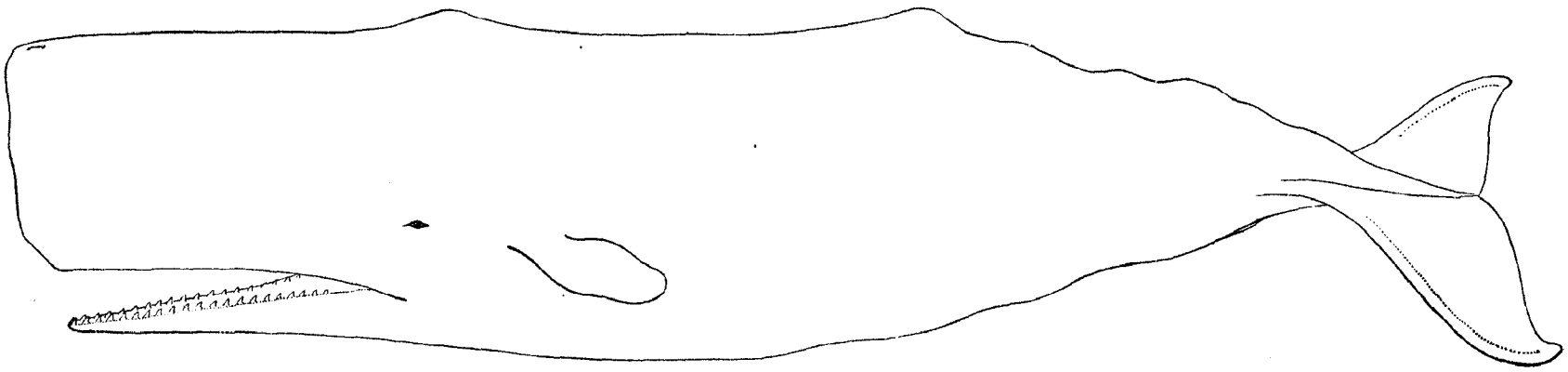
FIG. 3. The Sand Dollar, *Echinarachnius parma* Gray; upper surface, with the spines mostly removed, natural size; *a*, ambulacral zones; *b*, inter-ambulacral zones.
FIG. 4. The Star-fish or "Five Finger," *Asterias Forbesii* Verrill; much smaller than natural size.
FIGS. 5, 6, 7. The Jelly Fishes. Fig. 5, *Zygodactyla Grœnlandica* Agassiz; profile view, one-half natural size. Fig. 6, *Aurelia flavidula* Peron and Le Sueur; dorsal view, about one-fourth natural size. Fig. 7, *Dactylometra quinquecirra* Agassiz; lateral view, one-fourth natural size.

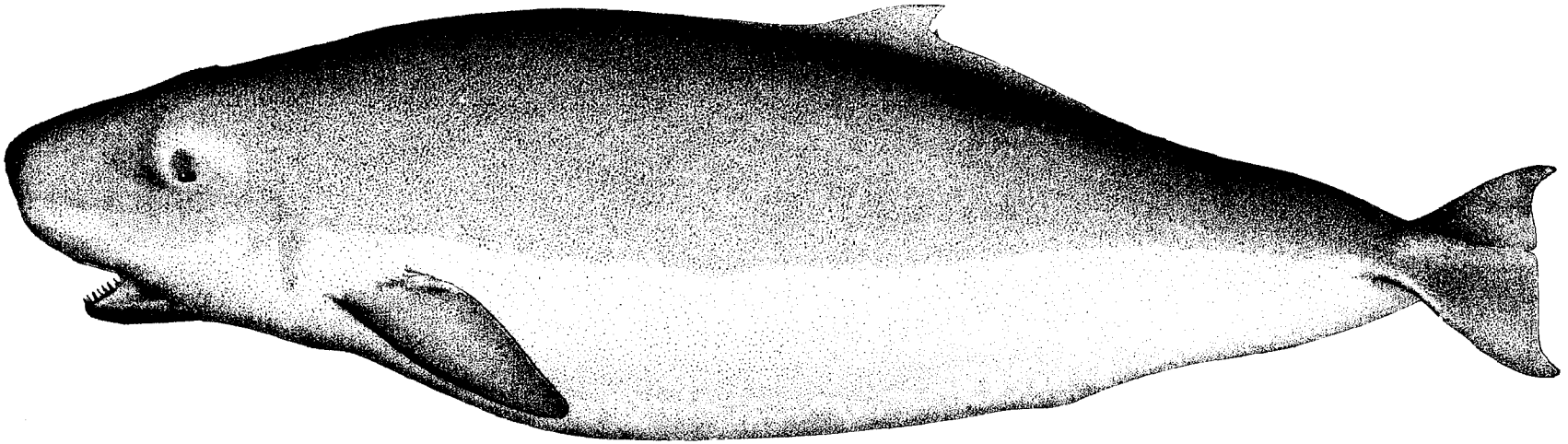


## THE SPERM WHALE.

**Physeter macrocephalus, L.** (p. 7.)

Outline, from Scammon's Marine Mammals of the Northwest Coast, Plate XIV.

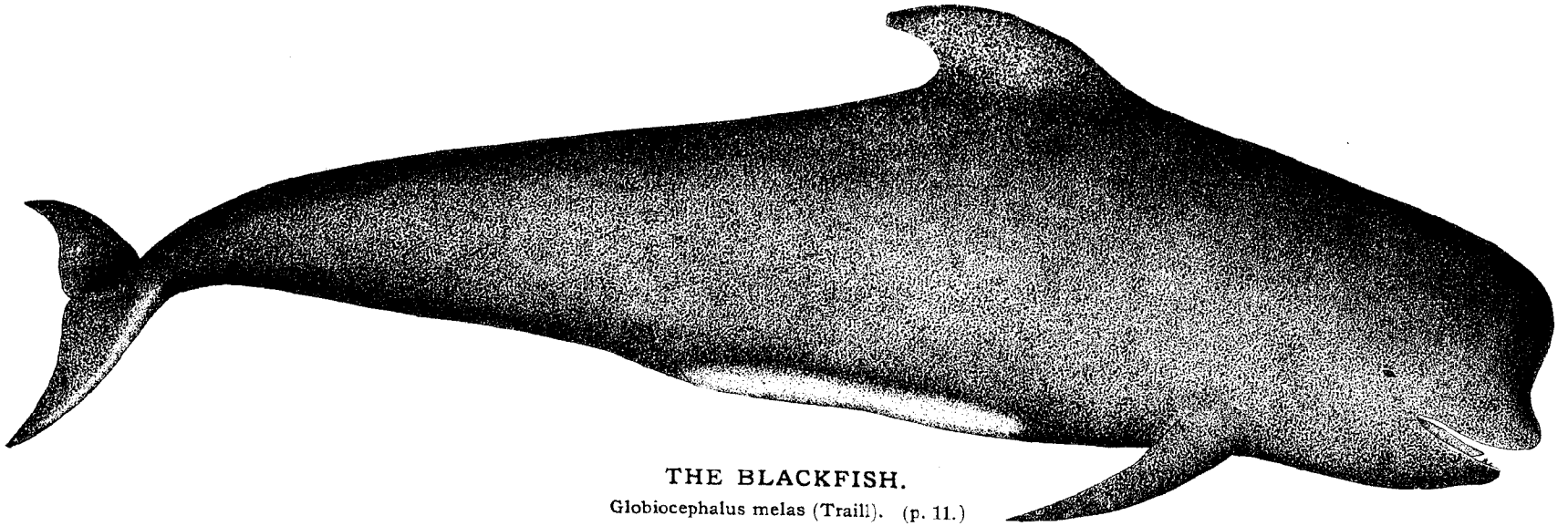
PLATE 1.



## THE PYGMY SPERM WHALE.

Kogia Goodei, True. (p. 11.)

Drawing by H. L. Todd, from No. 13738, U. S. National Museum. Stranded at Spring Lake, New Jersey, April 27, 1883.

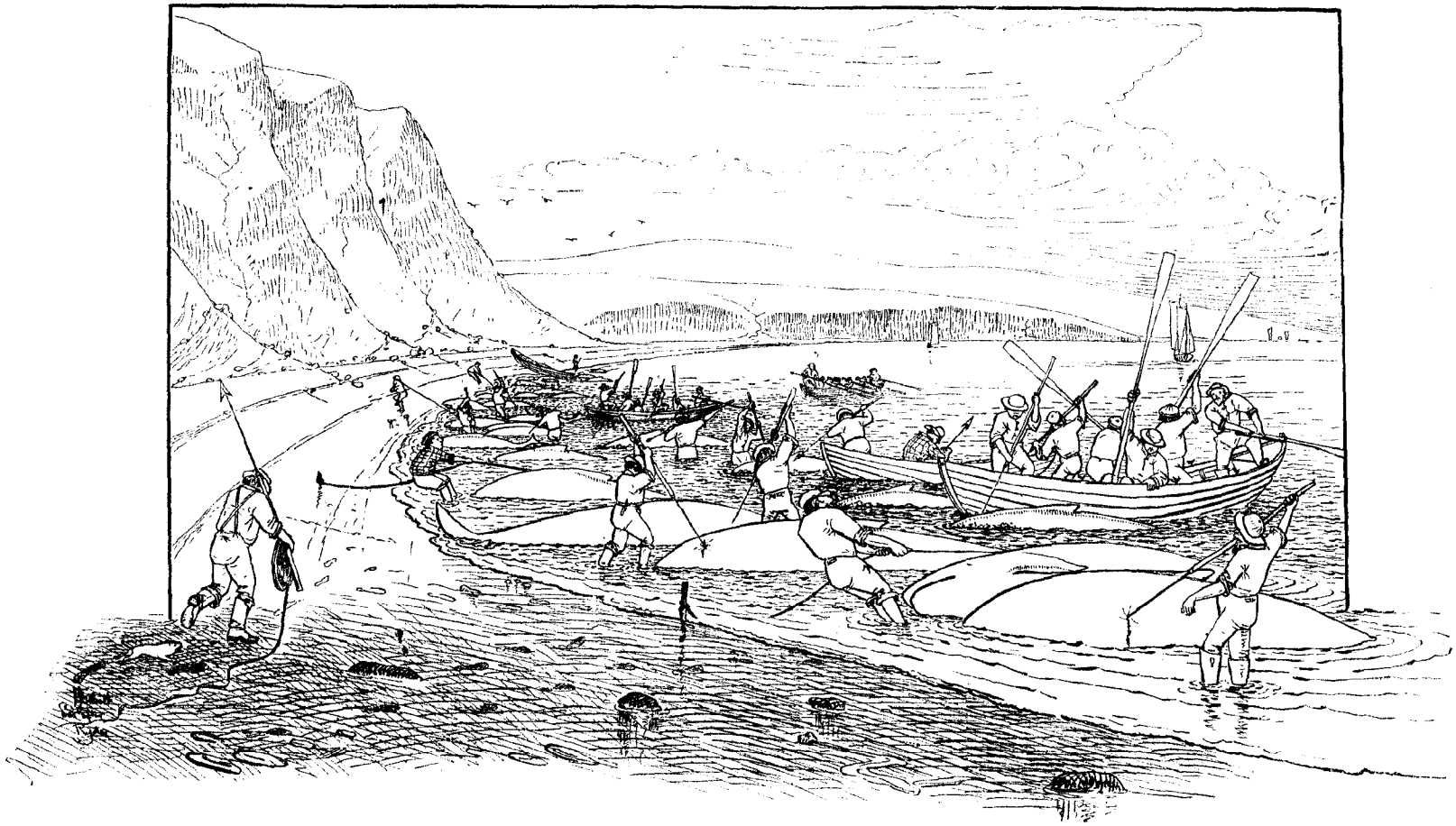


## THE BLACKFISH.

Globiocephalus melas (Traill). (p. 11.)

From Transactions of the Zoological Society of London, Vol. 8, Plate 30.

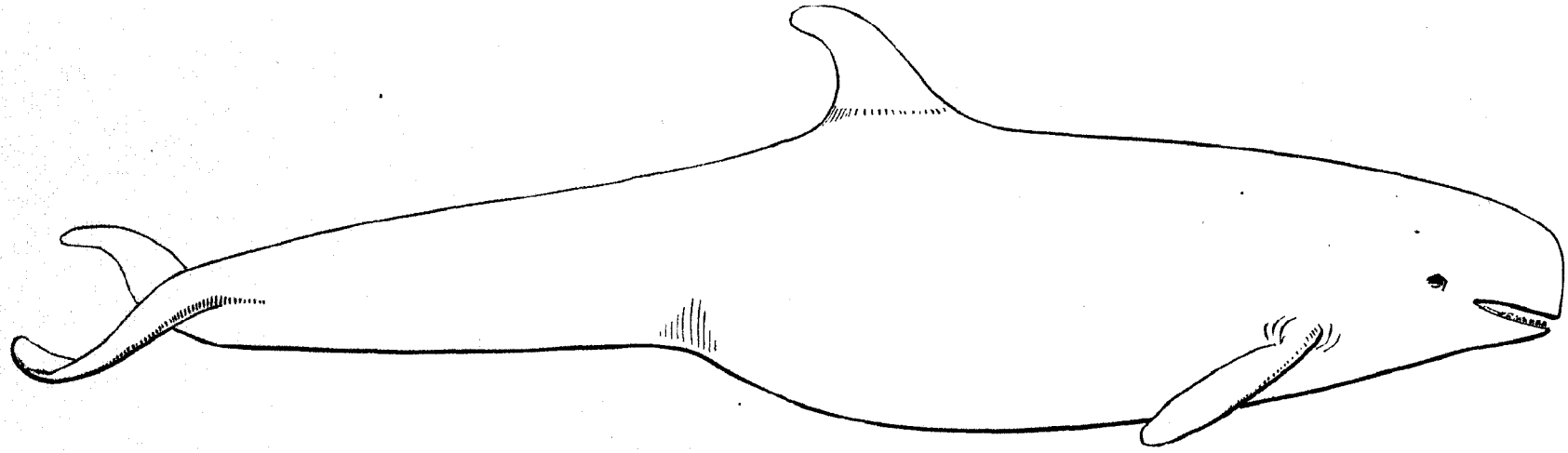
PLATE 2.



THE CAPTURE OF A SCHOOL OF BLACKFISH IN CAPE COD BAY.

Drawing by Henry W. Elliott, from a sketch by John S. Ryder.

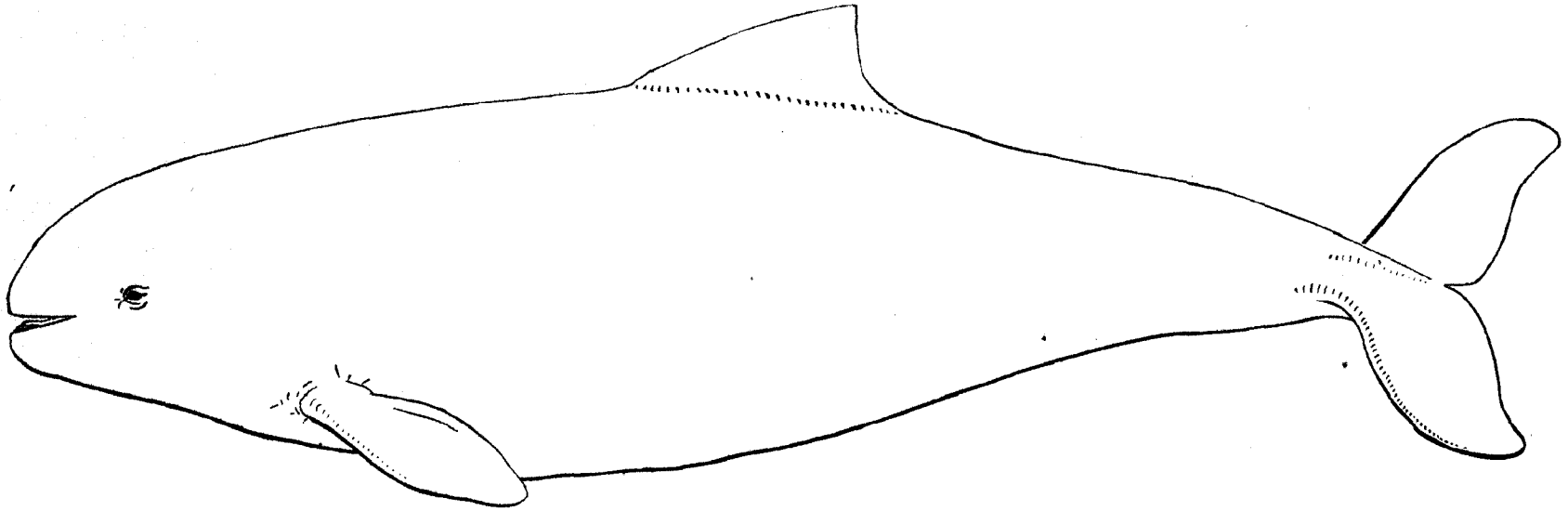
PLATE 3.



## THE COWFISH, OR GRAMPUS.

Grampus griseus (Less.) Gray. (p. 13.)

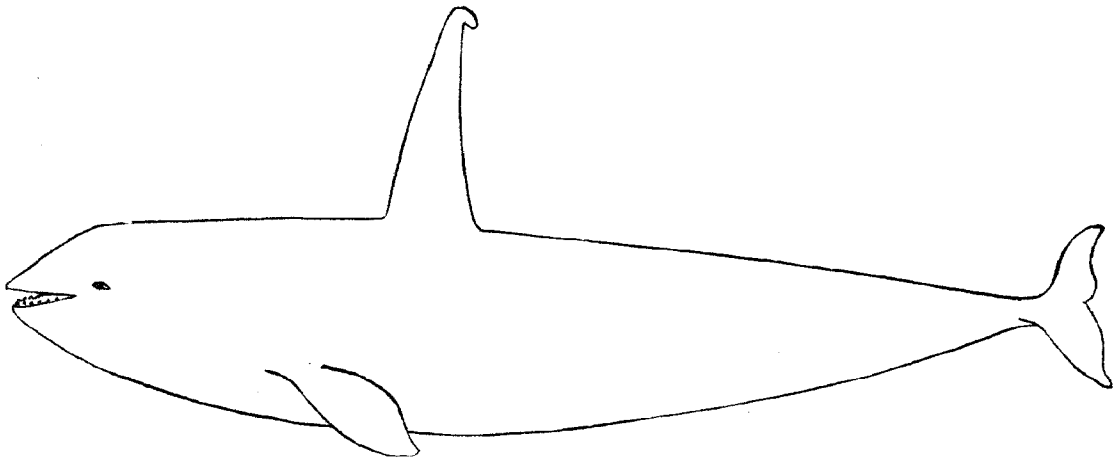
Outline by Henry W. Elliott, from cast No. 12839, U. S. National Museum.



## THE HARBOR PORPOISE, OR "HERRING HOG."

Phocœna brachycion, Cope. (p. 14.)

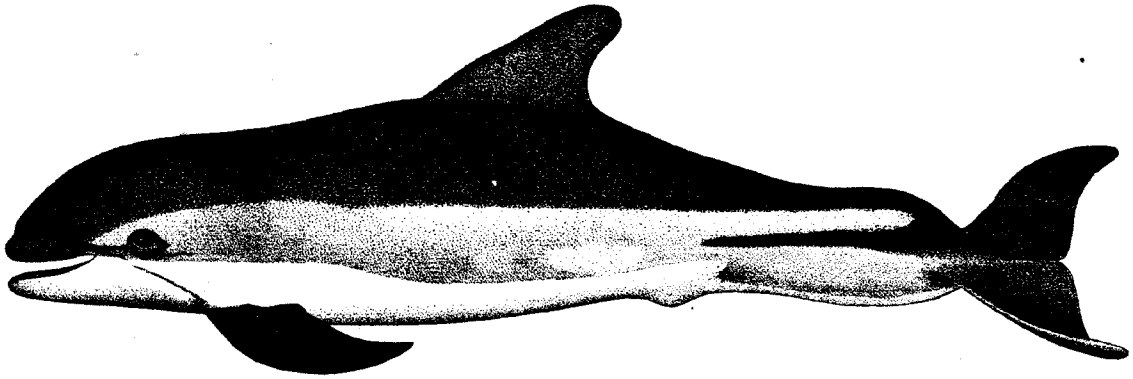
Outline by Henry W. Elliott, from photograph by U. S. Fish Commission.



## THE HIGH-FINNED KILLER.

Orca rectipinnis, Cope. (p. 17.)

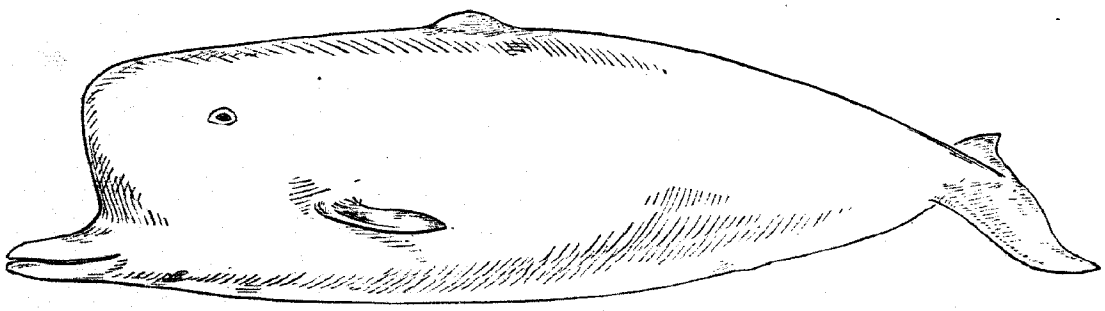
Outline from Scammon's Marine Mammals of the Northwest Coast.



## THE SKUNK PORPOISE, OR BAY PORPOISE.

Lagenorhynchus gubernator, Cope (L. perspicillatus, Cope). (p. 16.)

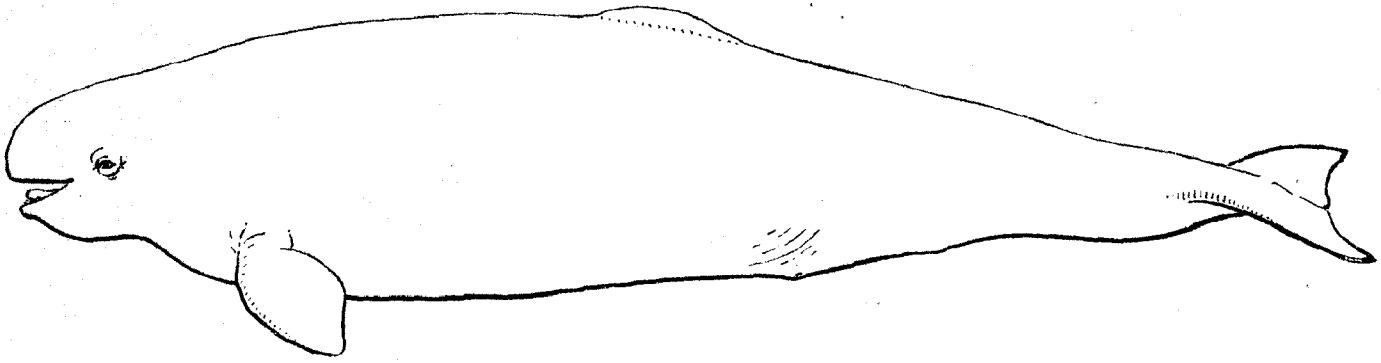
Outline from Proceedings of the Academy of Natural Sciences, Philadelphia, 1876.



## THE SPERM WHALE PORPOISE.

Hyperoodon bidens, Owen. (p. 18.)

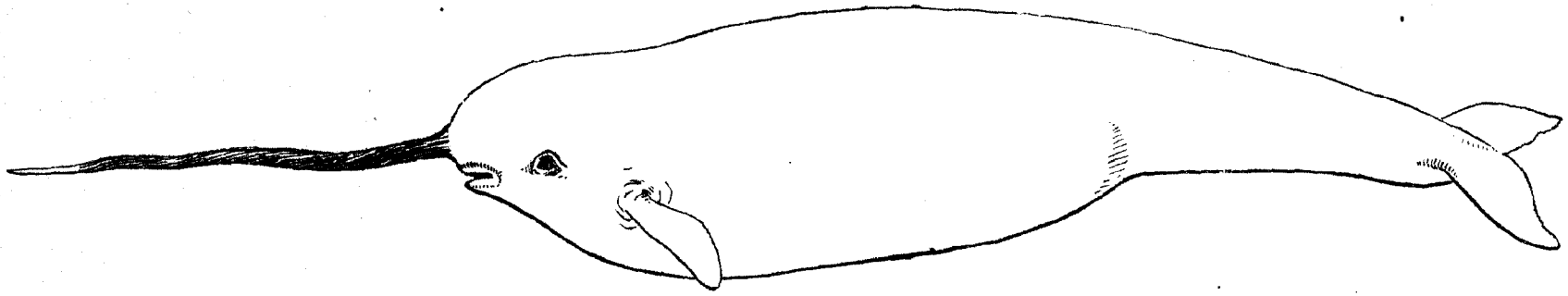
Sketch by James Henry Blake, 1869, from specimen stranded at North Dennis, Mass.



## THE WHITE WHALE, OR BELUGA.

Delphinapterus catodon (L.) Gill. (p. 18.)

Outline by Henry W. Elliott, from cast No. 12490, U. S. National Museum, obtained near Quebec, 1875.

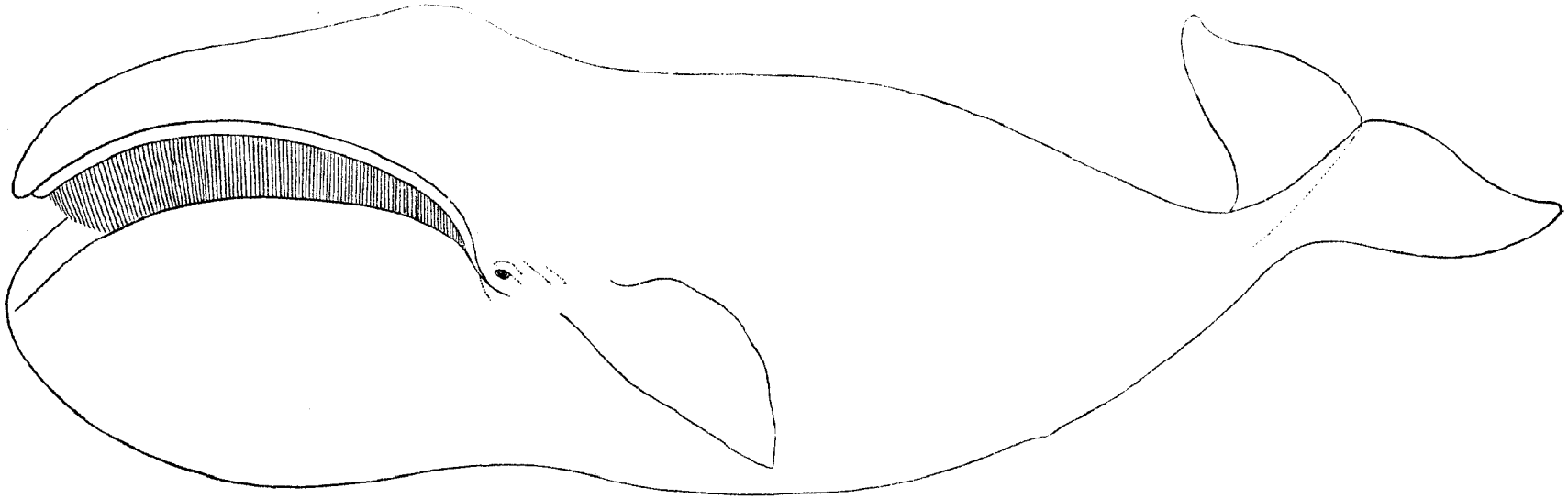


## THE NARWHAL.

Monodon monoceros, L. (p. 19.)

Sketch by Henry W. Elliott, adapted from Vogt and Specht's "Saugethiere," p. 236.

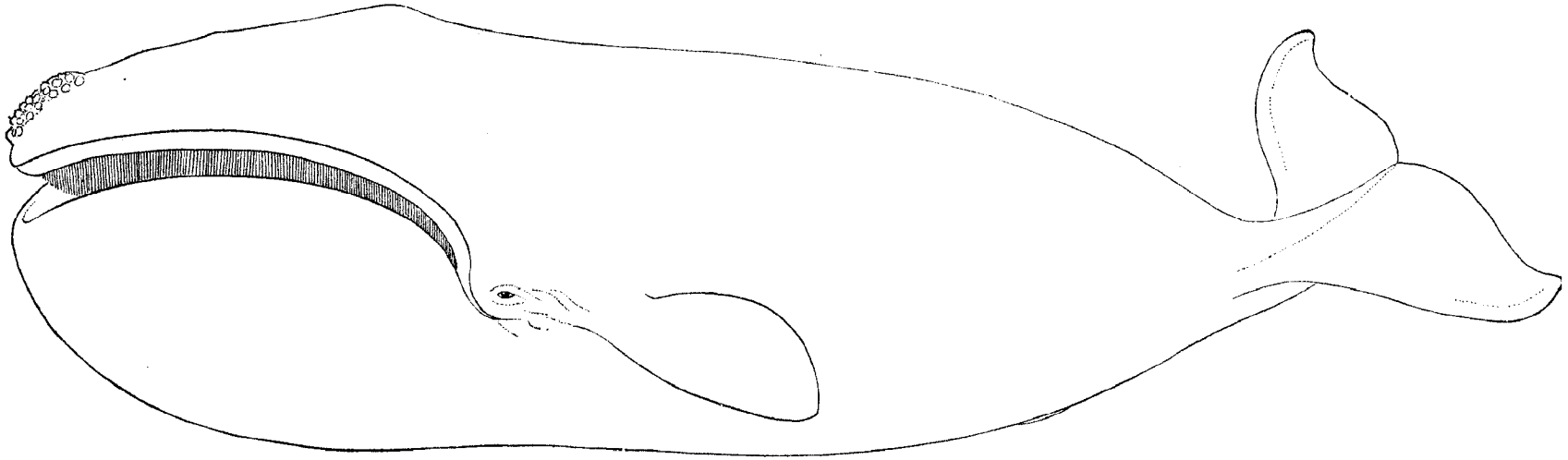
PLATE 6.



## THE BOWHEAD OR ARCTIC WHALE.

Balæna mysticetus, L. (p. 20.)

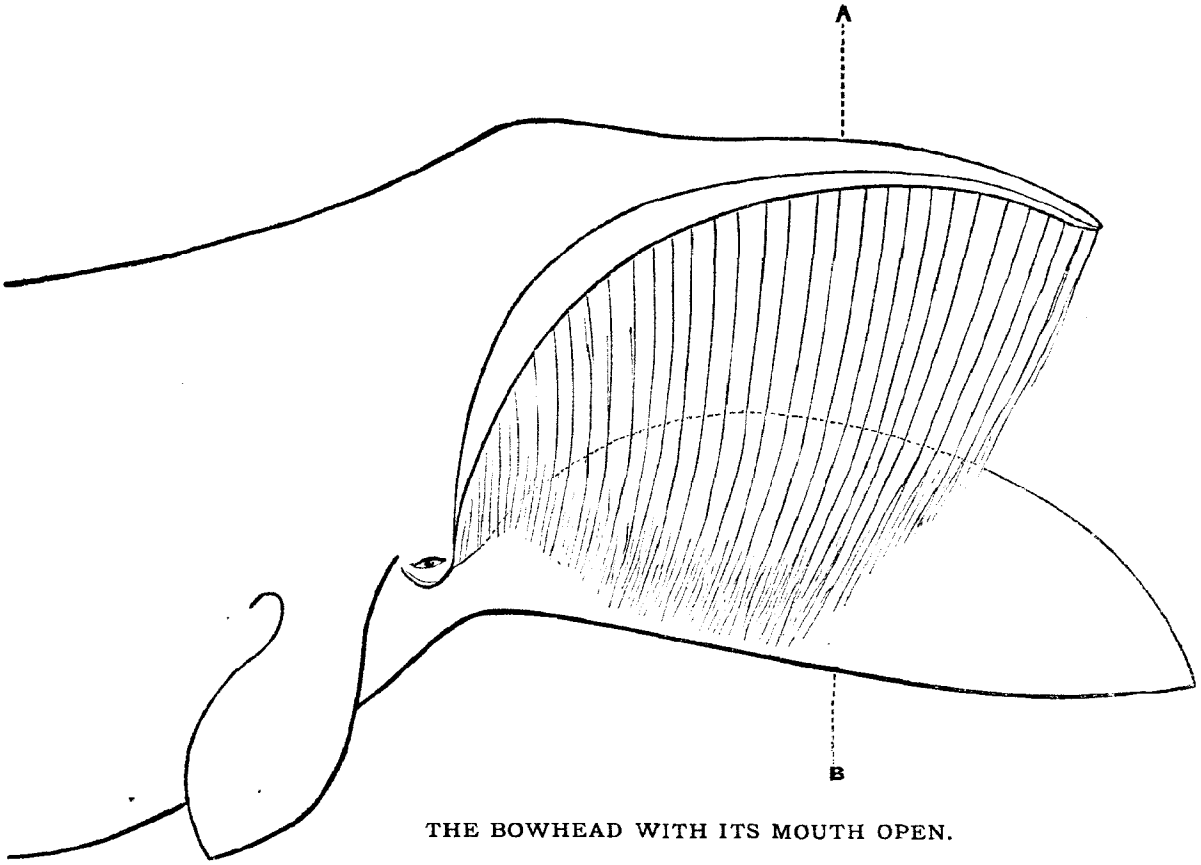
Outline, from Scammon's Marine Mammals, Plate XI.



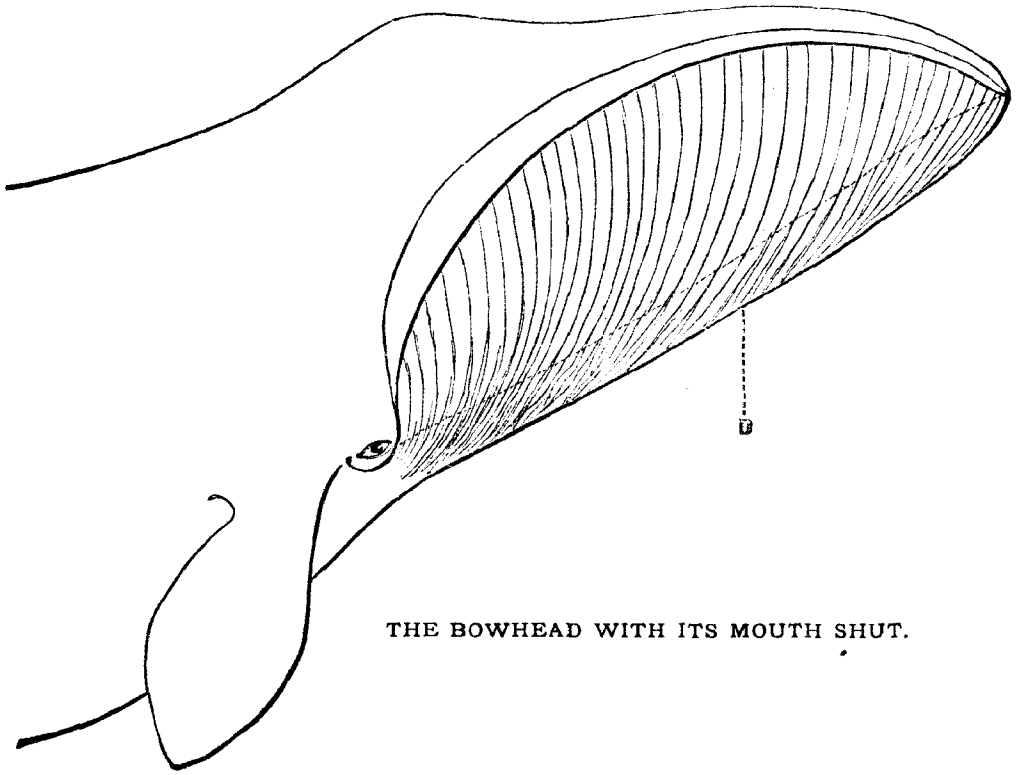
## THE RIGHT WHALE OF THE PACIFIC.

Balæna japonica, Gray. (Eubalæna cullamach.) (p. 24.)

Outline, from Scammon's Marine Mammals, Plate XII.



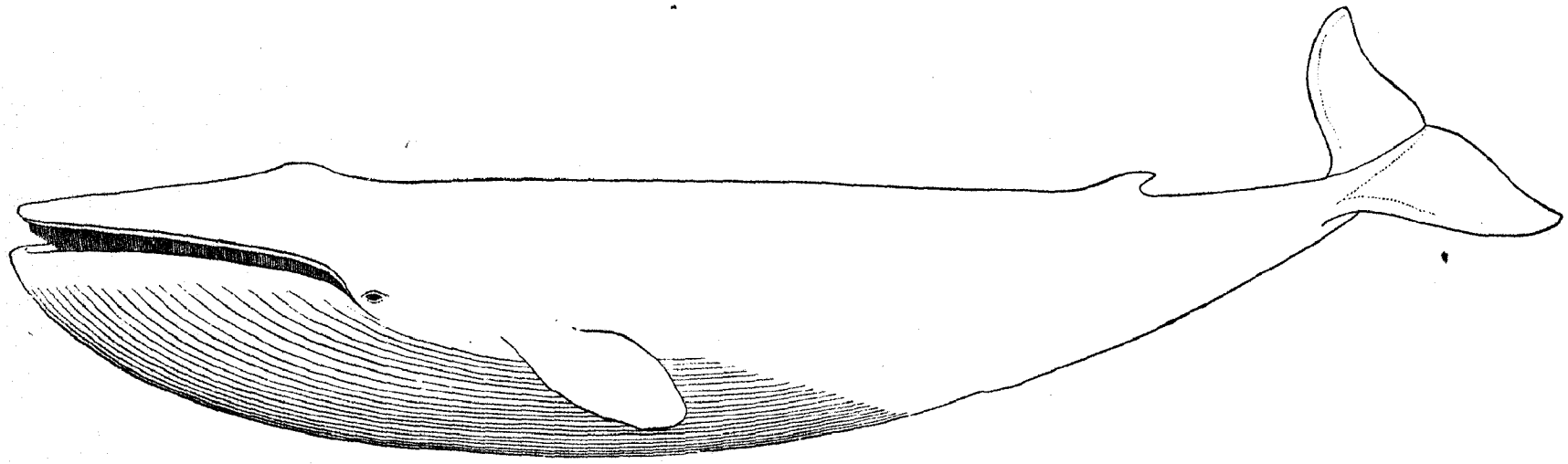

THE BOWHEAD WITH ITS MOUTH OPEN.




THE BOWHEAD WITH ITS MOUTH SHUT.

## DIAGRAMS ILLUSTRATING THE USE OF THE WHALEBONE PLATES IN THE MOUTH OF THE BOWHEAD WHALE.

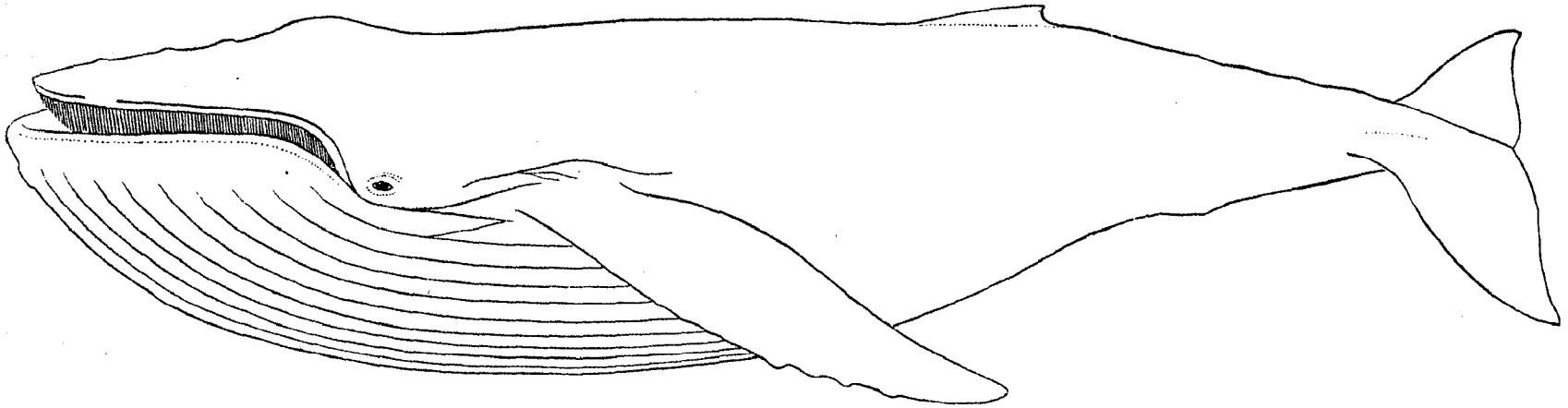
From sketches by Captain David Gray, in Land and Water, December 1, 1877. (p. 22.)



## THE SULPHUR BOTTOM OF THE PACIFIC.

Sibbaldius sulfureus, Cope. (p. 27.)

Outline, from Scammon's Marine Mammals, Plate VIII.

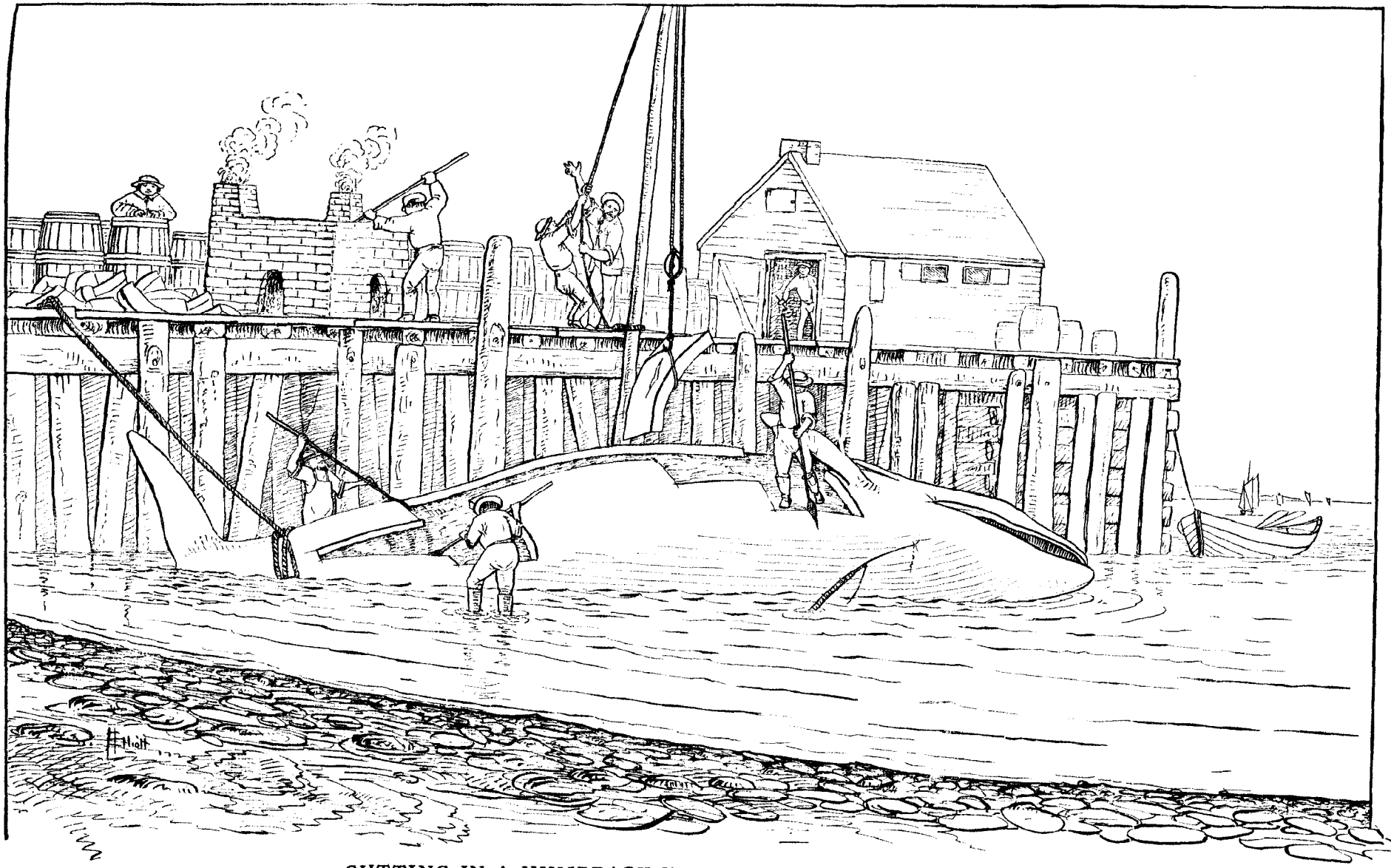


## THE HUMPBACK OF THE PACIFIC.

Megaptera versabilis, Cope. (p. 26.)

Outline, from Scammon's Marine Mammals, Plate VII.

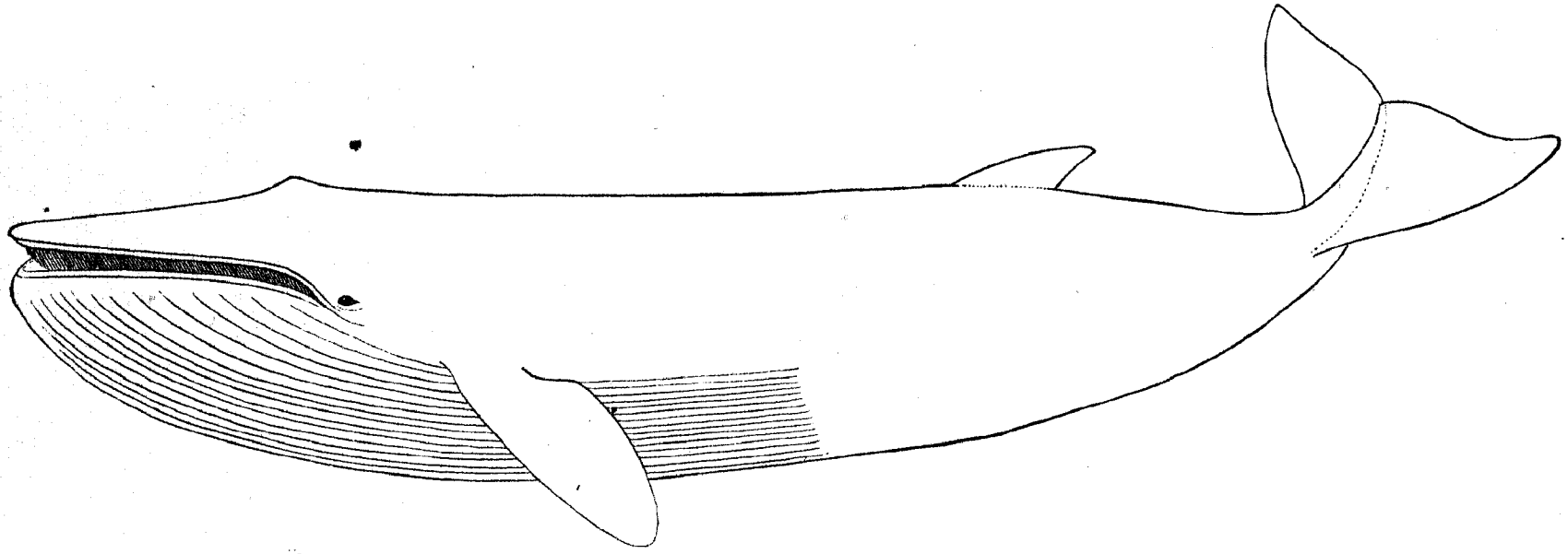
PLATE 9.



CUTTING IN A HUMPBACK WHALE AT PROVINCETOWN, MASS.

From a sketch by J. S. Ryder.

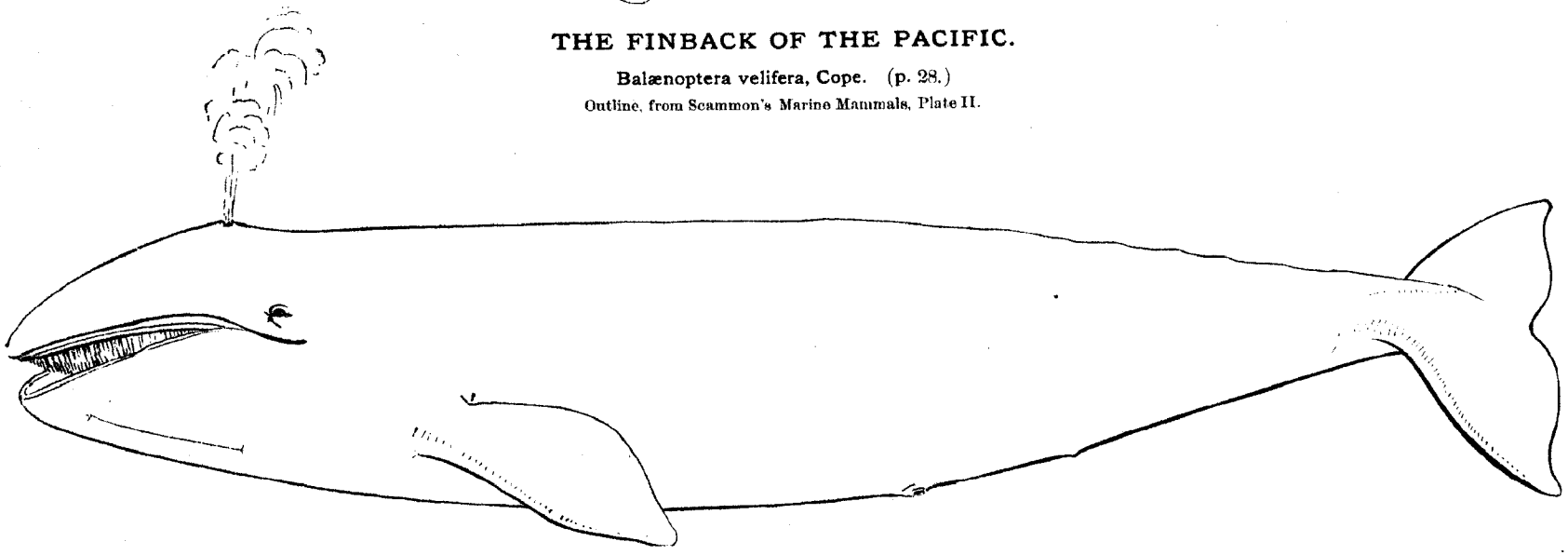
PLATE 10.



## THE FINBACK OF THE PACIFIC.

**Balænoptera velifera, Cope.** (p. 28.)

Outline, from Scammon's Marine Mammals, Plate II.



## THE CALIFORNIA GRAY WHALE, OR DEVIL-FISH.

**Rhachianectes glaucus, Cope.** (p. 31.)

Outline, from Scammon's Marine Mammals, Plate II.

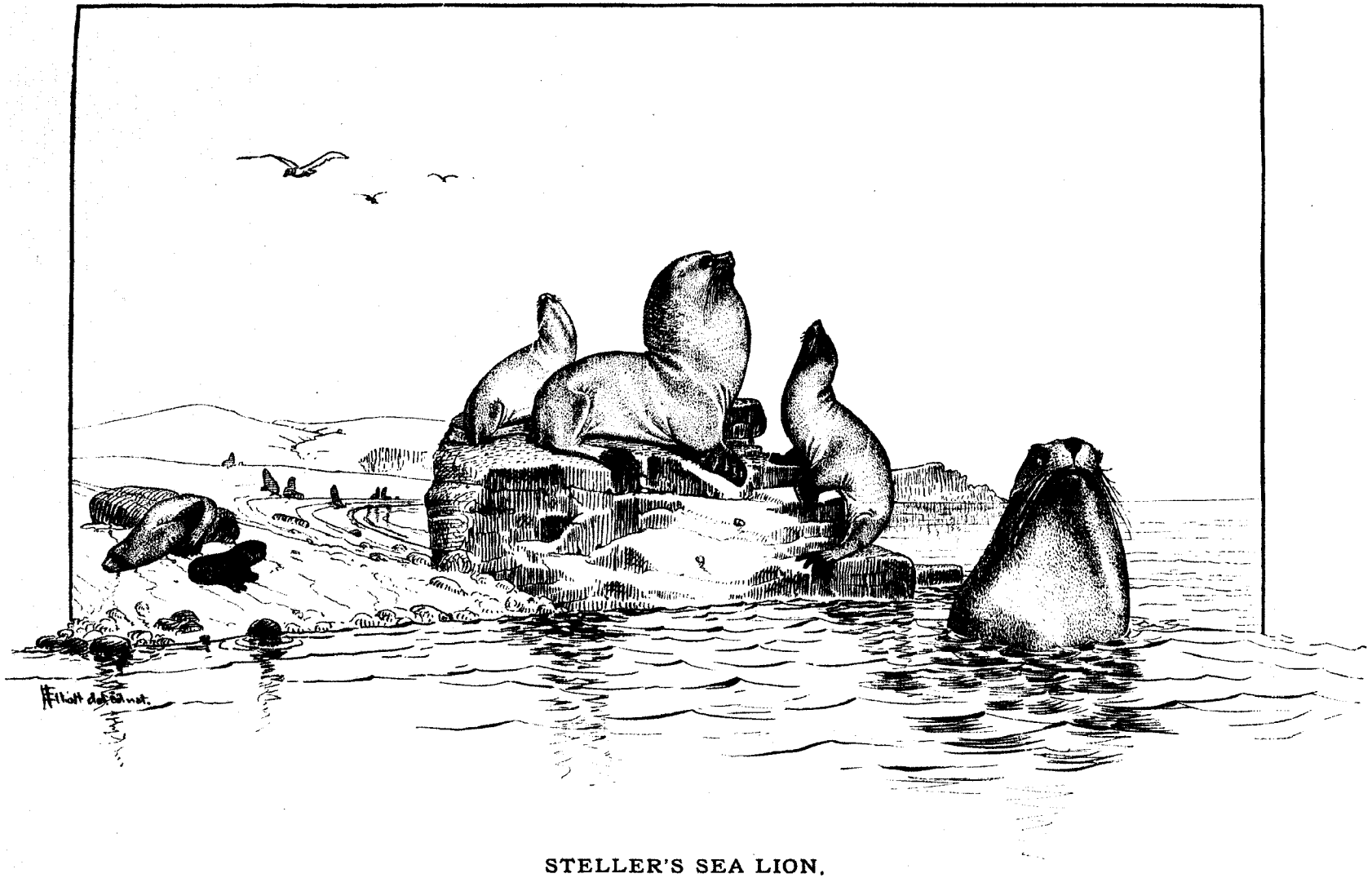
PLATE 11.

PLATE 14.

## THE PACIFIC WALRUS.

Odobænus obesus (Illiger), Allen. (p. 34.)

Sketch by Henry W. Elliott, Walrus Island, Alaska, July 5, 1872.

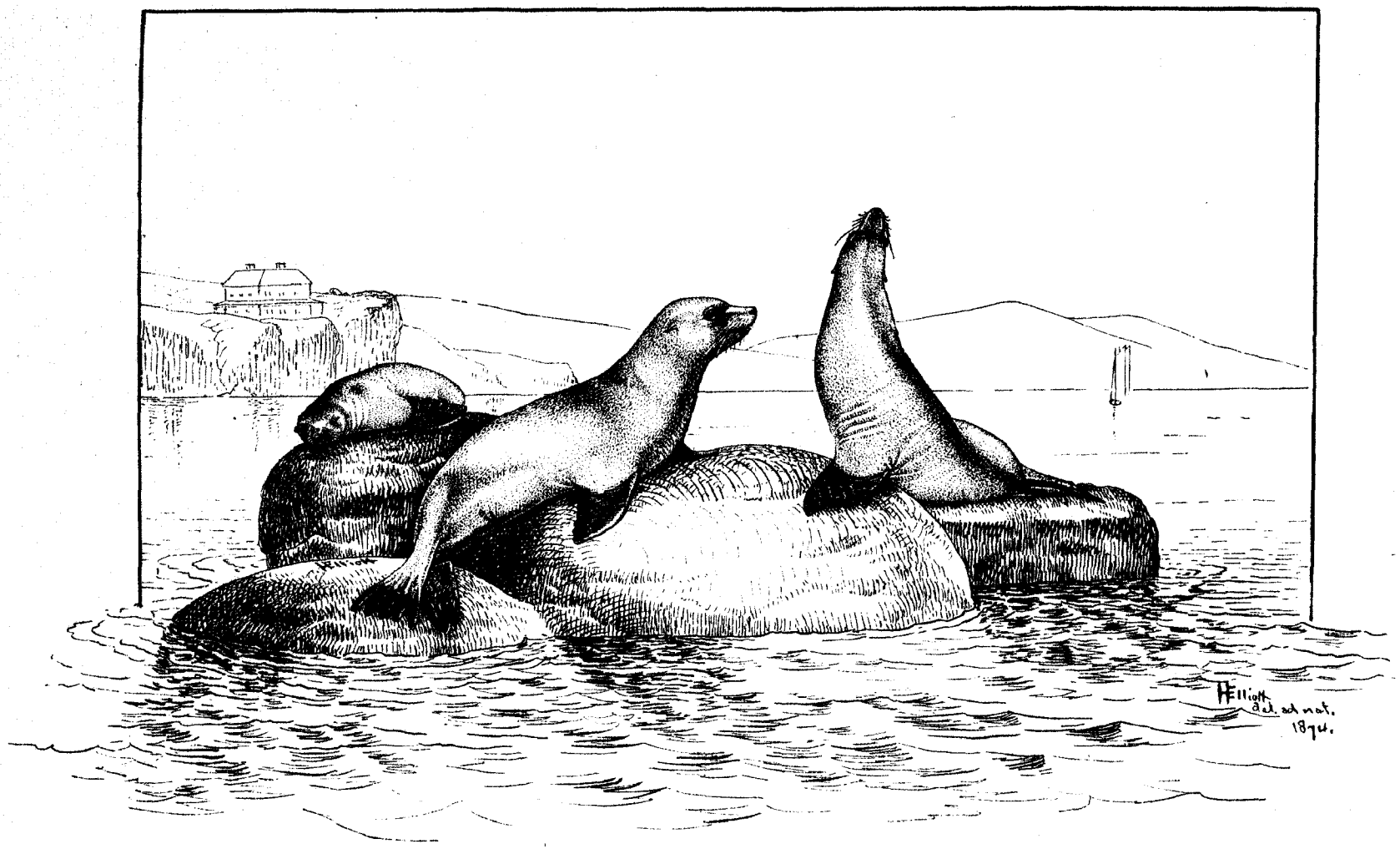


## STELLER'S SEA LION.

**Eumetopias Stelleri (Less.), Peters.** (p. 30.)

Sketch from life, by Henry W. Elliott.

PLATE 13.

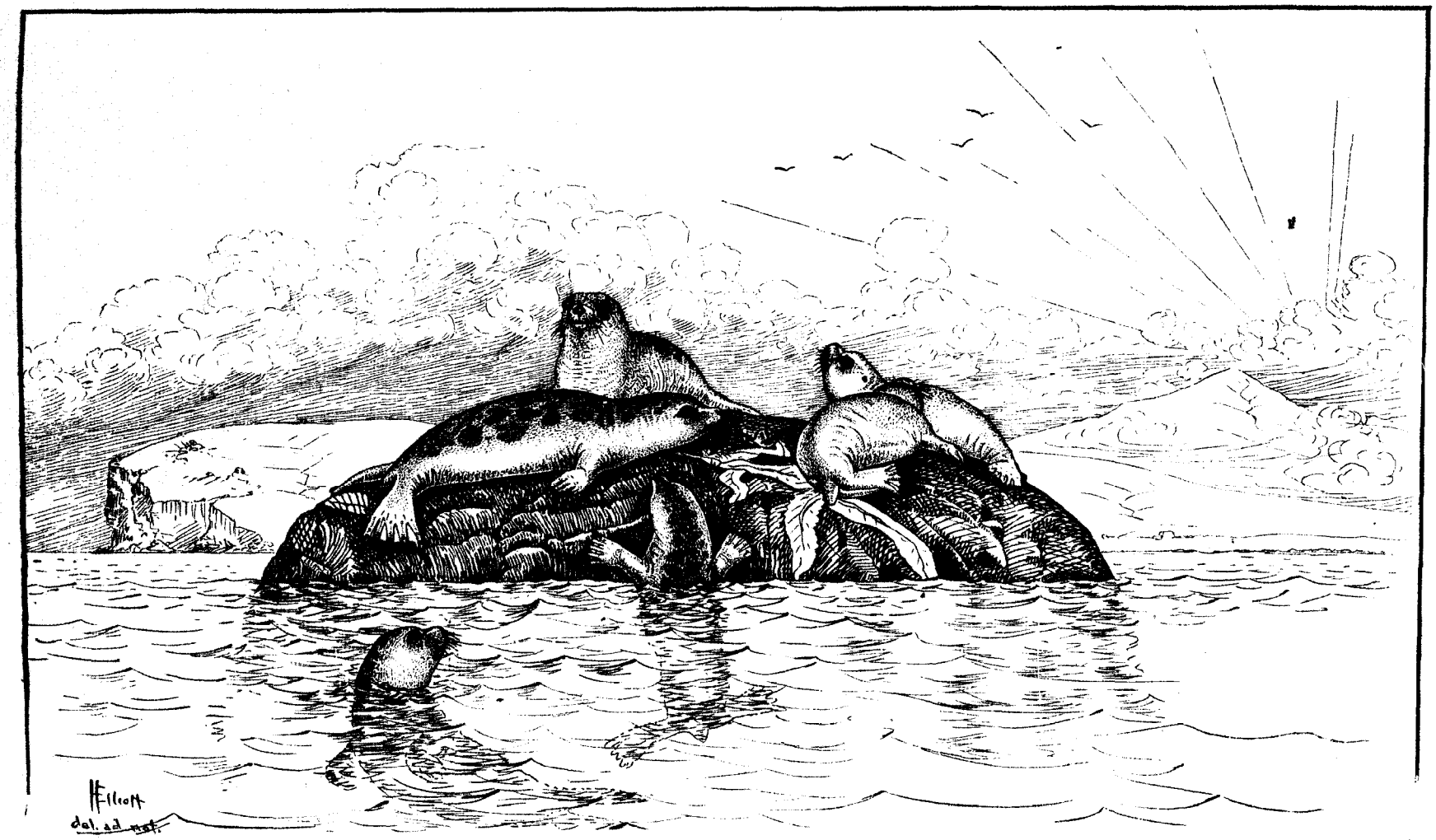



## THE CALIFORNIA SEA LION.

**Zalophus californianus (Less.), Allen.** (p. 44.)

Sketch from life, by Henry W. Elliott.

PLATE 14.

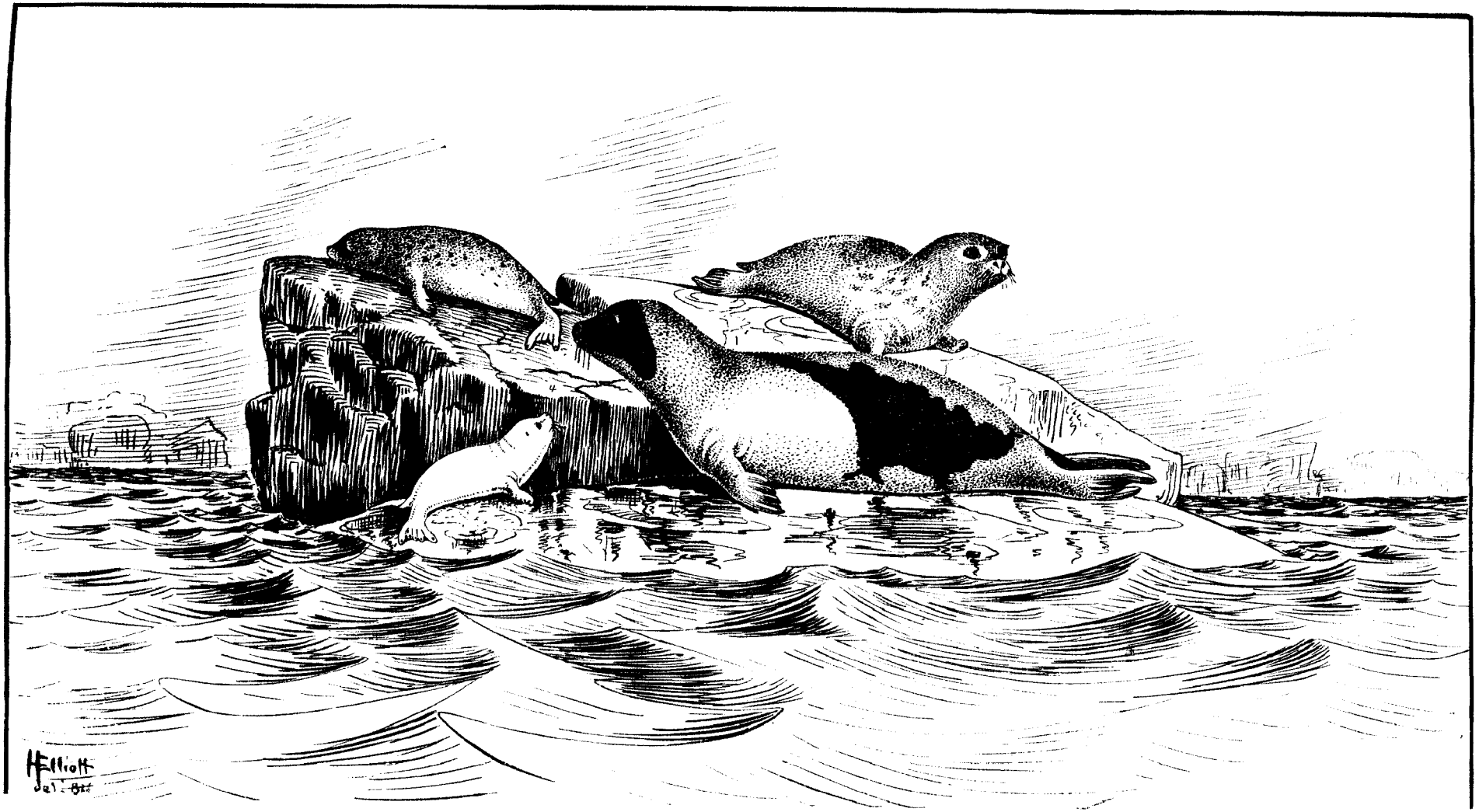



## THE HARBOR SEAL.

Phoca vitulina, L. (p. 55.)

Sketch from life, by Henry W. Elliott, Alaska, 1872.

PLATE 15.

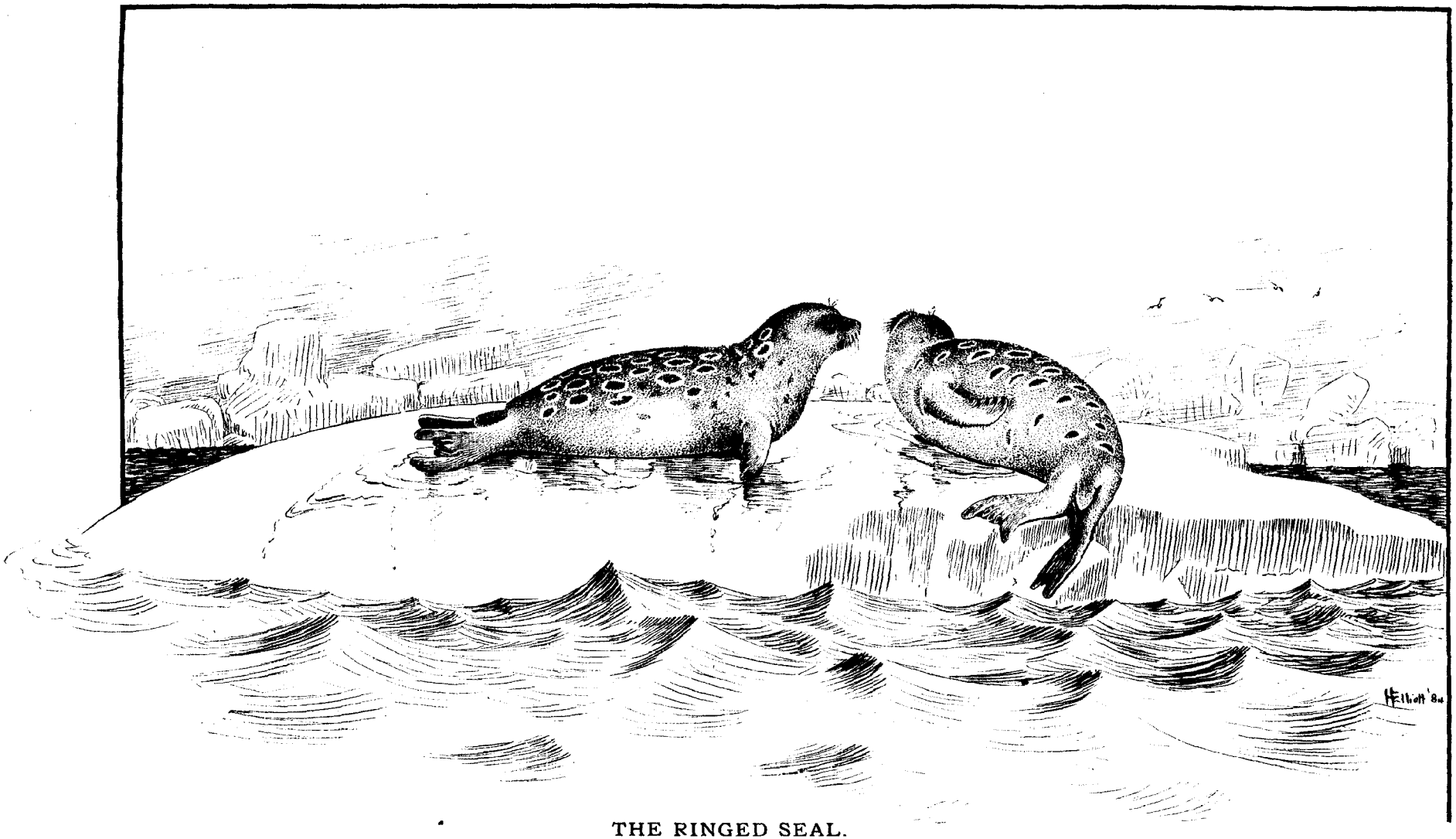


## THE HARP SEAL.

Phoca grœnlandica, Fabricius. (p. 62.)

Sketch by Henry W. Elliott, from specimens in the U. S. National Museum, Nos. 13741, 13748 13938, and, 13939, obtained on the north shore of the Gulf of Saint Lawrence by Dr. C. Hart Merriam.

PLATE 16.

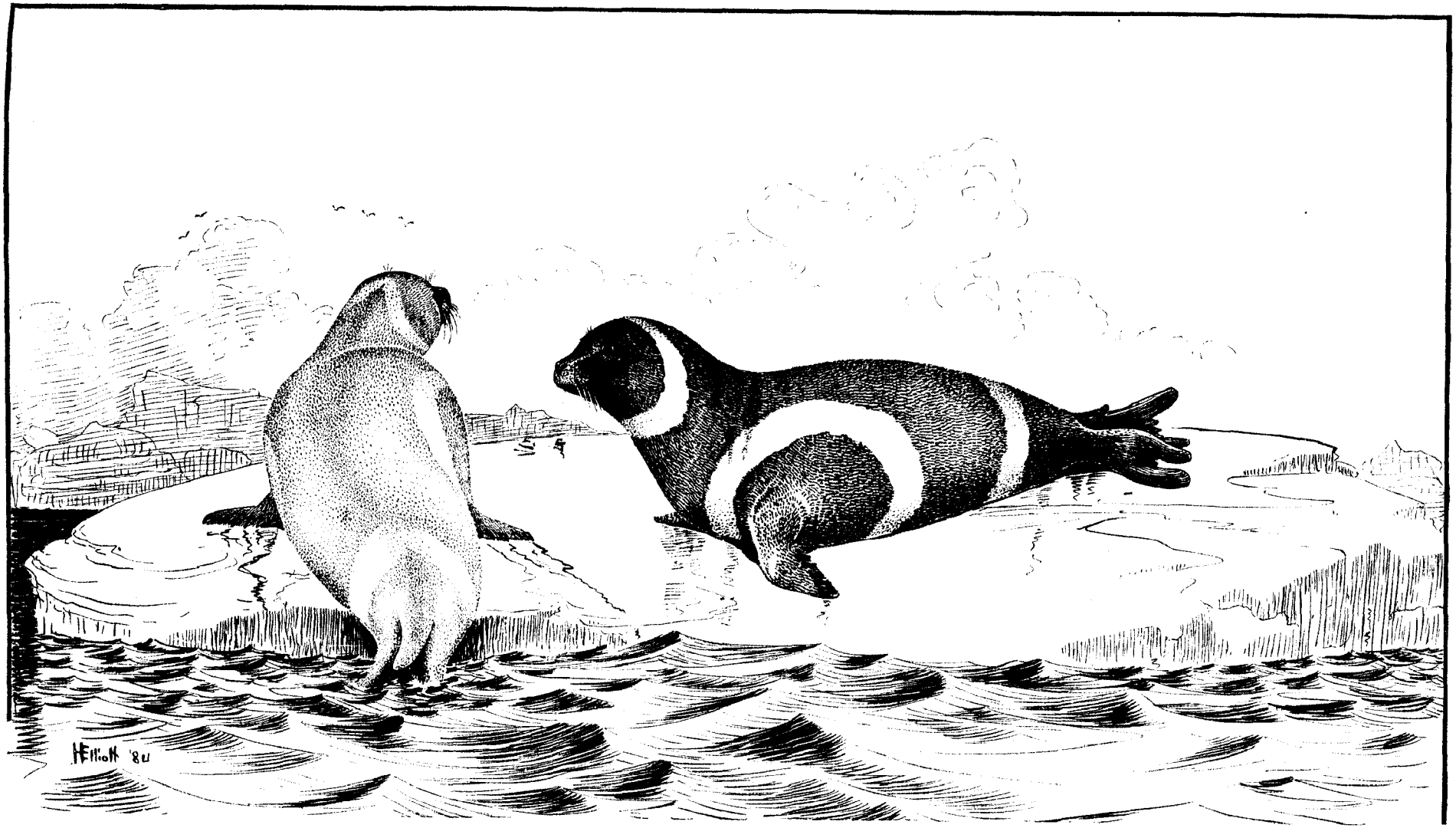


## THE RINGED SEAL.

Phoca fœtida, Fabricius. (p. 65.)

Sketch by Henry W. Elliott, adapted from figure in Allen's North American Pinnipeds, p. 601.

PLATE 17.

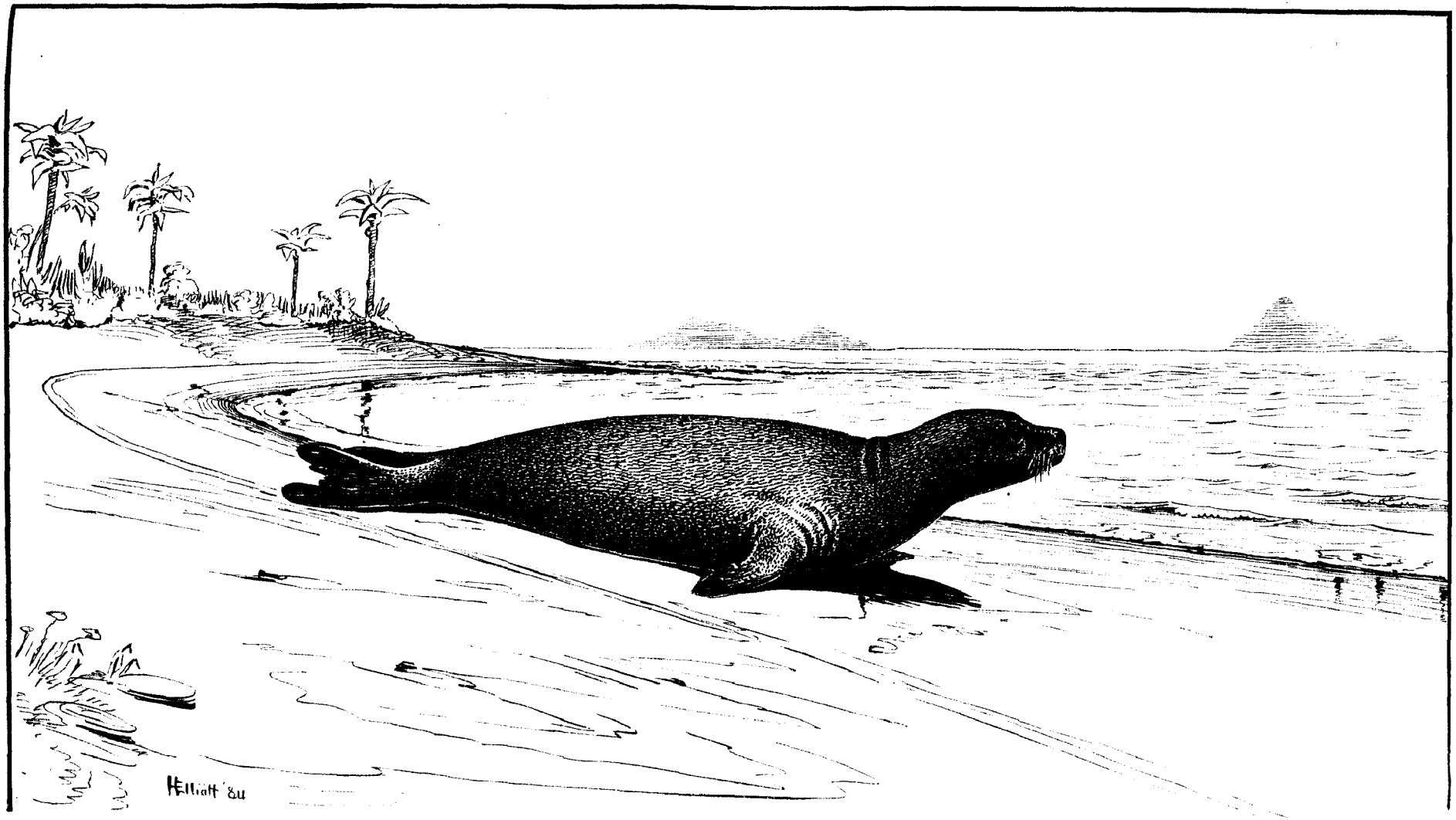



**THE RIBBON SEAL.** (Male and Female.)

Histriophoca fasciata (Zimmerman), Gill. (p. 67.)

Drawing by Henry W. Elliott, from specimens in U. S. National Museum, No. 13284, obtained at Plover Bay, East Siberia, August 12, 1880, by W. H. Dall, and No. 13285, obtained from Bering Sea, 1880, by Capt. H. E. Williams.

PLATE 18.

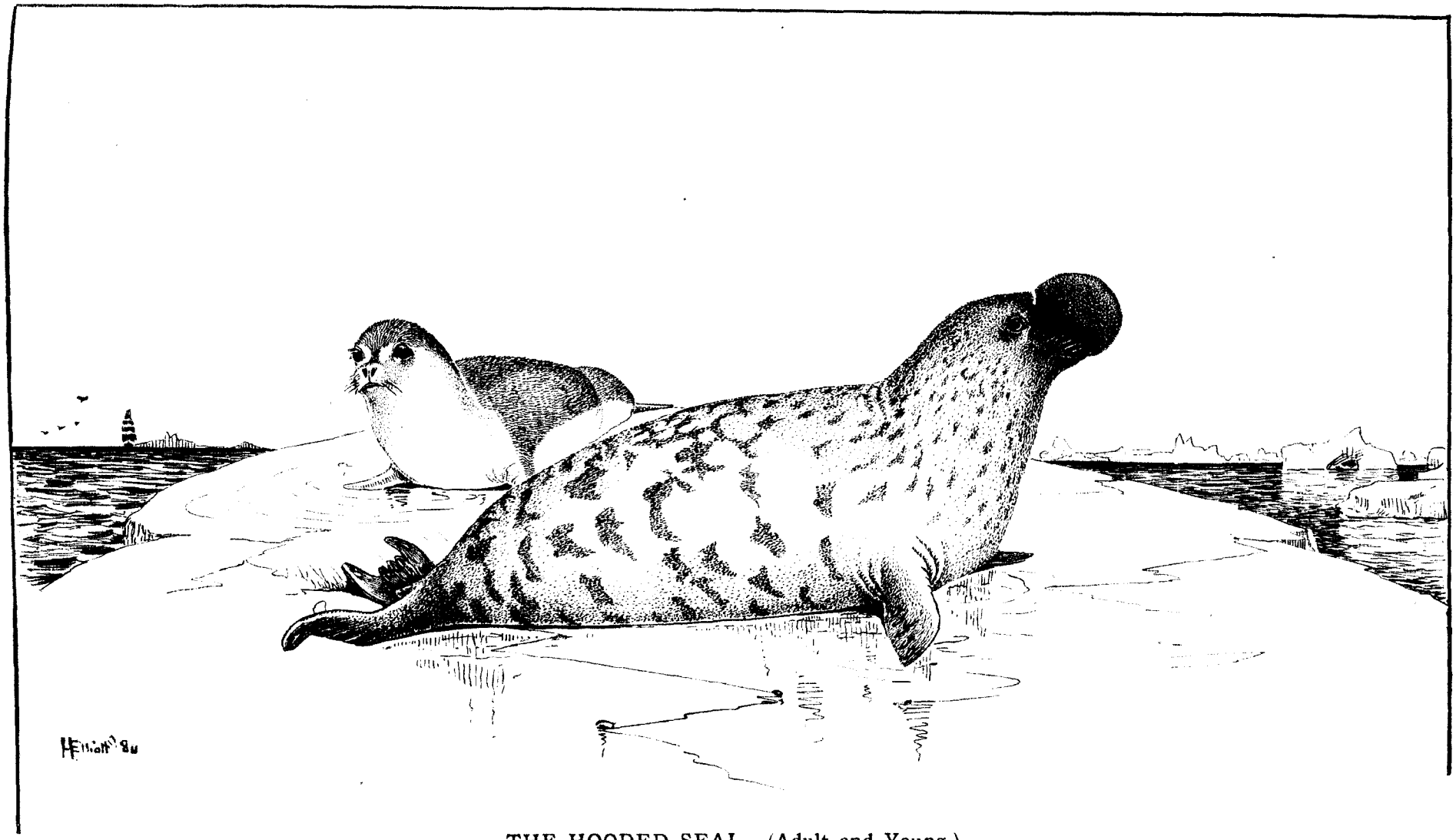



## THE WEST INDIAN SEAL.

**Monachus tropicalis, Gray.** (p. 67.)

Drawing by Henry W. Elliott, from specimen in U. S. National Museum, No. 13950, obtained by Professor Felipe Poey, at Matanzas, Cuba.

PLATE 19.



## THE HOODED SEAL. (Adult and Young.)

Cystophora cristata (Erxl.), Nilss. (p. 68.)

Sketch by Henry W. Elliott, from specimens in the U. S. National Museum, Nos. 13742 and 13753, collected by Dr. C. Hart Merriam, off Labrador. 1883.

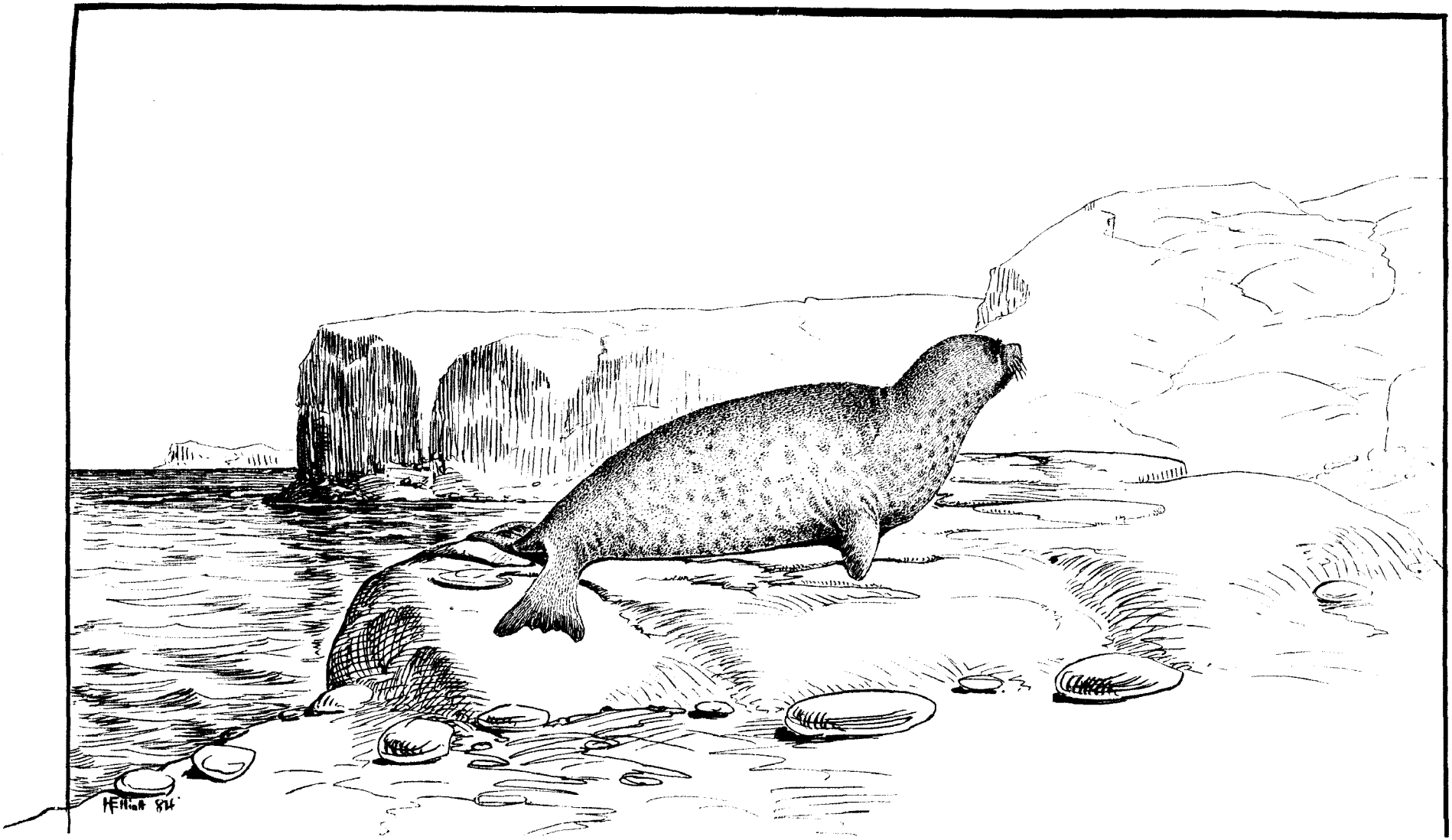
PLATE 20.

## THE GRAY SEAL.

Halichœrus grypus (Fabricius), Nilss.

Sketch by Henry W. Elliott, from specimen in U. S. National Museum, No. 5851, collected at Sable Island, Nova Scotia, 1862.

PLATE 21.

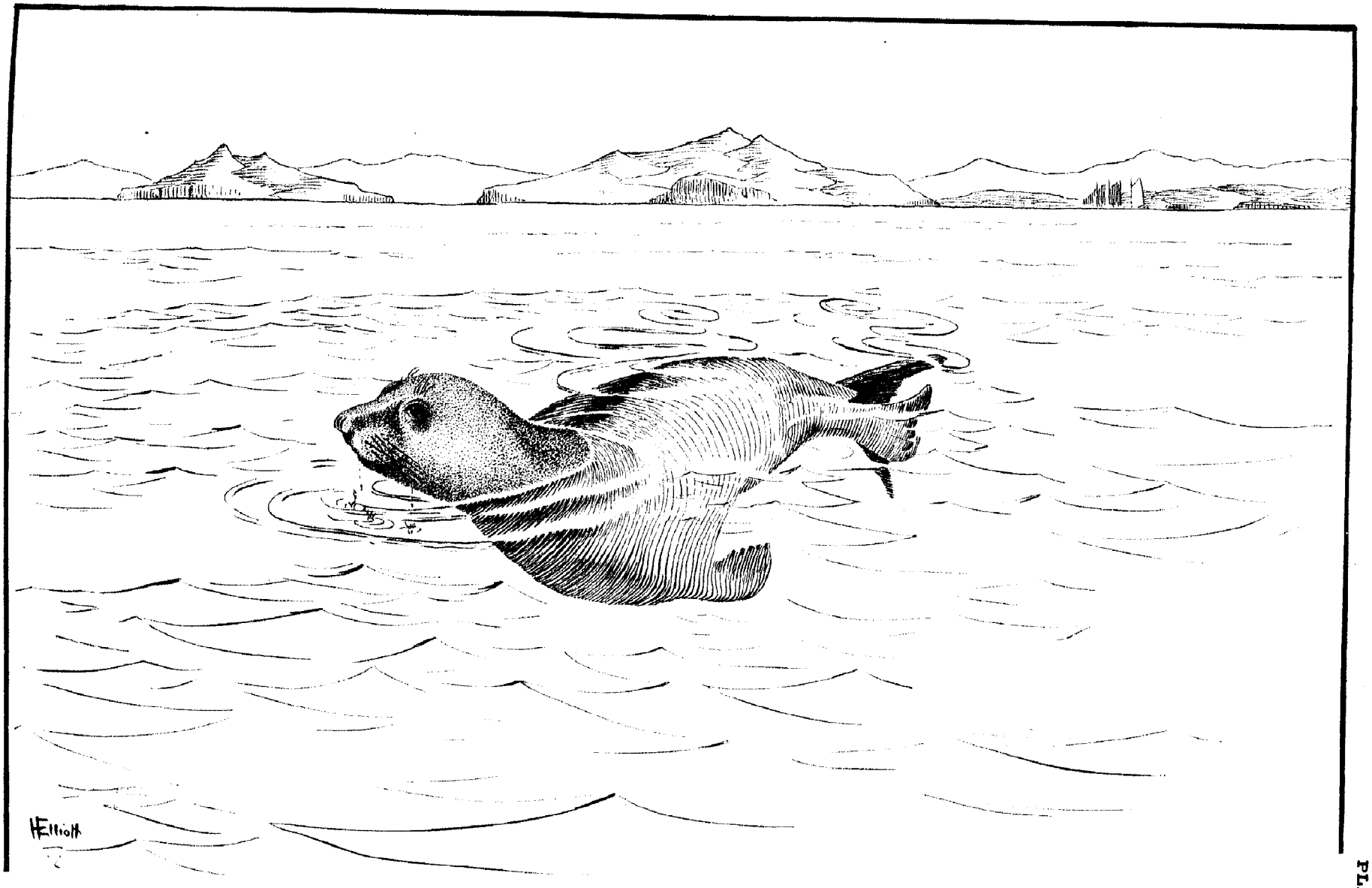


## THE SQUARE FLIPPER SEAL.

Erignathus barbatus (Fabricius), Gill.

Sketch by Henry W. Elliott, from specimen in U. S. National Museum, No. 13755, collected by Dr. C. Hart Merriam, off Battle Harbor, Gulf of Saint Lawrence, 1883.

PLATE 22.

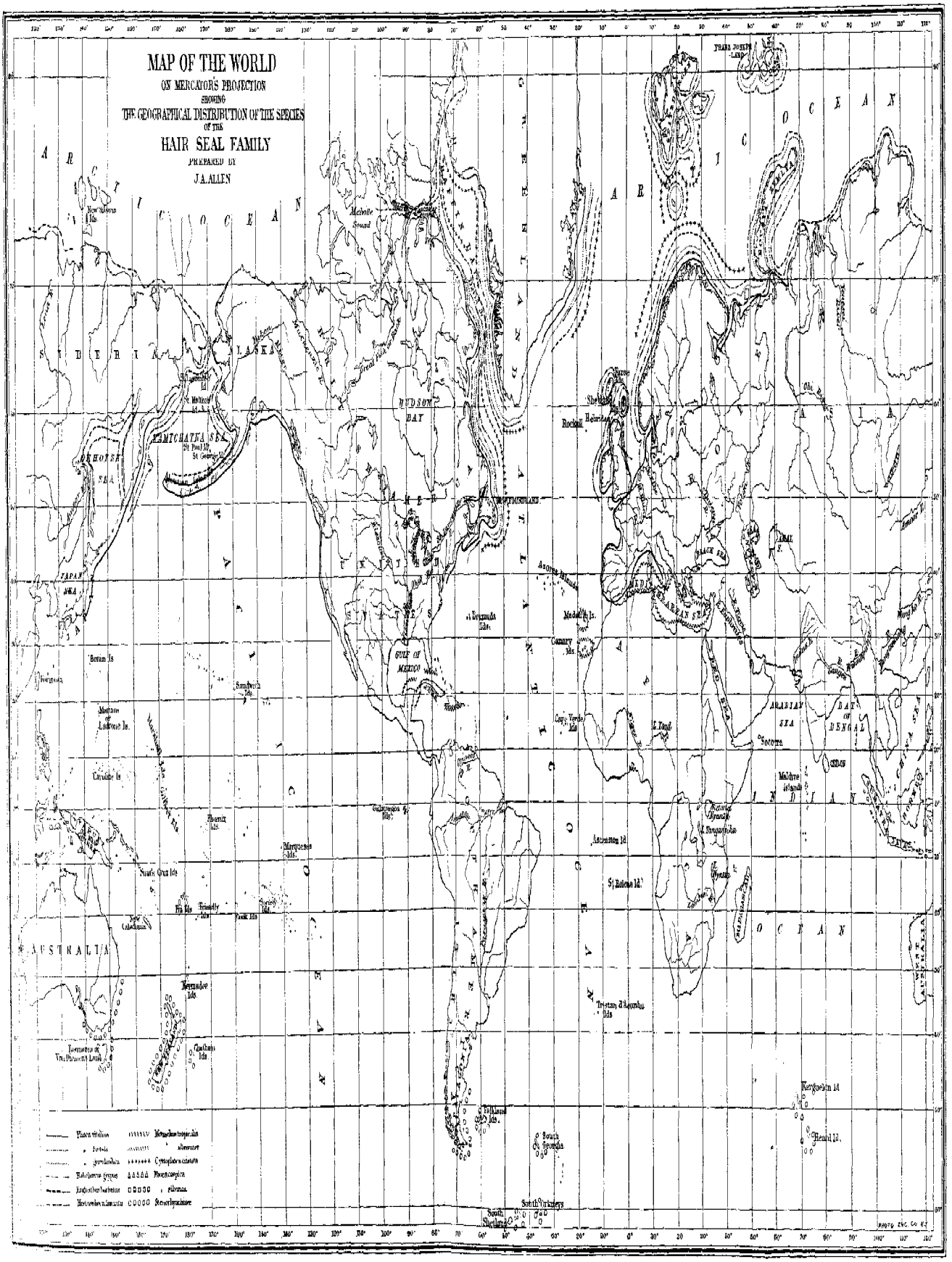



## THE SEA ELEPHANT.

Macrorhinus angustirostris, Gill. (p. 72.)

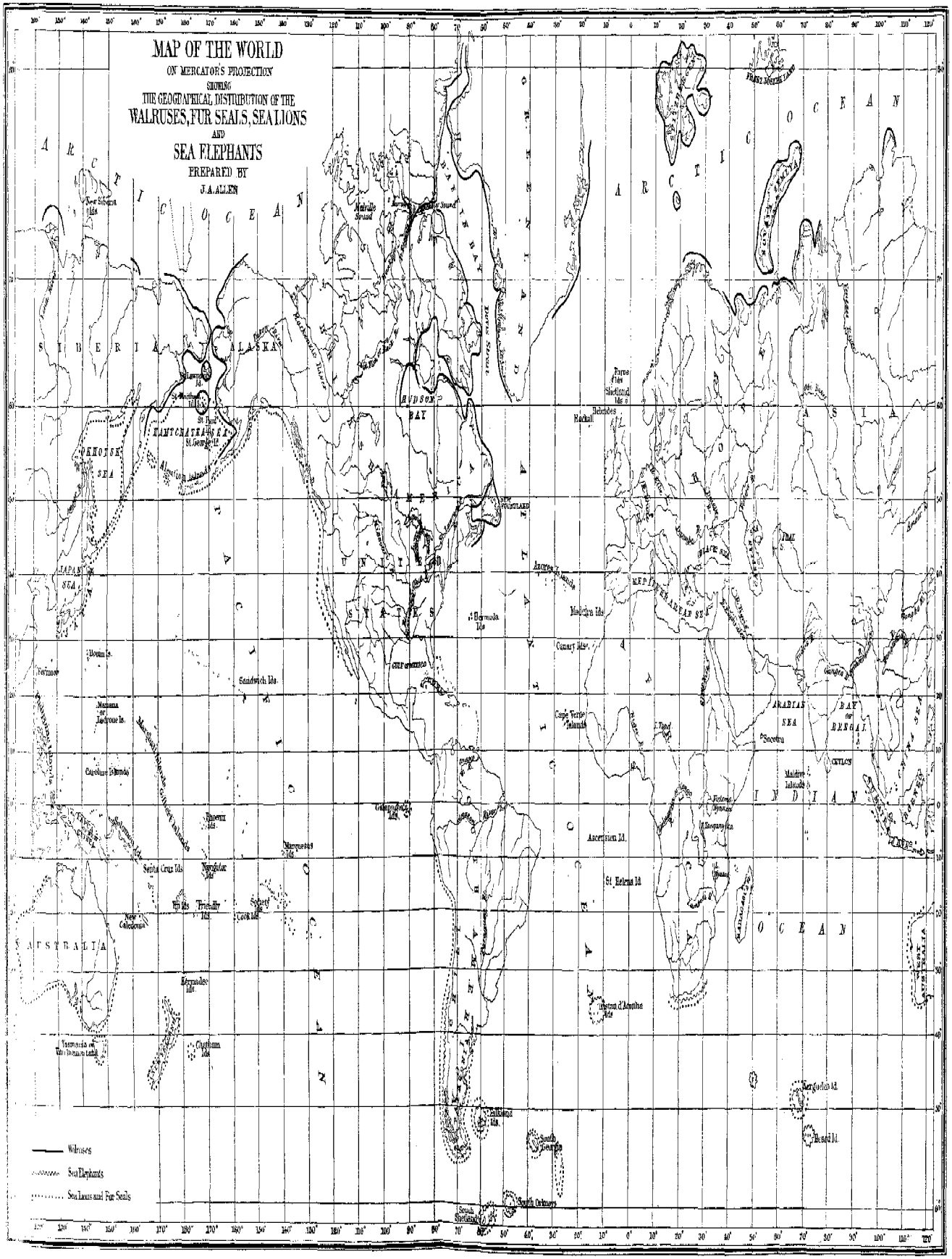
Drawing by Henry W. Elliott, from specimen in U. S. National Museum, from Santa Barbara Island, California.

PLATE 23.



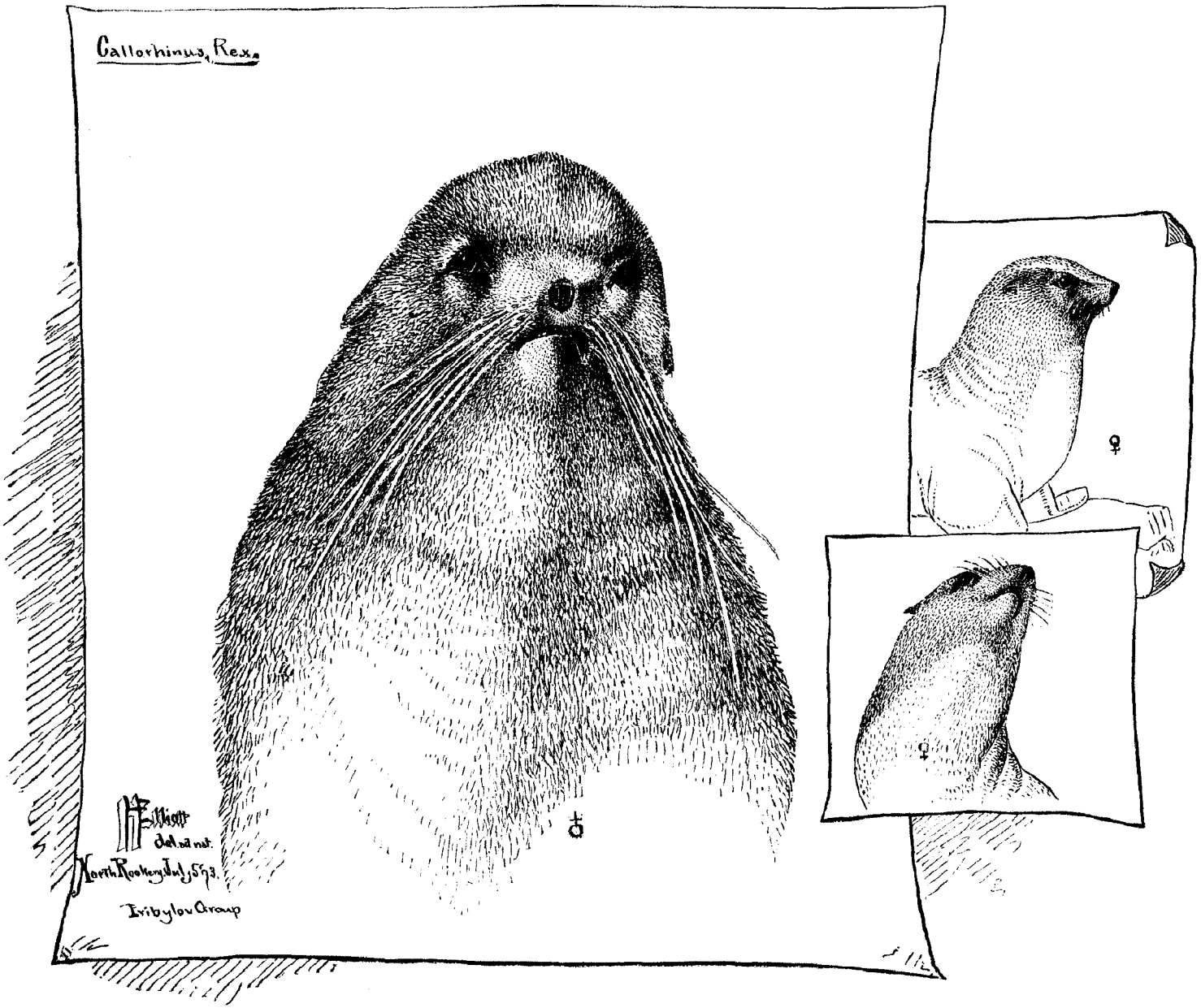

MAP OF THE WORLD, ON MERCATOR'S PROJECTION, SHOWING THE GEOGRAPHICAL DISTRIBUTION OF THE SPECIES OF THE HAIR SEAL FAMILY.

Prepared by J. A. Allen.




MAP OF THE WORLD, ON MERCATOR'S PROJECTION, SHOWING THE GEOGRAPHICAL DISTRIBUTION OF THE WALRUSES, FUR SEALS, SEALIONS, AND SEA ELEPHANTS.

Prepared for the Illustration of the chapter by J. A. Allen.

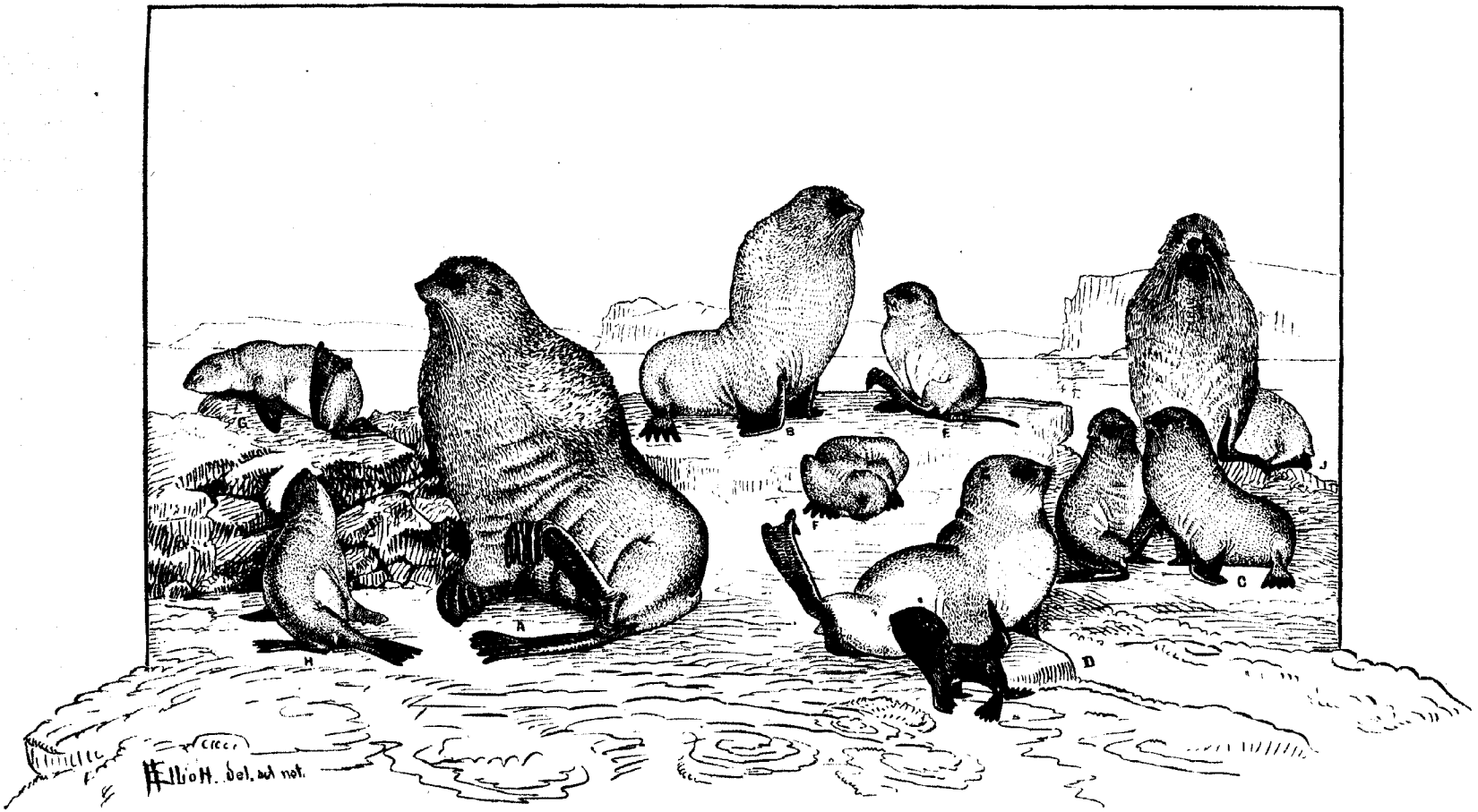



**THE COUNTENANCE OF CALLORHINUS.—A LIFE STUDY OF AN ADULT MALE FUR-SEAL.**

(Full face of old male, profile and under view of female heads.)

Drawing by Henry W. Elliott, North Rookery, Pribylov Group, July 5, 1873. (p. 75.)

PLATE 26.



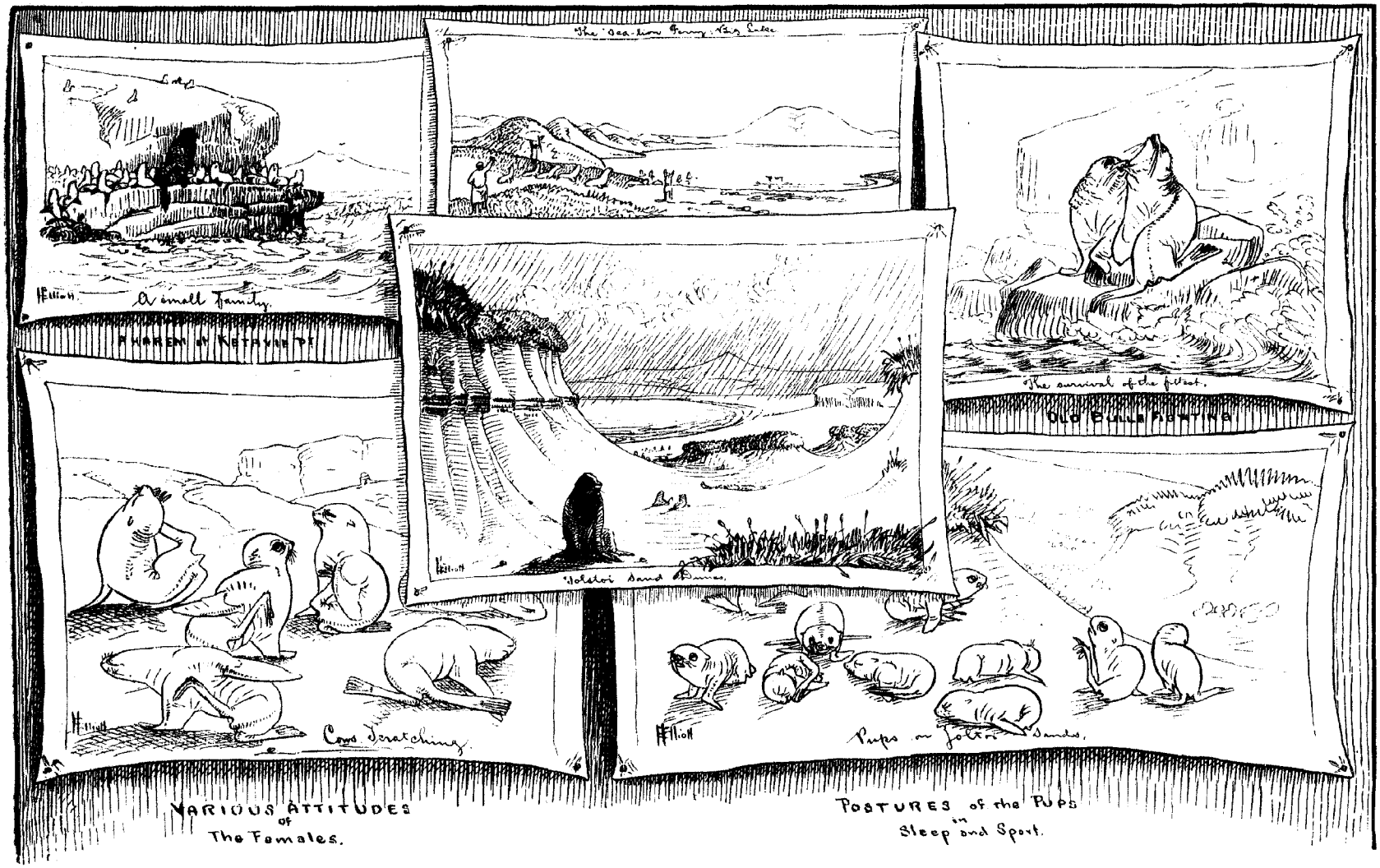

## THE FUR-SEAL.

Callorhinus ursinus.

A series of life studies by Henry W. Elliott, Pribylov Islands, 1872 to 1876.

A. Old "Seecatch" or male, eight to twenty-four years.
B. Young "Seecatch," six to eight years.
C. "Holluschickie" or young males, two years.
D. "Matkah" or mother nursing her "pup." I
E. "Cow" fanning herself.
F. "Cow" sleeping.
G. "Cow" napping and fanning herself.
H. "Cow" crooning to the male.
J. Characteristic position of old males.

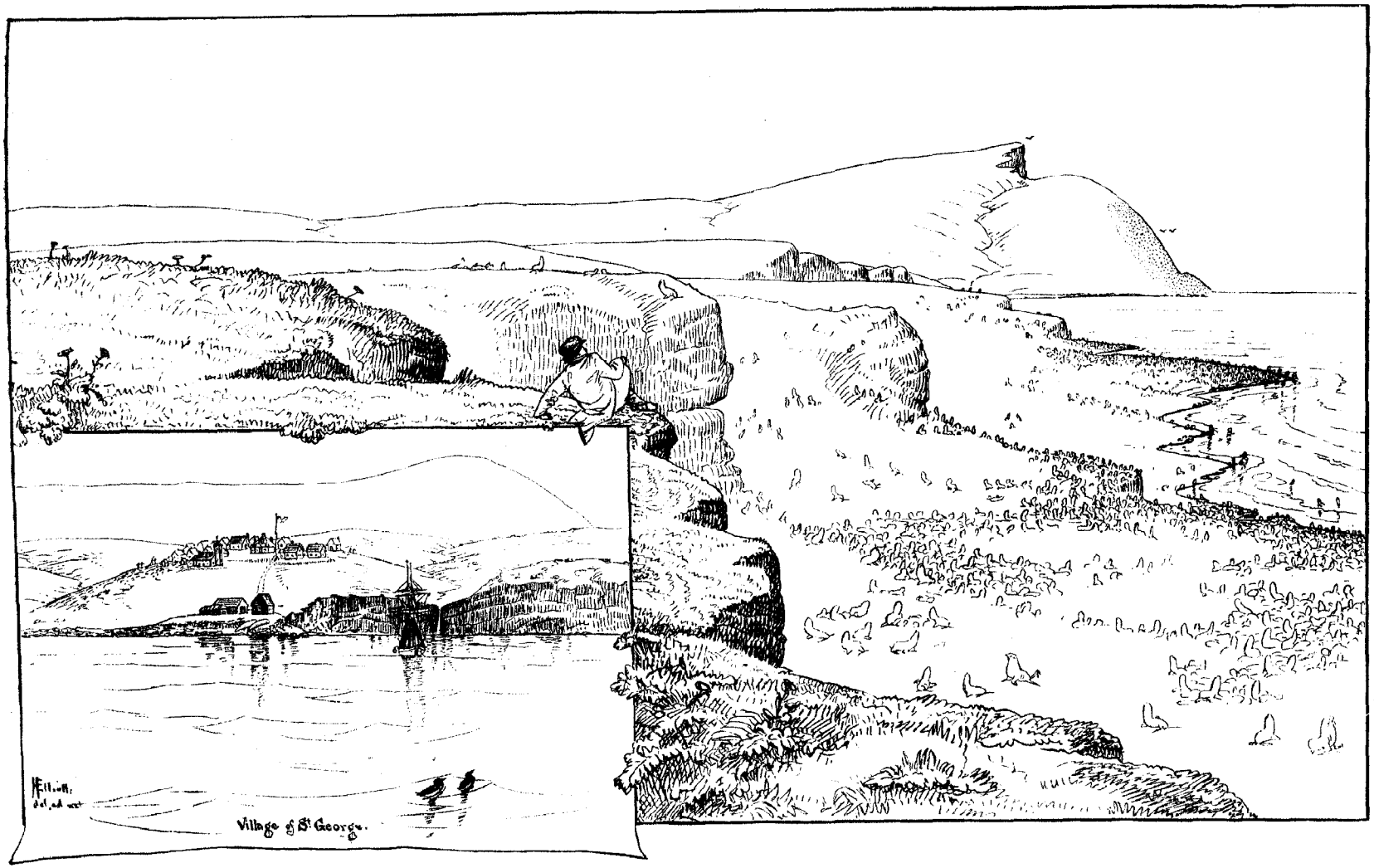
PLATE 27.




## SUNDRY SEAL SKETCHES ON THE PRIBYLOV ISLANDS.

From the portfolio of Henry W. Elliott, 1872, 1876.

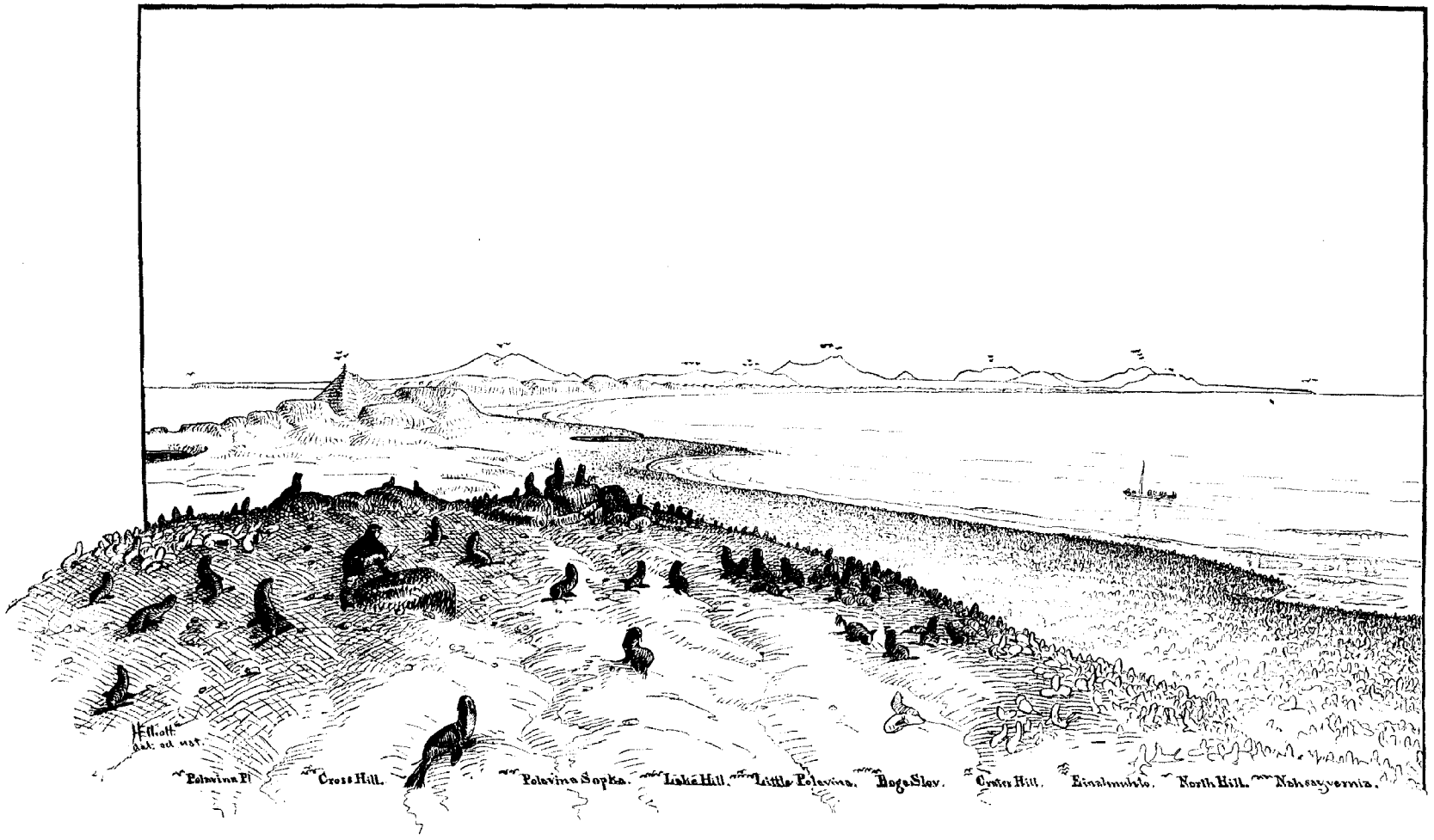
PLATE 28.




## HAULING AND BREEDING GROUNDS OF THE FUR-SEAL.

Sketched from nature on the North Rookery, Saint George's Island, Pribylov Group, by Henry W. Elliott, July, 1874.

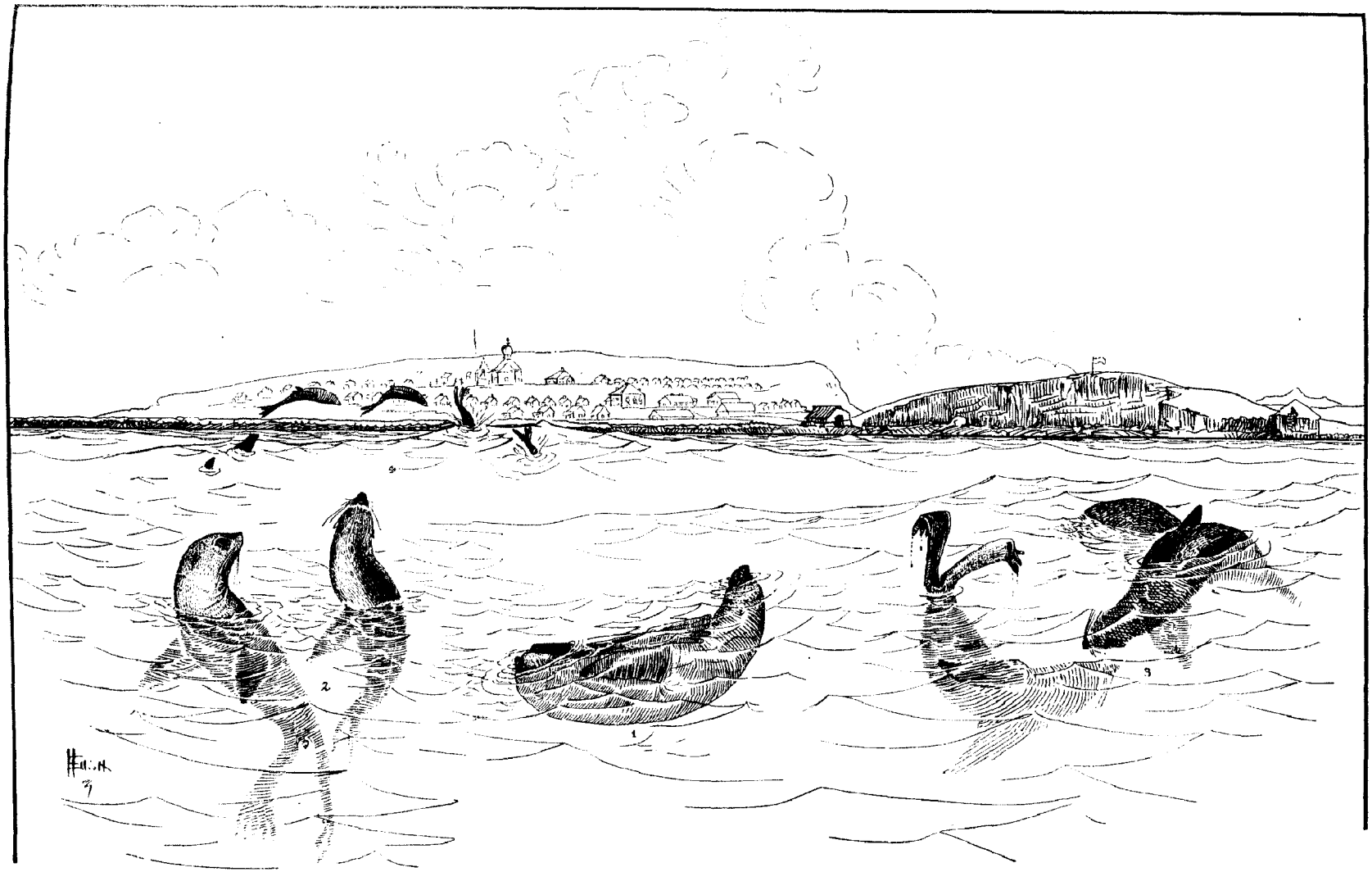
PLATE 29.




## THE NORTH SHORE OF SAINT PAUL'S ISLAND, PRIBYLOV GROUP.

Sketched from the summit of Hutchinson's Hill, by Henry W. Elliott, looking over a wing of the great Norastoshoah Rookery, July, 1872.

PLATE 30.

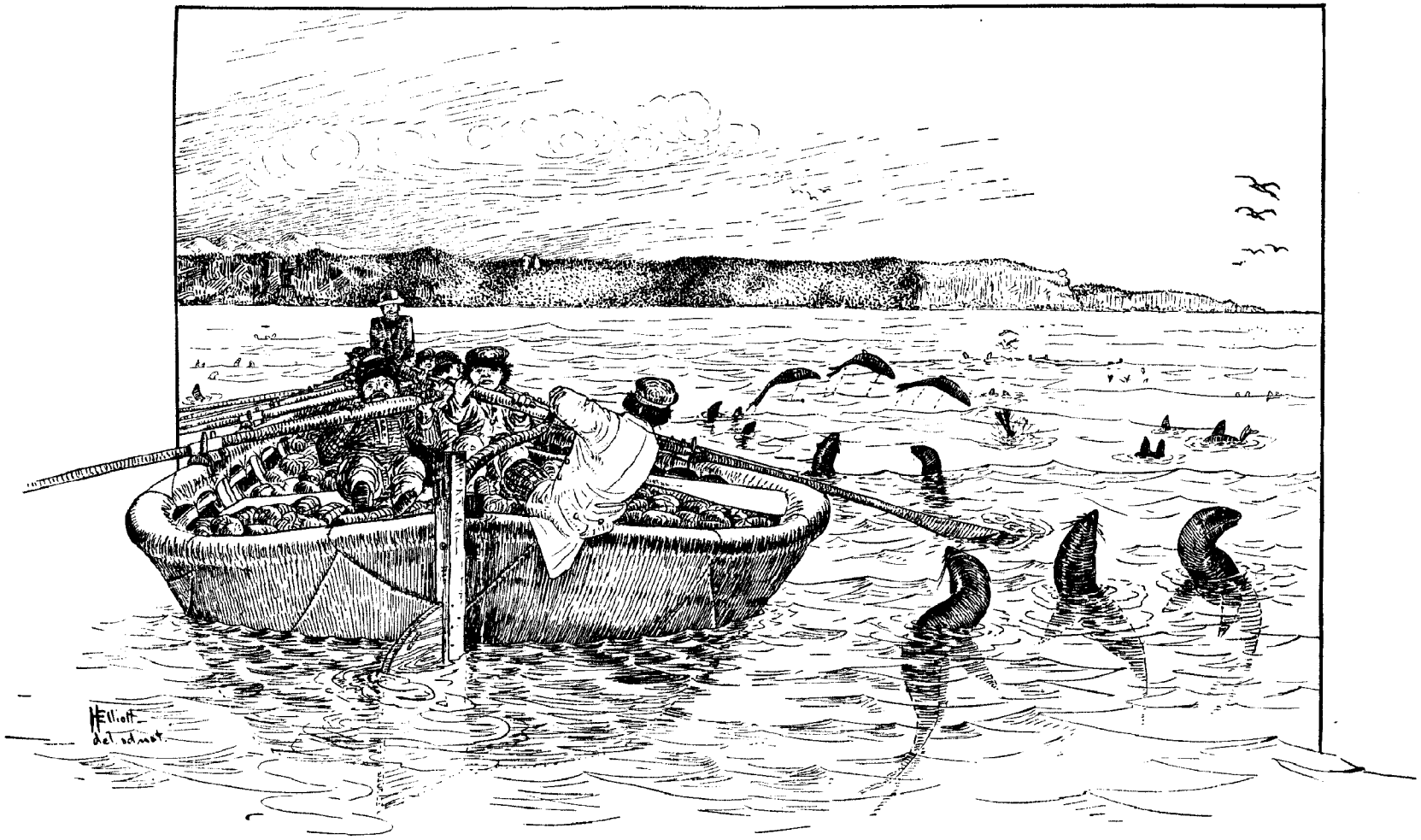


## PELAGIC ATTITUDES OF THE FUR-SEAL.

Sketched from life, by Henry W. Elliott, Saint Paul's Island, 1872. Village of Saint Paul in distance. Black bluffs to the right on middle ground.

1. Position while sleeping. 2. Position when rising to breathe, survey, &c. 3. Position when scratching. 4. "Dolphin jumps."

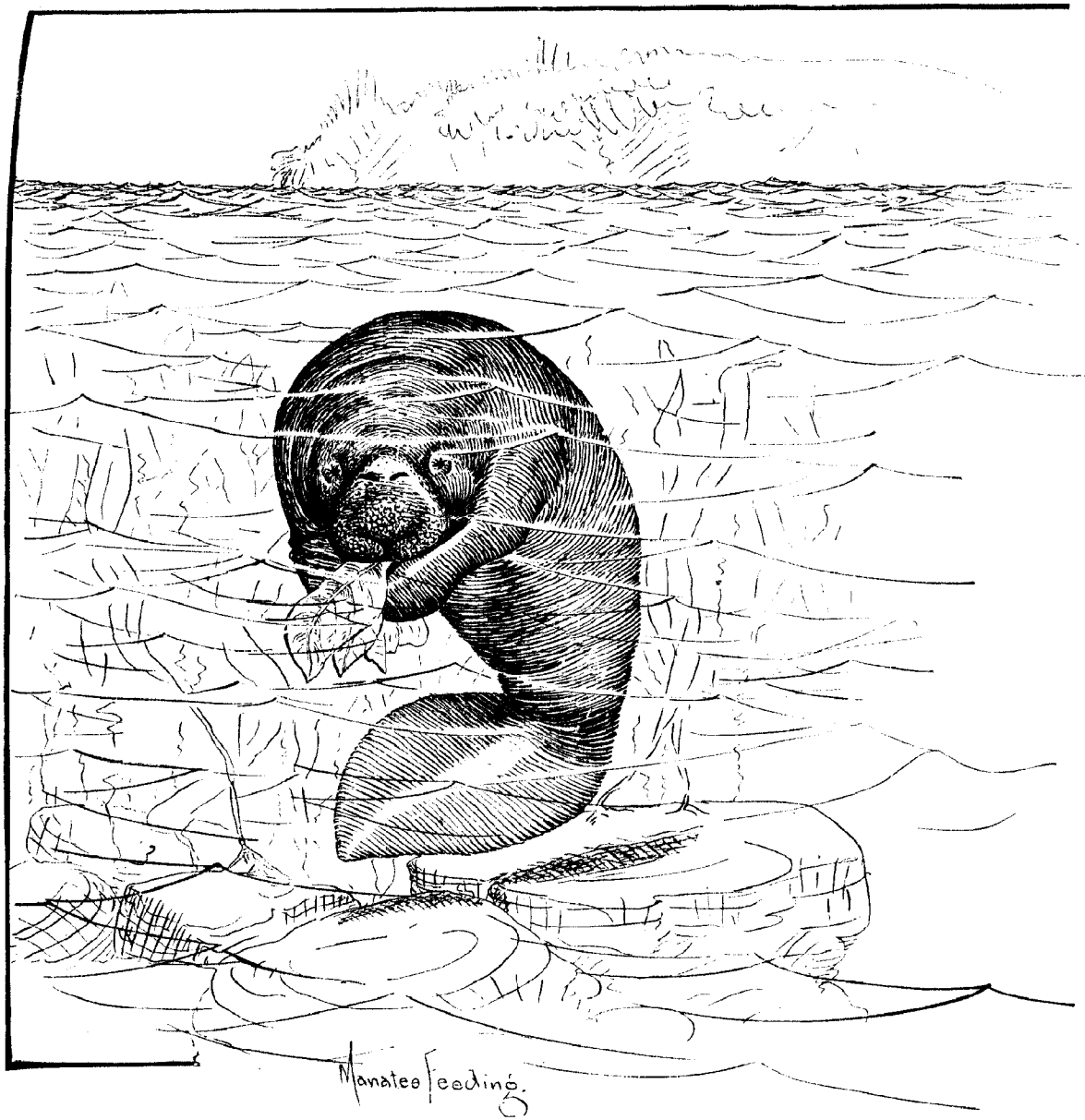
PLATE 31.



## FUR-SEALS SPORTING AROUND THE "BIDARRAH."

Sketched from life, by Henry W. Elliott, in Zoltoi, Saint Paul's Island, 1872. A view of the Reef Point and Gorbatch Rookery on the horizon.

PLATE 32.

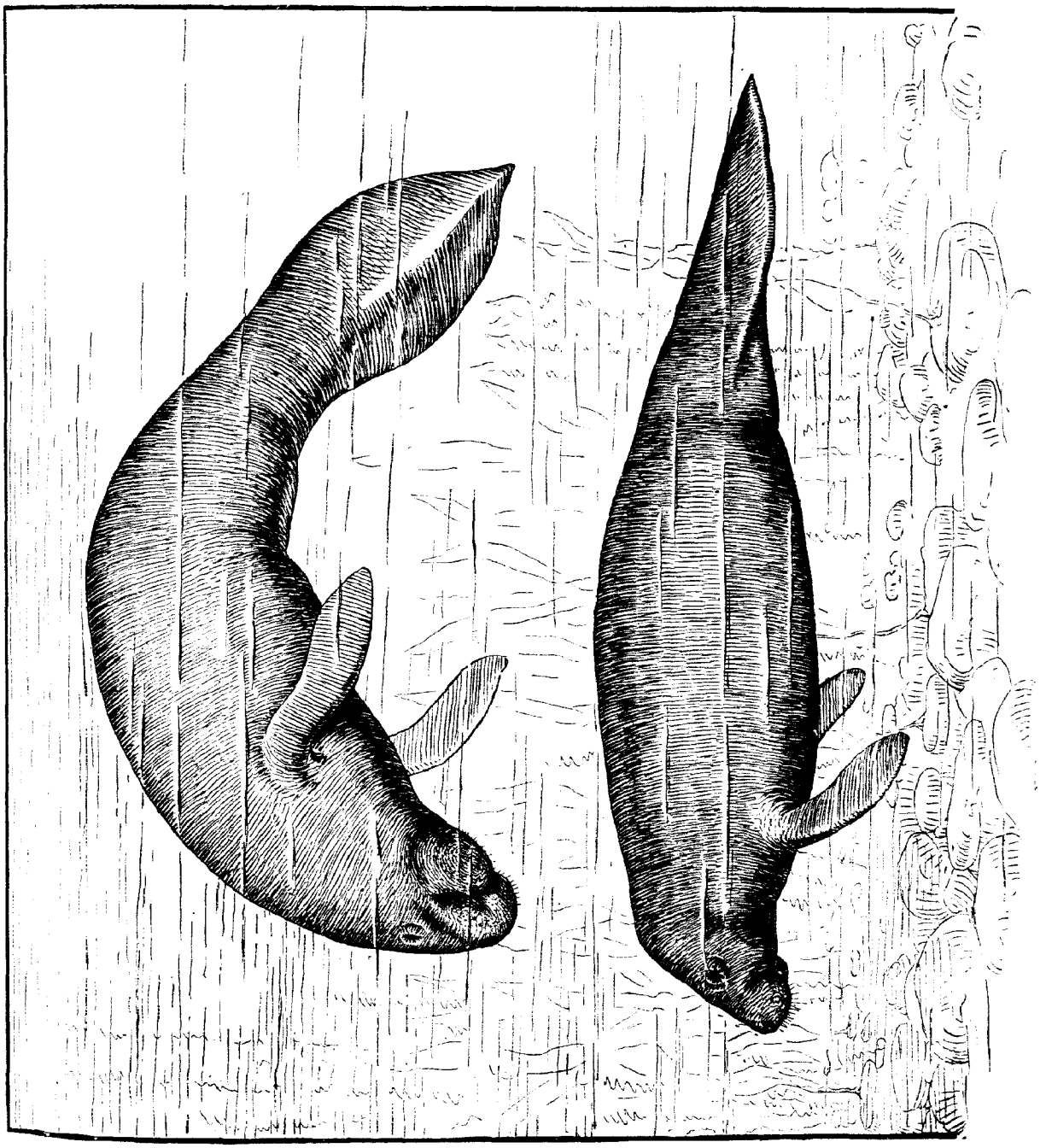



## THE MANATEE.

Trichechus manatus, L.

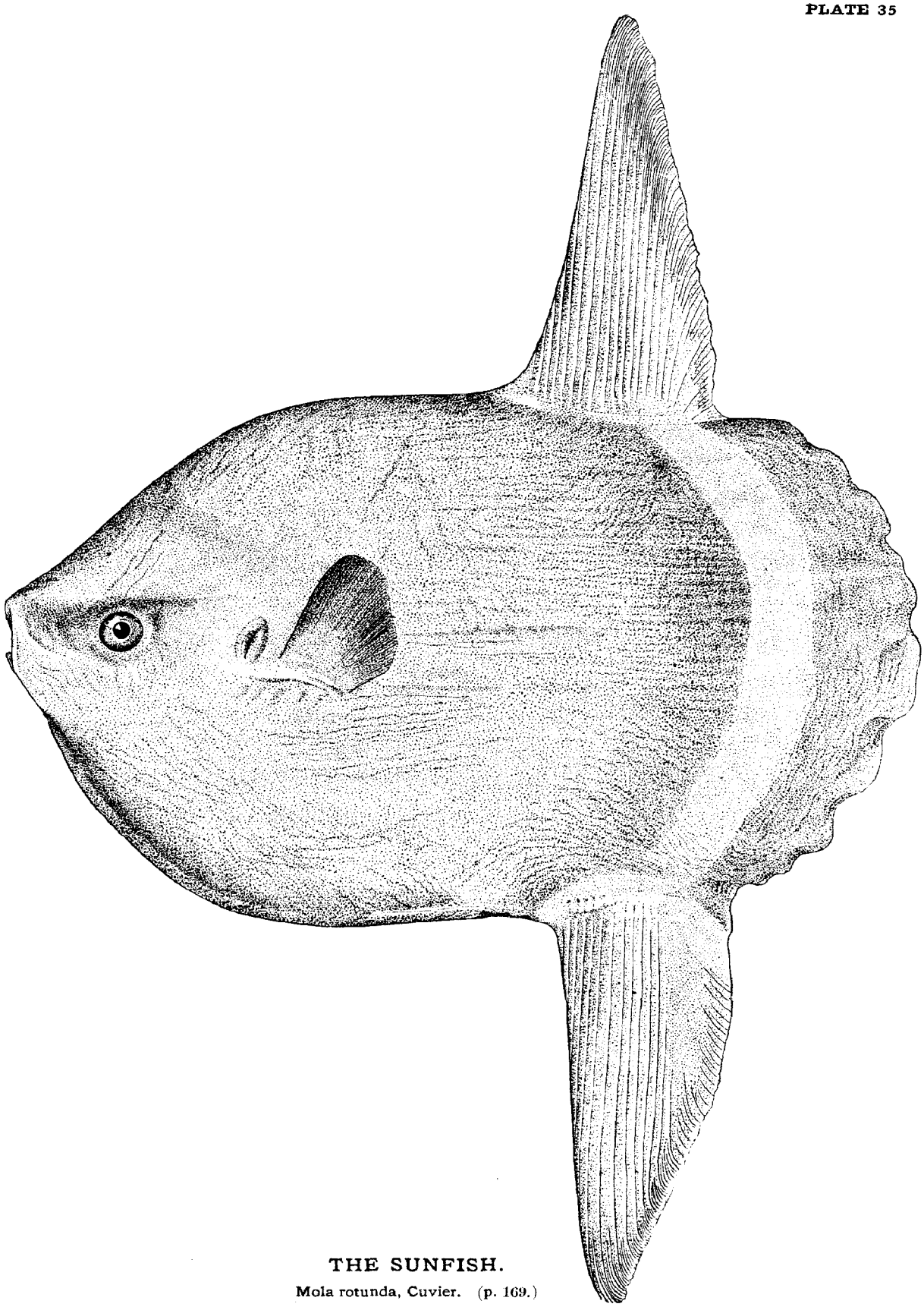
Sketch by Henry W. Elliott, from "Transactions Zoological Society of London."

PLATE 33.



MANATEES SWIMMING.

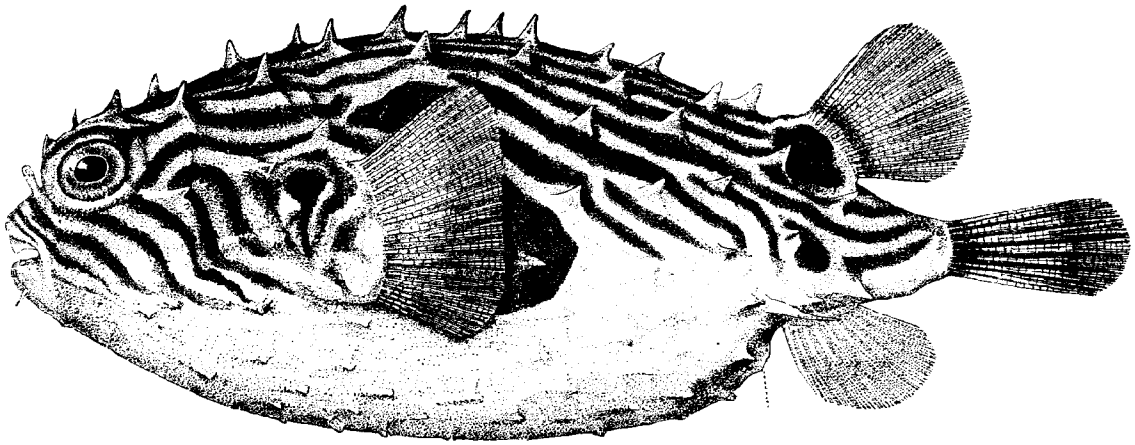
Sketch by Henry W. Elliott, from "Transactions Zoological Society of London."



## THE SUNFISH.

Mola rotunda, Cuvier. (p. 169.)

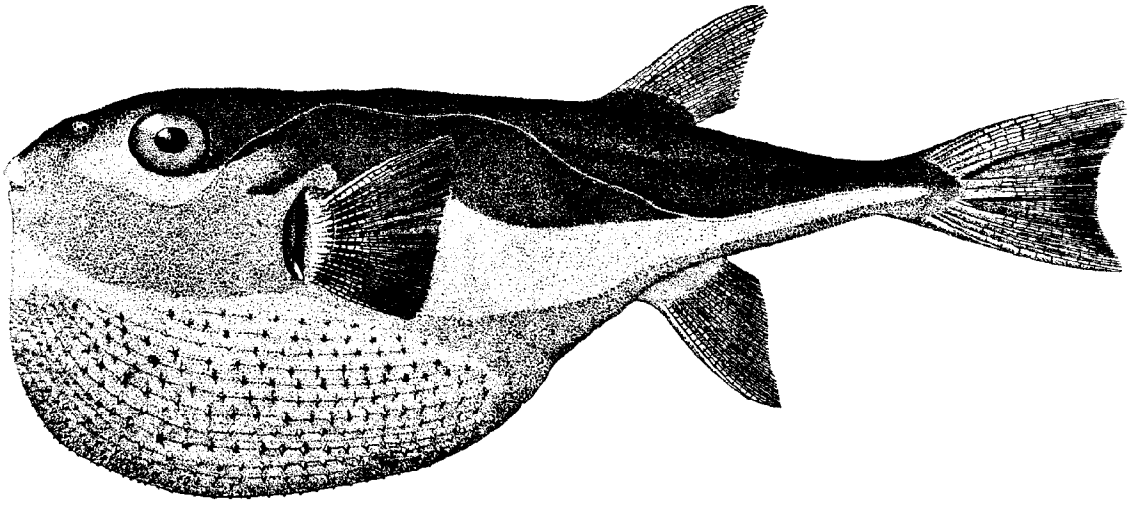
From washed drawing by H. L. Todd, from a cast.



## THE SWELL-FISH OR BURR-FISH.

Chilomycterus geometricus (Schneider), Kaup. (p. 170.)

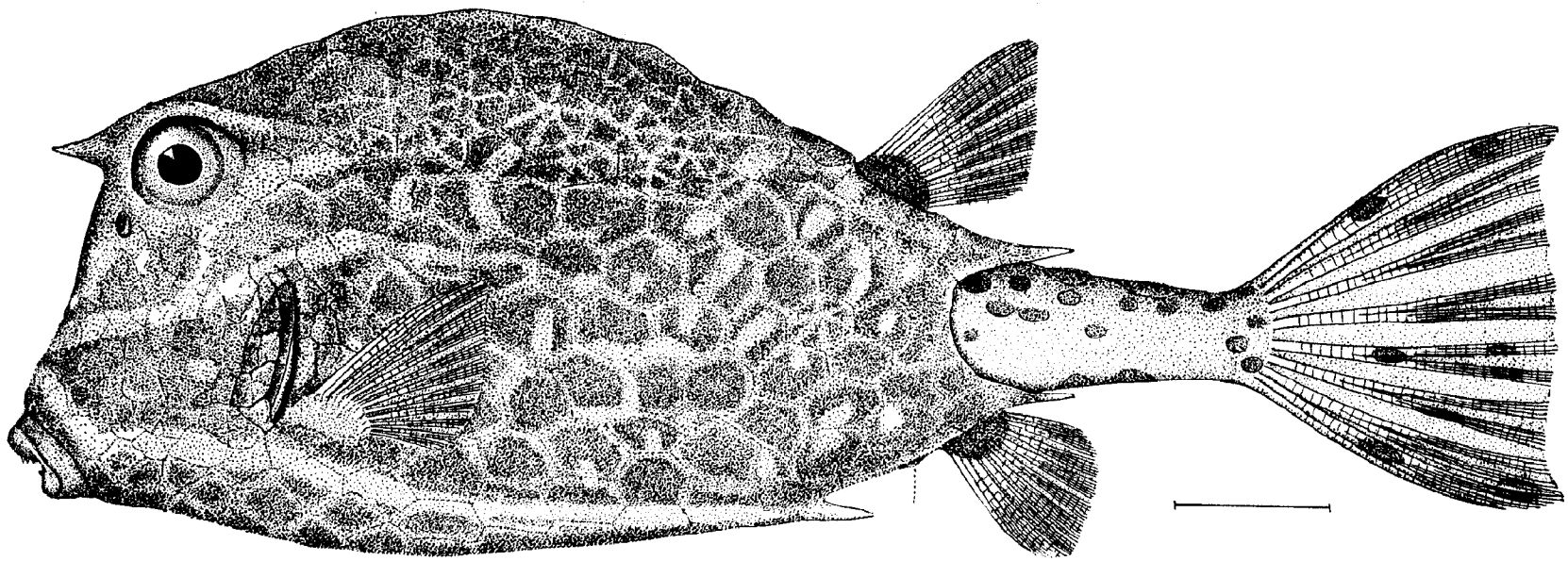
Drawing by H. L. Todd, from No. 14825, U. S. National Museum, collected at Noank, Conn., 1874, by U. S. Fish Commission.



## THE RABBIT-FISH.

Lagocephalus lævigatus (L.), Gill. (p. 170.)

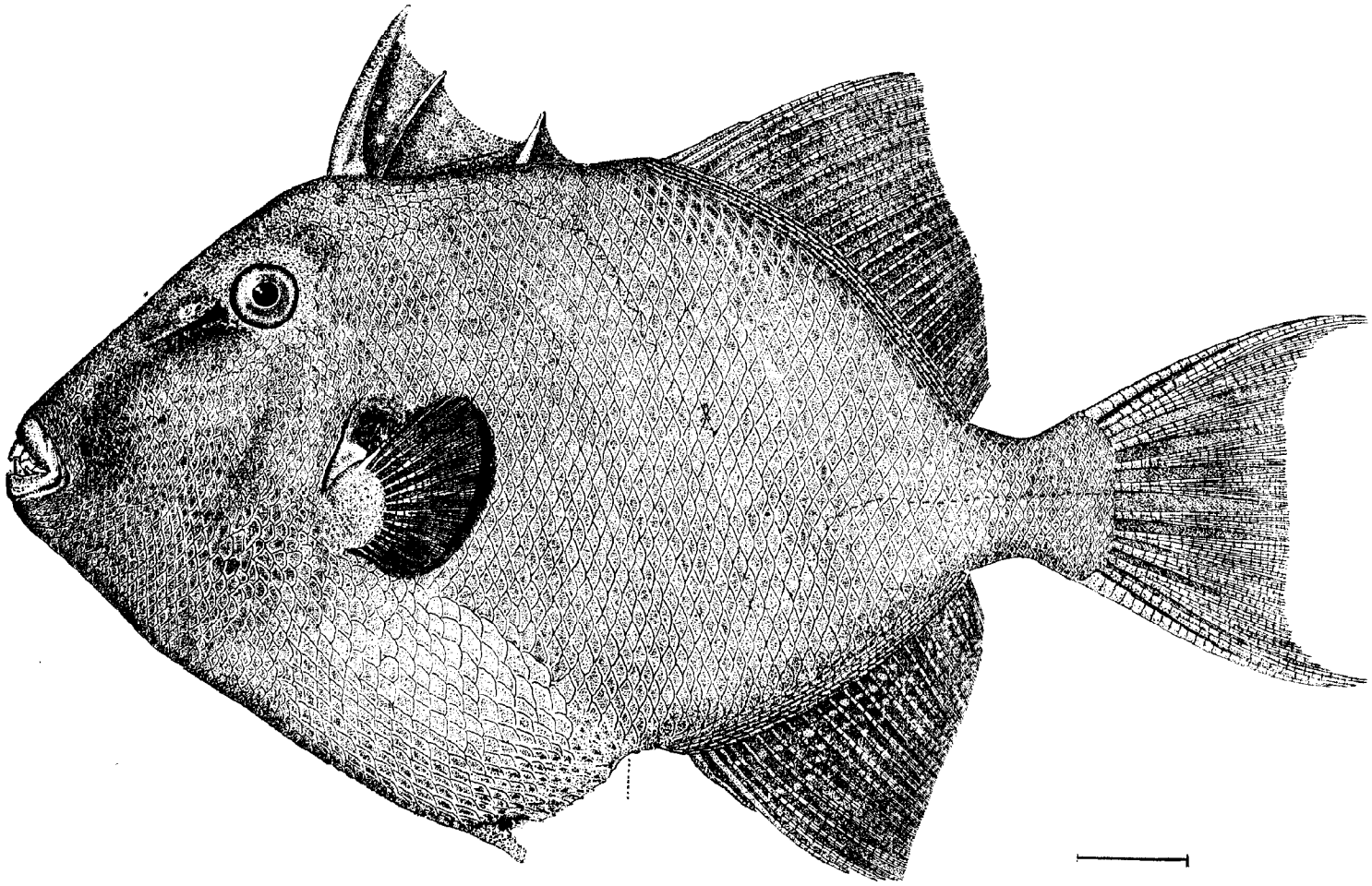
Drawing by H. L. Todd, from No. 20757, U. S. National Museum, collected at Newport, R. I., by Hon. Samuel Powell.



## THE TRUNK-FISH OR COW-FISH.

Ostracion quadricornis, L. (p. 171.)

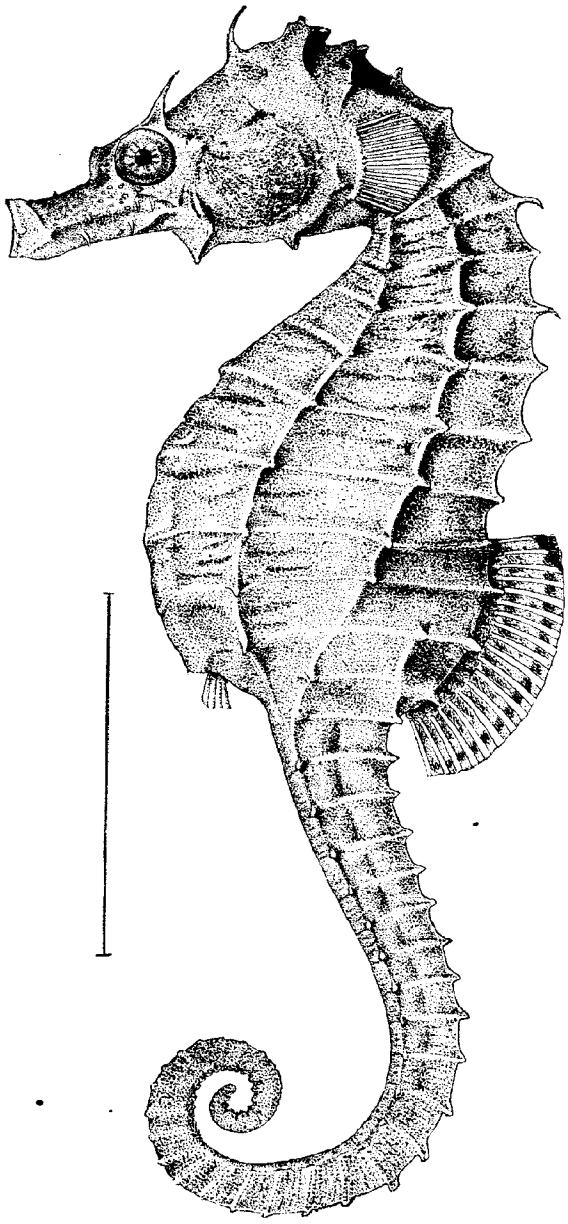
Drawing by H. L. Todd, from No. 21548, U. S. National Museum, collected at Charleston, S. C., July, 1878, by C. C. Leslie.



## THE TRIGGER-FISH.

Balistes capriscus, Gmelin. (p. 172.)

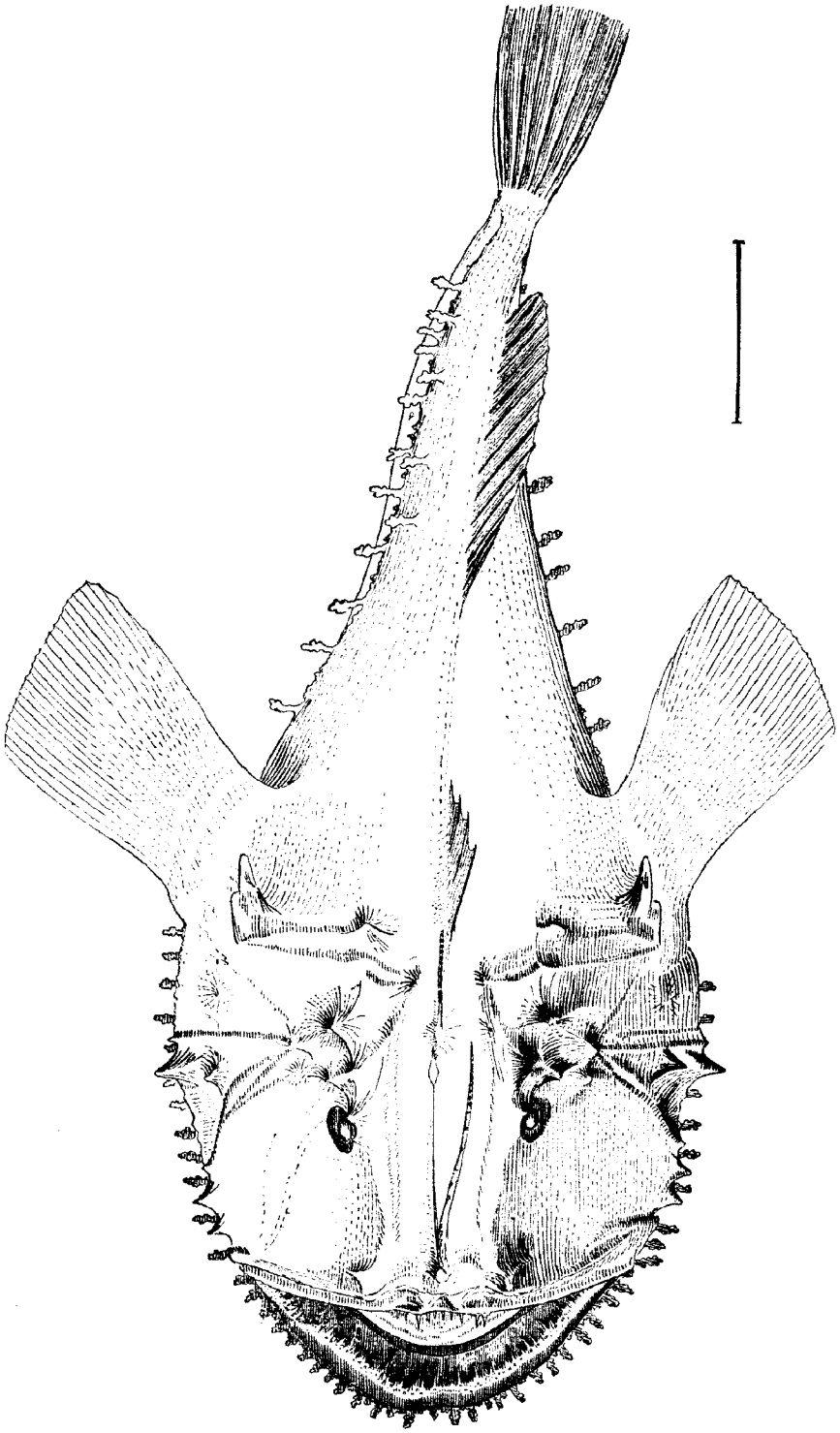
Drawing by H. L. Todd, from No. 15233, U. S. National Museum, collected at New York by Mr. Sutherland.



## THE SEA HORSE.

Hippocampus heptagonus, Raf. (p. 172.)

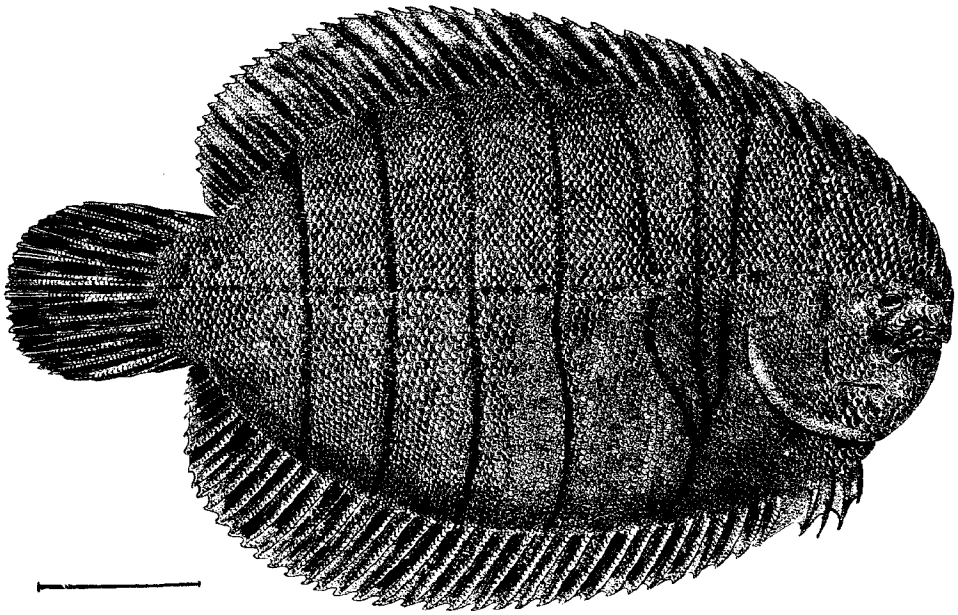
Drawing by H. L. Todd, from No. 3451, U. S. National Museum, collected at Old Point Comfort, Virginia, by Admiral Farragut.



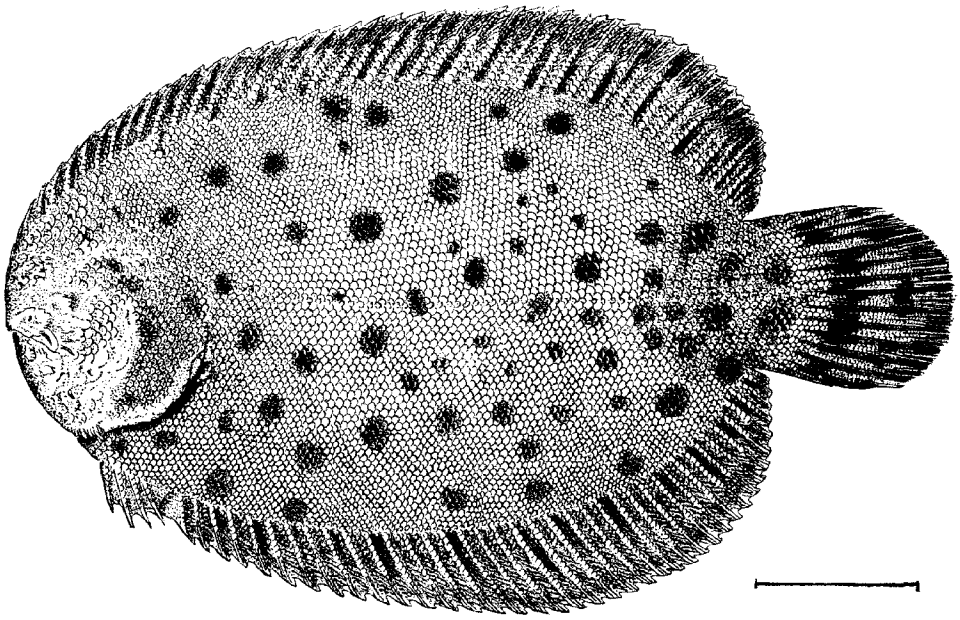
## THE GOOSE-FISH OR BELLOWS-FISH.

Lophius piscatorius, L. (p. 173.)

Drawing by H. L. Todd, from specimen collected at Vineyard Sound, Massachusetts, by the U. S. Fish Commission.



UPPER SIDE.

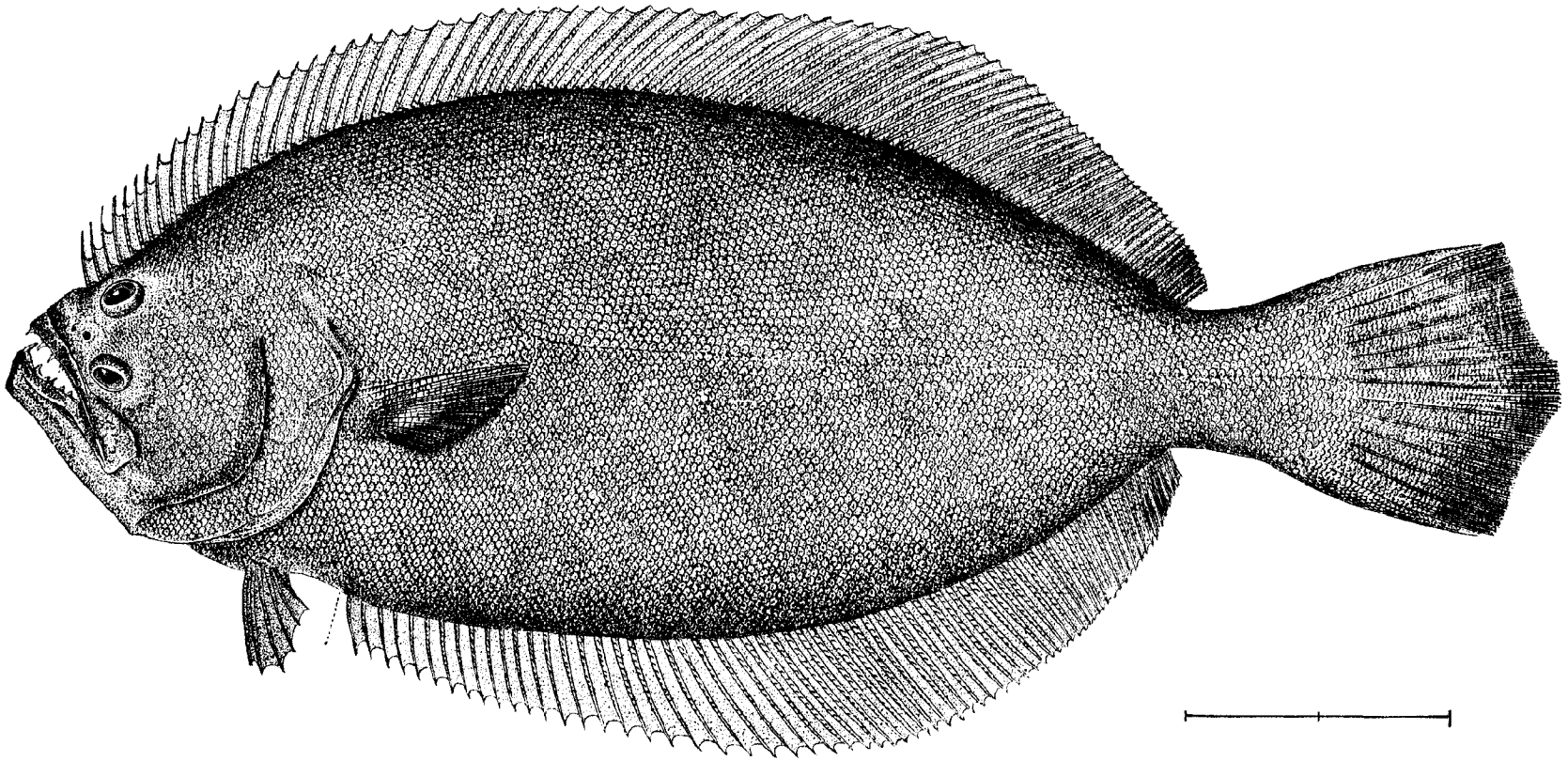


UNDER SIDE.

## THE AMERICAN SOLE, OR "HOG CHOKER."

Achirus lineatus (L.) Cuv. (p. 177.)

Drawing by H. L. Todd, from No. 12985, U. S. National Museum, collected at Wood's Holl, Massachusetts, July 14, 1871, by Vinal N. Edwards.

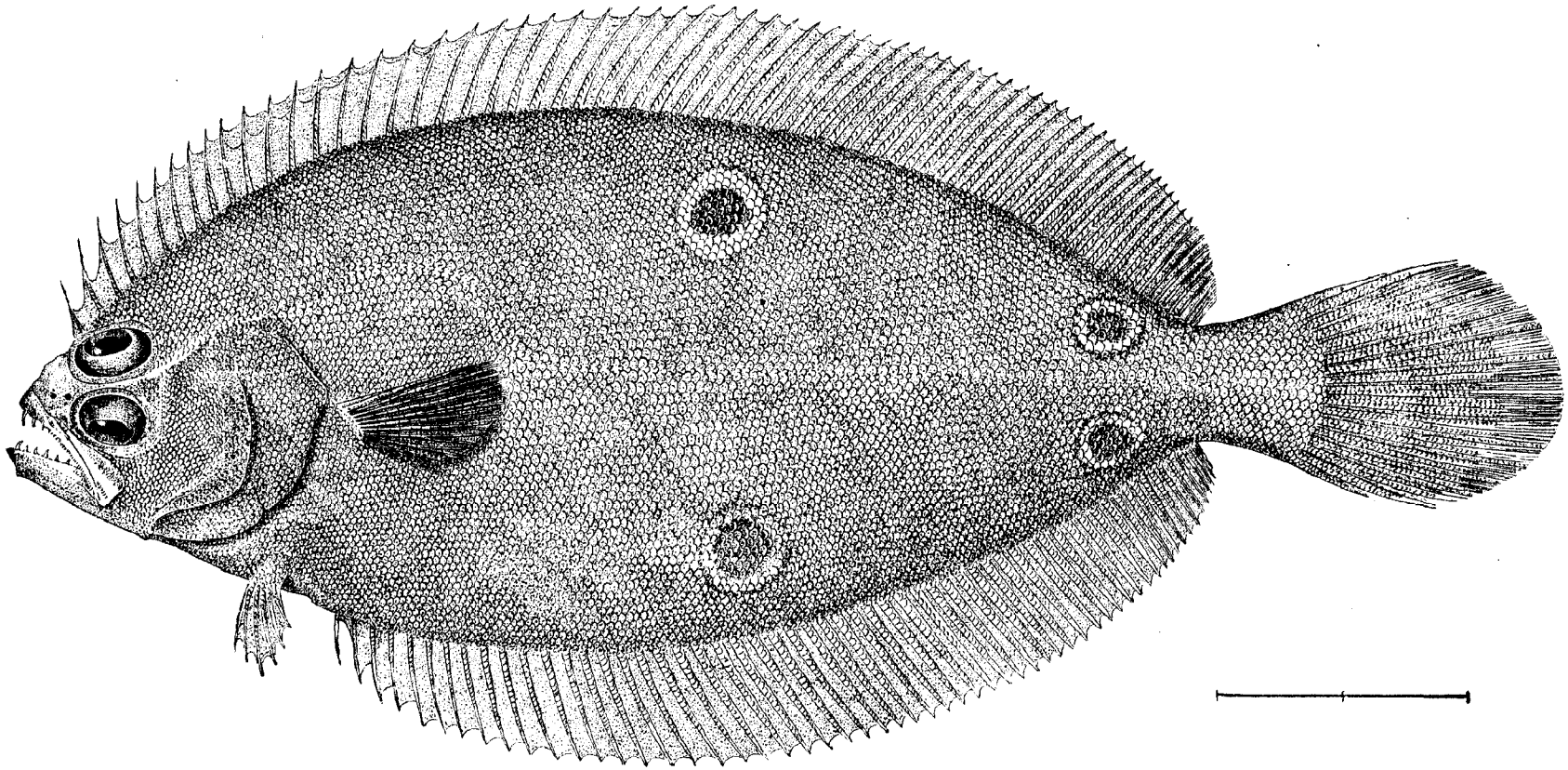


## THE AMERICAN PLAICE, OR TURBOT-FLOUNDER.

Paralichthys dentatus (L.), J. & G. (p. 178.)

Drawing by H. L. Todd, from No. 21279, U. S. National Museum, collected in Saint John's River, Florida, 1878, by G. Brown Goode.

PLATE 42.

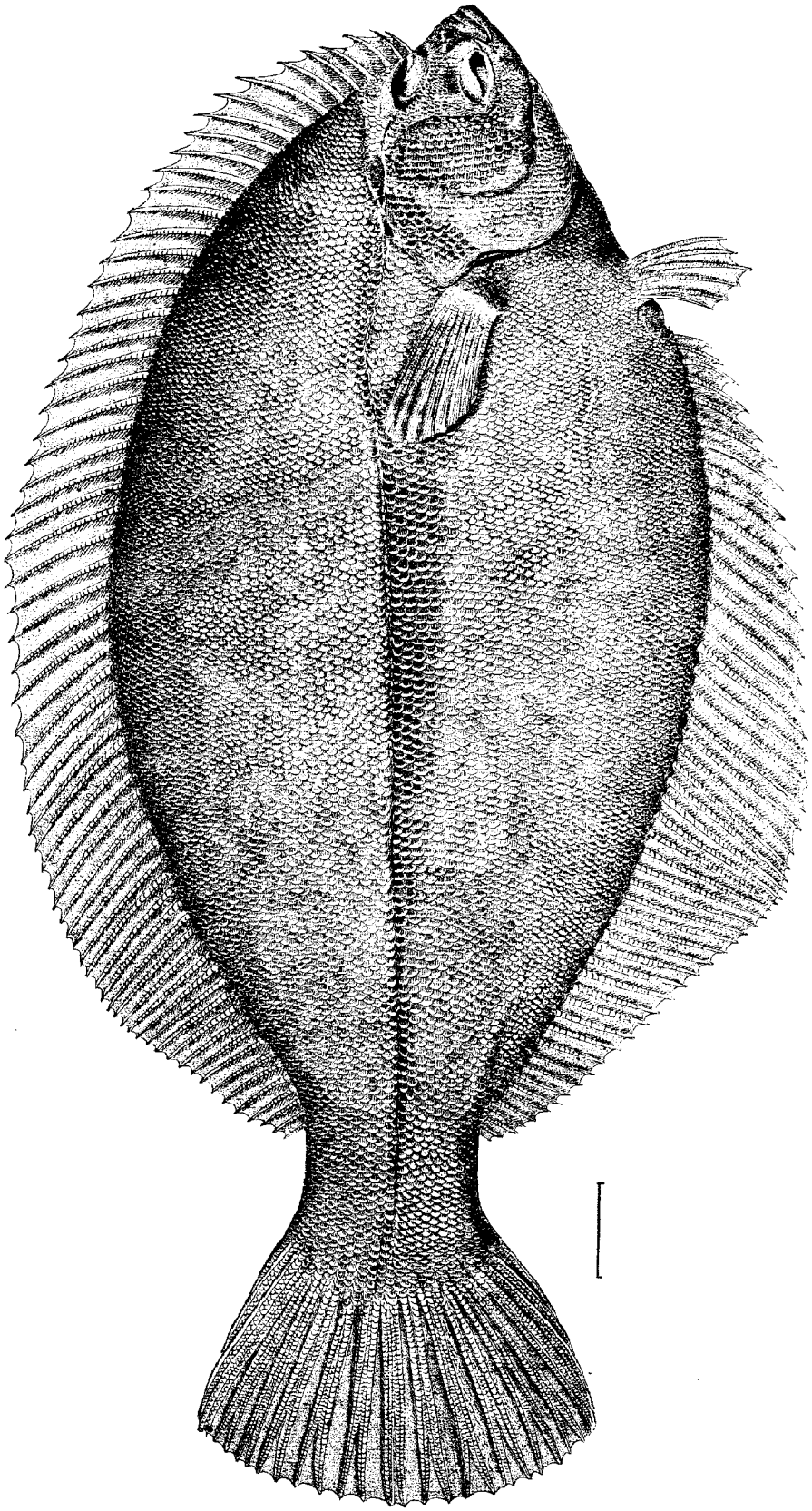


## THE FOUR-SPOTTED FLOUNDER.

Paralichthys oblongus (Mitch.), J. & G. (p. 181.)

Drawing by H. L. Todd, from No. 10730, U. S. National Museum, collected at Wood's Holl, Massachusetts, by Prof. S. F. Baird.

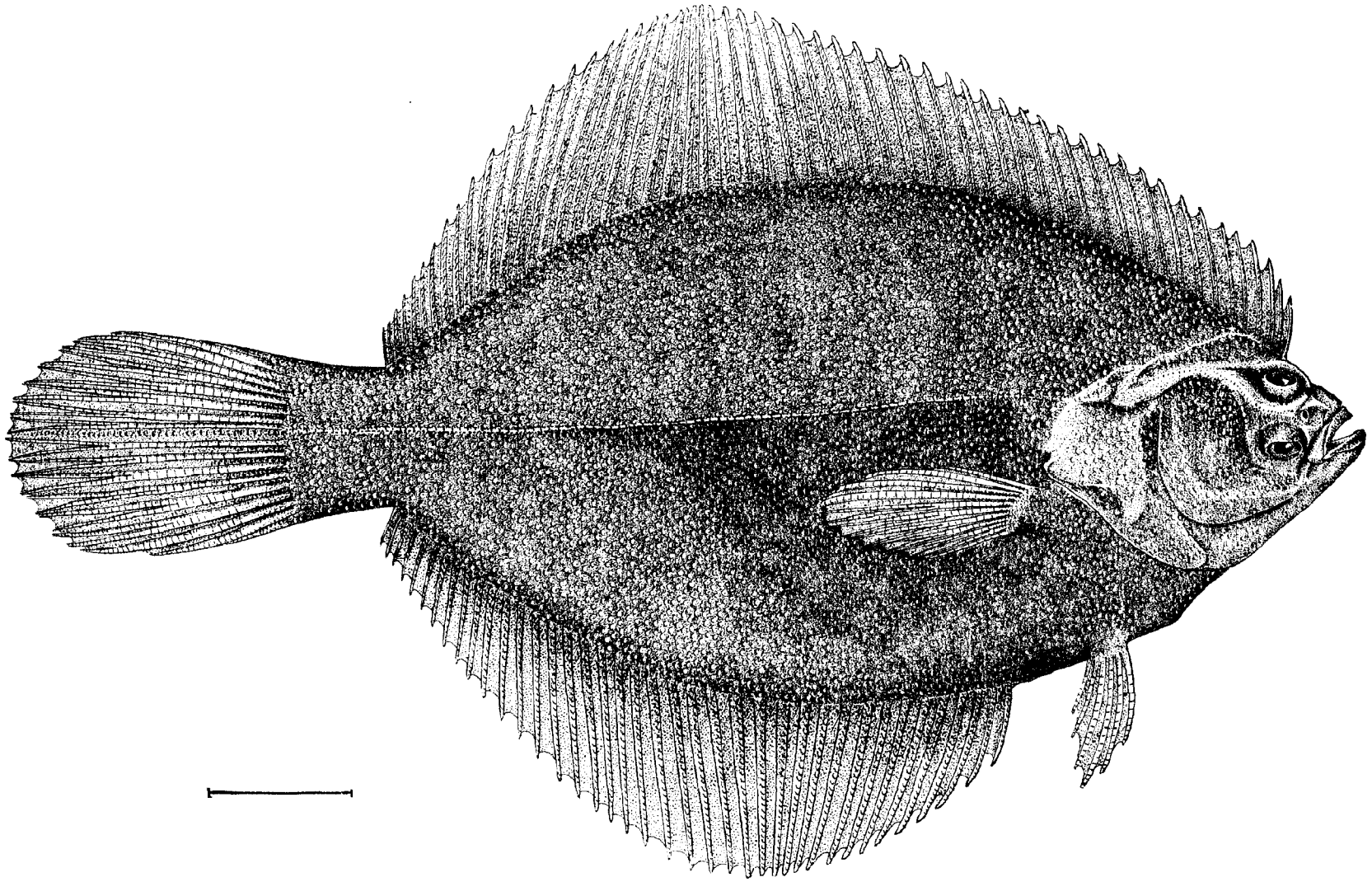
PLATE 43.



THE FLATFISH, OR WINTER FLOUNDER.

Pseudopleuronectes americanus (Walb.), Gill. (p. 182.)

Drawing by H. L. Todd.

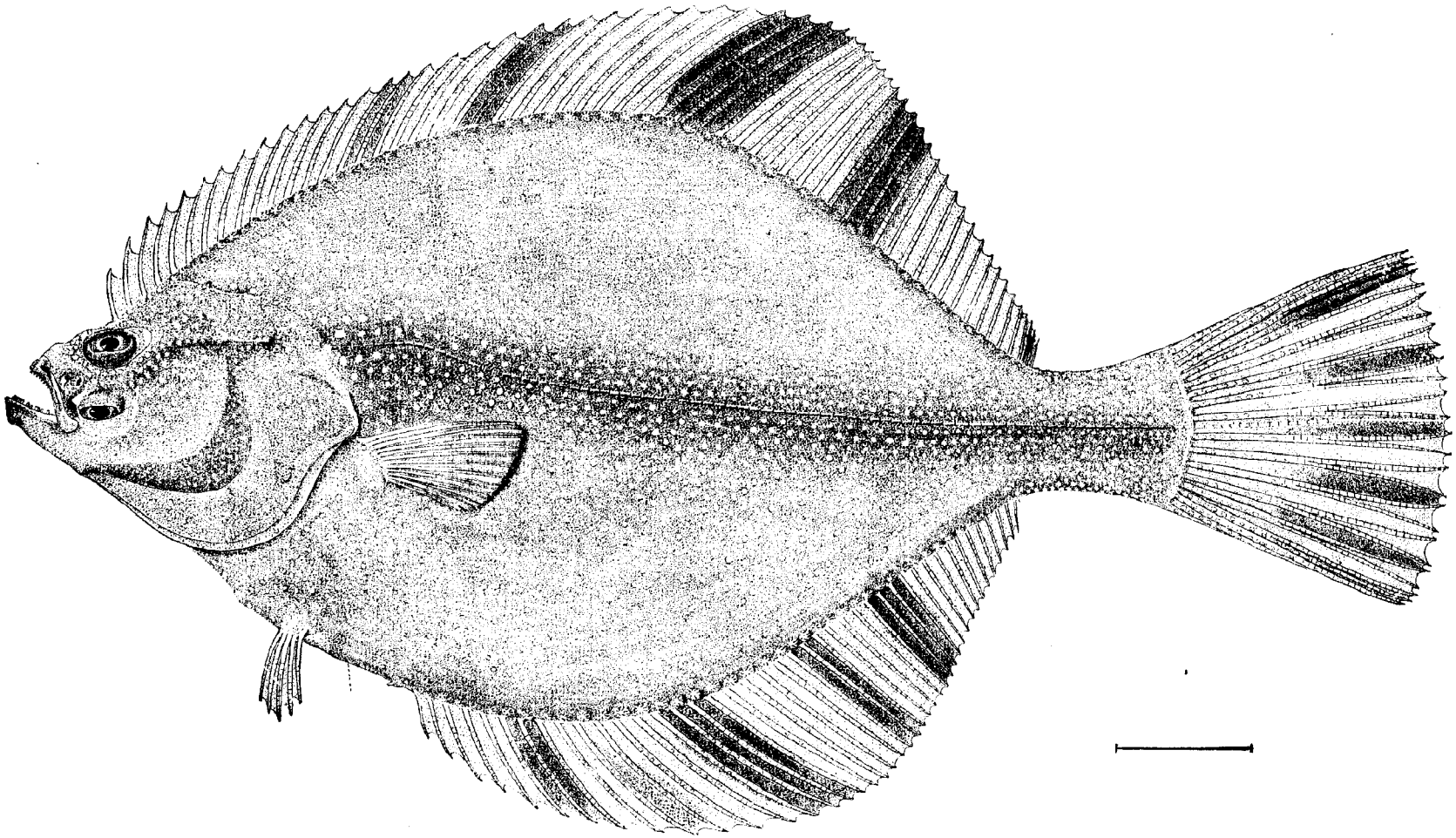


## THE SMOOTH FLOUNDER.

Pleuronectes glaber (Storer), Gill. (p. 183.)

Drawing by H. L. Todd, from No. 5368, U. S. National Museum, collected at Salem, Mass., by C. Putnam.

PLATE 45.

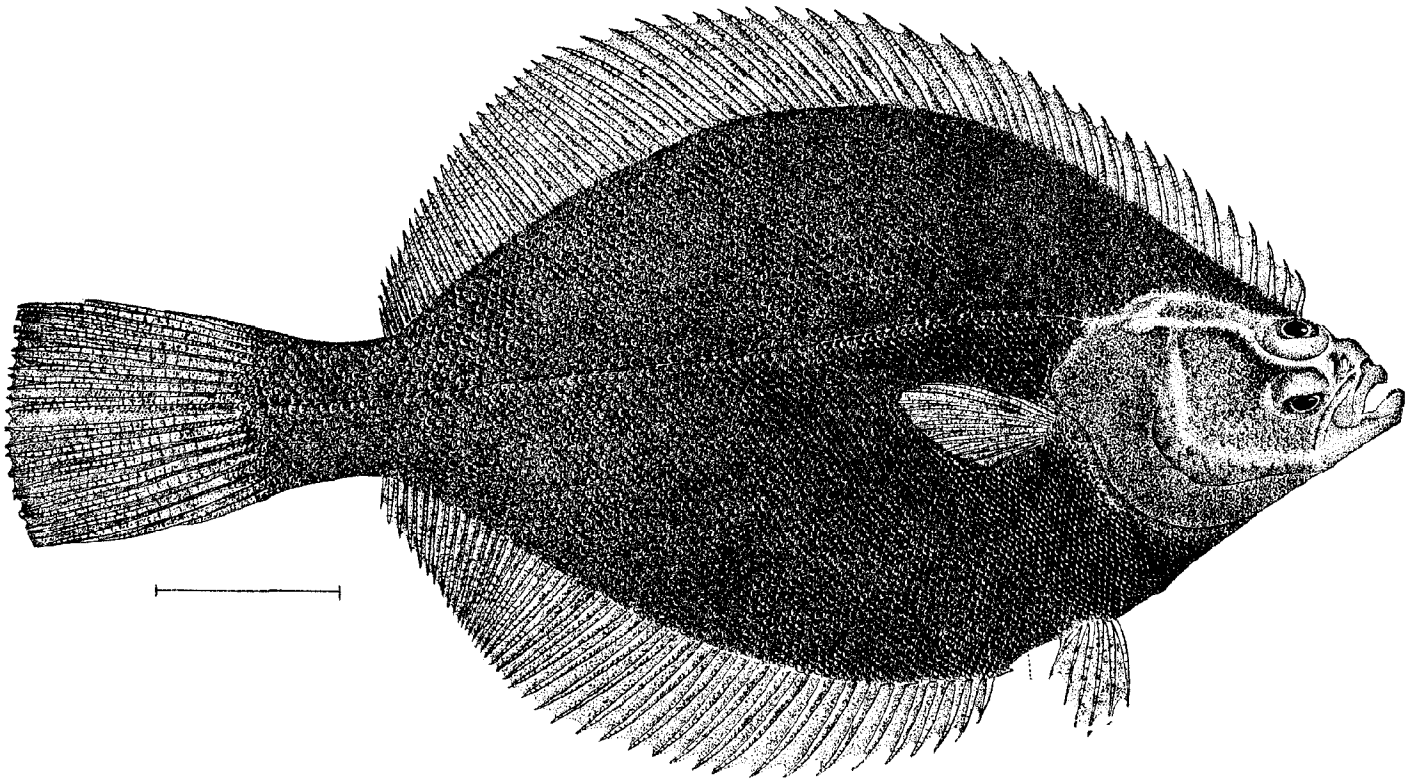


## THE STARRY FLOUNDER.

Pleuronectes stellatus, Pallas. (p. 184.)

Drawing by H. L. Todd, from No. 24164, U. S. National Museum, collected at San Francisco, Cal., January, 1880, by Prof. D. S. Jordan.

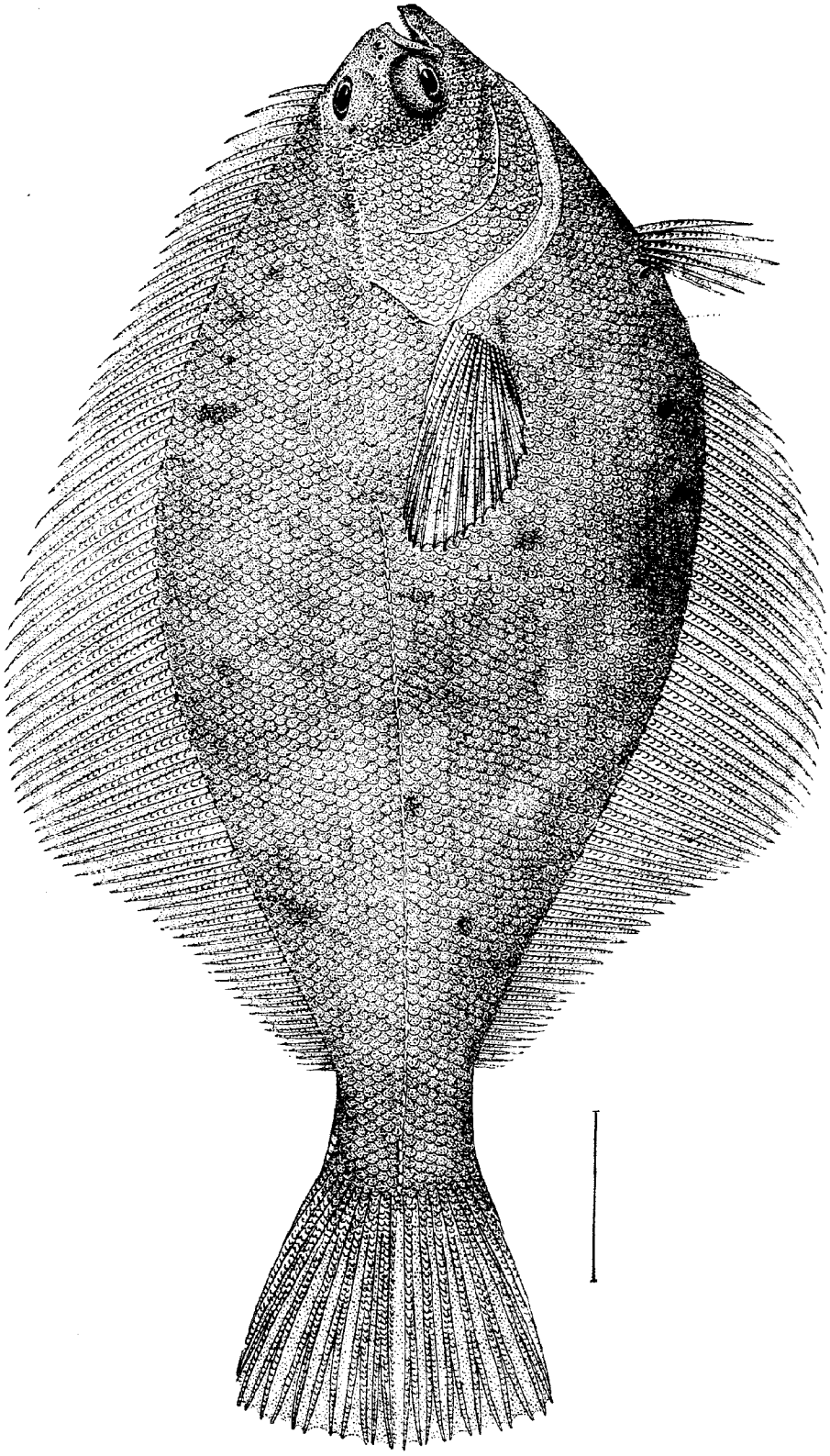
PLATE 46.



## THE ARCTIC FLOUNDER.

Pleuronectes glacialis, Pallas. (p. 184.)

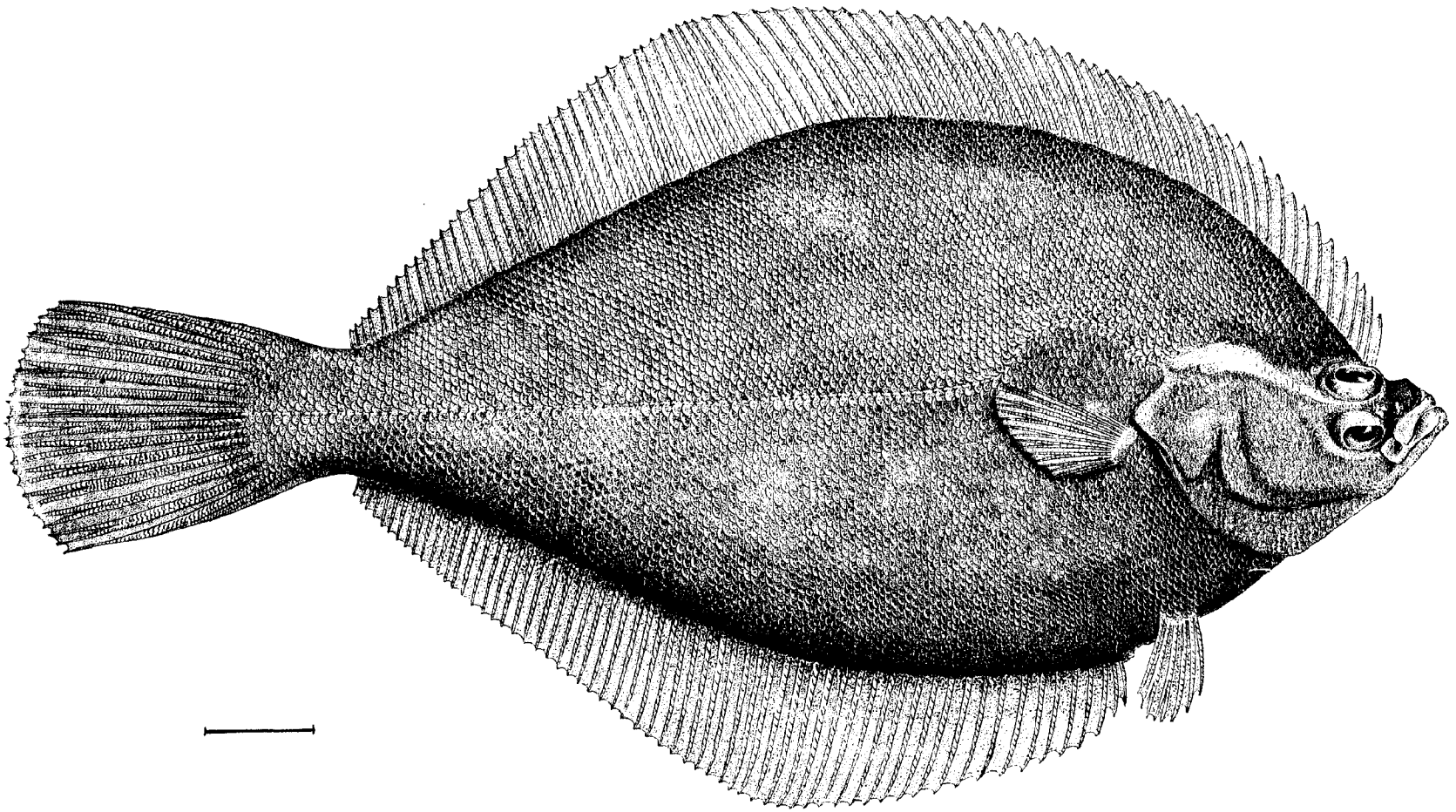
Drawing by H. L. Todd, from No. 27497, U. S. National Museum, collected at Kotzebue Sound, September 2, 1880, by Dall and Bean.



## THE ROUGH LIMANDA.

Limanda aspera (Pallas), Bean. (p. 184.)

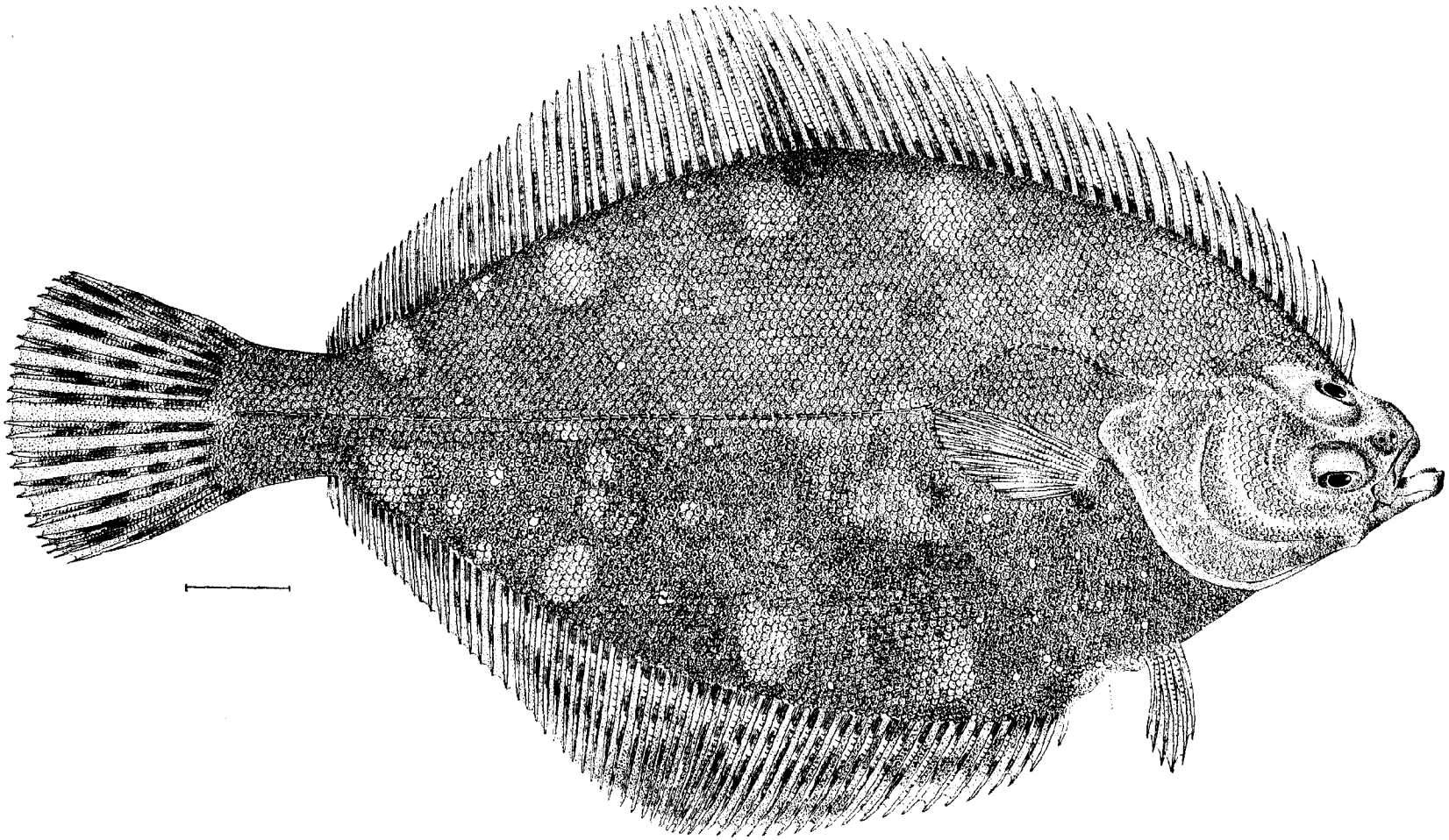
Drawing by H. L. Todd, from No. 27044, U. S. National Museum, collected at Sitka, Alaska, 1880, by Dr. T. H. Bean.



## THE RUSTY DAB.

Limanda ferruginea (Storer), Goode & Bean. (p. 184.)

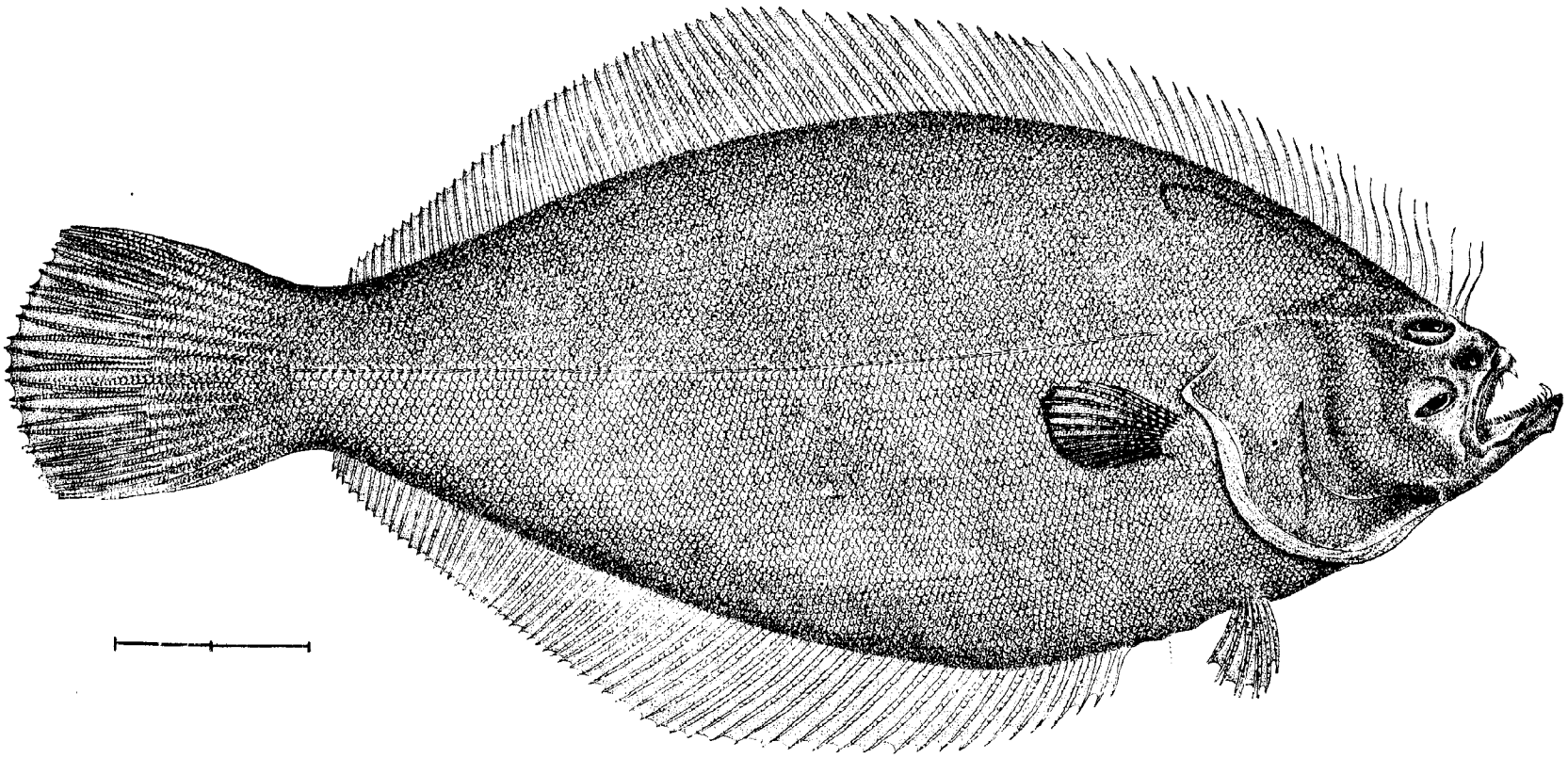
Drawing by H. L. Todd, from No. 21020, U. S. National Museum, collected at Halifax, Nova Scotia, September 4, 1877, by U. S. Fish Commission.



THE CALIFORNIA "SOLE."

Lepidopsetta bilineata (Ayres), Gill. (p. 185.)

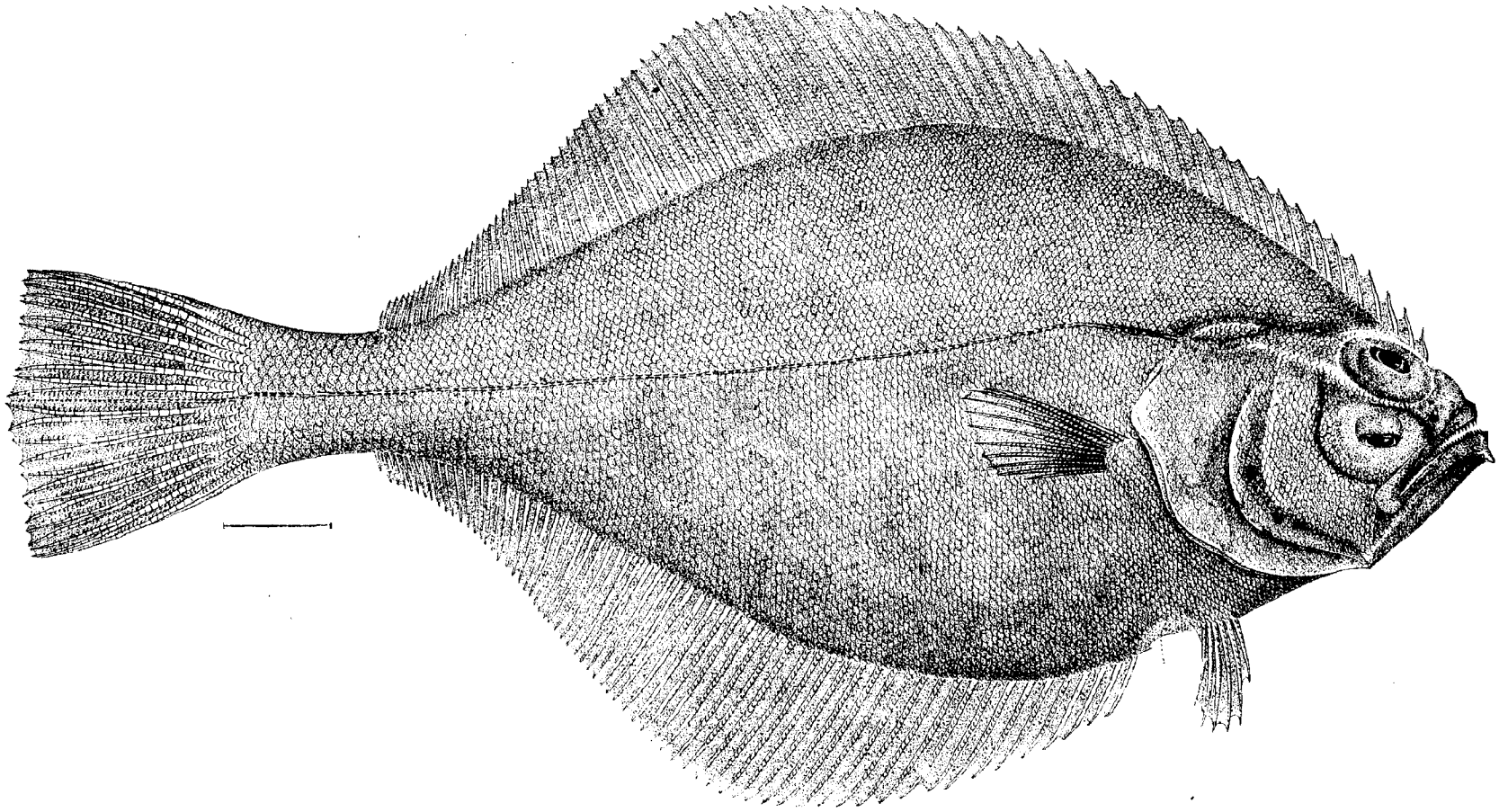
Drawing by H. L. Todd, from No. 27602, U. S. National Museum, collected at Saint Paul's, Kodiak Island, 1880, by Dr. T. H. Bean.



## THE SAN FRANCISCO "SOLE."

Psettichthys melanostictus, Girard. (p. 186.)

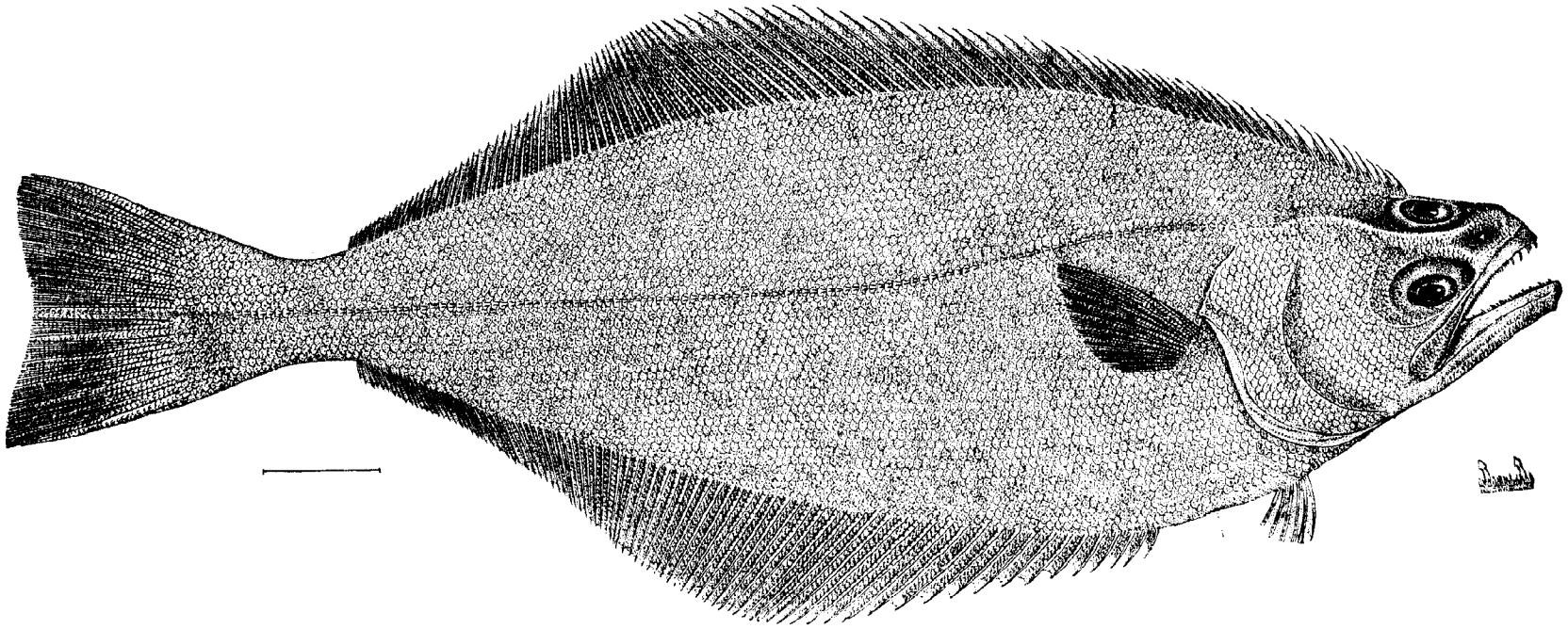
Drawing by H. L. Todd, from No. 27602, U. S. National Museum, collected at San Francisco, Cal., January, 1880, by Prof. D. S. Jordan.



## THE ALASKA SAND DAB.

Hippoglossoides elassodon, J. & G. (p. 188.)

Drawing by H. L. Todd, from No. 27938, U. S. National Museum, collected at Humboldt Harbor, Shumagins, July 19, 1880, by Dr. T. H. Bean.

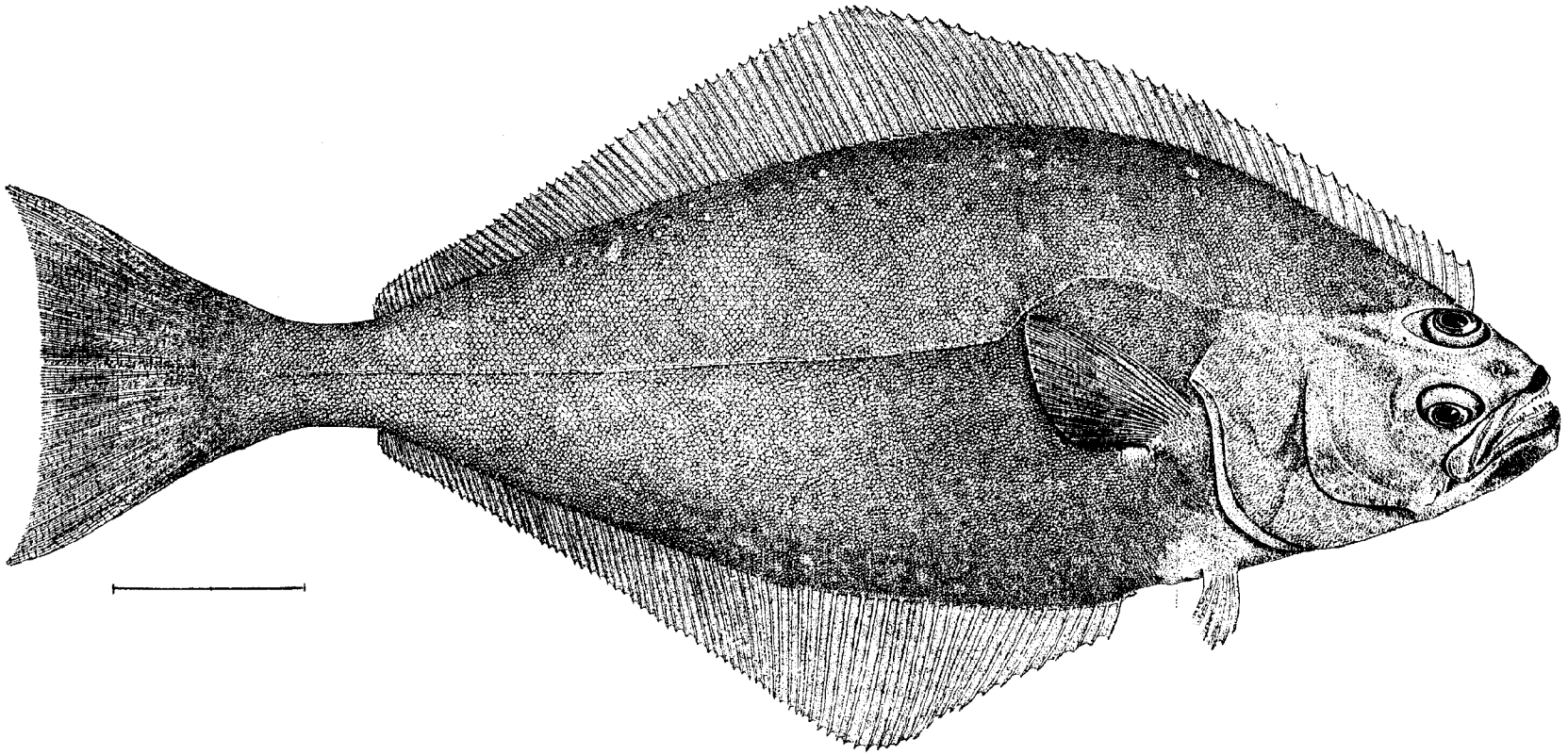


## THE ATHERESTES FLOUNDER.

Atherestes stomias, J. & G. (p. 188.)

Drawing by H. L. Todd, from No. 27186, U. S. National Museum, collected at Point Reyes, California, 1880, by Jordan and Gilbert.

PLATE 53.

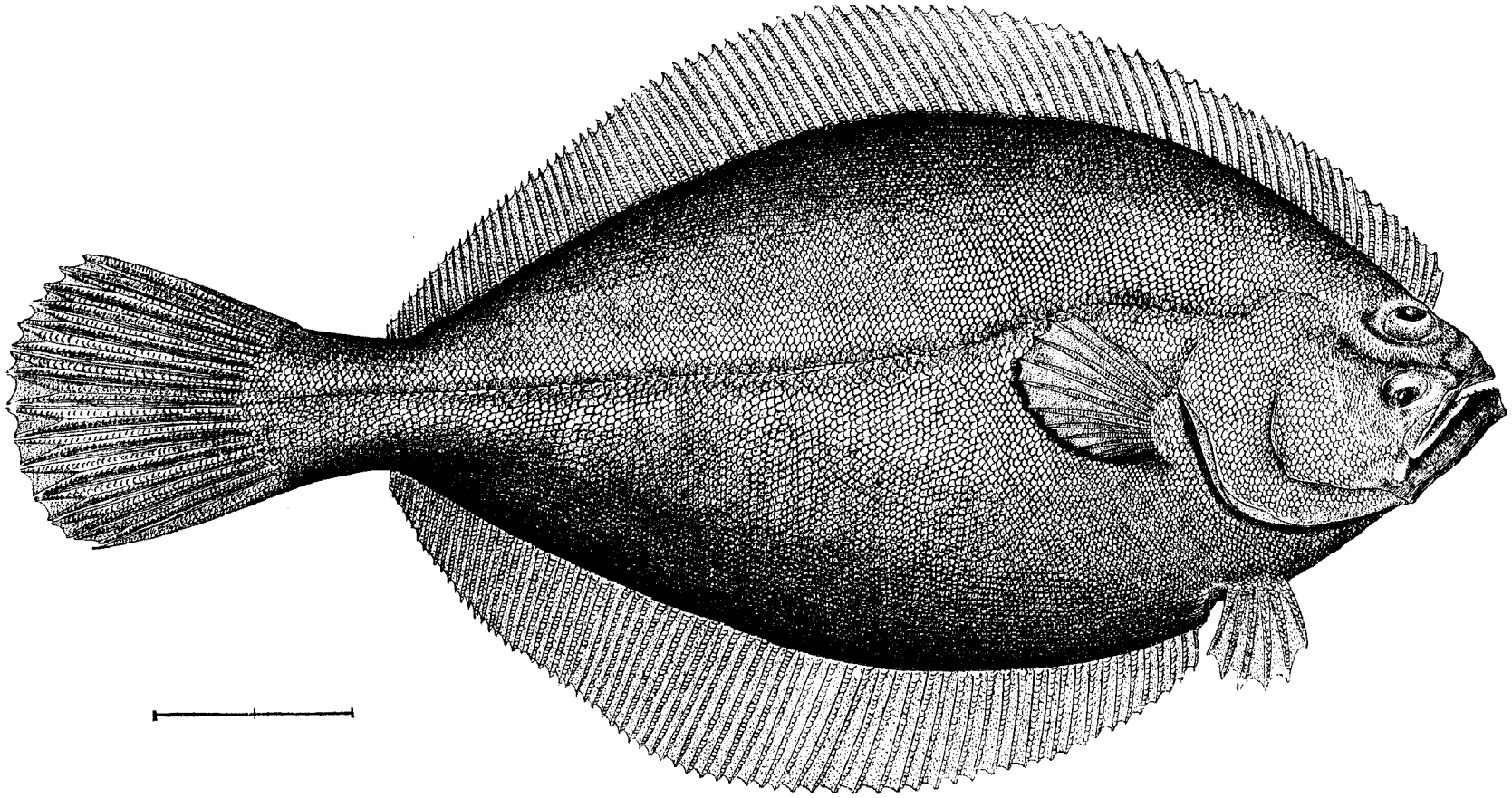


## THE HALIBUT.

Hippoglossus vulgaris, Fleming. (p. 189.)

Drawing by H. L. Todd, from No. 10439, U. S. National Museum, collected at Eastport, Me., 1872, by U. S. Fish Commission.

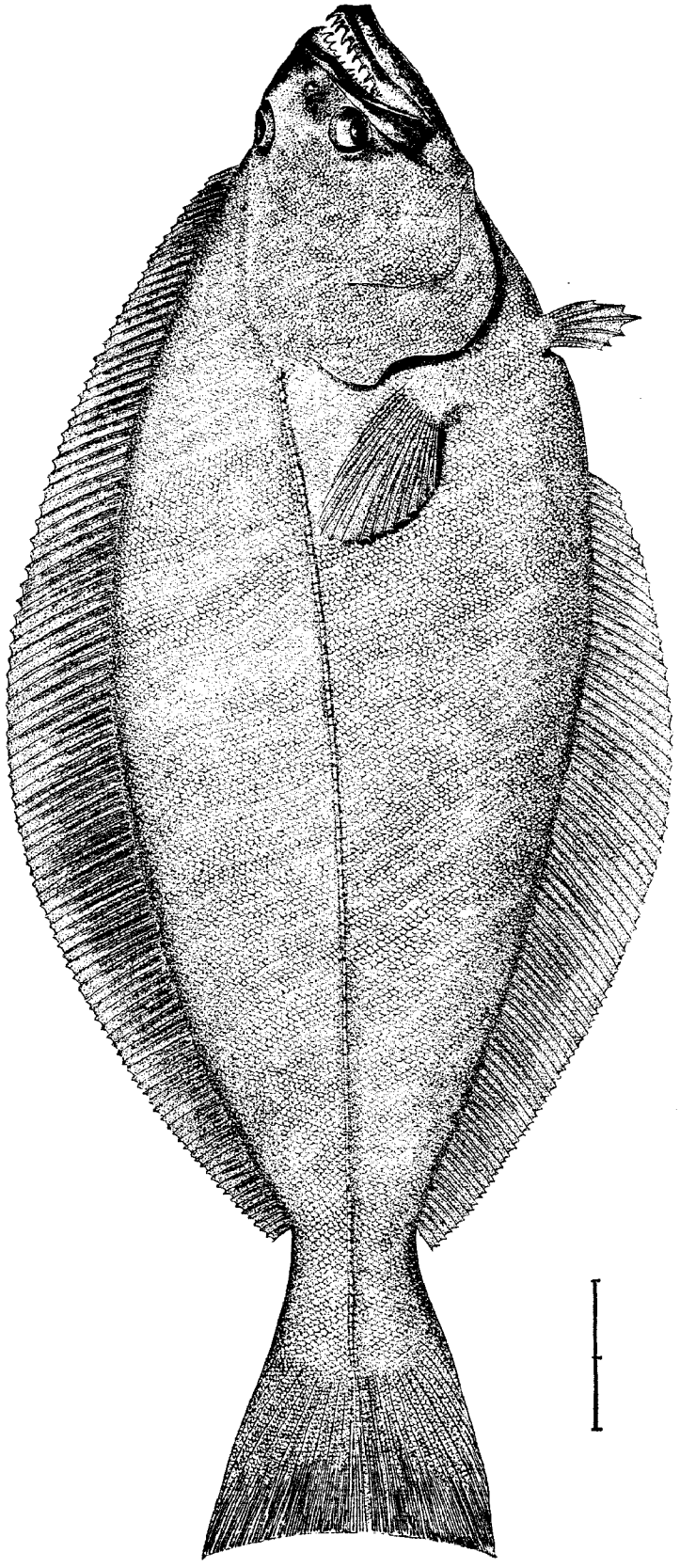
PLATE 54.



## THE SAND DAB.

Hippoglossoides platessoides (Fab.), Gill. (p. 197.)

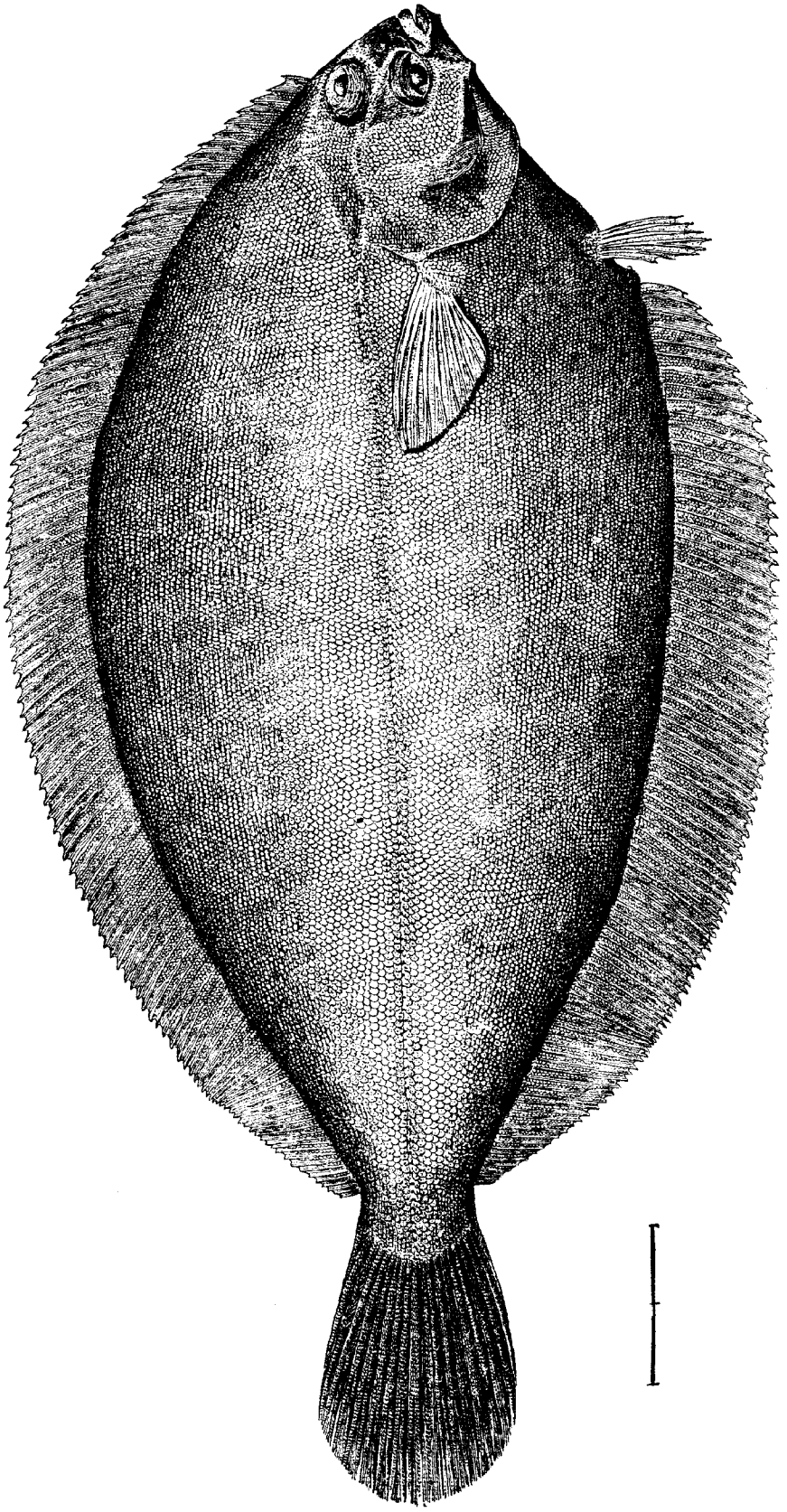
Drawing by H. L. Todd, from No. 21002, U. S. National Museum, collected at Le Have Bank, August 21, 1877, by U. S. Fish Commission.



## THE GREENLAND TURBOT.

Platysomatichthys hippoglossoides (Walb.), Goode & Bean. (p. 197.)

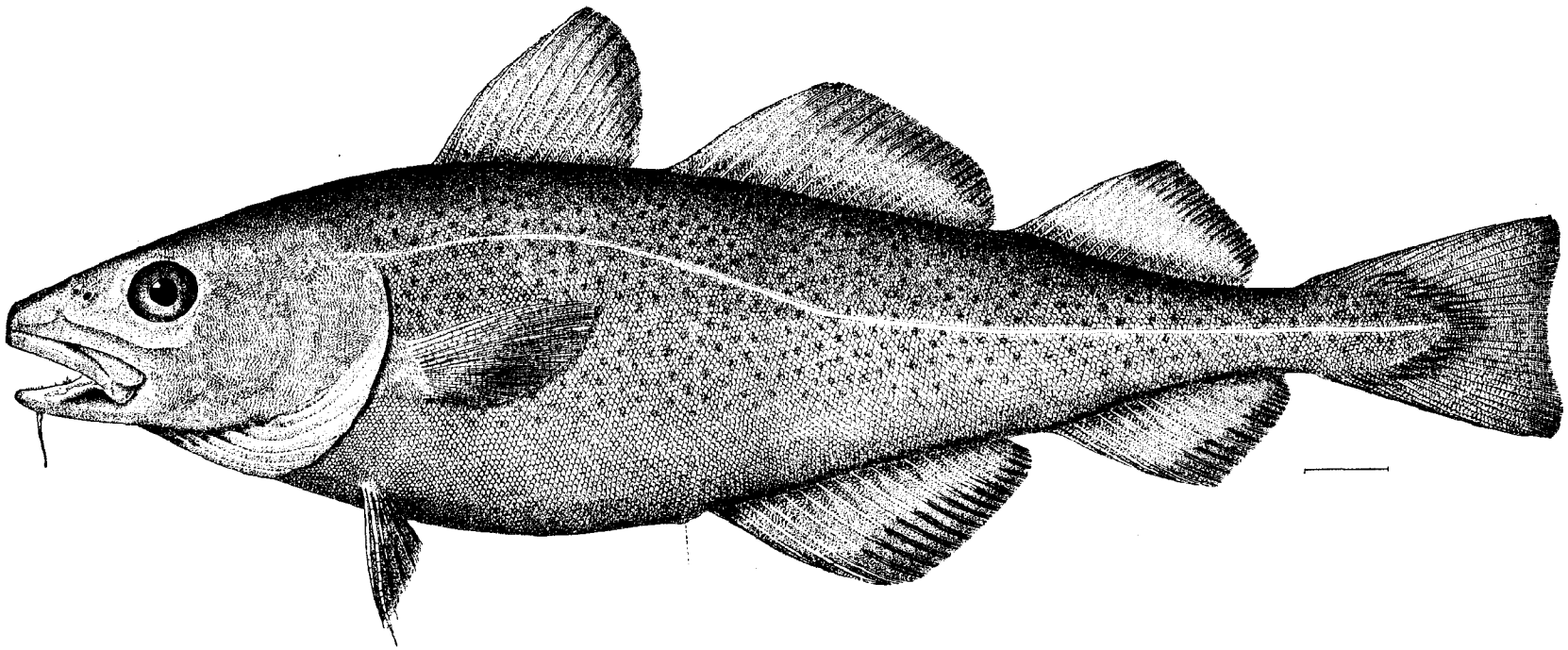
Drawing by H. L. Todd, from a specimen obtained in Fulton Market, New York.



THE POLE FLOUNDER.

Glyptocephalus cynoglossus (L.), Gill. (p. 198.)

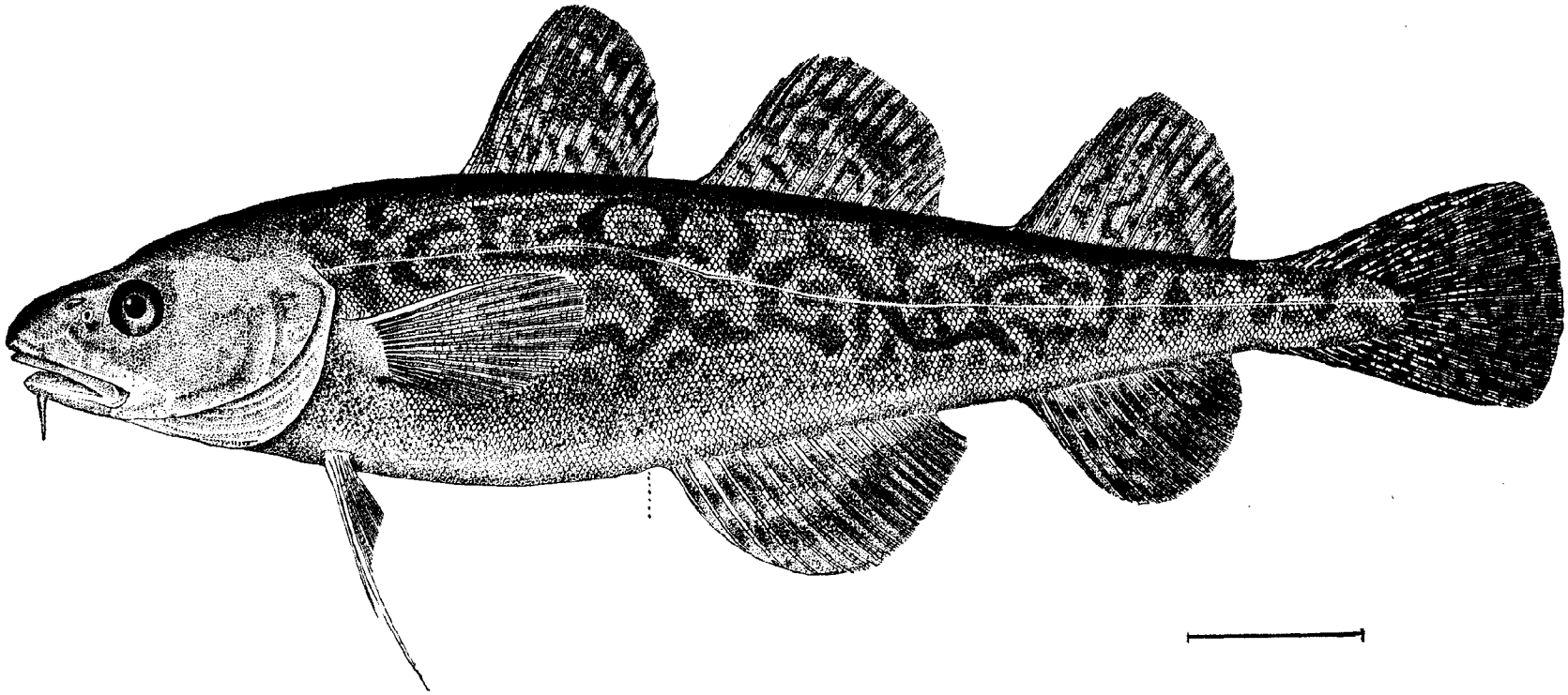
Drawing by H. L. Todd.



## THE CODFISH.

Gadus morrhua, L. (p. 200.)

Drawing by H. L. Todd, from No. 10444, U. S. National Museum, collected at Eastport, Me., 1872, by U. S. Fish Commission.

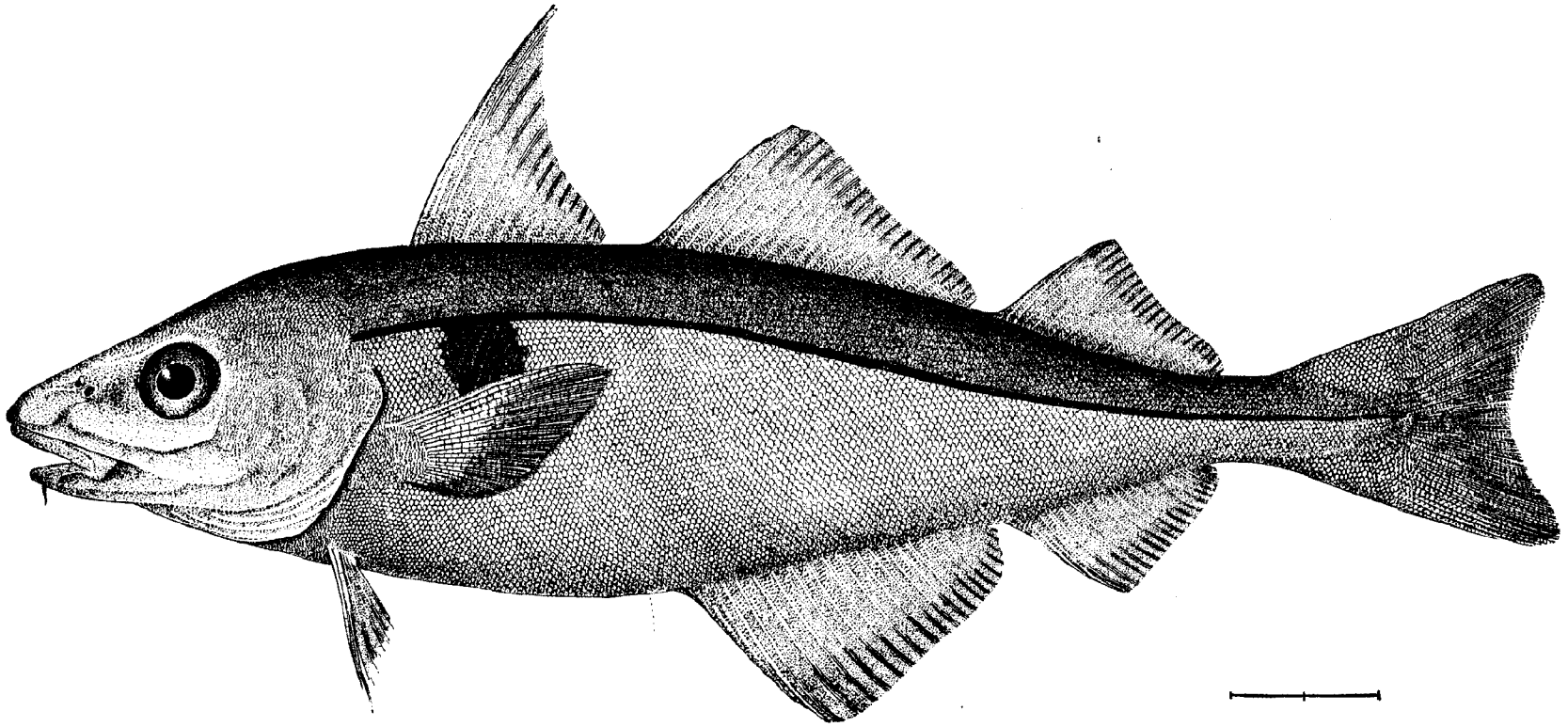


## THE ATLANTIC TOM COD.

Microgadus tomcod (Walb.), Gill. (p. 223.)

Drawing by H. L. Todd, from No. 17733, U. S. National Museum, collected at Wood's Holl, Mass., December 23, 1875, by Vinal N. Edwards.

PLATE 58 *a*.

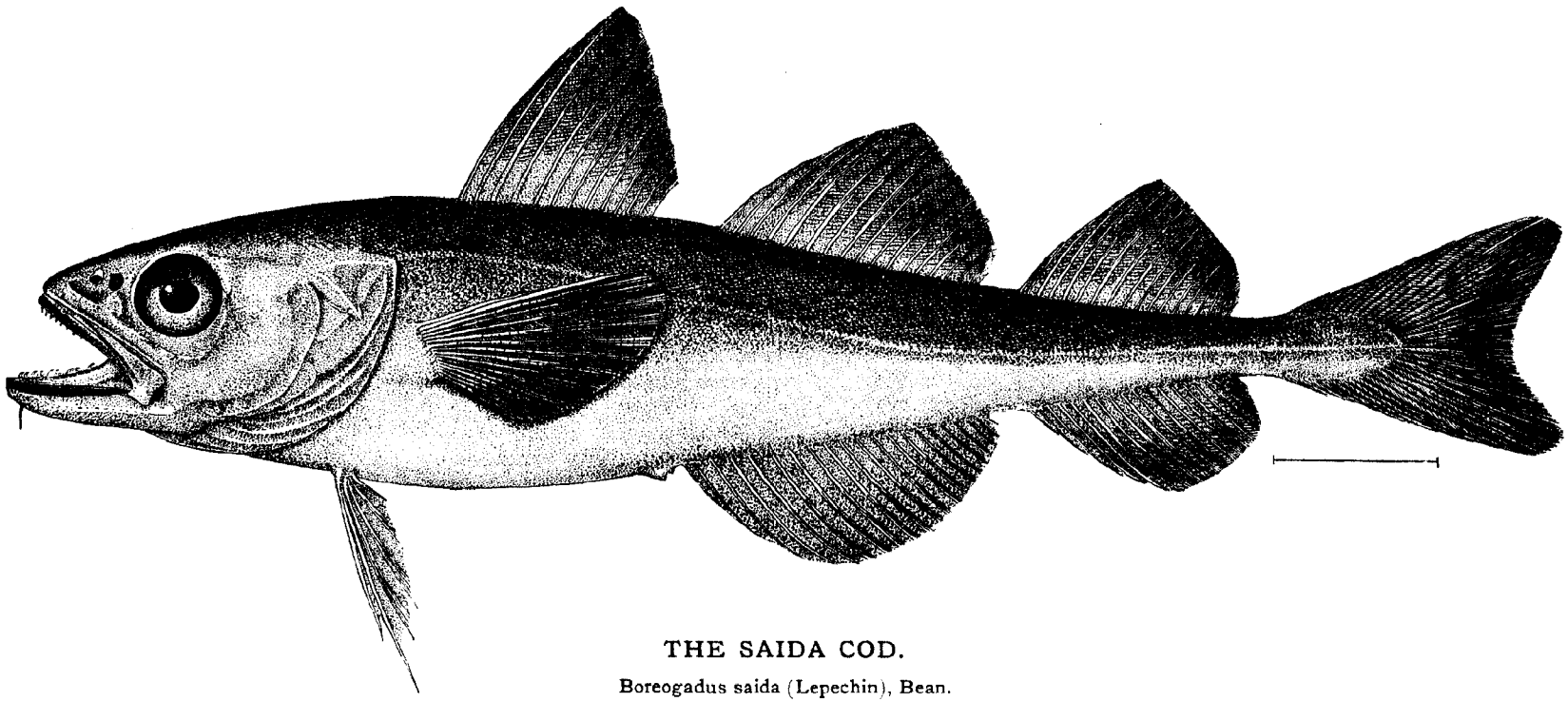


## THE HADDOCK.

**Melanogrammus æglefinus** (L.), Gill. (p. 223.)

Drawing by H. L. Todd, from No. 10440, U. S. National Museum, collected at Eastport, Me., 1872, by U. S. Fish Commission.

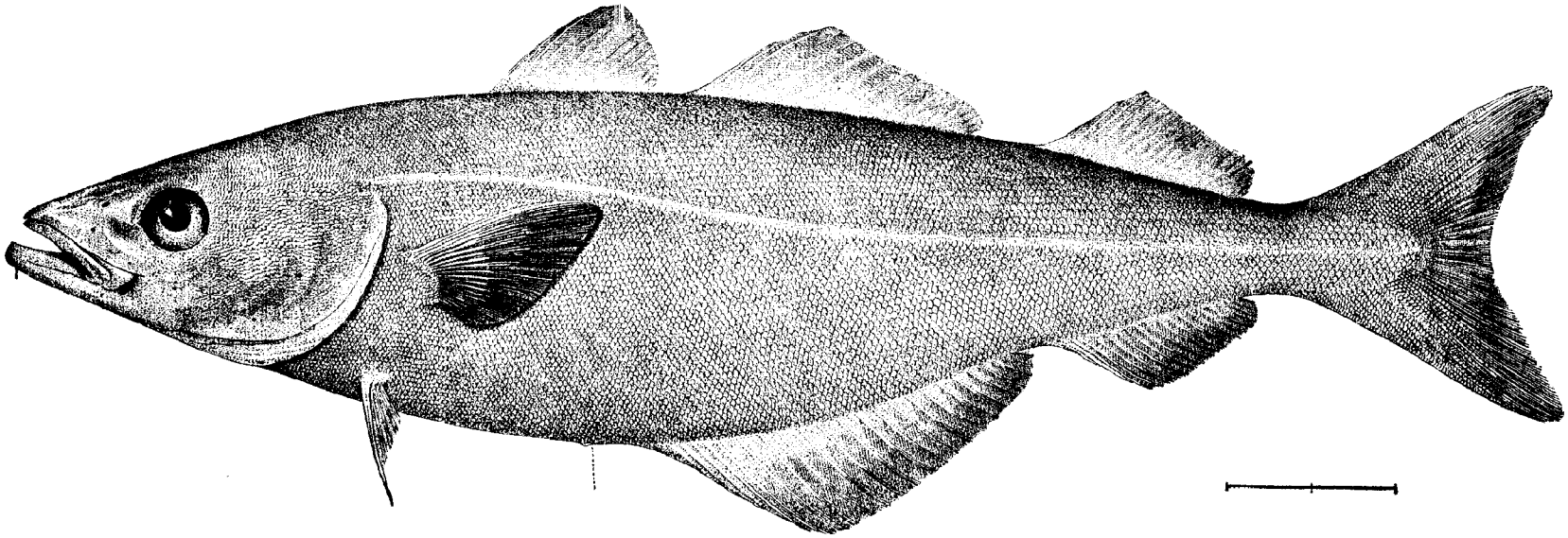
PLATE 59 A.



## THE SAIDA COD.

Boreogadus saida (Lepechin), Bean.

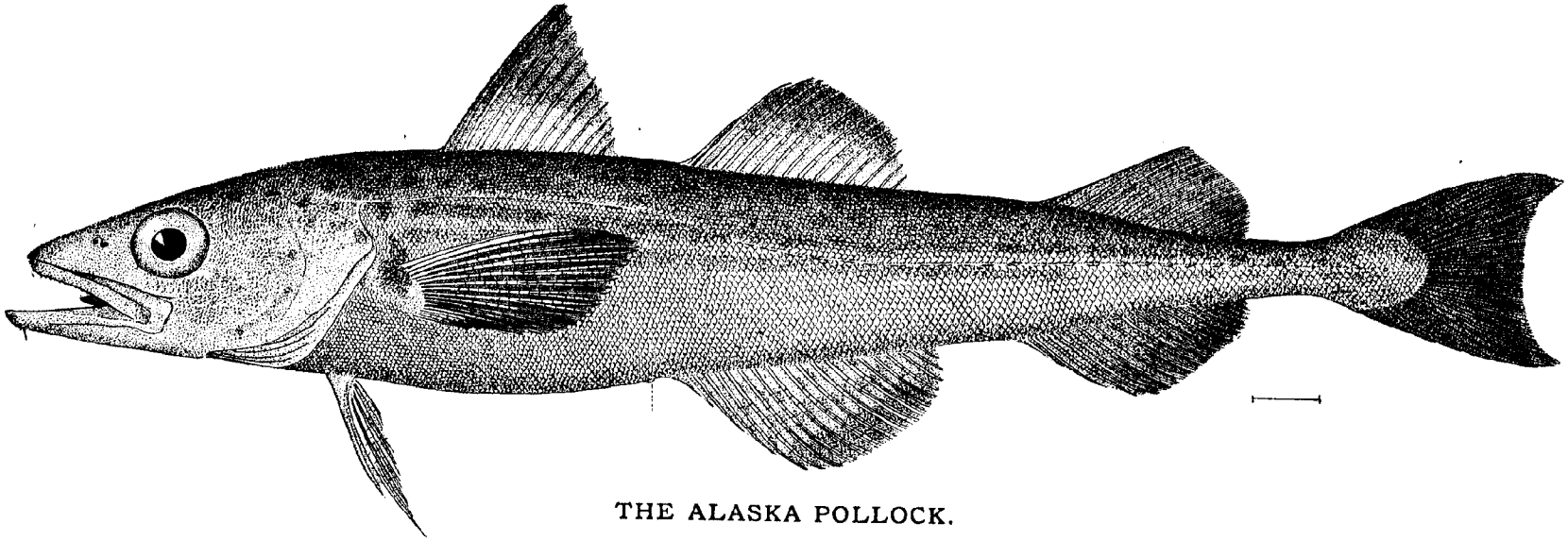
Drawing by H. L. Todd, from No. 21746, U. S. National Museum, collected at Annanactook Harbor, Cumberland Gulf, October 19, 1877, by Ludwig Kumlien.



## THE POLLOCK.

Pollachius carbonarius (L.), Gill. (p. 228.)

Drawing by H. L. Todd, from No. 10443, U. S. National Museum, collected at Eastport, Me., 1872, by Prof. S. F. Baird.

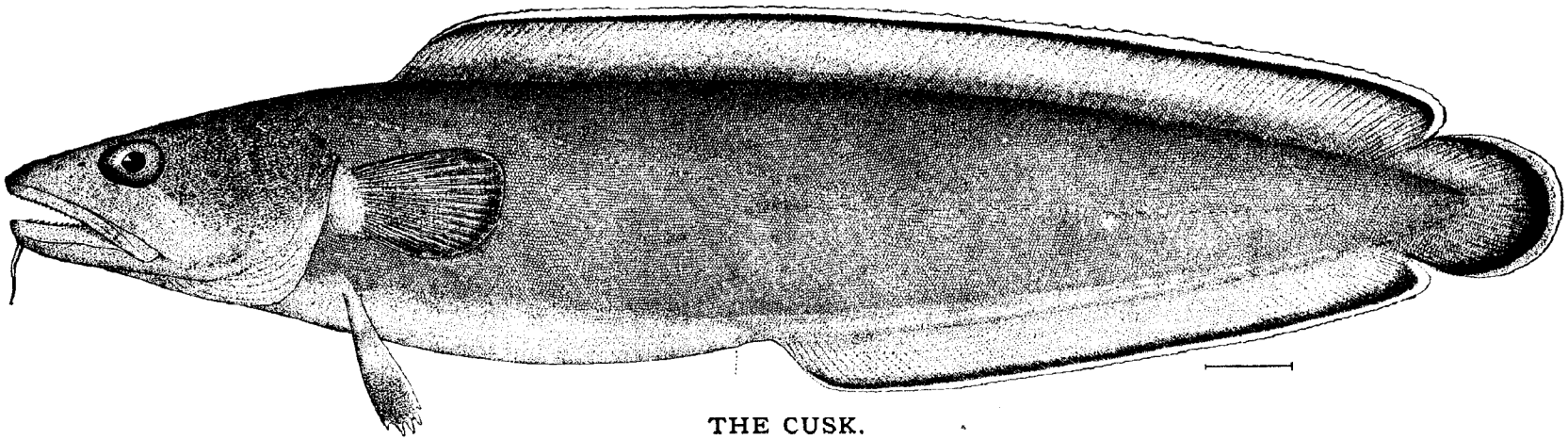


## THE ALASKA POLLOCK.

Pollachus chalcogrammus (Pallas). (p. 232.)

Drawing by H. L. Todd, from No. 27687, U. S. National Museum, collected at Pirate Cove, Shumagin Islands, Alaska, 1880, by William H. Dall.

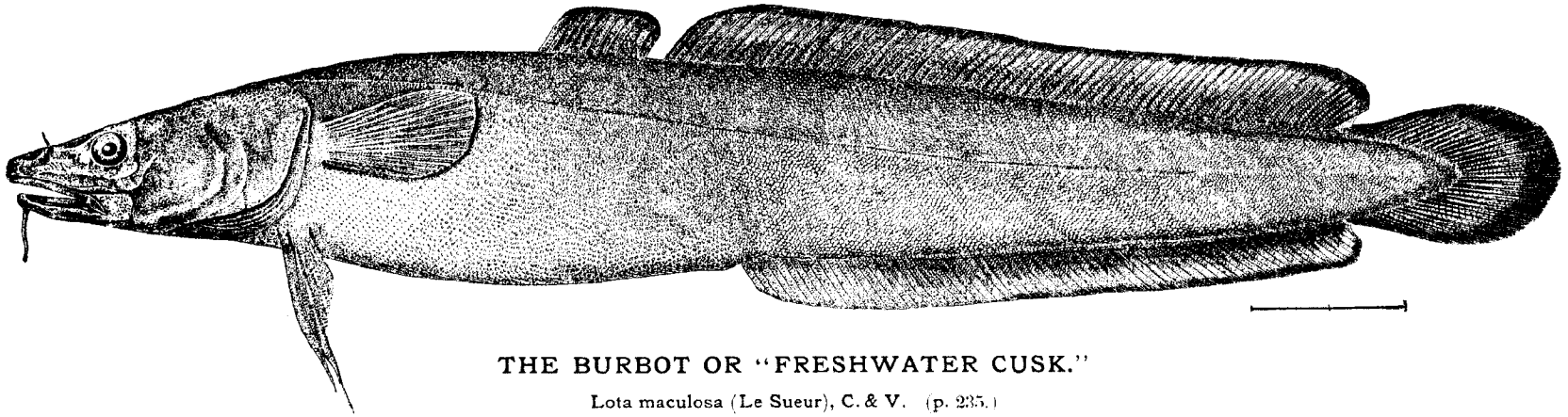
PLATE 60.



## THE CUSK.

Brosmius brosme (Müller), White. (p. 233.)

Drawing by H. L. Todd, from No. 29967, U. S. National Museum, collected at Boston Market, January 11, 1882, by W. A. Wilcox.

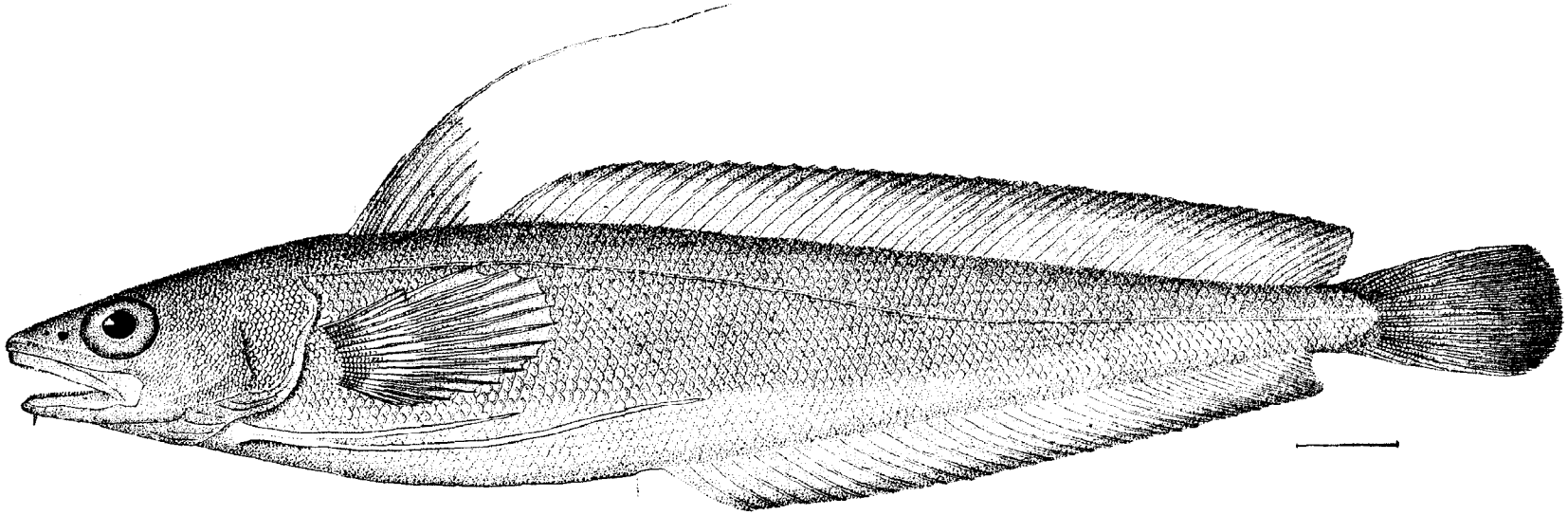


## THE BURBOT OR "FRESHWATER CUSK."

Lota maculosa (Le Sueur), C. & V. (p. 235.)

Drawing by H. L. Todd, from No. 10553, U. S. National Museum, collected at Ecorse, Mich., by J. W. Milner.

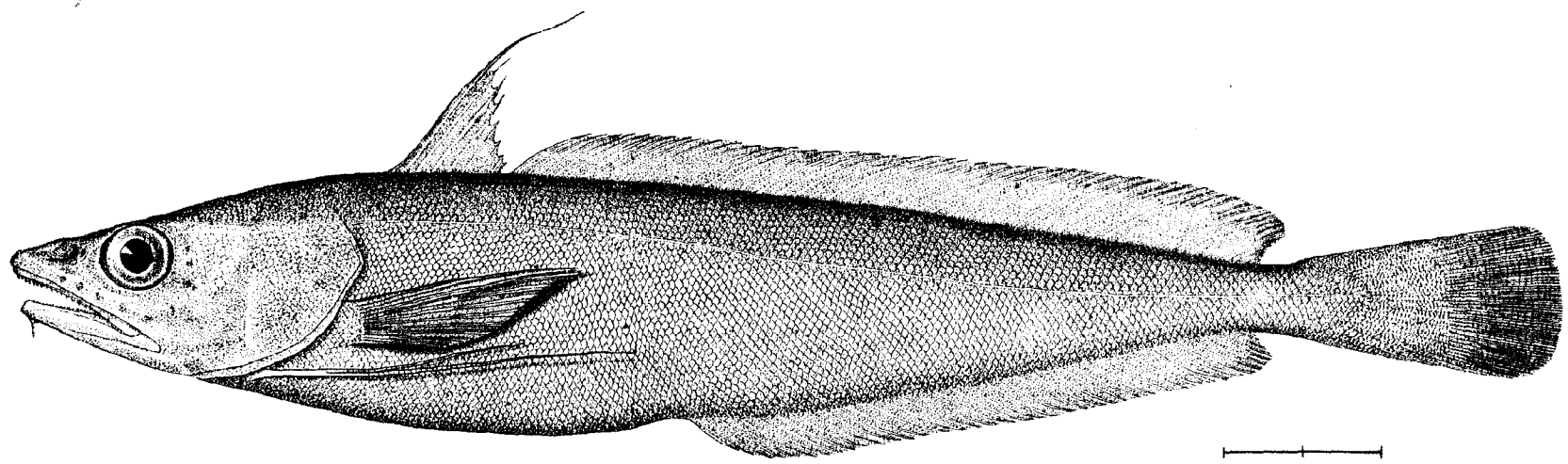
PLATE 61.



## THE COMMON HAKE.

Phycis chuss (Walb.), Gill. (p. 234.)

Drawing by H. L. Todd, from No. 28707, U. S. National Museum, collected at Martha's Vineyard, July 16, 1881, by U. S. Fish Commission.

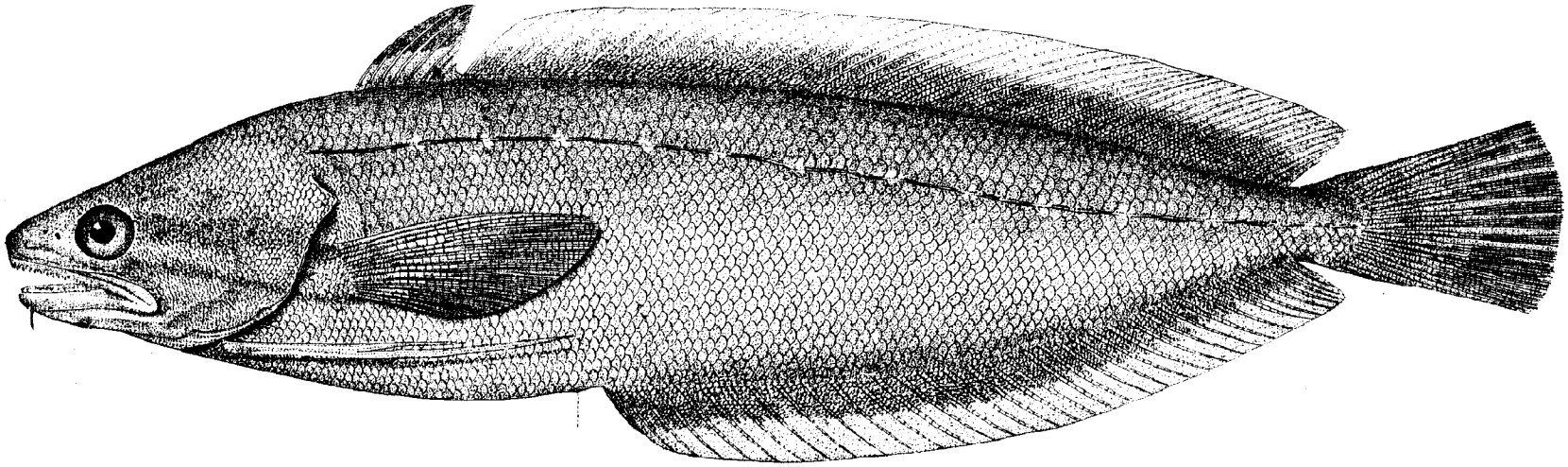


## THE SQUIRREL OR WHITE HAKE.

Phycis tenuis (Mitchell), De Kay. (p. 234.)

Drawing by H. L. Todd, from No. 21029, U. S. National Museum, collected in Halifax Harbor, November 30, 1877, by U. S. Fish Commission.

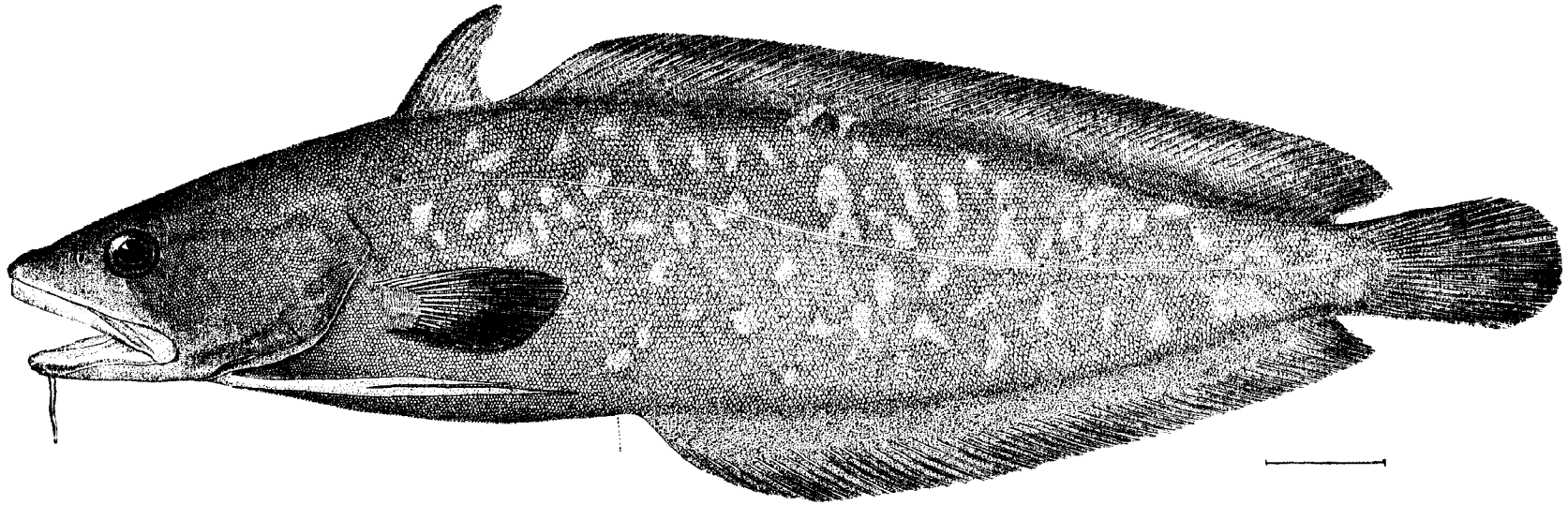
PLATE 62.



## THE KING HAKE.

Phycis regius (Walb.), Gill. (p. 234.)

Drawing by H. L. Todd, from No. 20923, U. S. National Museum, obtained at New York Aquarium, 1878, by E. G. Blackford.

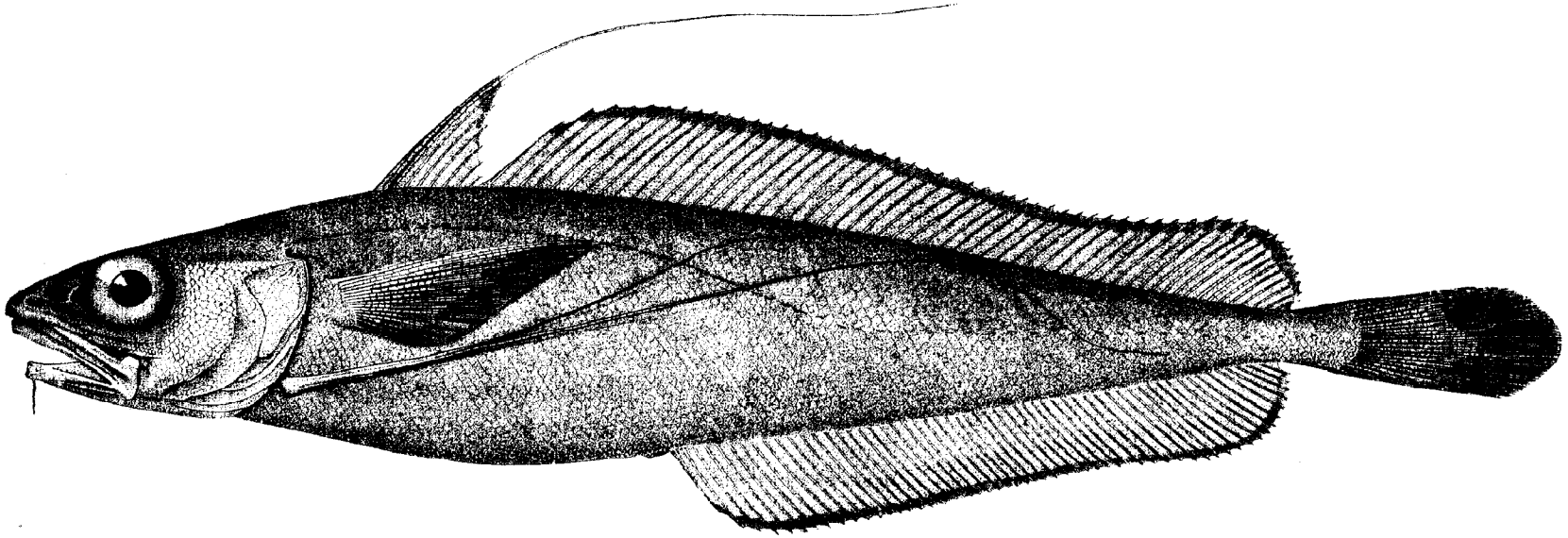


## EARL'S HAKE.

Phycis Earllii, Bean. (p. 234.)

Drawing by H. L. Todd, from No. 25207, U. S. National Museum, collected at Charleston, S. C., March 25, 1880, by R. E. Earll.

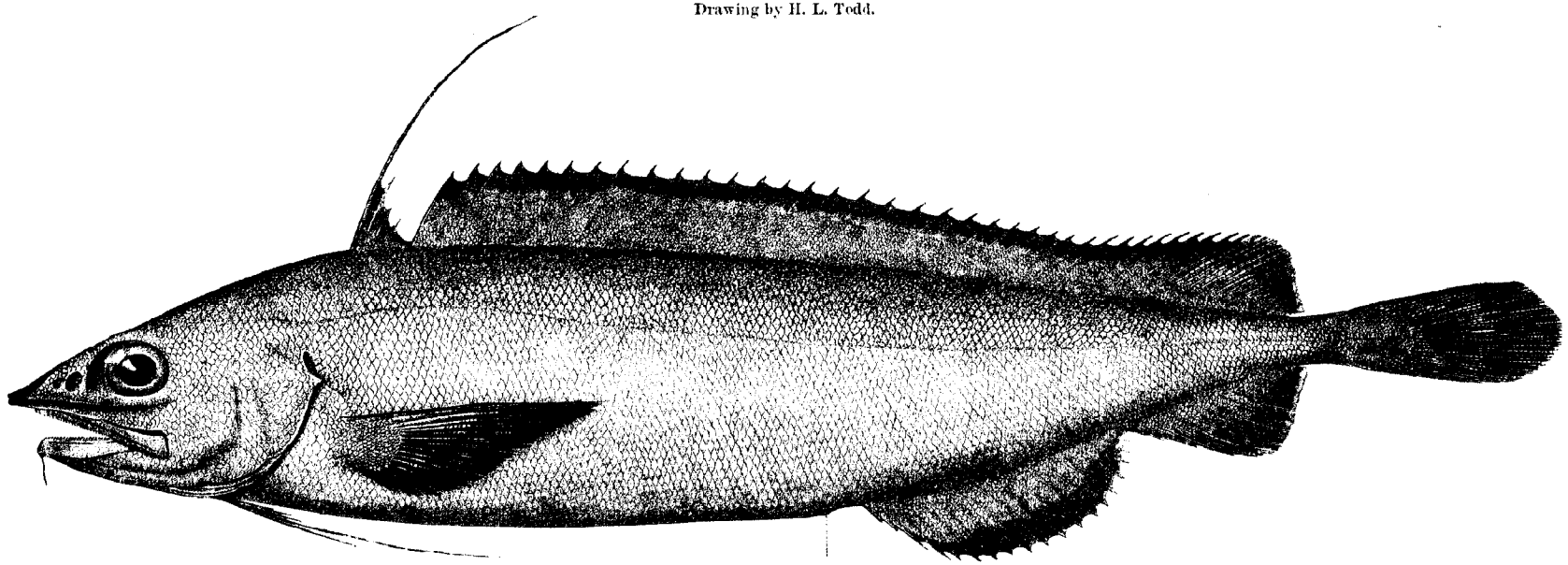
PLATE 63.



## CHESTER'S HAKE.

Phycis Chesteri, Goode & Bean. (p. 234.)

Drawing by H. L. Todd.

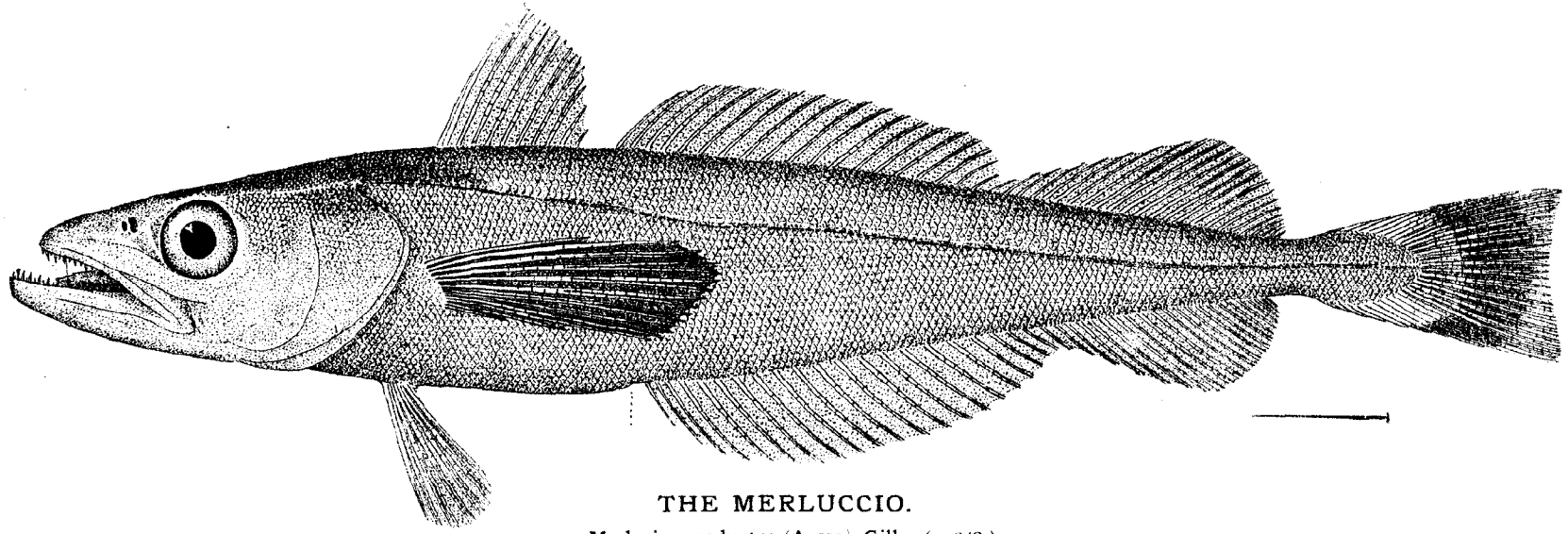


## THE BLUE HAKE.

Haloporphyrus viola, Goode & Bean.

Drawing by H. L. Todd, from No. 21837, U. S. National Museum, collected on Le Have Bank, August 26, 1878, by Capt. J. W. Collins, schooner Marion.

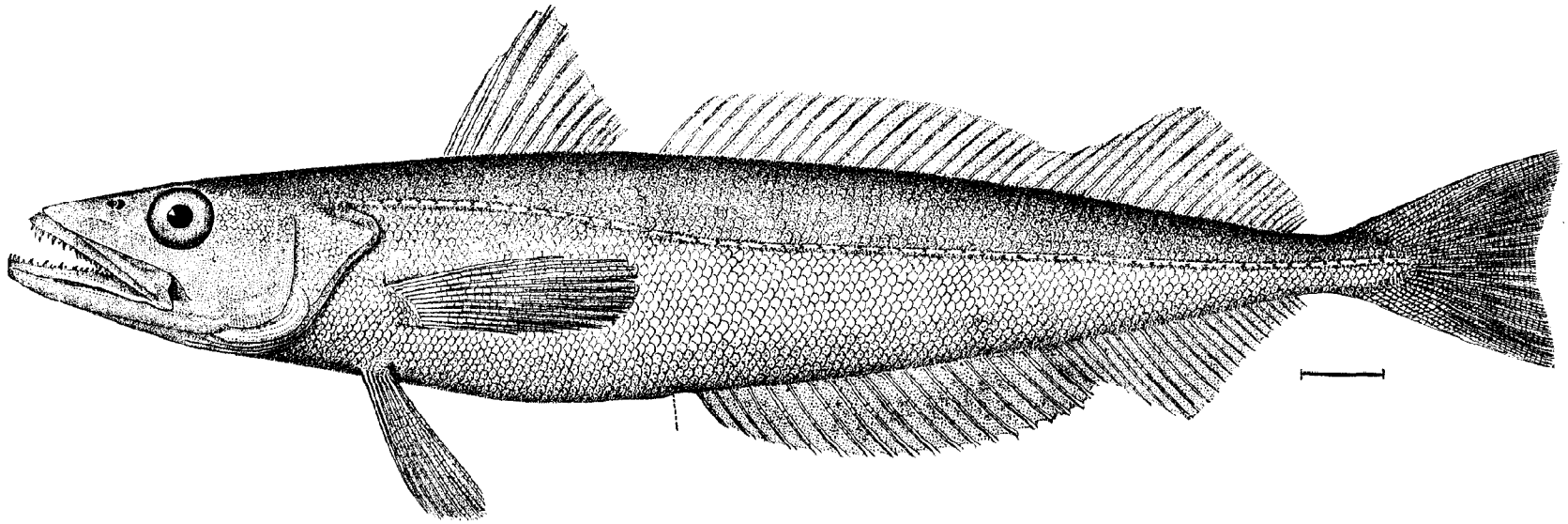
PLATE 64.



## THE MERLUCCIO.

Merlucius productus (Ayres), Gill. (p. 243.)

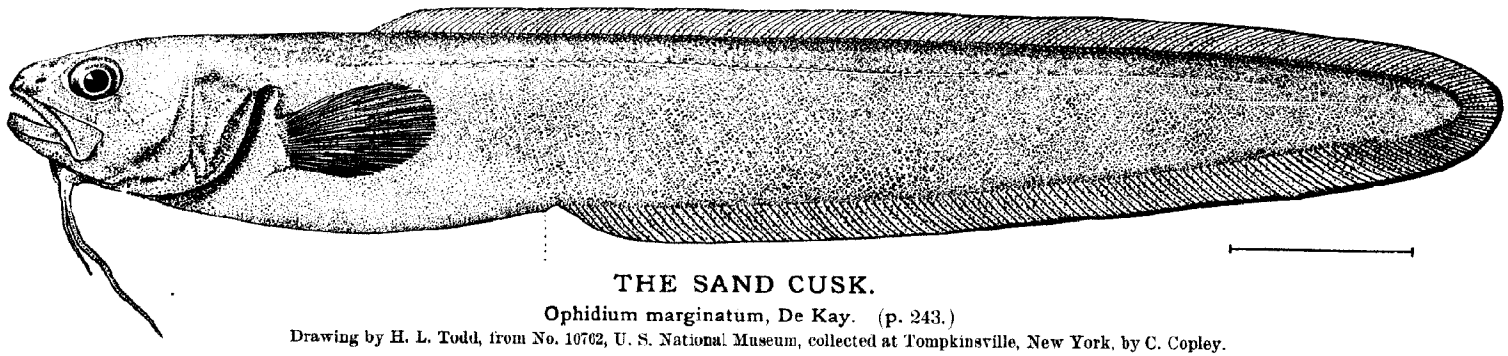
Drawing by H. L. Todd, from No. 20638, U. S. National Museum, collected at Seattle, Wash. Ter., 1880, by Col. F. W. Prosser.



## THE SILVER HAKE OR NEW ENGLAND WHITING.

Merlucius bilinearis (Mitch.), Gill. (p. 240.)

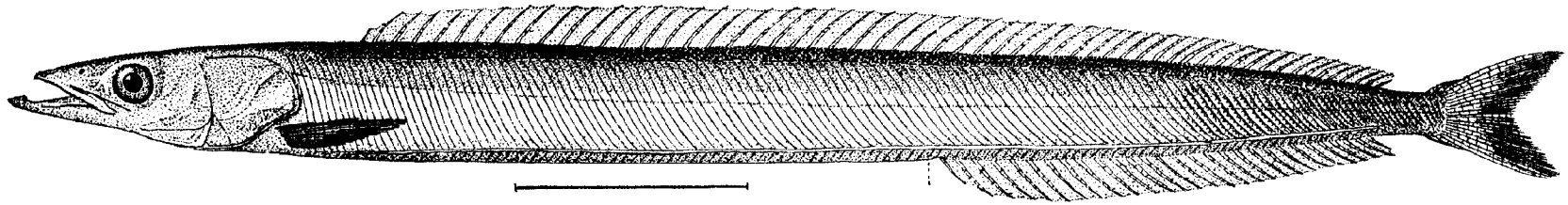
Drawing by H. L. Todd, from No. 21016, U. S. National Museum, collected at Halifax, Nova Scotia, September 8, 1877, by the U. S. Fish Commission.



## THE SAND CUSK.

Ophidium marginatum, De Kay. (p. 243.)

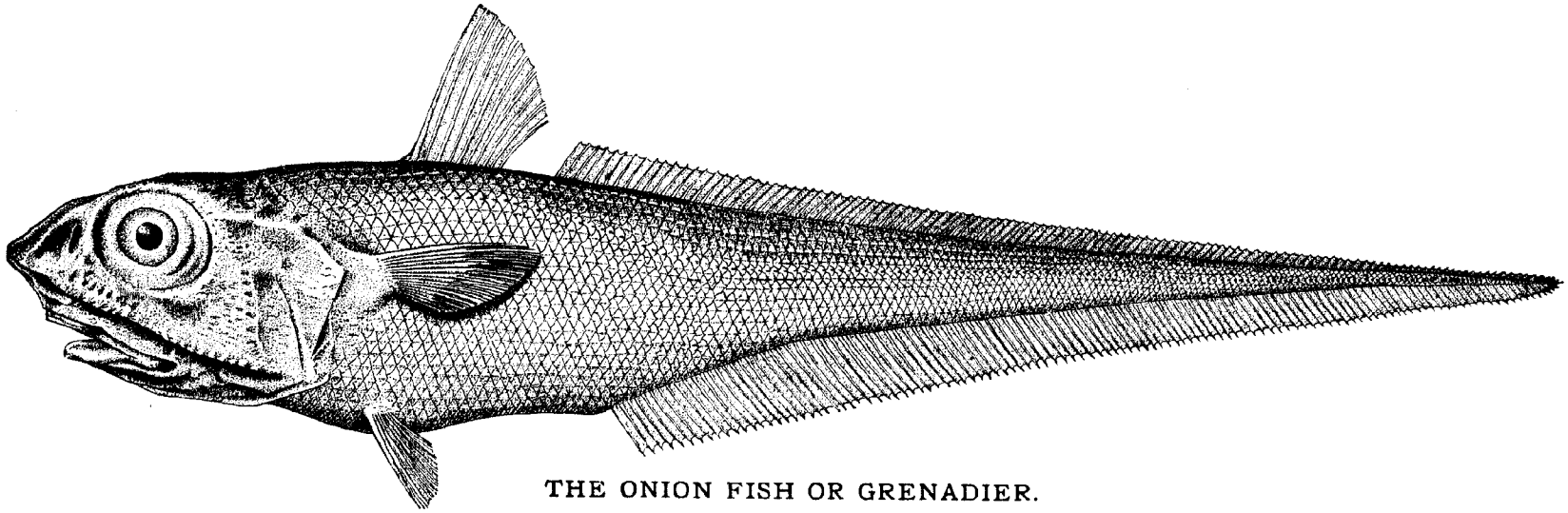
Drawing by H. L. Todd, from No. 10762, U. S. National Museum, collected at Tompkinsville, New York, by C. Copley.



## THE LANT OR SAND EEL.

Ammodytes americanus, De Kay. (p. 244.)

Drawing by H. L. Todd, from No. 16500, U. S. National Museum, collected at Nantucket, Mass., August 12, ——, by U. S. Fish Commission.

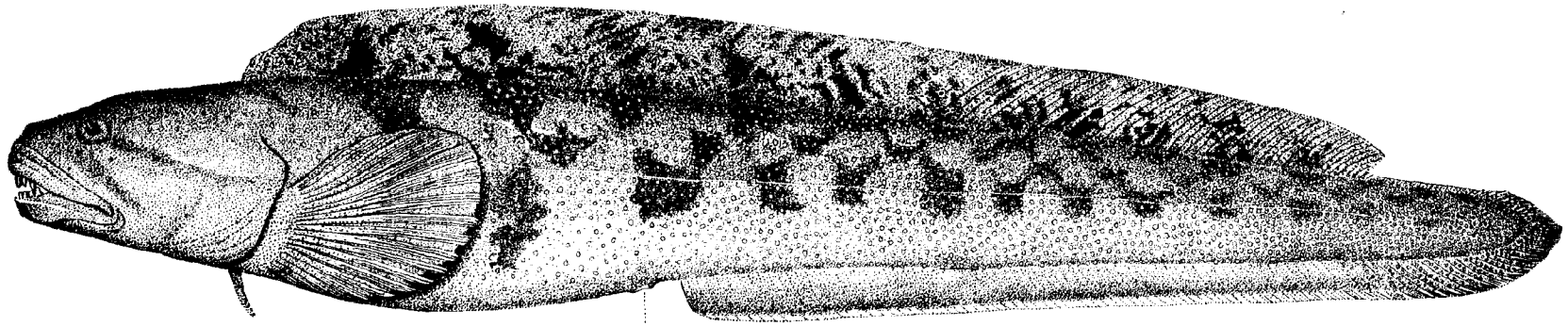


## THE ONION FISH OR GRENADIER.

Macrurus rupestris (Müller), Block. (p. 244.)

Drawing by H. L. Todd, from No. 15608, U. S. National Museum, collected at Saint George's Bank, October 27, 1875. Presented by E. G. Blackford.

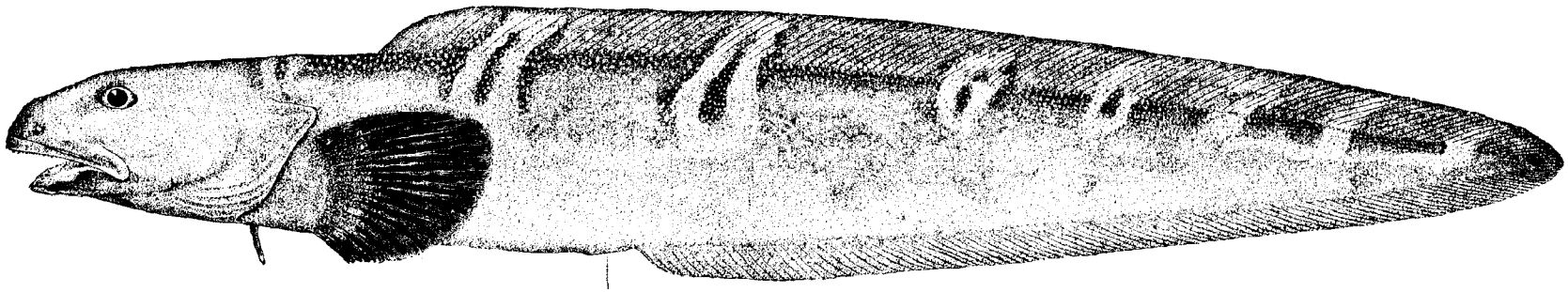
PLATE 66.



## THE MUTTON-FISH.

*Zoarces anguillaris* (Peck), Storer. (p. 247.)

Drawing by H. L. Todd, from No. 10438, U. S. National Museum, collected at Eastport, Me., 1872, by U. S. Fish Commission.

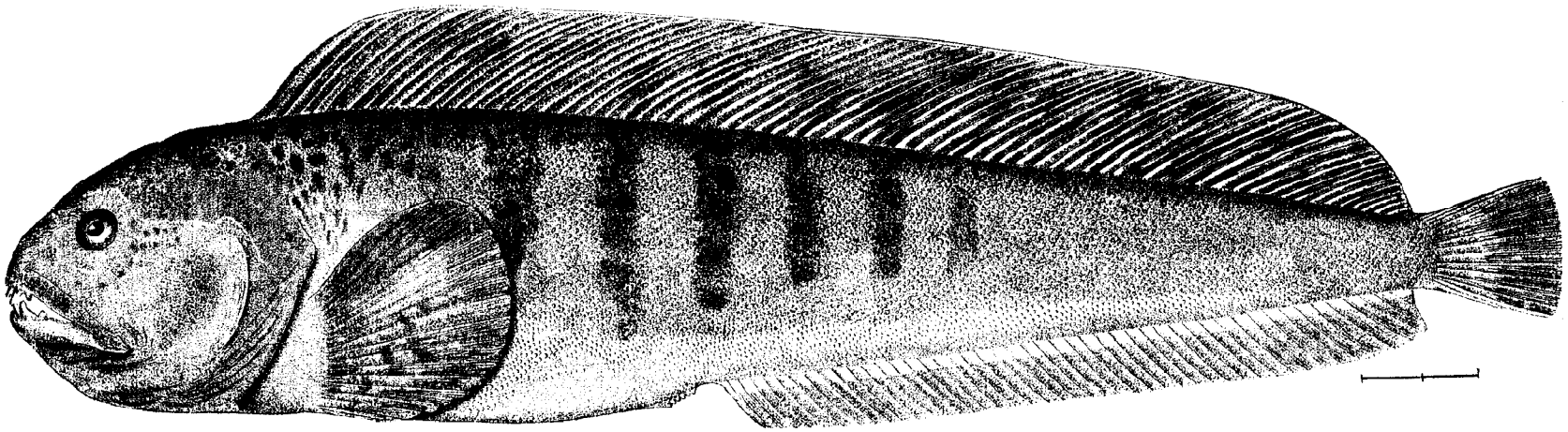


## VAHL'S LYCODES.

*Lycodes Vahlii*, Reinhardt. (p. 247.)

Drawing by H. L. Todd, from No. 21991, U. S. National Museum, collected on Le Have Bank, by Capt. Z. Hawkins, schooner Gwendolen.

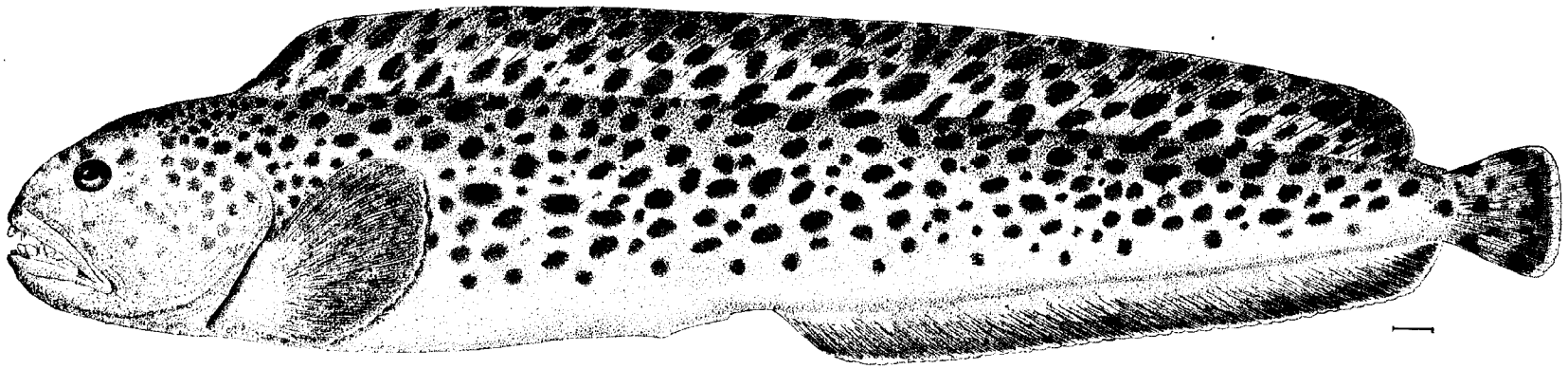
PLATE 67.



## THE COMMON CATFISH OR WOLF-FISH.

Anarrhicas lupus, L. (p. 248.)

Drawing by H. L. Todd, from No. 21846, U. S. National Museum, collected on George's Bank, September 27, 1878, by Capt. John Gourville.

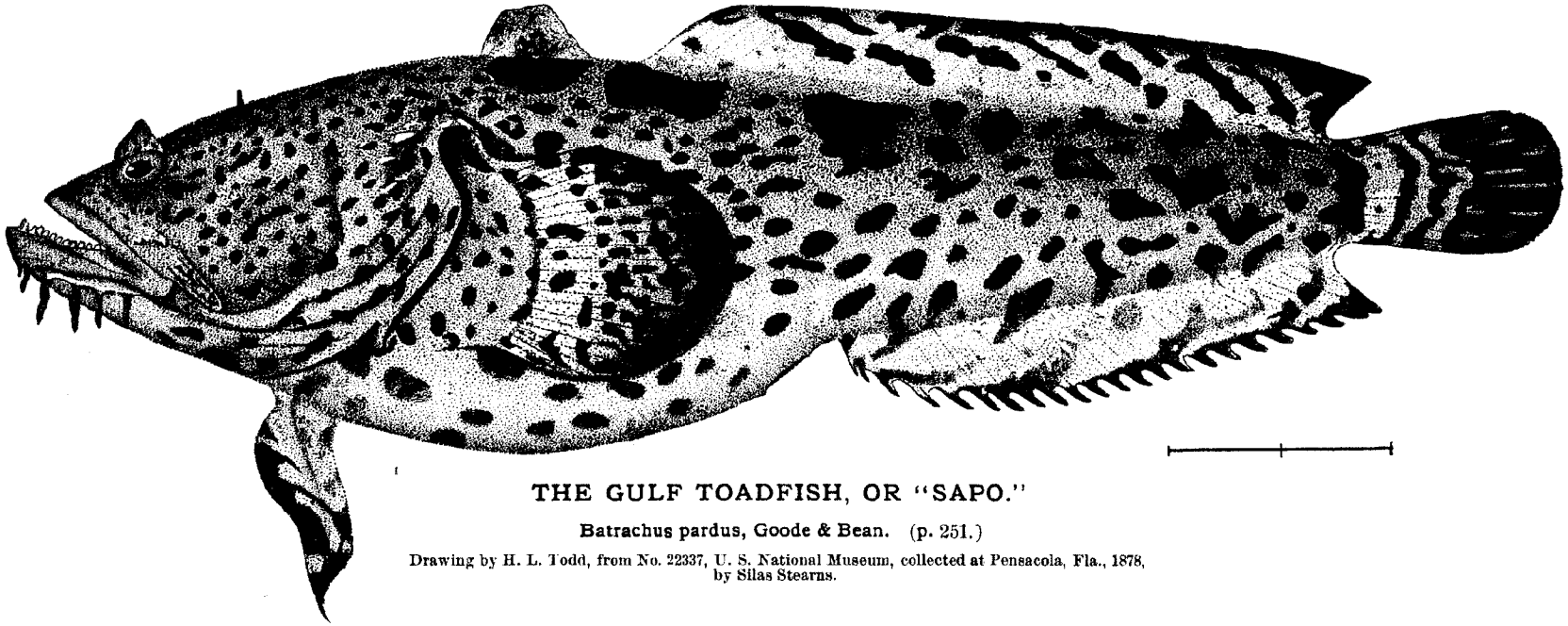


## THE SPOTTED CATFISH.

Anarrhicas minor, Olafsen. (p. 249.)

Drawing by H. L. Todd, from No. 21618, U. S. National Museum, collected at sea November, 1878, by Capt. R. H. Hurlbert.

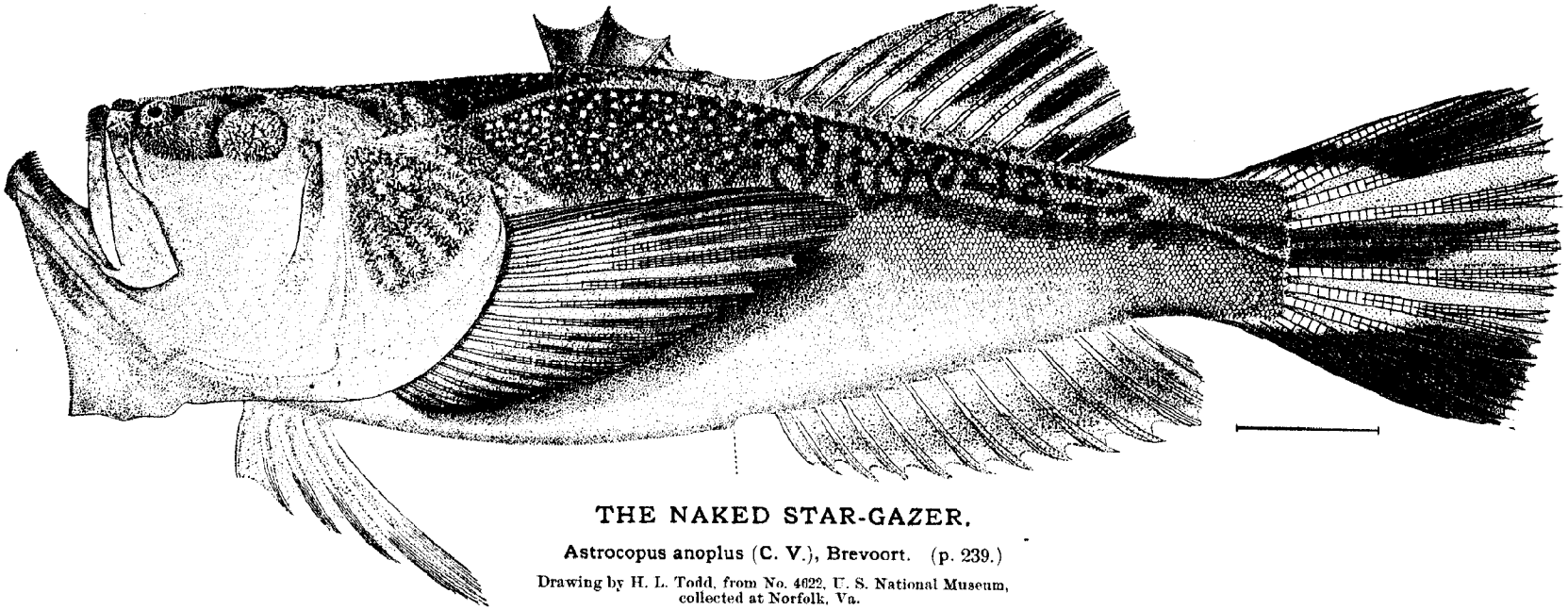
PLATE 68.



## THE GULF TOADFISH, OR "SAPO."

**Batrachus pardus, Goode & Bean.** (p. 251.)

Drawing by H. L. Todd, from No. 22337, U. S. National Museum, collected at Pensacola, Fla., 1878, by Silas Stearns.

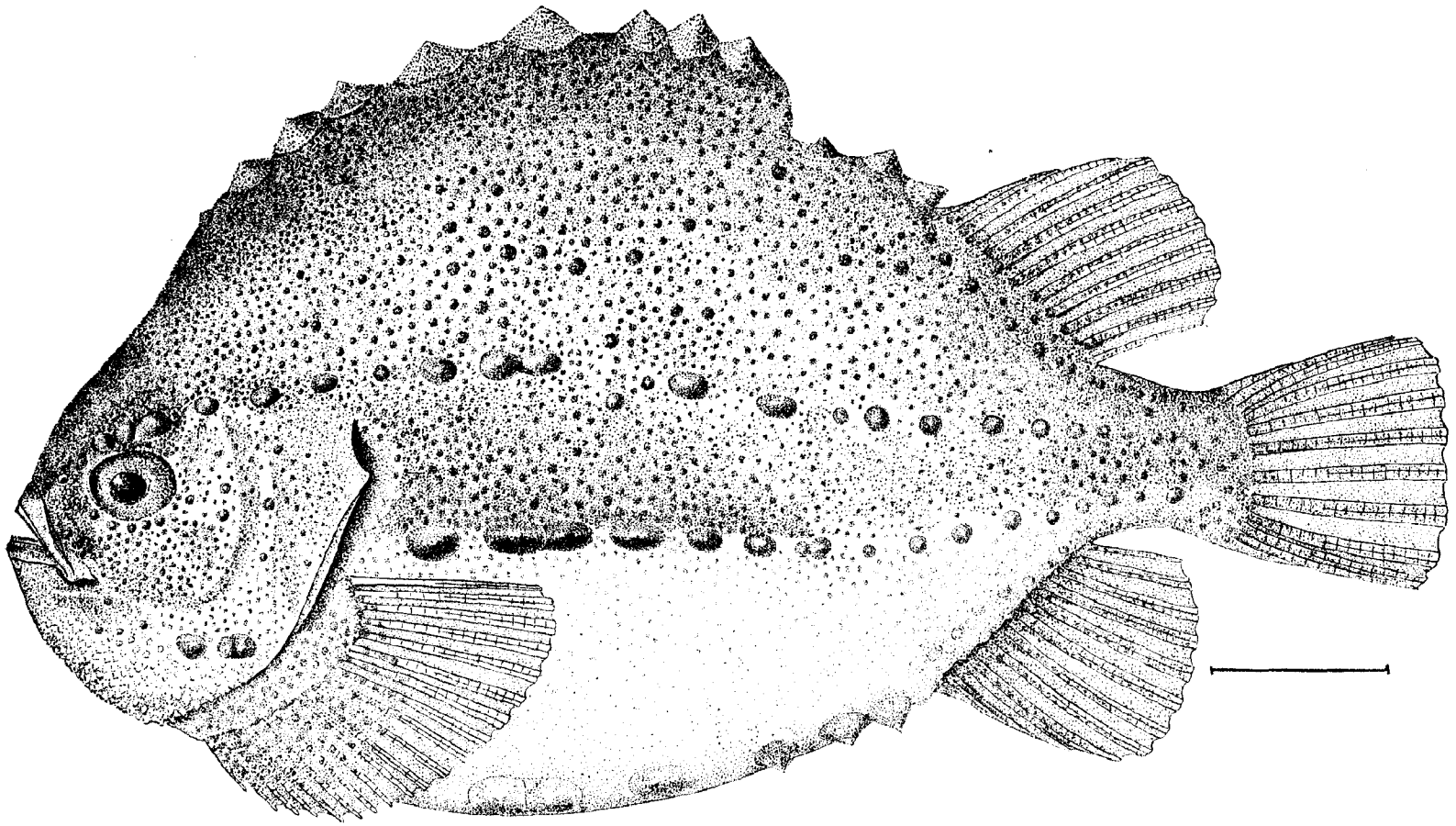


## THE NAKED STAR-GAZER.

**Astrocopus anoplus (C. V.), Brevoort.** (p. 239.)

Drawing by H. L. Todd, from No. 4622, U. S. National Museum, collected at Norfolk, Va.

PLATE 69.

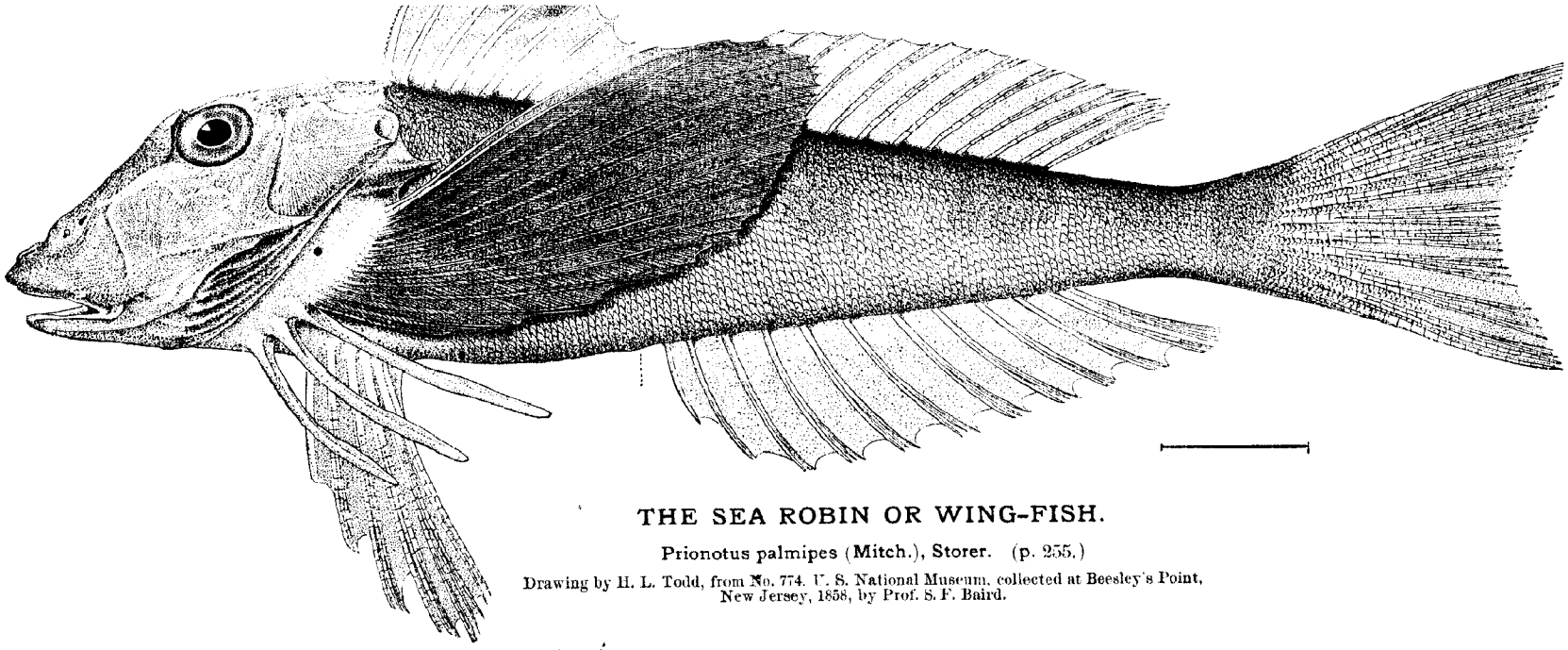


## THE LUMP-FISH.

Cyclopterus lumpus, L. (p. 253.)

Drawing by H. L. Todd, from No. 14795, U. S. National Museum, collected at Eastport, Me., 1872, by U. S. Fish Commission.

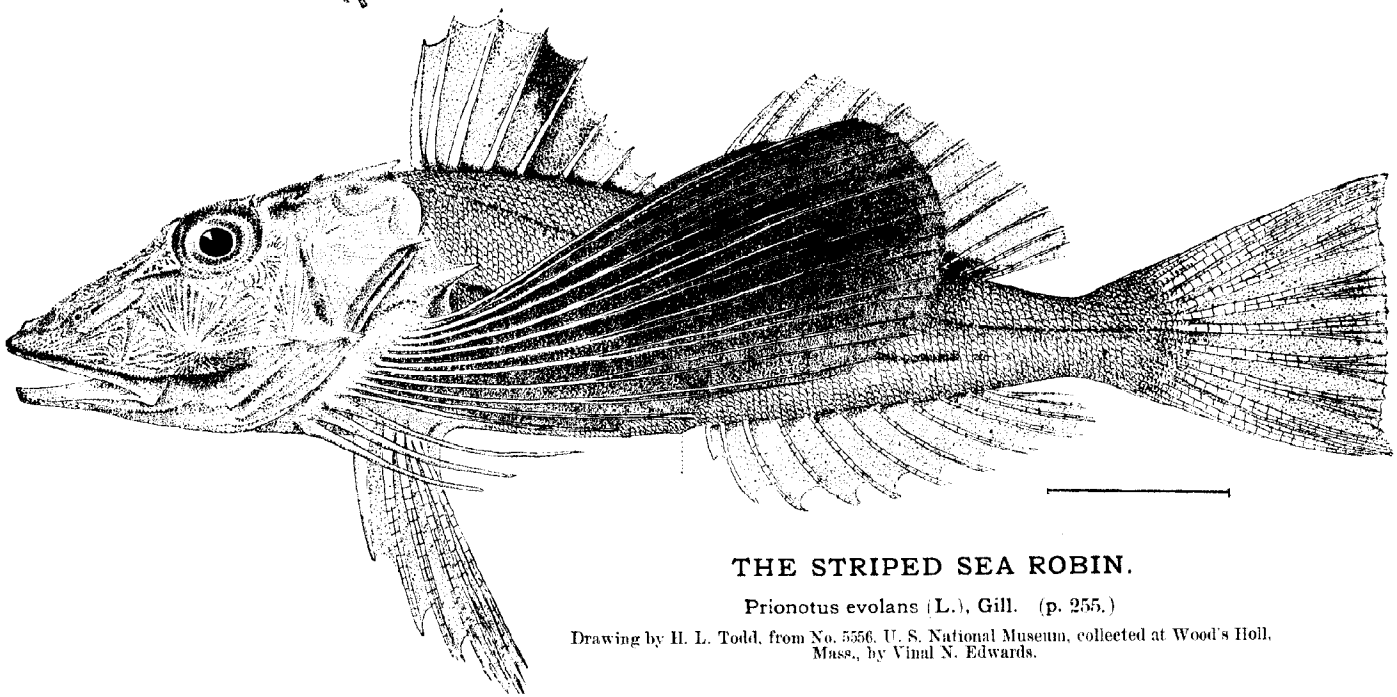
PLATE 70.



## THE SEA ROBIN OR WING-FISH.

Prionotus palmipes (Mitch.), Storer. (p. 255.)

Drawing by H. L. Todd, from No. 774. U. S. National Museum, collected at Beesley's Point, New Jersey, 1858, by Prof. S. F. Baird.

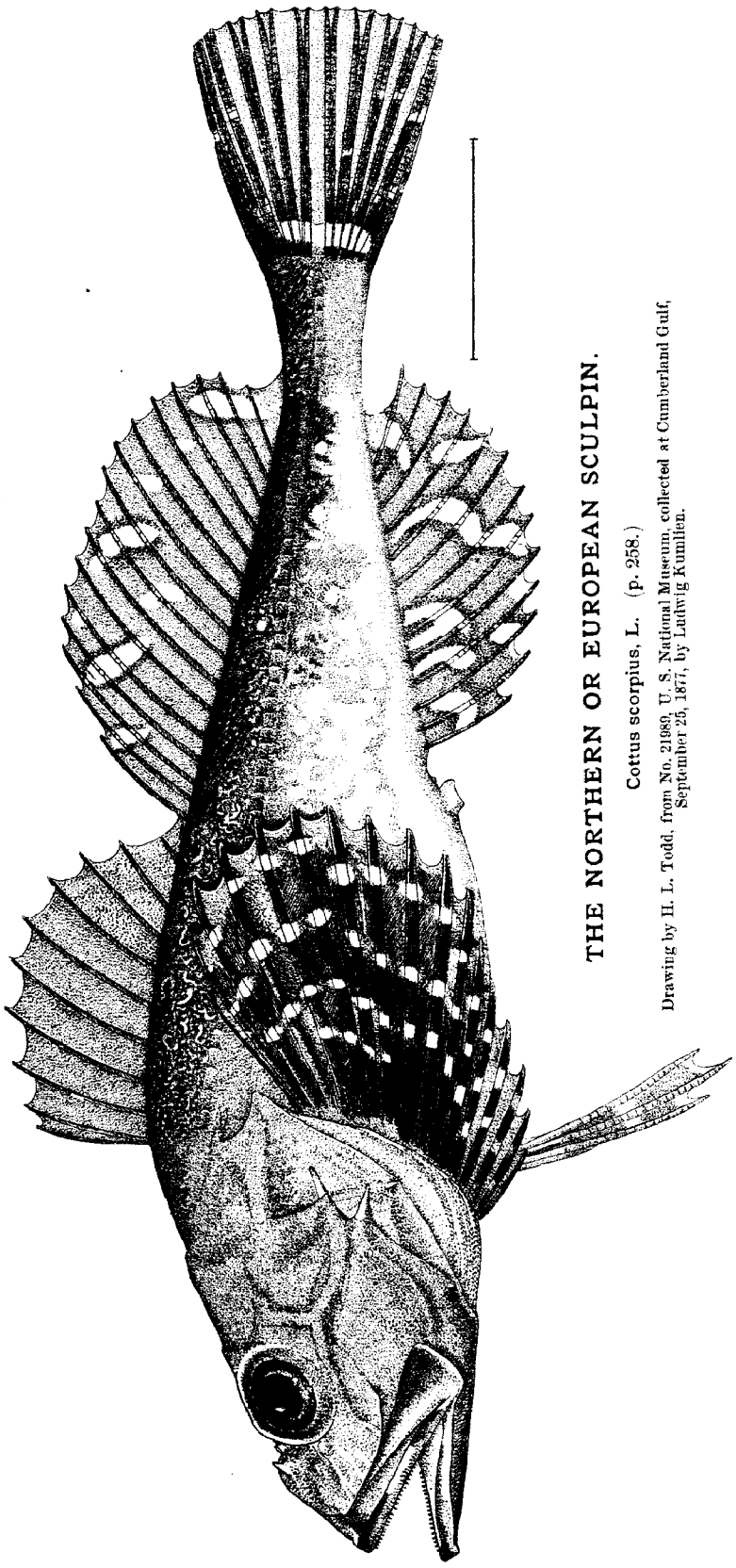


## THE STRIPED SEA ROBIN.

Prionotus evolans (L.), Gill. (p. 255.)

Drawing by H. L. Todd, from No. 5556, U. S. National Museum, collected at Wood's Holl, Mass., by Vinal N. Edwards.

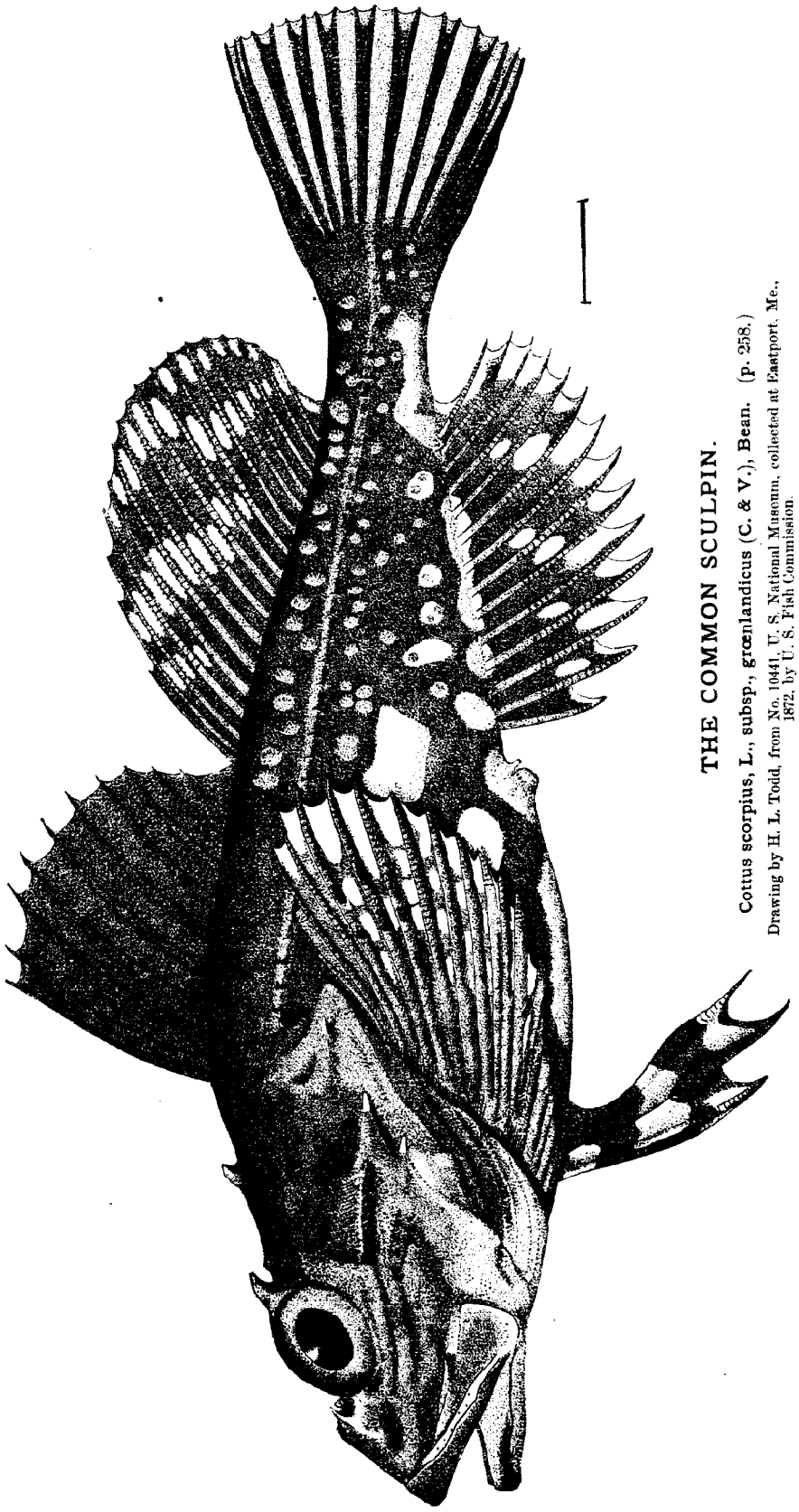
PLATE 71.



## THE NORTHERN OR EUROPEAN SCULPIN.

Cottus scorpius, L. (p. 258.)

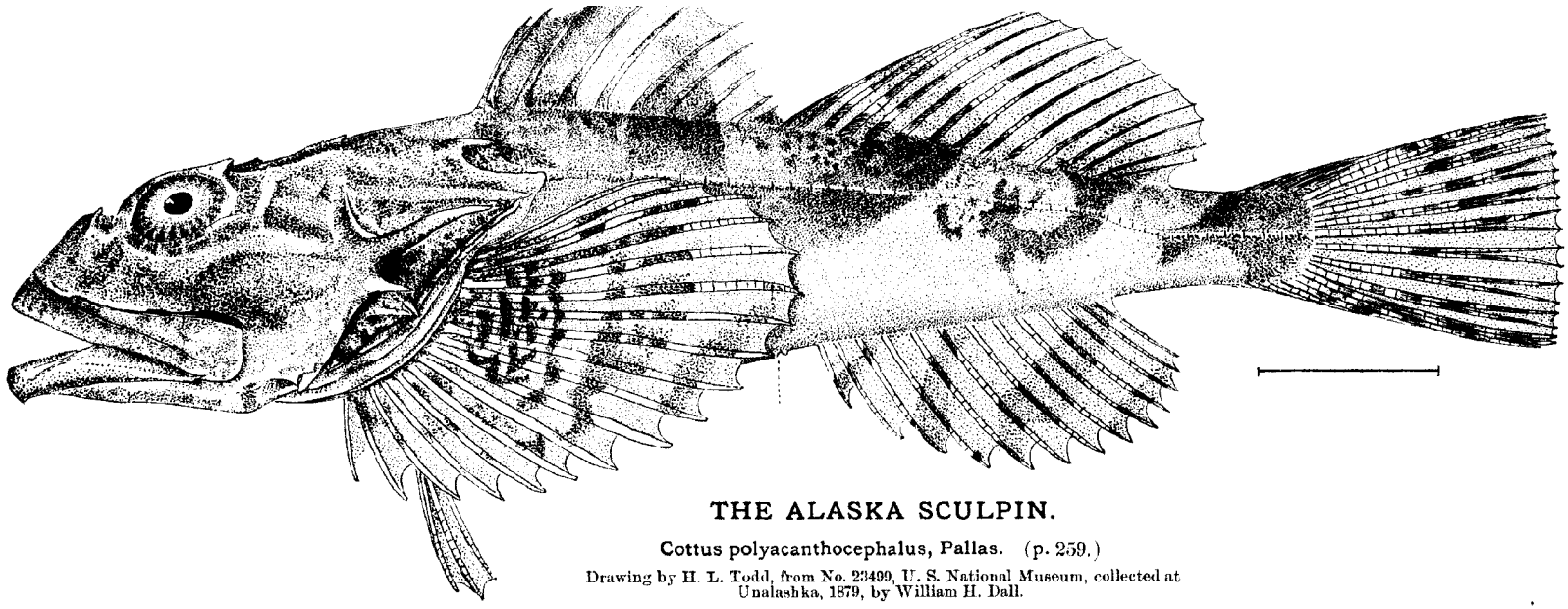
Drawing by H. L. Todd, from No. 21989, U. S. National Museum, collected at Cumberland Gulf, September 25, 1877, by Ludwig Kumlien.



THE COMMON SCULPIN.

Cottus scorpius, L., subsp., grœnlandicus (C. & V.), Bean. (p. 258.)

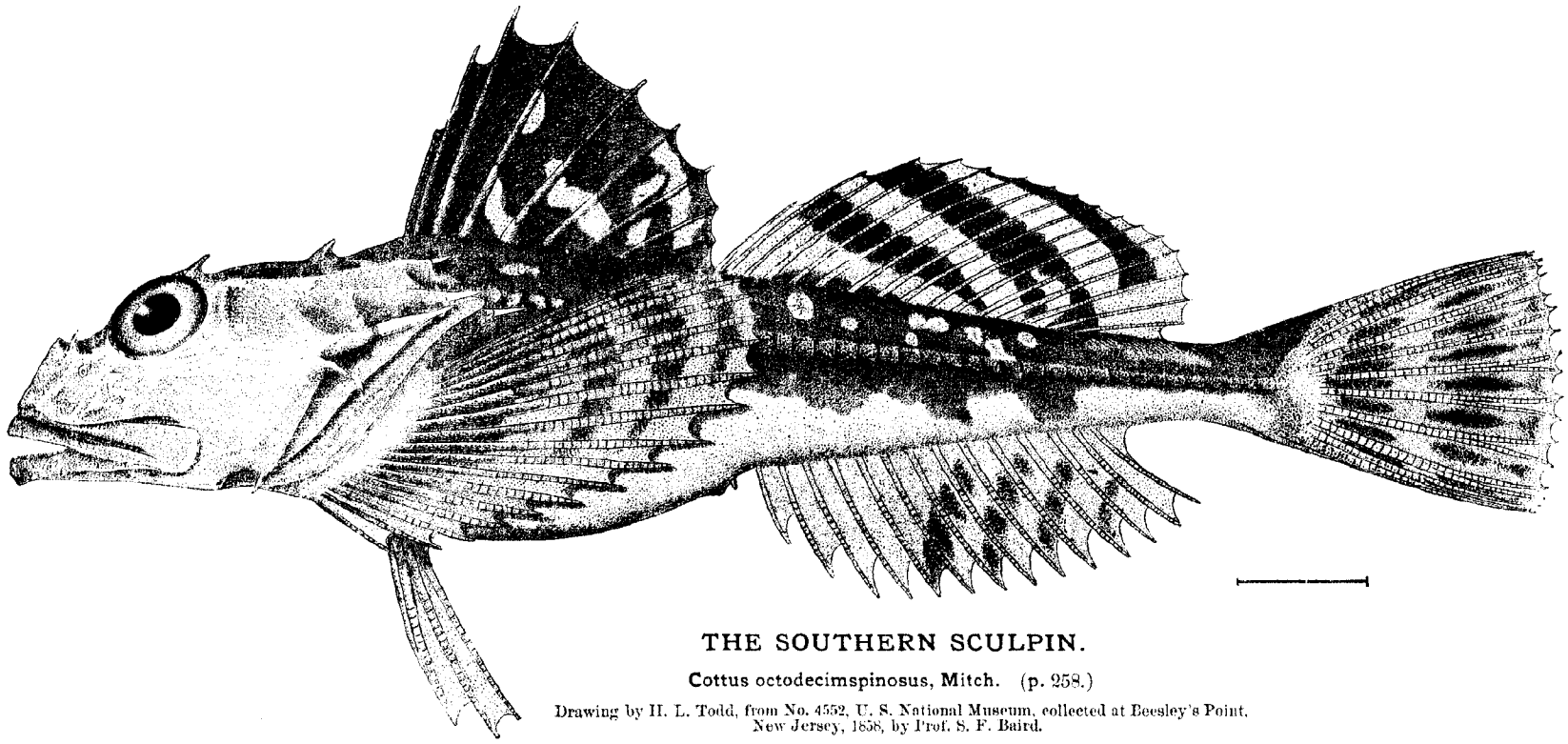
Drawing by H. L. Todd, from No. 10441, U. S. National Museum, collected at Eastport, Me., 1872, by U. S. Fish Commission.



## THE ALASKA SCULPIN.

**Cottus polyacanthocephalus, Pallas.** (p. 259.)

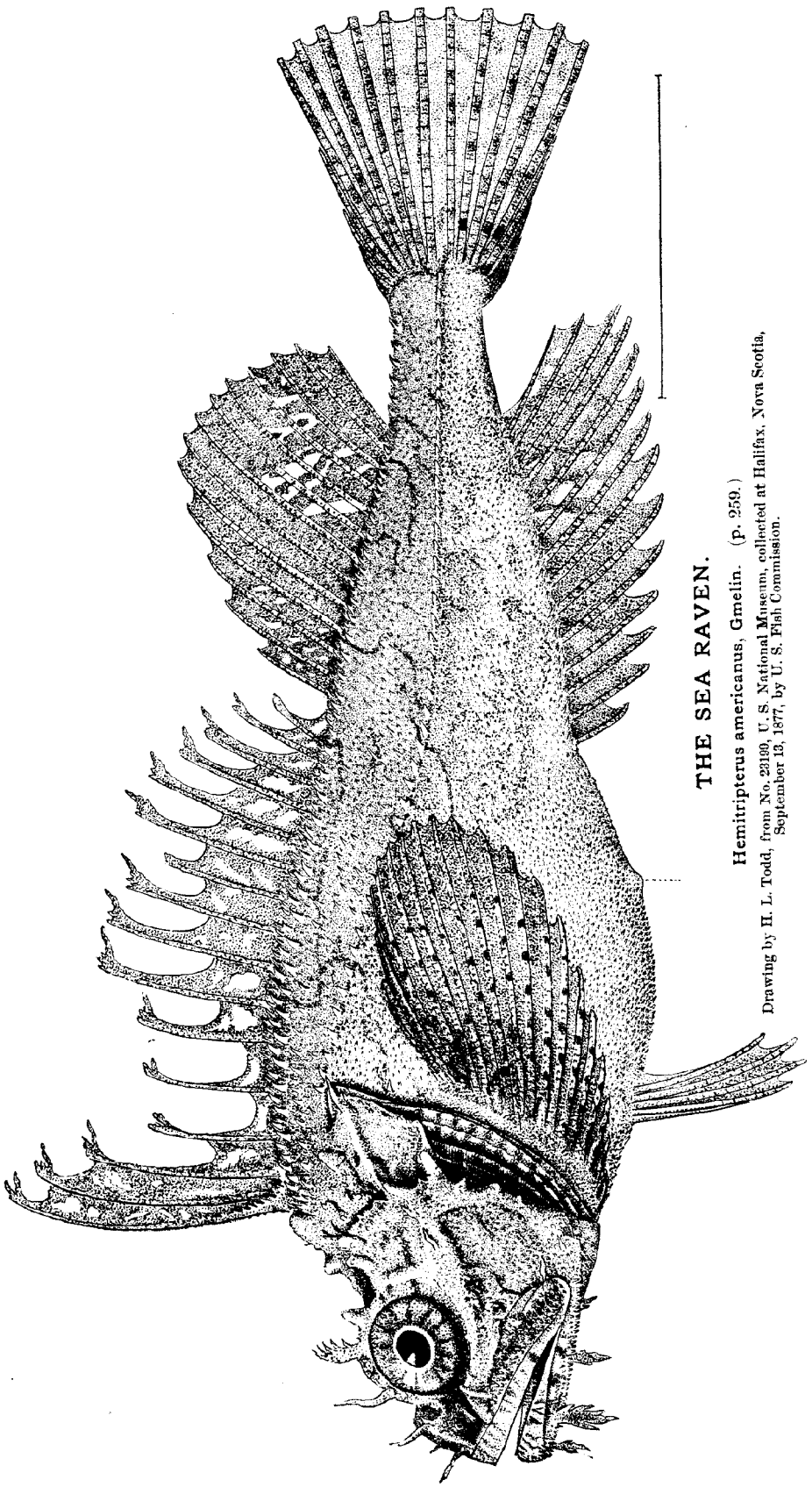
Drawing by H. L. Todd, from No. 23499, U. S. National Museum, collected at Unalashka, 1879, by William H. Dall.



## THE SOUTHERN SCULPIN.

**Cottus octodecimspinosus, Mitch.** (p. 258.)

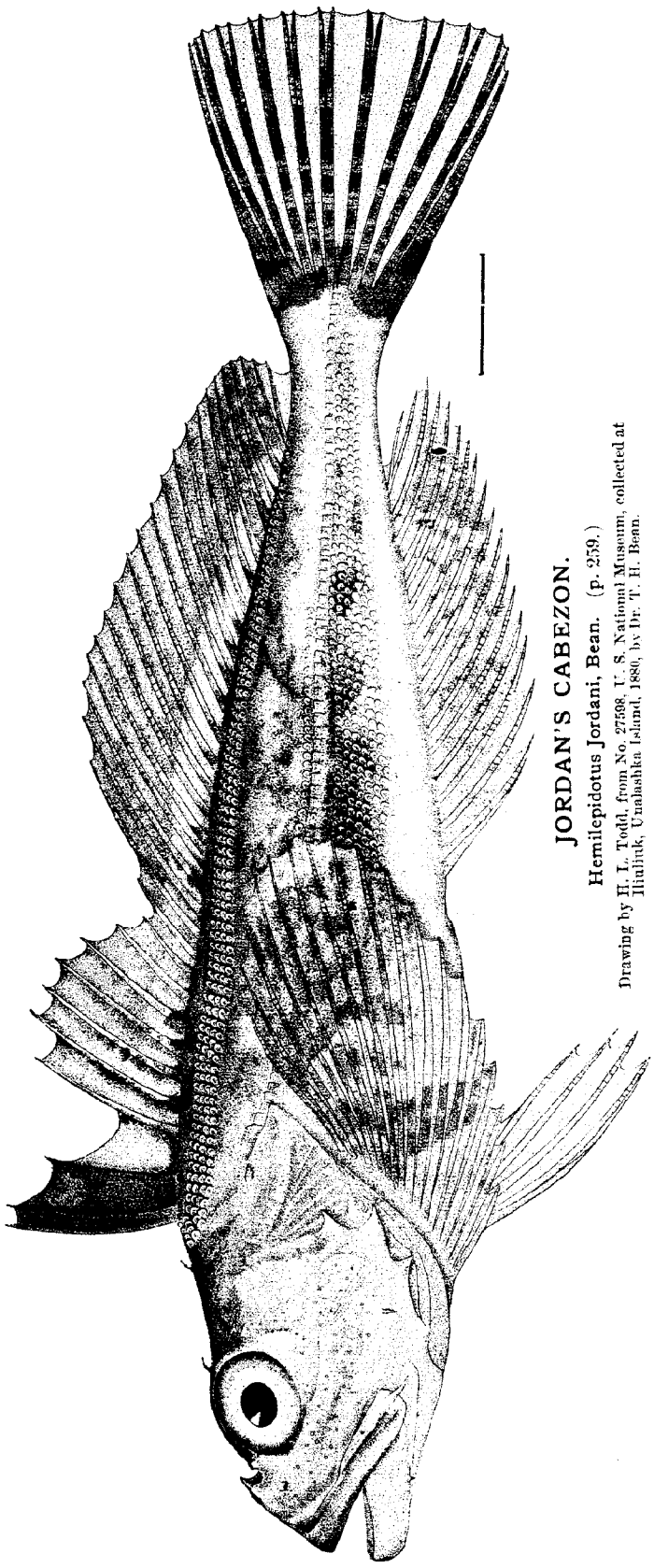
Drawing by H. L. Todd, from No. 4552, U. S. National Museum, collected at Beesley's Point, New Jersey, 1858, by Prof. S. F. Baird.



## THE SEA RAVEN.

**Hemitripterus americanus**, Gmelin. (p. 259.)

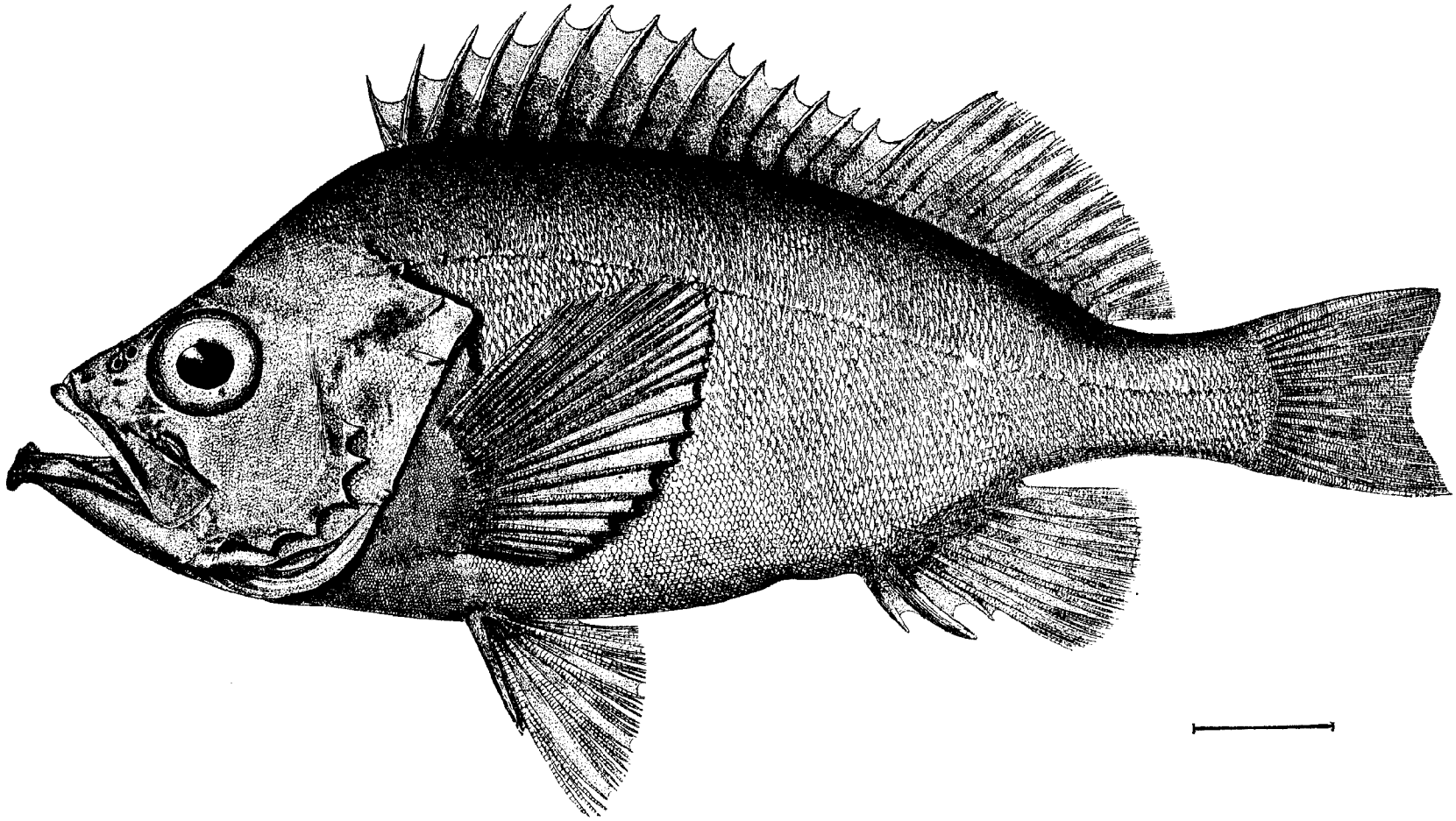
Drawing by H. L. Todd, from No. 23190, U. S. National Museum, collected at Halifax, Nova Scotia, September 13, 1877, by U. S. Fish Commission.



JORDAN'S CABEZON.

Hemilepidotus Jordani, Bean. (p. 259.)

Drawing by H. L. Todd, from No. 27598, U. S. National Museum, collected at Unalaska, Unalashka Island, 1880, by Dr. T. H. Bean.



## THE ROSE-FISH OR NORWAY HADDOCK.

Sebastes marinus (L.), Lütken. (p. 260.)

Drawing by H. L. Todd, from No. 10442, U. S. National Museum, collected at Eastport, Me., 1872, by U. S. Fish Commission.

PLATE 75.

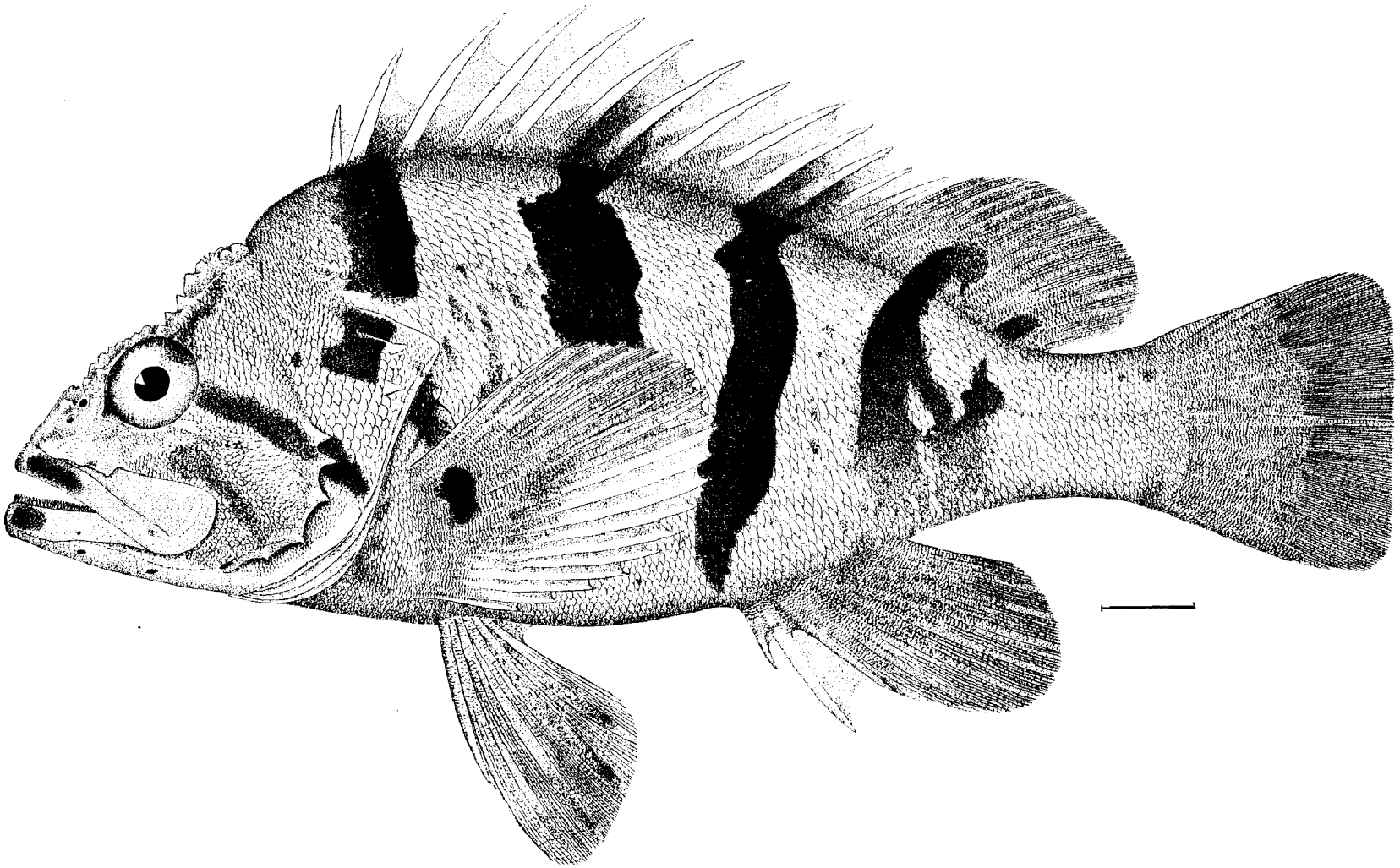
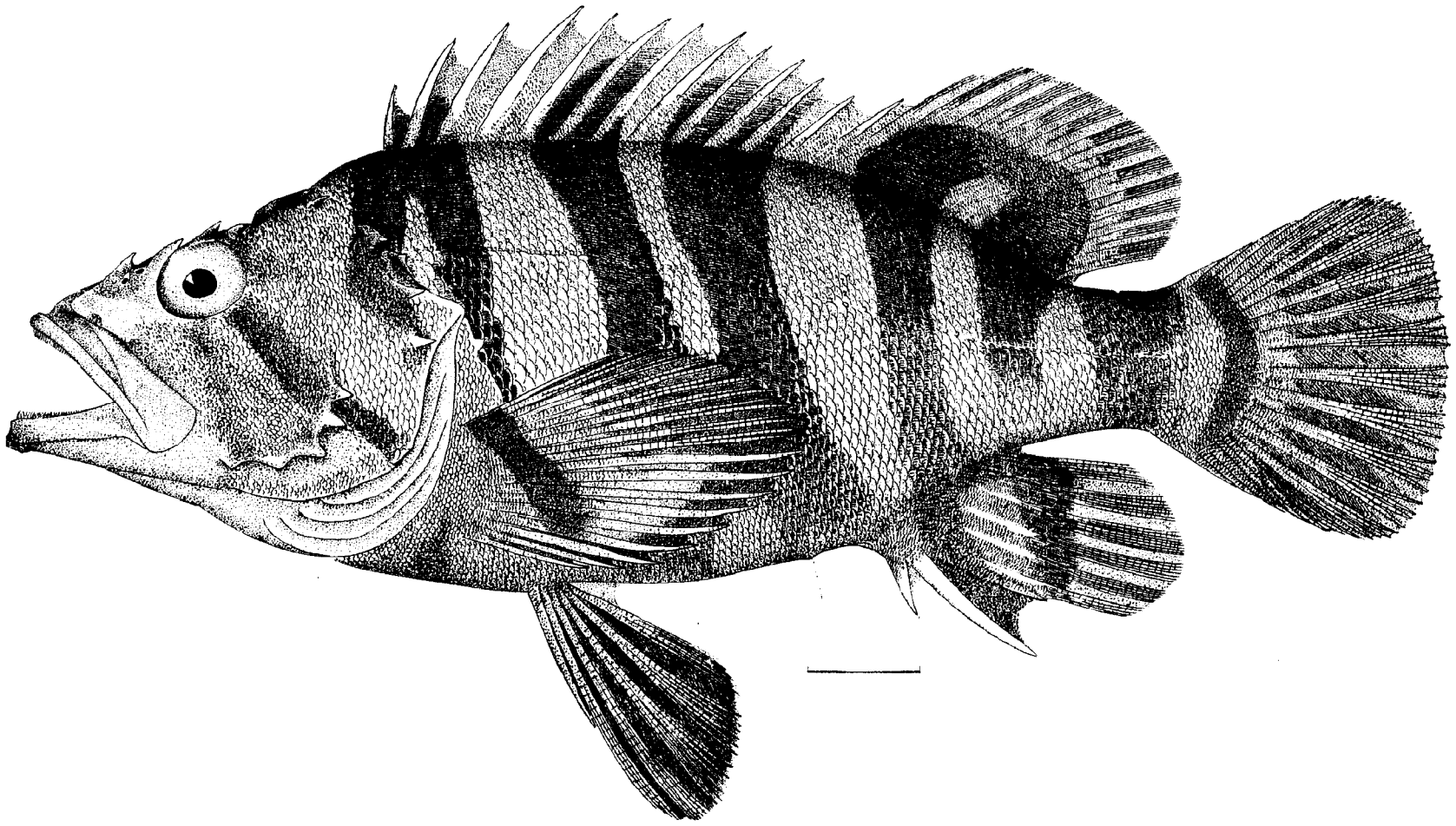


PLATE 76.

## THE BLACK-BANDED ROCKFISH.

Sebastichthys nigrocinctus (Ayres), Gill. (p. 263.)

Drawing by H. L. Todd, from No. 27285, U. S. National Museum, collected at Puget Sound, 1880, by Jordan and Gilbert.

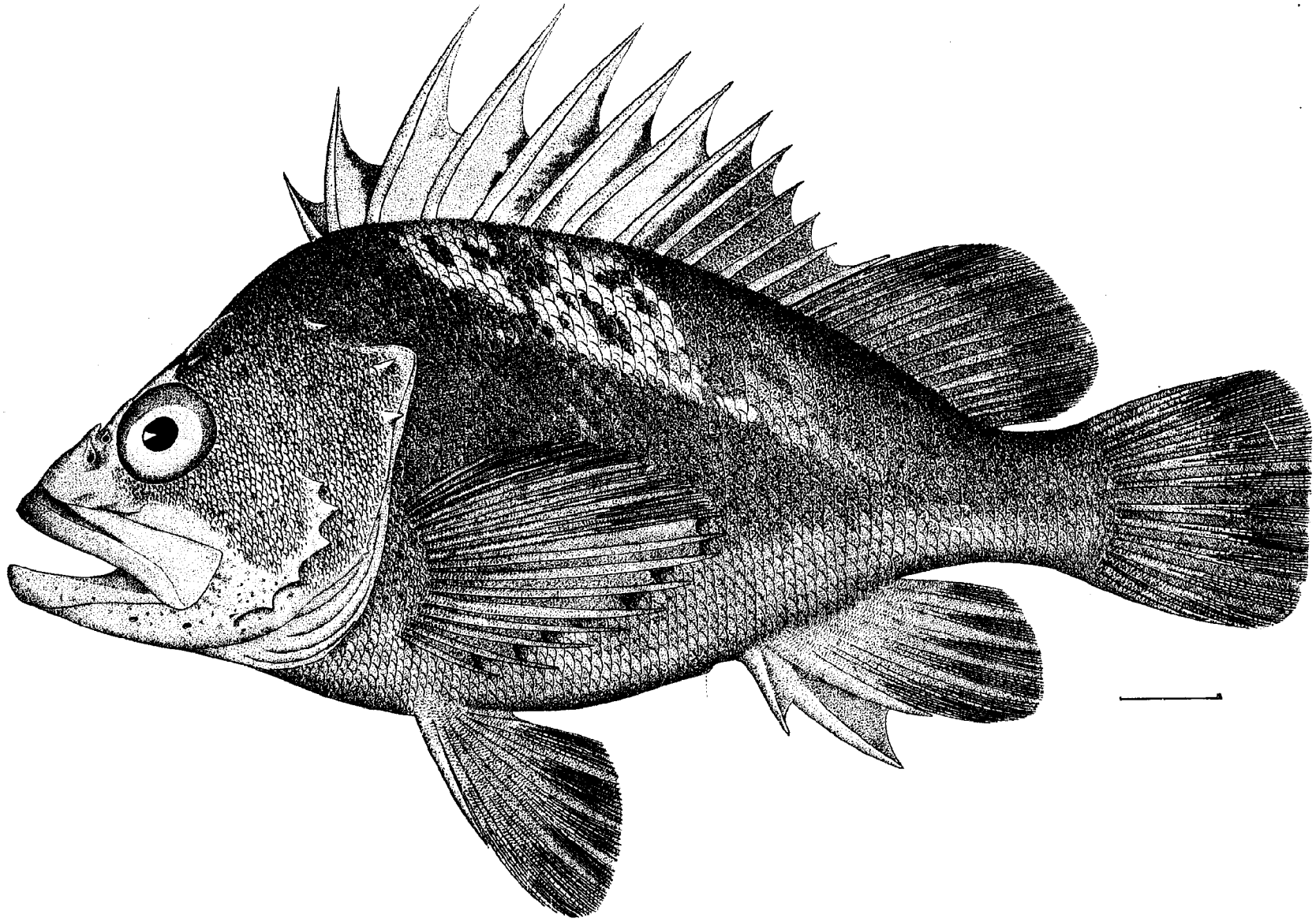


## THE TREE-FISH.

Sebastichthys serriceps, J. & G. (p. 263.)

Drawing by H. L. Todd, from No. 27041, U. S. National Museum, collected at Monterey, Cal., 1880, by Jordan and Gilbert.

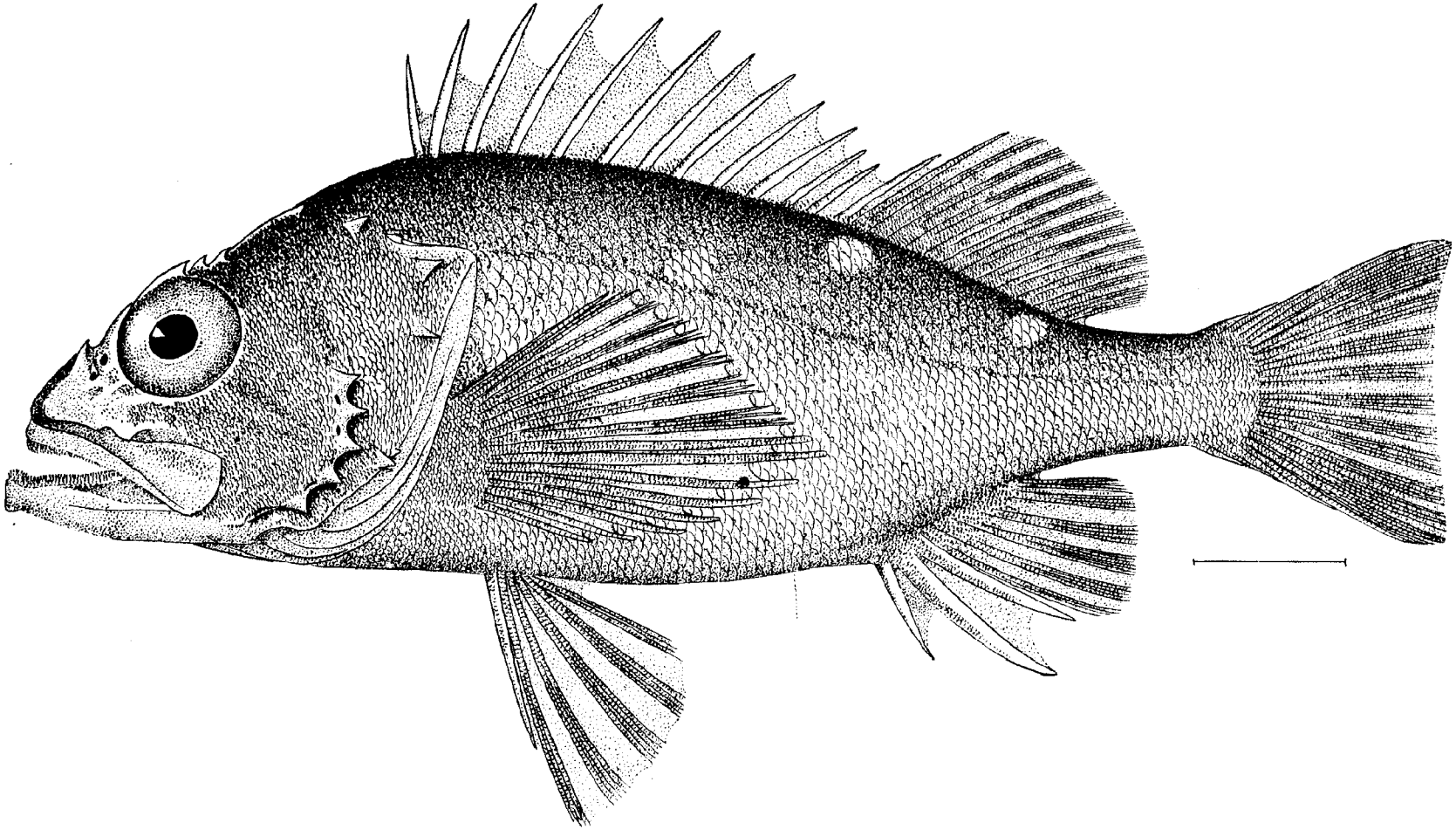
PLATE 77.



## THE YELLOW-BACKED ROCKFISH.

Sebastichthys maliger, J. & G. (p. 264.)

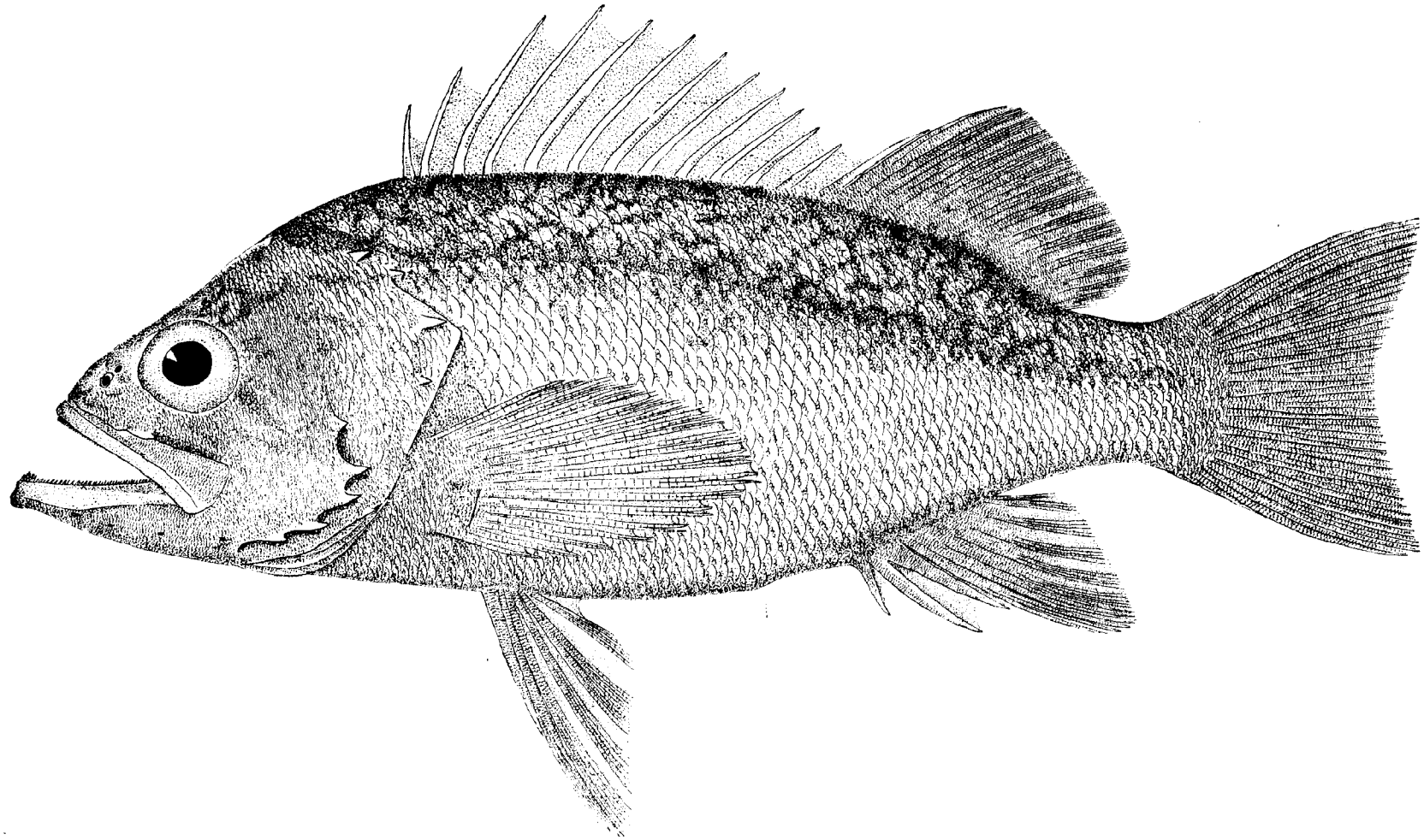
Drawing by H. L. Todd, from No. 27713, U. S. National Museum, collected at Sitka, Alaska, June 2, 1880, by Dr. T. H. Bean.



## THE CORSAIR.

Sebastichthys rosaceus (Grd.), Lock. (p. 265.)

Drawing by H. L. Todd, from No. 26961, U. S. National Museum, collected at Santa Barbara, Cal., 1880, by Jordan and Gilbert.

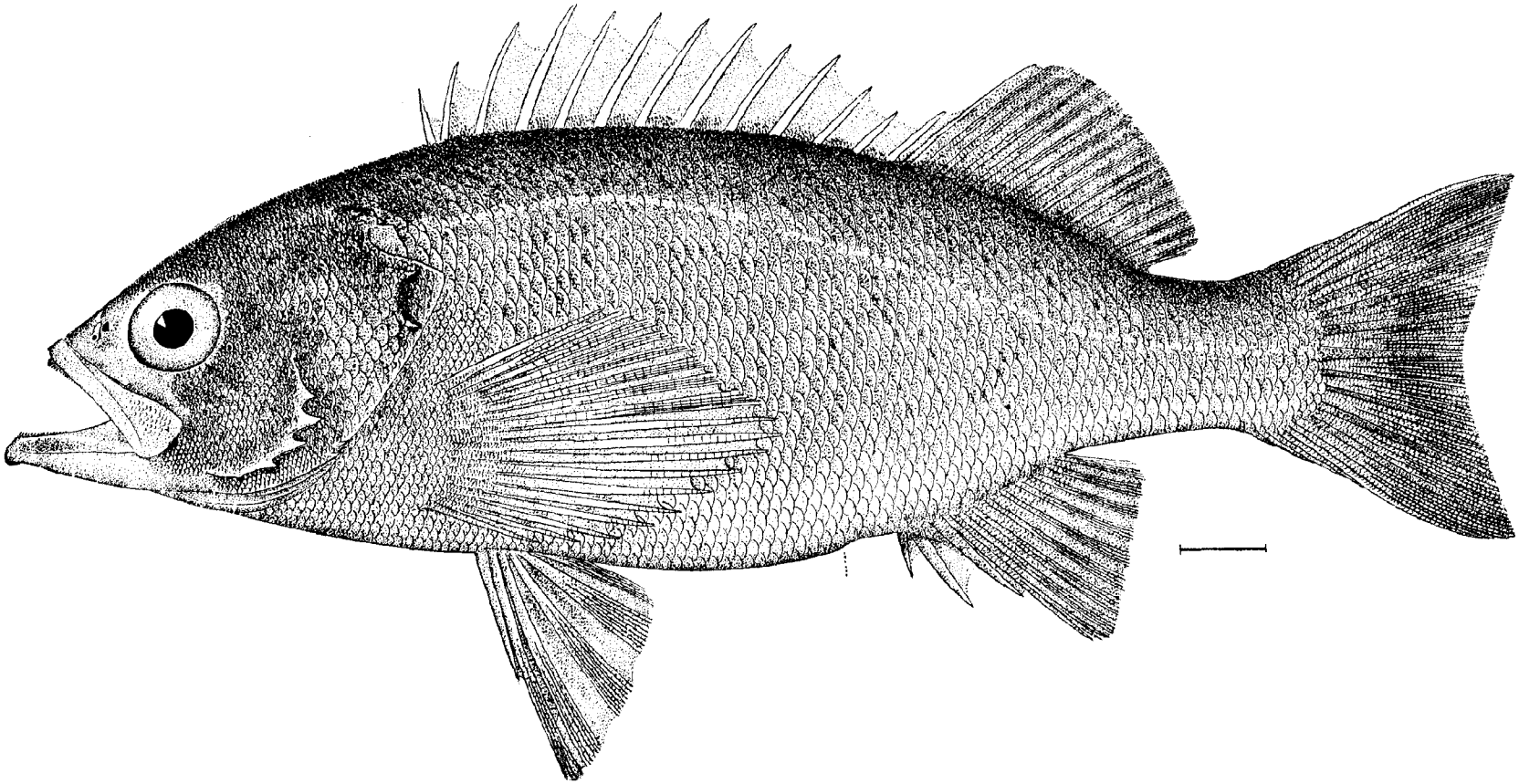


## THE ORANGE ROCKFISH.

Sebastichthys pinniger (Gill.), Lock. (p. 265.)

Drawing by H. L. Todd, from No. 27488, U. S. National Museum, collected at Neah Bay, Washington Territory, December, 1880, by James G. Swan.

PLATE 80.

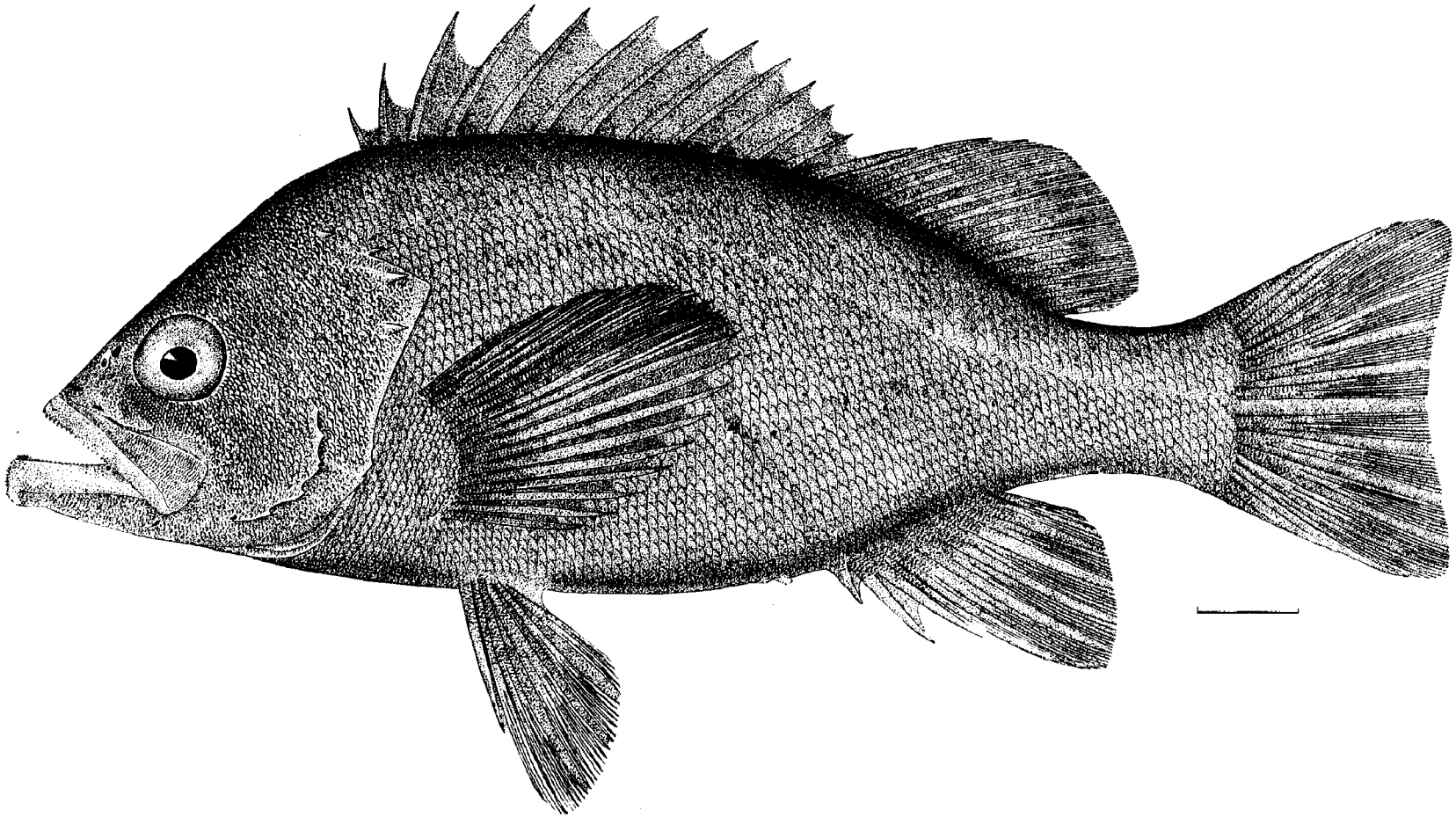


## THE BLACK ROCKFISH.

Sebastichthys mystinus, J. & G. (p. 266.)

Drawing by H. L. Todd, from No. 27031, U. S. National Museum, collected at Monterey, Cal., 1880, by Jordan and Gilbert.

PLATE 81.

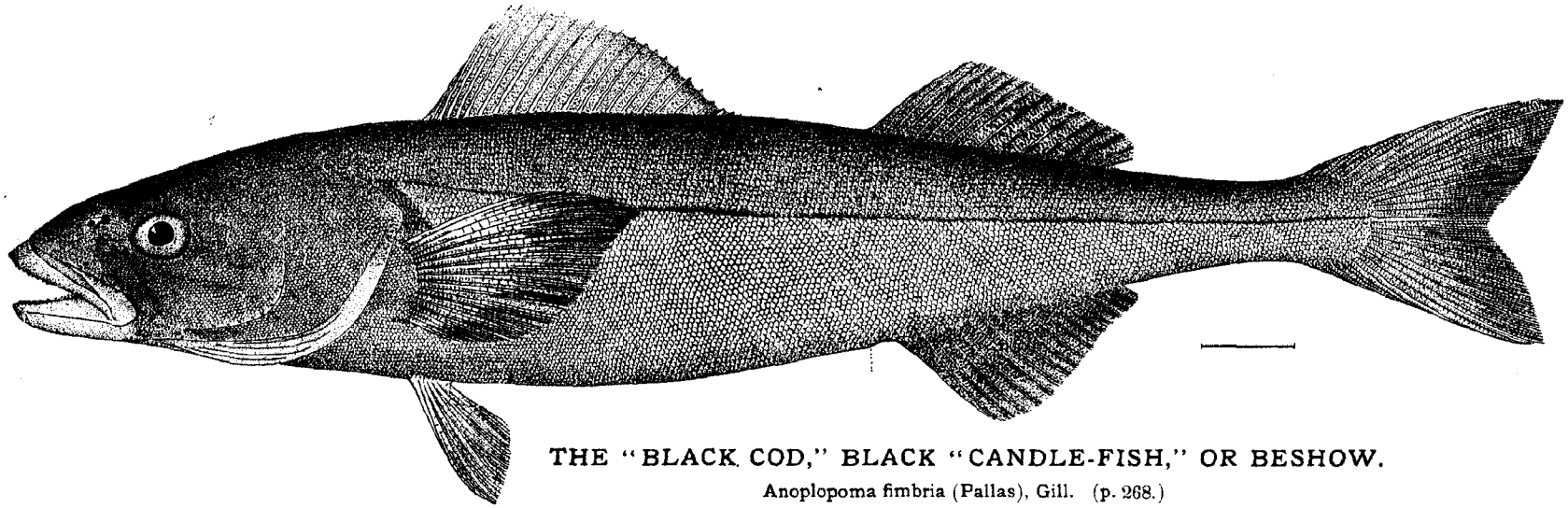


## THE SPOTTED BLACK ROCKFISH.

Sebastichthys melanops (Grd.), J. & G. (p. 266.)

Drawing by H. L. Todd, from No. 27628, U. S. National Museum, collected at Sitka, Alaska, May 28, 1880, by Dr. T. H. Bean.

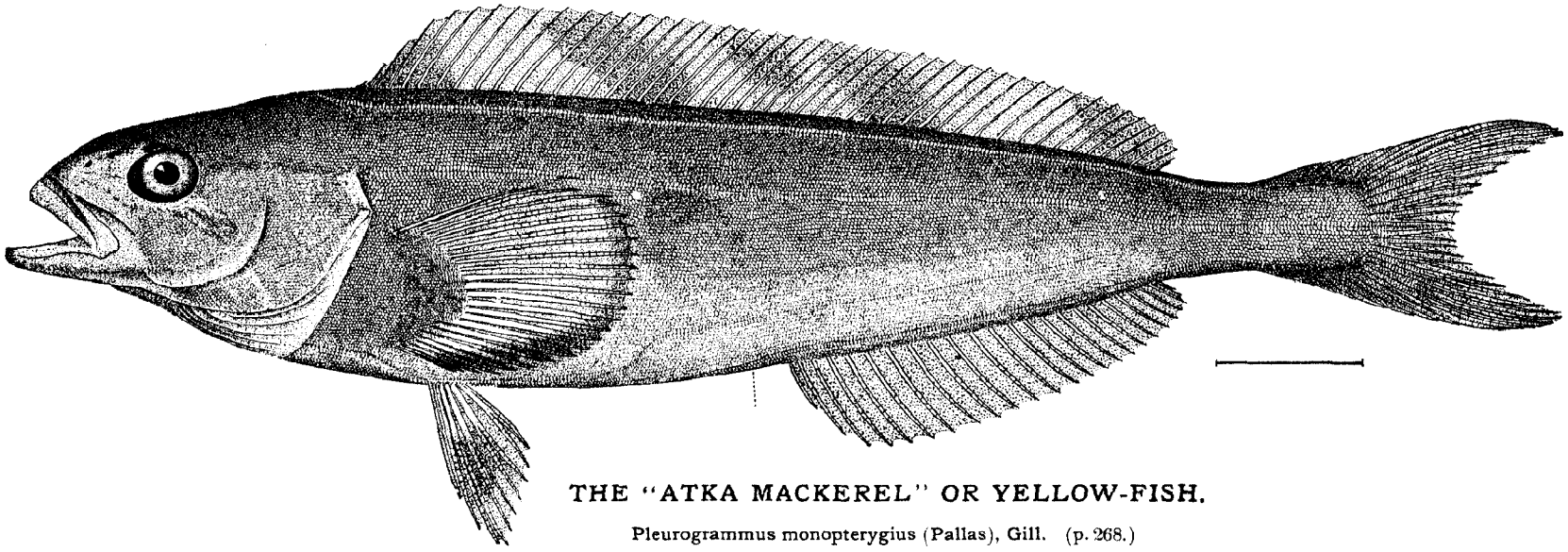
PLATE 82.



## THE "BLACK COD," BLACK "CANDLE-FISH," OR BESHOW.

Anoplopoma fimbria (Pallas), Gill. (p. 268.)

Drawing by H. L. Todd, from No. 27745 U. S. National Museum, collected at Sitka, Alaska, December, 1880, by Commander L. A. Beardslee, U. S. N.

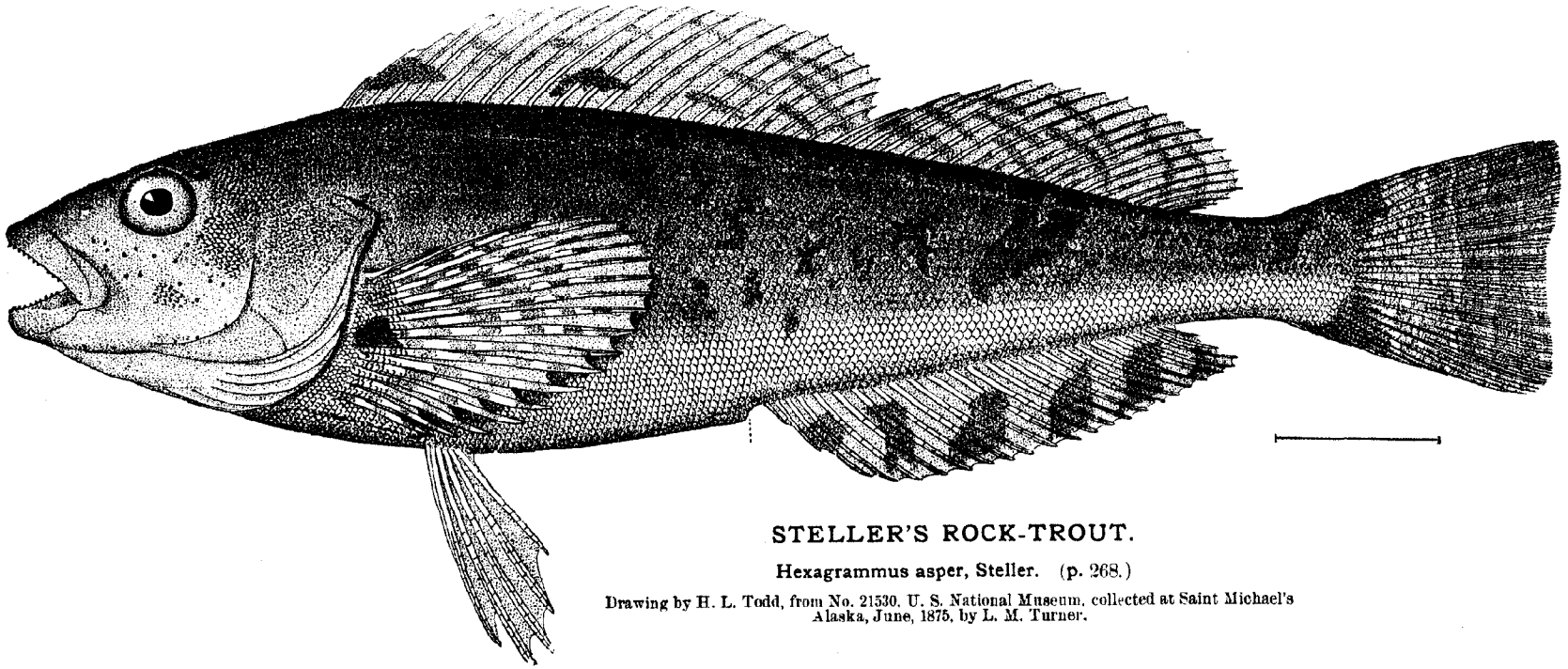


## THE "ATKA MACKEREL" OR YELLOW-FISH.

Pleurogrammus monopterygius (Pallas), Gill. (p. 268.)

Drawing by H. L. Todd, from No. 27954, U. S. National Museum, collected at Iliuliuk, Unalashka, 1880, by Dr. T. H. Bean.

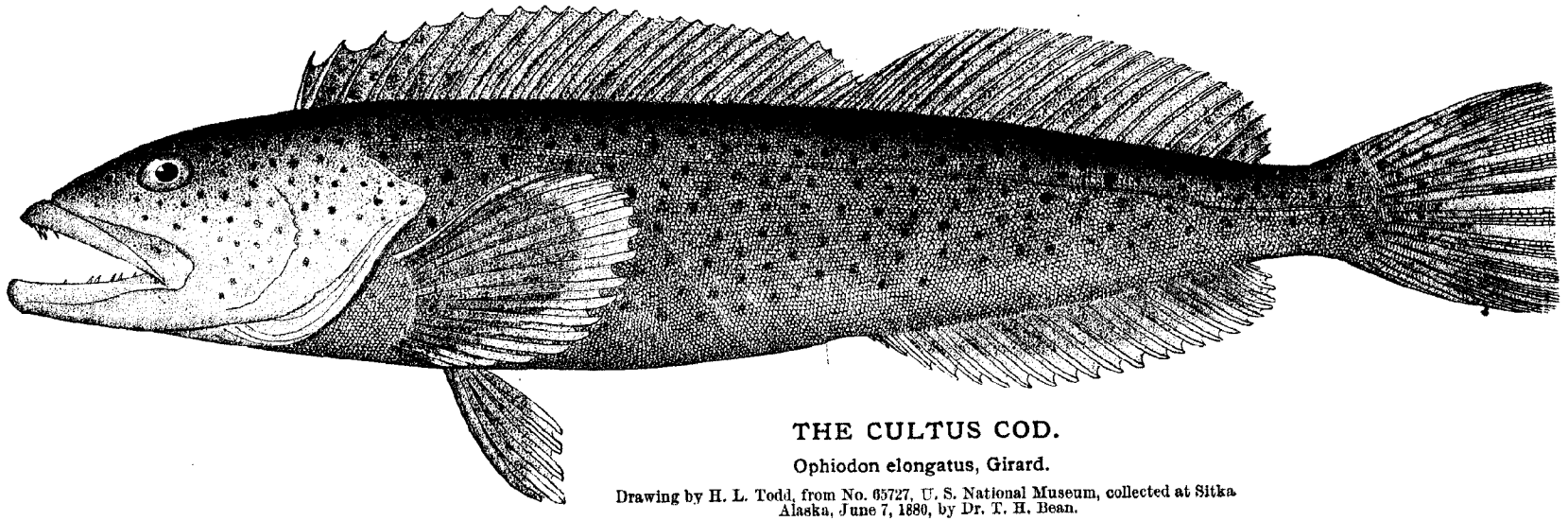
PLATE 83.



## STELLER'S ROCK-TROUT.

**Hexagrammus asper, Steller.** (p. 268.)

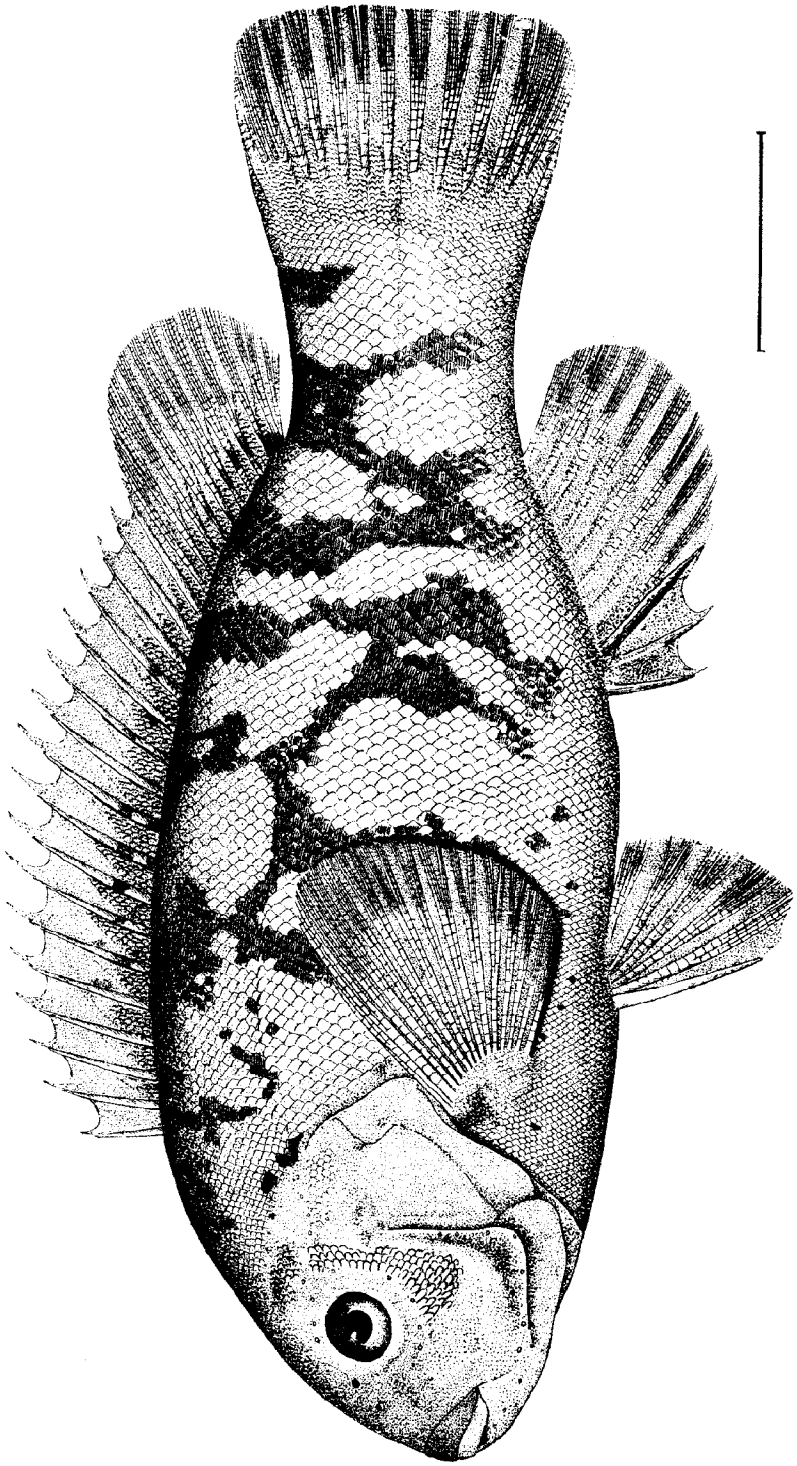
Drawing by H. L. Todd, from No. 21530, U. S. National Museum, collected at Saint Michael's Alaska, June, 1875, by L. M. Turner.



## THE CULTUS COD.

**Ophiodon elongatus, Girard.**

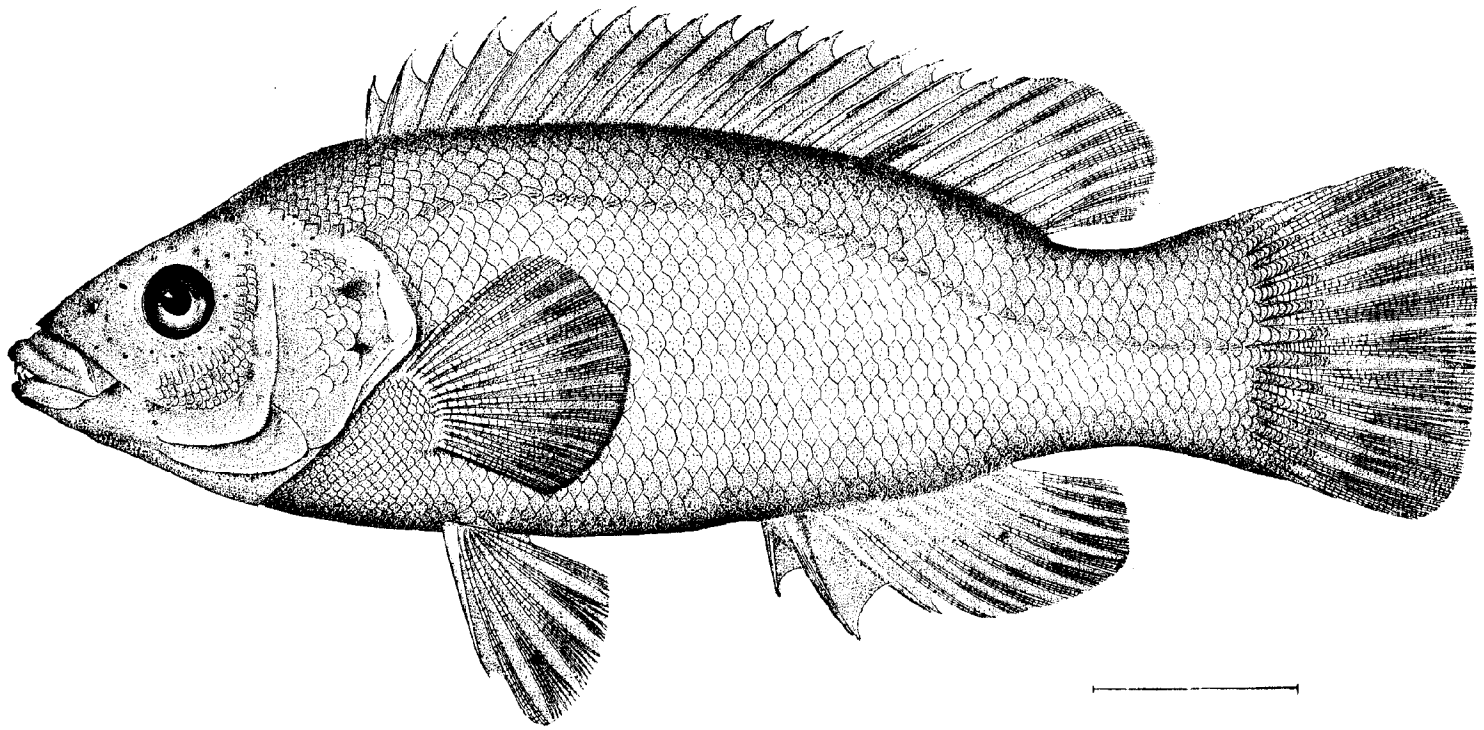
Drawing by H. L. Todd, from No. 65727, U. S. National Museum, collected at Sitka Alaska, June 7, 1880, by Dr. T. H. Bean.



## THE TAUTOG.

**Tautoga onitis (L.), Gthr.** (p. 968.)

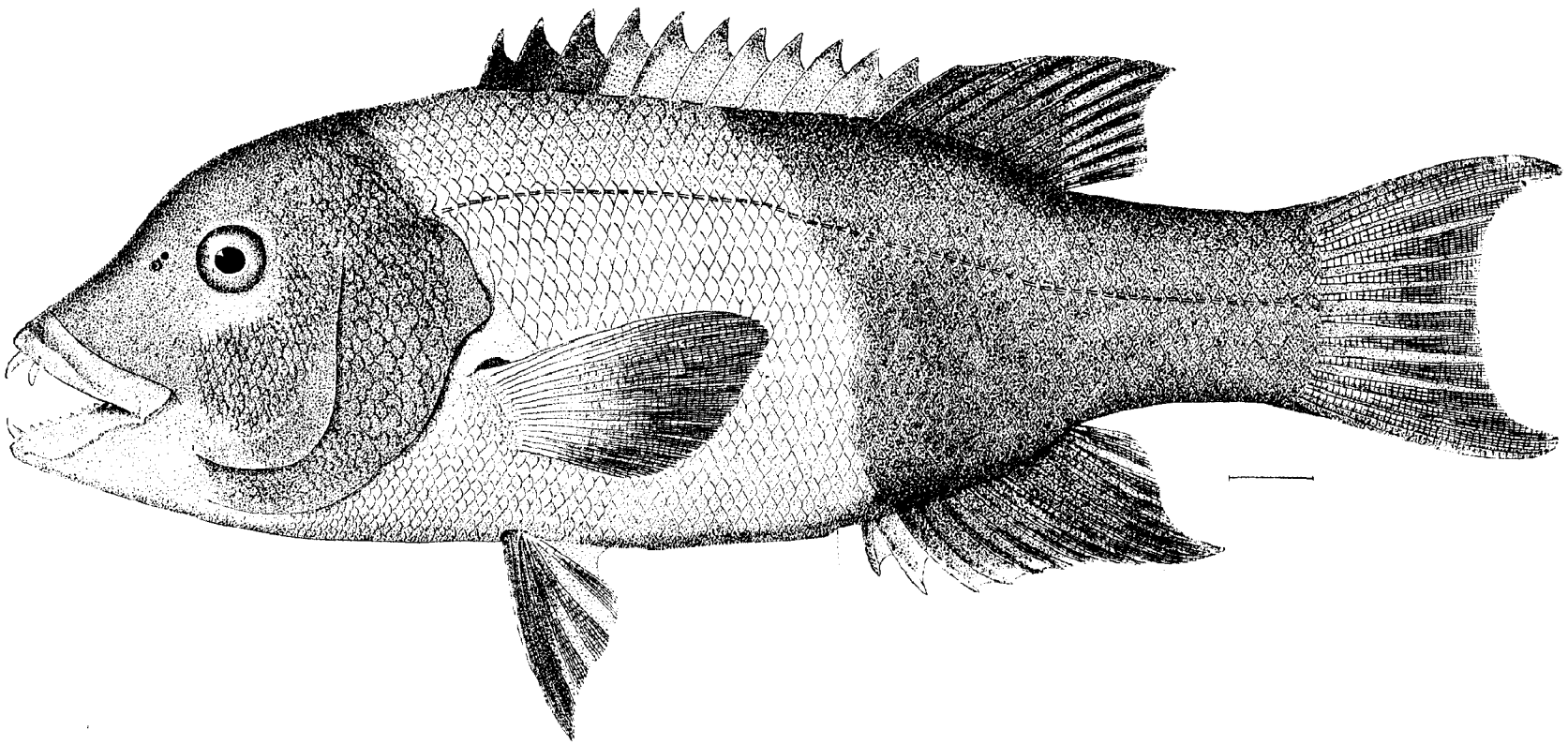
Drawing by H. L. Todd, from No. 17738, U. S. National Museum, collected at Wood's Holl, Mass., December 13, 1875, by Vinal N. Edwards.



## THE CHOGSET OR CUNNER.

Ctenolabrus adspersus (Walb.), Goode. (p. 273.)

Drawing by H. L. Todd, from No. 17741, U. S. National Museum, collected at Wood's Holl, Mass., December 11, 1875, by Vinal N. Edwards.

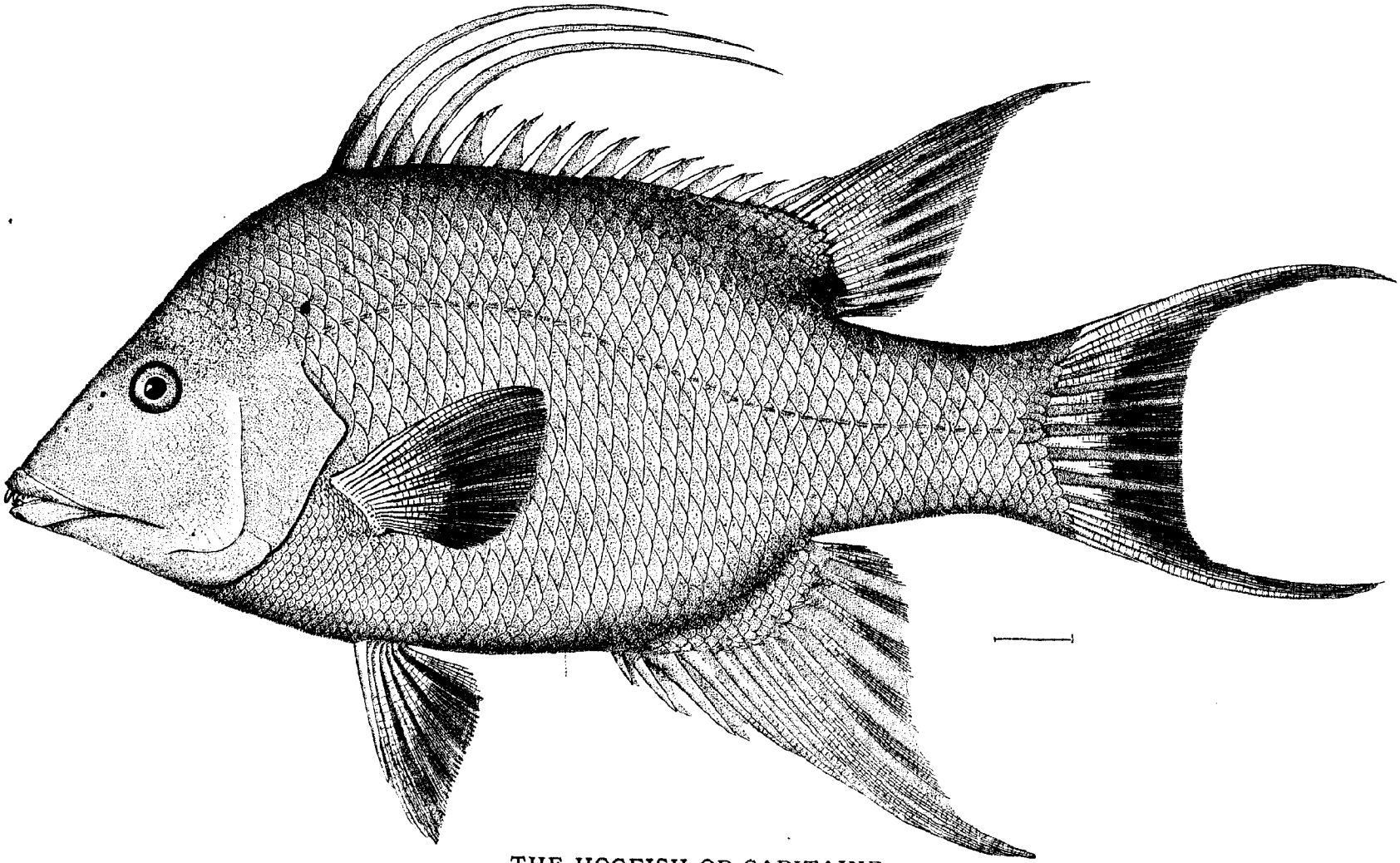


## THE FAT-HEAD OR REDFISH.

Trochocopus pulcher (Ayres), Garman. (p. 275.)

Drawing by H. L. Todd, from No. 24890, U. S. National Museum, collected at San Diego, Cal., January, 1880, by Jordan and Gilbert.

PLATE 87.

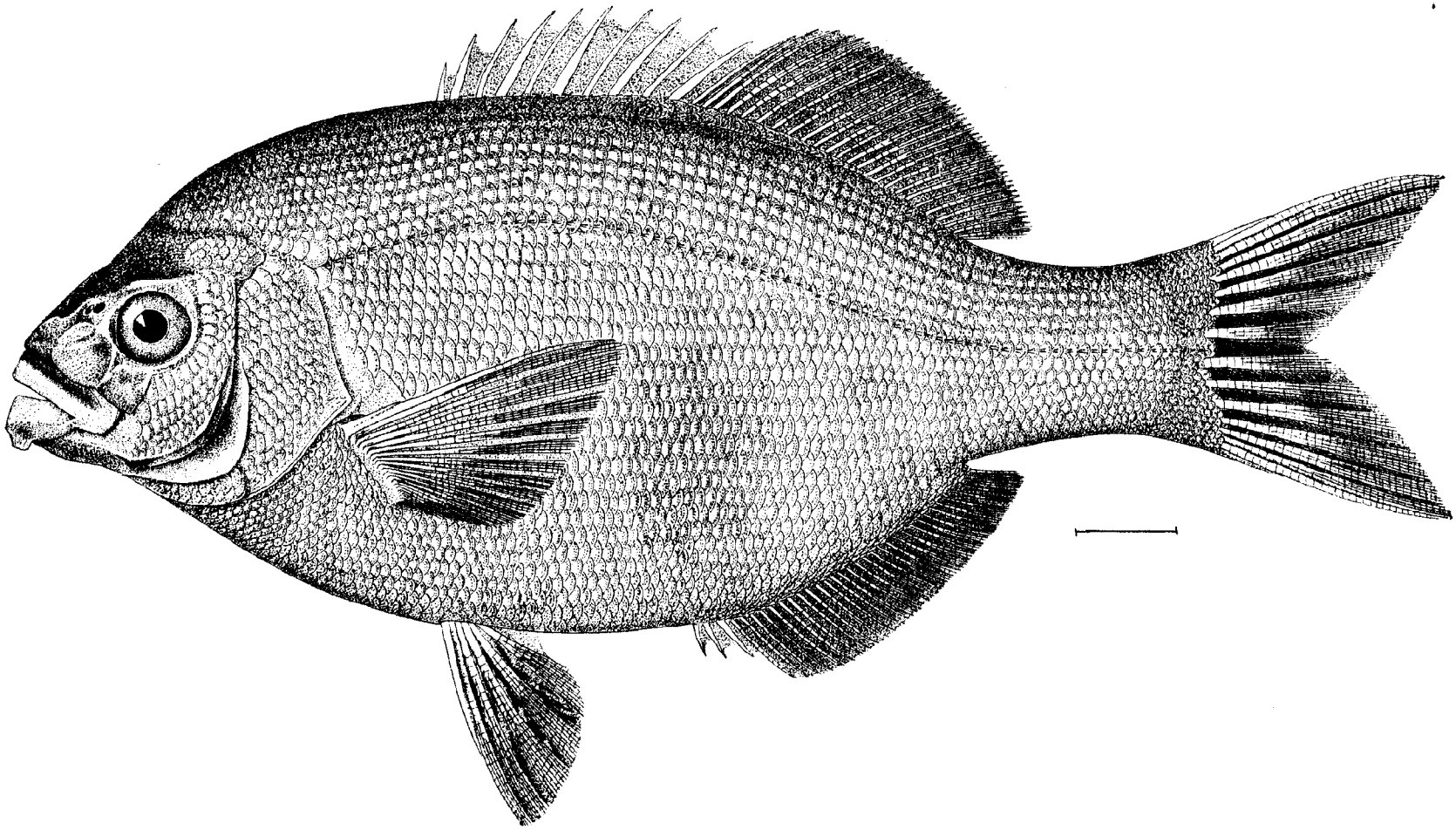


THE HOGFISH OR CAPITAINE.

Lachnolæmus falcatus (L.), C. & V. (p. 275.)

Drawing by H. L. Todd.

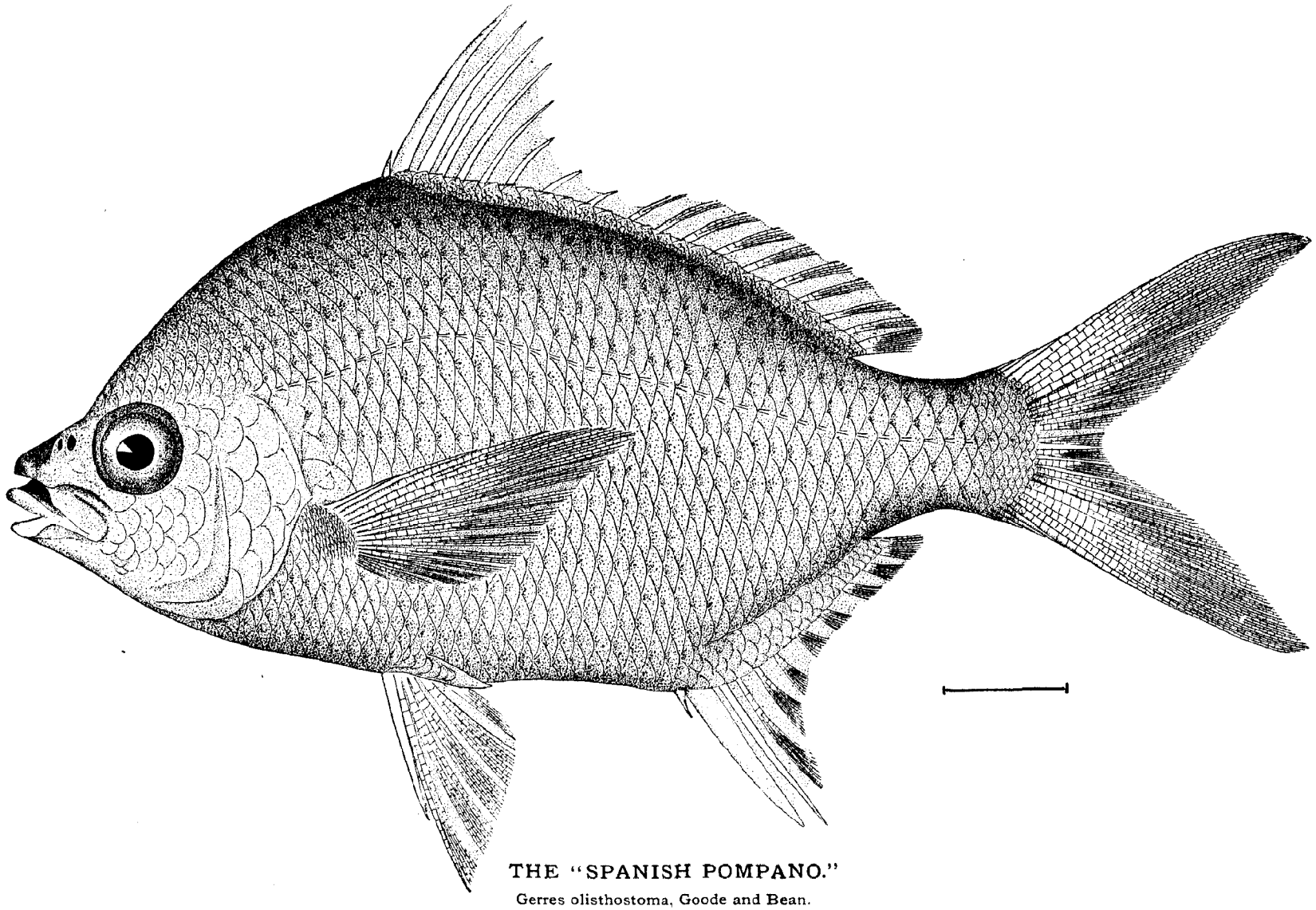
PLATE 88.



## THE ALFIONE.

**Rhacochilus toxotes, Agassiz.** (p. 277.)

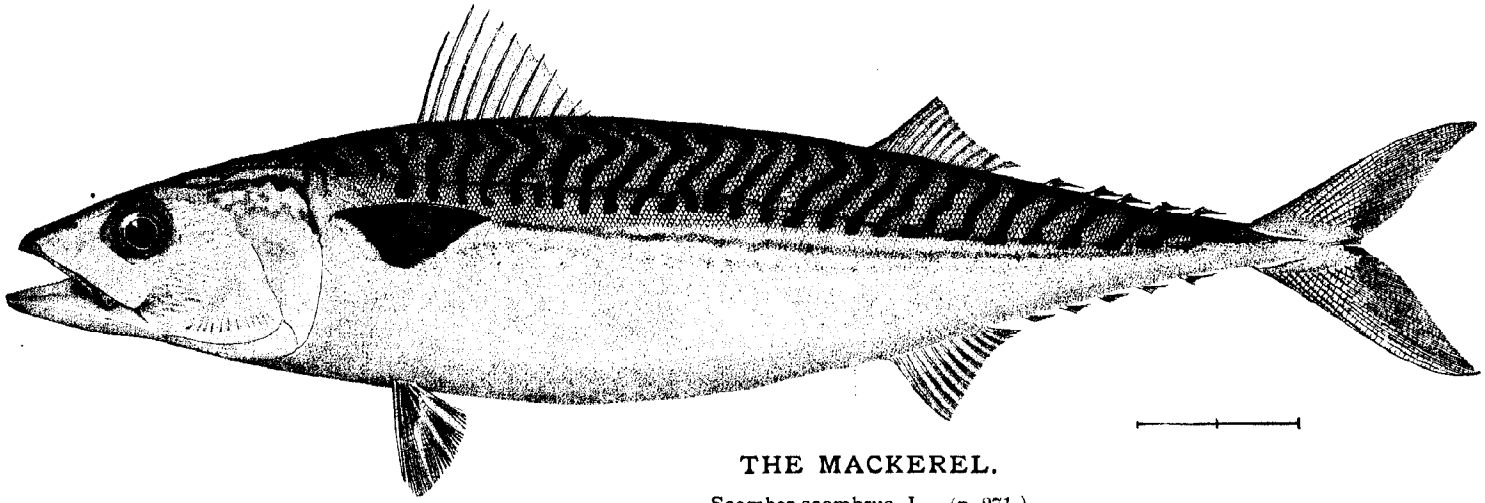
Drawing by H. L. Todd, from No. 27015, U. S. National Museum, collected at Monterey, Cal., 1880, by Jordan and Gilbert.



THE "SPANISH POMPANO."

Gerres olisthostoma, Goode and Bean.

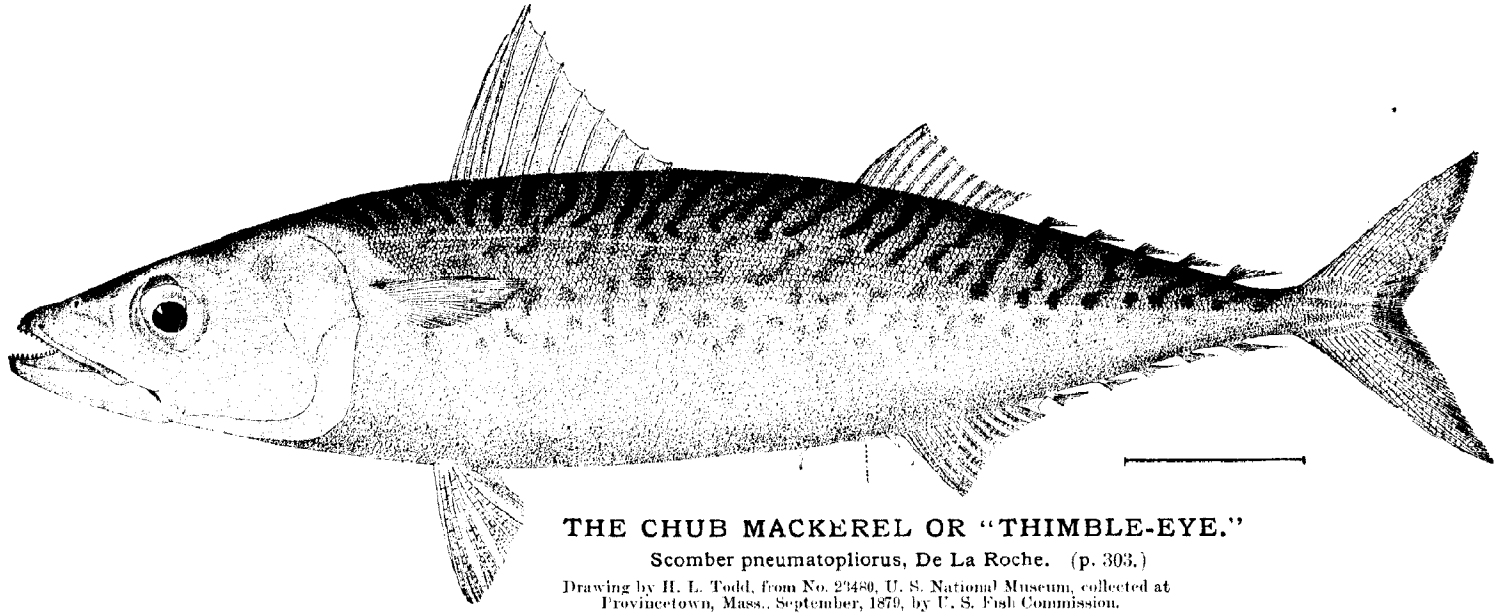
Drawing by H. L. Todd, from No. 25118, U. S. National Museum, collected at Indian River, Florida, March 8, 1880, by R. E. Earll.



## THE MACKEREL.

Scomber scombrus, L. (p. 271.)

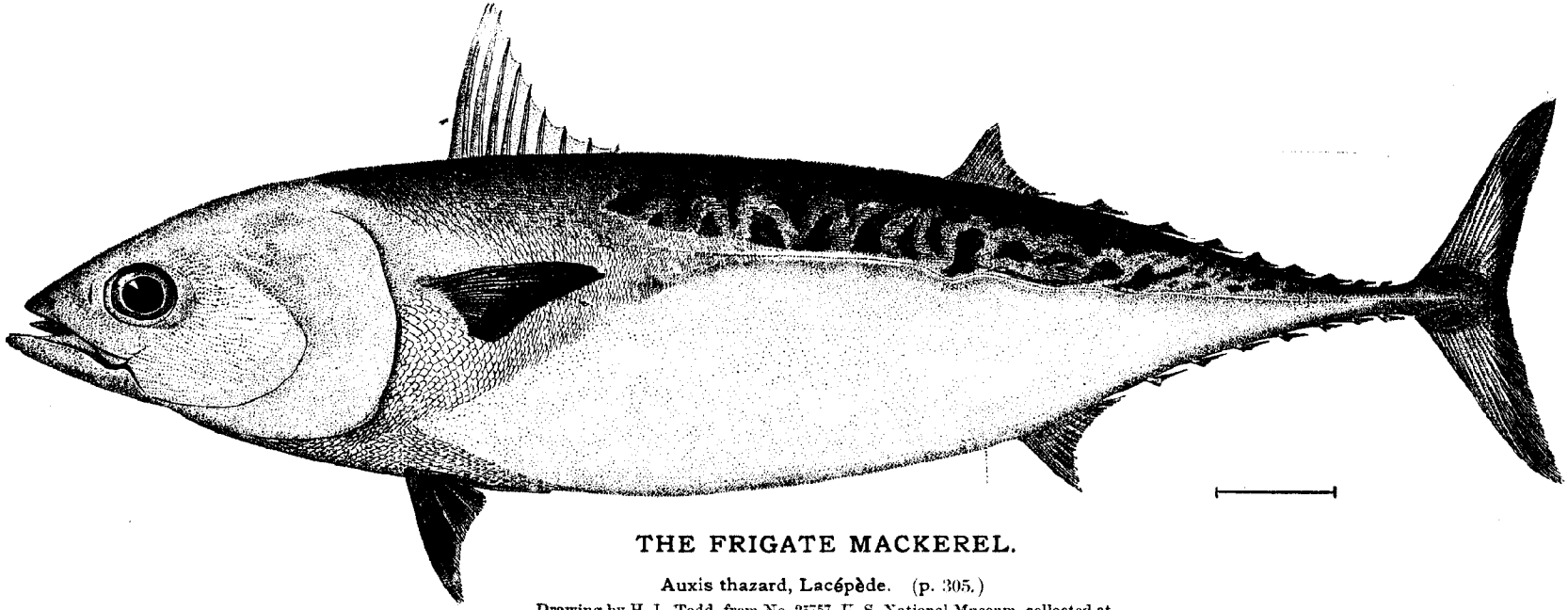
Drawing by H. L. Todd, from No. 25256, U. S. National Museum, collected at Provincetown, Mass., September, 1879, by U. S. Fish Commission.



## THE CHUB MACKEREL OR "THIMBLE-EYE."

Scomber pneumatopliorus, De La Roche. (p. 303.)

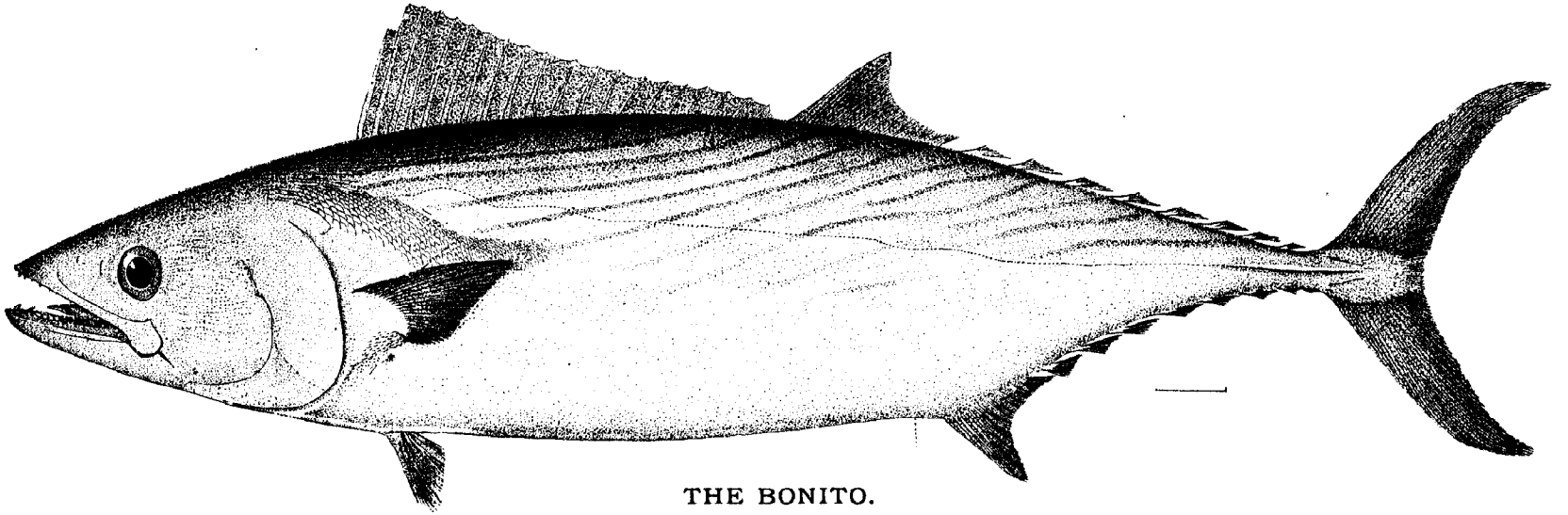
Drawing by H. L. Todd, from No. 23480, U. S. National Museum, collected at Provincetown, Mass., September, 1879, by U. S. Fish Commission.



## THE FRIGATE MACKEREL.

**Auxis thazard, Lacépède.** (p. 305.)

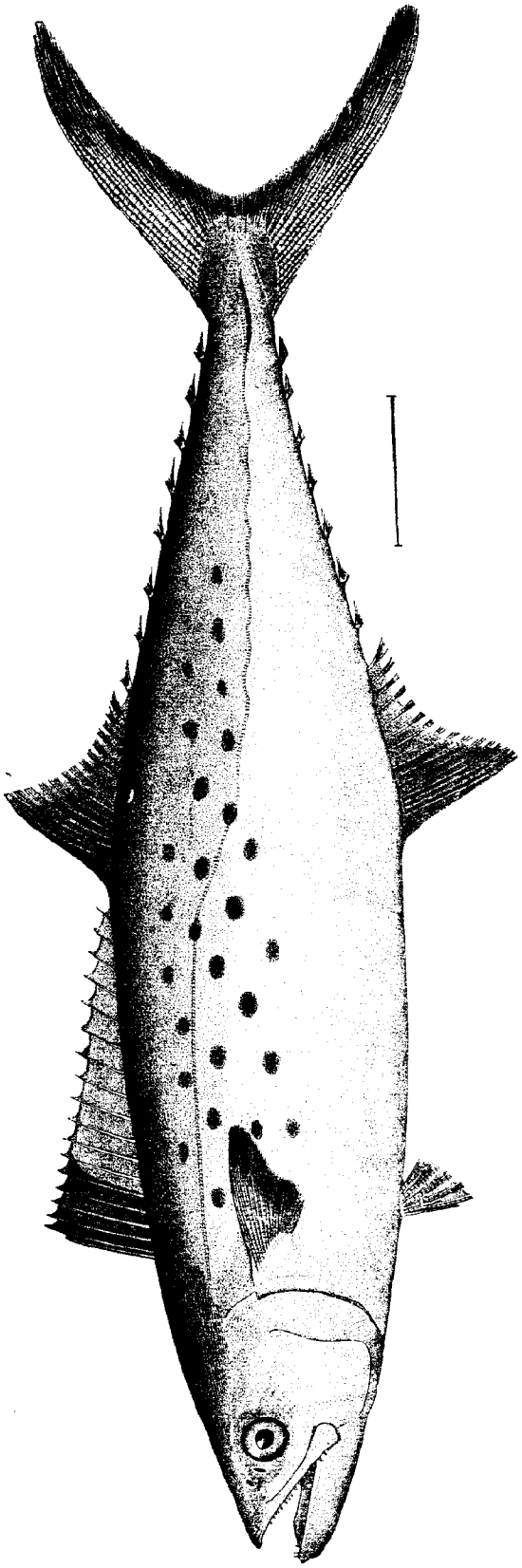
Drawing by H. L. Todd, from No. 25757, U. S. National Museum, collected at Newport, R. I., August, 1880, by U. S. Fish Commission.



## THE BONITO.

**Sarda mediterranea** (Schn.), J. & G. (p. 316.)

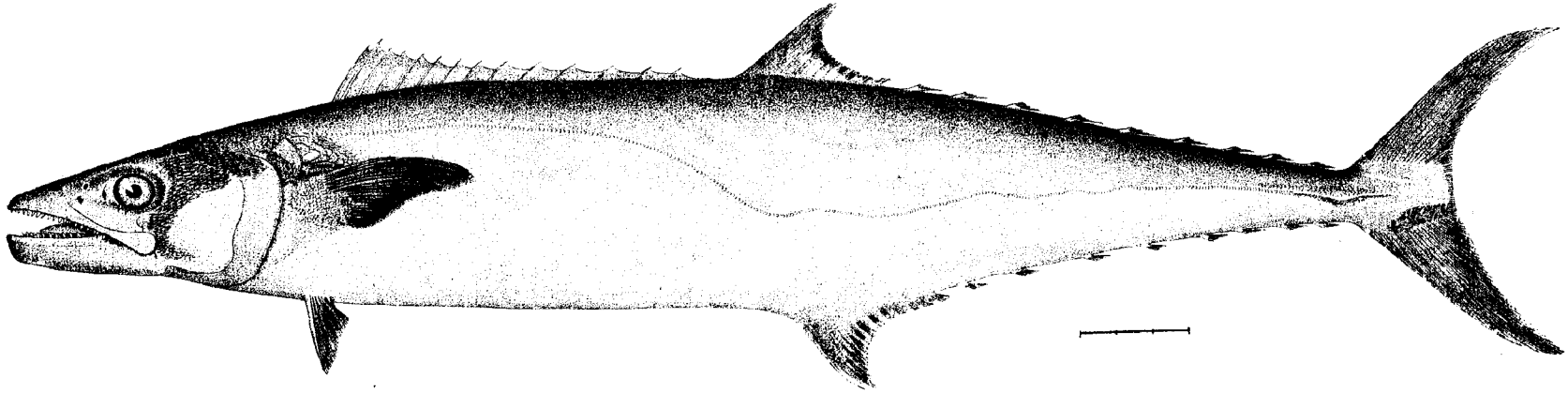
Drawing by H. L. Todd, from No. 10419, U. S. National Museum, collected at Wood's Holl, Mass., 1871, by U. S. Fish Commission.



## THE SPANISH MACKEREL.

Scomberomorus maculatus (Mitch.), J. & G. (p. 307.)

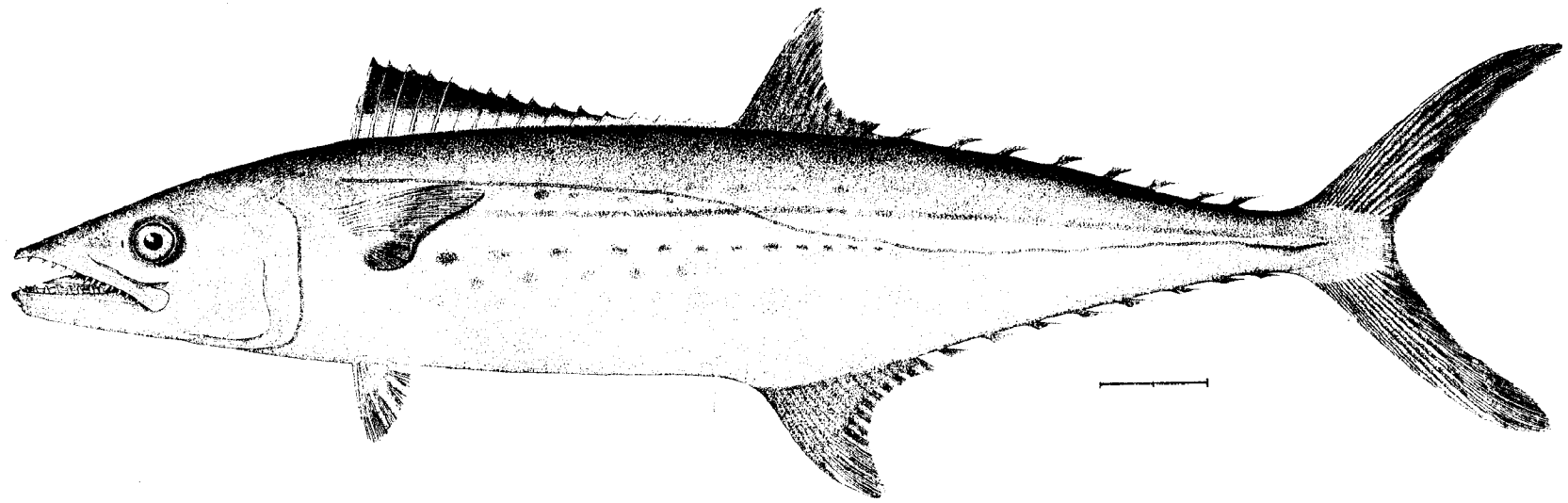
Drawing by H. L. Todd, from No. 15582, U. S. National Museum, collected at Fulton Market, New York, by E. G. Blackford.



## THE CERO OR KINGFISH.

Scomberomorus caballa (C. & V.), J. & G. (p. 316.)

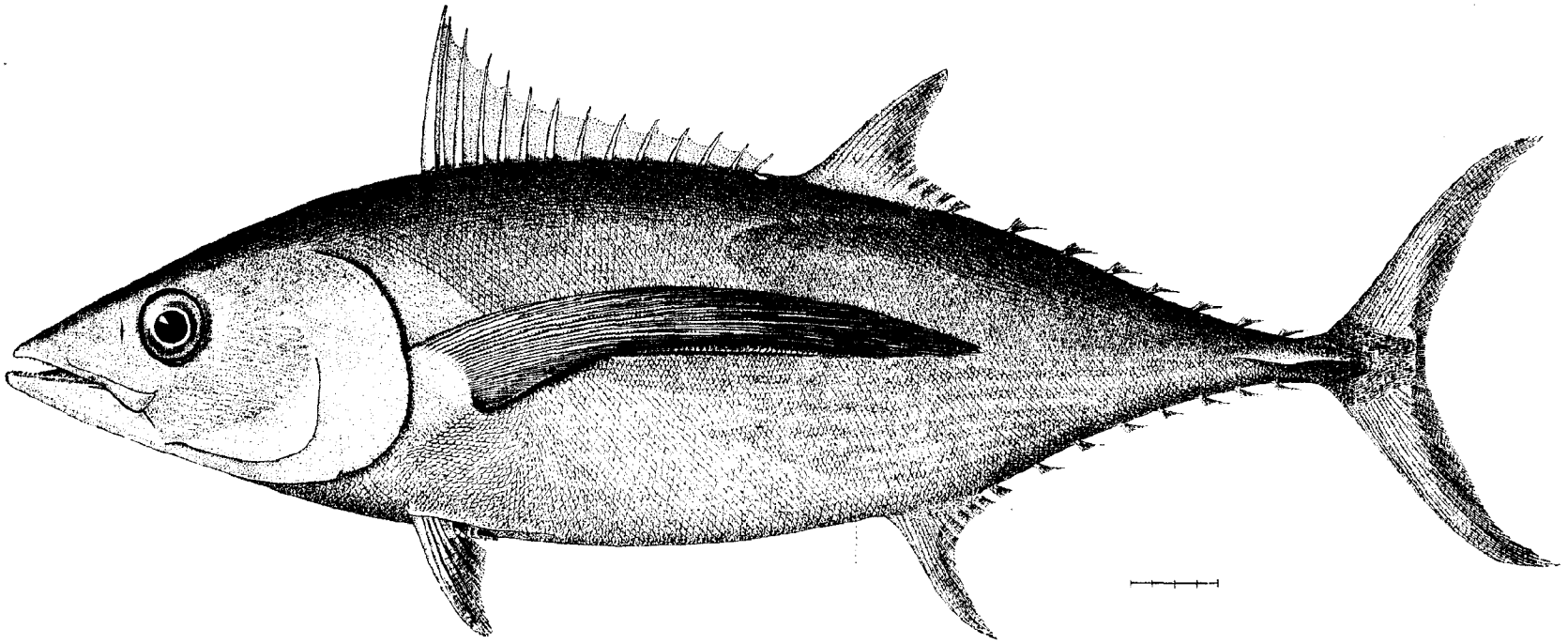
Drawing by H. L. Todd, from No. 19418, U. S. National Museum, collected at Wood's Holl, Mass., 1875, by U. S. Fish Commission.



## THE SPOTTED CERO.

Scomberomorus regalis (Bloch), J. & G. (p. 316.)

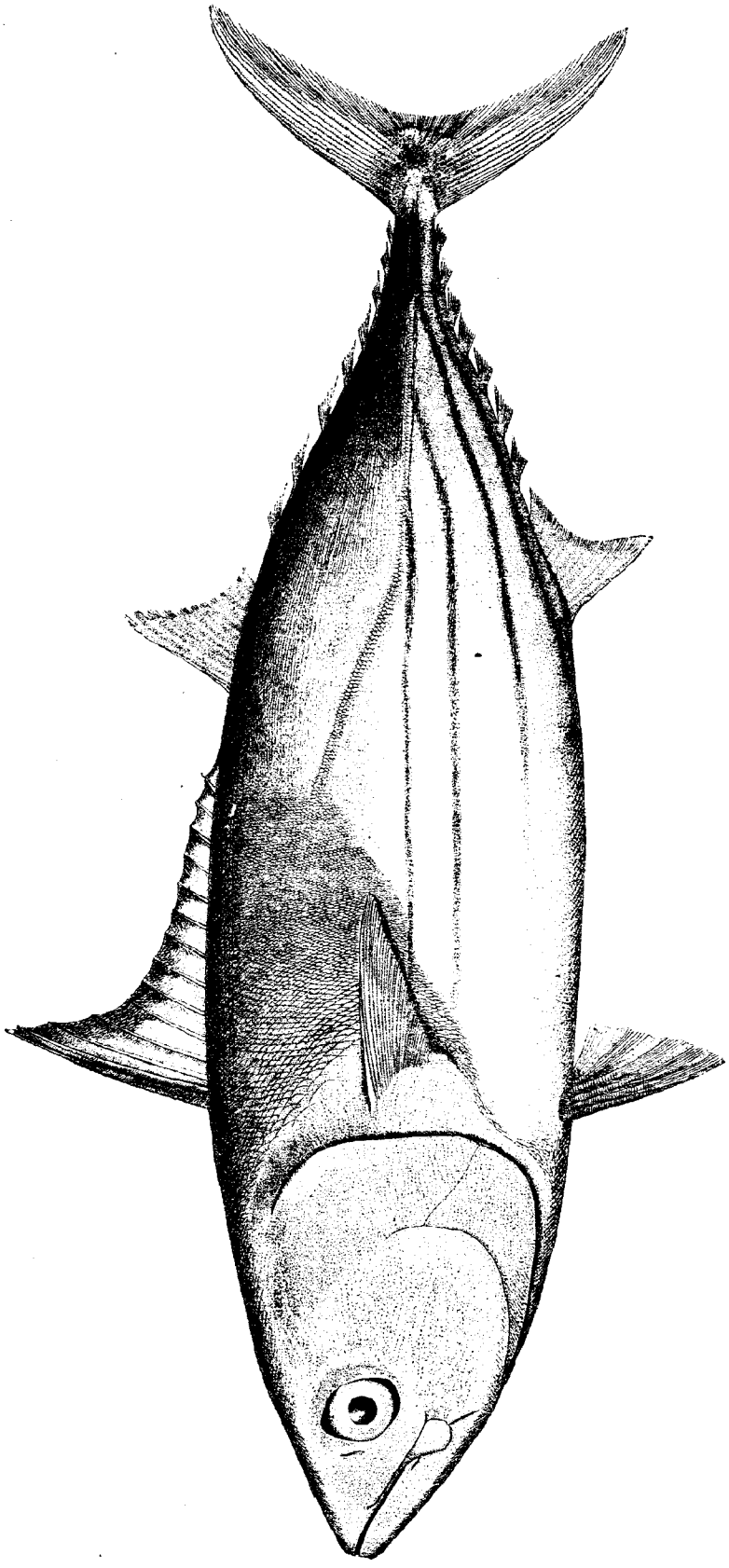
Drawing by H. L. Todd, from No. 12527, U. S. National Museum, collected at Key West, Fla., by E. G. Blackford.



## THE ALALONGA OR LONG-FINNED TUNNY.

Orcynus alalonga (Gmel.), Risso. (p. 320.)

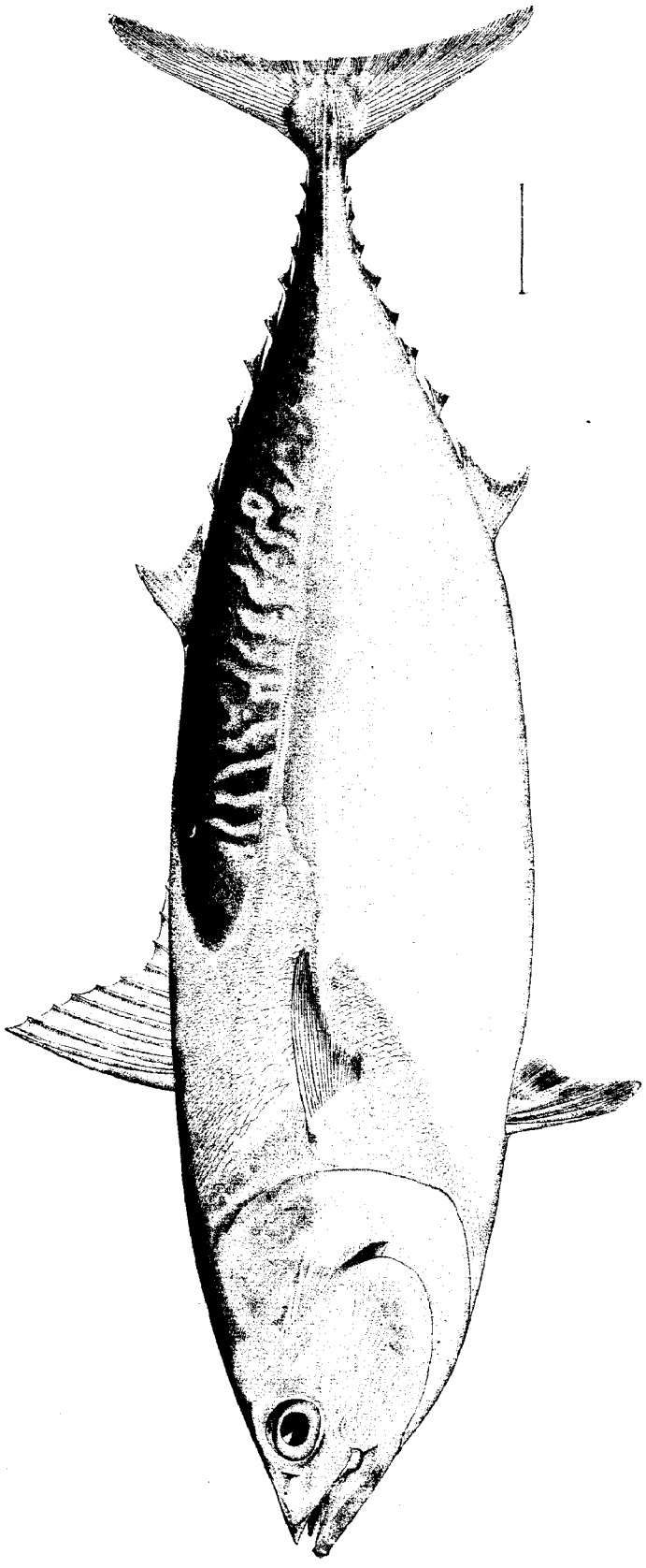
Drawing by H. L. Todd, from No. 21884, U. S. National Museum, collected at Banquereau, September 10, 1878, by Capt. William Thompson, schooner Magic.



## THE STRIPED OR OCEANIC BONITO.

Euthynnus pelamys (L.), Lutken. (p. 320.)

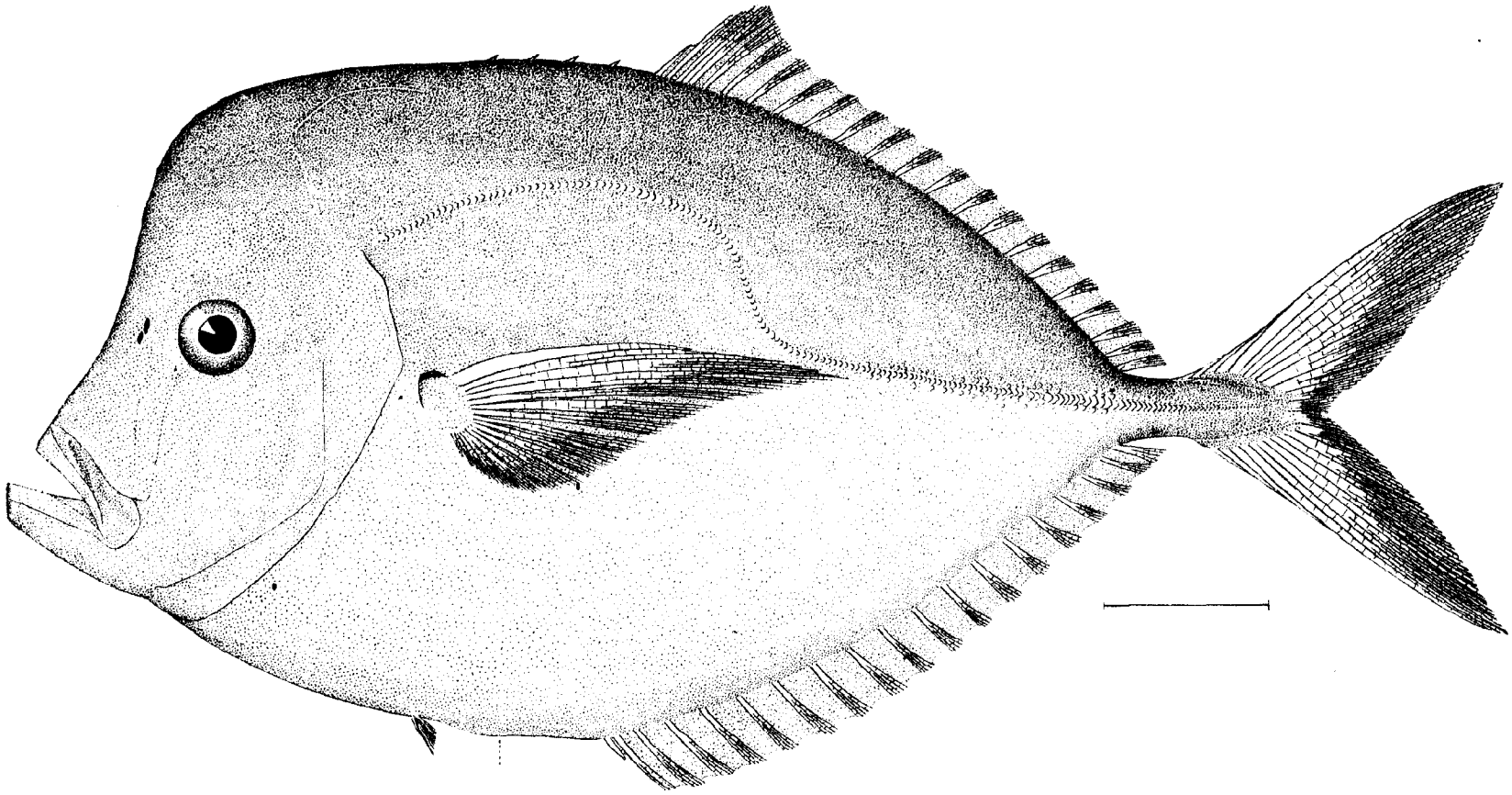
Drawing by H. L. Todd, from No. 20762, sent from Museum of Comparative Zoology, Cambridge, Mass.



## THE HORSE MACKEREL OR TUNNY.

Orcynus thynnus (L.), Poey. (p. 320.)

Drawing by H. L. Todd, from specimen collected in Vineyard Sound, by U. S. Fish Commission.

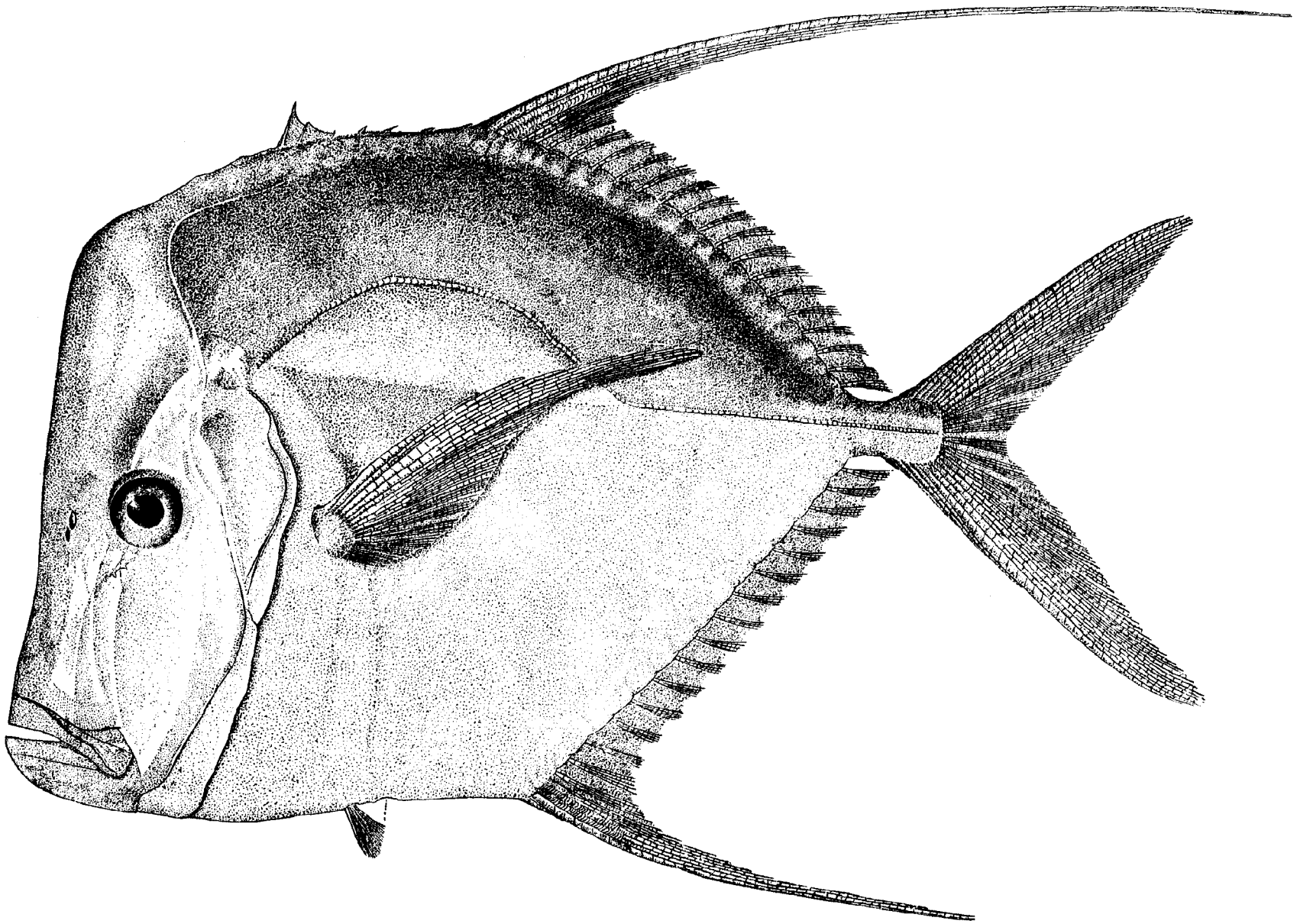


## THE HORSE FISH OR BLUNT-NOSED SHINER.

Selene setipinnis (Mitch.), Lütken. (p. 322.)

Drawing by H. L. Todd, from No. 16252, U. S. National Museum, obtained in Fulton Market, New York, by E. G. Blackford.

PLATE 97.

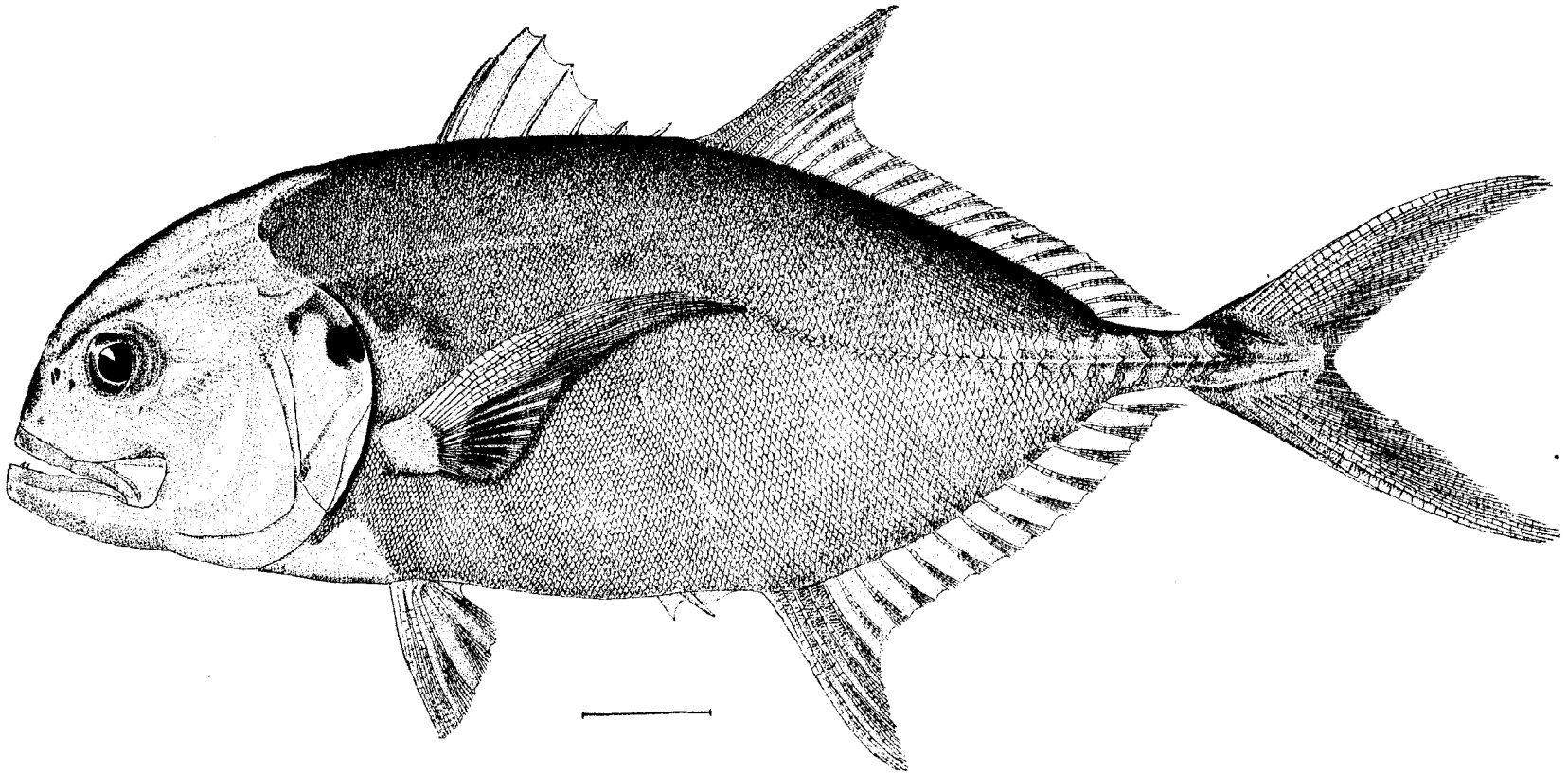


THE SILVER MOONFISH OR "LOOK-DOWN."

Selene argentea, Lacépède. (p. 322.)

Drawing by H. L. Todd, from No. 22279, U. S. National Museum

PLATE 98.

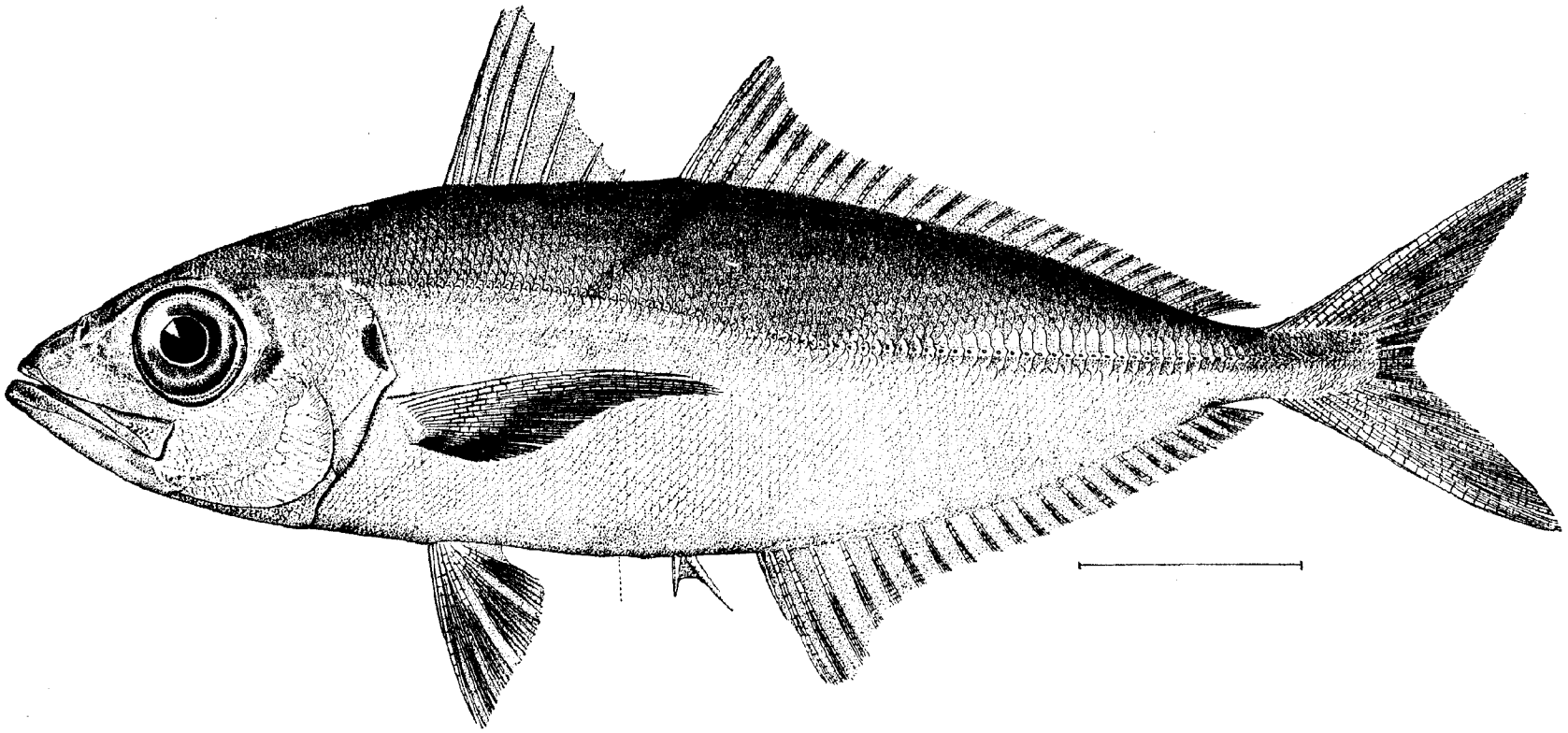


## THE CAVALLY OR CREVALLE.

Caranx hippos (L.), Gthr. (p. 323.)

Drawing by H. L. Todd, from No. 10431 U. S. National Museum, collected at Wood's Holl, Mass., 1871, by U. S. Fish Commission.

PLATE 99.

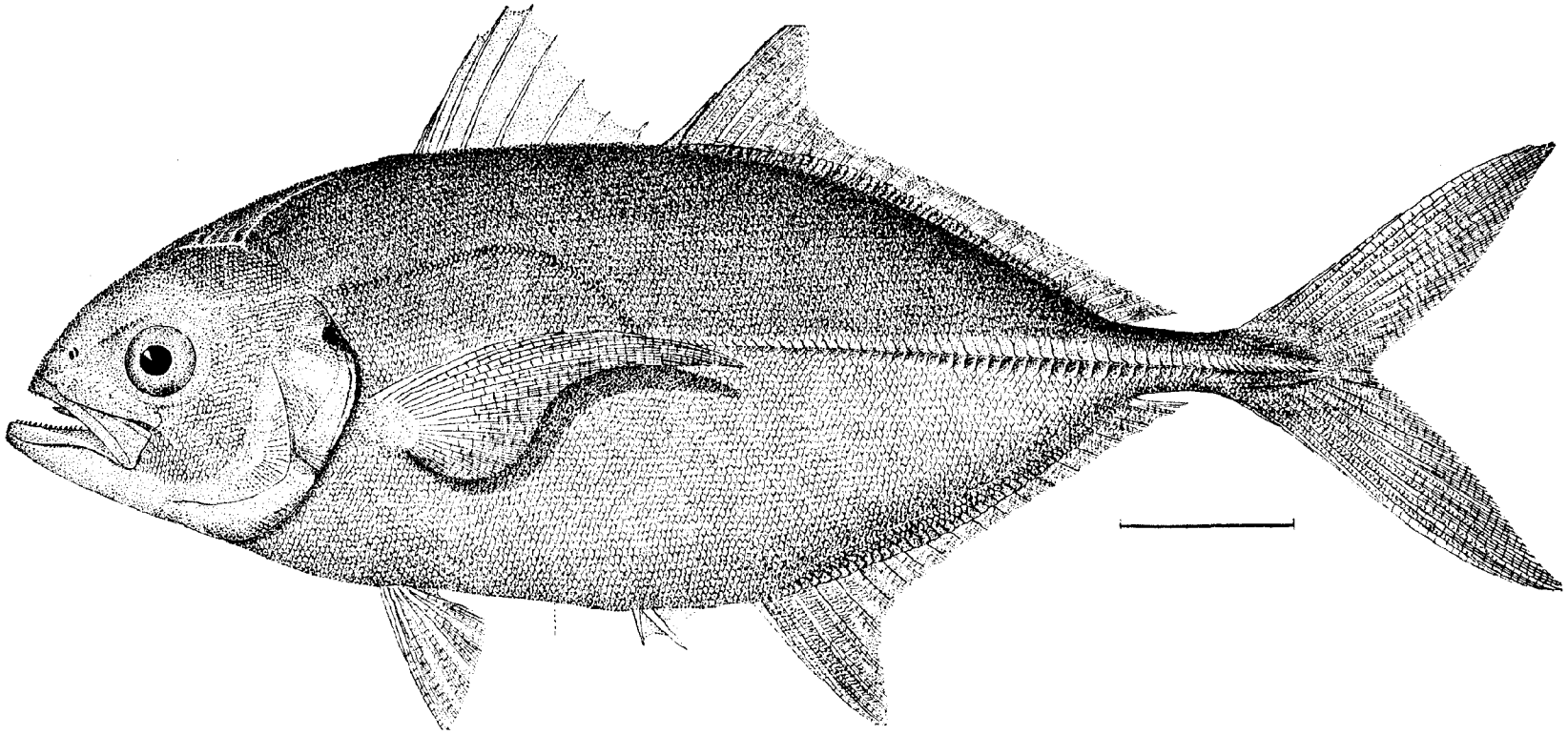


## THE GOGGLER OR "GOGGLE EYE."

Caranx crumenophthalmus (Bloch), Lac. (p. 324.)

Drawing by H. L. Todd, from No. 20681, U. S. National Museum, collected at Wood's Holl, Mass., October 3, 1877, by Vinal N. Edwards.

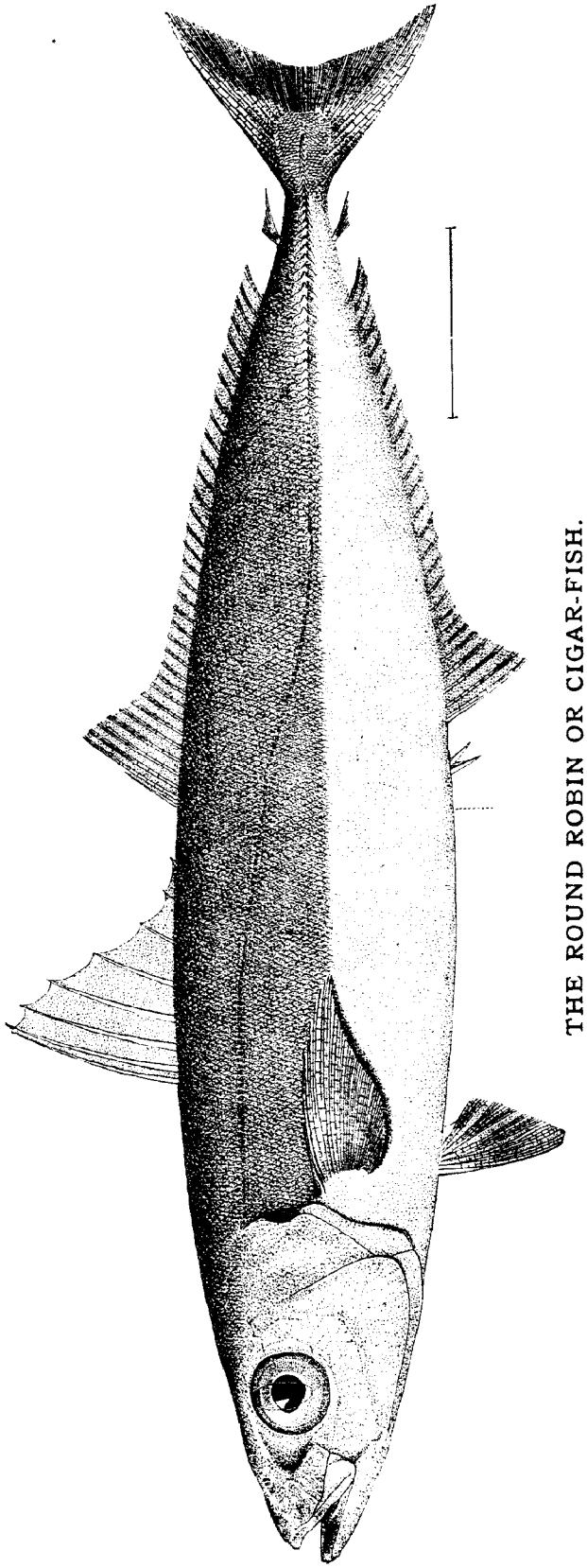
PLATE 100.



## THE JUREL OR HARD TAIL.

Caranx pisquetus, C. & V. (C. chrysos, Gthr.) (p. 321.)

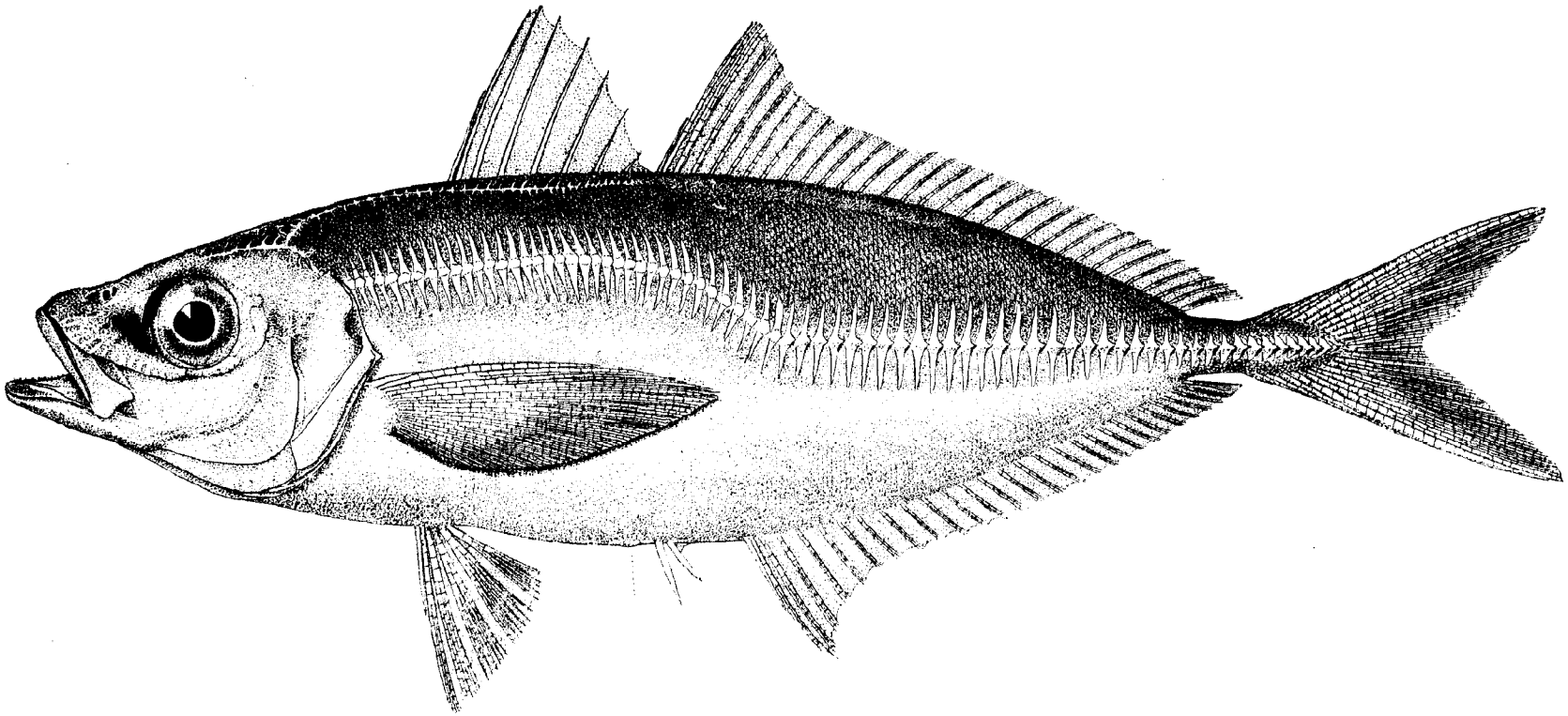
Drawing by H. L. Todd, from No. 16512, U. S. National Museum, collected at Wood's Holl, Mass., by U. S. Fish Commission.



## THE ROUND ROBIN OR CIGAR-FISH.

Decapterus punctatus (Ag.), Gill. (p. 325.)

Drawing by H. L. Todd, from No. 20639, U. S. National Museum, collected at Wood's Holl, Mass., September 11, 1877, by Vinal N. Edwards.

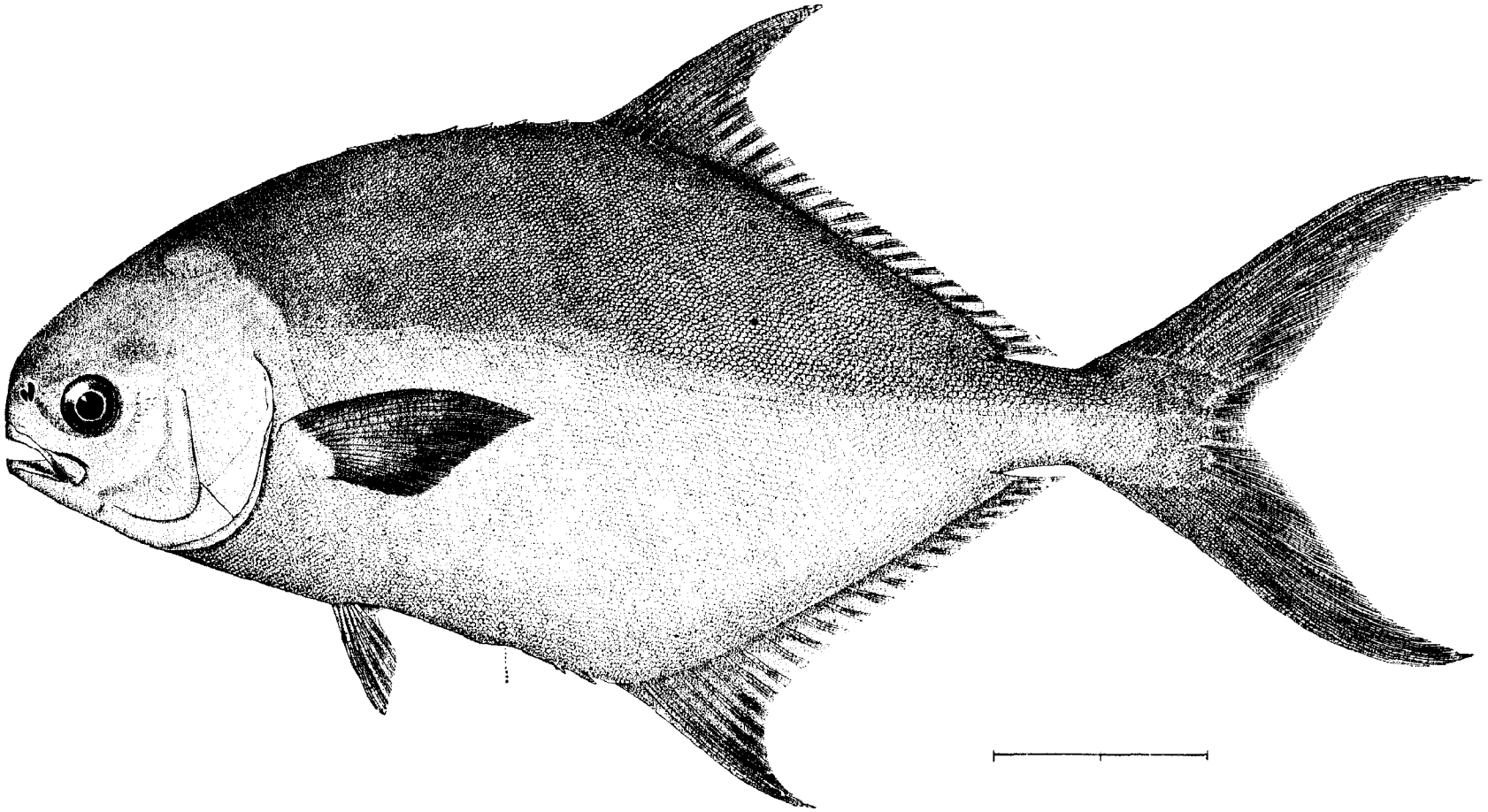


## THE SCAD OR DUTCH MARSE-BANKER.

Trachurus saurus, Raf. (p. 326.)

Drawing by H. L. Todd, from No. 23421, U. S. National Museum, collected at Newport, R. I., by S. Powel.

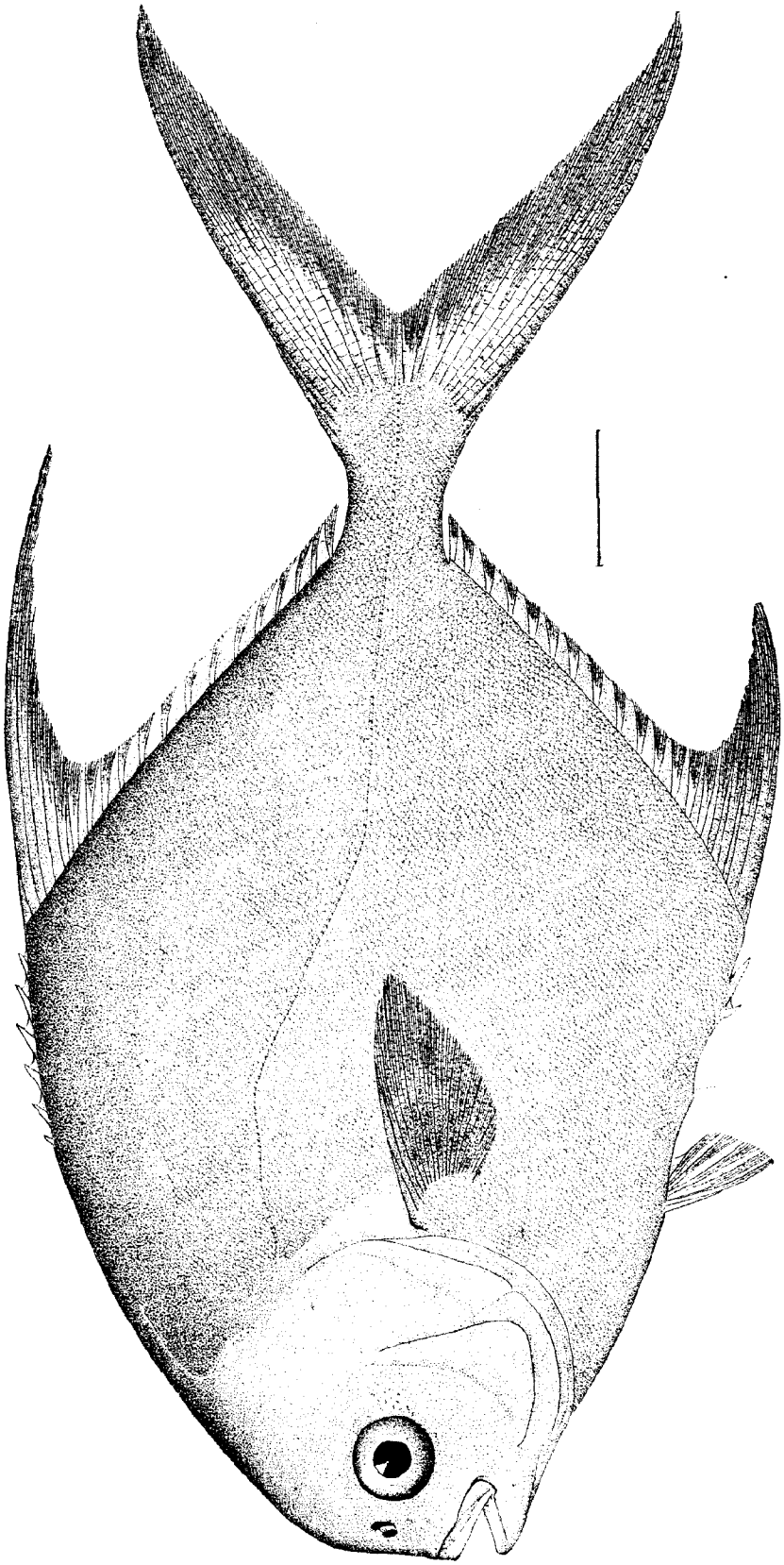
PLATE 103.



## THE COMMON POMPANO.

Trachynotus carolinus (L.), Gill. (p. 327.)

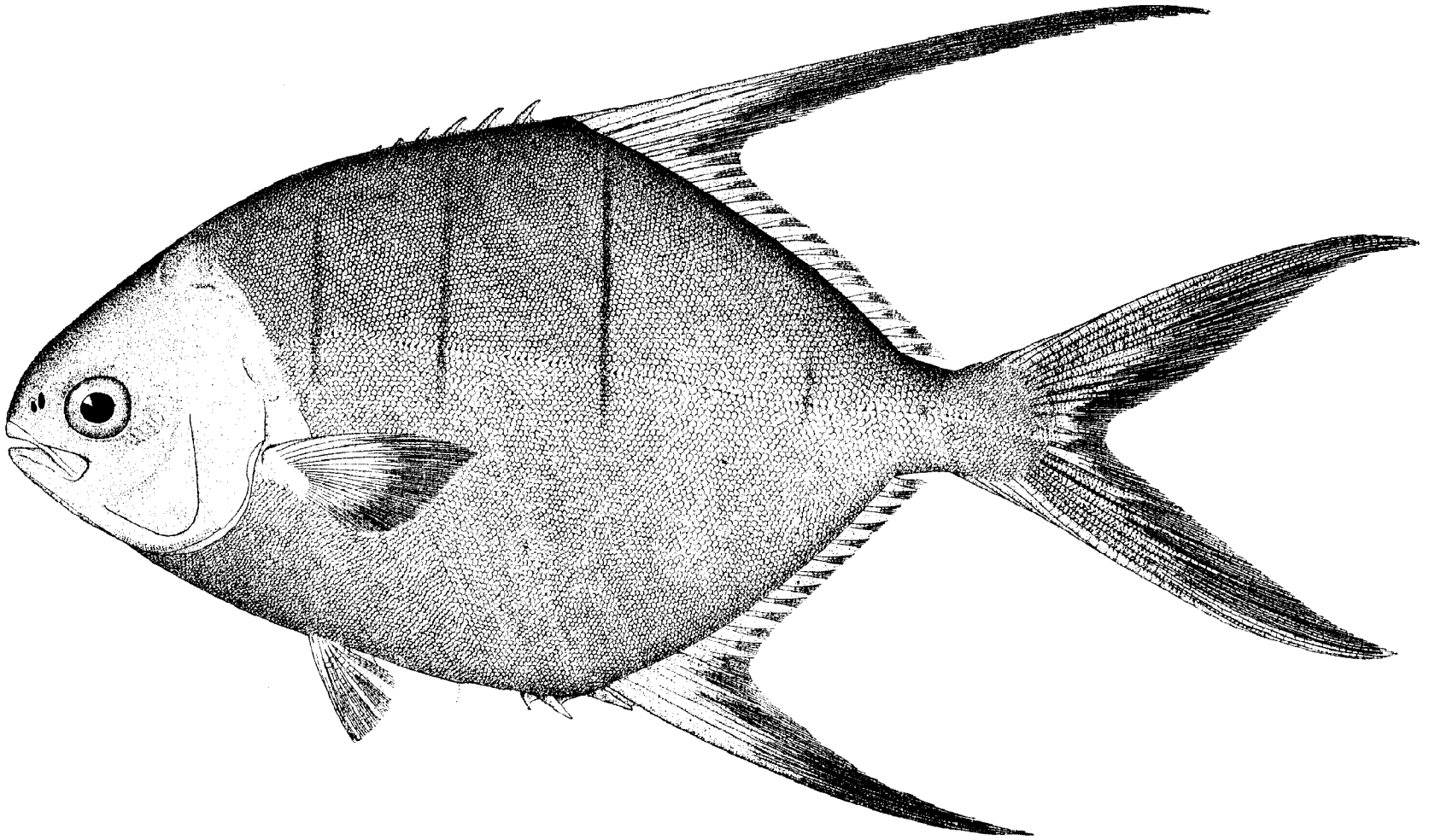
Drawing by H. L. Todd, from No. 15178, U. S. National Museum, collected at Wood's Holl, Mass., October 5, 1871, by Prof. S. F. Baird.



THE SHORT POMPANO.

Trachynotus ovatus, (L.), Gthr. (p. 326.)

Drawing from No. 26585, U. S. National Museum, collected in Florida by Silas Stearns.

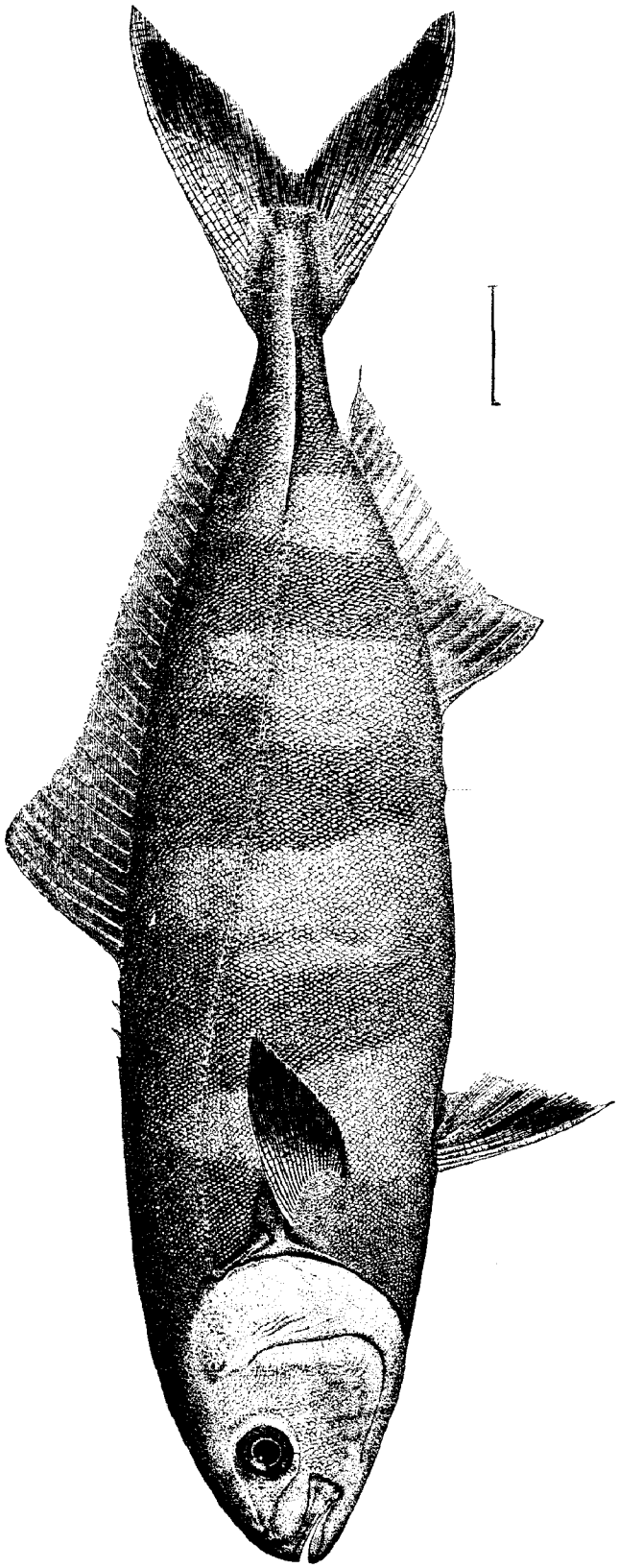


## THE BANNER POMPANO.

Trachynotus glaucus. C. & V. (p. 326.)

Drawing by H. L. Todd, from No. 30176, U. S. National Museum, collected at Pensacola, Fla., January 7, 1882, by Silas Stearns.

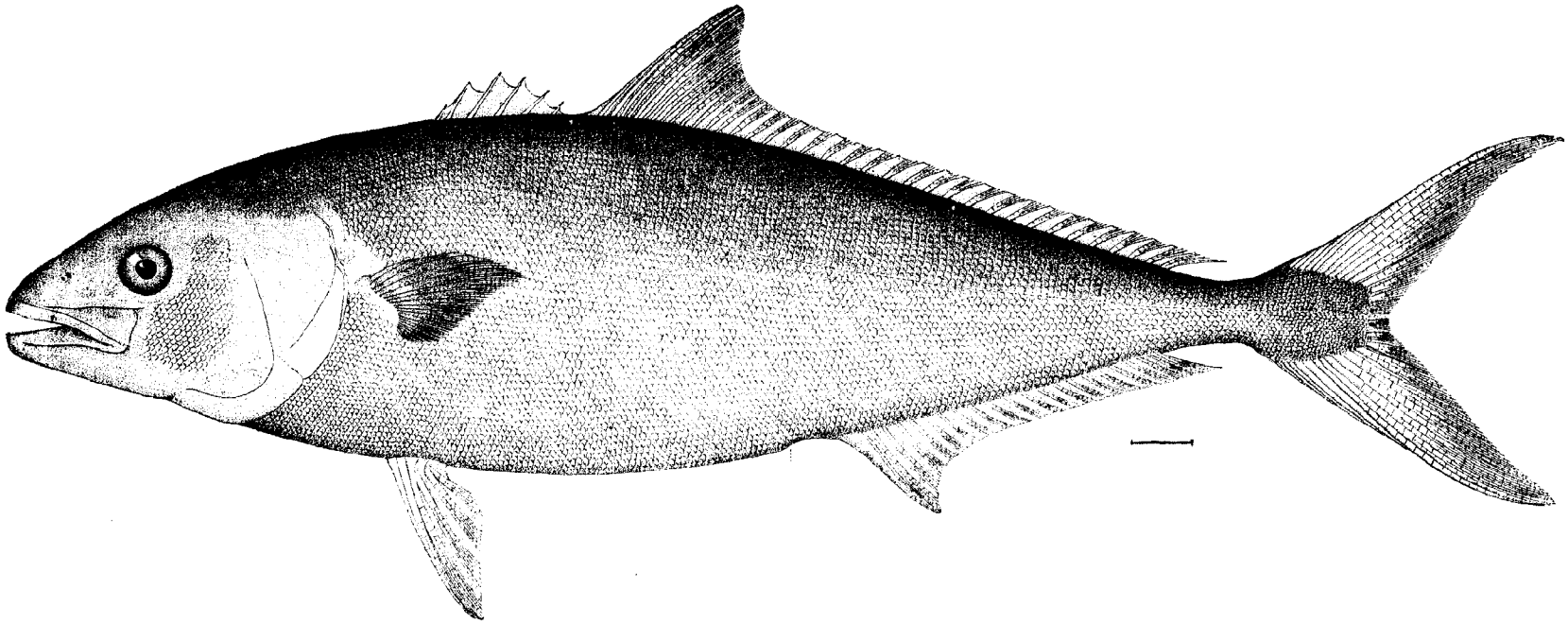
PLATE 106.



## THE PILOT-FISH.

Naucrates ductor (L.), Raf. (p. 330.)

Drawing by H. L. Todd, from No. 2197, U. S. National Museum, collected at New Bedford, Mass., September 27, 1878, by William A. Bassett.

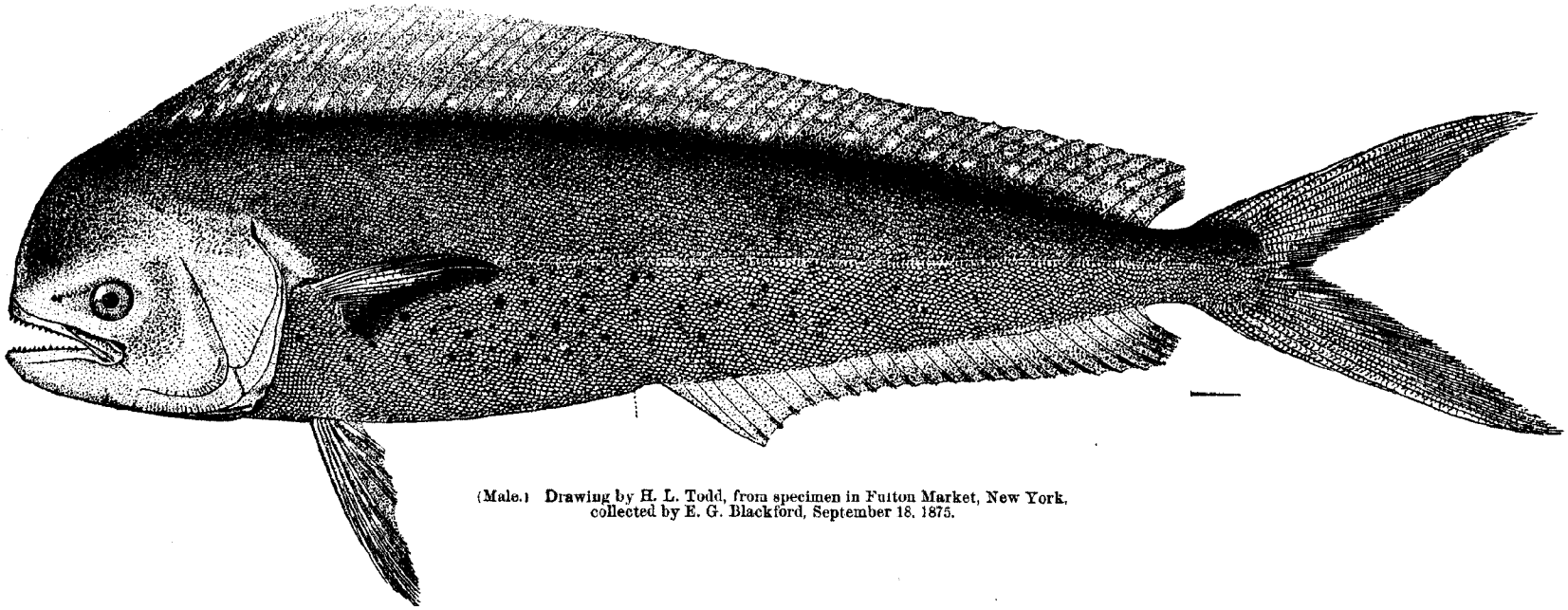


## THE CALIFORNIA YELLOW-TAIL OR AMBER-FISH

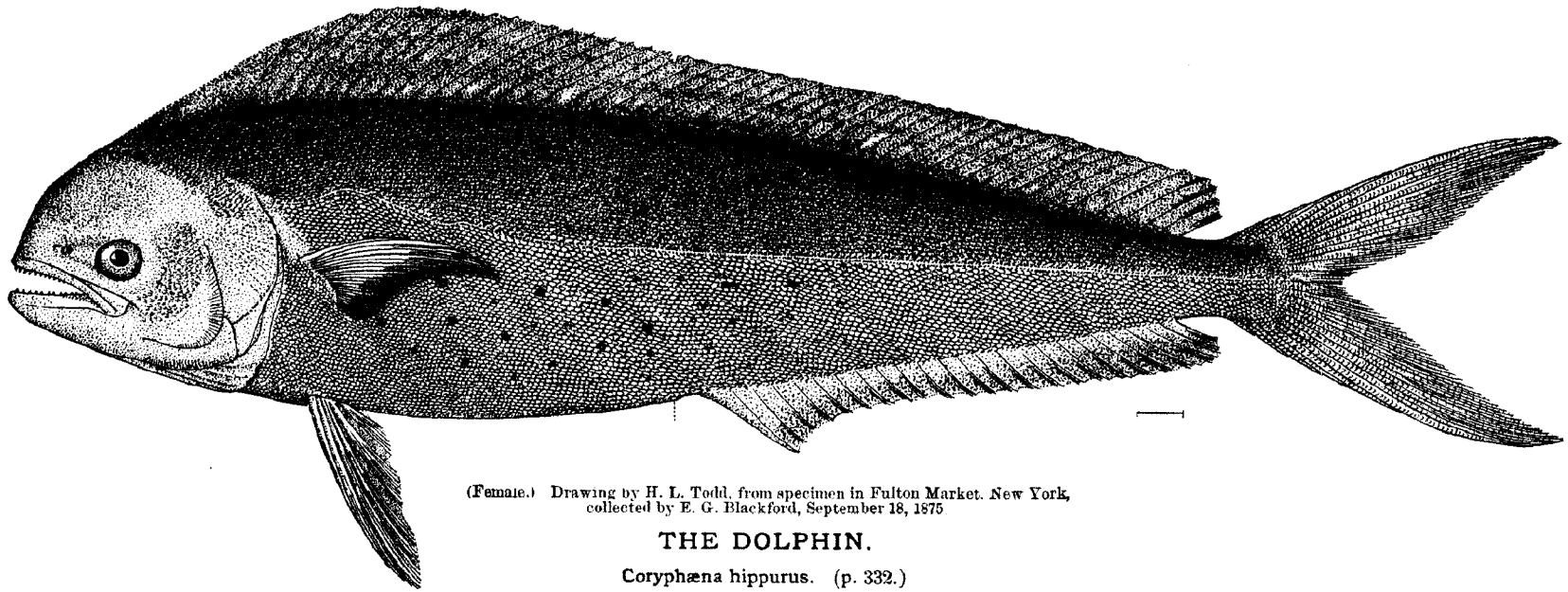
Seriola dorsalis, C. & V. (p. 331.)

Drawing by H. L. Todd, from No. 26835, U. S. National Museum, collected at San Pedro, Cal., 1880 (?), by Jordan and Gilbert.

PLATE 108.



(Male.) Drawing by H. L. Todd, from specimen in Fulton Market, New York, collected by E. G. Blackford, September 18, 1875.

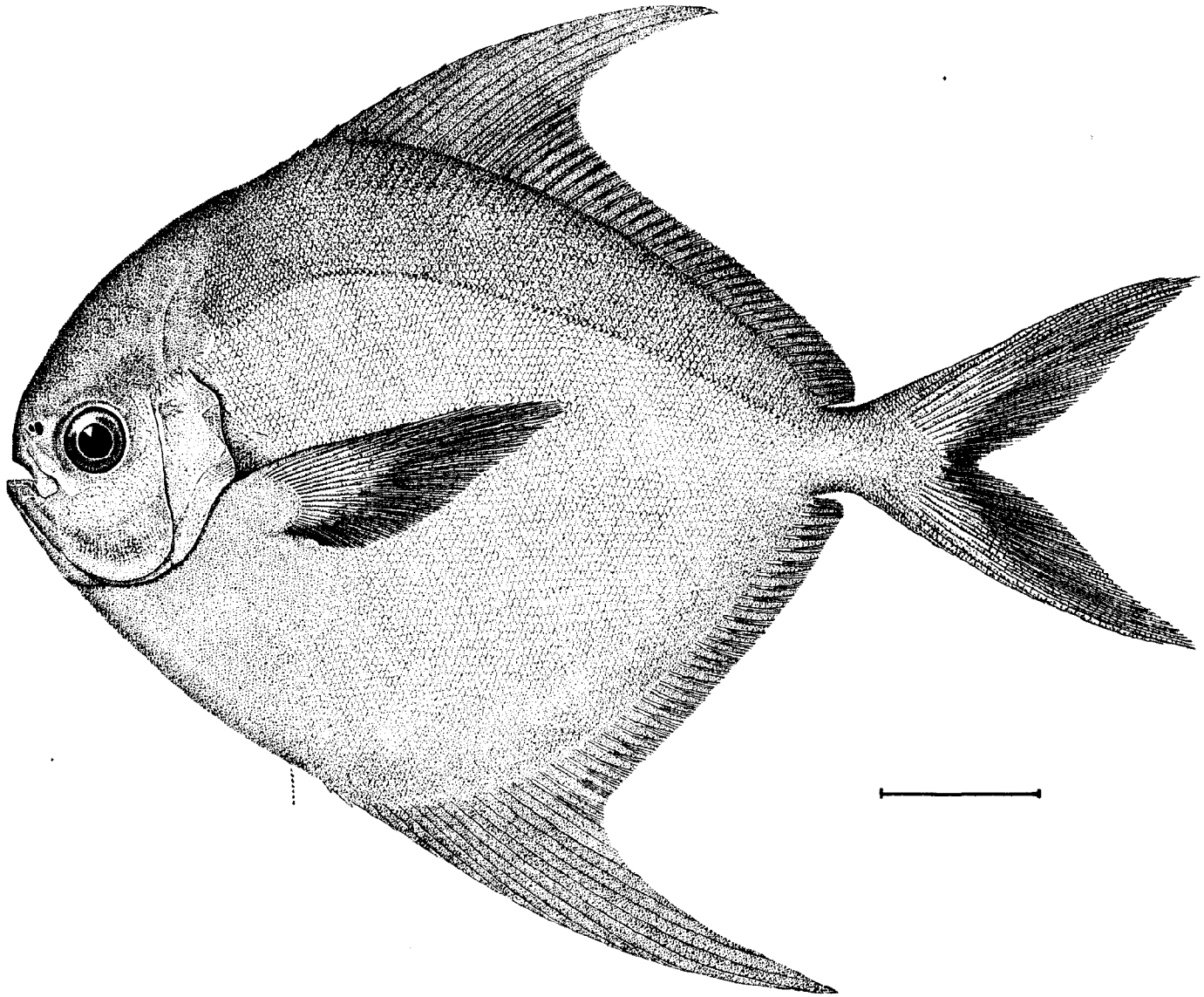


(Female.) Drawing by H. L. Todd, from specimen in Fulton Market, New York, collected by E. G. Blackford, September 18, 1875

# THE DOLPHIN.

Coryphæna hippurus. (p. 332.)

PLATE 106.

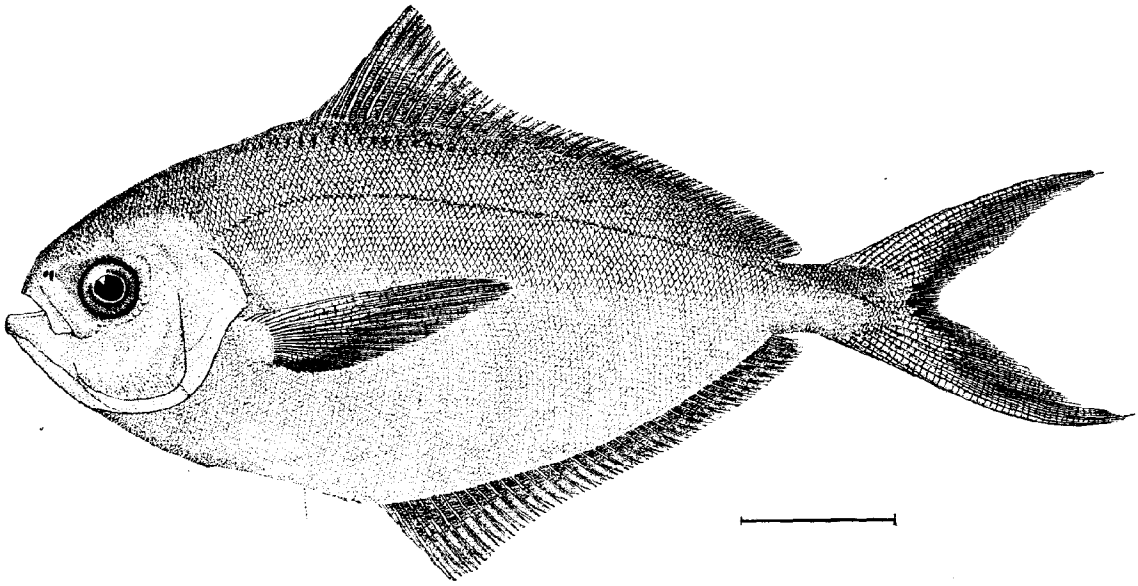


## THE HARVEST-FISH.

Stromateus alepidotus (L.), J. & G. (p. 333.)

Drawing by H. L. Todd, from No. 15234, U. S. National Museum, collected at New York by Sutherland.

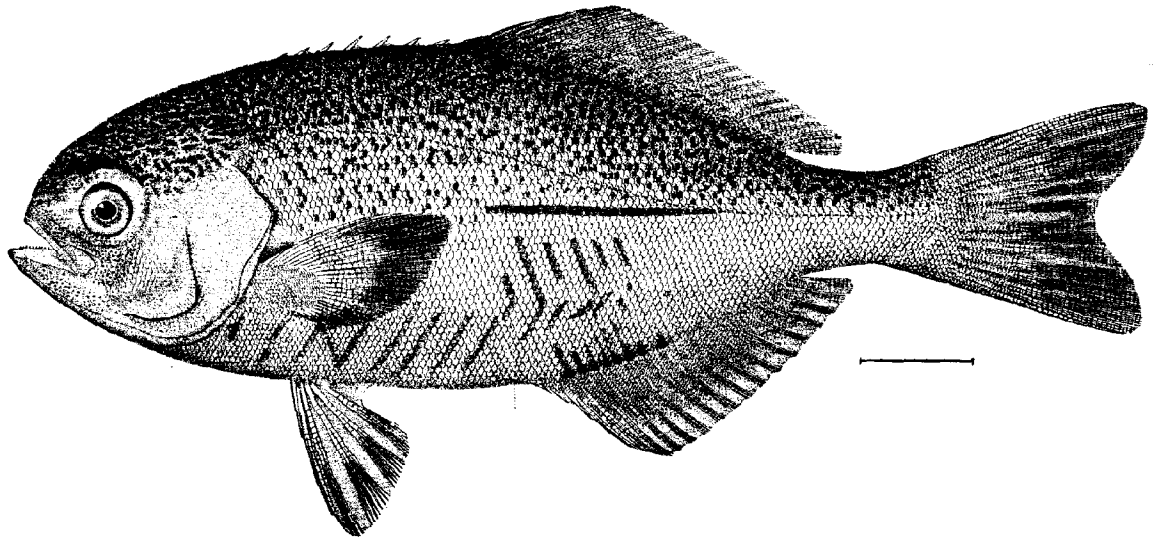
PLATE 110.



## THE BUTTERFISH OR DOLLAR-FISH.

Stromateus triacanthus, Peck. (p. 333.)

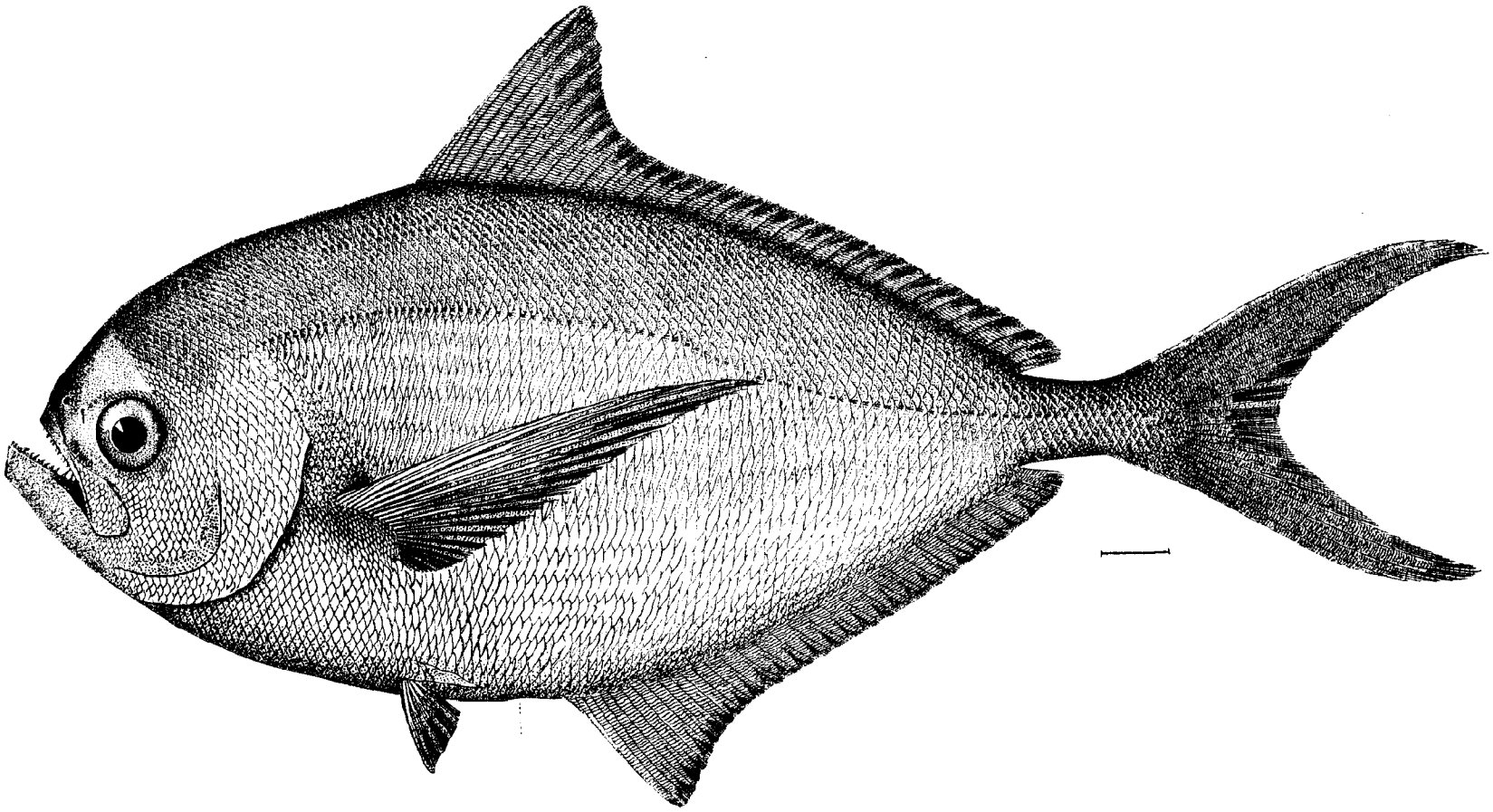
Drawing by H. L. Todd, from No. 787, U. S. National Museum, collected at Beesley's Point, New Jersey, 1858, by Prof. S. F. Baird.



## THE LOG-FISH OR BLACK RUDDER-FISH.

Lirus perciformis (Mitch.), J. & G. (p. 334.)

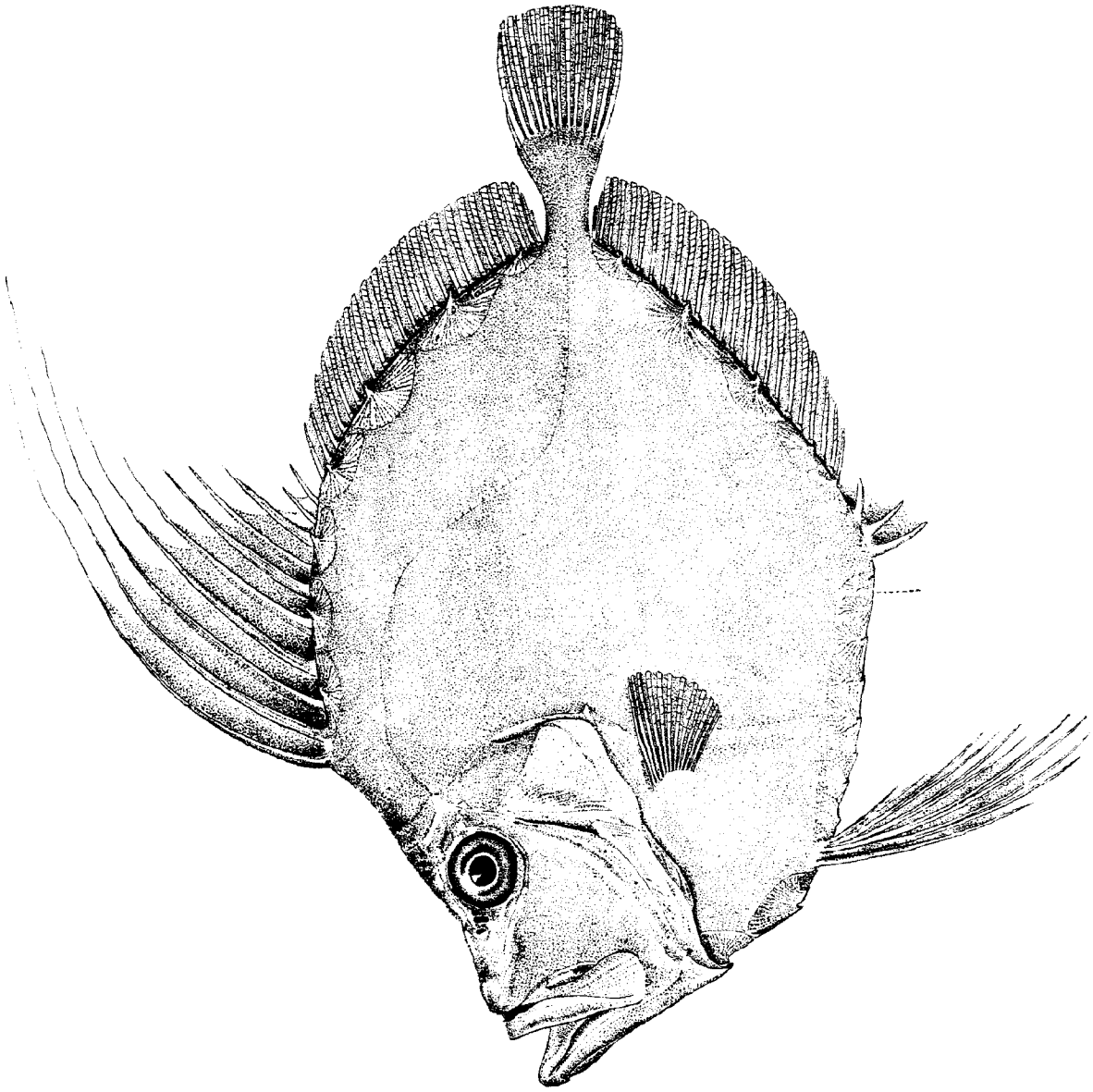
Drawing by H. L. Todd, from No. 22650, U. S. National Museum, collected at Le Have Bank, by Capt. James Hawkins.



## THE POMFRET.

**Brama Rayi (Bl.), Schn.**

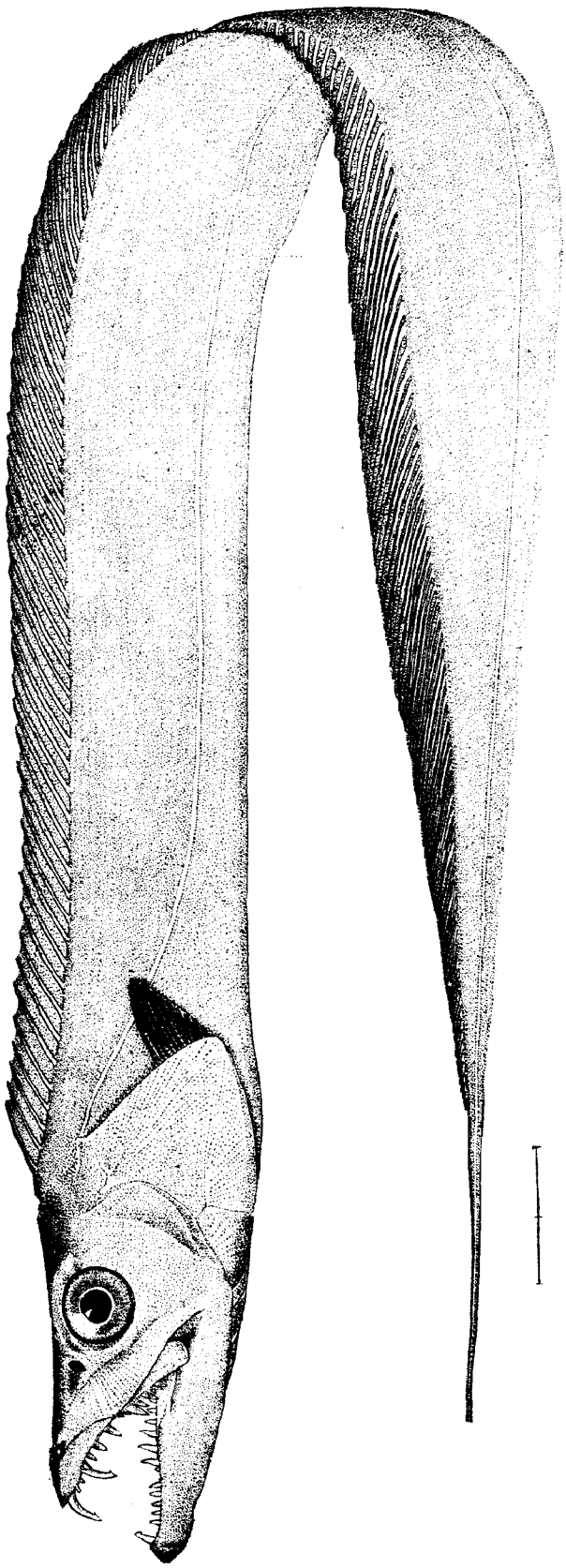
Drawing by H. L. Todd, from No. 26236, U. S. National Museum, collected at west end of Grand Bank, May, 1881, by Capt. Andrew McKinney.



## THE BOAR FISH.

Zenopsis ocellatus (Storer), Gill.

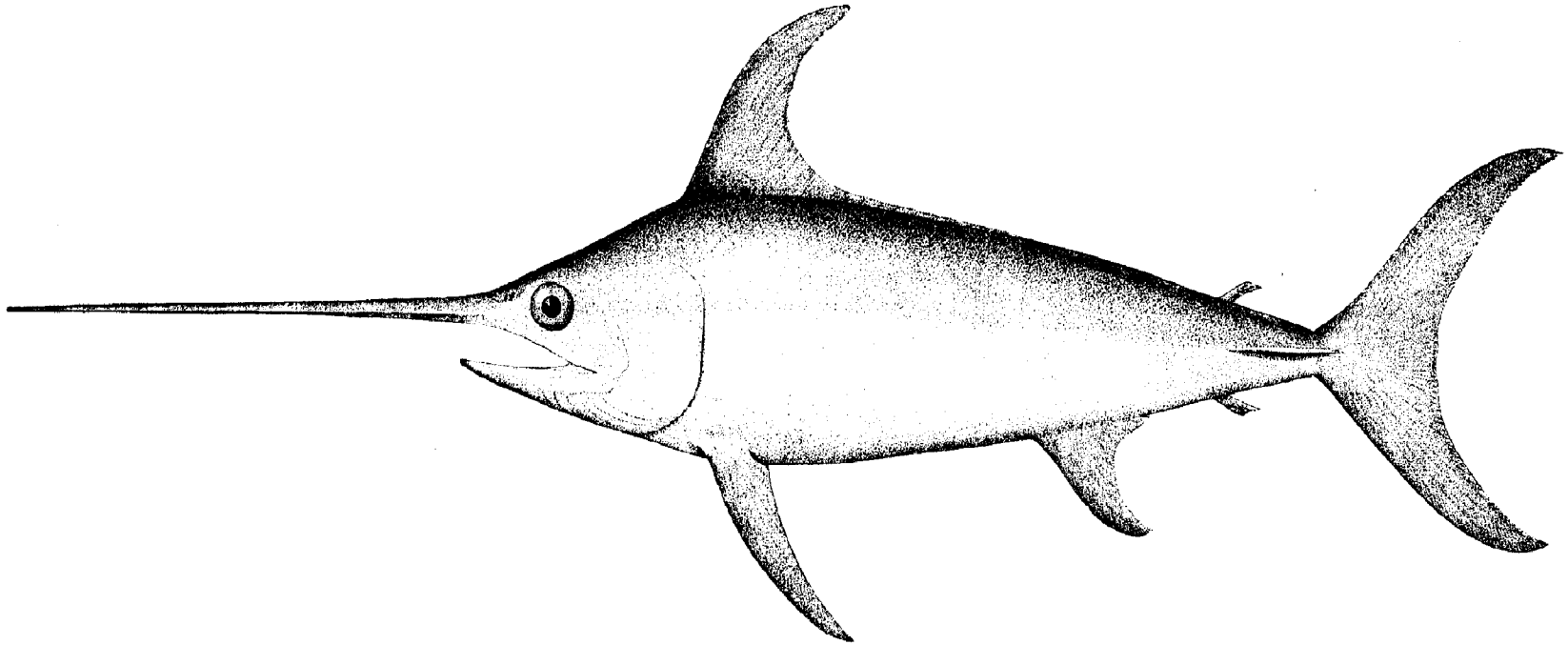
Drawing by H. L. Todd, from specimen taken at Provincetown, Mass., in museum of Boston Society of Natural History.



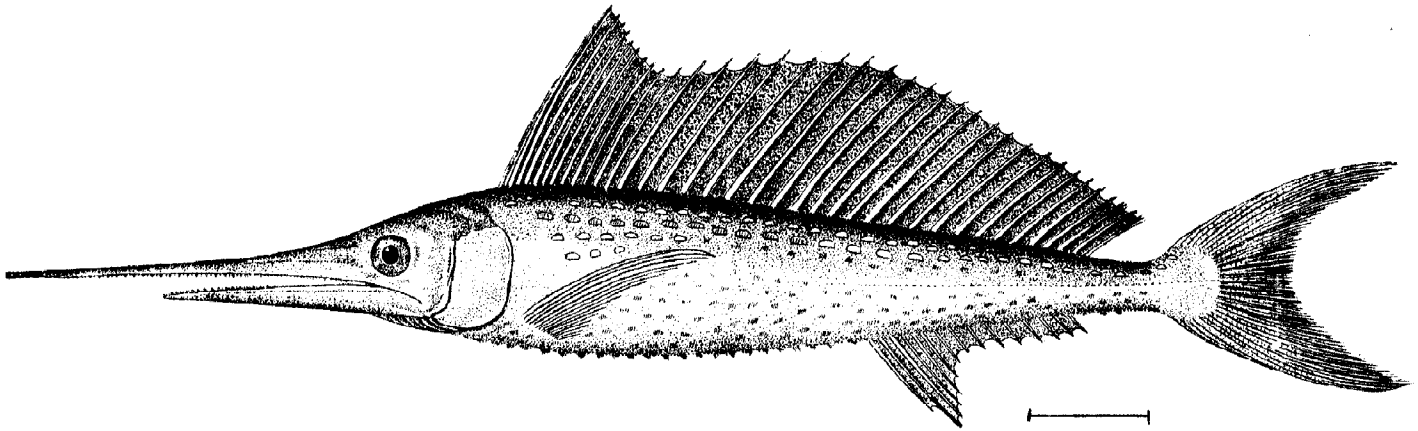
## THE CUTLASS-FISH.

**Trichiurus lepturus, L.** (p. 335.)

Drawing by H. L. Todd, from No. 18028, U. S. National Museum, collected at St. Augustine, Fla., 1877, by Dr. Janeway, U. S. N



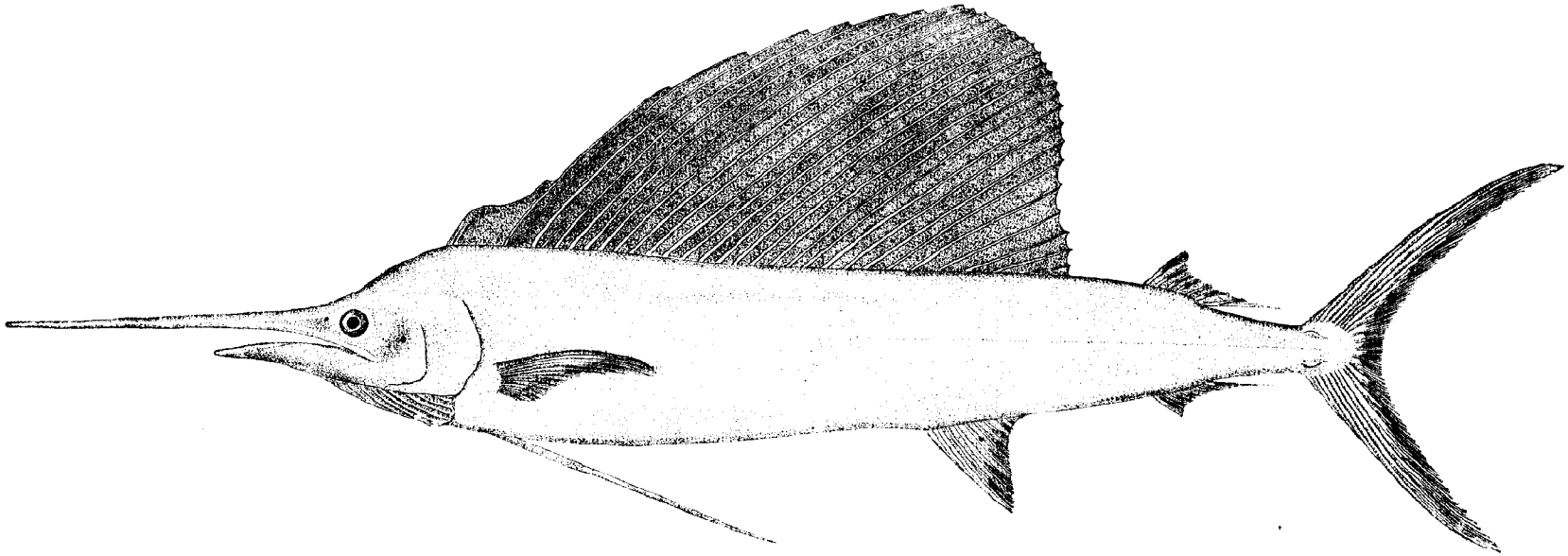
(Adult.) Drawing by H. L. Todd, from No. 16126, U. S. National Museum, collected at New Bedford, Mass., July 17, 1875, by U. S. Fish Commission.



(Young.) Drawing from Plate 225, Cuvier, Histoire des Poissons.

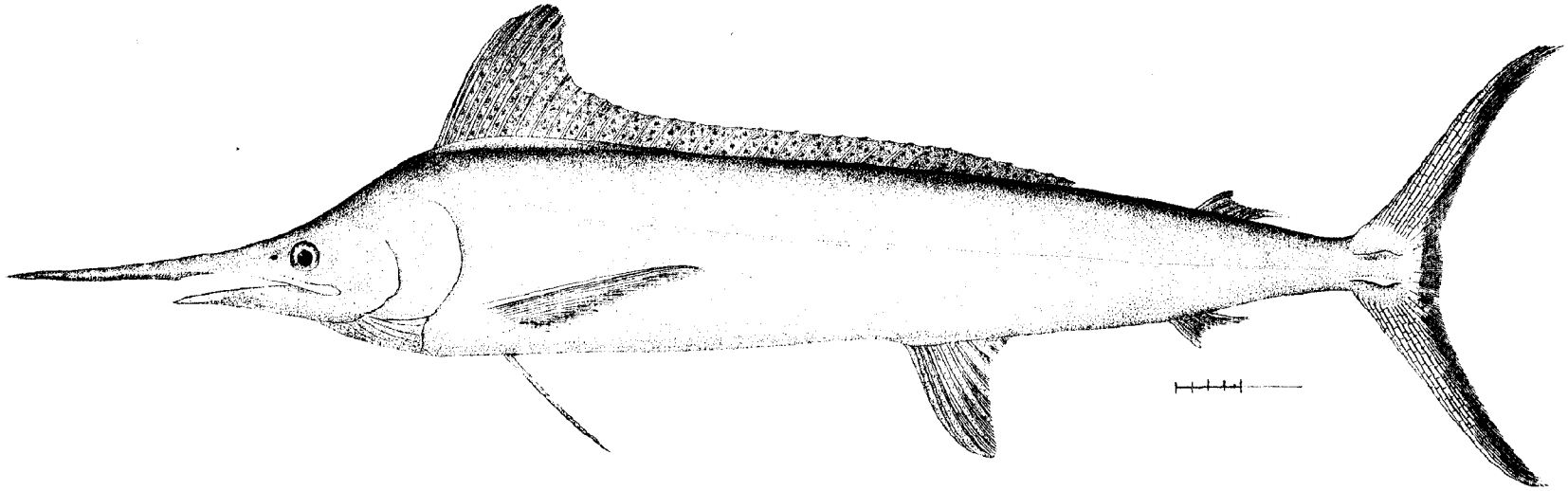
## THE SWORDFISH.

Xiphias gladius, L. (p. 336.)



THE SAIL-FISH.

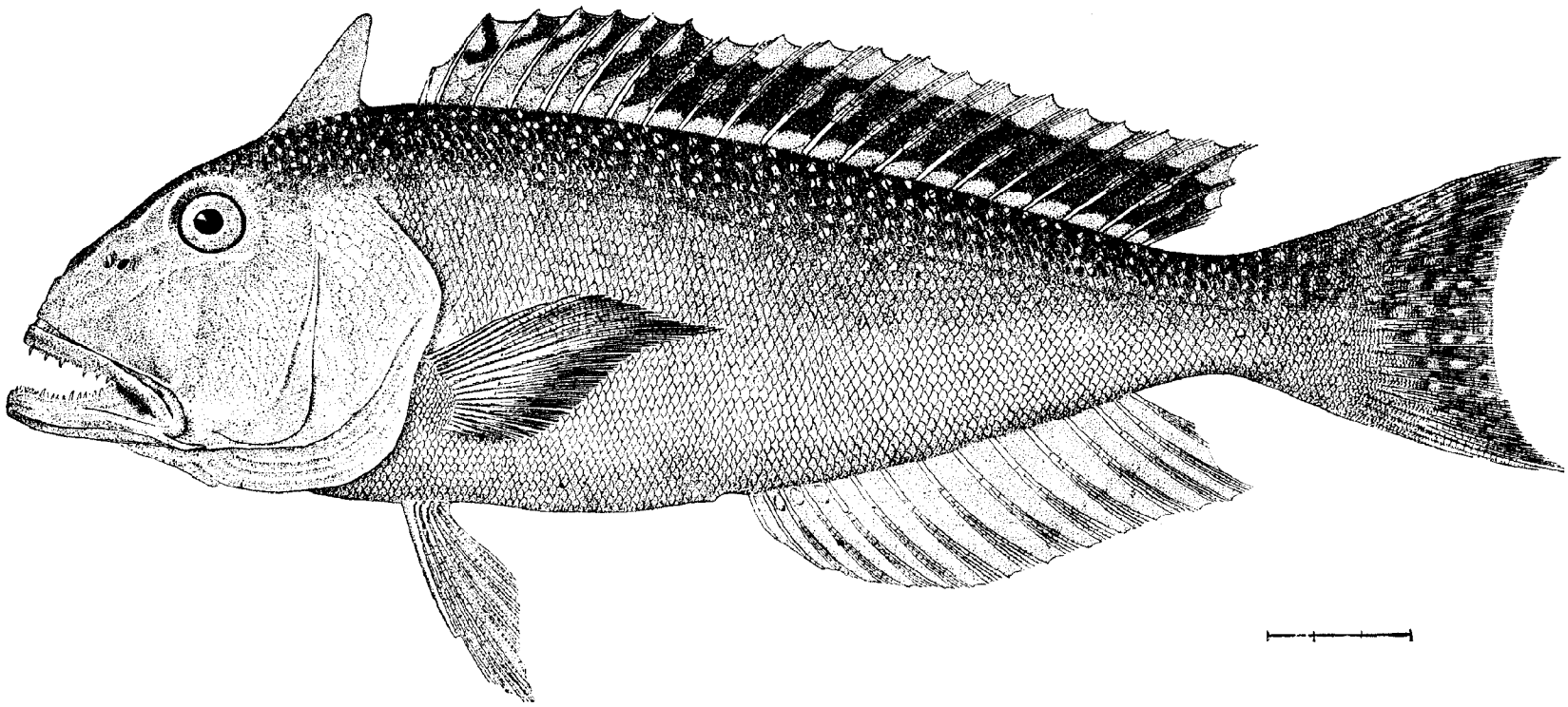
Histiophorus gladius (Brown), Gthr. (p. 356.)



THE SPEAR-FISH.

Tetrapturus albidus, Poey. (p. 358.)

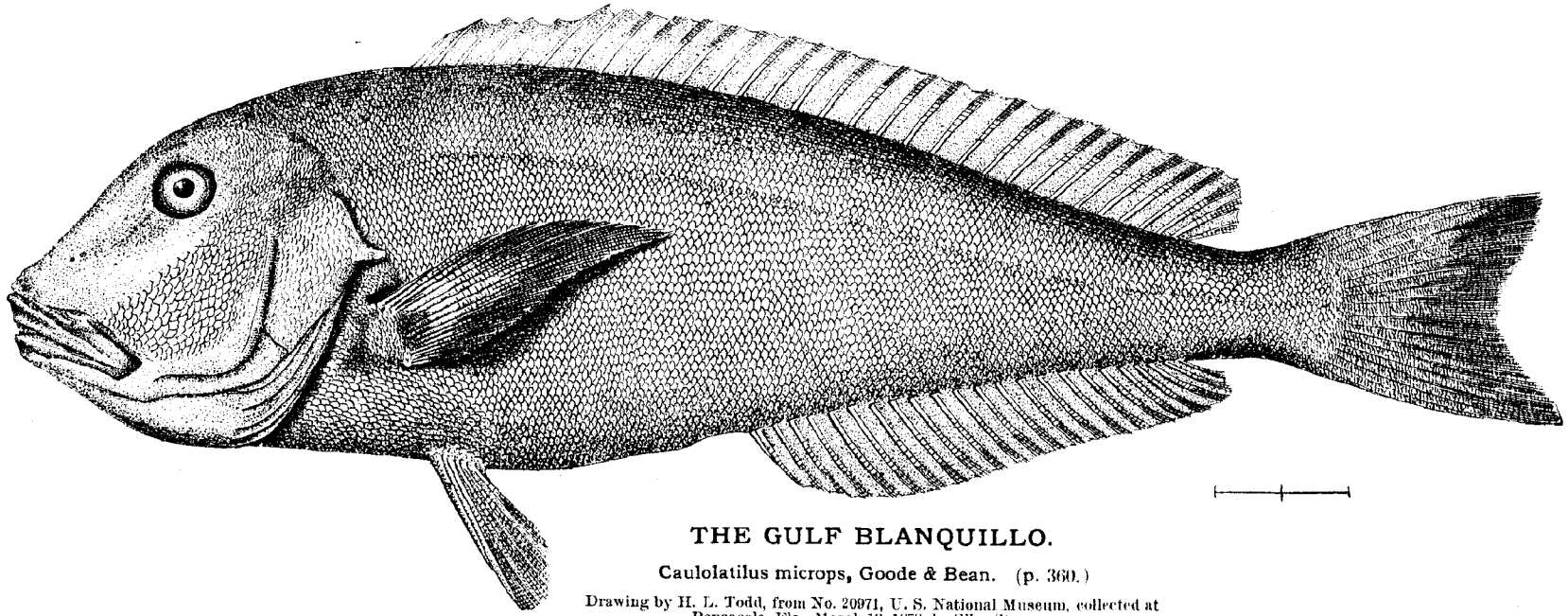
PLATE 116.



## THE TILE-FISH.

Lopholatilus chamœleonticeps, Goode & Bean. (p. 360.)

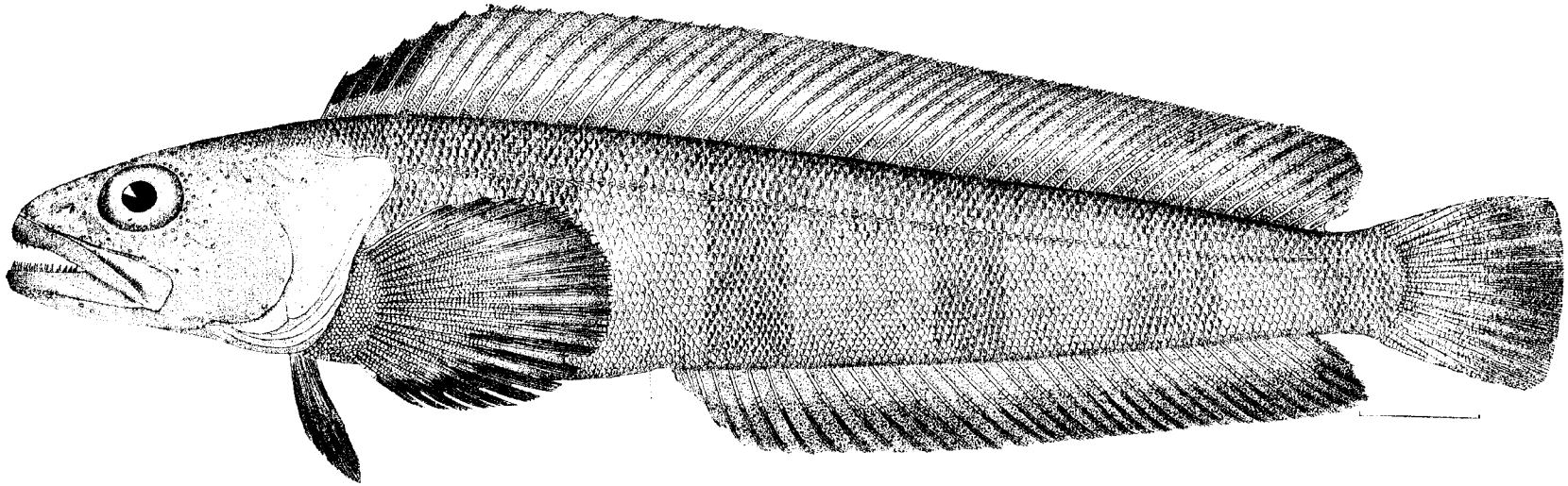
Drawing by H. L. Todd, from No. 22899, U. S. National Museum, collected 80 miles south by east of No Man's Land, Mass., by Captain Kirby.



## THE GULF BLANQUILLO.

Caulolatilus microps, Goode & Bean. (p. 360.)

Drawing by H. L. Todd, from No. 20971, U. S. National Museum, collected at Pensacola, Fla. March 18, 1878, by Silas Stearns.

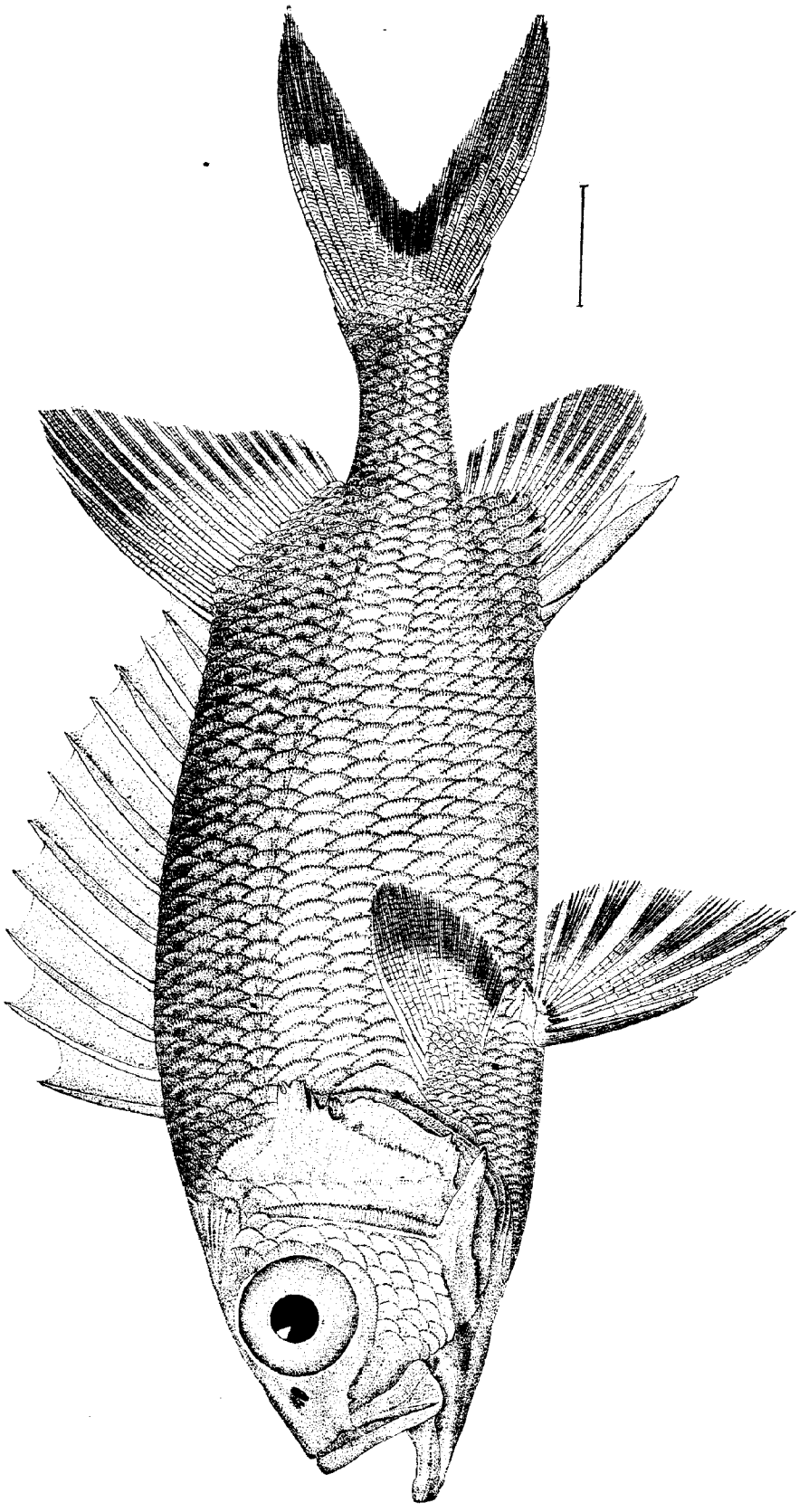


## THE RONCHIL.

Bathymaster signatus, Cope. (p. 361.)

Drawing by H. L. Todd, from No. 27646, U. S. National Museum, collected off the Shumagins, Alaska, by E. P. Herendeen.

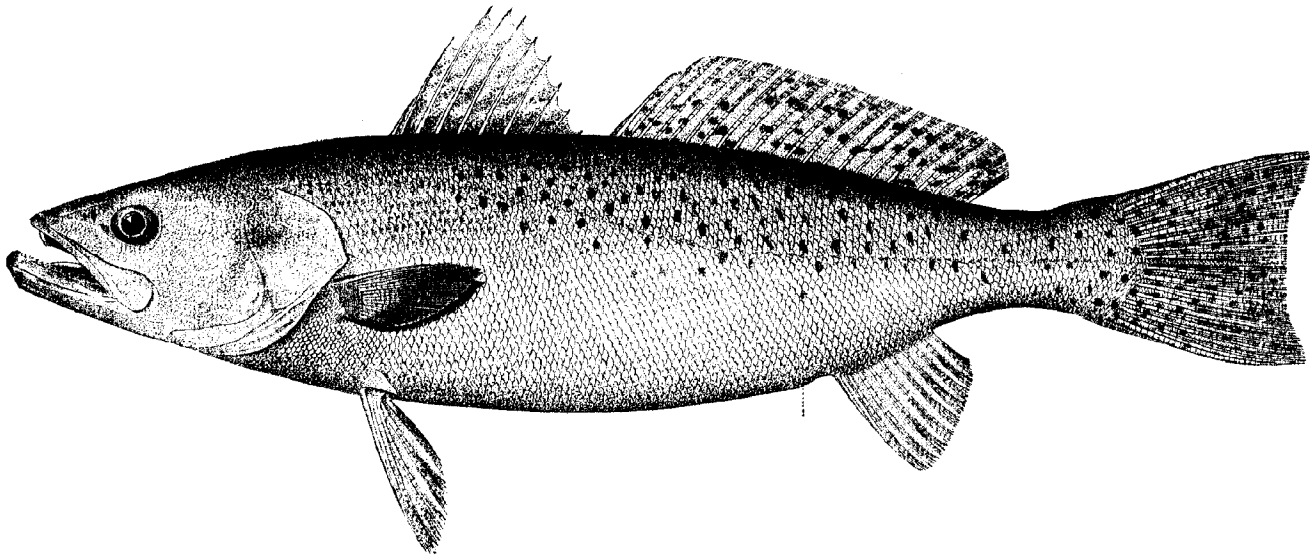
PLATE 118.



THE SQUIRREL-FISH.

Holocentrum pentacanthum (Bloch), Vaill & Bocourt. (p. 361.)

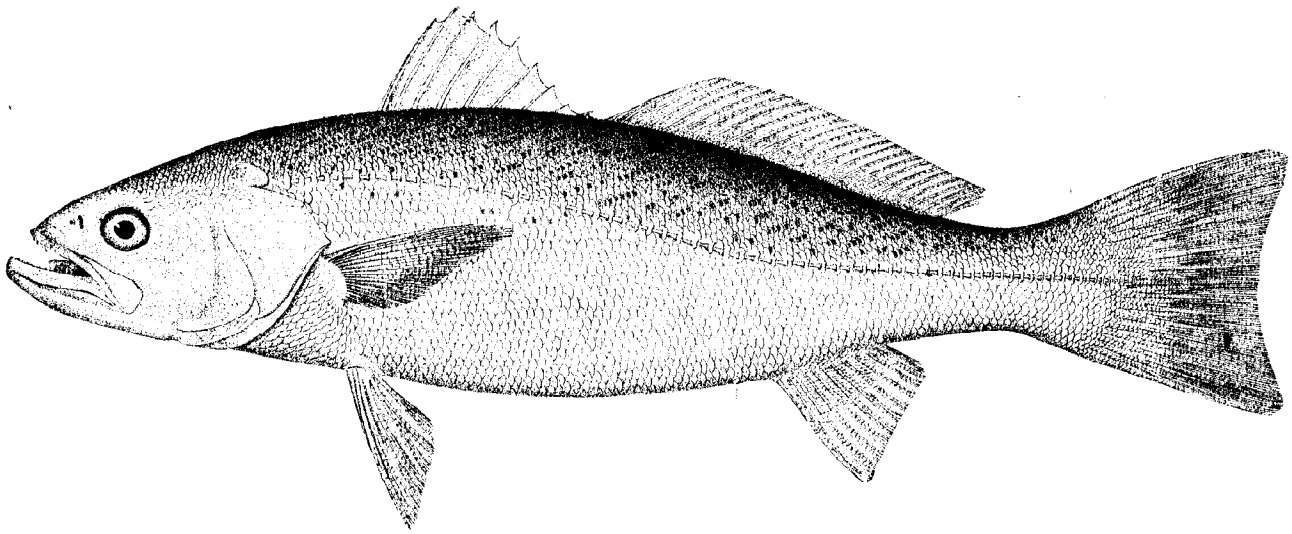
Drawing by H. L. Todd, from No. 26580, U. S. National Museum, collected at Key West, Fla., 1880, by Silas Stearns.



## THE SPOTTED SQUETEAGUE OR SOUTHERN "SEA TROUT."

Cynoscion maculatum (Mitch.), Gill. (p. 362.)

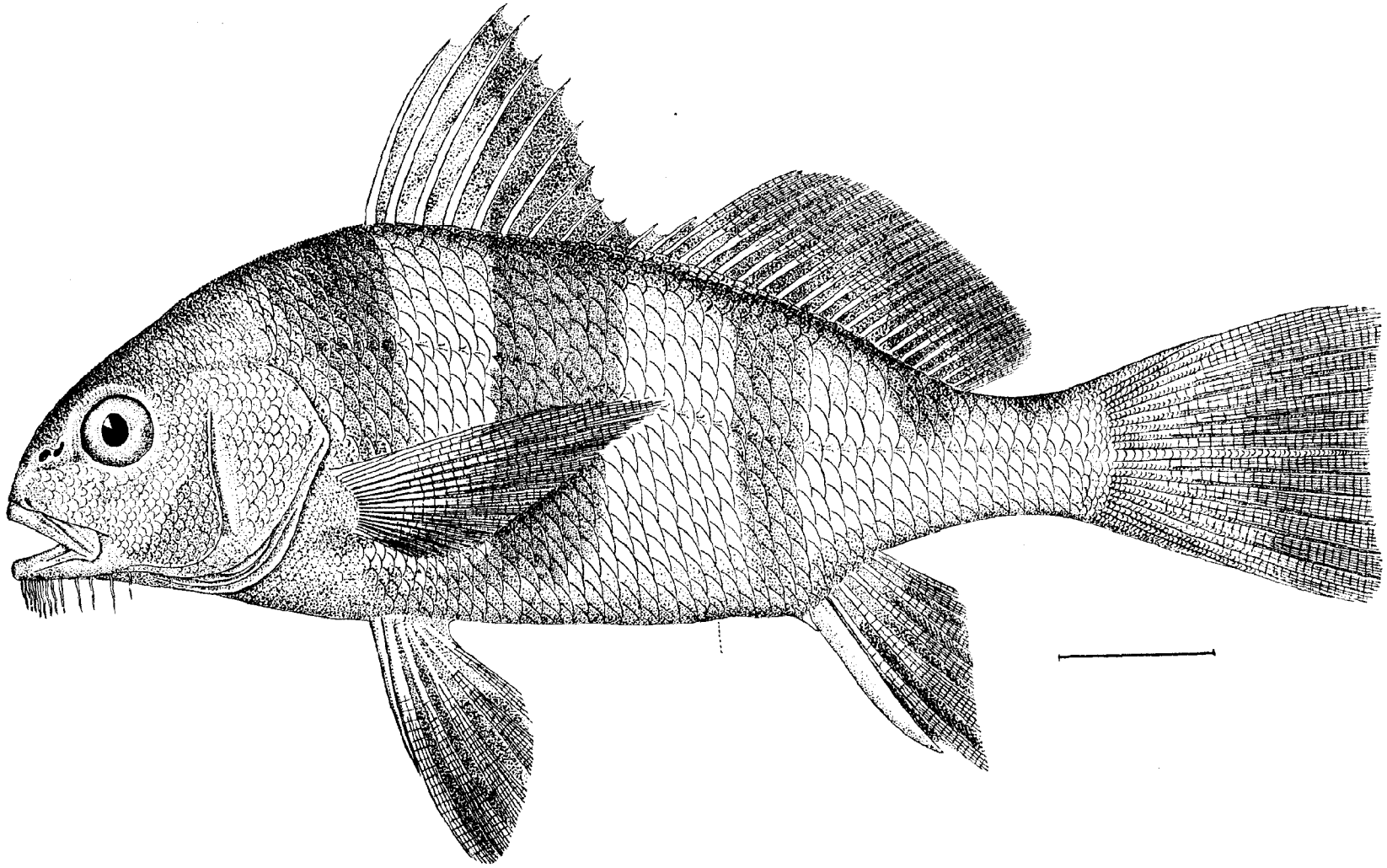
Drawing by H. L. Todd, from No. 15000, U. S. National Museum, collected at Norfolk, Va., 1872, by Mr. Sibley.



## THE COMMON SQUETEAGUE.

Cynoscion regale (Schn.), Gill. (p. 362.)

Drawing by H. L. Todd, from No. 10421, U. S. National Museum, collected at Wood's Holl, Mass., 1871, by the U. S. Fish Commission.

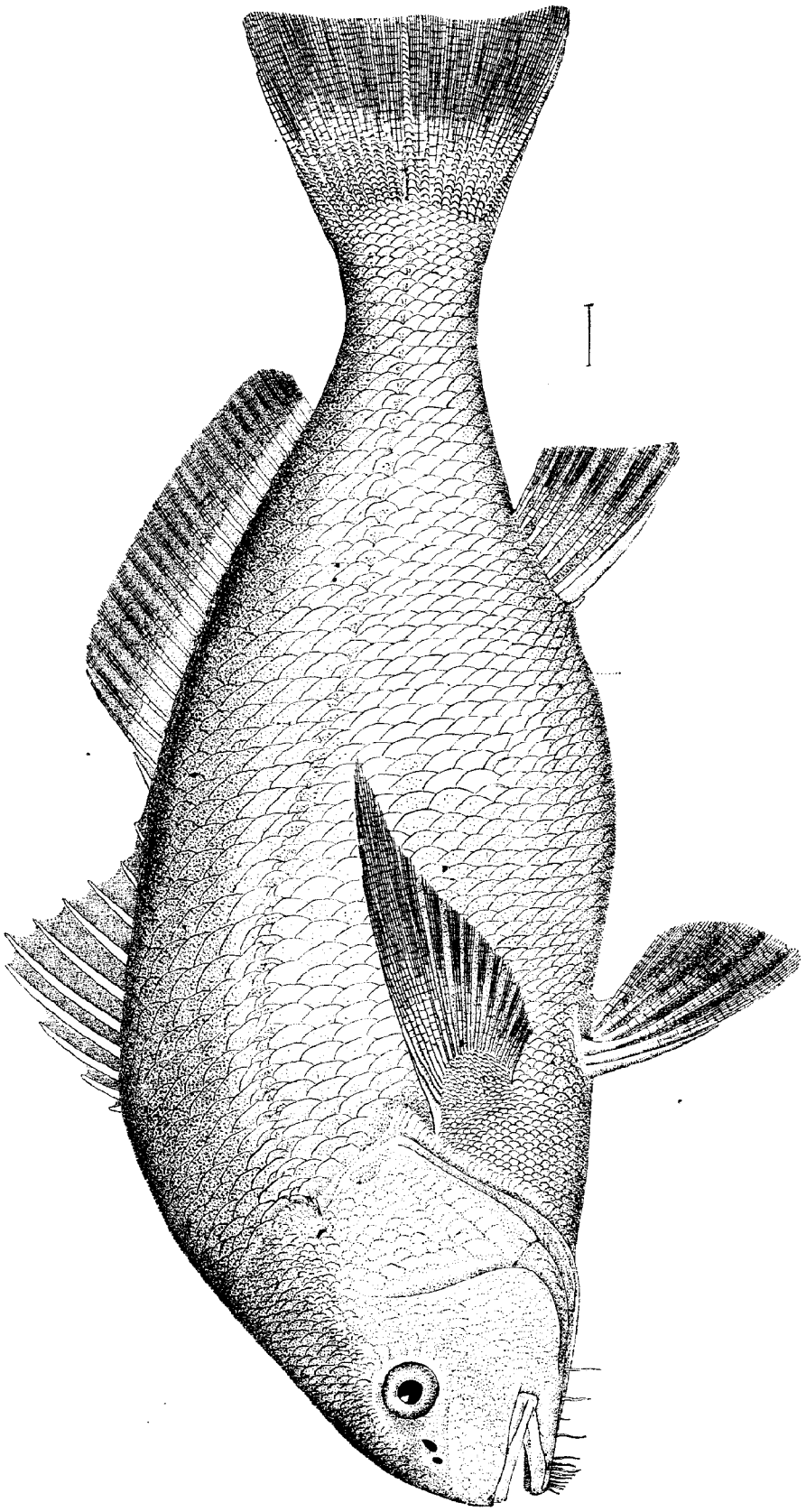


THE DRUM. (Young.)

Pogonias chromis (L.), C. & V. (p. 367.)

Drawing by H. L. Todd, from No. 18036, U. S. National Museum, collected at Matanzas River Inlet, Florida, February, 1877, by John C. Willets.

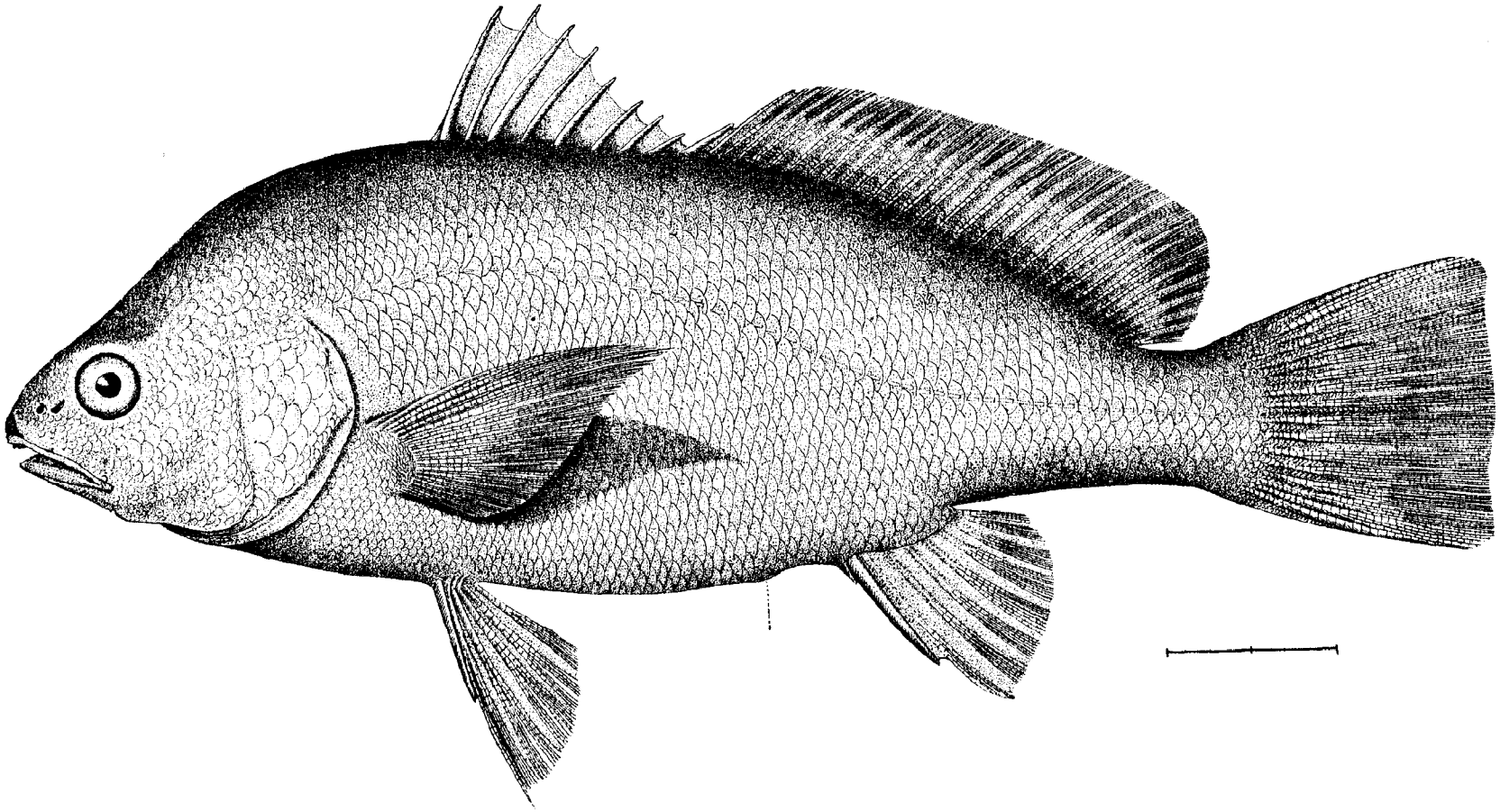
PLATE 121.



THE DRUM. (Adult.)

Pogonias chromis (L.), C. & V. (p. 367.)

Drawing by H. L. Todd, from No. 22936, U. S. National Museum.

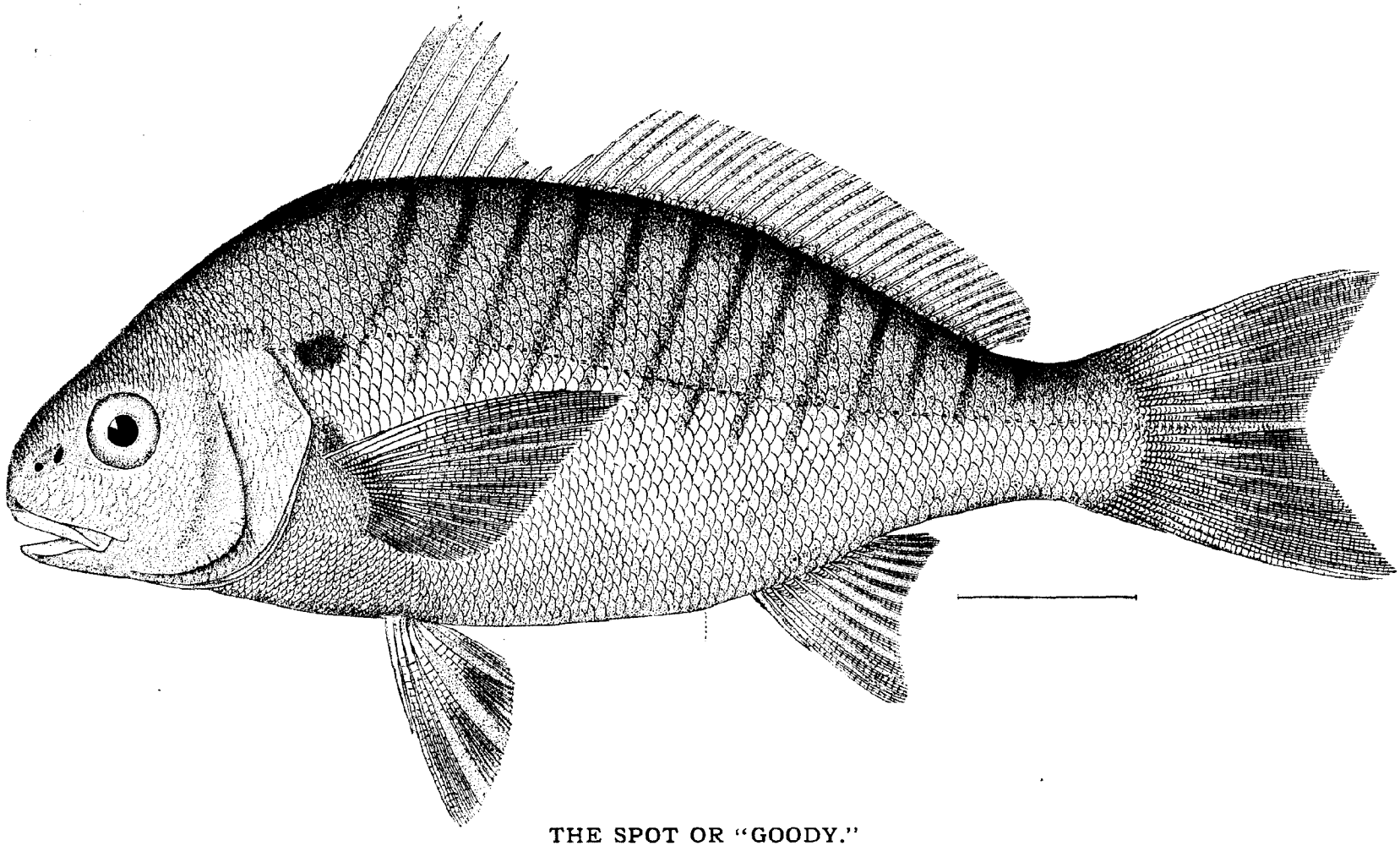


## THE FRESH-WATER DRUM OR GASPERGOU.

Halpoidonotus grunniens, Raf. (p. 370.)

Drawing by H. L. Todd, from No. 10542, U. S. National Museum, collected at Ecorse, Mich., by J. W. Milner.

PLATE 123.

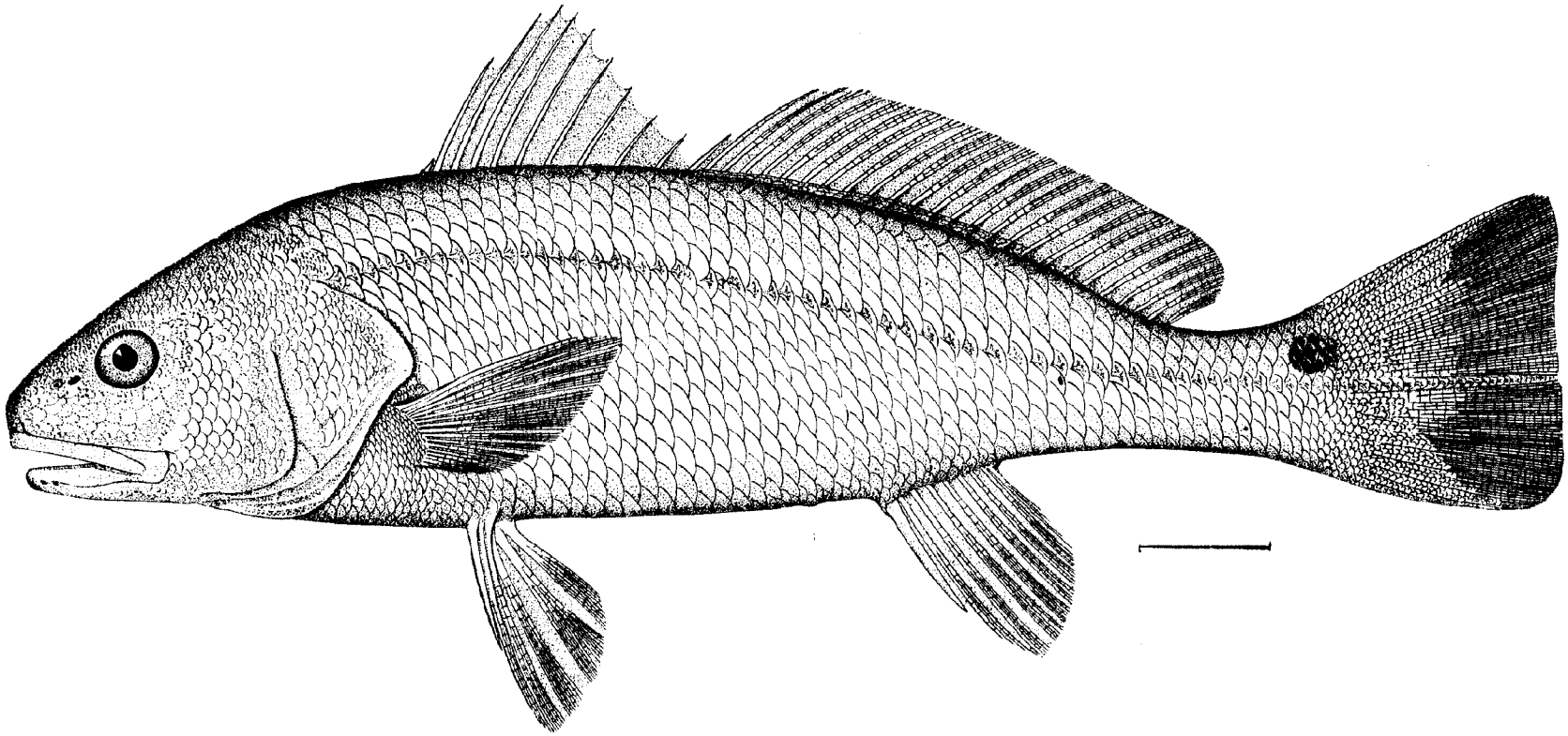


## THE SPOT OR "GOODY."

Liostomus xanthurus, Lac. (p. 370.)

Drawing by H. L. Todd, from No. 20222, U. S. National Museum, collected at Newport, R. I., November, 1875, by Samuel Powel.

PLATE 124.

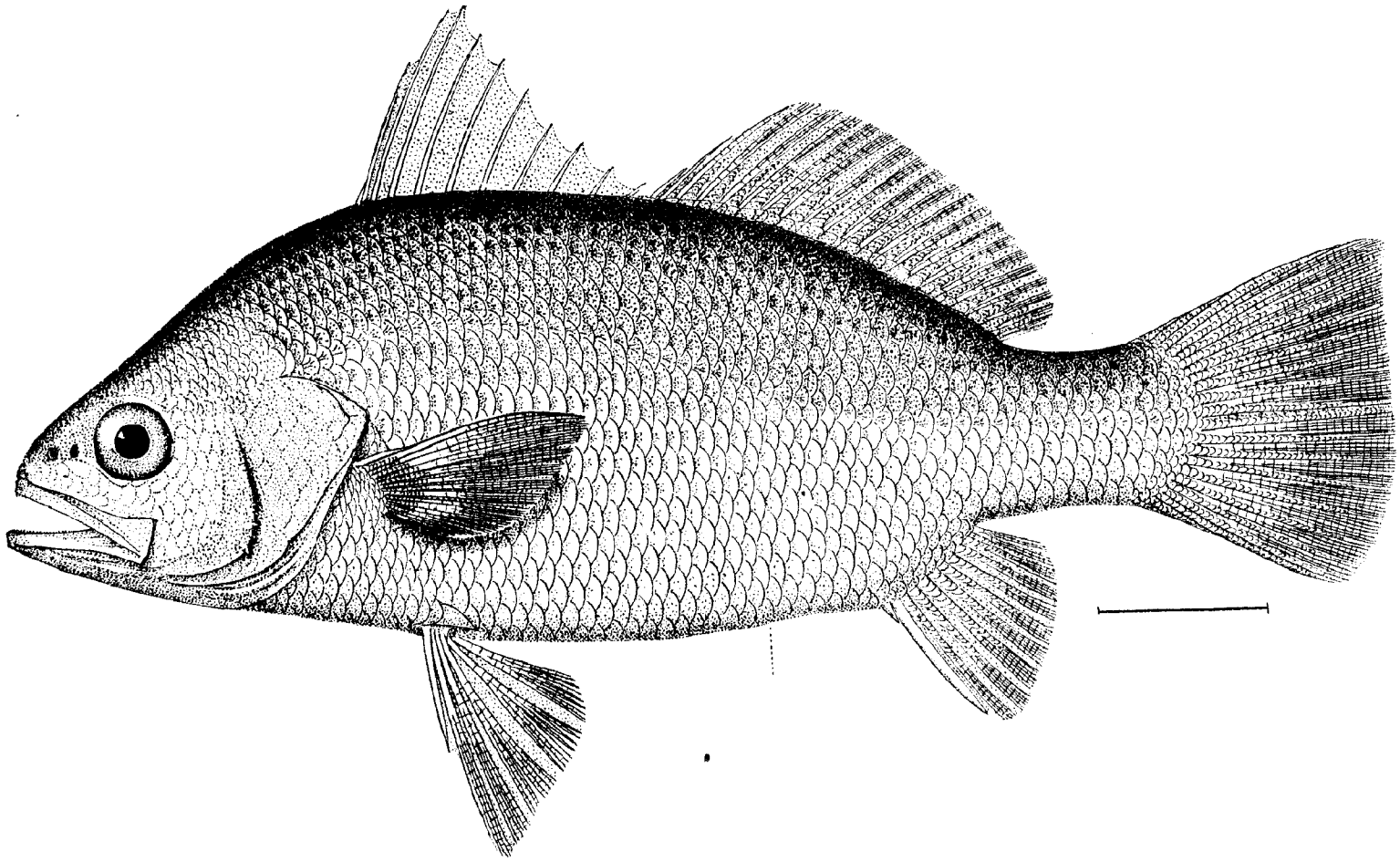


## THE RED-FISH OR BASS OF THE SOUTH.

Sciœna ocellata (L.), Gthr. (p. 371.)

Drawing by H. L. Todd, from No. 622, U. S. National Museum, collected at Indianola, Tex., 1858, by Major Emory.

PLATE 125.

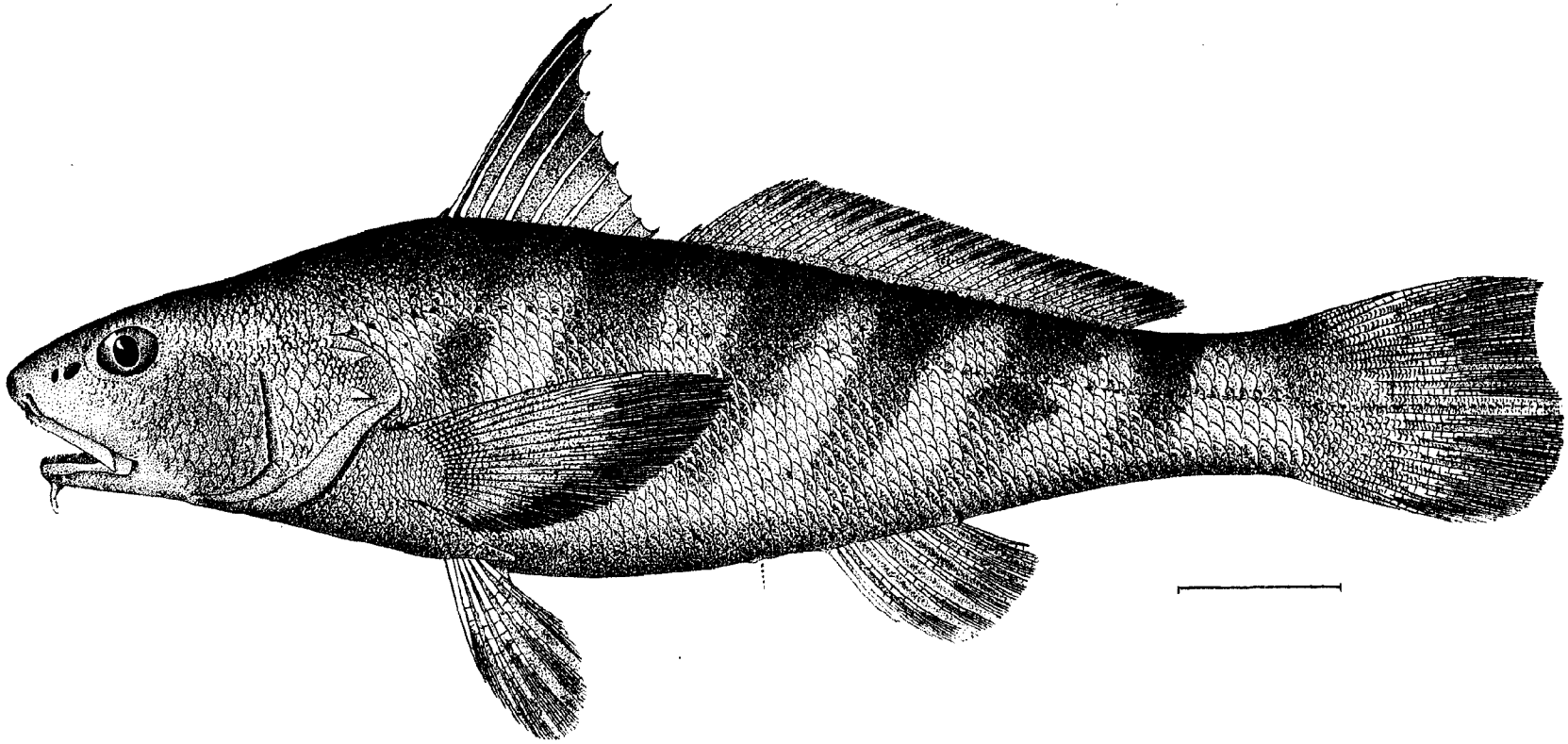


## THE YELLOW TAIL.

Bairdiella chrysura (Lac.). (p. 375.)

Drawing by H. L. Todd, from No. 771, U. S. National Museum, collected at Beesley's Point, New Jersey, 1858, by Prof. S. F. Baird.

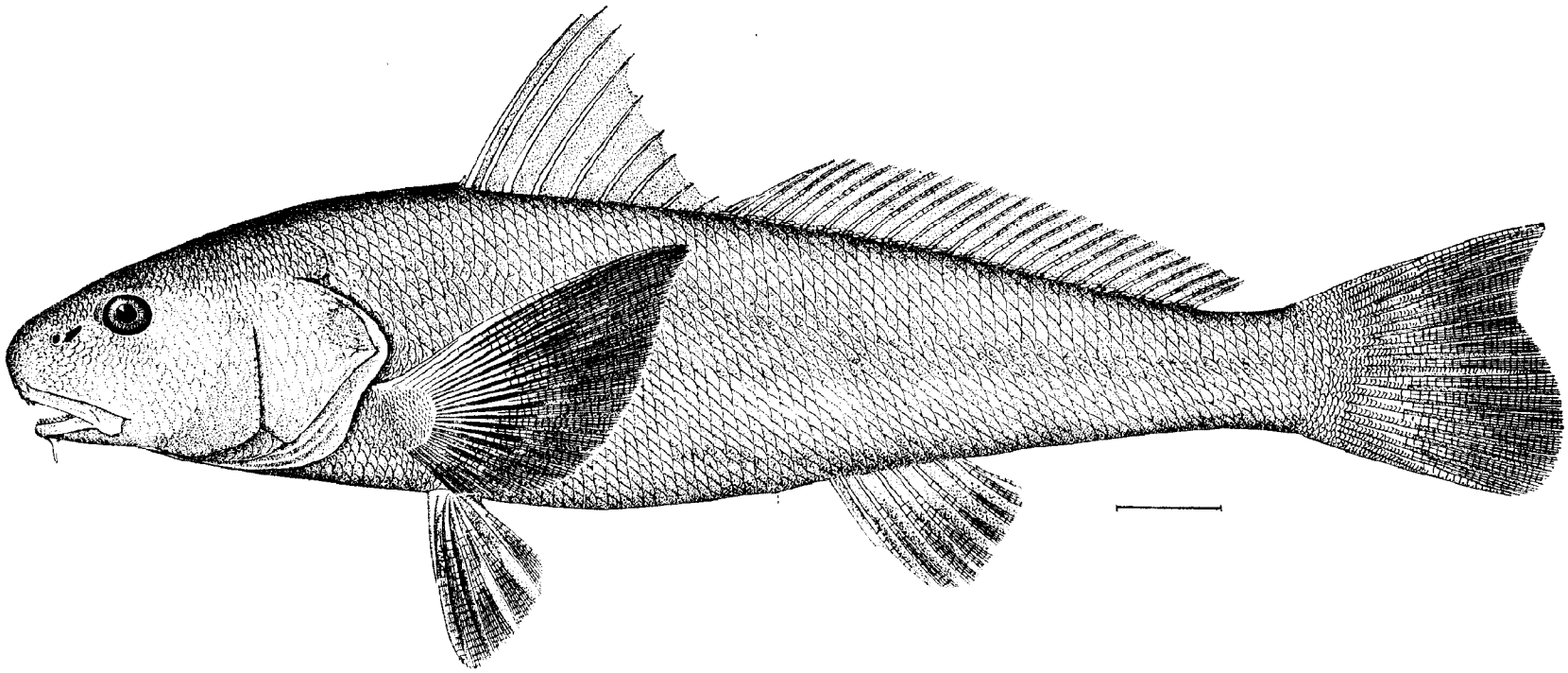
PLATE 126.



## THE KINGFISH OR SEA MINK.

Menticirrus nebulosus (Mitch.), Gill. (p. 375.)

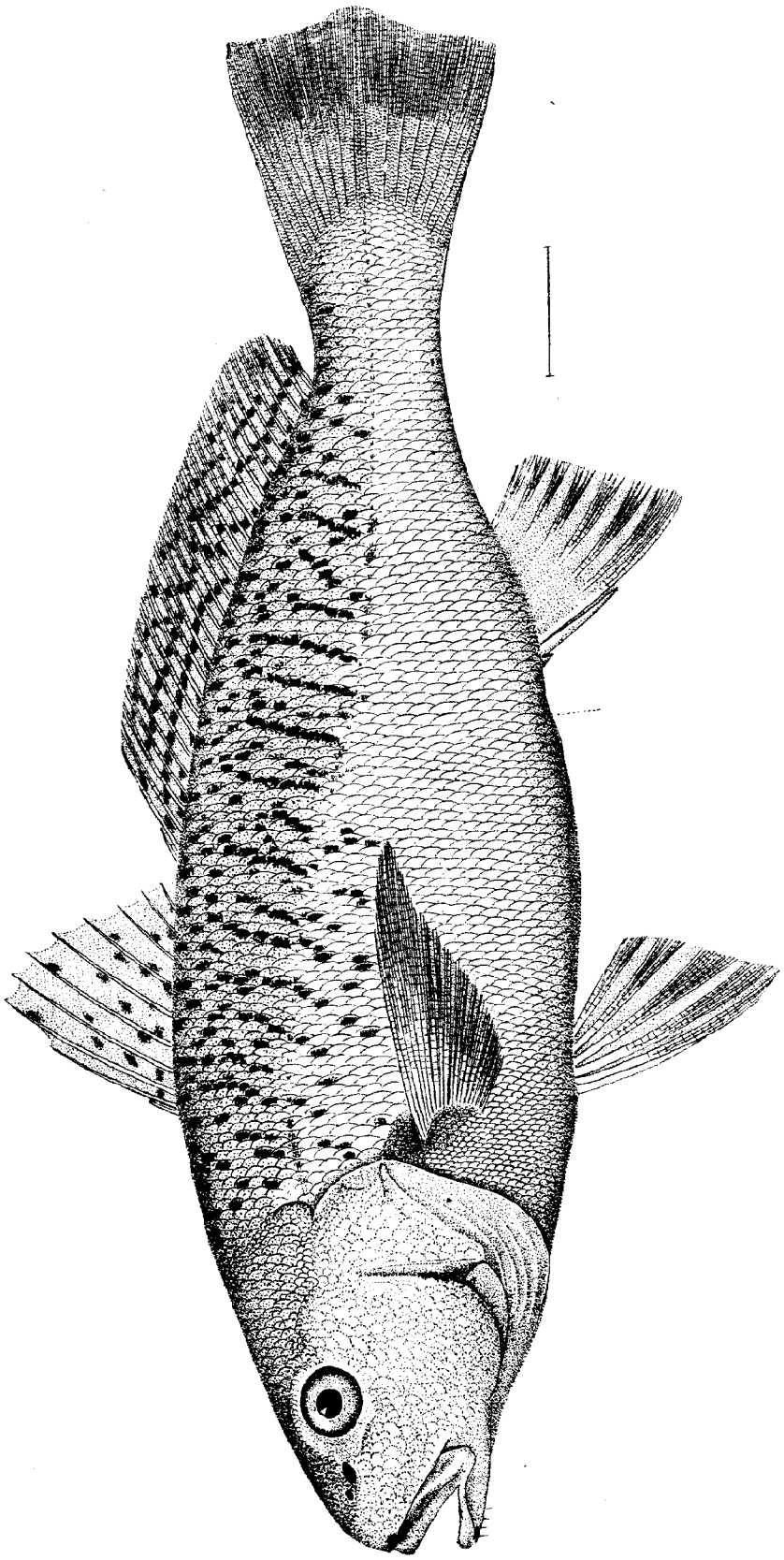
Drawing by H. L. Todd, from No. 25403, U. S. National Museum, collected at Charleston Harbor, South Carolina, March 25, 1880, by R. E. Earll.



## THE CAROLINA WHITING.

Menticirrus alburnus (L.), Gill. (p. 376.)

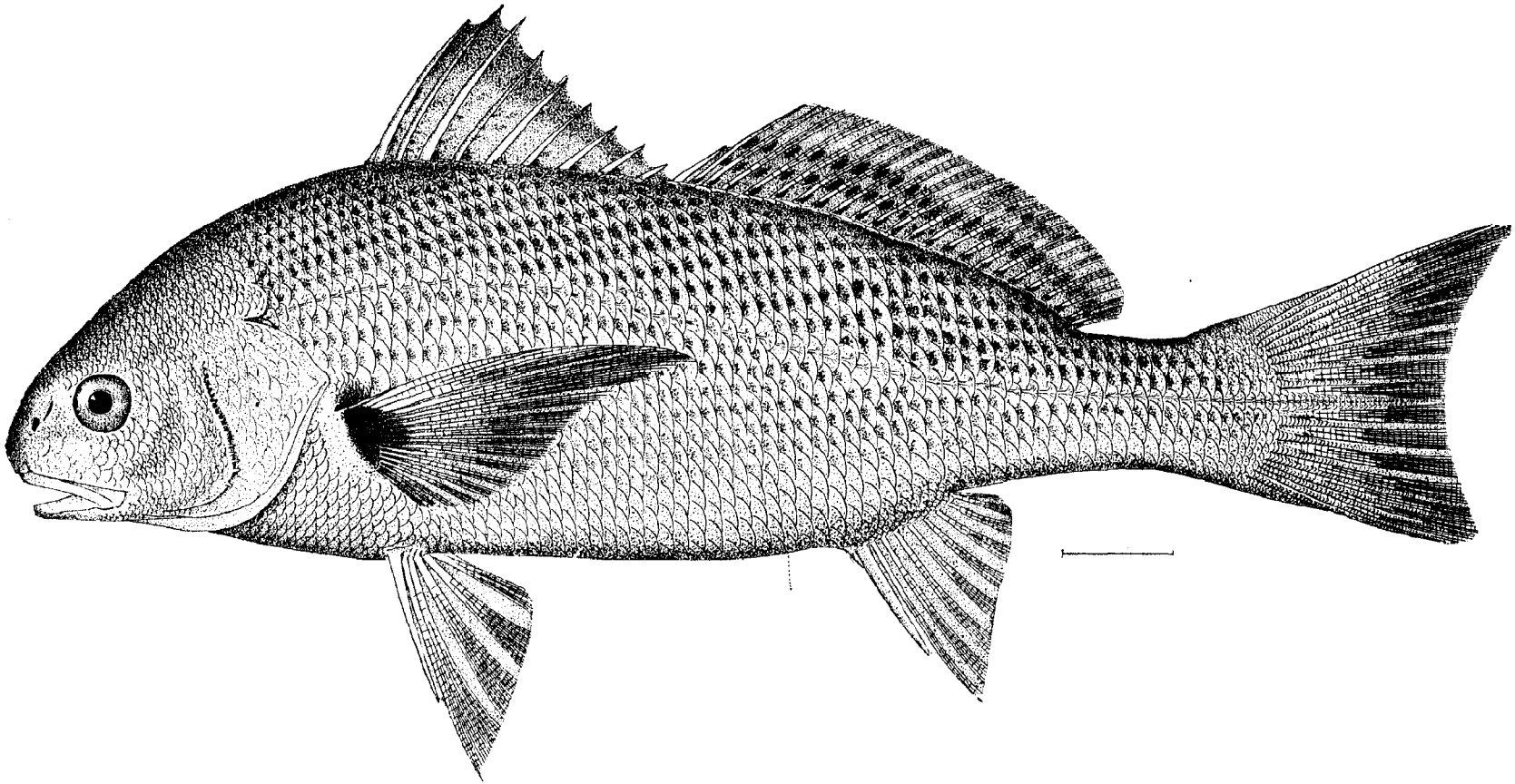
Drawing by H. L. Todd, from No. 22832, U. S. National Museum, collected at Pensacola, Fla., 1878, by Silas Stearns.



## THE CROAKER.

Micropogon undulatus (L.), C. & V. (p. 378.)

Drawing by H. L. Todd, from No. 29742, U. S. National Museum, collected at Newport, R. I., 1877, by Samuel Powel.

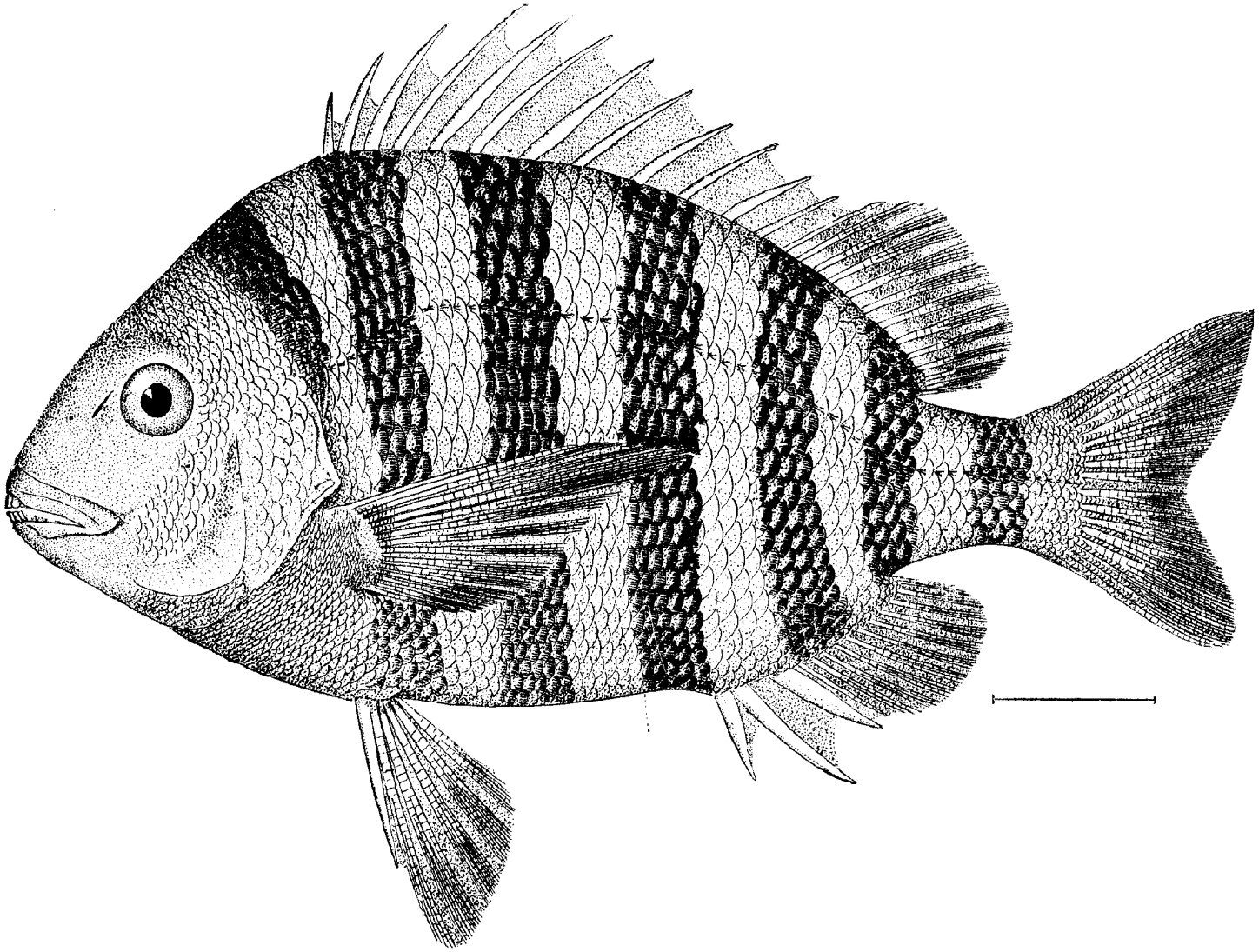


## THE RONCADOR.

Roncador Stearnsii (Steindachner), J. & G. (p. 379.)

Drawing by H. L. Todd, from No. 26864, U. S. National Museum, collected at Santa Barbara, Cal., 1880, by Prof. D. S. Jordan.

PLATE 129.

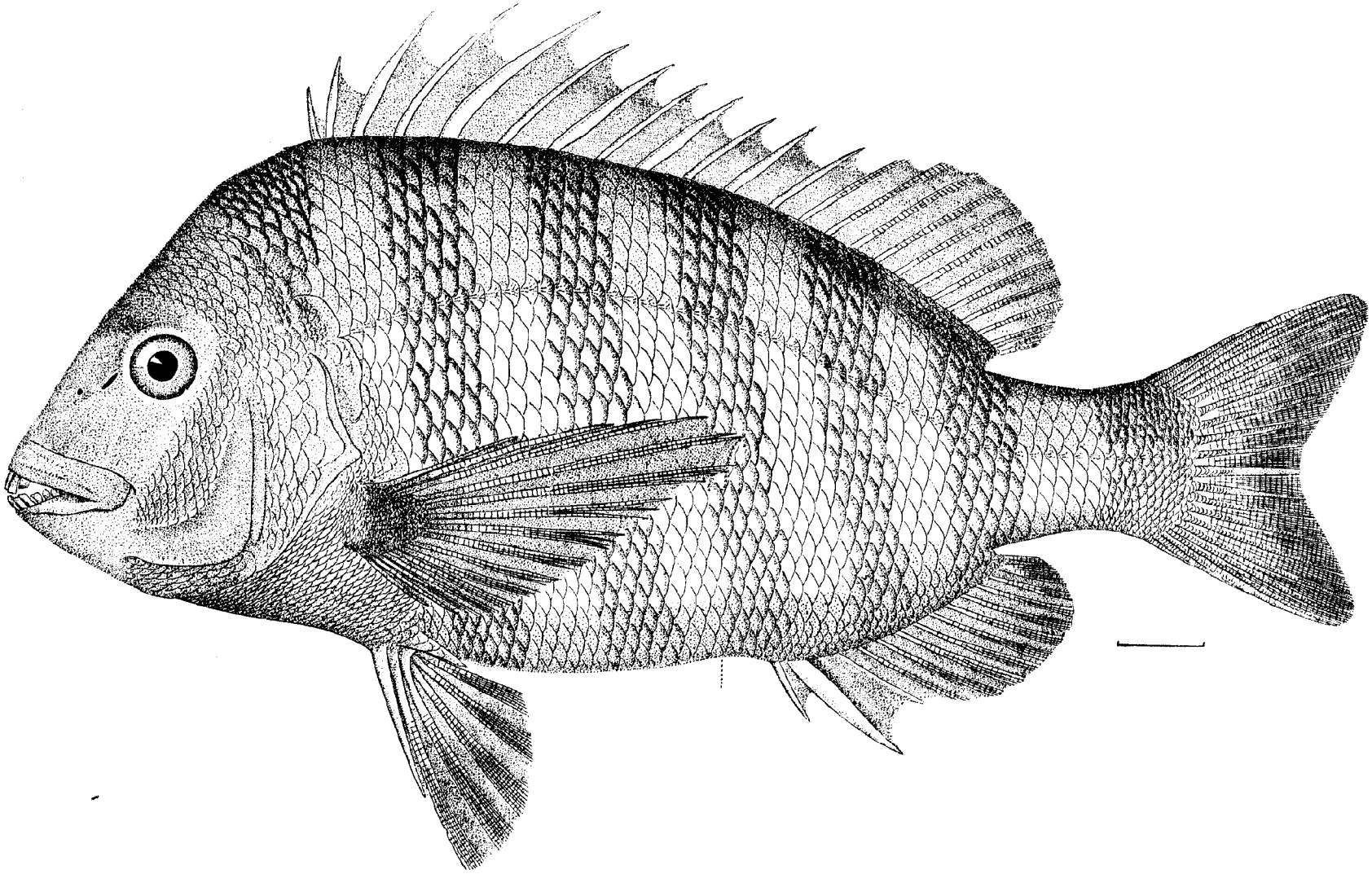


THE SHEEP'S-HEAD. (Young.)

Diplodus probatocephalus (Walb.), J. & G. (p. 381.)

Drawing by H. L. Todd, from specimen in U. S. National Museum.

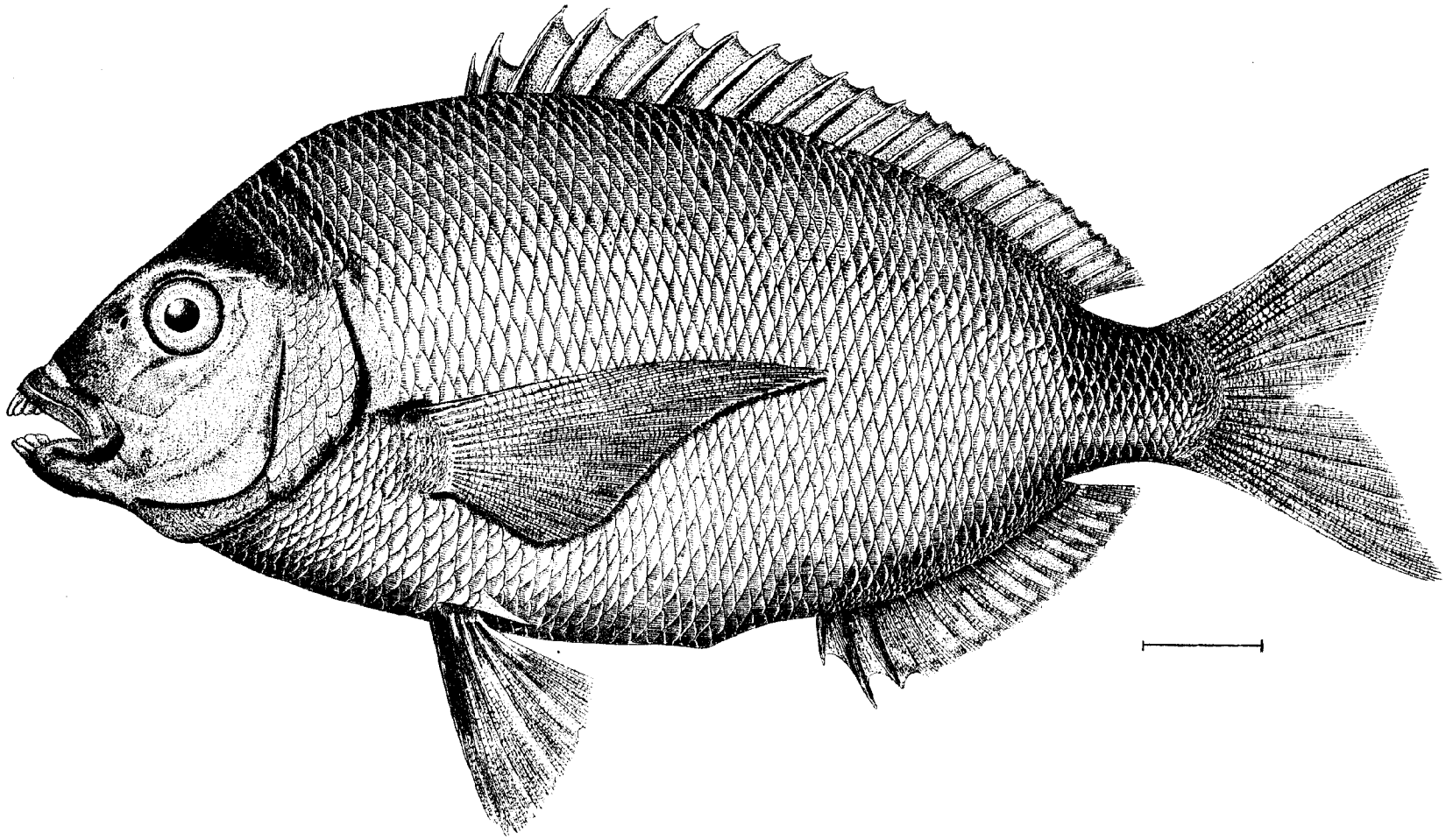
PLATE 130.



**THE SHEEP'S-HEAD. (Adult.)**

Diplodus probatocephalus (Walb.), J. & G. (p. 381.)

Drawing by H. L. Todd, from specimen in U. S. National Museum.

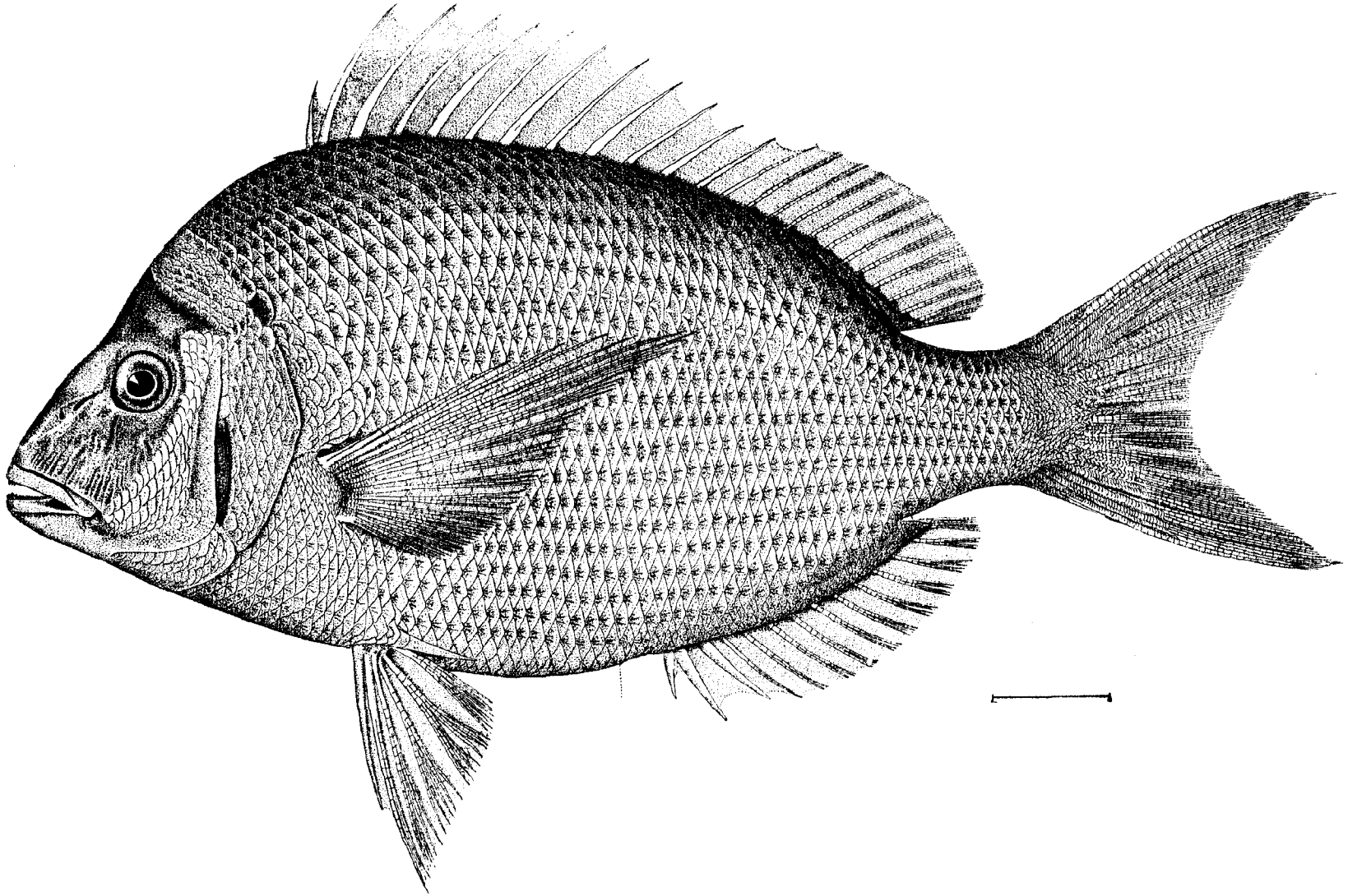


## THE CHARLESTON BREAM OR PIN-FISH.

Diplodus Holbrookii, Bean. (p. 386.)

Drawing by H. L. Todd, from No. 20979, U. S. National Museum, collected at Charleston, S. C., March 29, 1878, by G. Brown Goode.

PLATE 132.

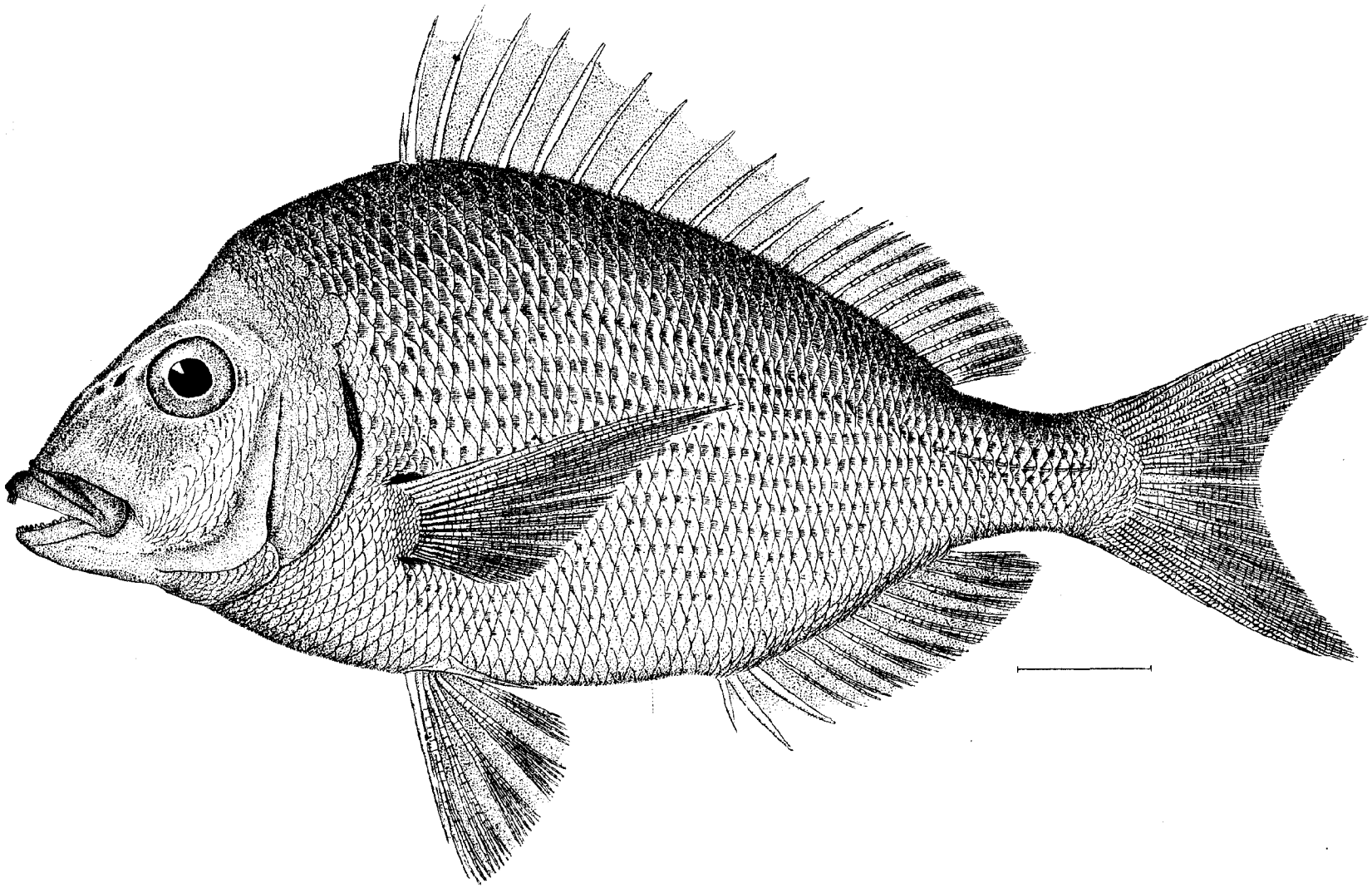


## THE SCUPPAUG, SCUP, OR NORTHERN PORGY.

**Stenotomus chrysops (Mitch.), Bean.** (p. 386.)

Drawing by H. L. Todd, from No. 10425, U. S. National Museum, collected at Wood's Holl, Mass., 1871, by Prof. S. F. Baird.

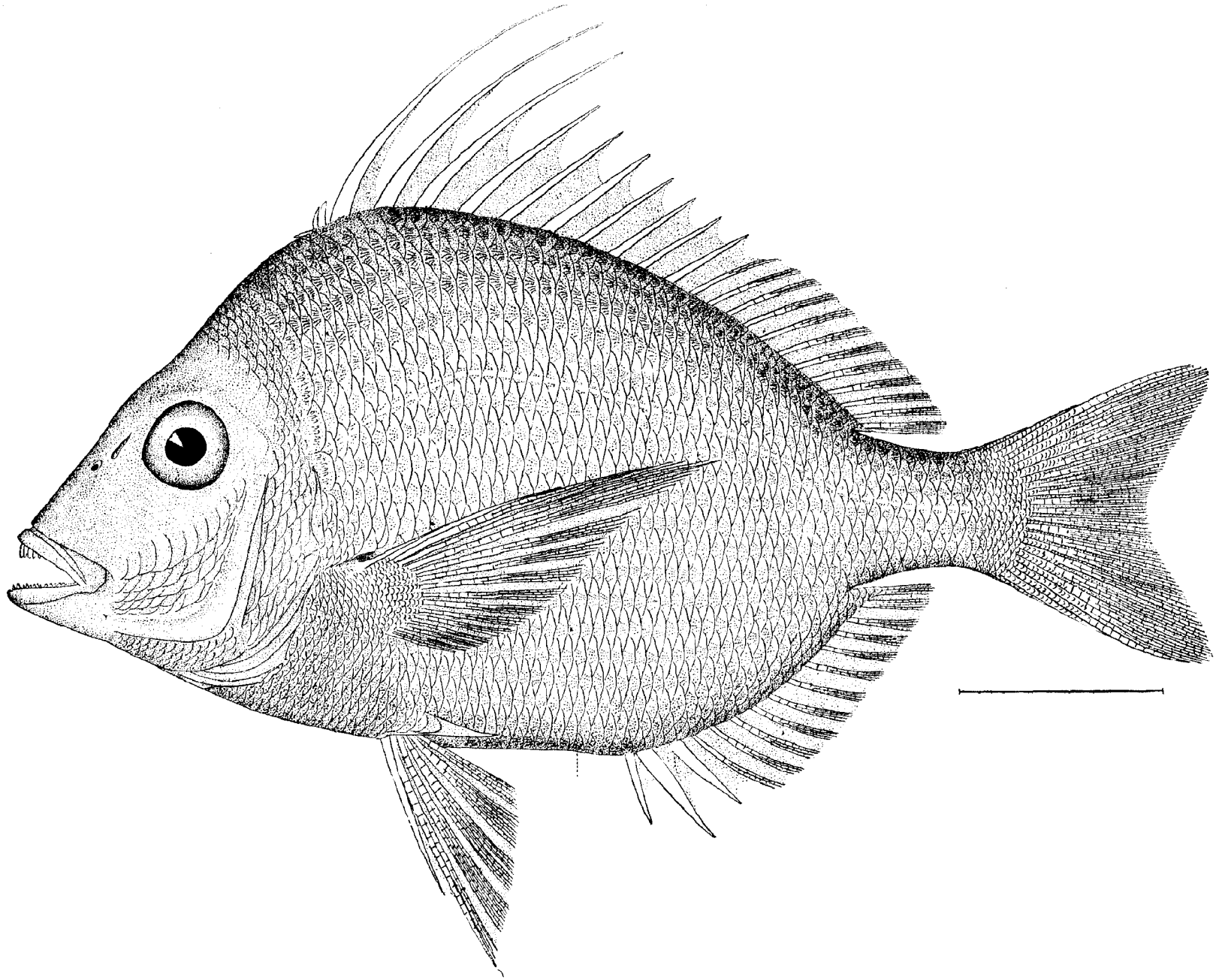
PLATE 133.



## THE SOUTHERN SCUP.

**Stenotomus Gardeni, Bean (S. aculeatus, ?).** (p. 387.)

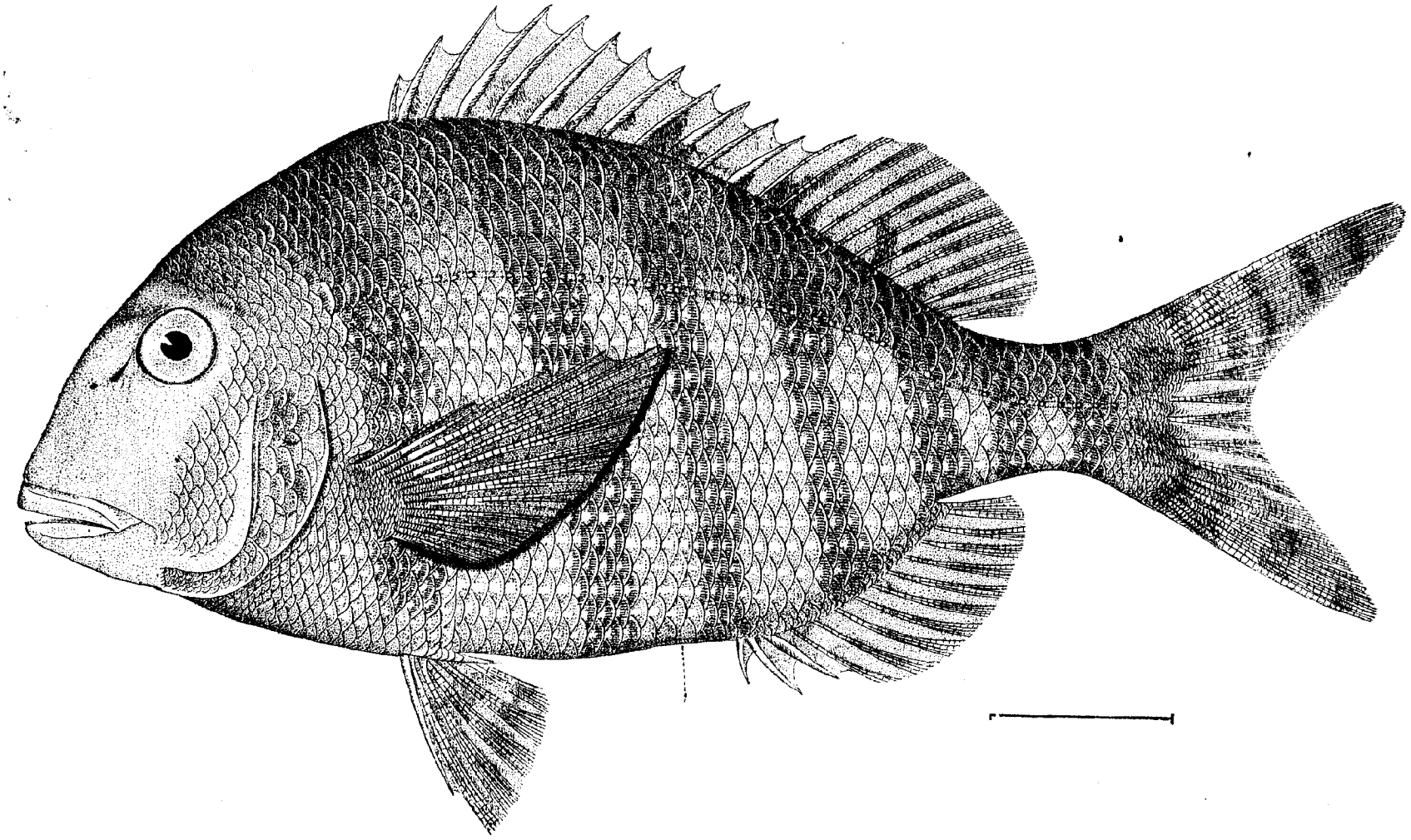
Drawing by H. L. Todd, from specimen collected at Charleston, S. C., by G. Brown Goode.



## THE GULF SCUP OR GOAT'S HEAD PORGY.

Stenotomus caprinus, Goode & Bean. (p. 393.)

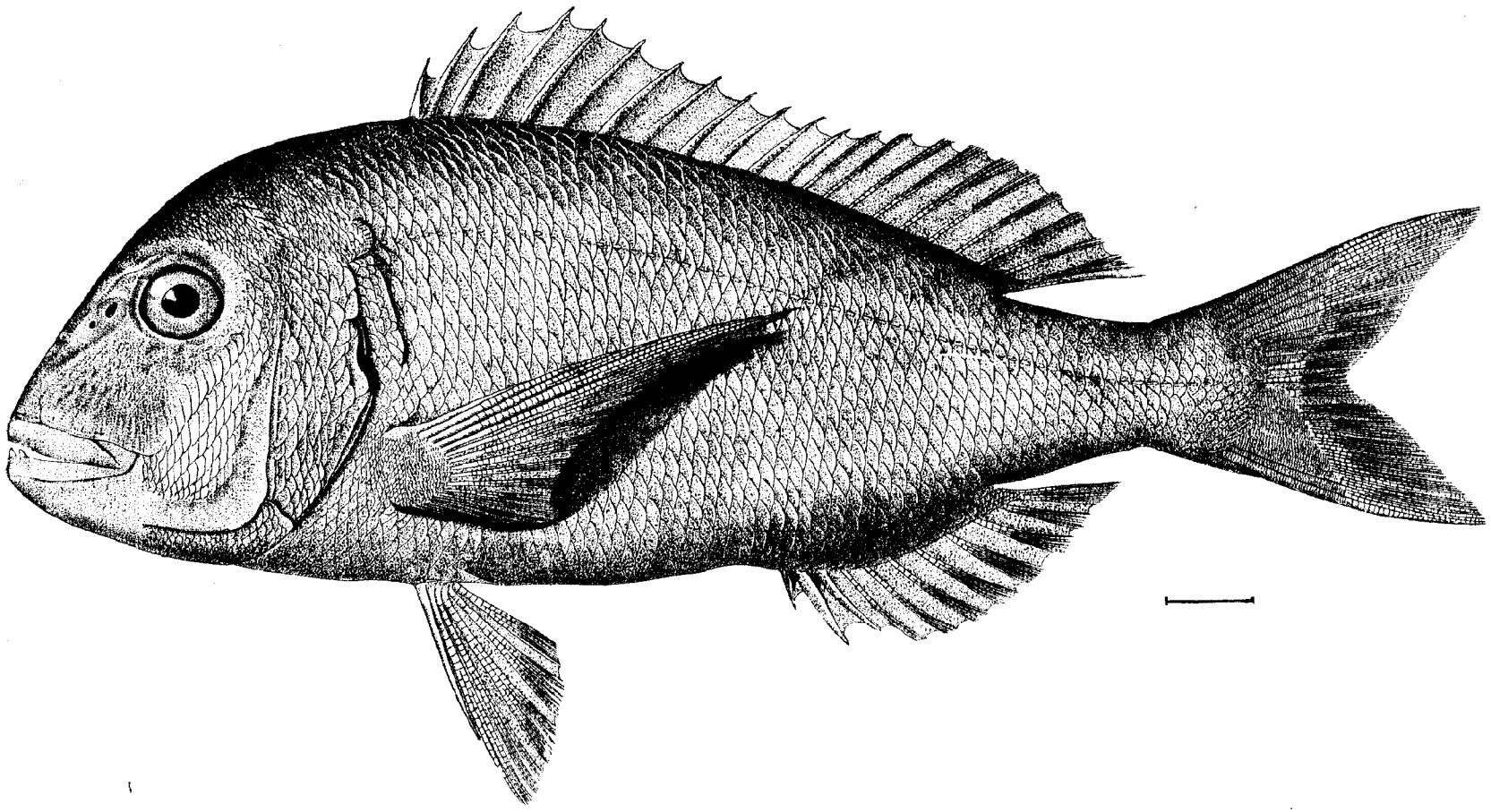
Drawing by H. L. Todd, from No. 32683, U. S. National Museum, collected at Pensacola, Fla., by Silas Stearns.



## MILNER'S PAGELLUS.

**Pagellus Milneri, Goode & Bean.**

Drawing by H. L. Todd, from No. 6134, U. S. National Museum, collected at Charlotte Harbor, Fla., by C. B. Baker.

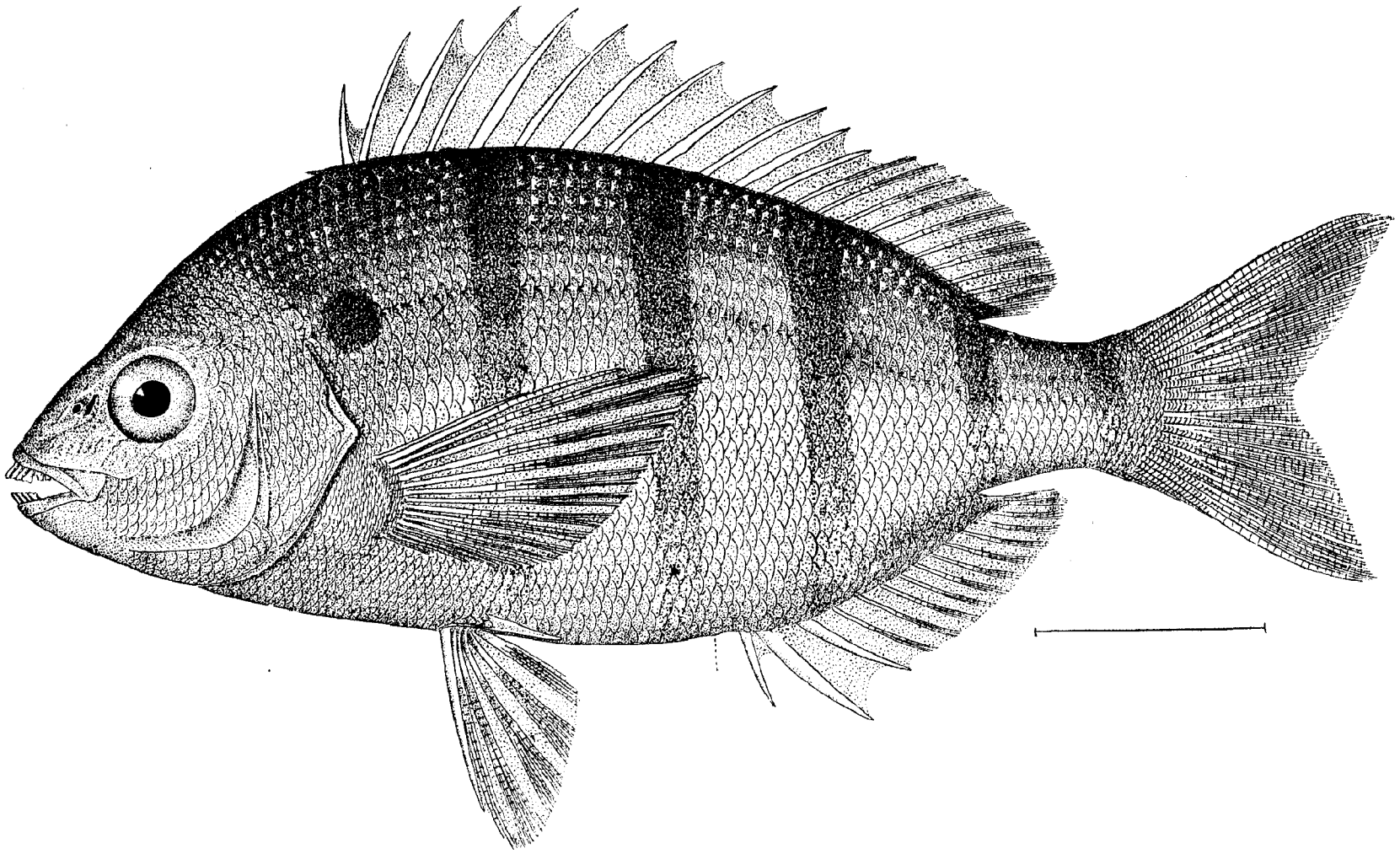


THE MARGATE FISH, BASTARD SNAPPER, OR CHARLESTON "PORGY."

Sparus pagrus, L.

Drawing by H. L. Todd, from specimen in U. S. National Museum, collected at Charleston, S. C., by G. Brown Goode.

PLATE 137.

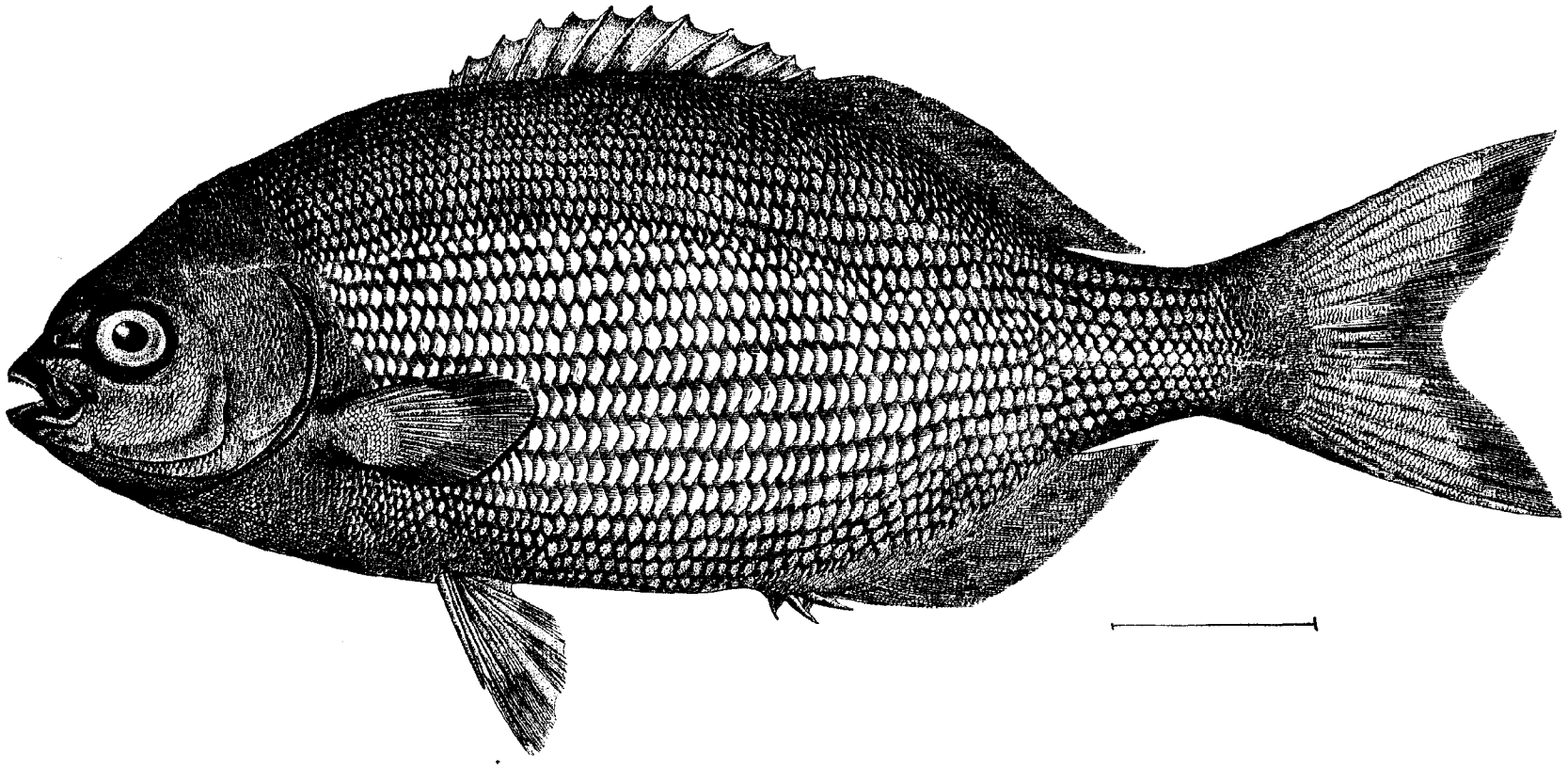


## THE SAILOR'S CHOICE.

Lagodon rhomboides (L.), Holbrook. (p. 393.)

Drawing by H. L. Todd, from No. 21280, U. S. National Museum, collected in the Saint John's River, Florida, April, 1878, by G. Brown Goode.

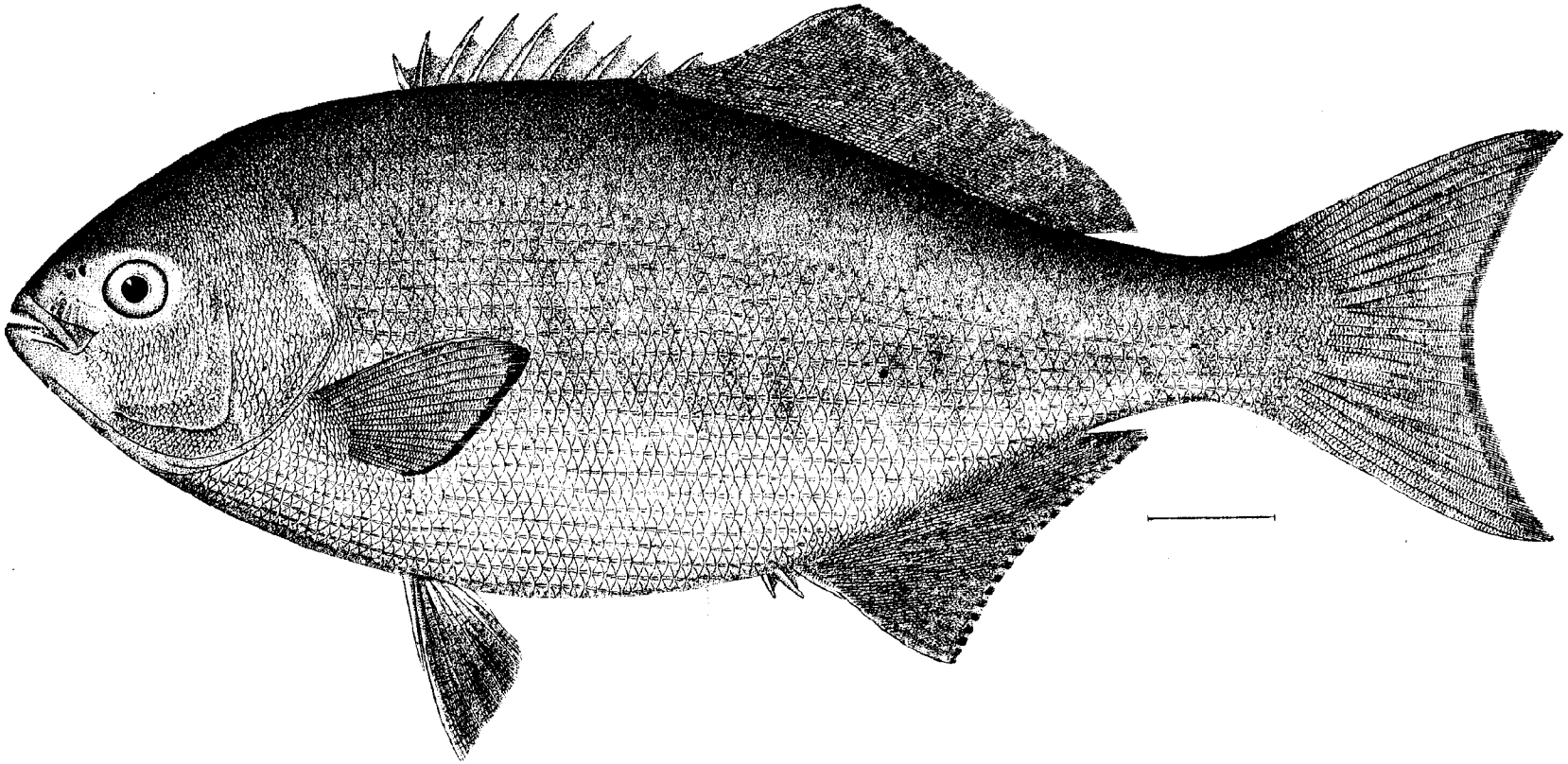
PLATE 138.



## THE BERMUDA CHUB.

Cyphosus Boscii (Lac.), J. & G. (p. 394.)

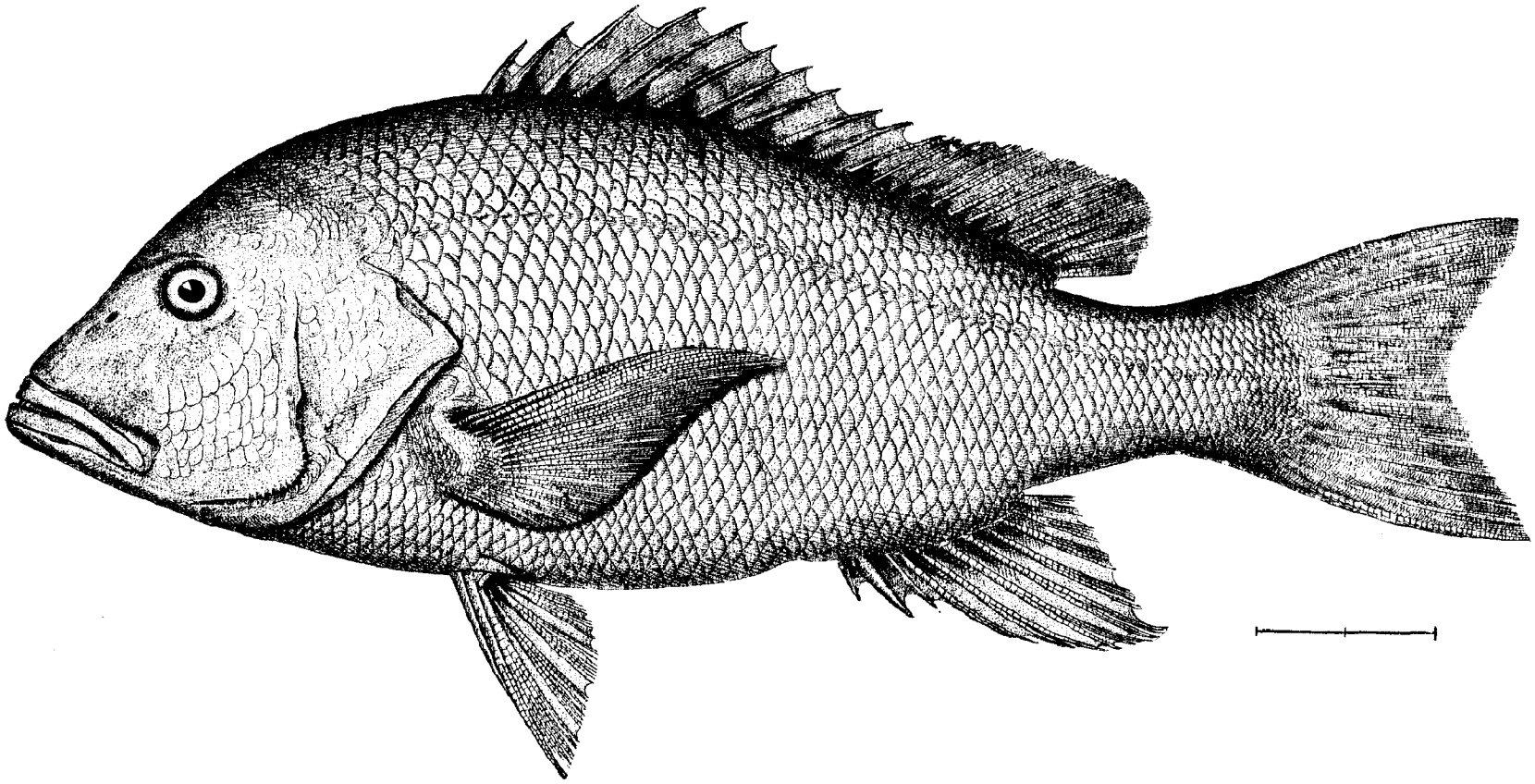
Drawing by H. L. Todd, from No. 20635, U. S. National Museum, collected at Wood's Holl, Mass., September 11, 1877, by Vinal N. Edwards.



## THE MEDIALUNA.

Scorpis californiensis, Steindachner. (p. 395.)

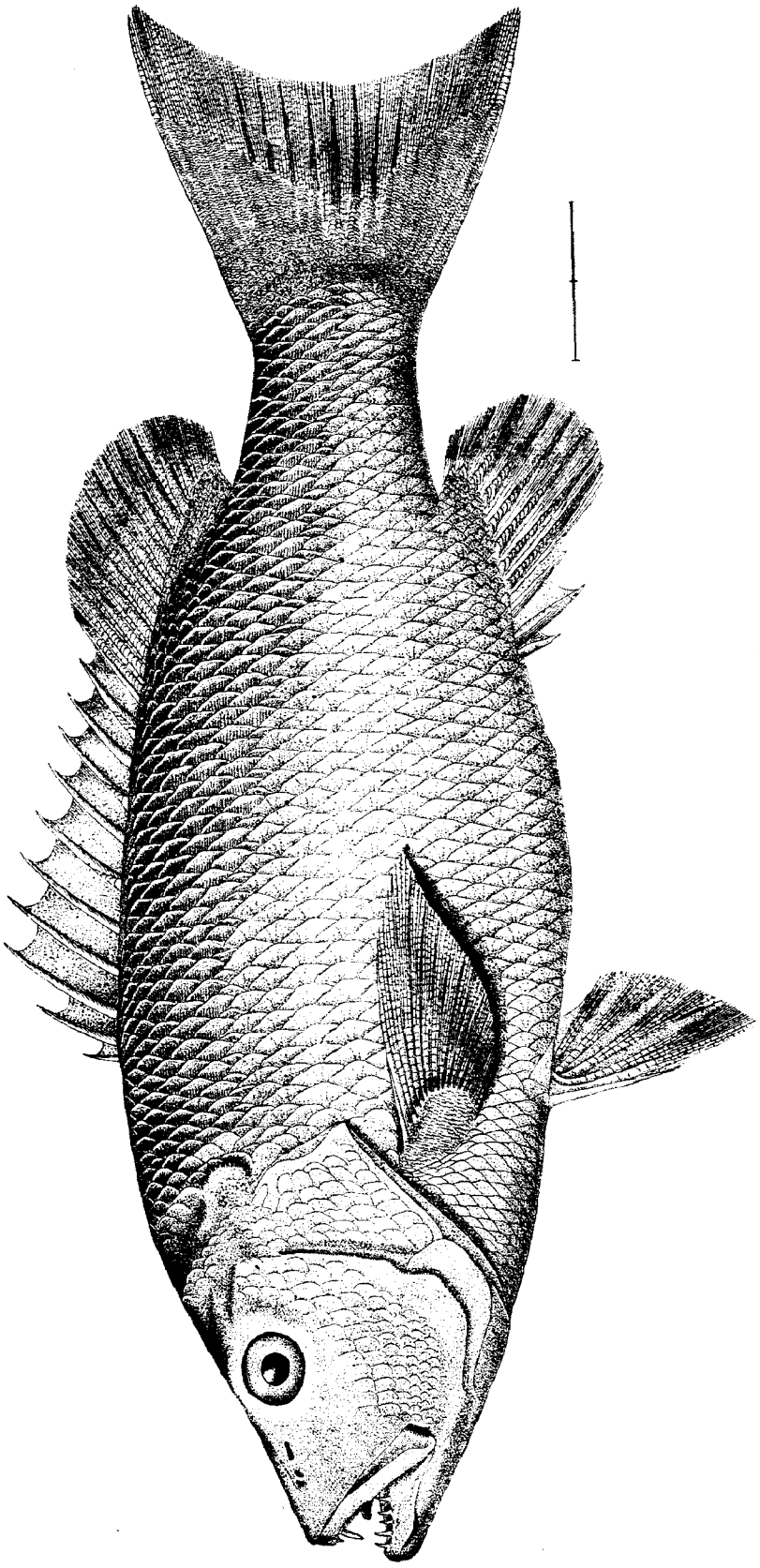
Drawing by H. L. Todd, from No. 26952, U. S. National Museum, collected at Santa Barbara, Cal., 1880, by Jordan & Gilbert.



## THE FLORIDA RED SNAPPER.

Lutjanus Blackfordii, Goode & Bean. (p. 395.)

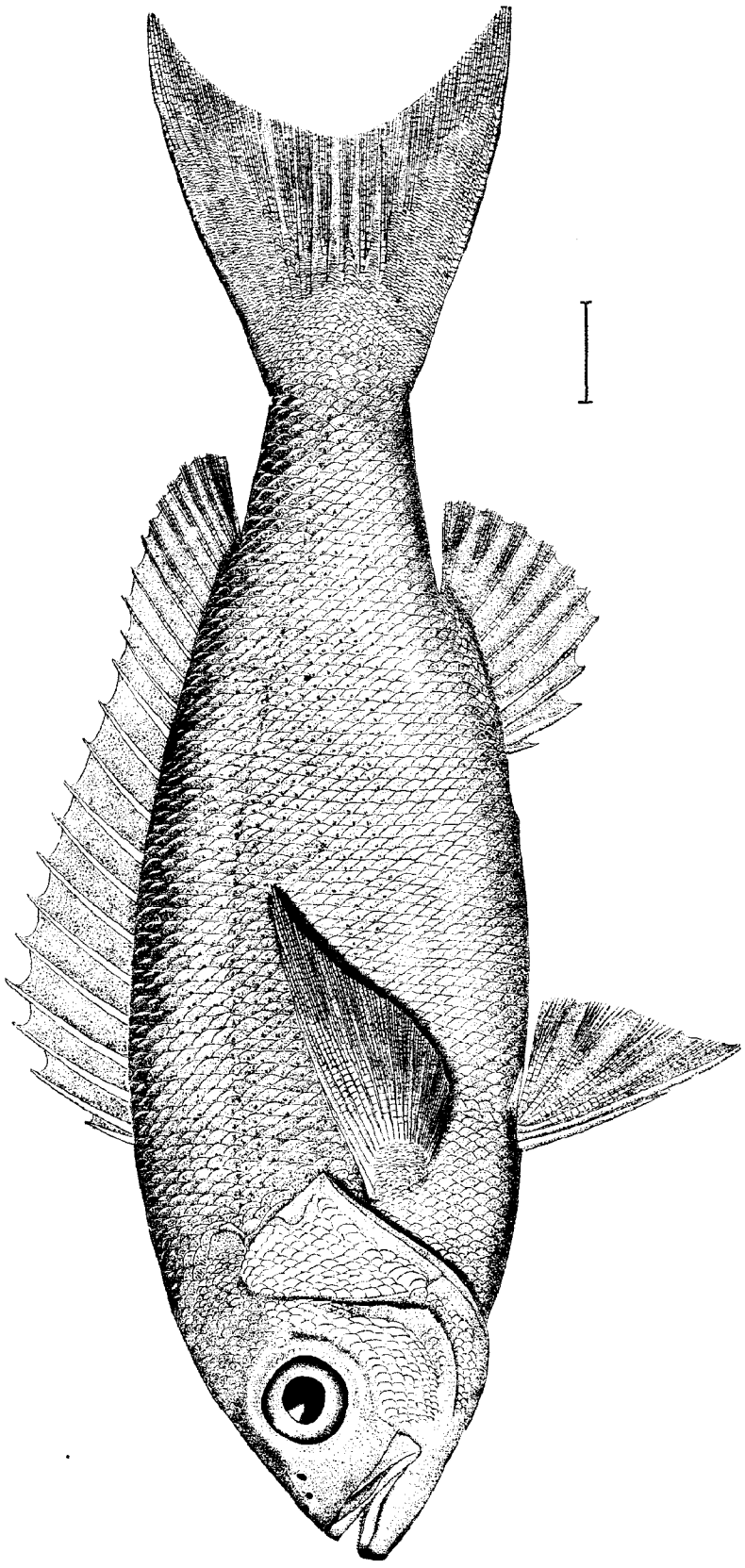
Drawing by H. L. Todd, from No. 21330, U. S. National Museum, collected at Pensacola, Fla., May, 1878, by Silas Stearns.



THE PENSACOLA SNAPPER.

Lutjanus Stearnsii, Goode & Bean. (p. 396.)

Drawing by H. L. Todd, from No. 21337, U. S. National Museum, collected at Pensacola, Fla., May, 1878, by Silas Stearns.



THE MANGROVE SNAPPER.

Rhomboplites aurorubens (C. & V.), Vaillant. (p. 397.)

Drawing by H. L. Todd, from No. 21338, U. S. National Museum, collected at Pensacola, Fla., May, 1878, by Silas Stearns.

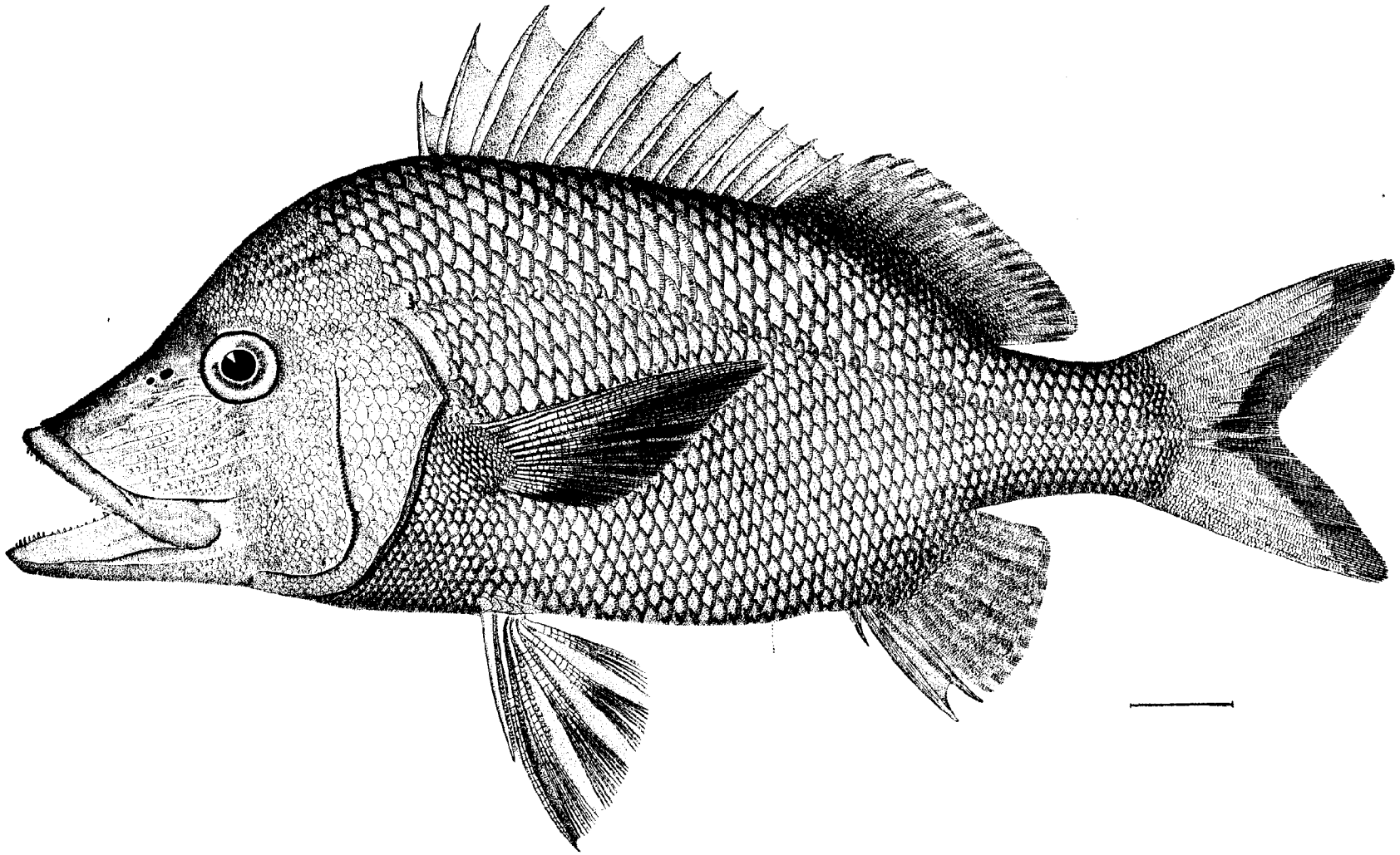
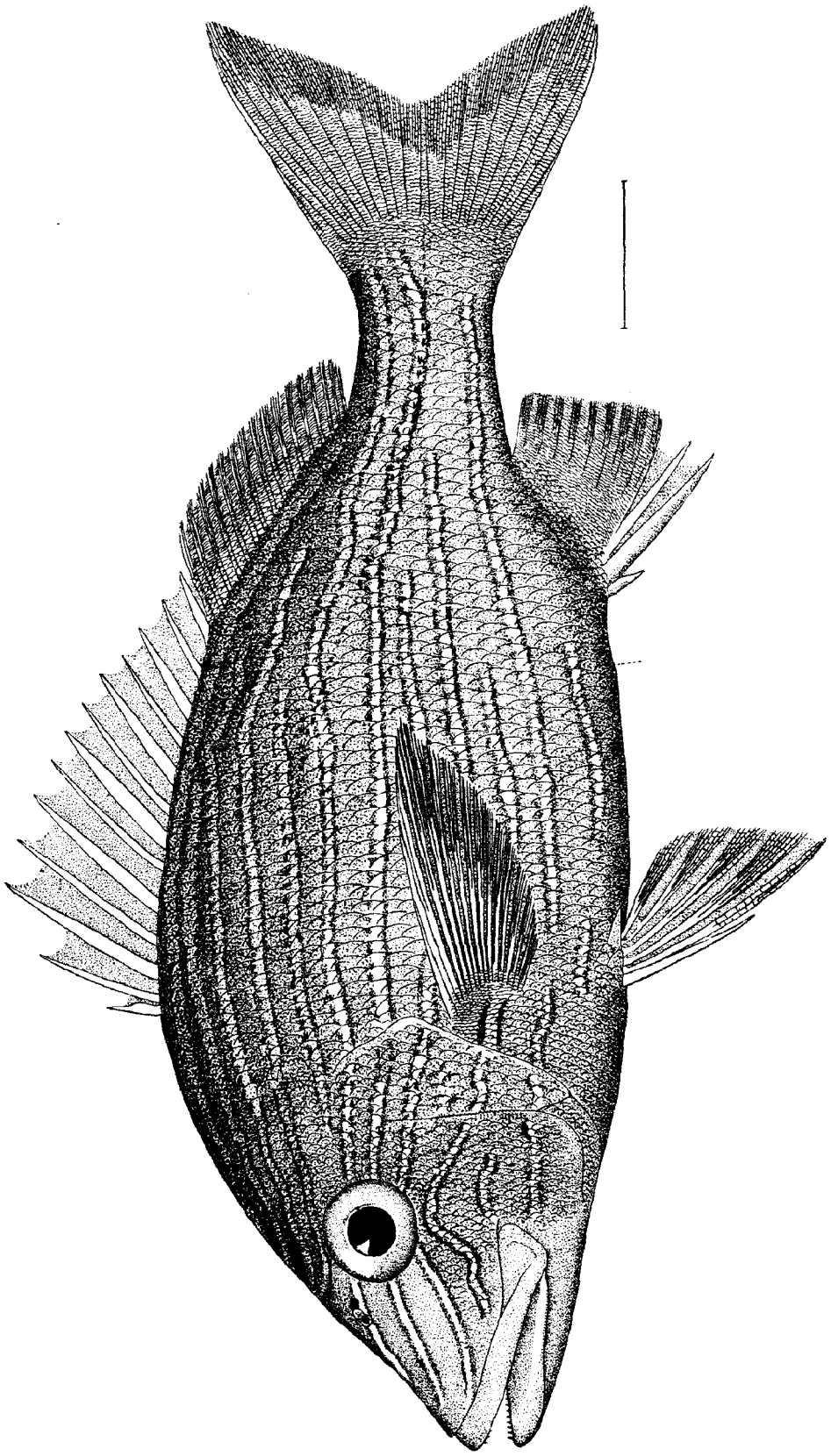


PLATE 144.

## THE BLACK GRUNT.

Hæmulon Plumieri (Lac.), J. & G. (p. 398.)

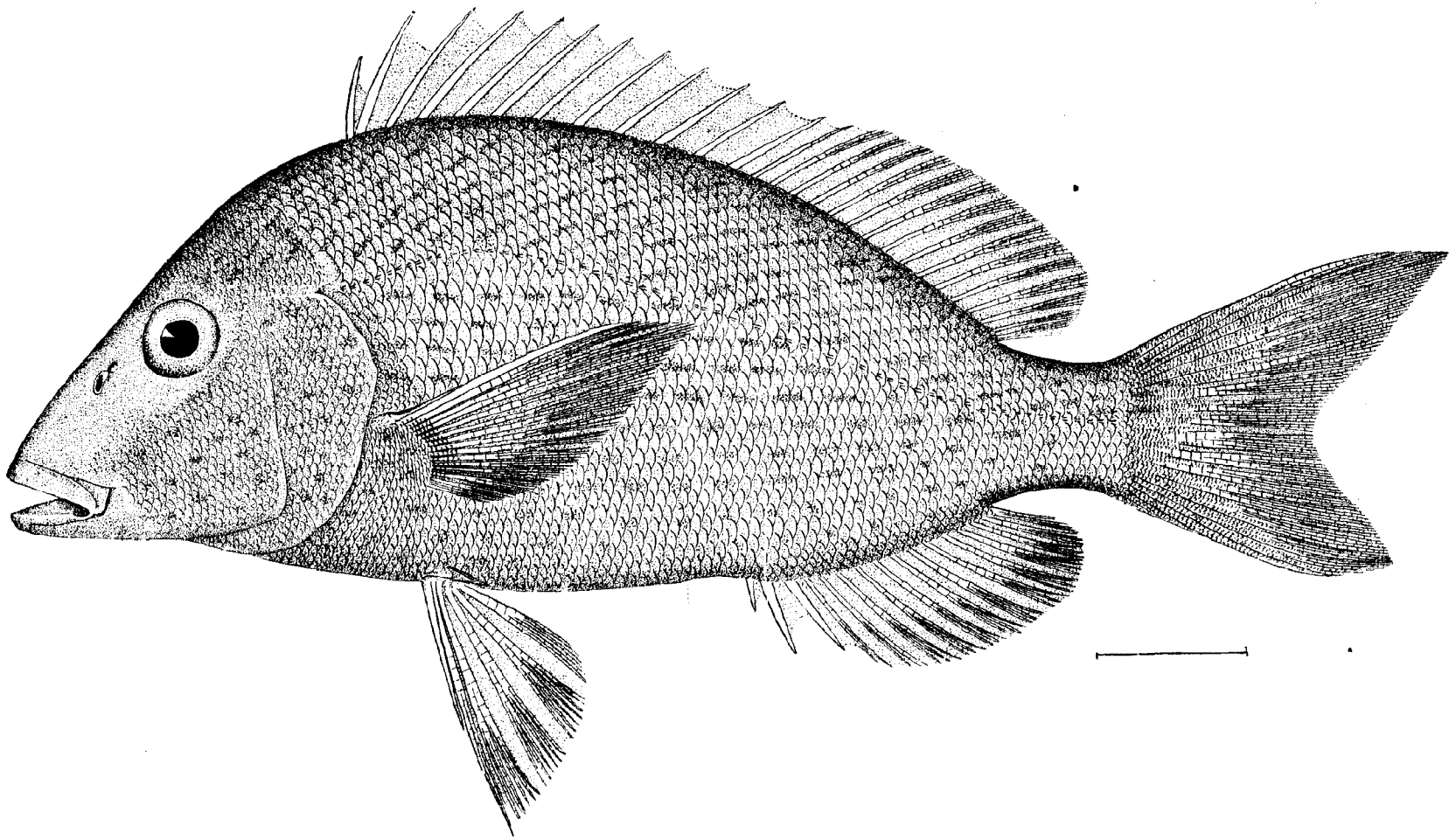
Drawing by H. L. Todd, from No. 20980, U. S. National Museum, collected at Charleston, S. C., May 29, 1878, by Silas Stearns.



## THE STRIPED GRUNT.

Hæmulon elegans (C. & V.). (p. 397.)

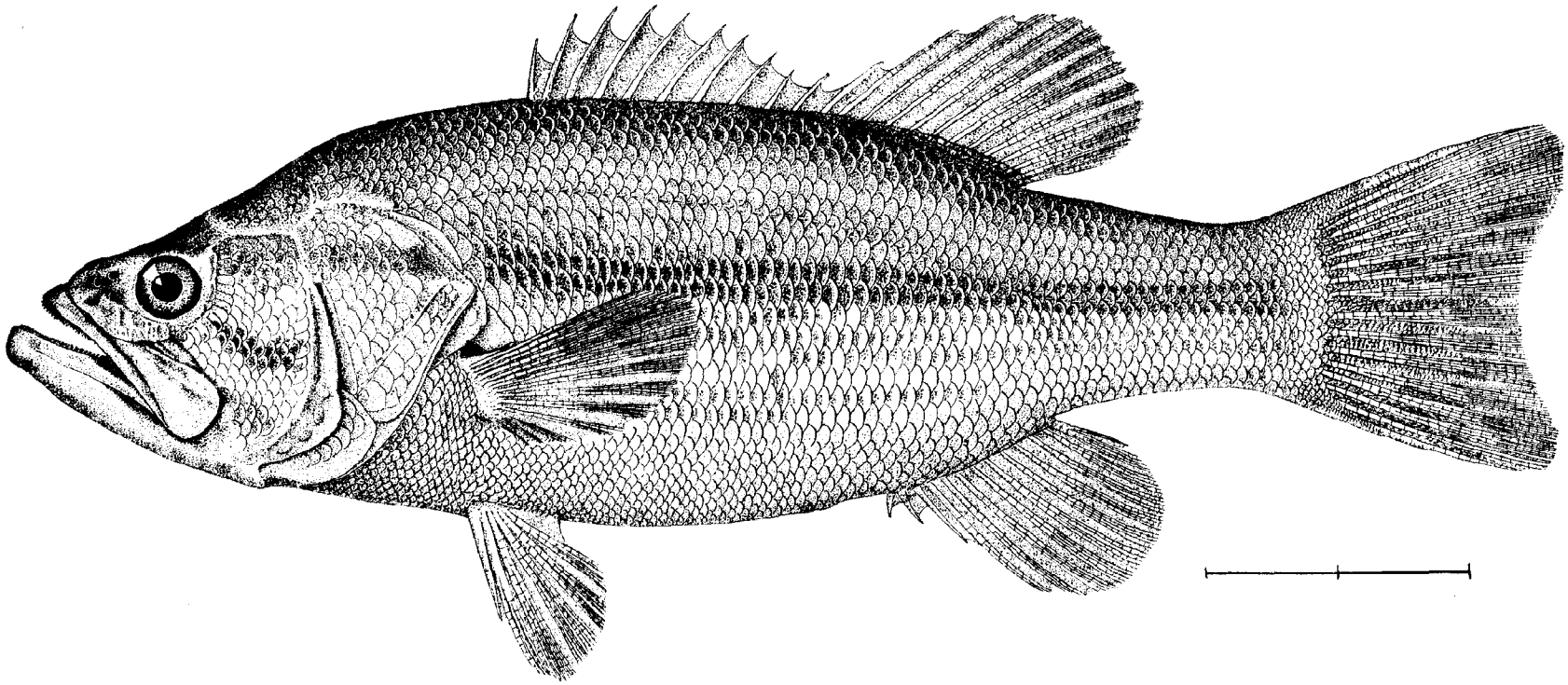
Drawing by H. L. Todd, from No. 32662, U. S. National Museum, collected at Key West, Fla., by Dr. J. A. Henshall.



## THE PIGFISH.

Pomodasys fulvomaculatus (Mitch.), J. & G. (p. 397.)

Drawing by H. L. Todd, from No. 3113, U. S. National Museum, collected at Charleston Harbor, South Carolina, by C. B. Baker.

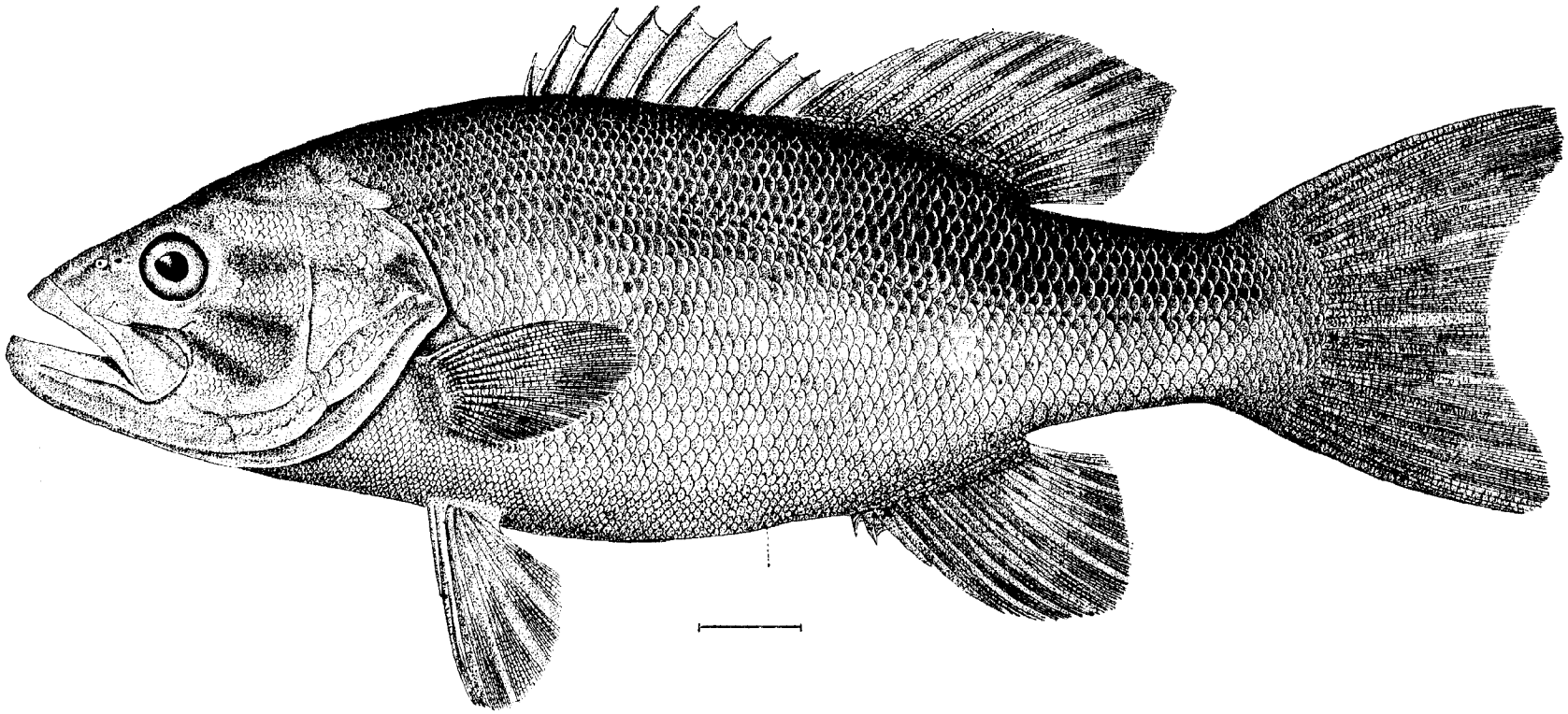


## THE BIG-MOUTHED BLACK BASS, OR OSWEGO BASS.

Micropterus salmoides (Lac.), Henshall. (p. 401.)

Drawing by H. L. Todd, from No. 14143, U. S. National Museum, collected at Little Falls, Potomac River, 1874, by Maj. T. J. Hobbs.

PLATE 147.

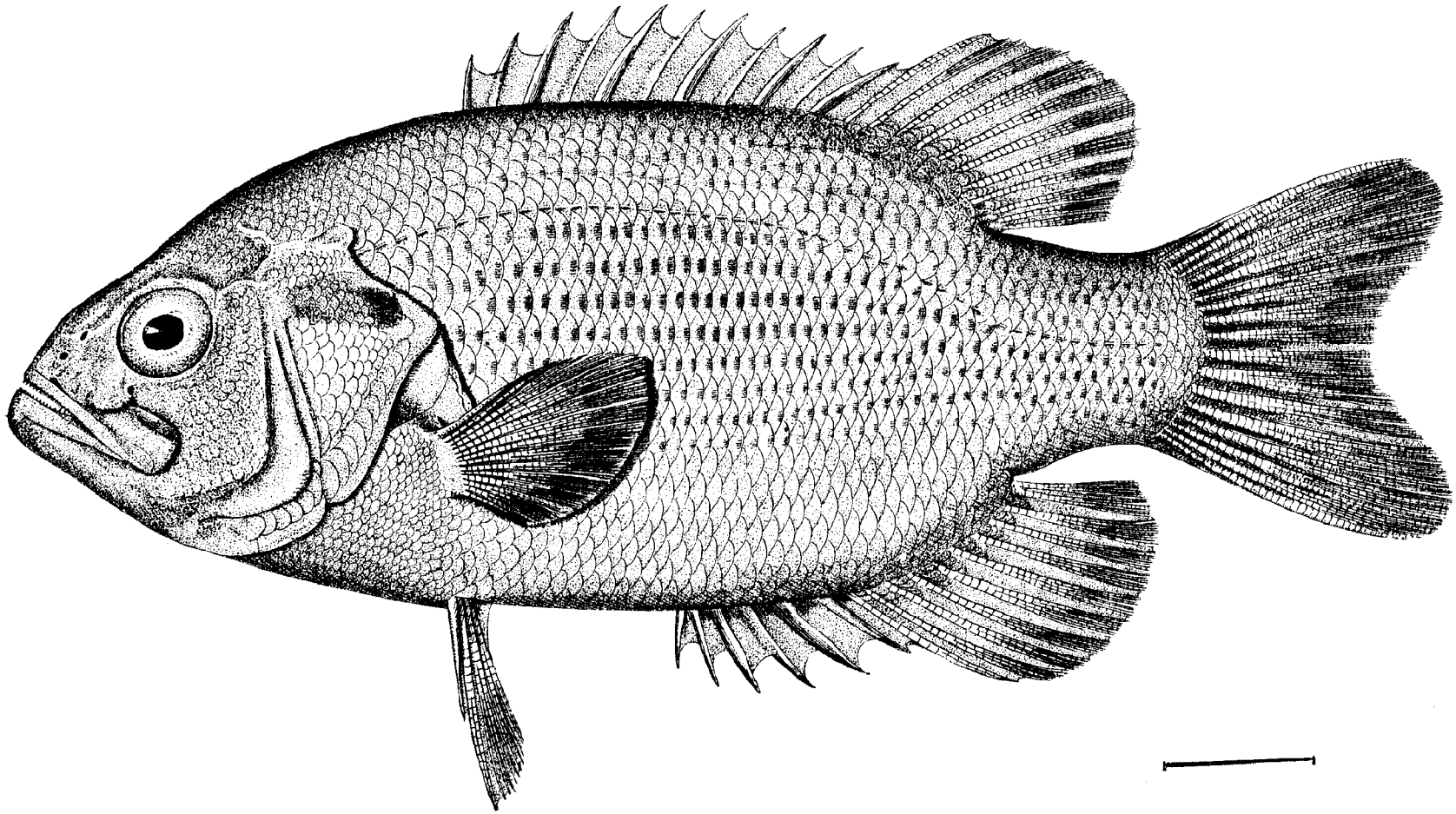


## THE SMALL-MOUTH BLACK BASS.

Micropterus Dolomiei, Lac. (p. 401.)

Drawing by H. L. Todd, from No. 10223, U. S. National Museum, collected at Sandusky, Ohio, 1872, by J. W. Milner.

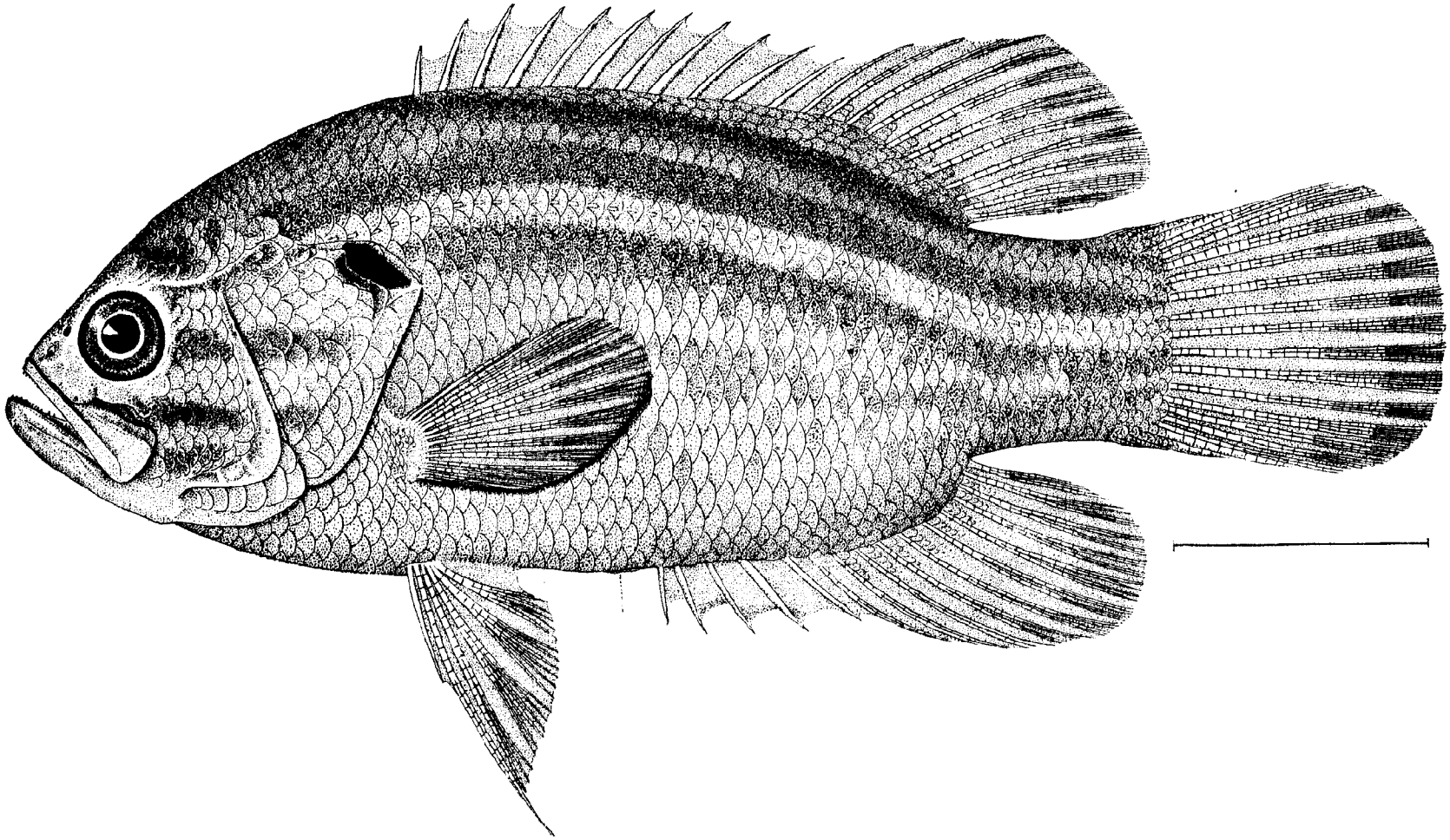
PLATE 148.



## THE ROCK-BASS OR RED EYE.

**Ambloplites rupestris** (Raf.), Gill. (p. 404.)

Drawing by H. L. Todd, from No. 9401, U. S. National Museum, collected at Ecorse, Mich., by George Clark.

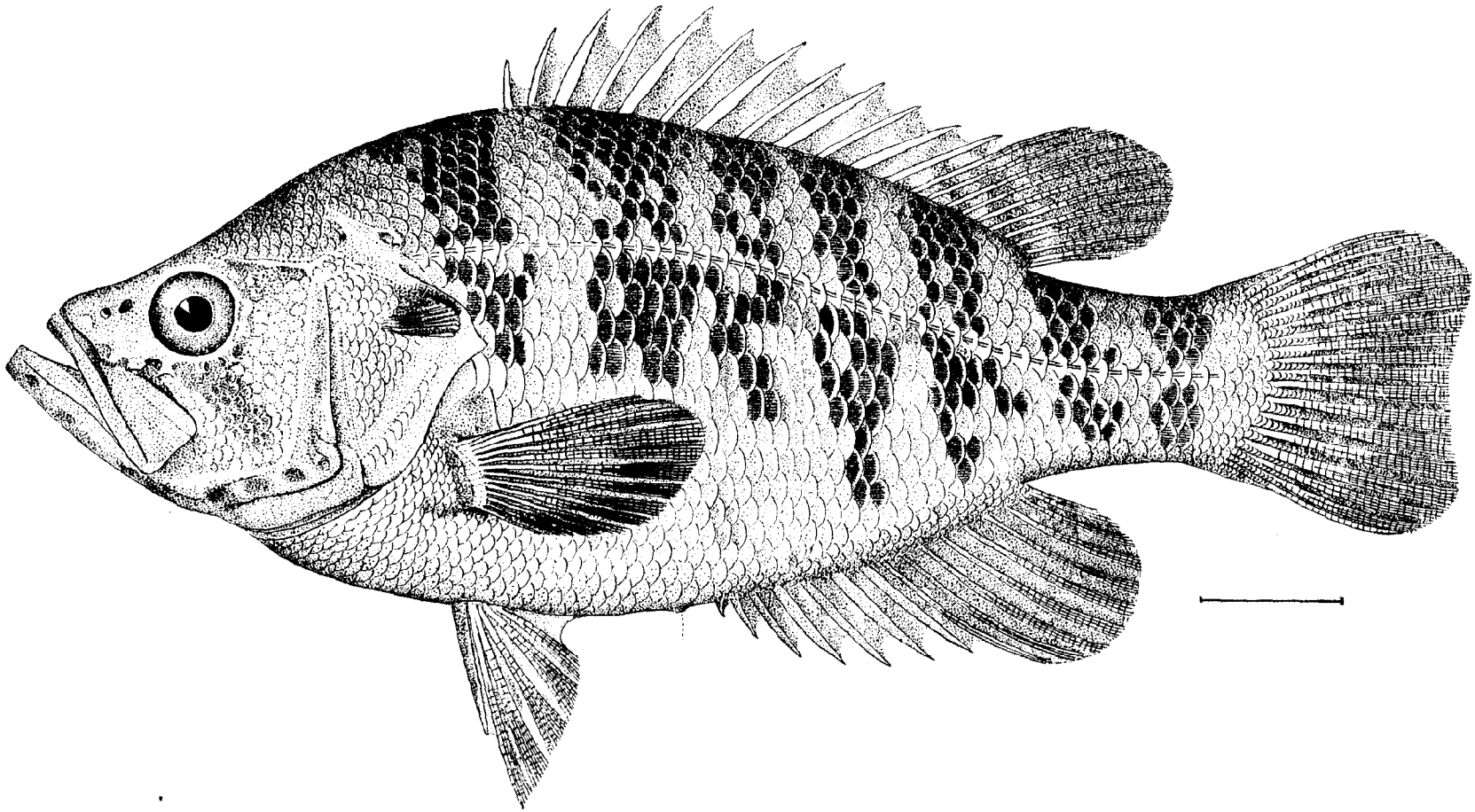


## THE MUD-BASS.

Acantharchus pomotis (Baird), Gill. (p. 405.)

Drawing by H. L. Todd, from No. 6475, U. S. National Museum, collected at Tarborough, N. C., by Mr. Bridger.

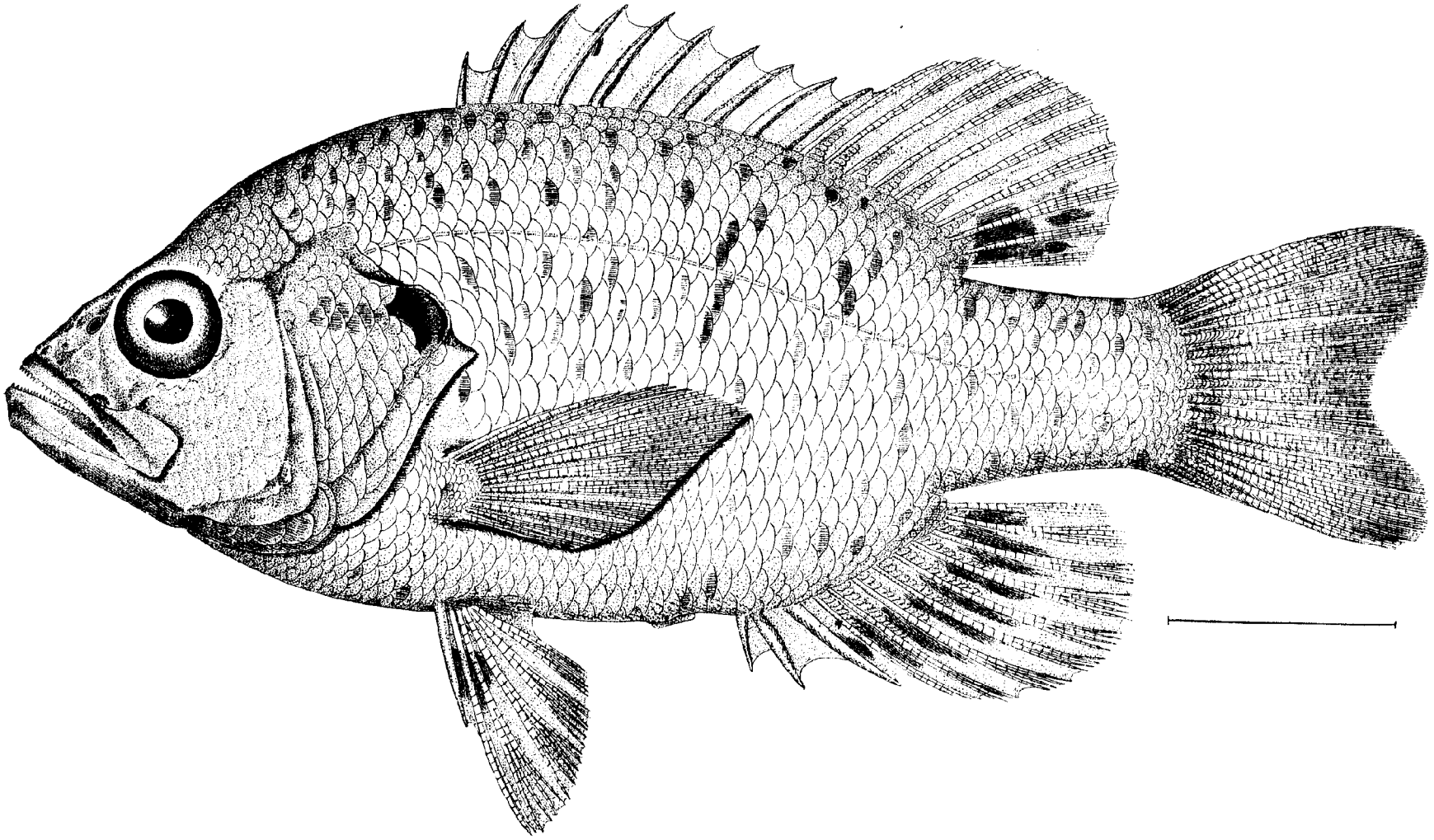
PLATE 150.



## THE SACRAMENTO PERCH.

Archoplites interruptus (Girard), Gill. (p. 405.)

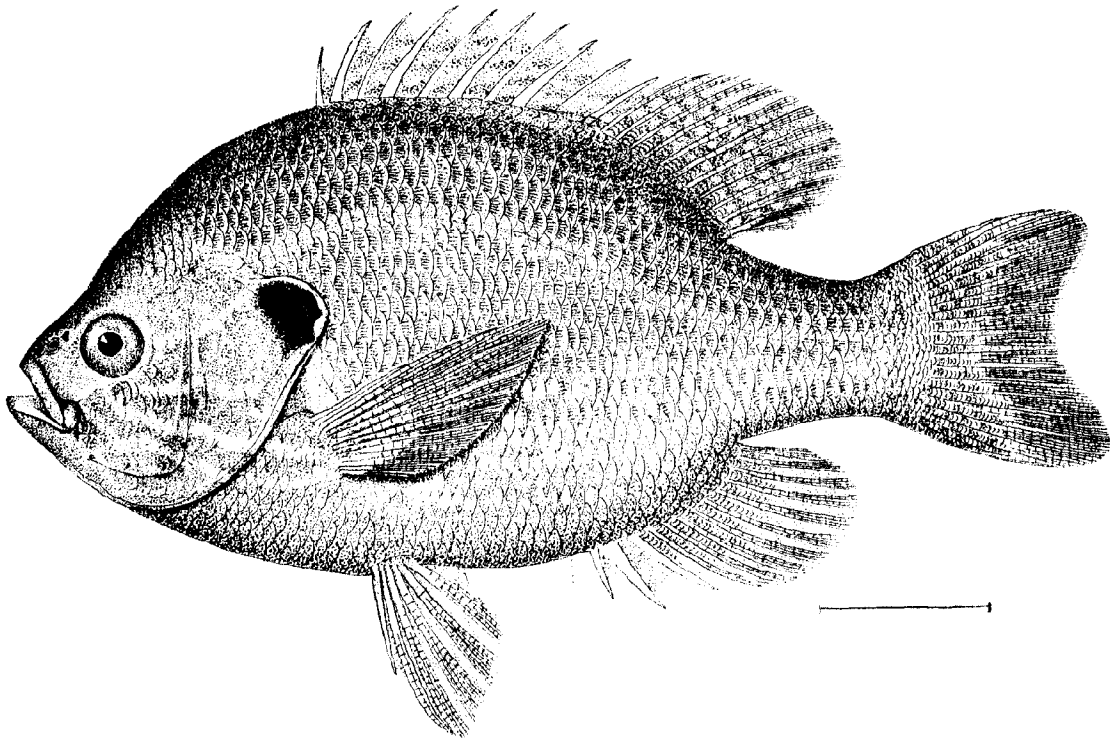
Drawing by H. L. Todd, from No. 27137, U. S. National Museum, collected at San Francisco, Cal., 1880, by Prof. D. S. Jordan.



## THE WAR-MOUTH BASS.

Chœnobryttus gulosus (C. & V.), Jordan. (p. 405.)

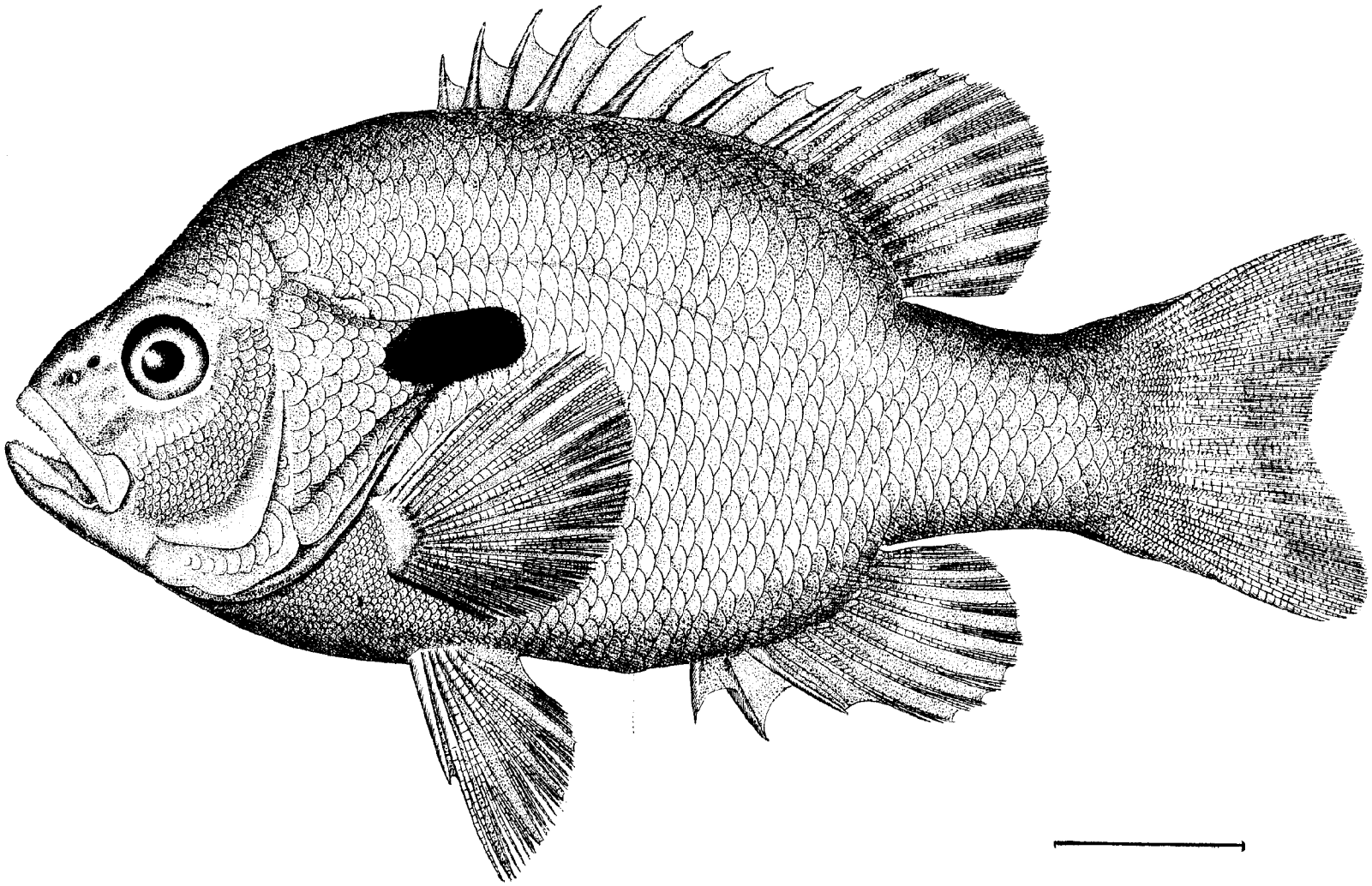
Drawing by H. L. Todd, from No. 17803, U. S. National Museum, collected at Jackson's Lake, Alabama, July 14, 1876, by Kumlien and Bean.



## THE PUMPKIN-SEED OR SUNFISH.

Lepomis gibbosus (L.), McKay. (p. 405.)

Drawing by H. L. Todd, from No. 4163, U. S. National Museum, collected at Root River, Wisconsin, July, 1853, by Prof. S. F. Baird.

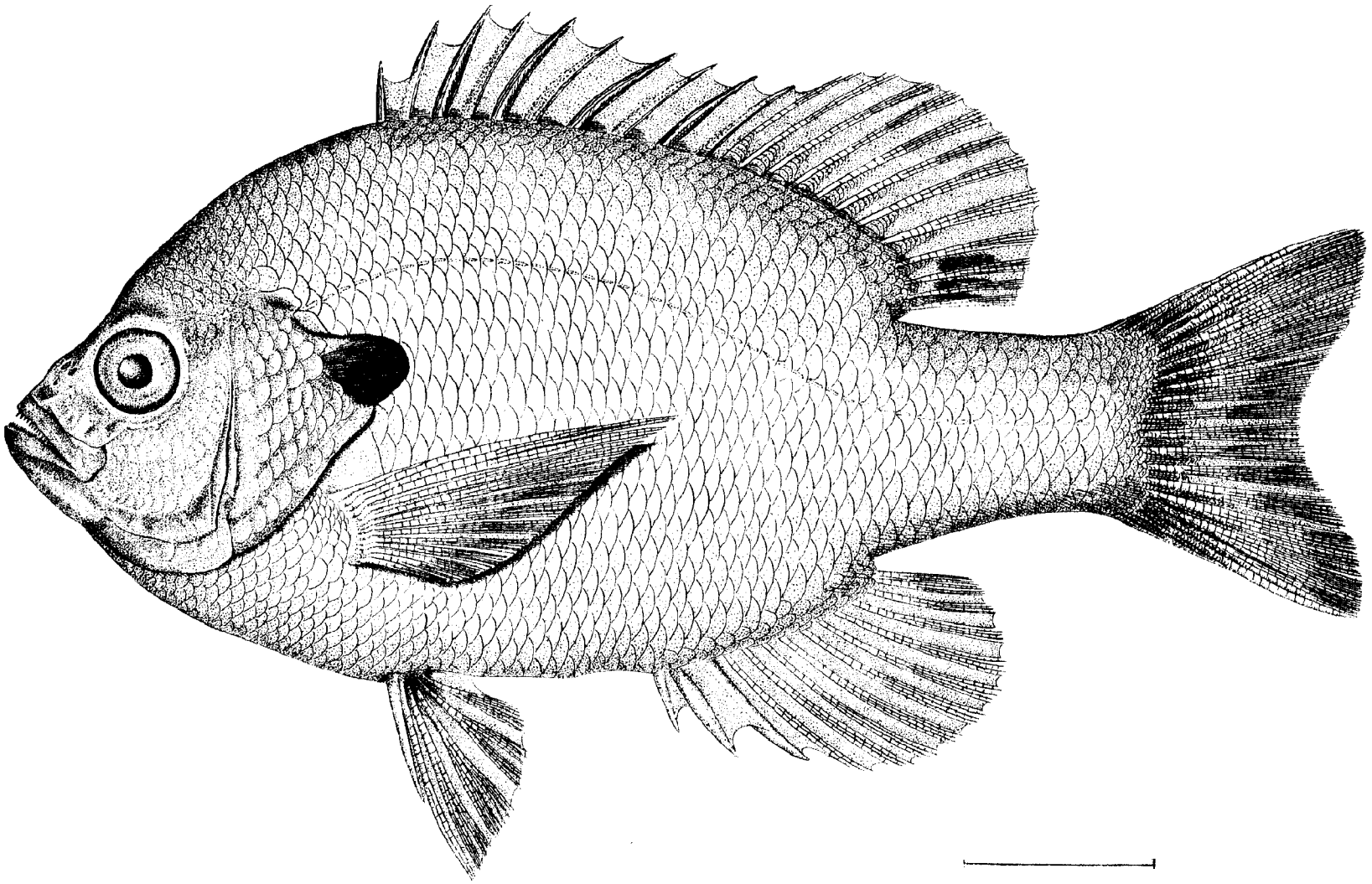


## THE LONG-EARED SUNFISH.

Lepomis auritus (L.), Raf. (p. 406.)

Drawing by H. L. Todd, from No. 25351, U. S. National Museum, collected from Susquehanna River, Bainbridge, Pa., May, 1875, by Dr. T. H. Bean.

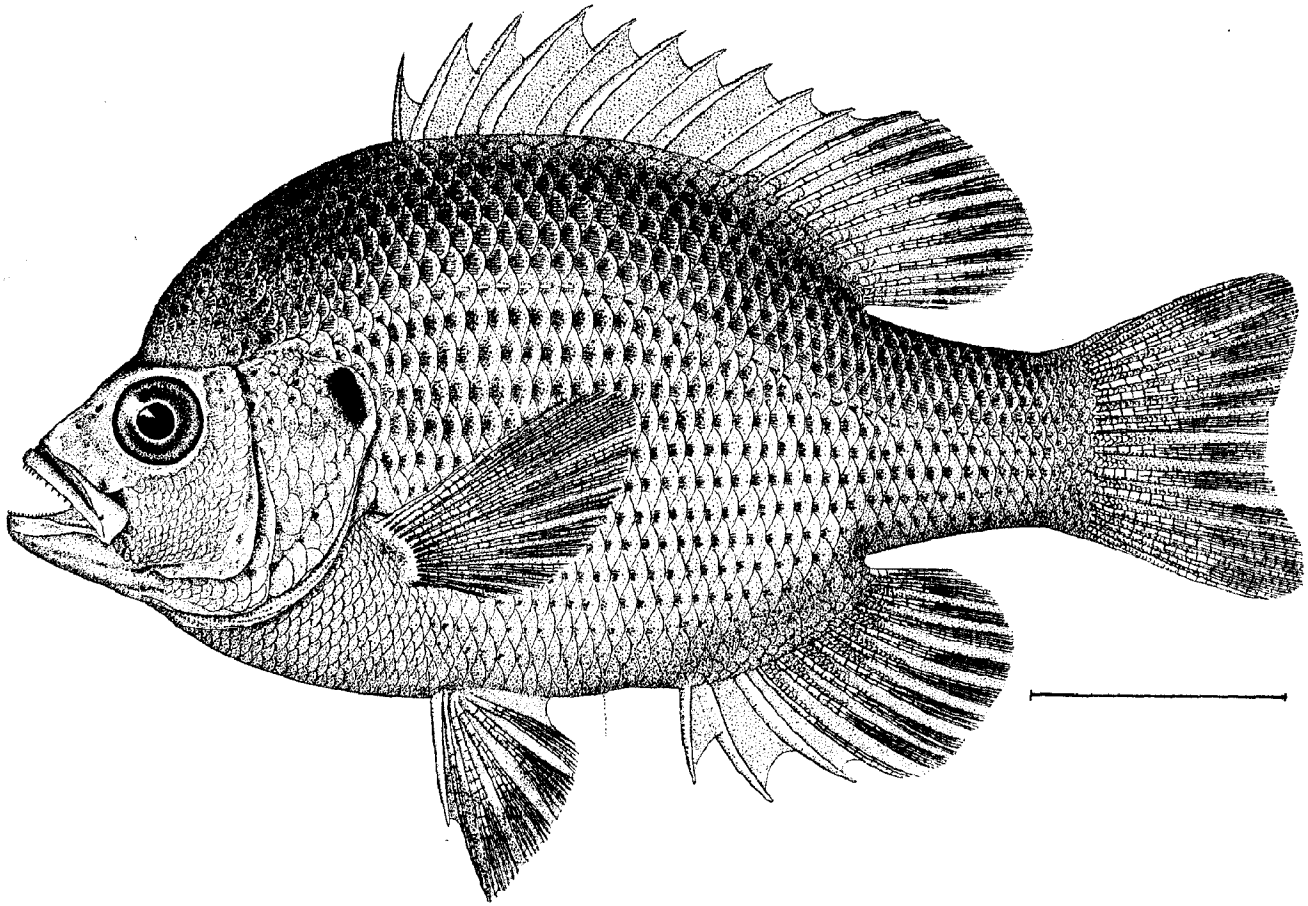
PLATE 154.



## THE BLUE SUNFISH OR COPPER-NOSE.

Lepomis pallidus (Mitch.), J. & G. (p. 406.)

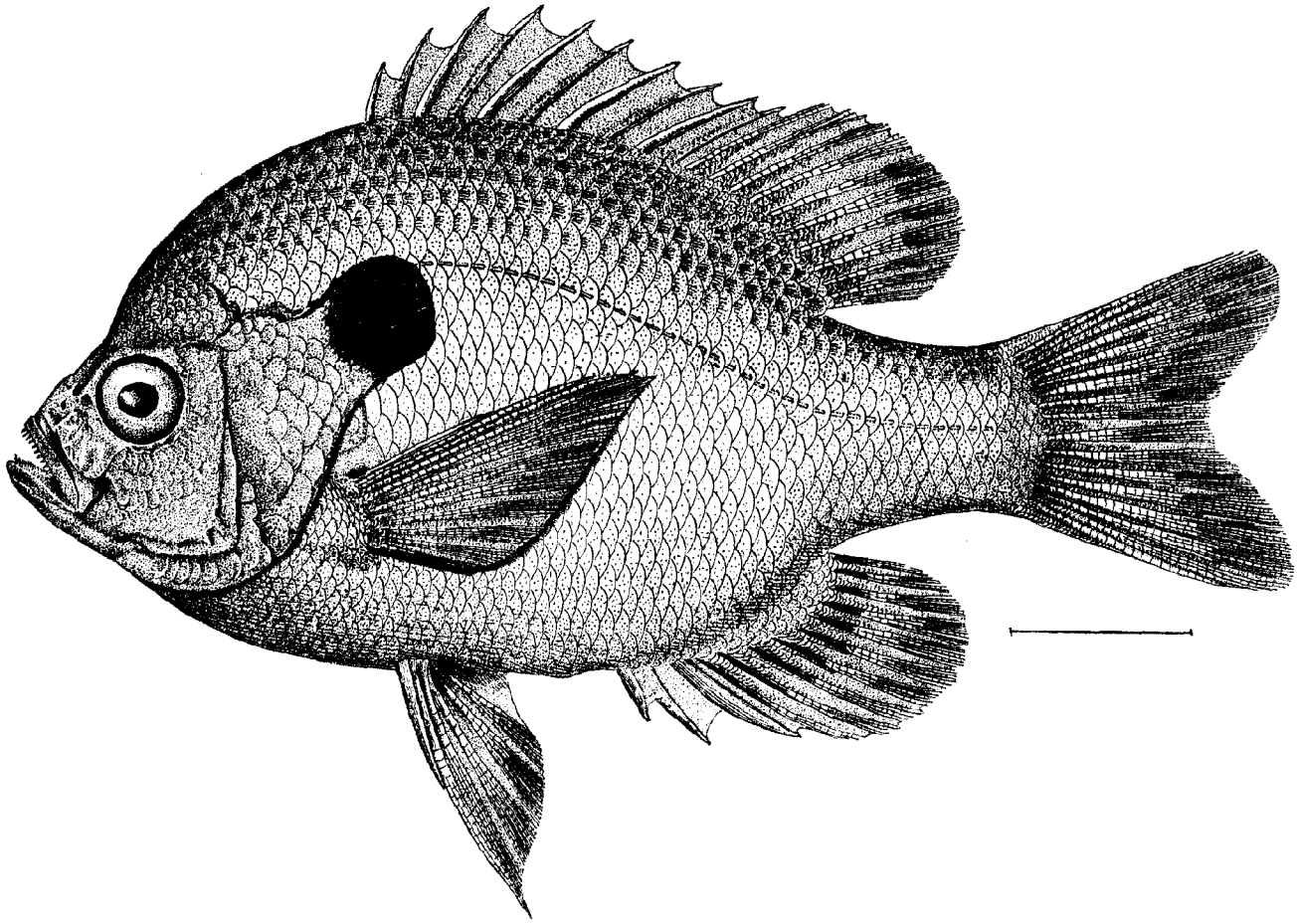
Drawing by H. L. Todd, from No. 8448, U. S. National Museum, collected in Tennessee.



## THE CHINQUAPIN PERCH.

Lepomis punctatus (C. & V.), Jordan. (p. 406.)

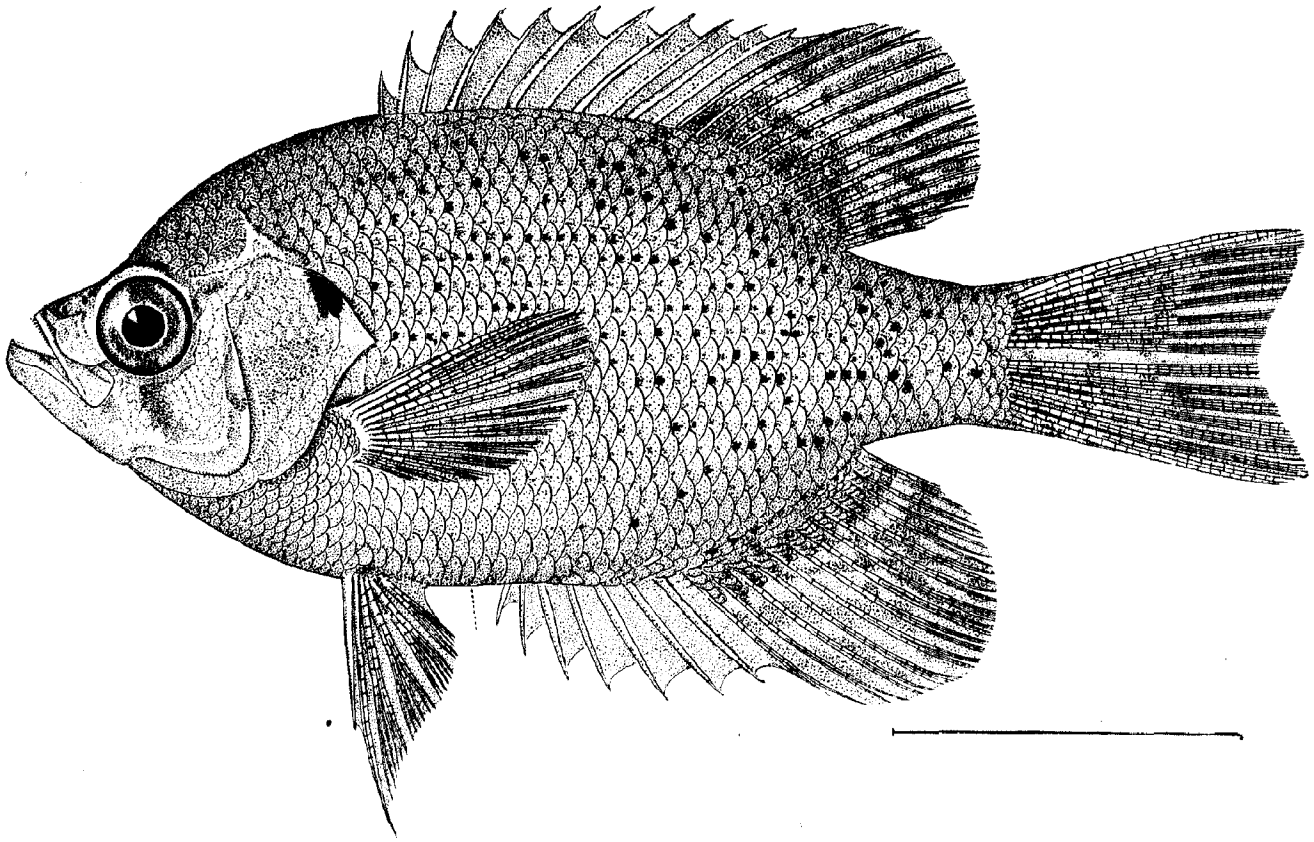
Drawing by H. L. Todd, from No. 4227-'46, U. S. National Museum, collected in Florida, by G. Brown Goode, 1875.



## THE BROAD-EARED SUNFISH.

Lepomis obscurus, Ag.

Drawing by H. L. Todd, from No. 20031, U. S. National Museum, collected in Cumberland River, Tennessee, by Prof. Alexander Winchell.



## THE RAINBOW SUNFISH.

Centrarchus macropterus (Lac.), Jordan. (p. 406.)

Drawing by H. L. Todd, from No. 20395, U. S. National Museum, collected at Kinston, N. C., 1875, by Welsher and Hyatt.

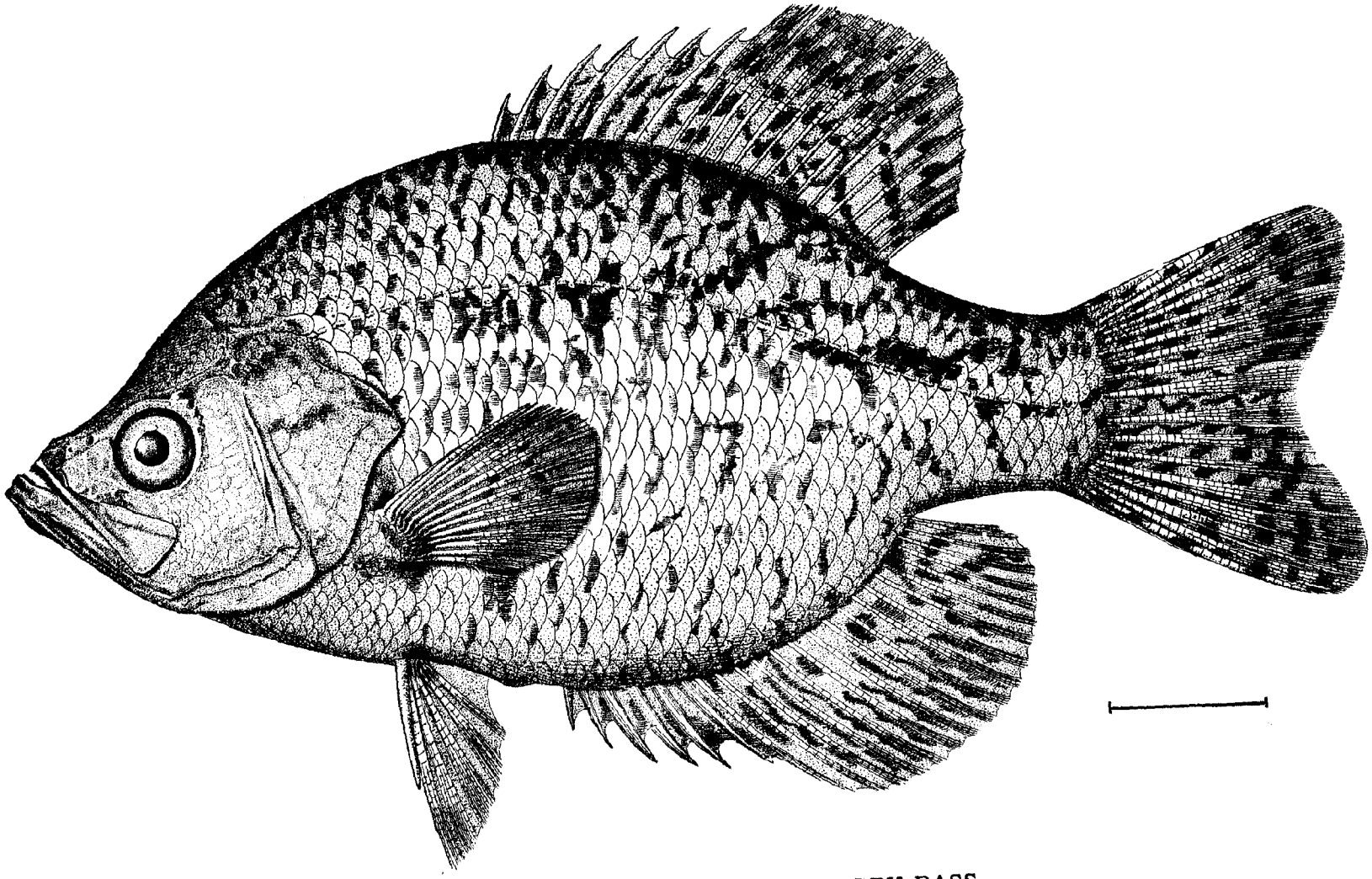
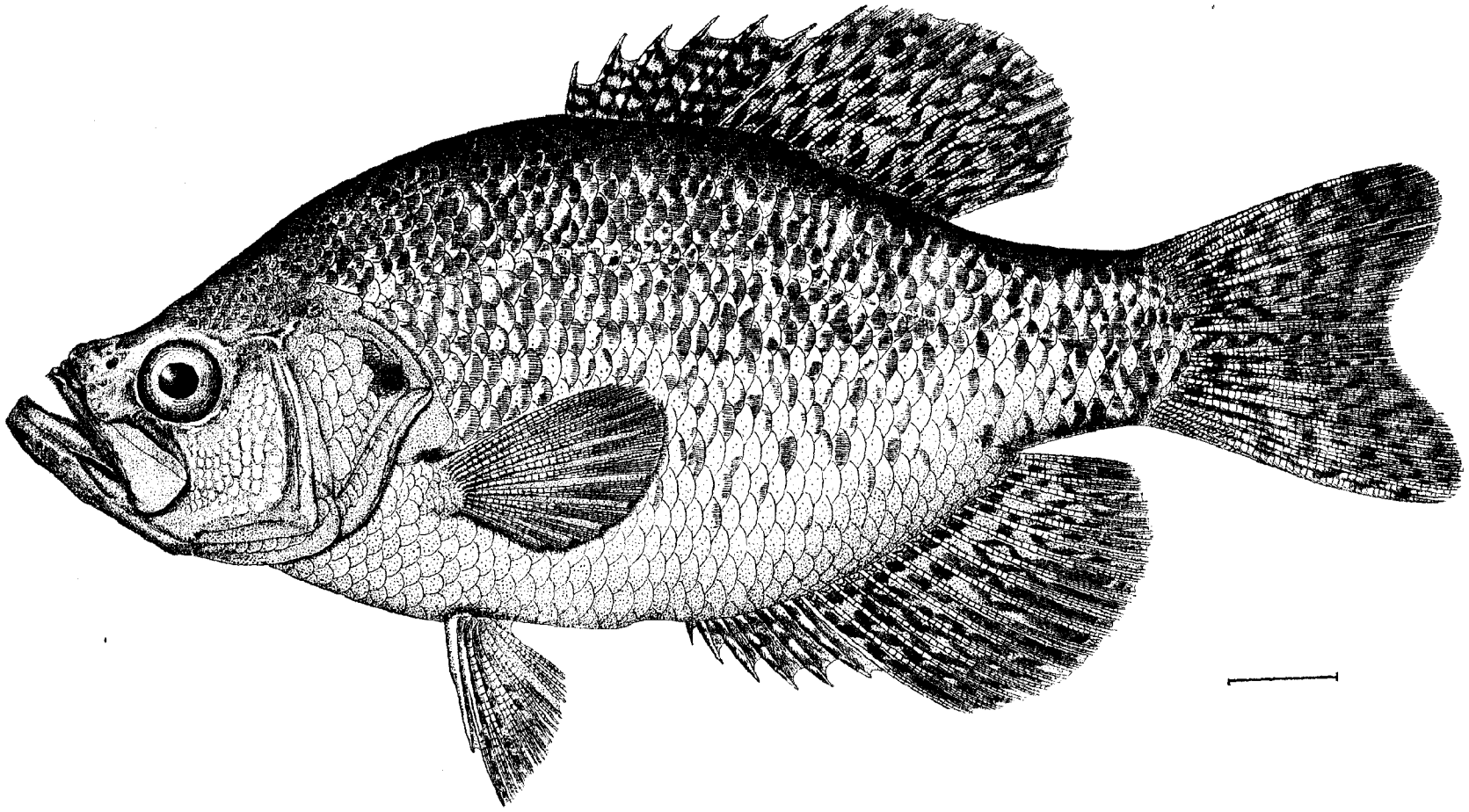


PLATE 159.

## THE CALICO BASS, OR STRAWBERRY BASS.

Pomoxys sparoides (Lac.), Grd. (p. 406.)

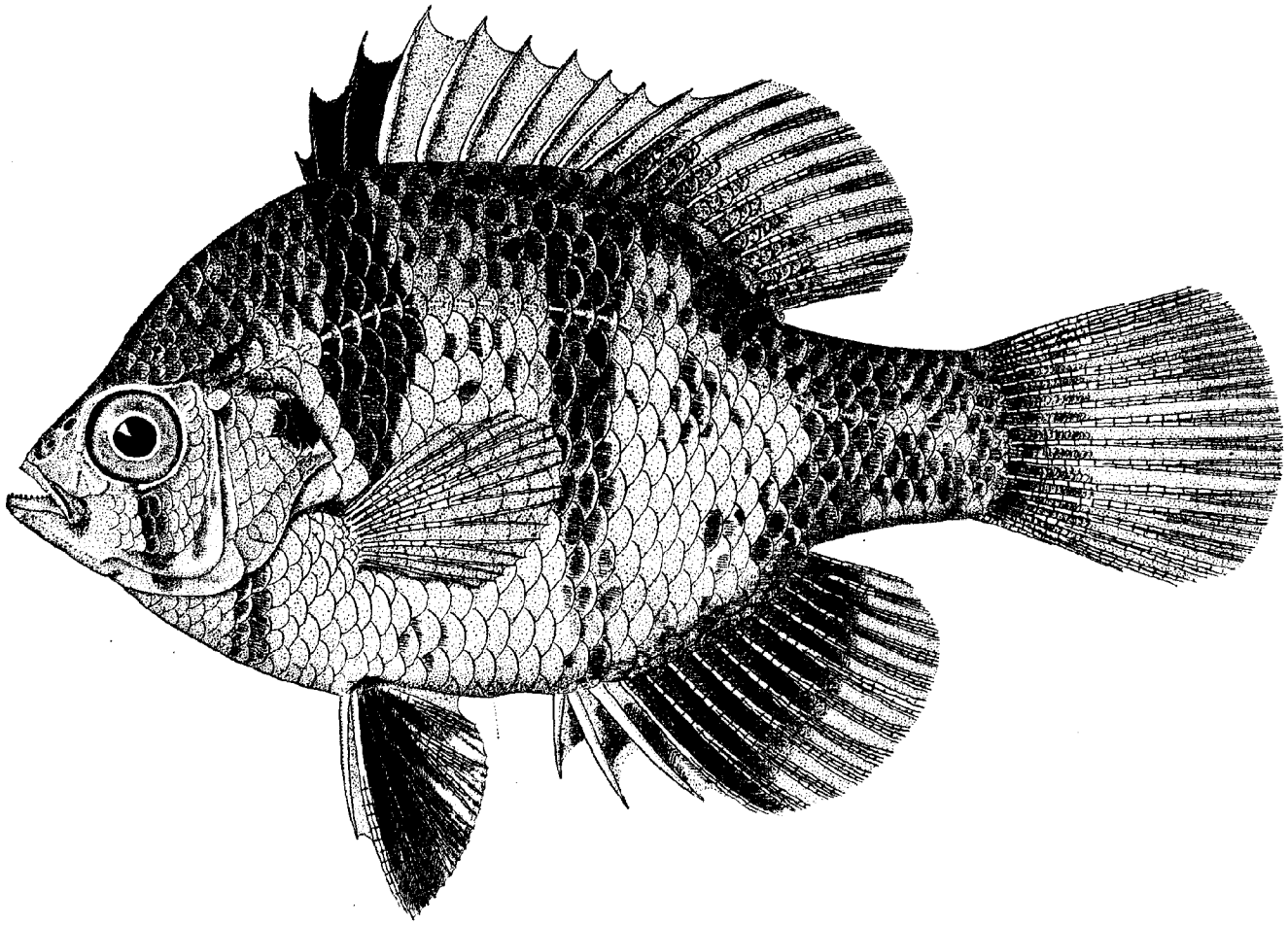
Drawing by H. L. Todd, from No. 10077, U. S. National Museum, collected at Rochester, N. Y., by J. W. Milner.



## THE CRAPPIE OR SAC-A-LAIT.

Pomoxys annularis, Raf. (p. 407.)

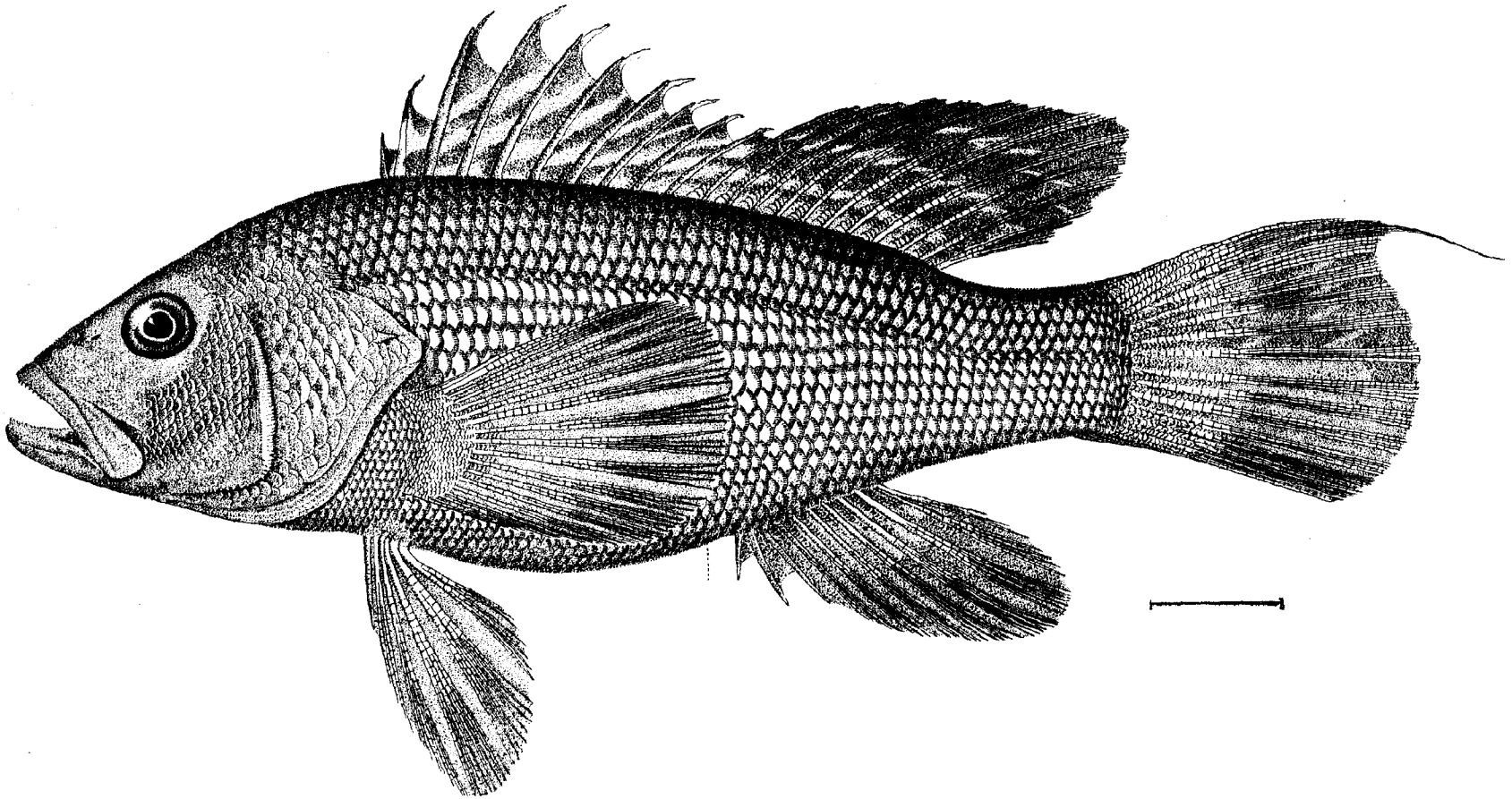
Drawing by H. L. Todd, from No. 10287, U. S. National Museum, collected at Norfolk, Va., 1873, by Dr. H. C. Yarrow.



## THE BLACK-BANDED SUNFISH.

**Mesagonistius chætodon (Baird), Gill.**

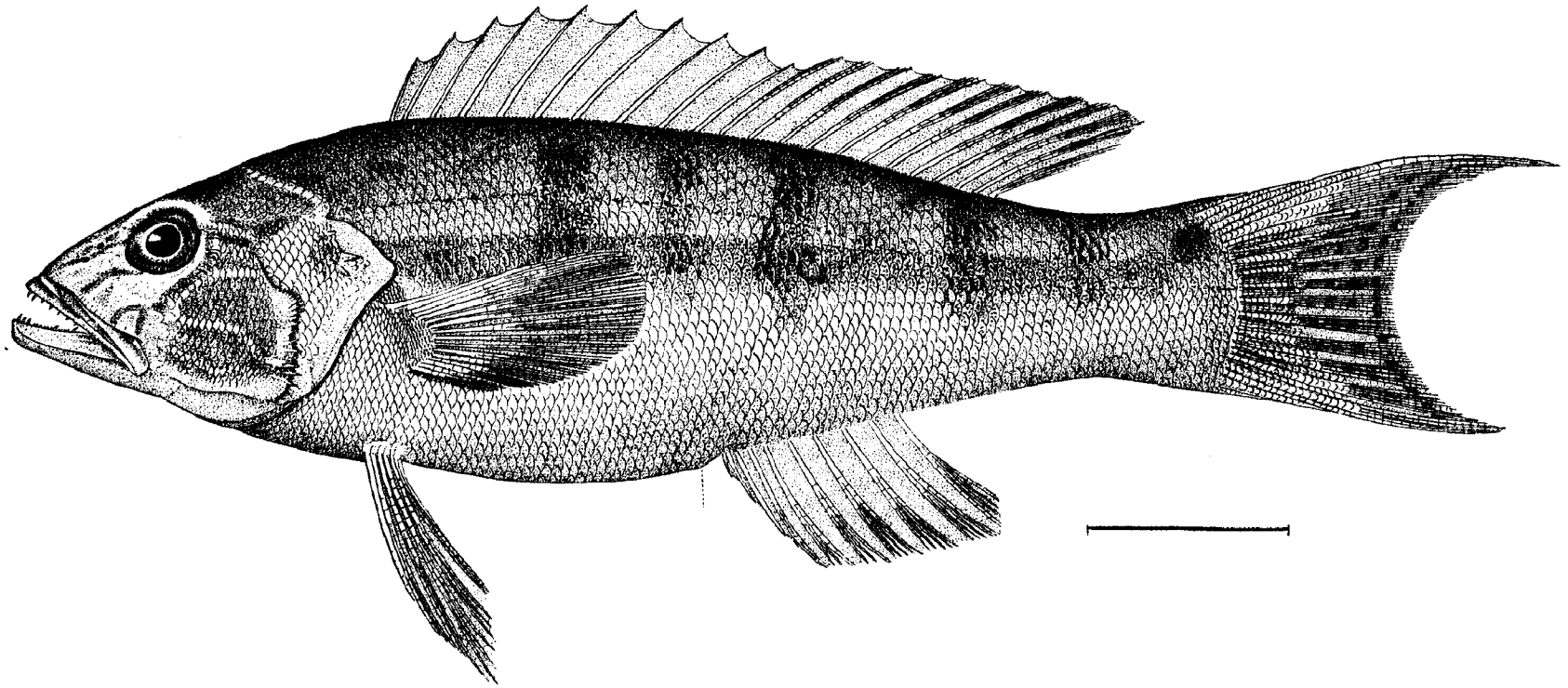
Drawing by H. L. Todd, from No. 20354, U. S. National Museum, collected at Trenton, N. J., 1875, by Dr. C. C. Abbott.



## THE SEA BASS.

Serranus atrarius (L.), J. & G. (p. 407.)

Drawing by H. L. Todd, from No. 14838, U. S. National Museum, collected at Noank, Conn., 1874, by U. S. Fish Commission.

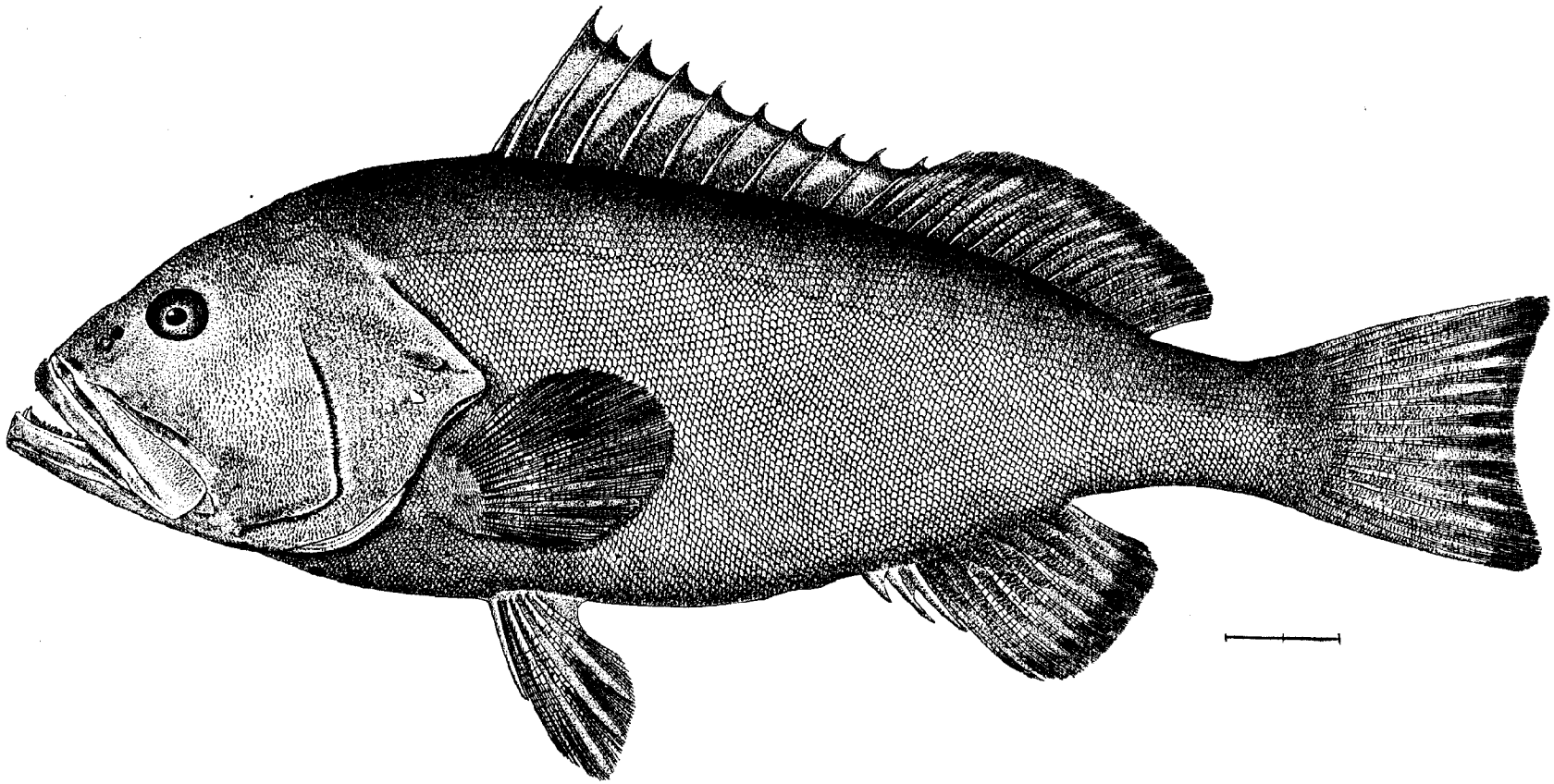


## THE SQUIRREL-FISH.

**Serranus fascicularis, C. & V.** (p. 410.)

Drawing by H. L. Todd, from No. 21543, U. S. National Museum, collected at Charleston, S. C., July, 1878, by C. C. Leslie.

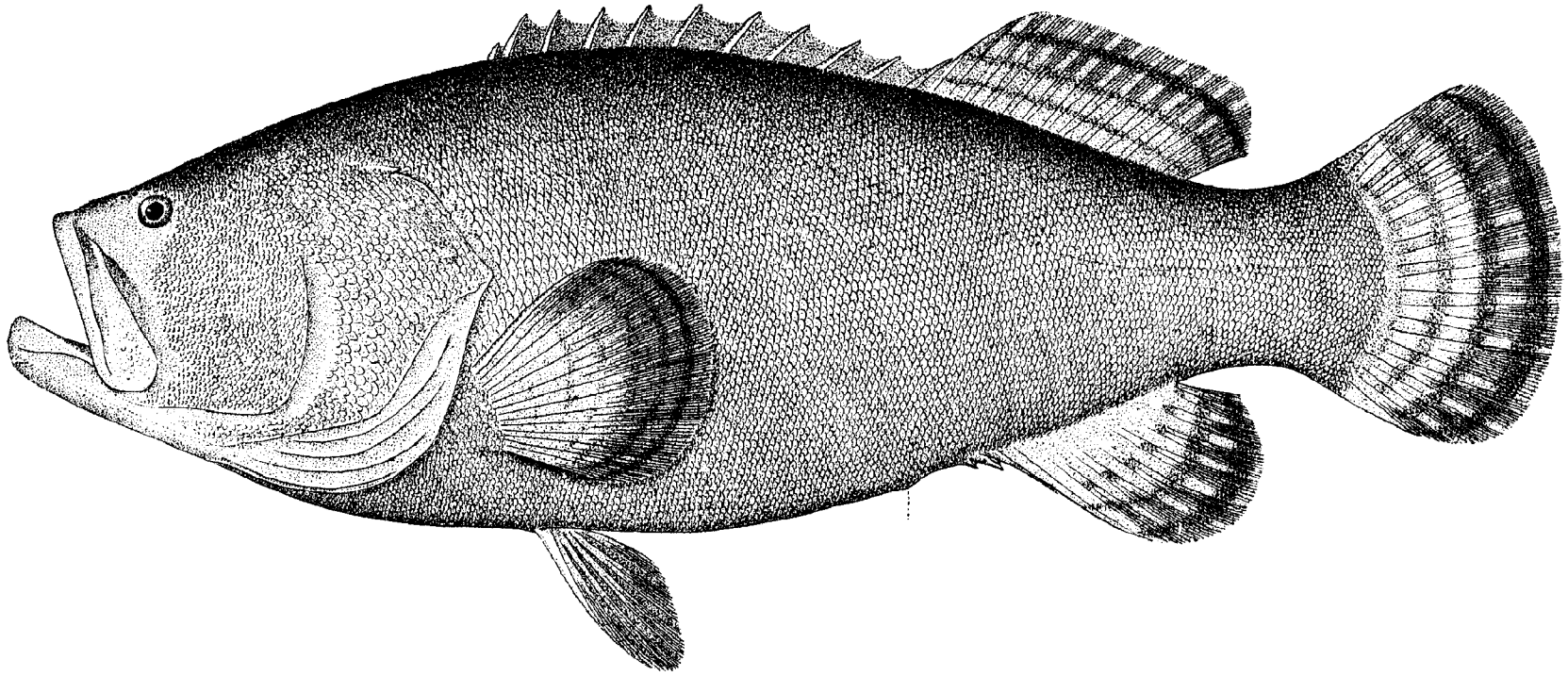
PLATE 163.



## THE RED GROUPER.

Epinephelus morio (Cuv.), Gill. (p. 411.)

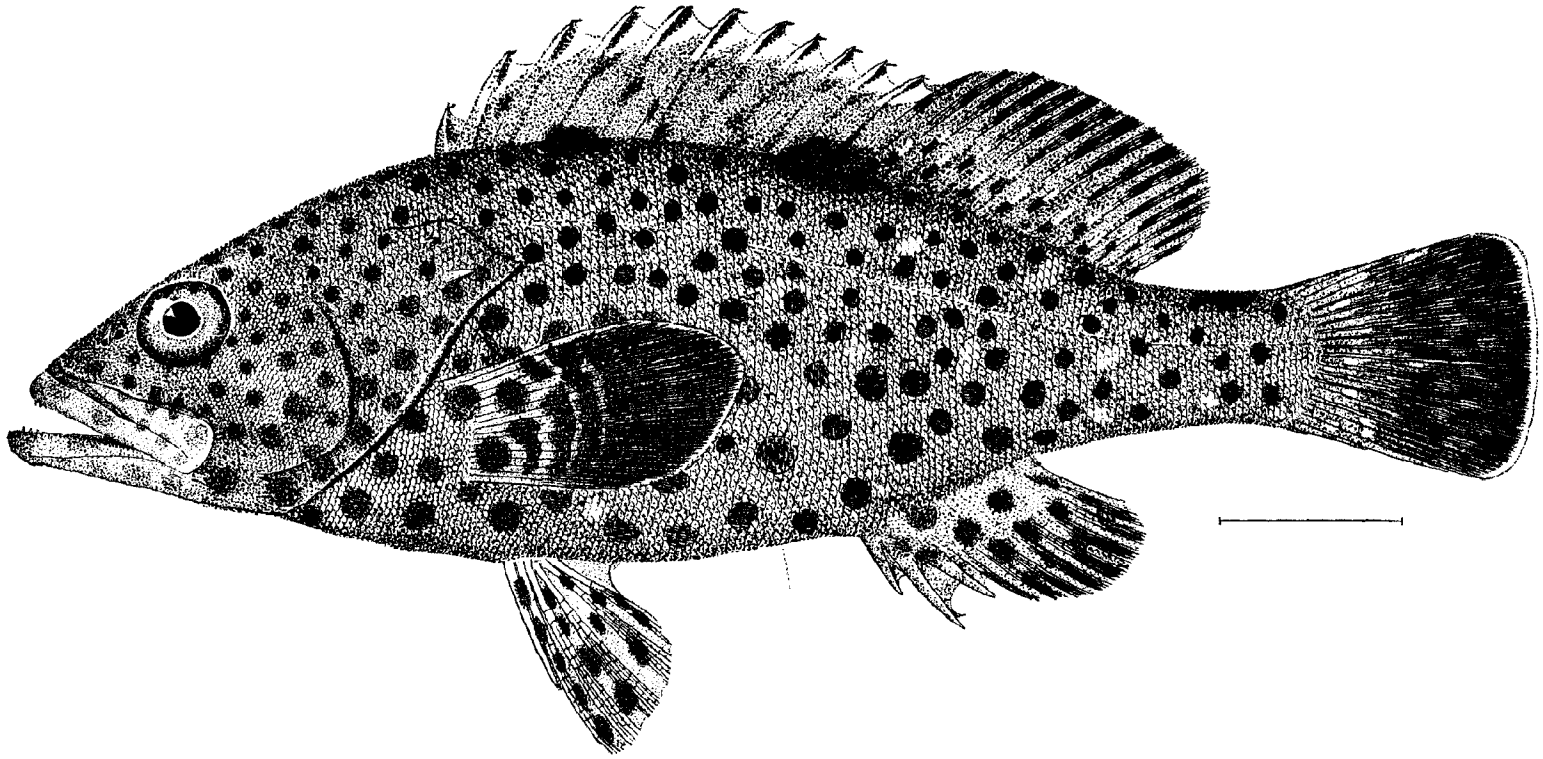
Drawing by H. L. Todd, from No. 22129, U. S. National Museum, obtained in the Washington Market, District of Columbia, by G. Brown Goode.



## THE JEW-FISH OR "WARSAW."

Promicrops guasa, Poey. (p. 412.)

Drawing by H. L. Todd, from No. 22306, U. S. National Museum, collected in the Saint John's River, Fla.

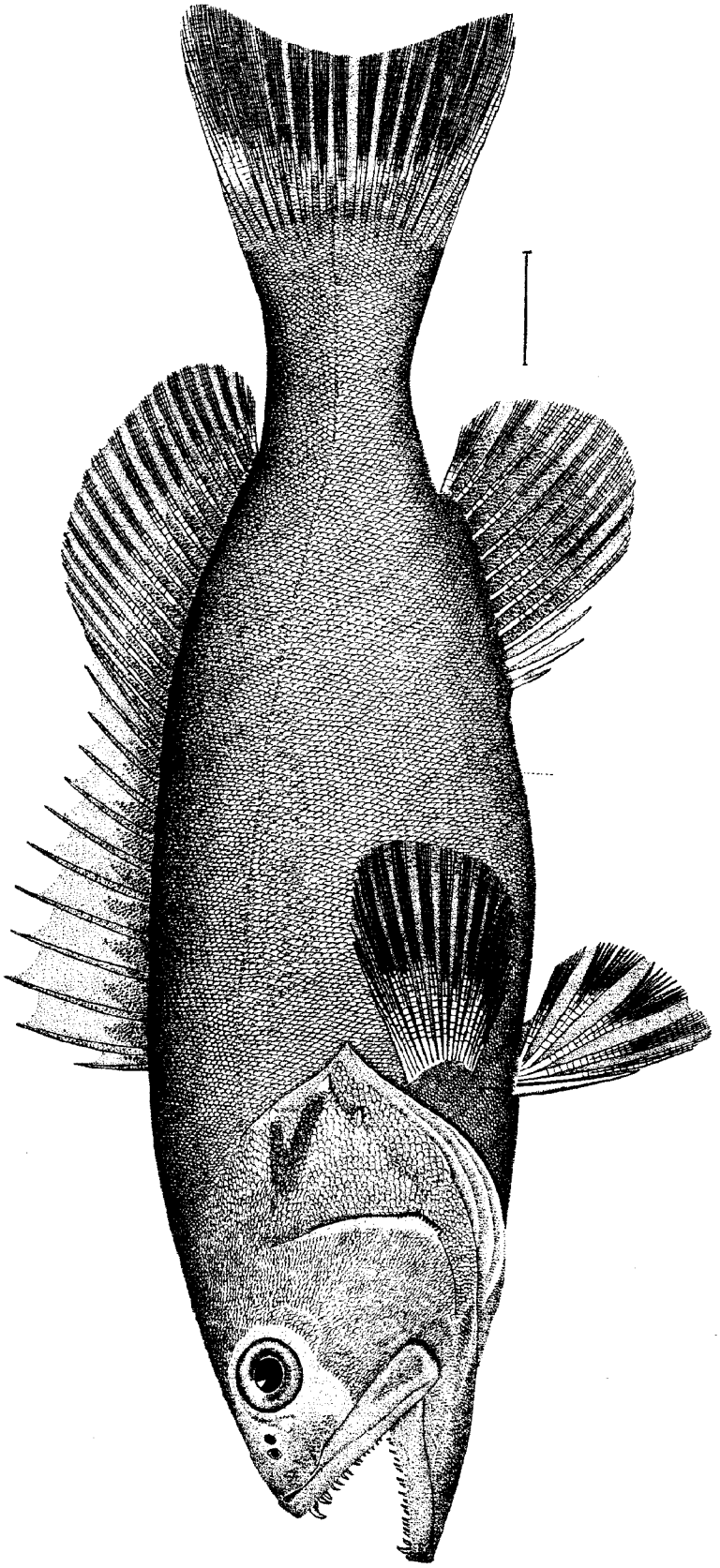


## THE WEST INDIAN CABRILLA.

Serranus clathratus (Grd.), Steind. (p. 413.)

Drawing by H. L. Todd, from No. 26574, U. S. National Museum, collected at Key West, Florida, May, 1880, by Silas Stearns.

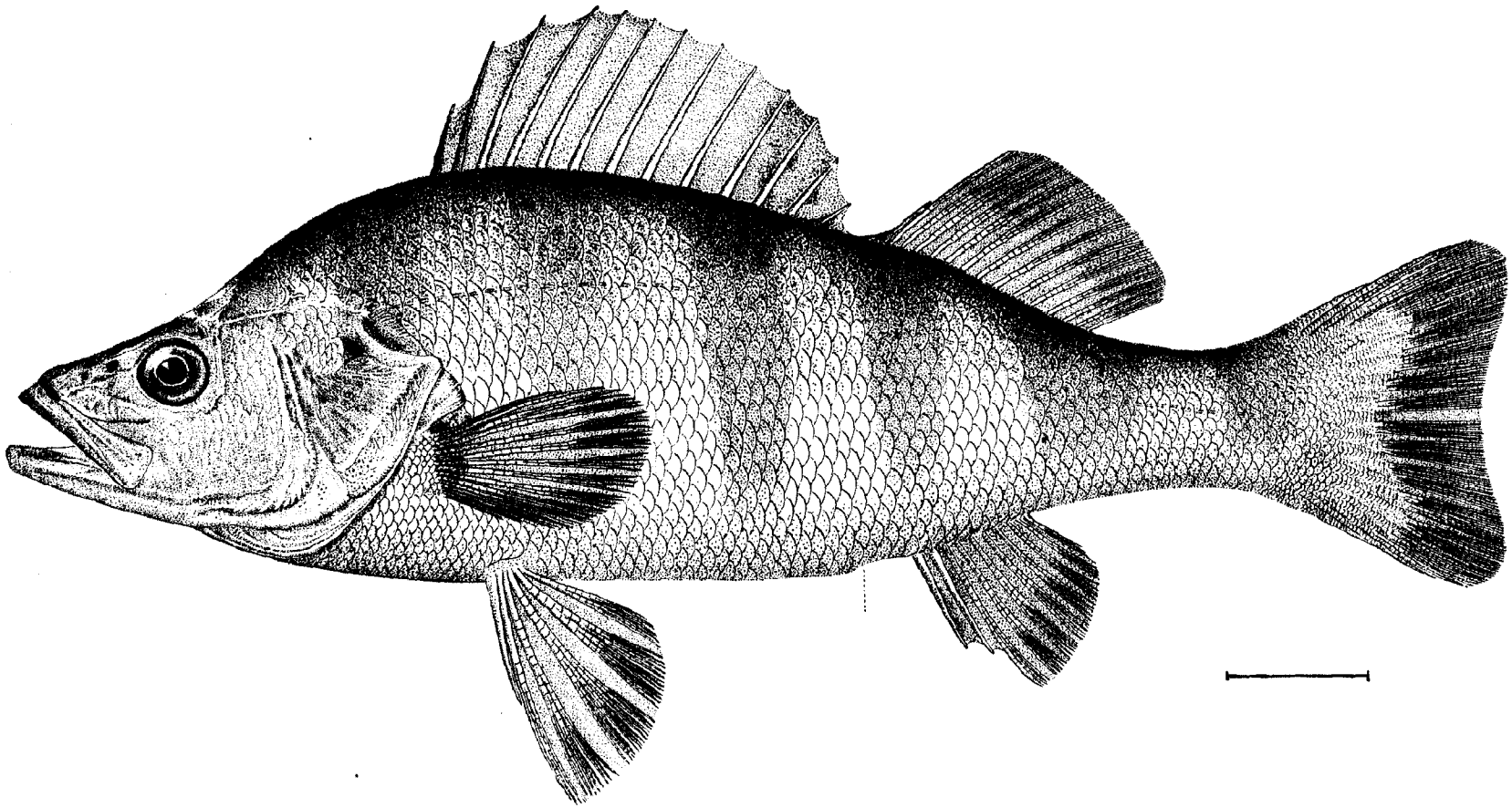
PLATE 166.



THE PENSACOLA BLACK GROUPER.

Trisotropis (*or* Mycteroperca) microlepis, Goode & Bean. (p. 413.)

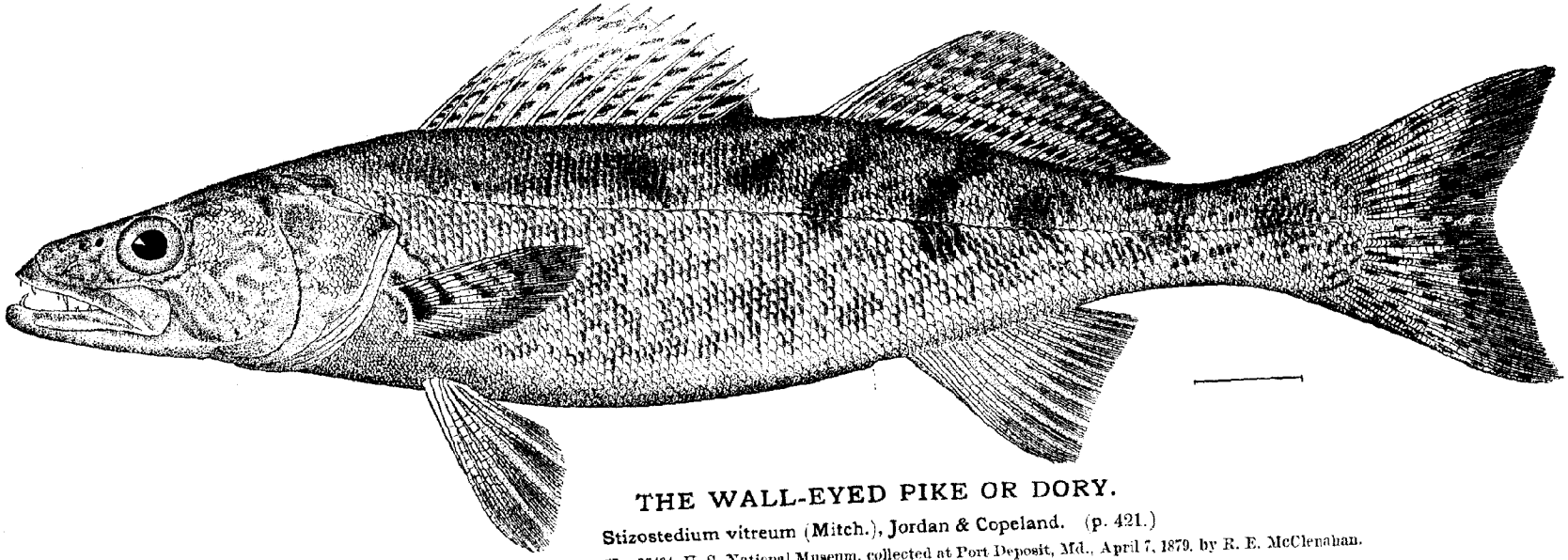
Drawing by H. L. Todd, from specimen collected by Silas Stearns at Pensacola, Fla., 1878.



## THE YELLOW PERCH.

Perca americana, Schrank. (p. 414.)

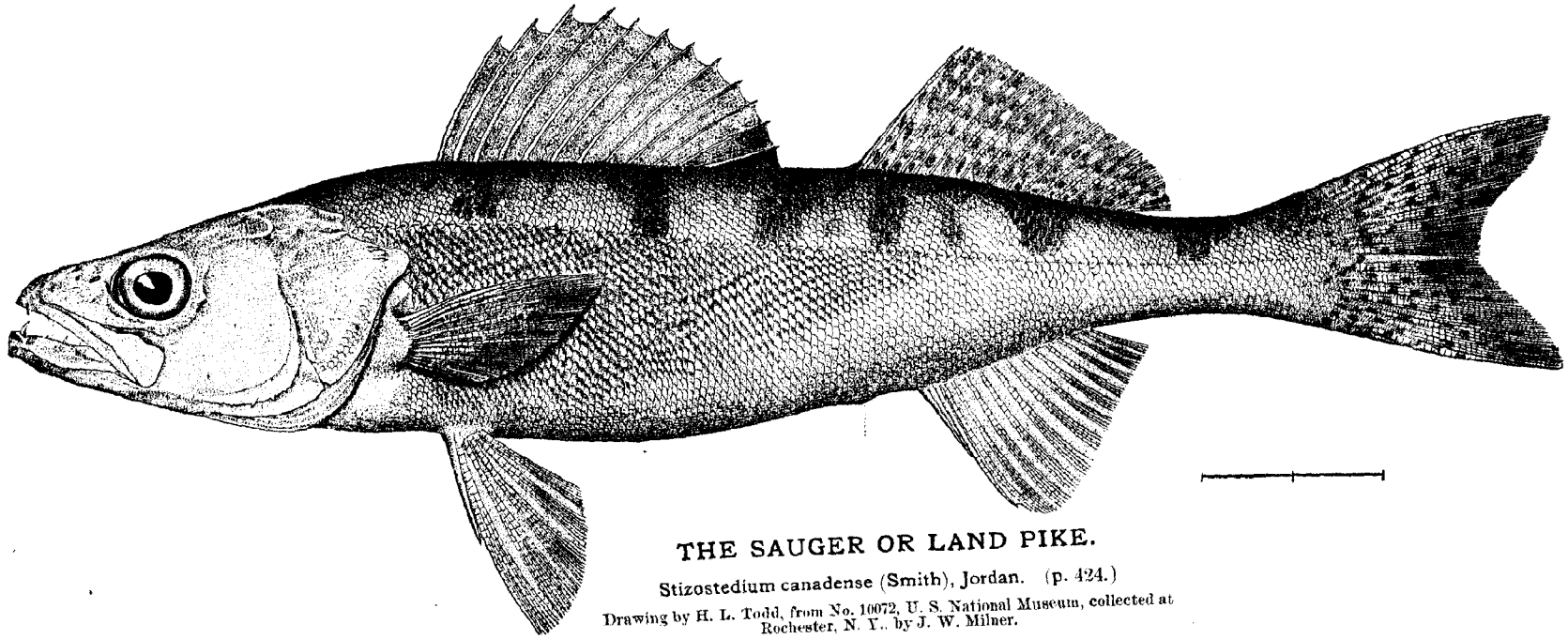
Drawing by H. L. Todd, from No. 25199, U. S. National Museum, collected in Washington Market, District of Columbia, April, 1880, by U. S. Fish Commission.



## THE WALL-EYED PIKE OR DORY.

Stizostedium vitreum (Mitch.), Jordan & Copeland. (p. 421.)

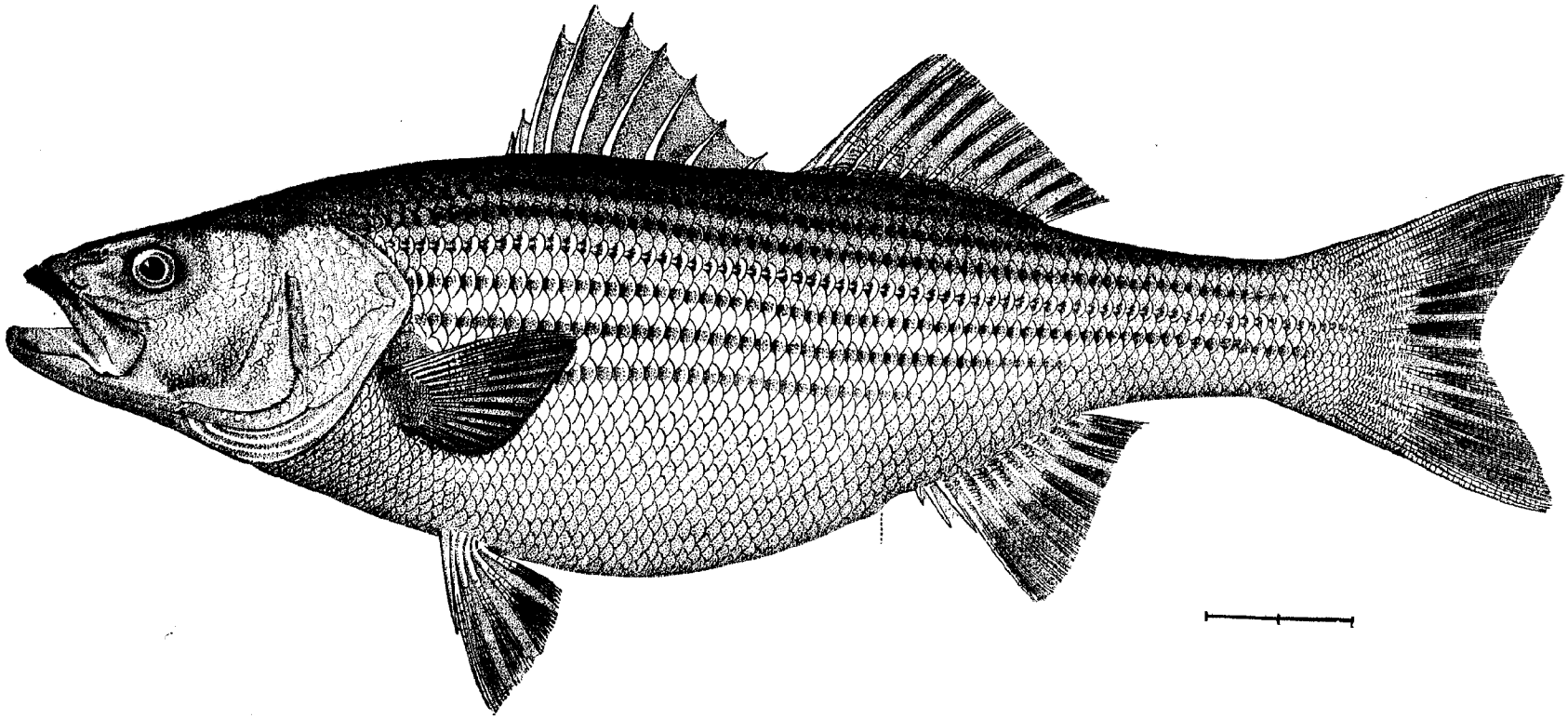
Drawing by H. L. Todd, from No. 22494, U. S. National Museum, collected at Port Deposit, Md., April 7, 1879, by R. E. McClenahan.



## THE SAUGER OR LAND PIKE.

Stizostedium canadense (Smith), Jordan. (p. 424.)

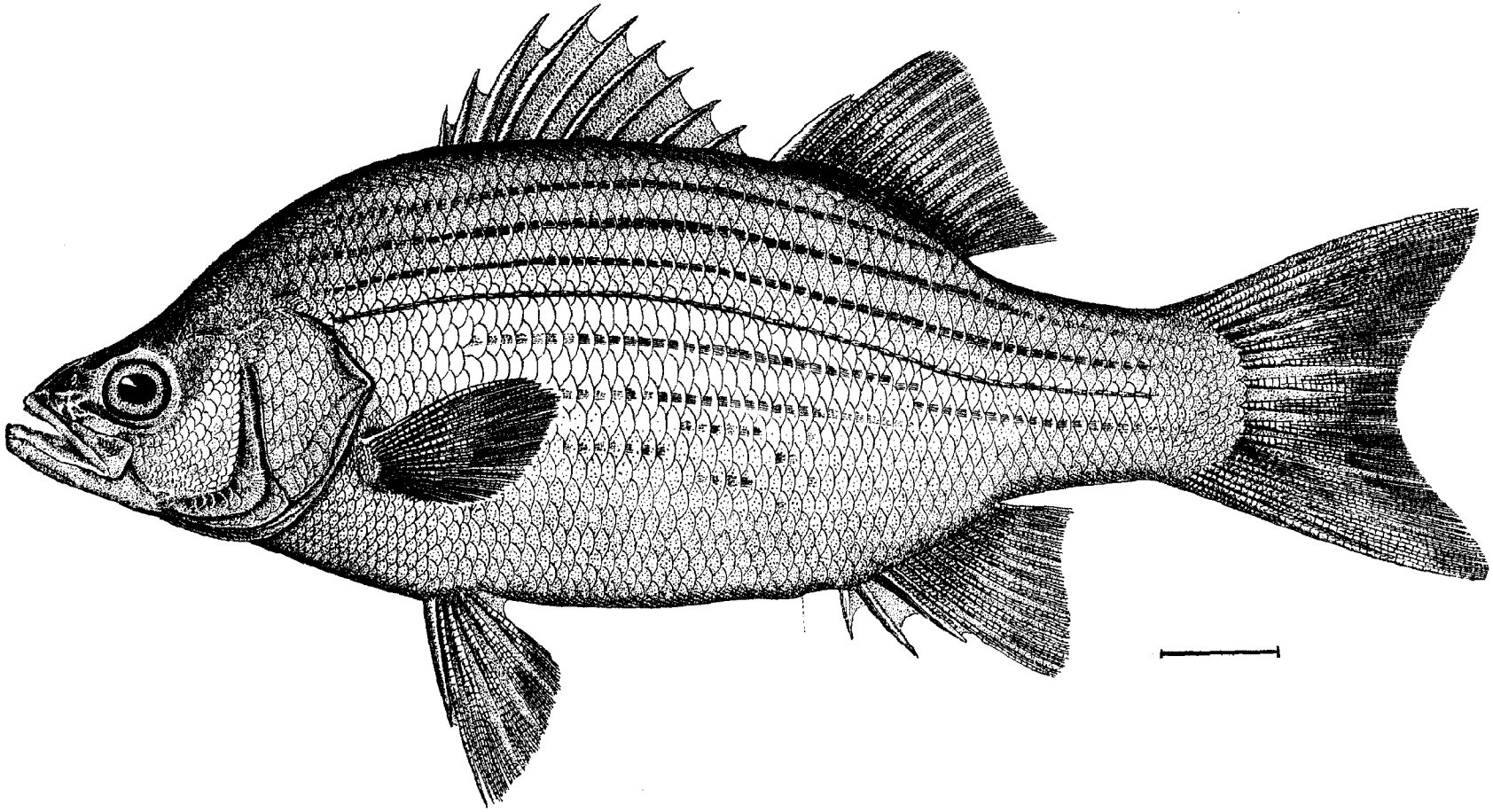
Drawing by H. L. Todd, from No. 10072, U. S. National Museum, collected at Rochester, N. Y., by J. W. Milner.



## THE STRIPED BASS OR ROCKFISH.

Roccus lineatus (Bloch.), Gill. (Roccus saxatilis, auctorum.) (p. 425.)

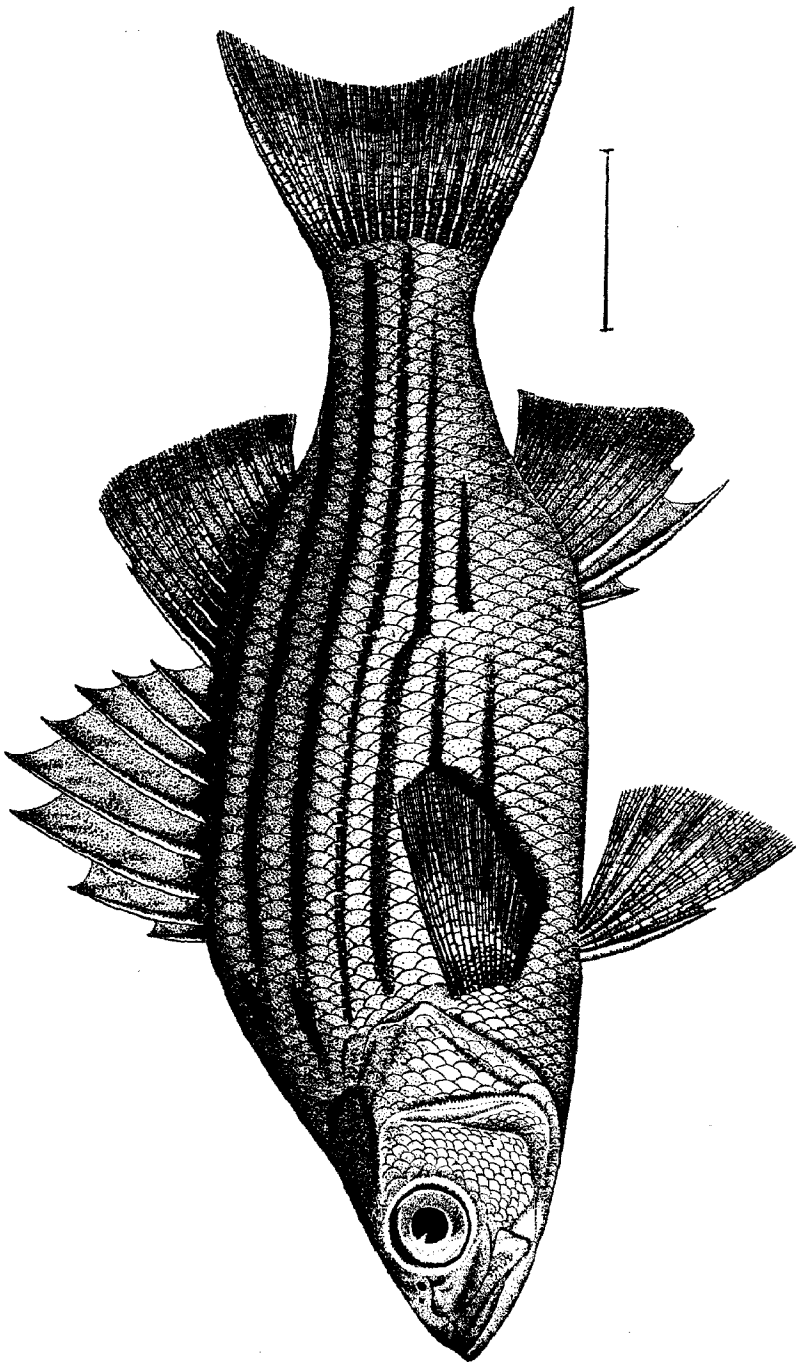
Drawing by H. L. Todd, from No. 25219, U. S. National Museum, collected at Washington Market, District of Columbia, by U. S. Fish Commission.



## THE WHITE BASS.

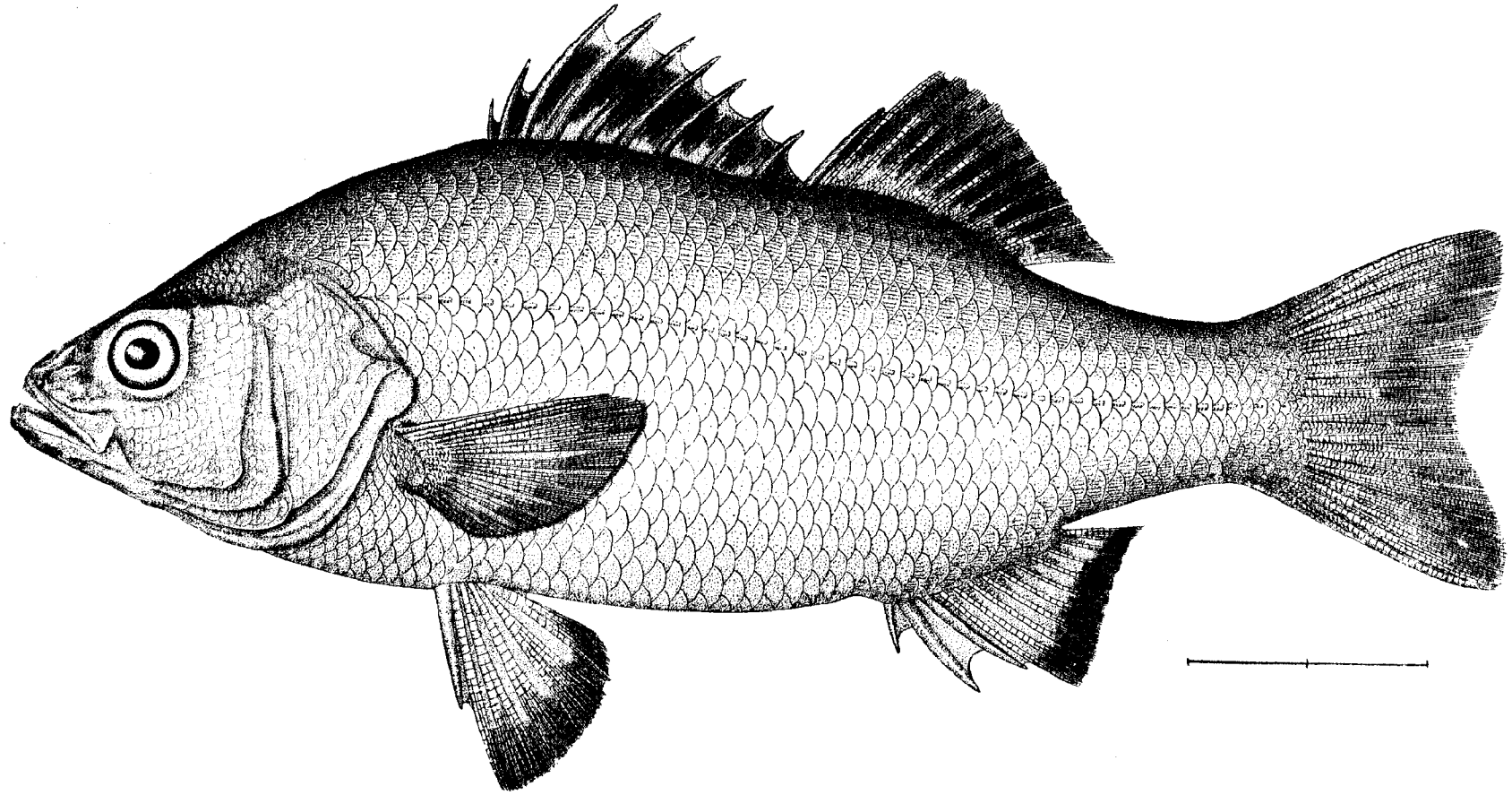
Roccus chrysops (Raf.), Gill. (p. 428.)

Drawing by H. L. Todd, from No. 10326, U. S. National Museum, collected at Sandusky, Ohio, by J. W. Milner.



THE YELLOW BASS.

Roccus interruptus (Gill), J. & G. (p. 431.)
Drawing by H. L. Todd, from specimen in National Museum.

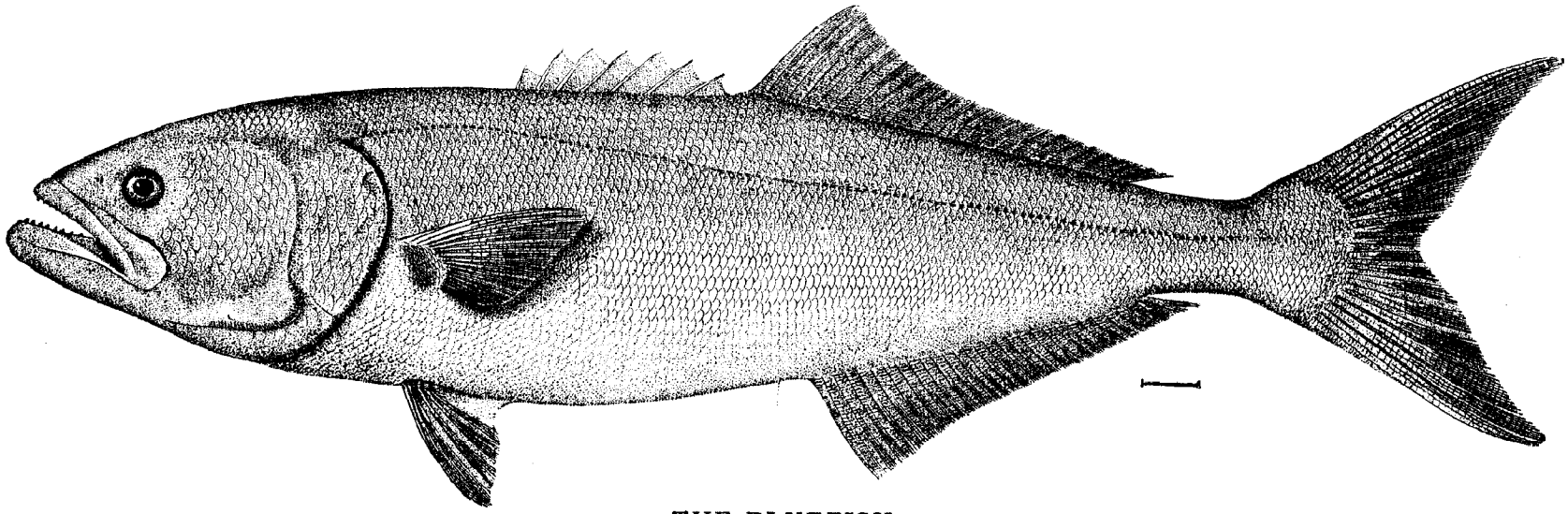


## THE WHITE PERCH.

Roccus americanus (Gml.), J. & G. (p. 431.)

Drawing by H. L. Todd, from No. 15681, U. S. National Museum, collected at New York, November 15, 1875, by E. G. Blackford.

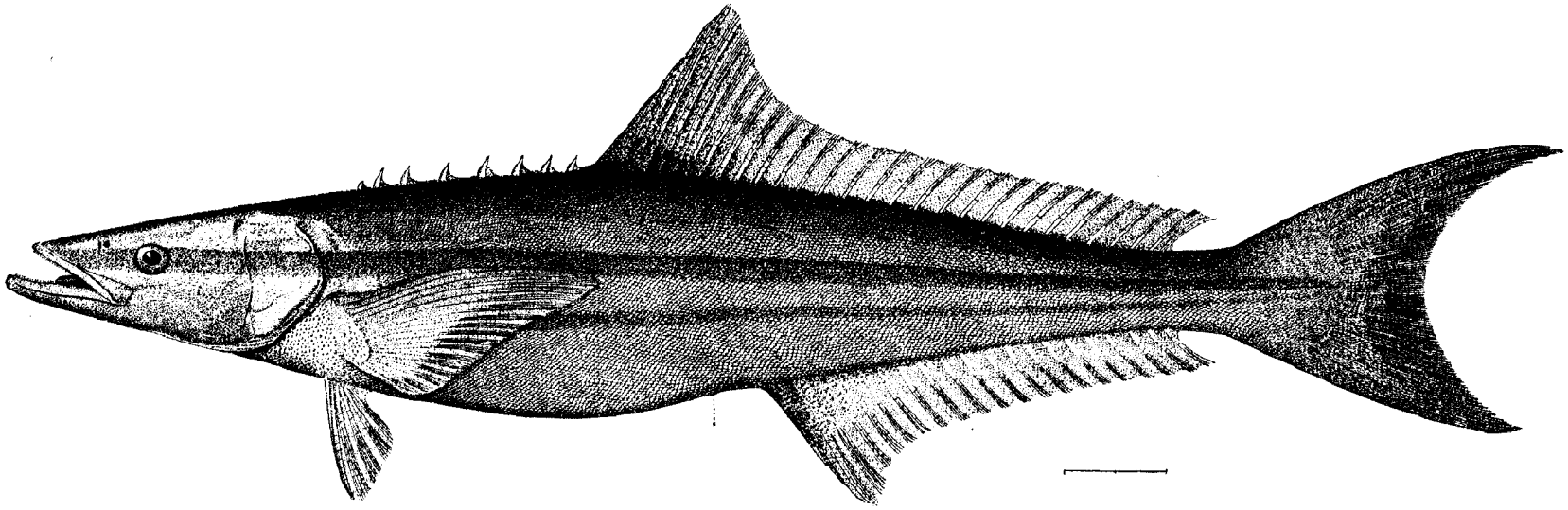
PLATE 173.



## THE BLUEFISH.

Pomatomus saltatrix (L.), Gill. (p. 444.)

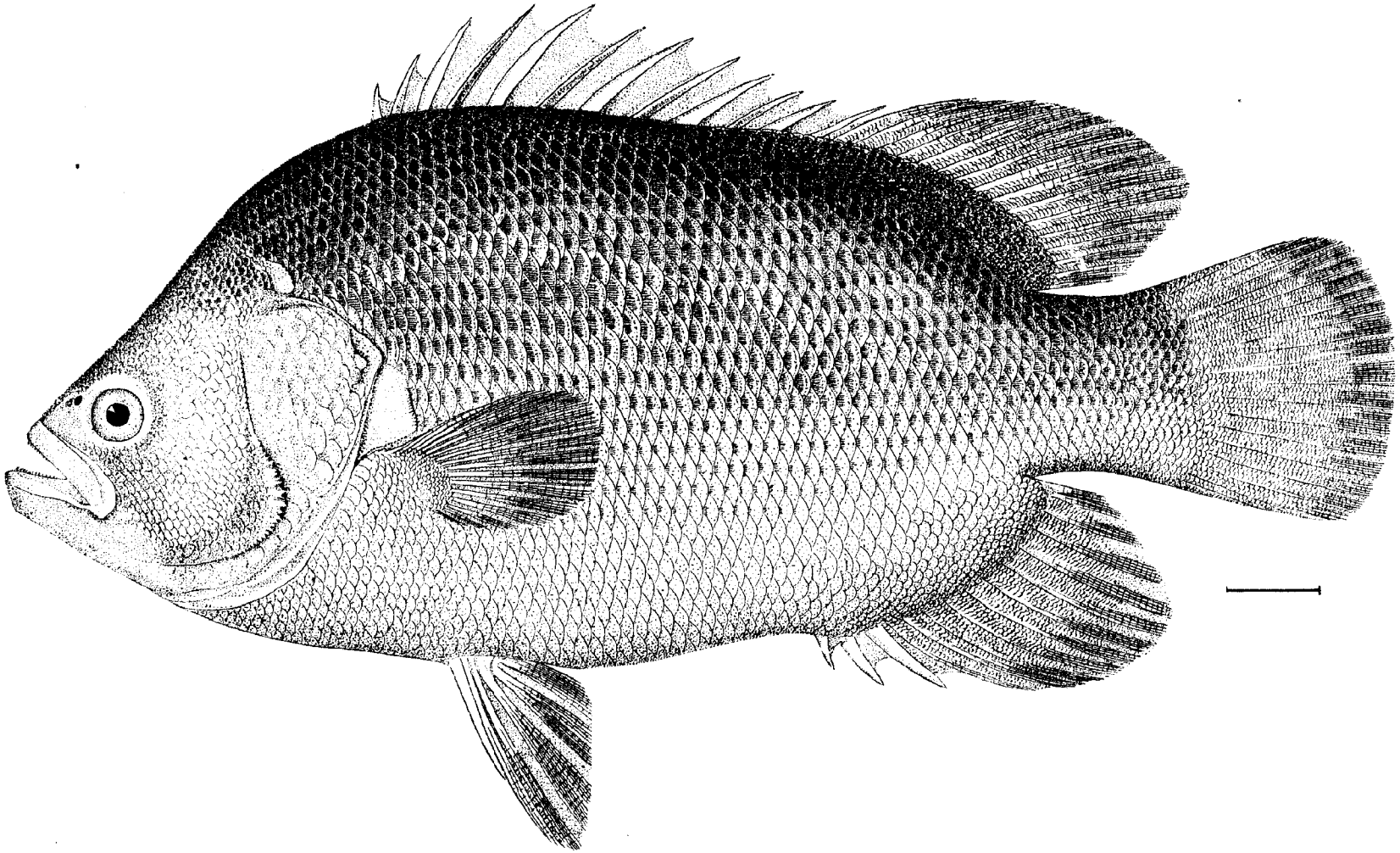
Drawing by H. L. Todd, from specimen in U. S. National Museum.



## THE COBIA OR CRAB-EATER.

Elacate canada (L.), Gill. (p. 444.)

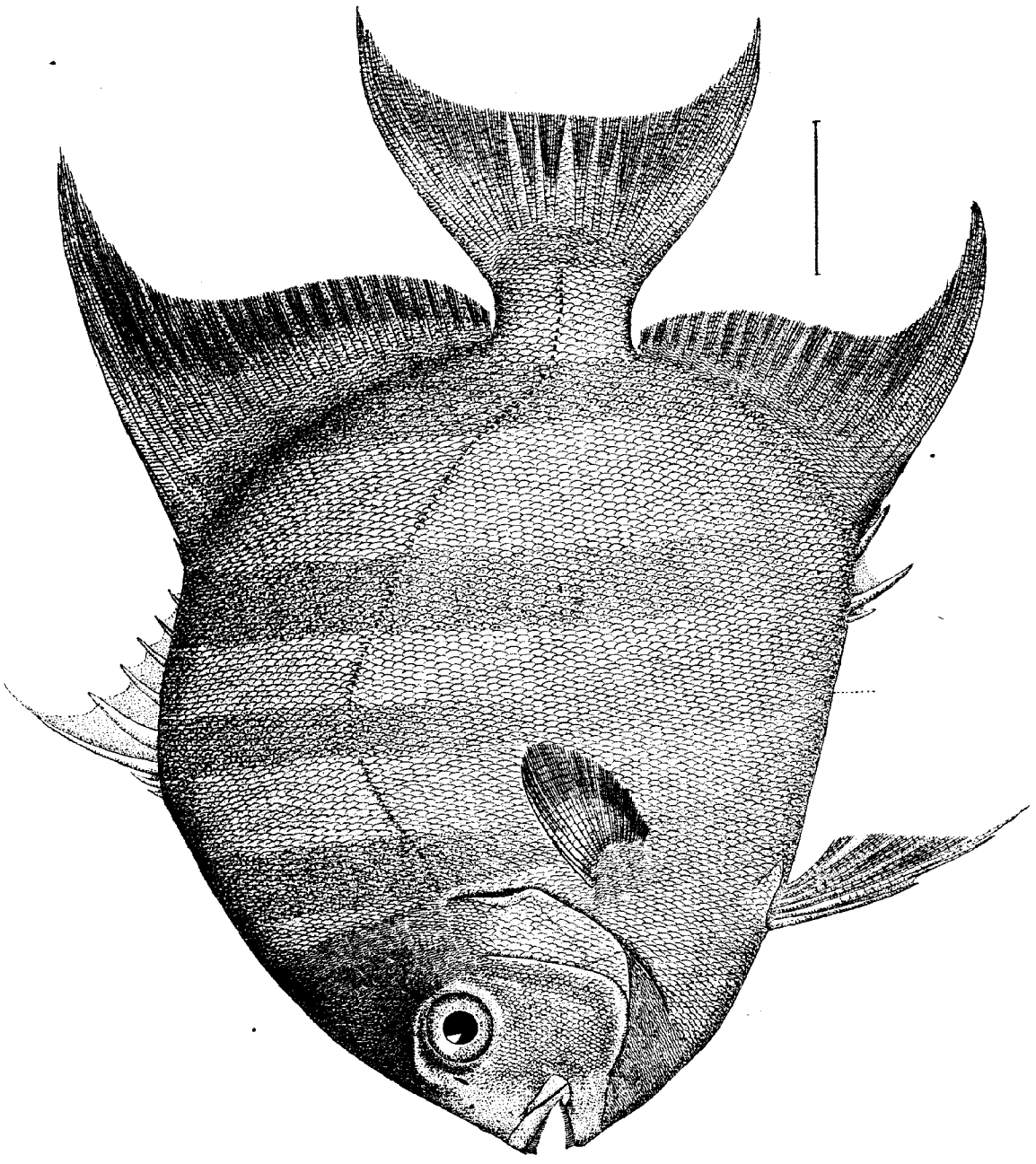
Drawing by H. L. Todd, from No. 18563, U. S. National Museum.



## THE TRIPLE-TAIL OR BLACK GROUPER.

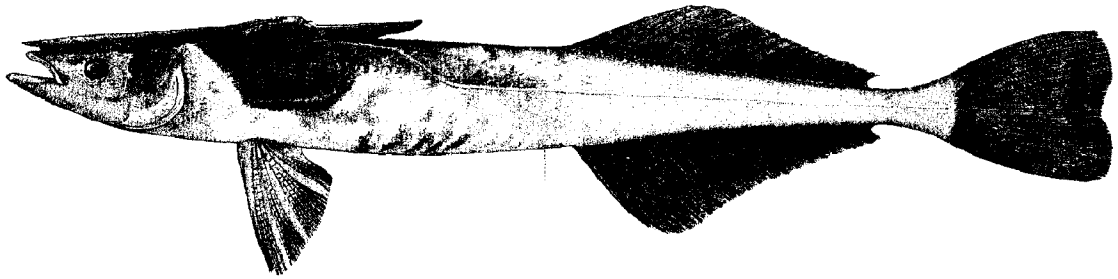
Lobotes surinamensis (Bl.), Cuvier. (p. 444.)

Drawing from specimens collected in the Saint John's River, Florida, 1874, by G. Brown Goode.



THE MOON-FISH OR SPADE-FISH.

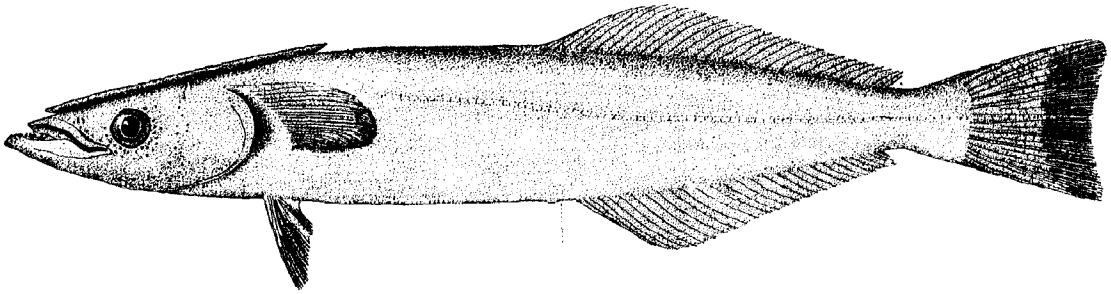
Chætodipterus faber (Brouss.), J. & G. (p. 445.)



## THE SPEAR-FISH REMORA.

Rhombochirus osteochir (Cuv.), Gill. (p. 446.)

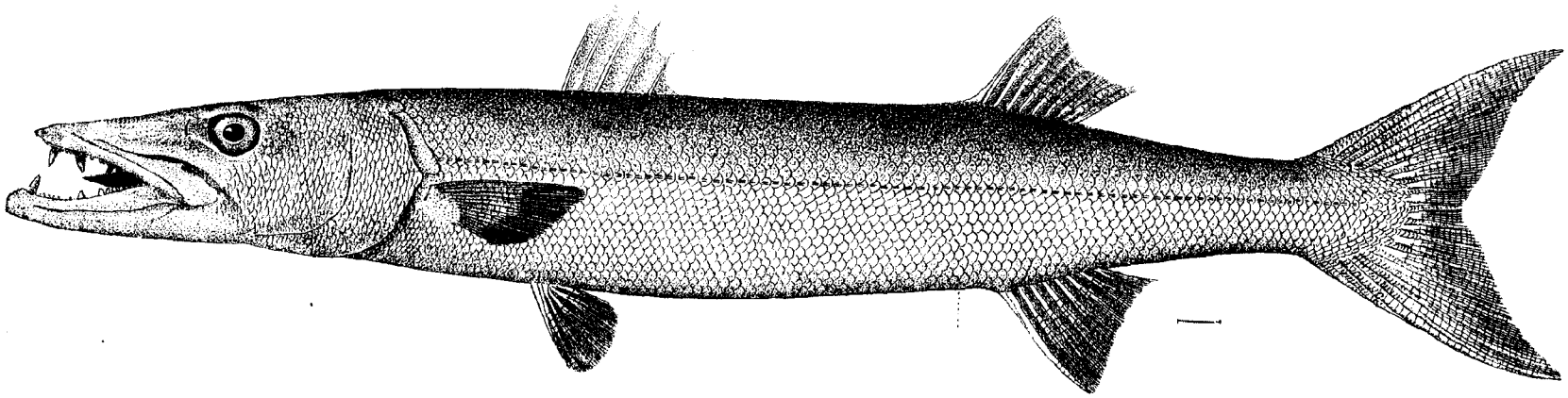
Drawing by H. L. Todd, from No. 19022, U. S. National Museum, collected at Wood's Holl, Mass., 1875, by U. S. Fish Commission.



## THE SWORD-FISH REMORA.

Remoropsis brachyptera, Lowe. (p. 446.)

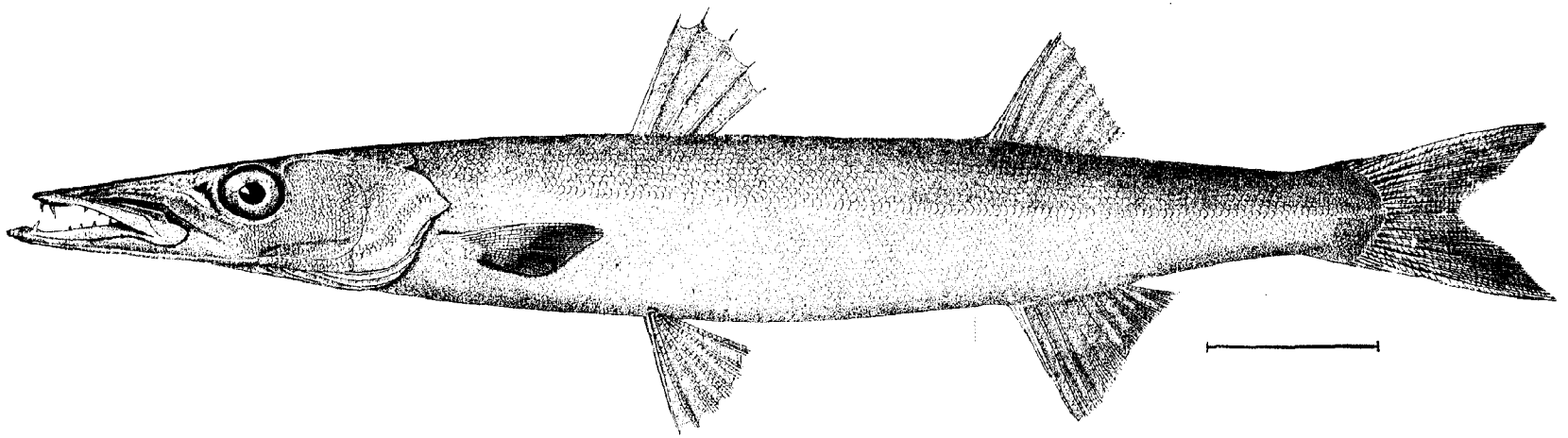
Drawing by H. L. Todd, from No. 23374, U. S. National Museum, collected at sea, in 250 fathoms of water, by Daniel McEachran.



## THE WEST INDIAN BARRACOUTA OR SENNET.

Sphyræna picuda, Schn. (p. 448.)

Drawing by H. L. Todd, from No. 14978, U. S. National Museum, collected in Florida, by E. G. Blackford.

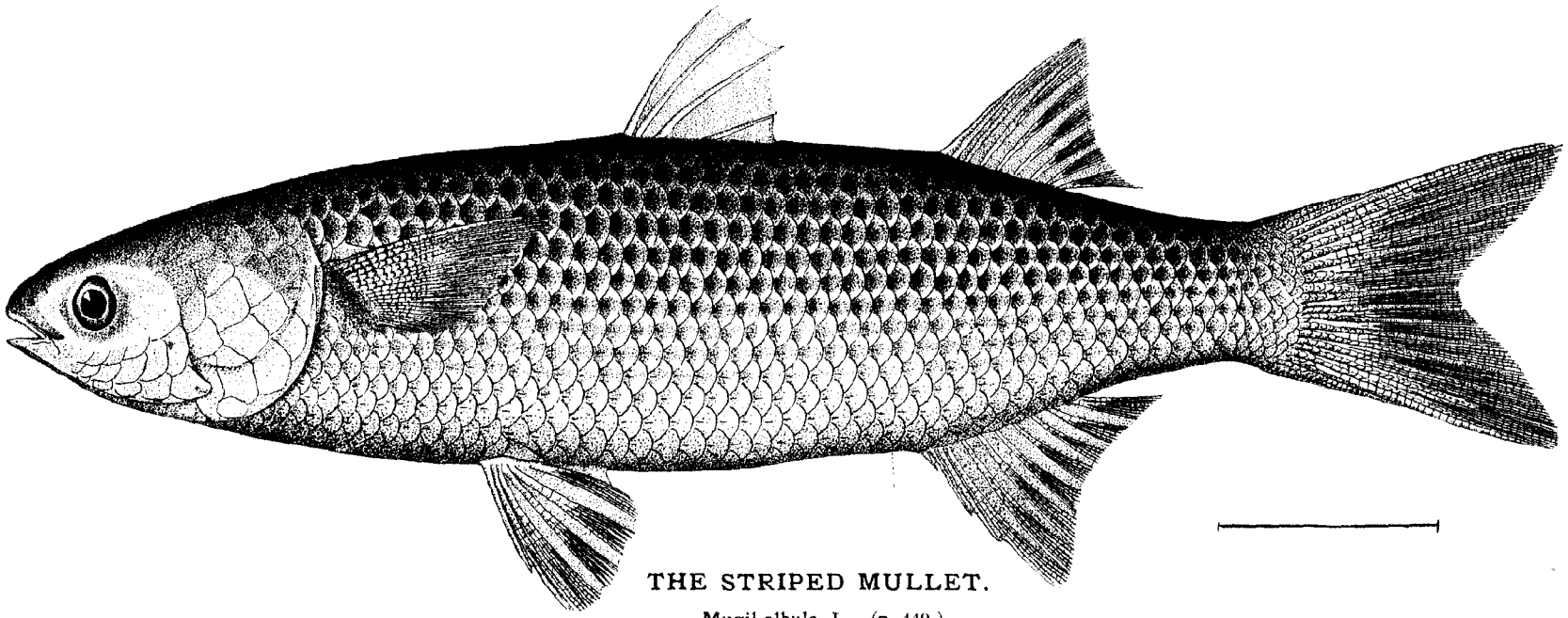


## THE NORTHERN BARRACOUTA.

Sphyræna borealis, de Kay. (p. 448.)

Drawing by H. L. Todd, from No. 18862, U. S. National Museum, collected at Wood's Holl, Mass., 1876, by Vinal N. Edwards.

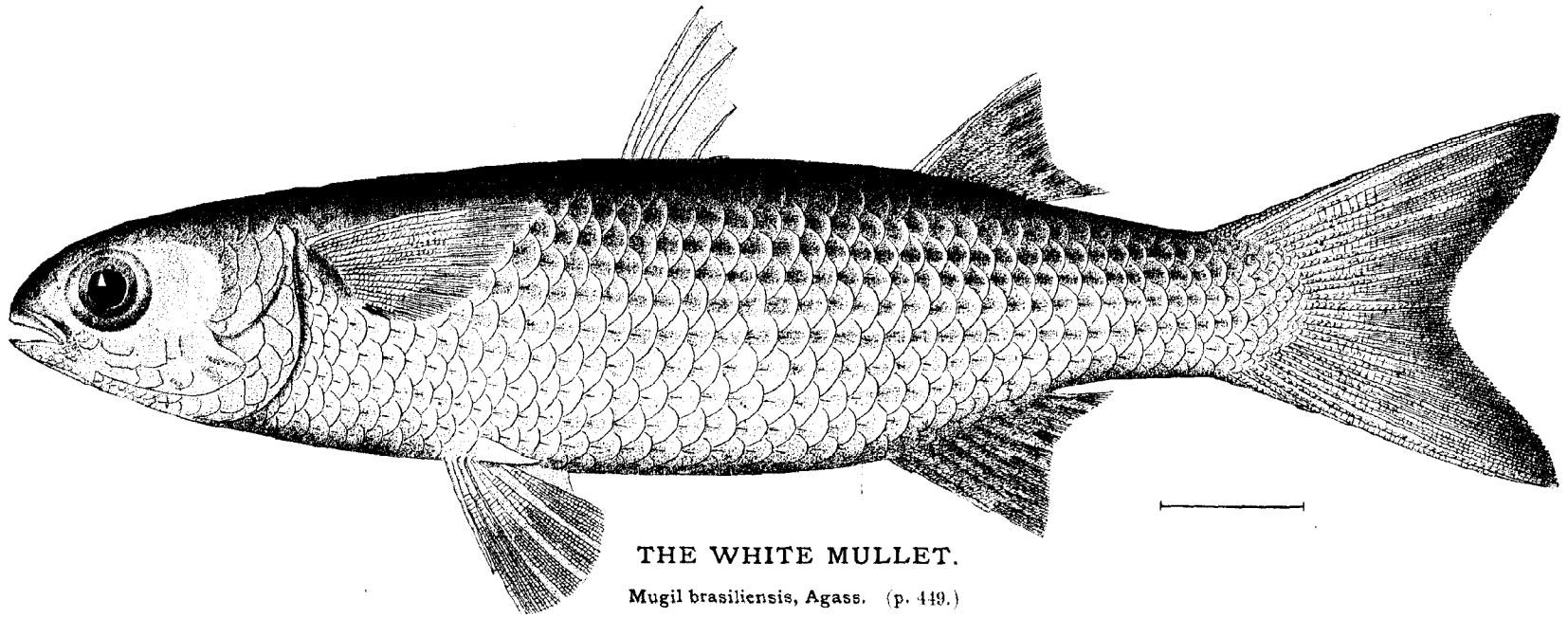
PLATE 178.



## THE STRIPED MULLET.

**Mugil albula, L.** (p. 449.)

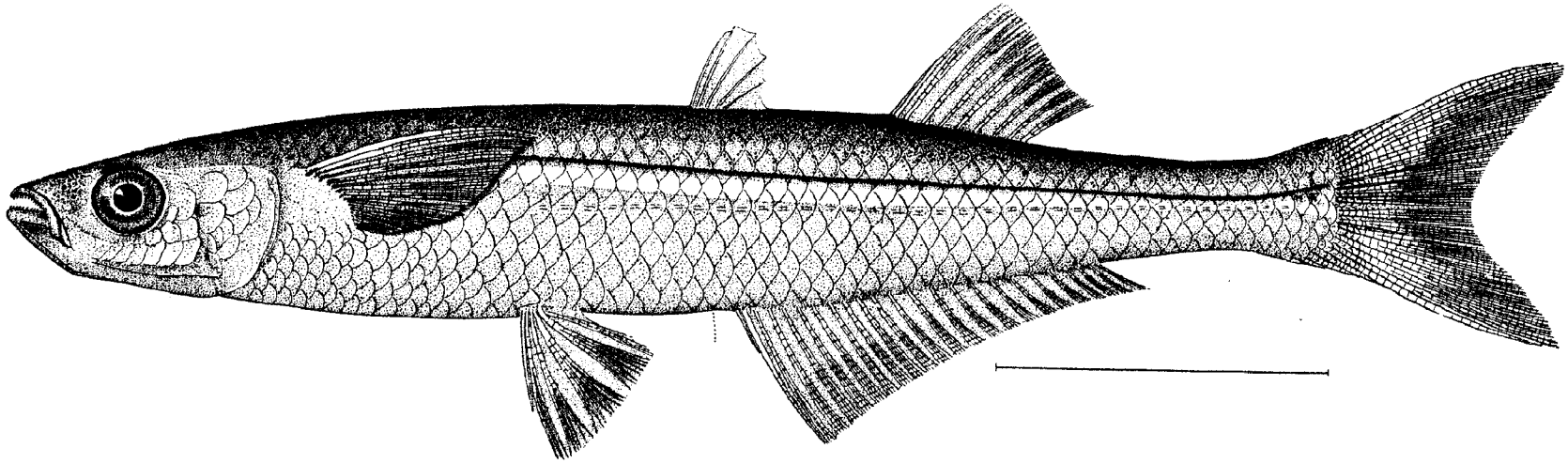
Drawing by H. L. Todd, from No. 24456, U. S. National Museum, collected at Wood's Holl, Mass., December 15, 1879, by Vinal N. Edwards.



## THE WHITE MULLET.

**Mugil brasiliensis, Agass.** (p. 449.)

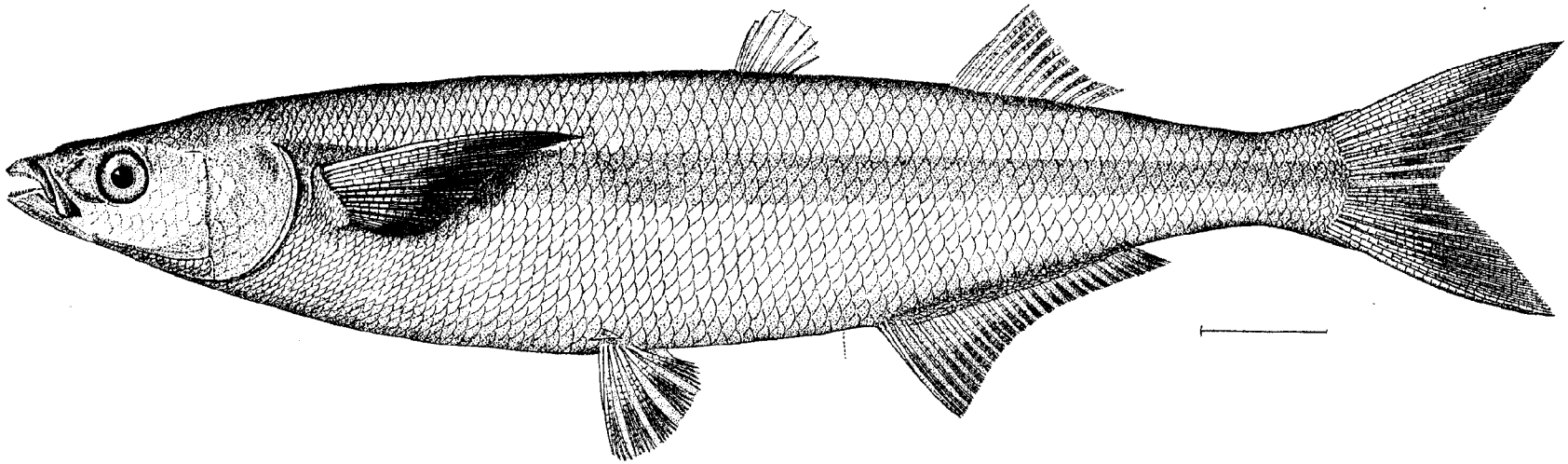
Drawing by Miss M. Smith, from No. 21498, U. S. National Museum, collected at Pensacola, Fla., 1878, by Silas Stearns.



## THE SAND SMELT OR SILVER SIDES.

Menidia notata (Mitch.), J. & G. (p. 456.)

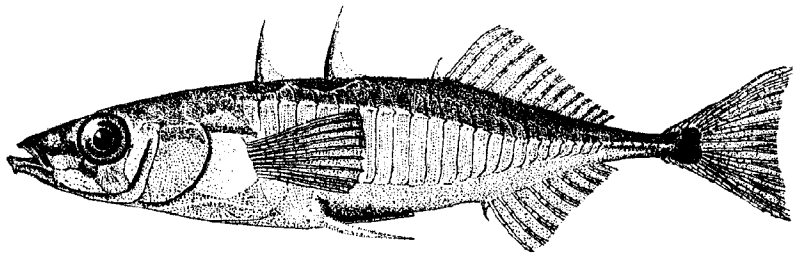
Drawing by H. L. Todd, from specimen in U. S. National Museum, collected at Noank, Conn., by U. S. Fish Commission.



## THE CALIFORNIA "SMELT" OR PESCADILLO.

Atherinopsis californiensis, Girard. (p. 457.)

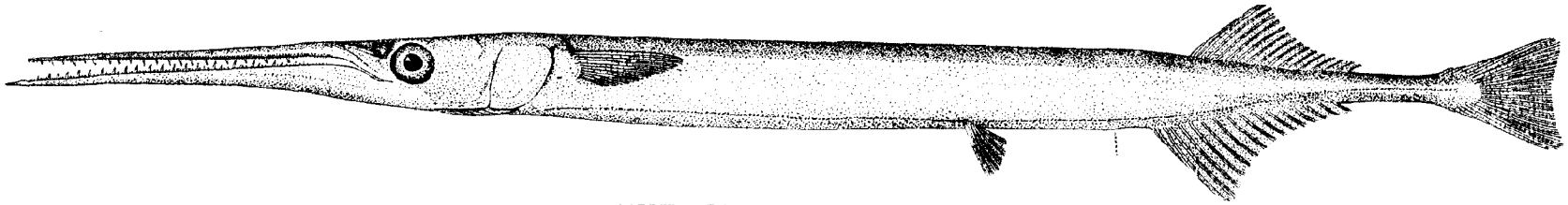
Drawing by H. L. Todd, from No. 26764, U. S. National Museum, collected at San Diego, Cal., 1880, by Prof. D. S. Jordan.



## THE TWO-SPINED STICKLE-BACK.

Gasterosteus aculeatus, L.

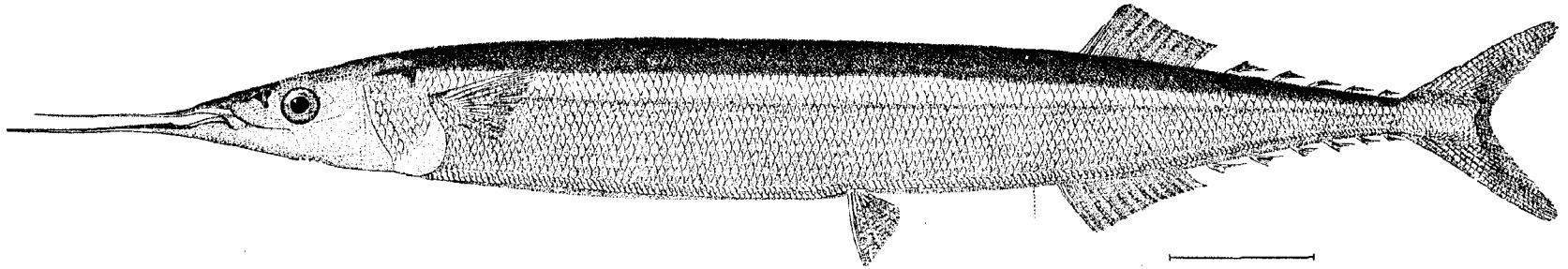
Drawing by H. L. Todd, from No. 20875, U. S. National Museum, collected at Wood's Holl, Mass., December 3, 1877, by Vinal N. Edwards.



## THE SILVER GAR-FISH.

Tylosurus longirostris (Mitch.), J. & G. (p. 458.)

Drawing by H. L. Todd, from specimens in National Museum.

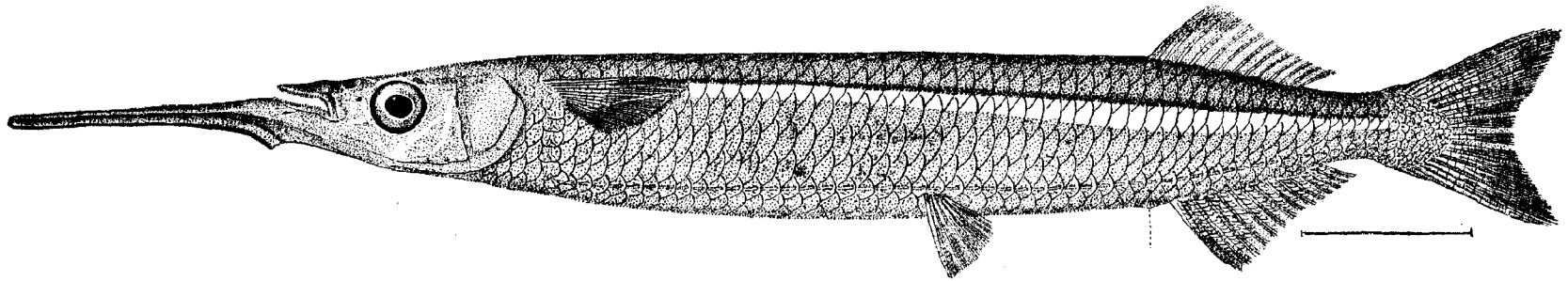


## THE SKIPPER OR SAURY.

Scomberesox saurus (Walb.), Fleming. (p. 460.)

Drawing by H. L. Todd, from No. 19853, U. S. National Museum, collected at Wood's Holl, Mass., November 3, 1875, by Vinal N. Edwards.

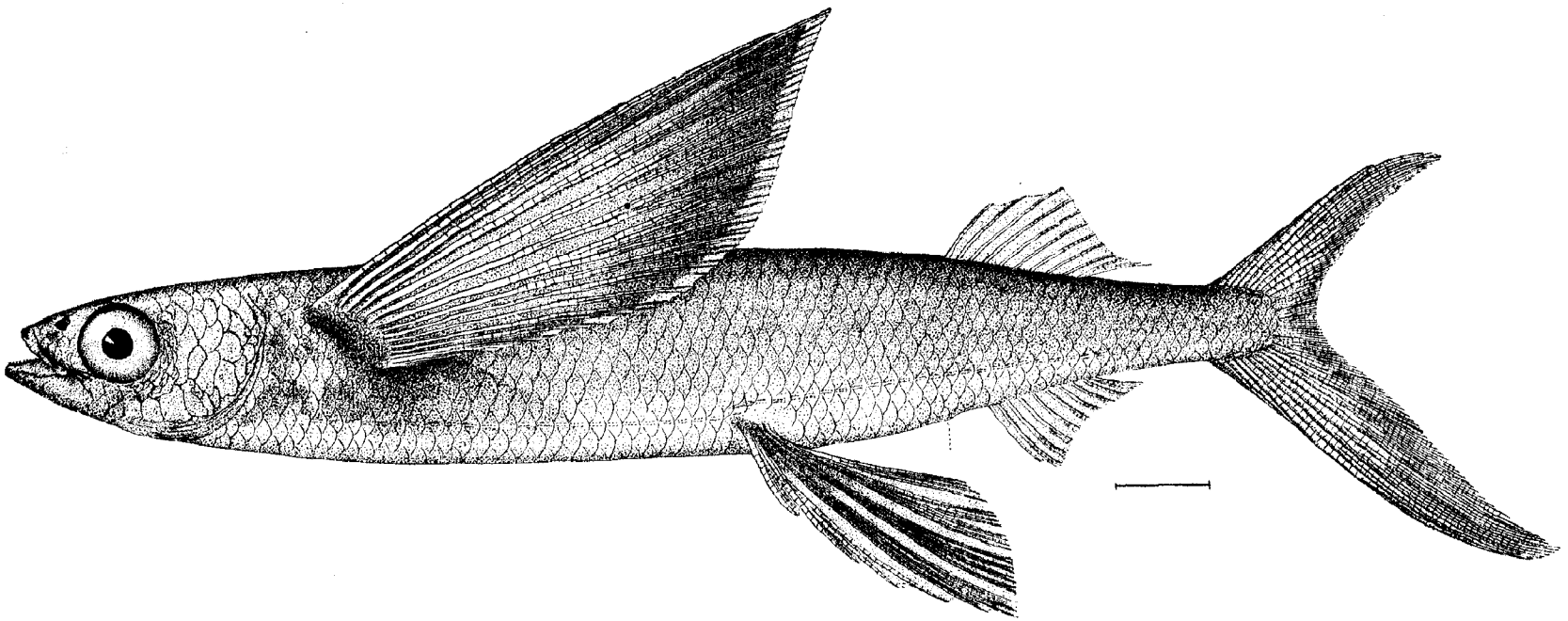
PLATE 181.



## THE HALF BEAK.

**Hemiramphus unifasciatus (Ranzani).** (p. 461.)

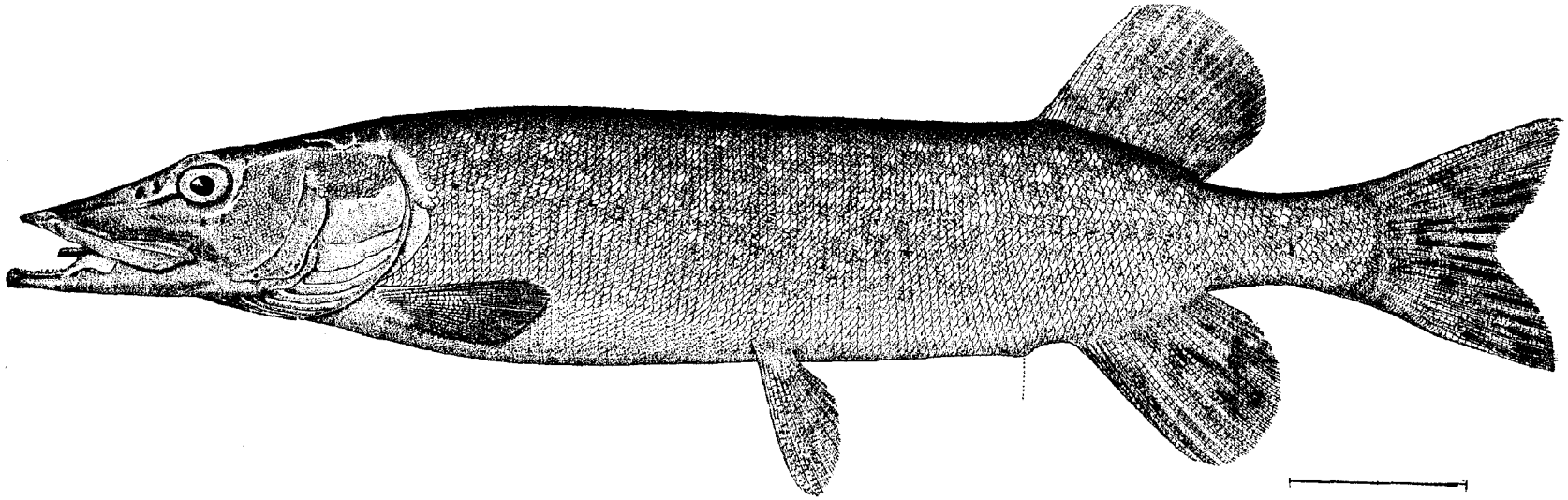
Drawing by H. L. Todd, from No. 16944, U. S. National Museum, collected in Chesapeake Bay, August, 1876, by Otto Lugger.



## THE CALIFORNIA FLYING-FISH.

Exocœtus californiensis, Cooper. (p. 459.)

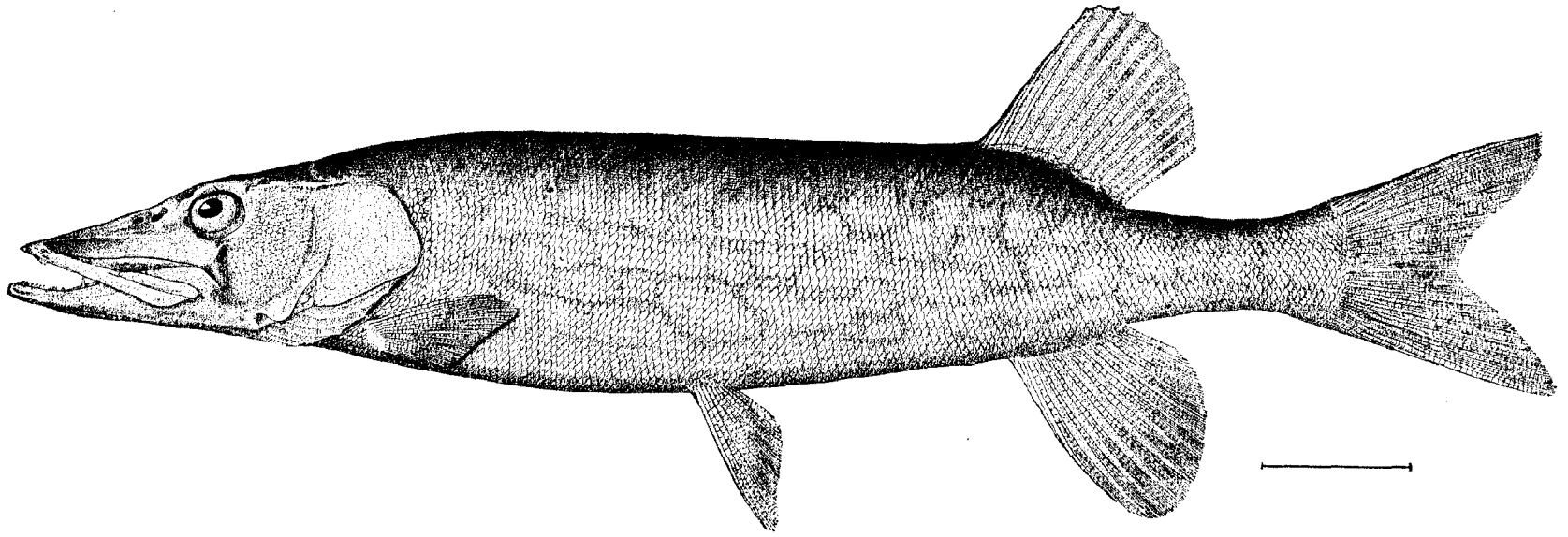
Drawing by H. L. Todd, from No. 26907, U. S. National Museum, collected at Santa Barbara, Cal., 1880, by Jordan and Gilbert.



## THE PIKE.

Esox lucius, L. (p. 461.)

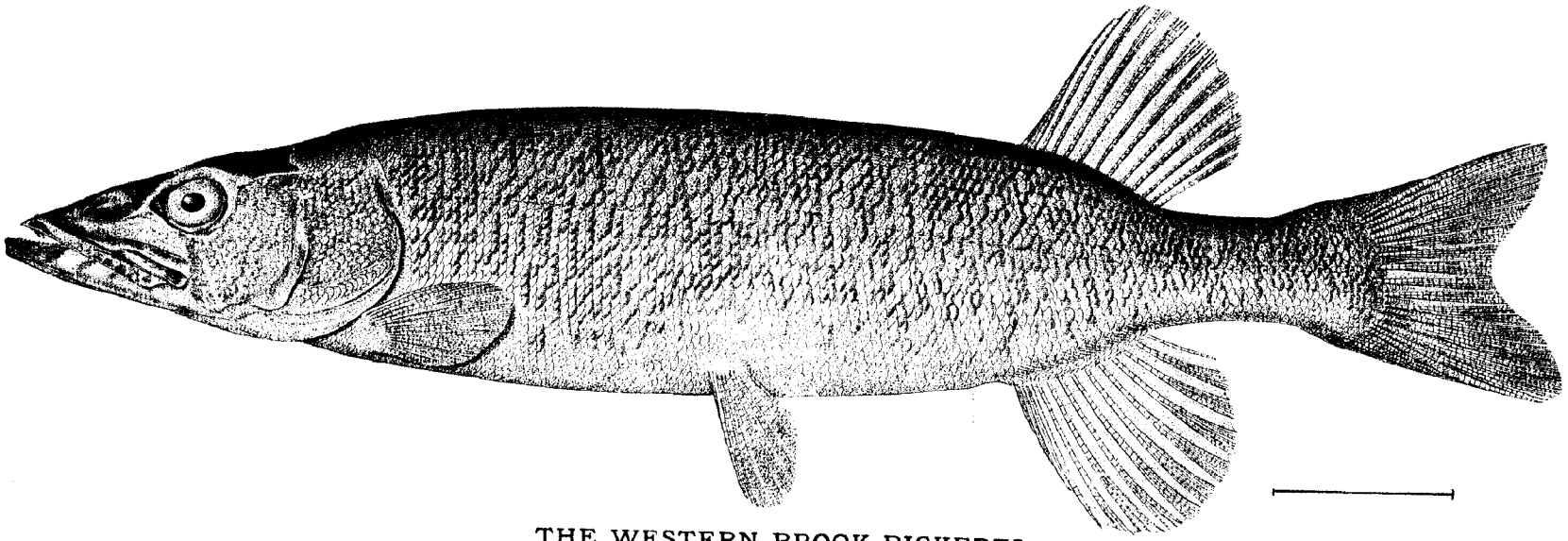
Drawing by H. L. Todd, from No. 9289, U. S. National Museum, collected at Ecorse, Mich., by George Clark.



## THE PICKEREL OR FEDERATION PIKE.

Esox reticulatus, Le Sueur. (p. 464.)

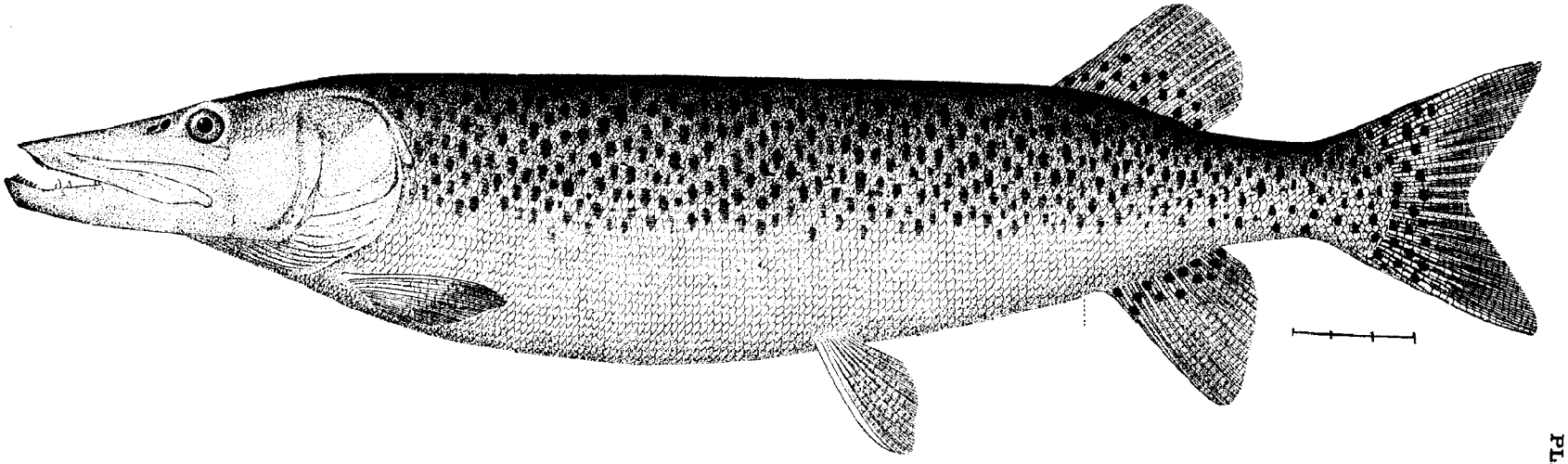
Drawing by H. L. Todd, from No. 20381, U. S. National Museum.



## THE WESTERN BROOK PICKEREL.

Esox umbrosus, Kirtland. (p. 464.)

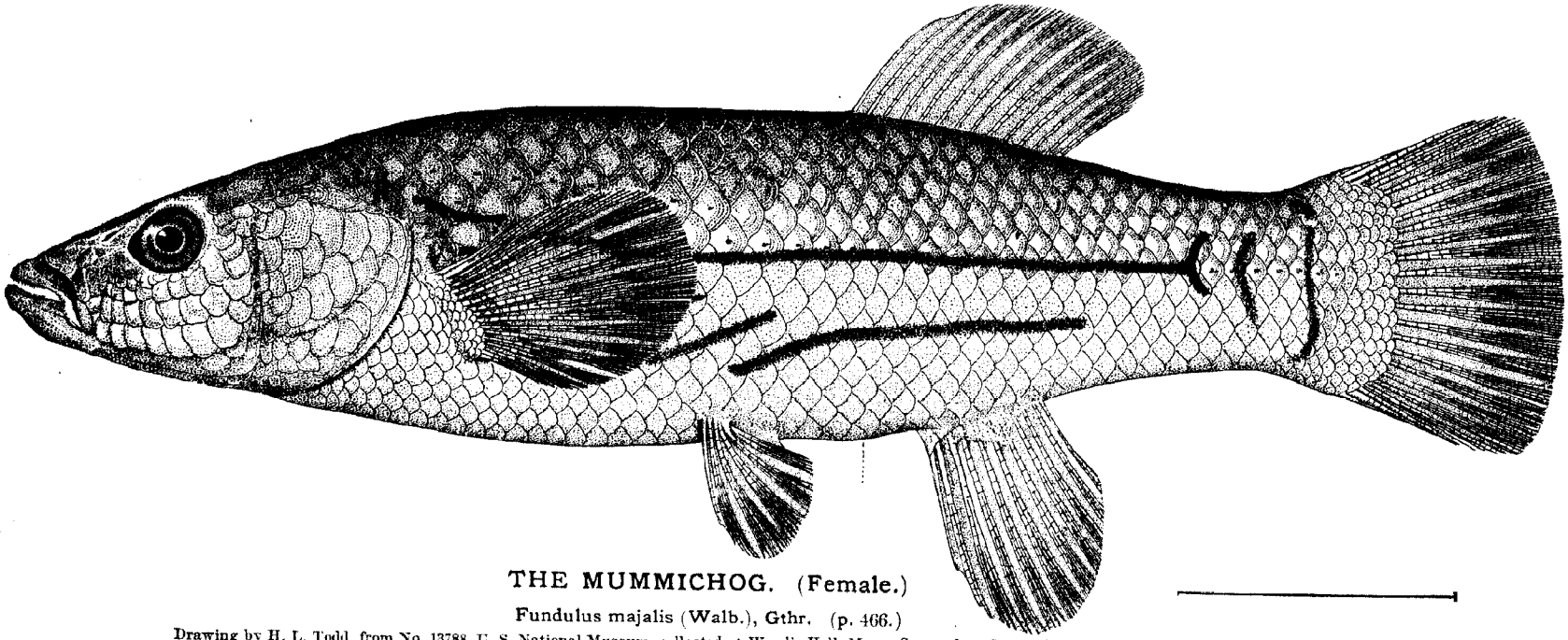
Drawing by H. L. Todd, from No. 20708, U. S. National Museum, collected by E. G. Blackford.



## THE MUSKELLUNGE.

Esox nobilior, Thompson. (p. 464.)

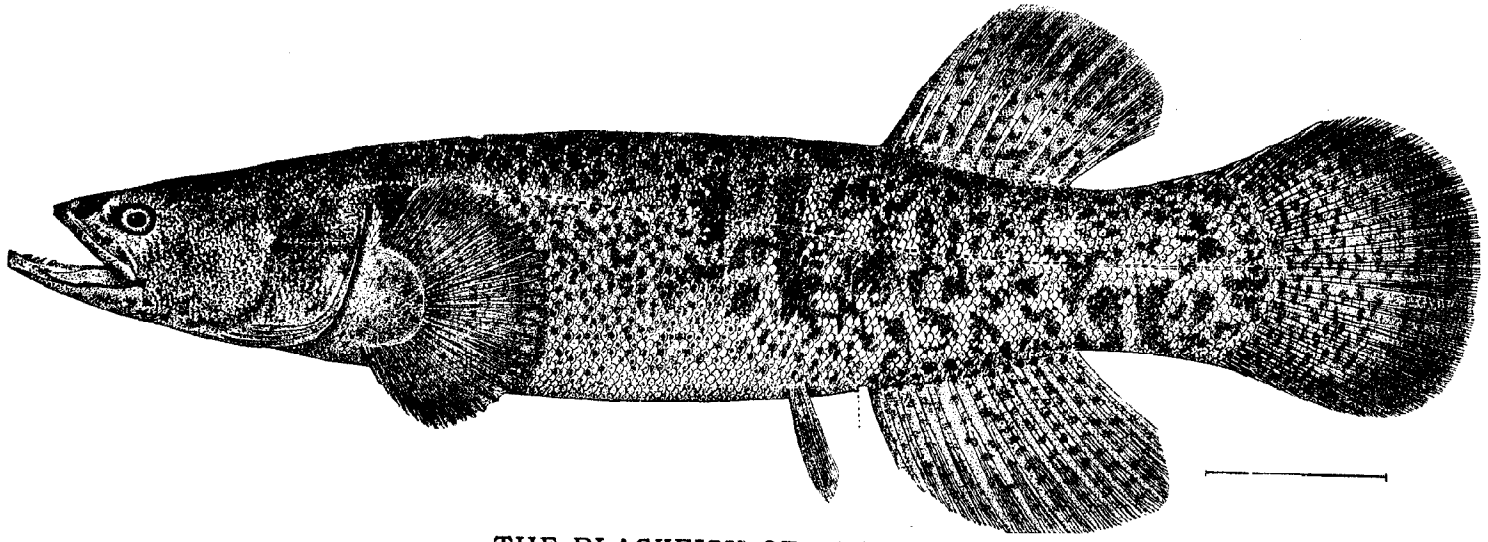
Drawing by H. L. Todd, from No. 10607, U. S. National Museum, collected at Ecorse, Mich., by George Clark.



THE MUMMICHOG. (Female.)

Fundulus majalis (Walb.), Gthr. (p. 466.)

Drawing by H. L. Todd, from No. 13788, U. S. National Museum, collected at Wood's Holl, Mass., September 15, 1871, by U. S. Fish Commission.

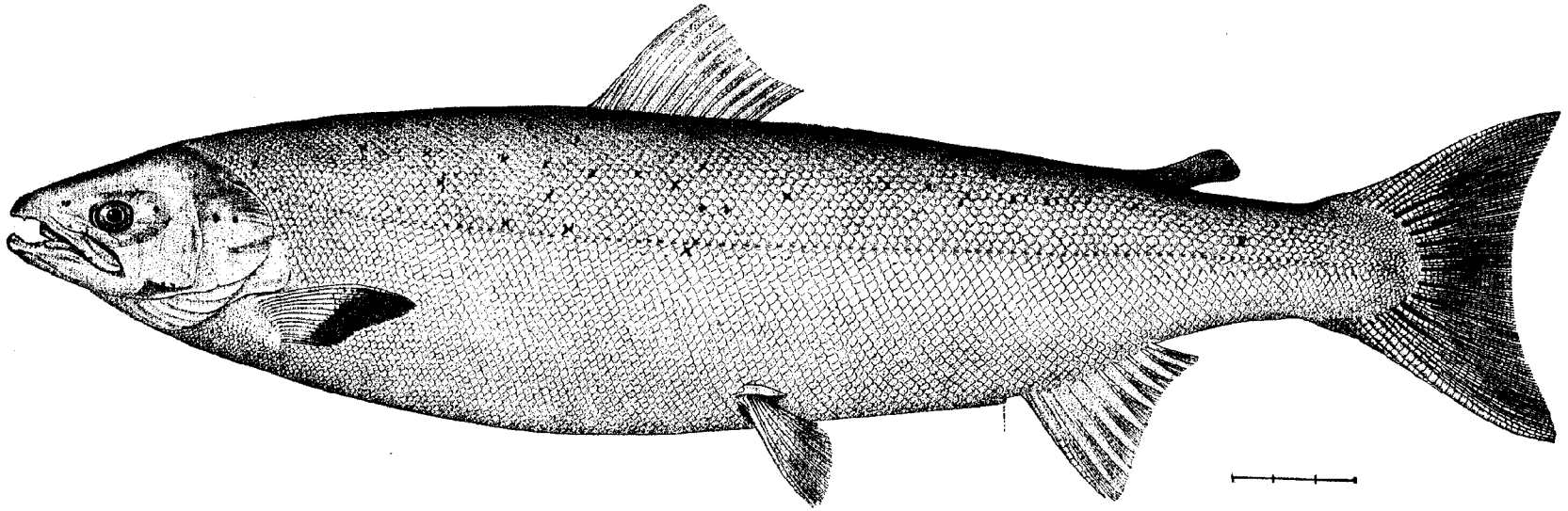


THE BLACKFISH OF ALASKA.

Dallia pectoralis, Bean. (p. 466.)

Drawing by H. L. Todd, from No. 23498 *A*, U. S. National Museum, collected at Saint Michaels, Alaska, February, 1877, by L. M. Turner.

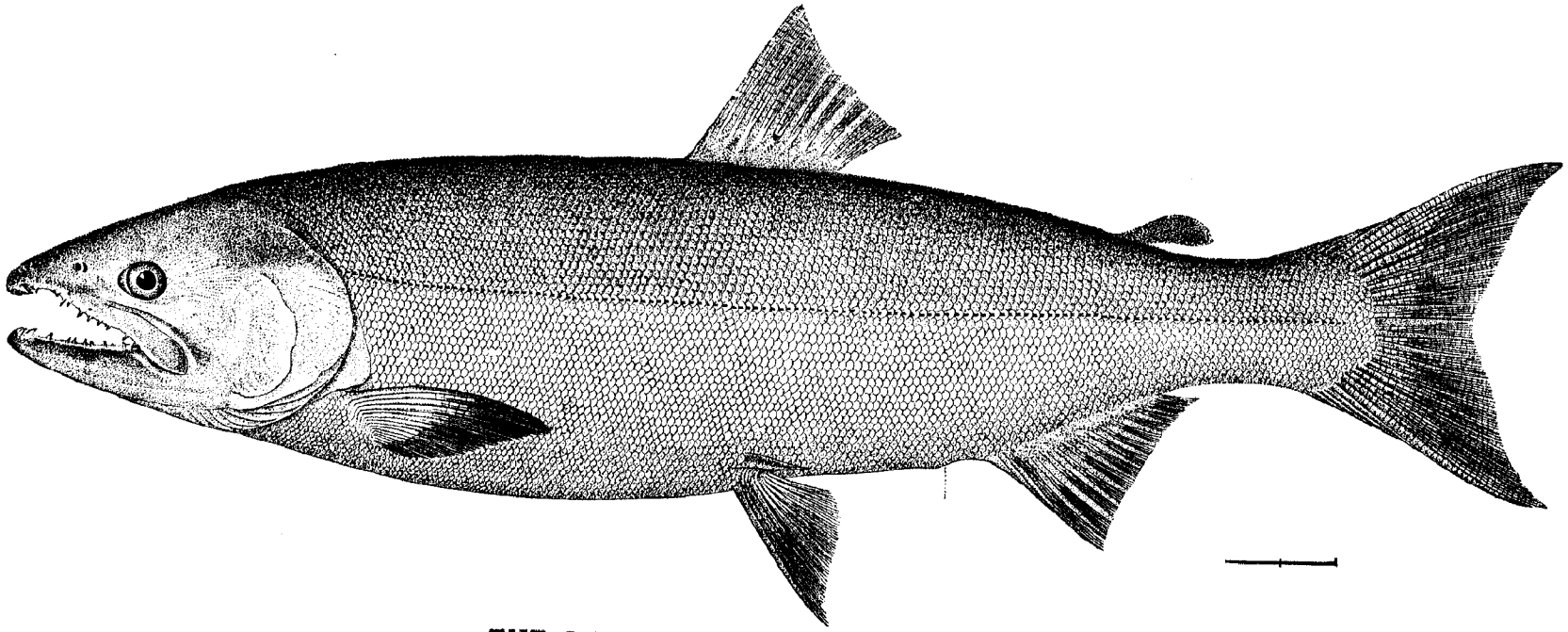
PLATE 185



## THE ATLANTIC SALMON.

Salmo salar, L. (p. 468.)

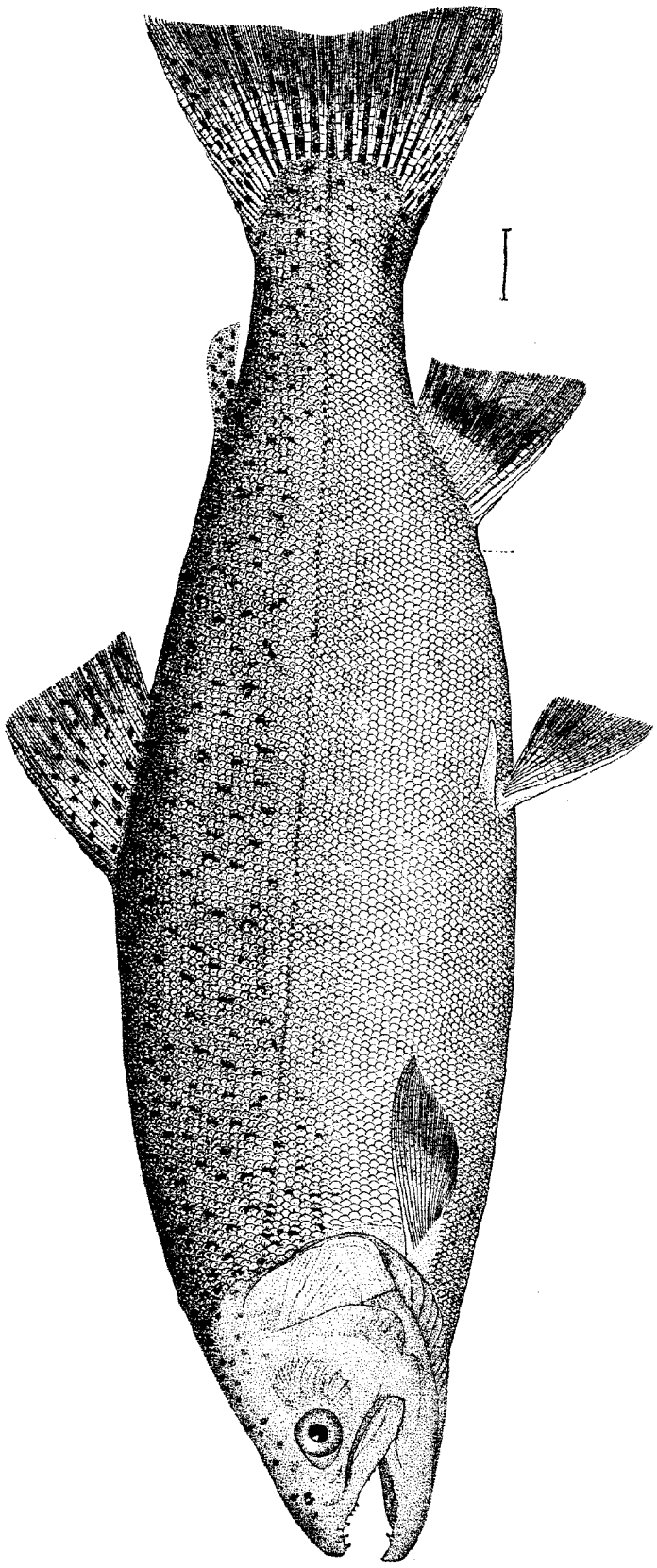
Drawing by H. L. Todd, from specimen in the U. S. National Museum, taken in the Delaware River.



## THE QUINNAT OR CALIFORNIA SALMON.

Oncorhynchus chouicha (Walb.), J. & G. (p. 479.)

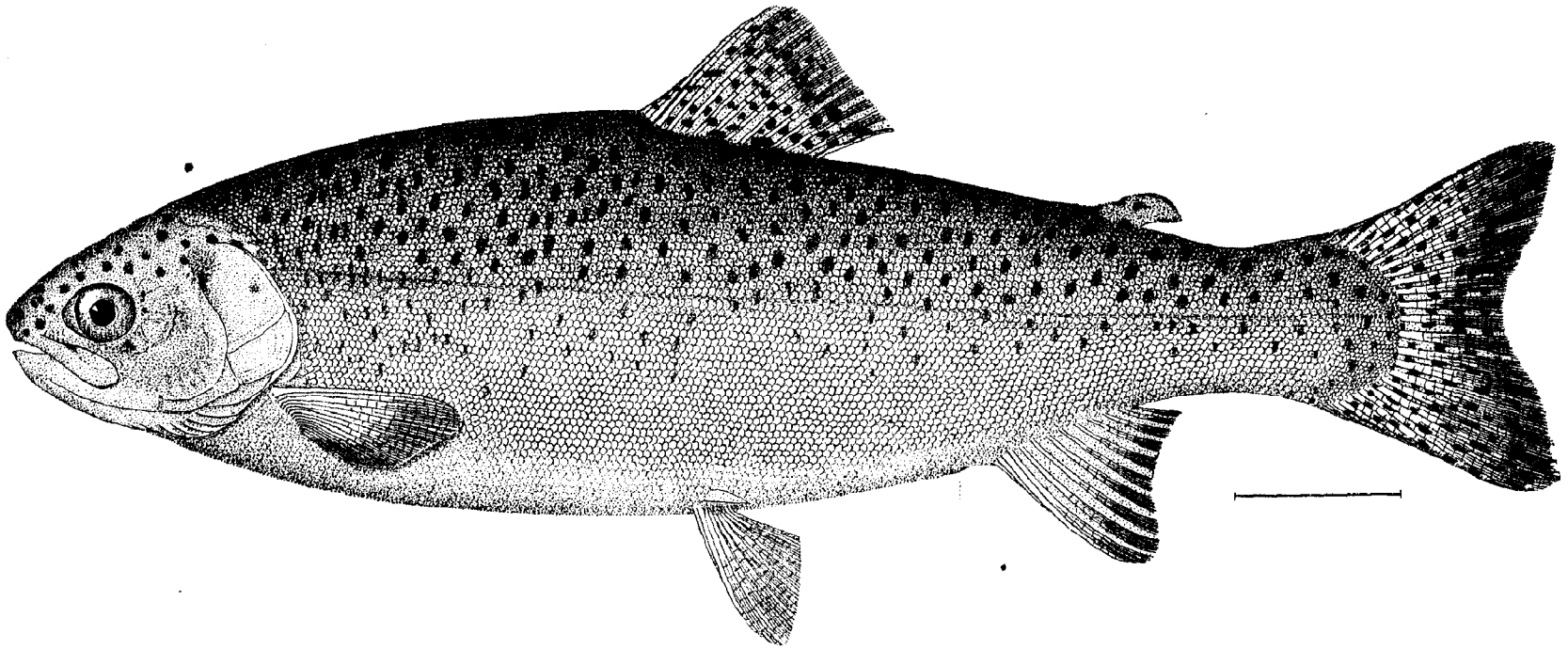
Drawing by H. L. Todd, from No. 24671, U. S. National Museum, collected at Neeah Bay, December, 1879, by James G. Swan.



## THE STEEL HEAD.

Salmo Gairdneri, Richardson. (p. 474.)

Drawing by H. L. Todd, from No. 27218, U. S. National Museum, collected in the Columbia River, 1880, by Prof. D. S. Jordan.

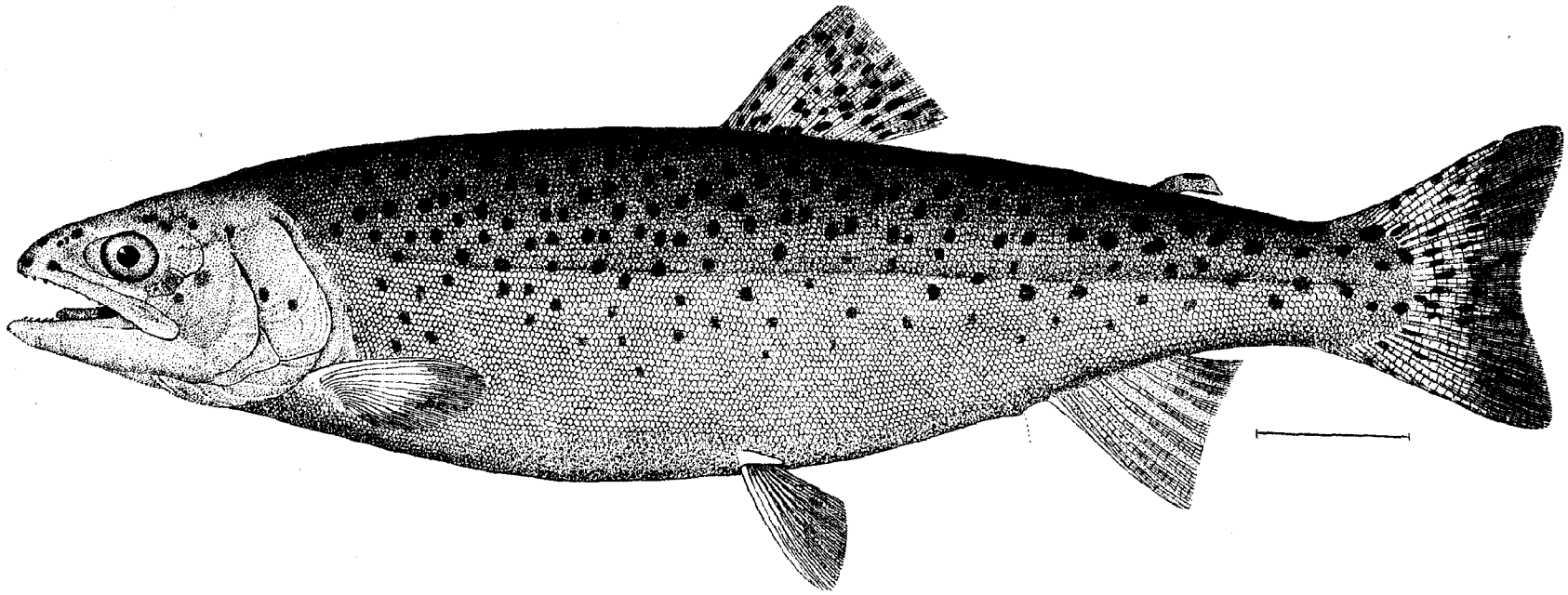


## THE RAINBOW TROUT.

Salmo irideus, Gibbons. (p. 475.)

Drawing by H. L. Todd, from No. 29093, U. S. National Museum, collected in the McCloud River, Cal., 1881, by Livingston Stone.

PLATE 187 B.

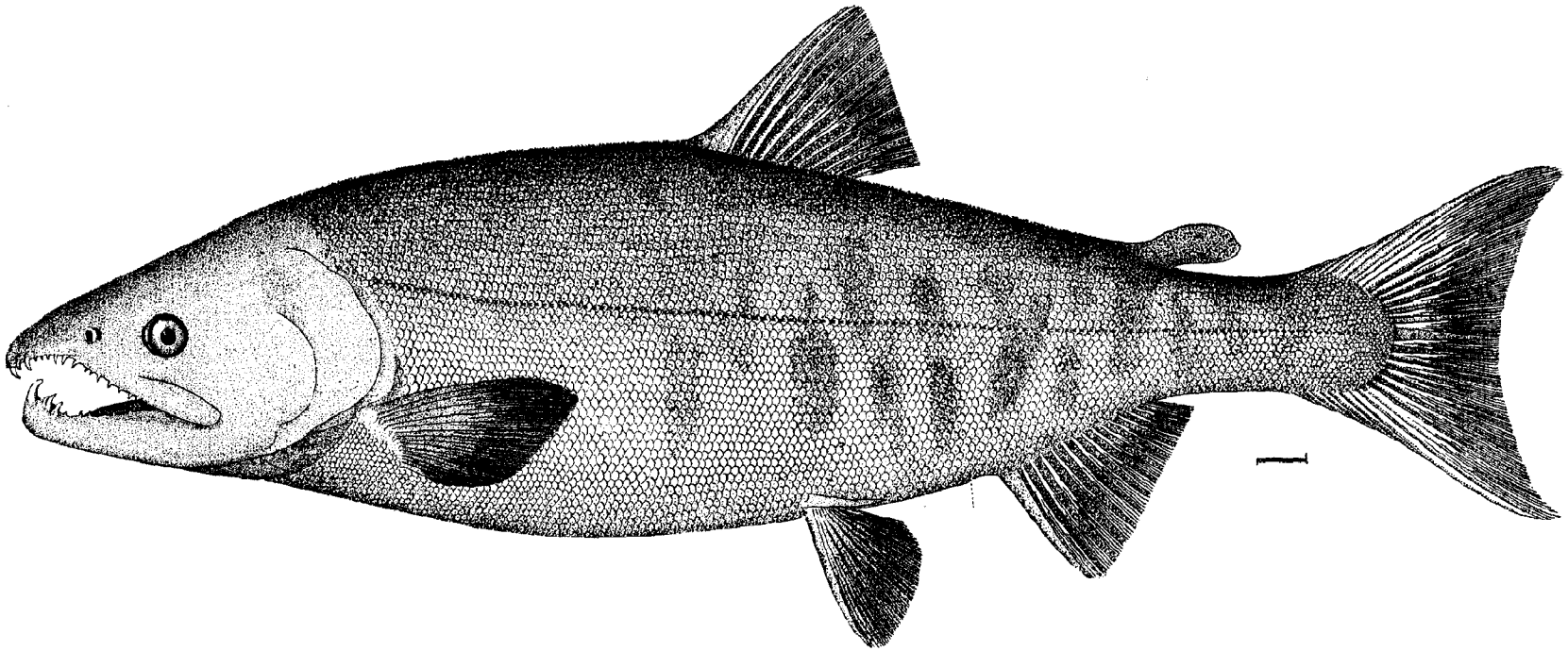


## THE BLACK-SPOTTED TROUT.

Salmo purpuratus, Pallas. (p. 475.)

Drawing by H. L. Todd, from No. 27905, U. S. National Museum, collected at Sitka, Alaska, 1870, by L. A. Beardslee.

PLATE 188 A.

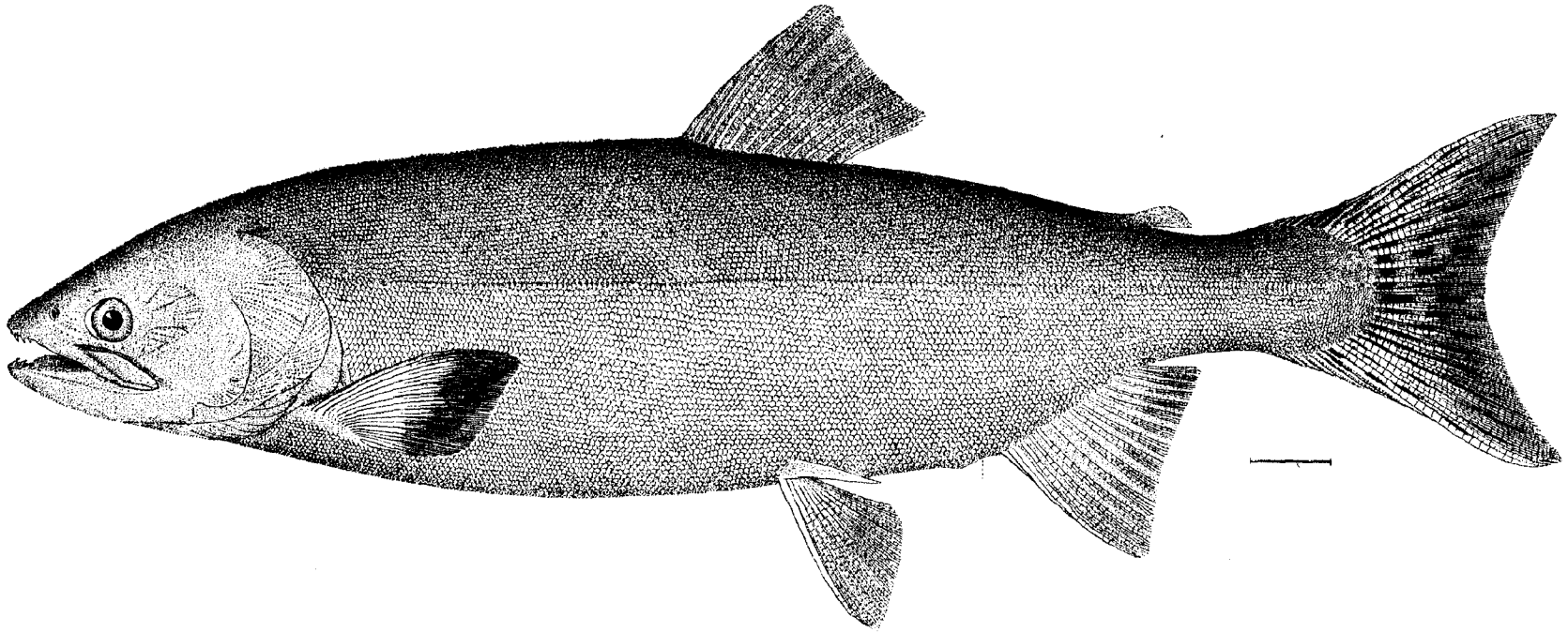


## THE KAYKO OR DOG SALMON.

Oncorhynchus keta (Walb.), Gill & Jordan. (p. 476.)

Drawing by H. L. Todd, from No. 27617, U. S. National Museum, collected at Fort Alexander, Cook's Inlet, Alaska, July 4, 1880, by J. Cohen.

PLATE 188 *b*.

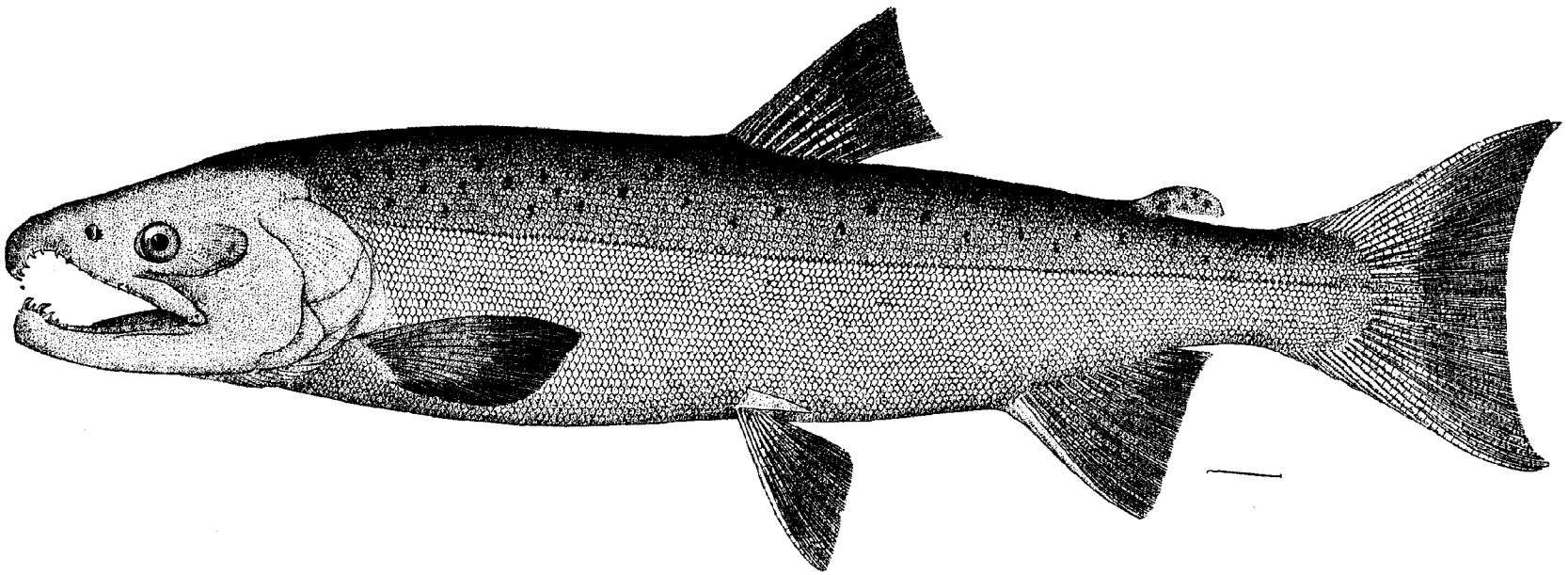


## THE GORBUSCHA OR HUMP-BACKED SALMON.

Oncorhynchus gorbuscha (Walb.), Gill & Jordan. (p. 470.)

Drawing by H. L. Todd, from No. 27743, U. S. National Museum, collected at Cook's Inlet, July 6, 1880, by Dr. T. H. Bean.

PLATE 189 *A*.

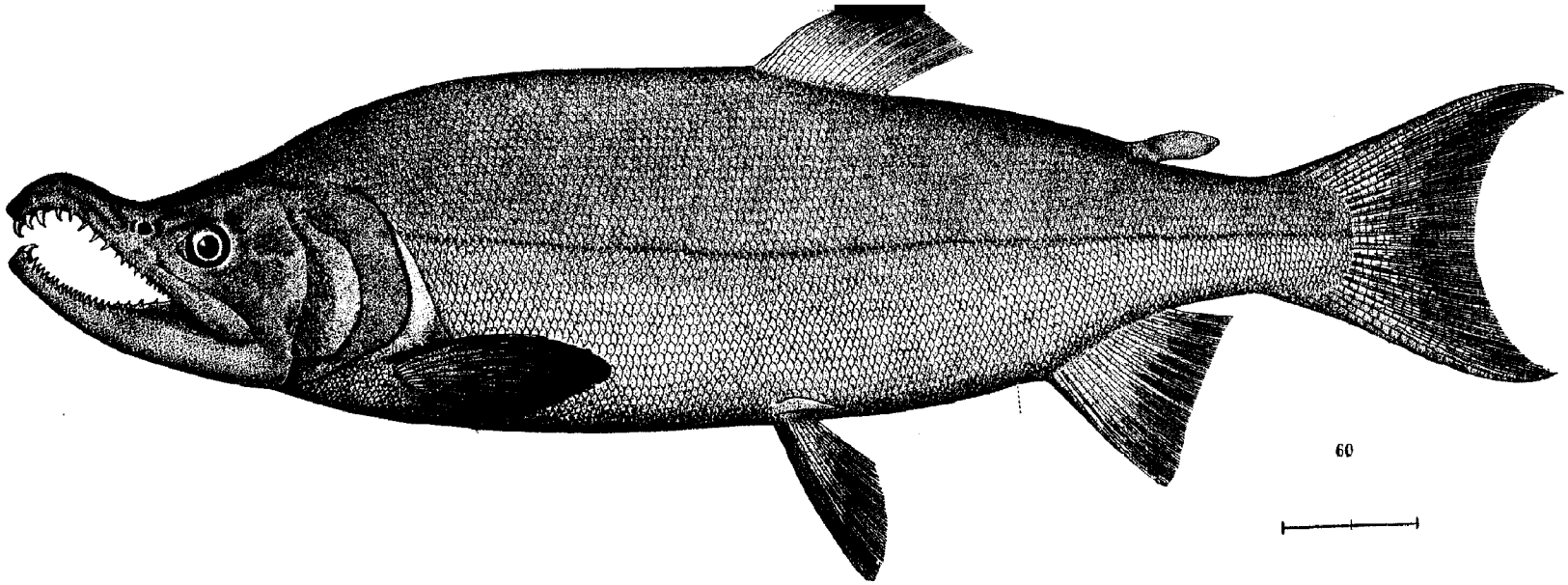


## THE KISUTCH OR SILVER SALMON.

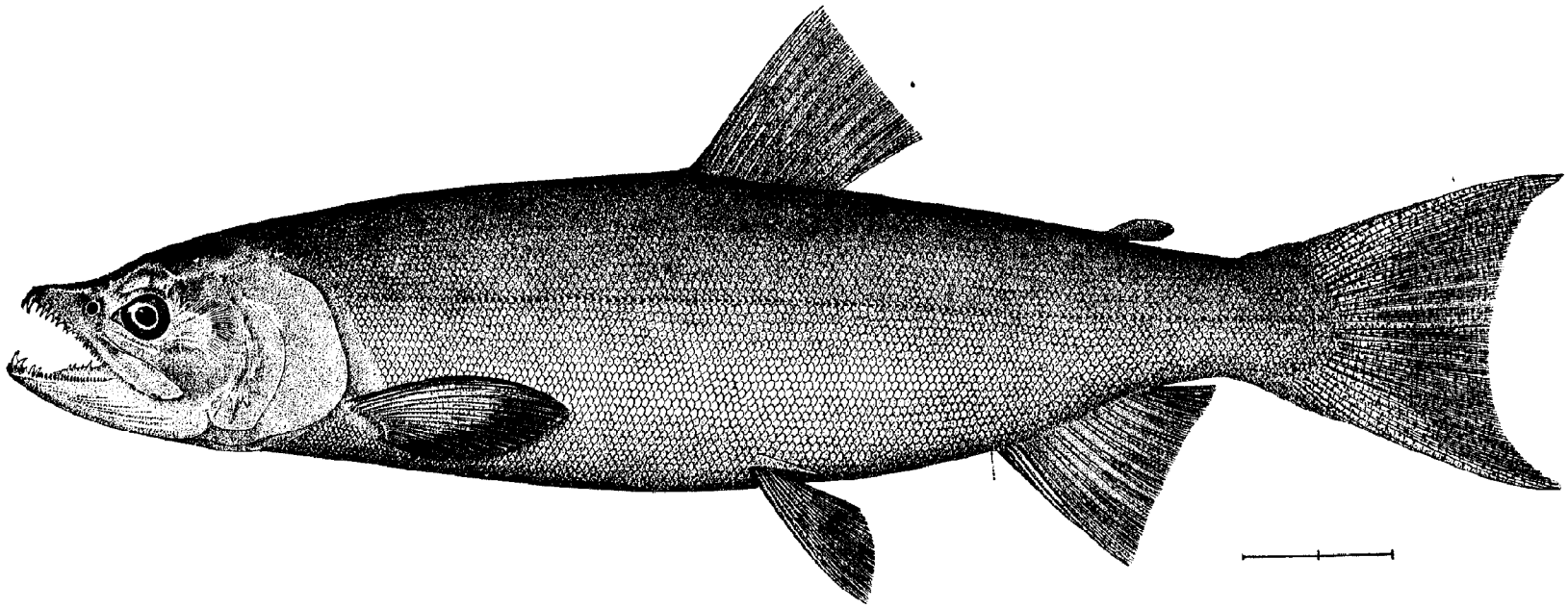
Oncorhynchus kisutch (Walb.), J. & G. (p. 477.)

Drawing by H. L. Todd, from No. 27712, U. S. National Museum, collected at Iliuliuk, Unalashka, October 12, 1880, by Dr. T. H. Bean.

PLATE 189 *b*.



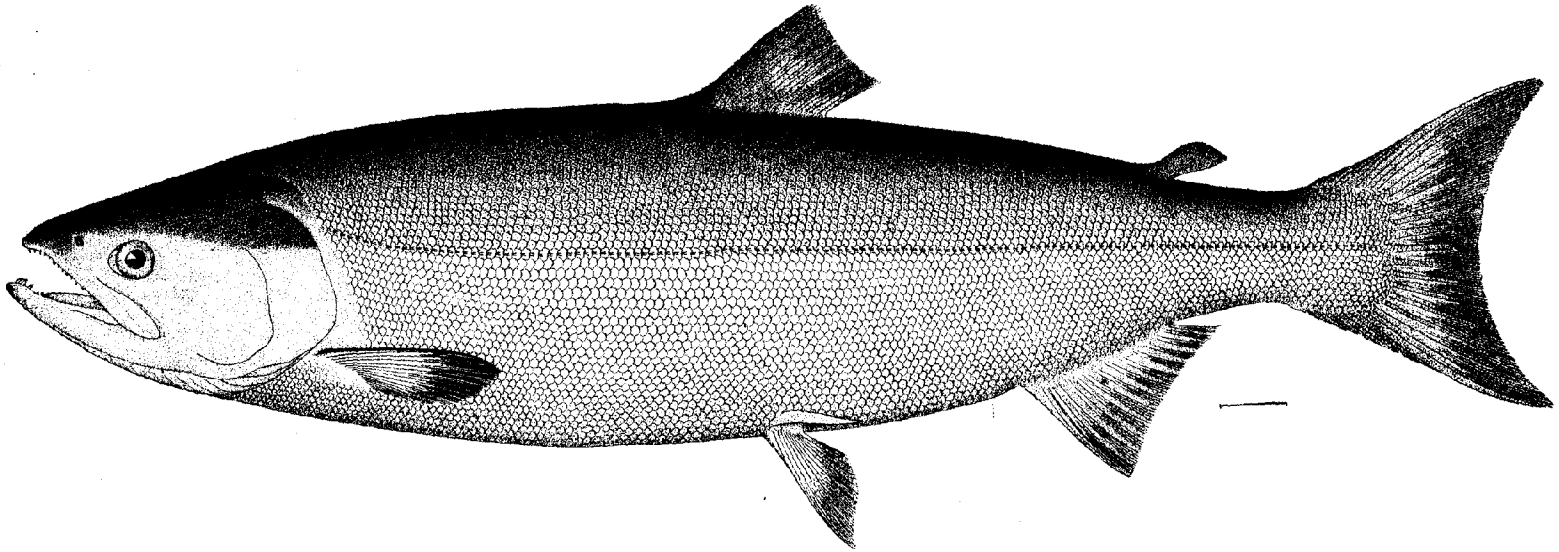

(Hooked-jawed male.) Drawing by H. L. Todd, from specimen in U. S. National Museum, collected by Capt. C. Bendire, U. S. N., in the Wallowa River, Idaho.



(Female.) Drawing by H. L. Todd, from specimen in U. S. National Museum, collected by Capt. C. Bendire, U. S. N., in the Wallowa River, Idaho.

## THE KRASNAYA RYBA, RED-FISH OF IDAHO, OR BLUE BACK SALMON.

Oncorhynchus nerka (Walb.), Gill & Jordan. (p. 477.)

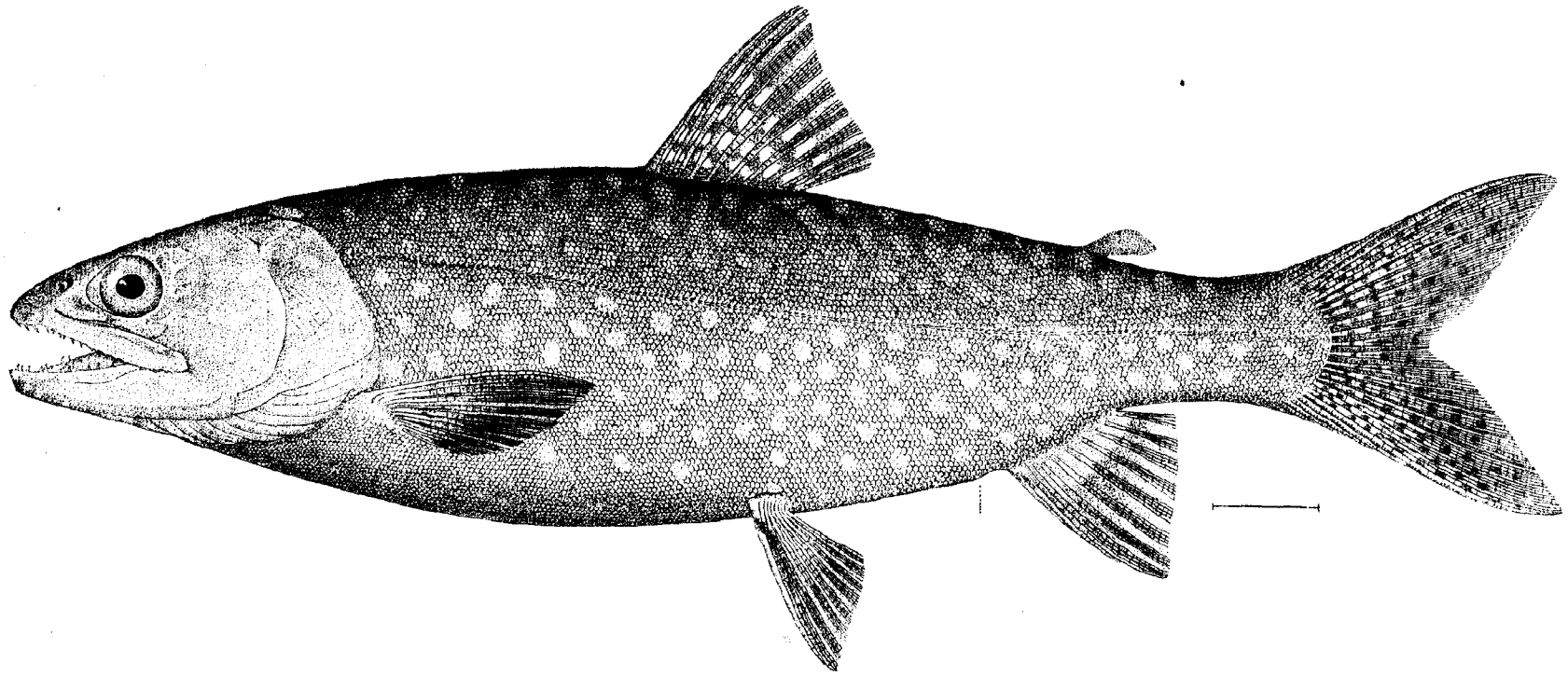


## THE KRASNAYA RYBA OR BLUE BACK SALMON.

Oncorhynchus nerka (Walb.), J. & G.

Drawing by H. L. Todd, from fresh run male sent to U. S. National Museum from the Columbia River, April, 1884, by A. Booth, esq.

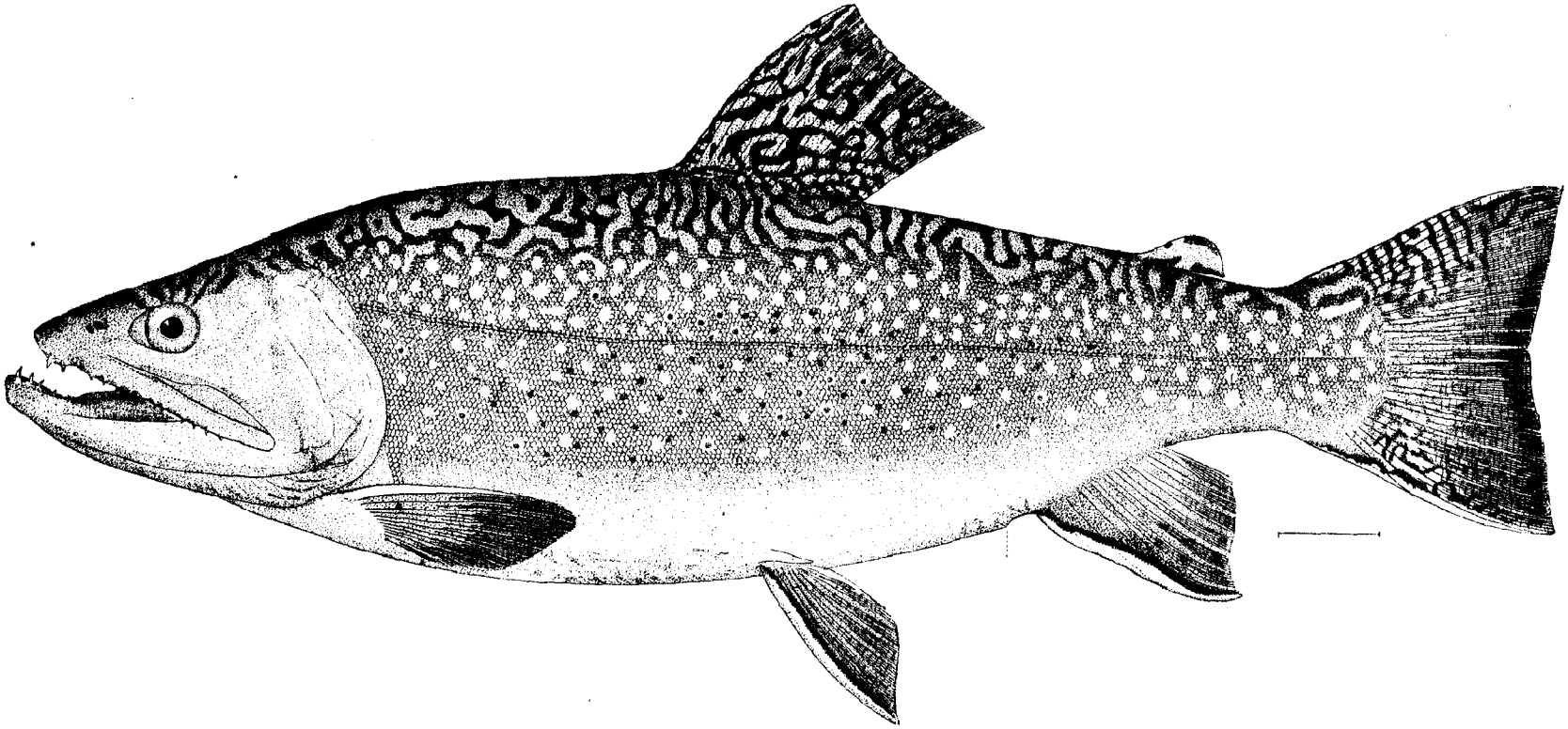
PLATE 191 A.



## THE NAMAYCUSH OR LAKE TROUT.

Salvelinus namaycush (Walb.), Goode. (p. 185.)

Drawing by H. L. Todd, from No. 17012, U. S. National Museum, collected at Raquette Lake, New York, February 23, 1877, by Verplanck Colvin.

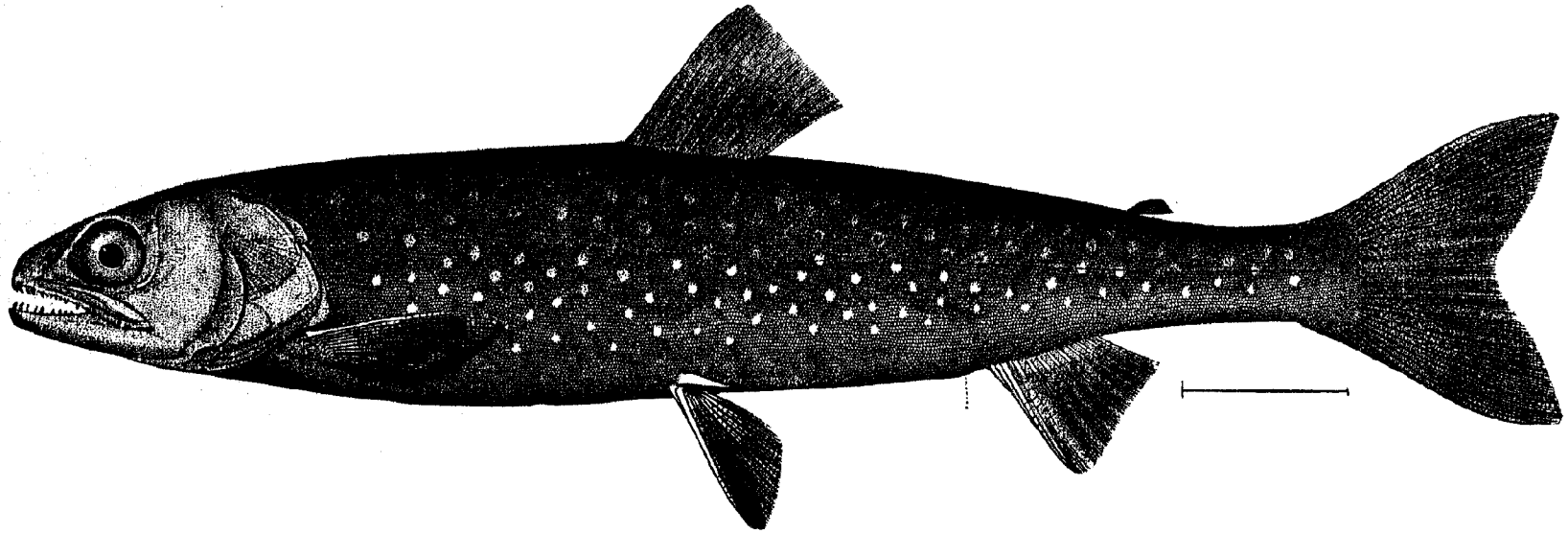


## THE SPECKLED TROUT.

Salvelinus fontinalis (Mitch.), Gill & Jordan. (p. 497.)

Drawing by H. L. Todd, from No. 28651, U. S. National Museum, obtained in New York Market, July, 1881, by E. G. Blackford.

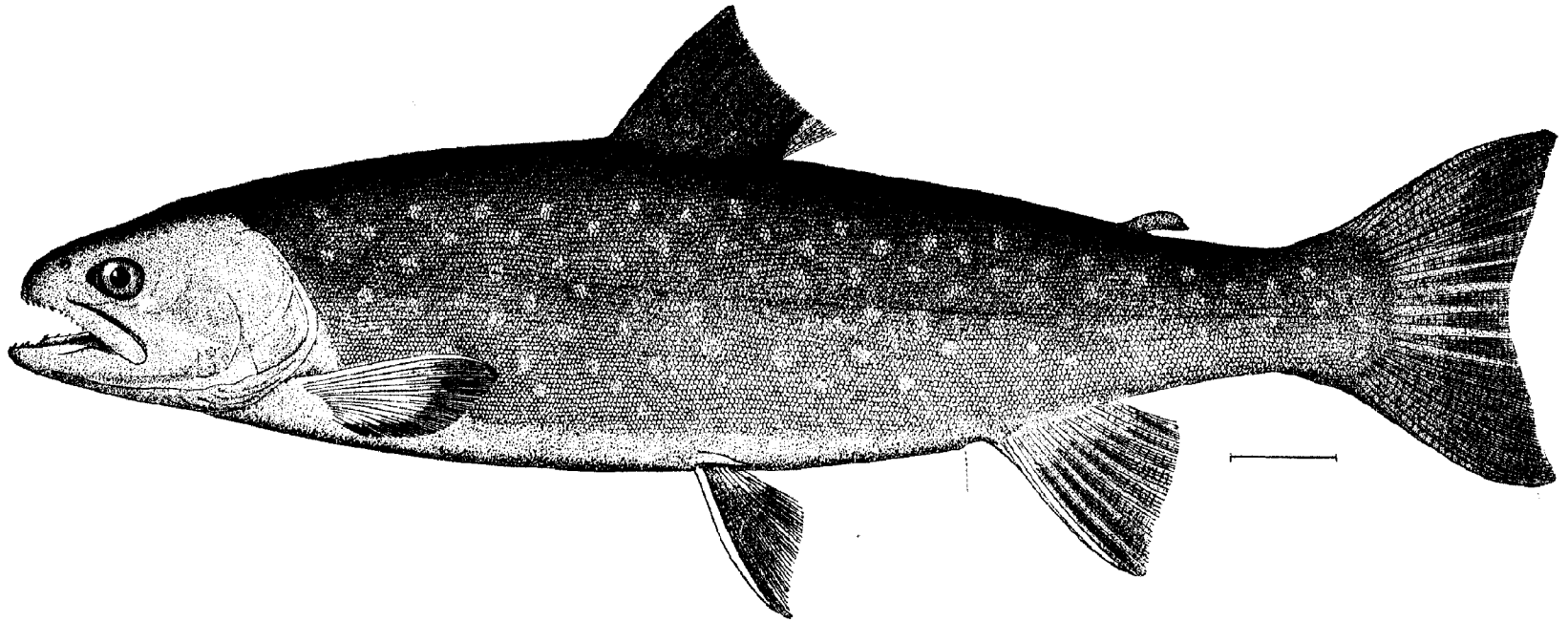
PLATE 192.



## THE OQUASSA TROUT.

**Salvelinus oquassa (Grd.), Gill & Jordan.** (p. 503.)

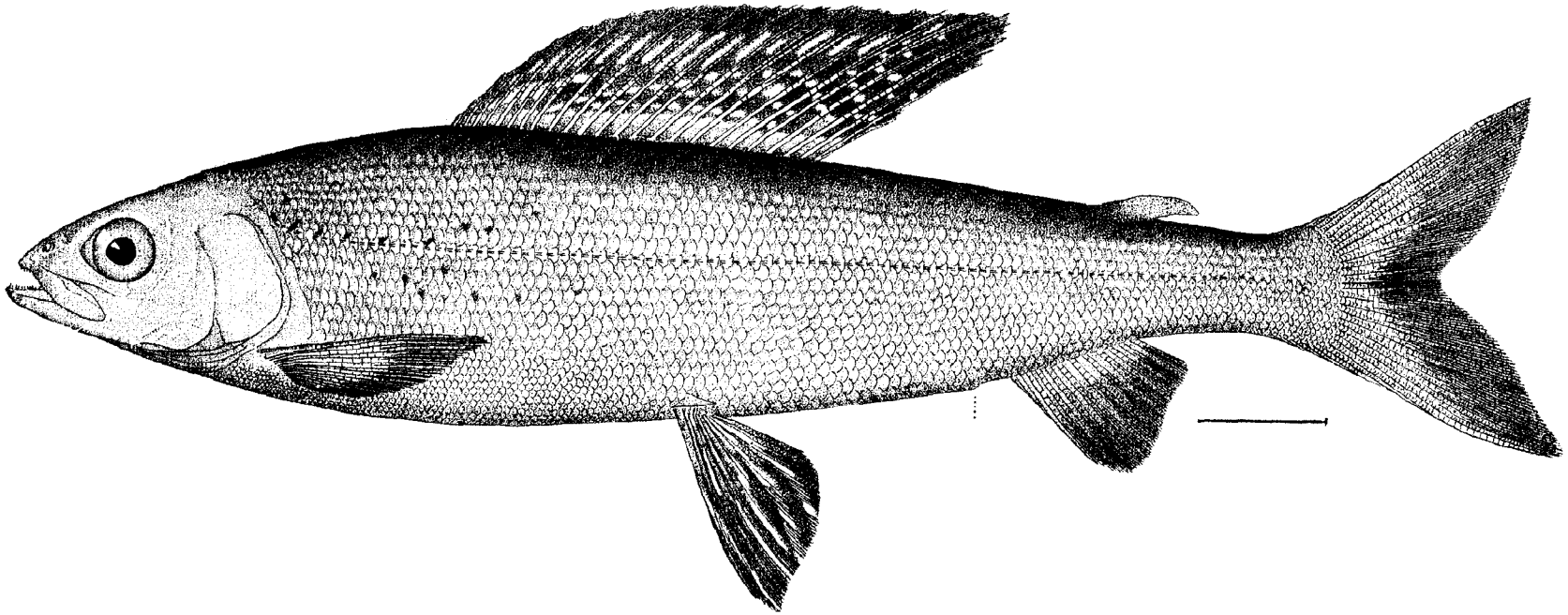
Drawing by H. L. Todd, from No. 20688, U. S. National Museum, collected at Oquassoc Lake, New York, November 9, 1877, by E. G. Blackford.



## THE MALMA OR DOLLY VARDEN TROUT.

**Salvelinus malma (Walb.), J. & G.** (p. 504.)

Drawing by H. L. Todd, from No. 27740, U. S. National Museum, collected at Port Chatham, Cook's Inlet, Alaska, 1880, by Dr. T. H. Bean.

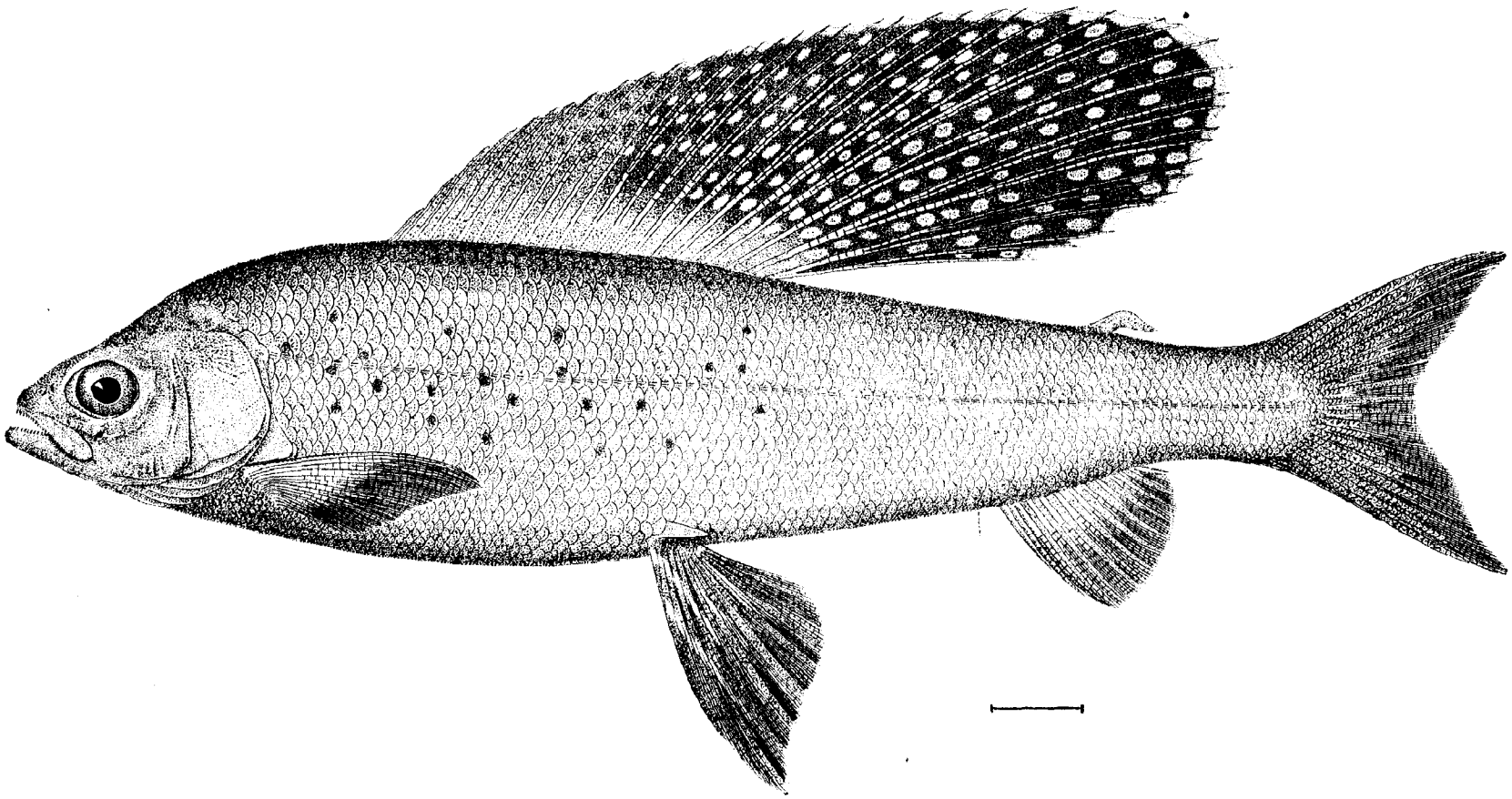


## THE GRAYLING.

Thymallus tricolor, Cope. (p. 505.)

Drawing by H. L. Todd, from No. 11115, U. S. National Museum, obtained from Au Sable River, Michigan, by J. W. Milner.

PLATE 194.

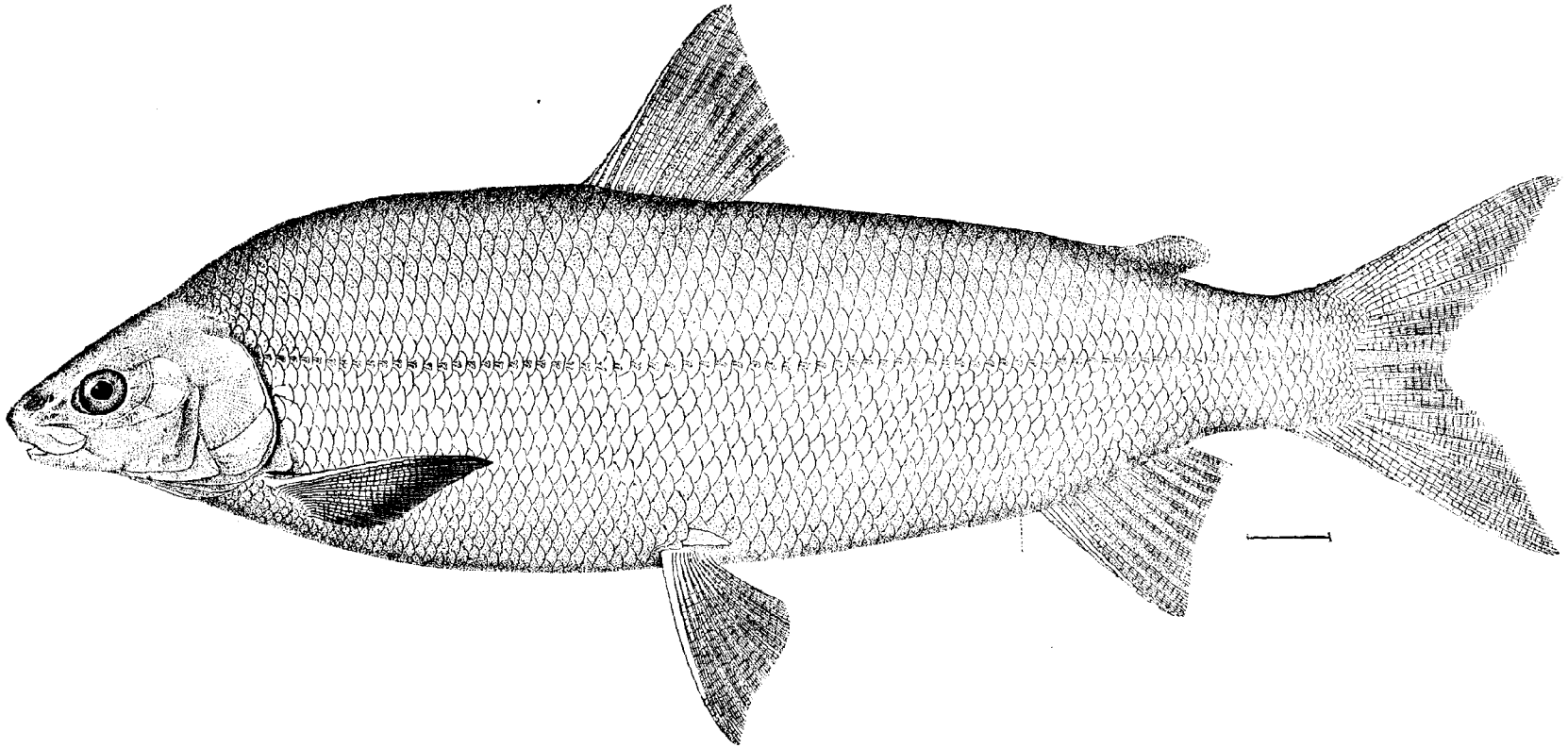


## THE ALASKA GRAYLING.

Thymallus signifer, Richardson. (p. 505.)

Drawing by H. L. Todd, from No. 3373, U. S. National Museum, collected at Port Simpson, June, 1860, by B. R. Ross.

PLATE 195.

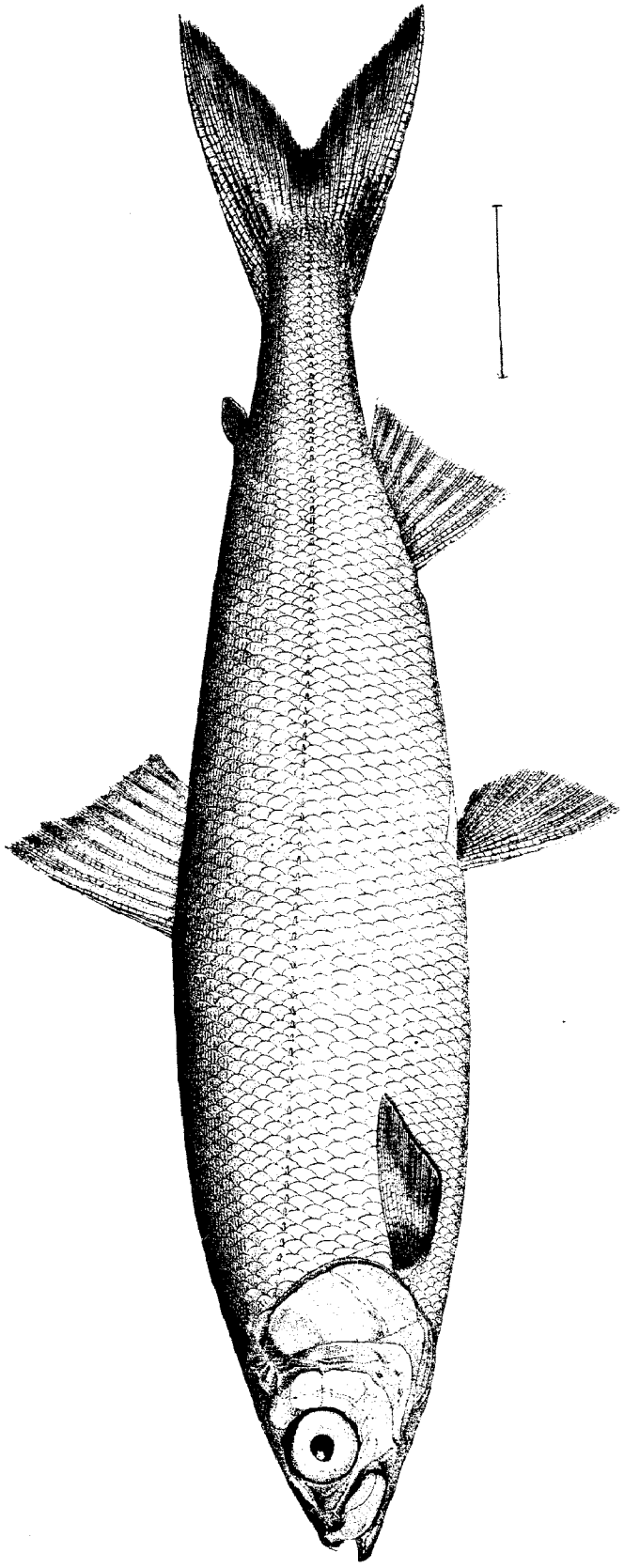


## THE WHITEFISH.

Coregonus clupeiformis (Mitch.), Milner. (p. 507.)

Drawing by H. L. Todd, from No. 10300, U. S. National Museum, collected at Ecorse, Mich., by George Clark.

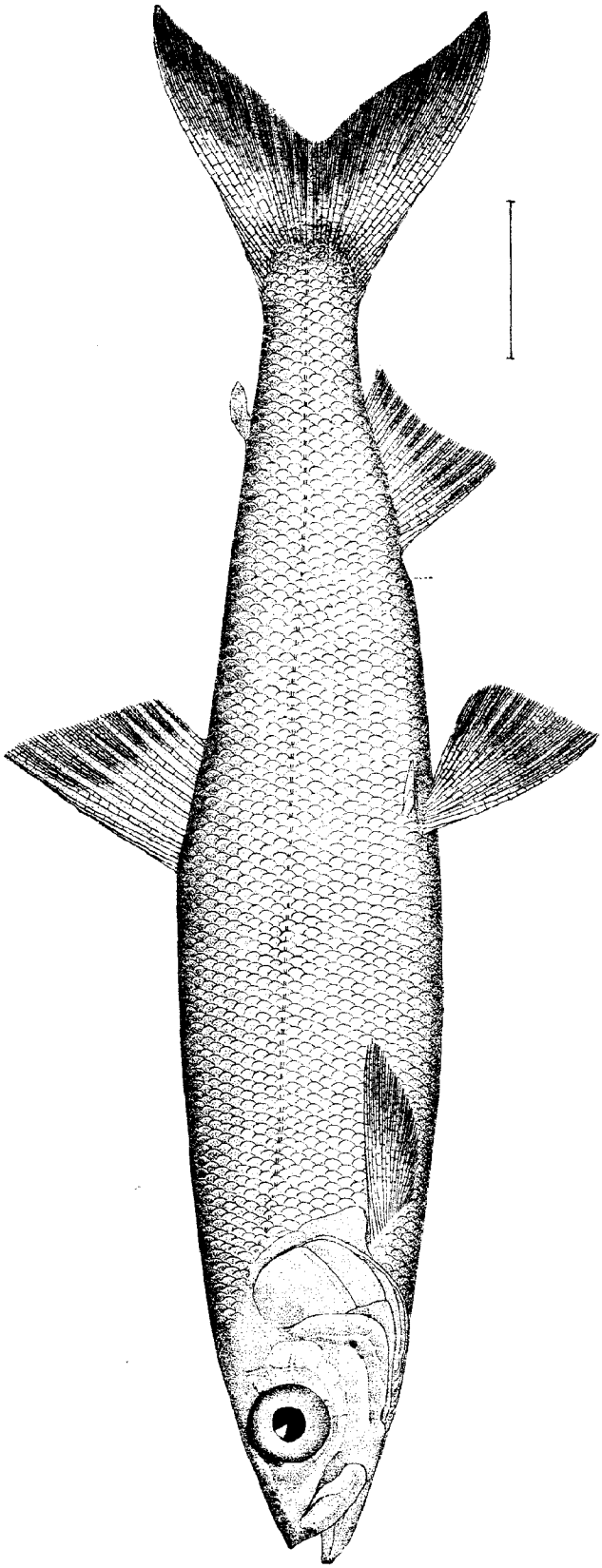
PLATE 196.



## THE CISCO OR LAKE HERRING.

Coregonus Artedi, Lesueur.

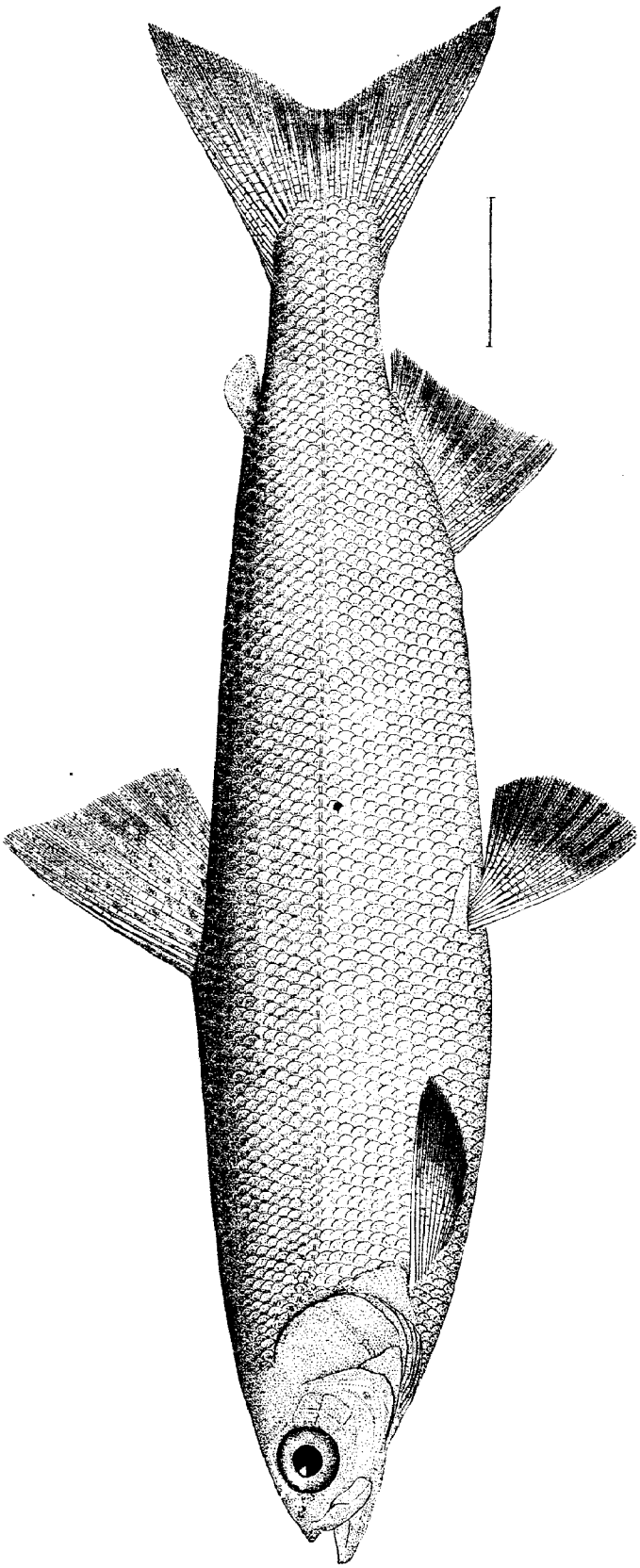
Drawing by H. L. Todd, from No. 33958, U. S. National Museum, collected at Northfield Bay, Wisconsin, by J. W. Milner.



## THE MOON-EYE OR CISCO OF LAKE MICHIGAN.

Coregonus Hoyi (Gill.), Jordan.

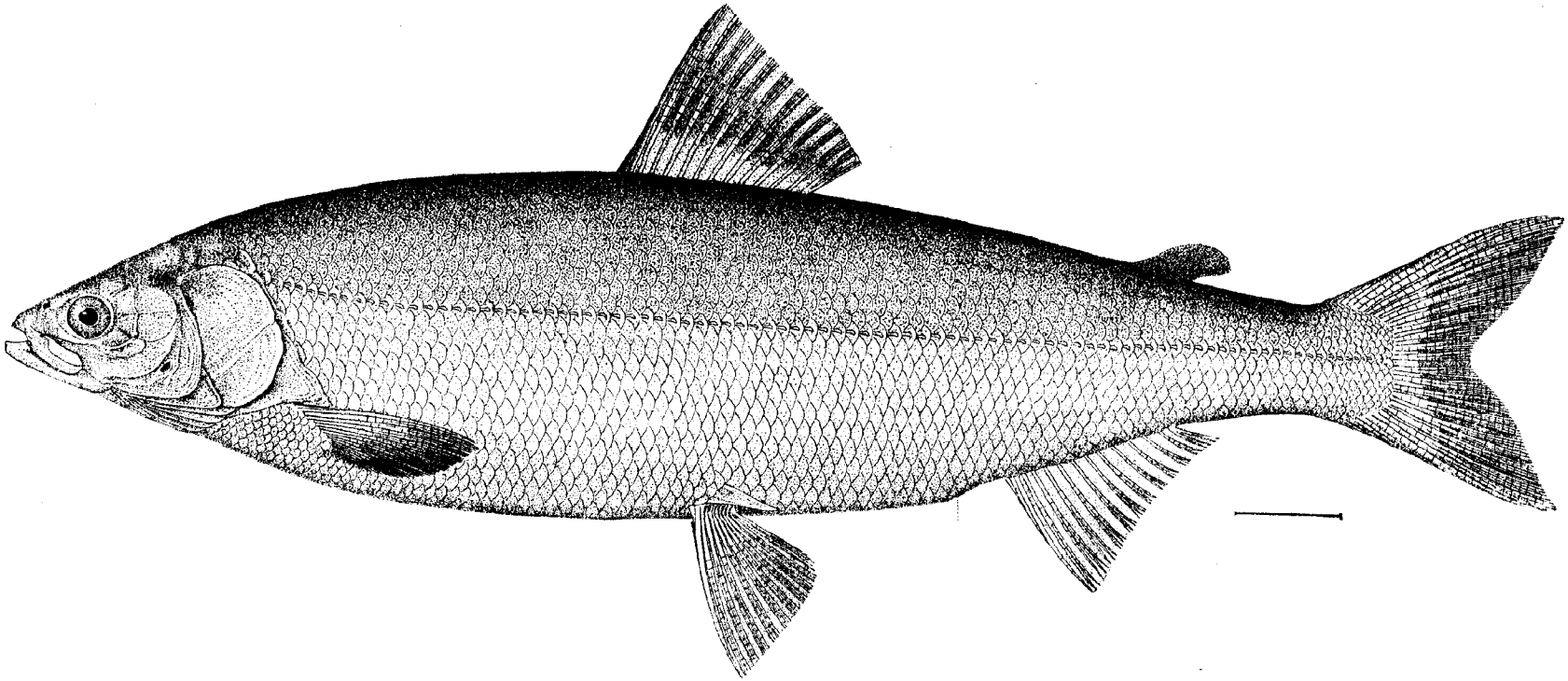
Drawing by H. L. Todd, from No. 32162, U. S. National Museum, collected at Seneca Lake, New York, June, 1878, by Prof. H. L. Smith.



## THE ALASKA WHITEFISH.

Coregonus Merki, Gthr. (p. 542.)

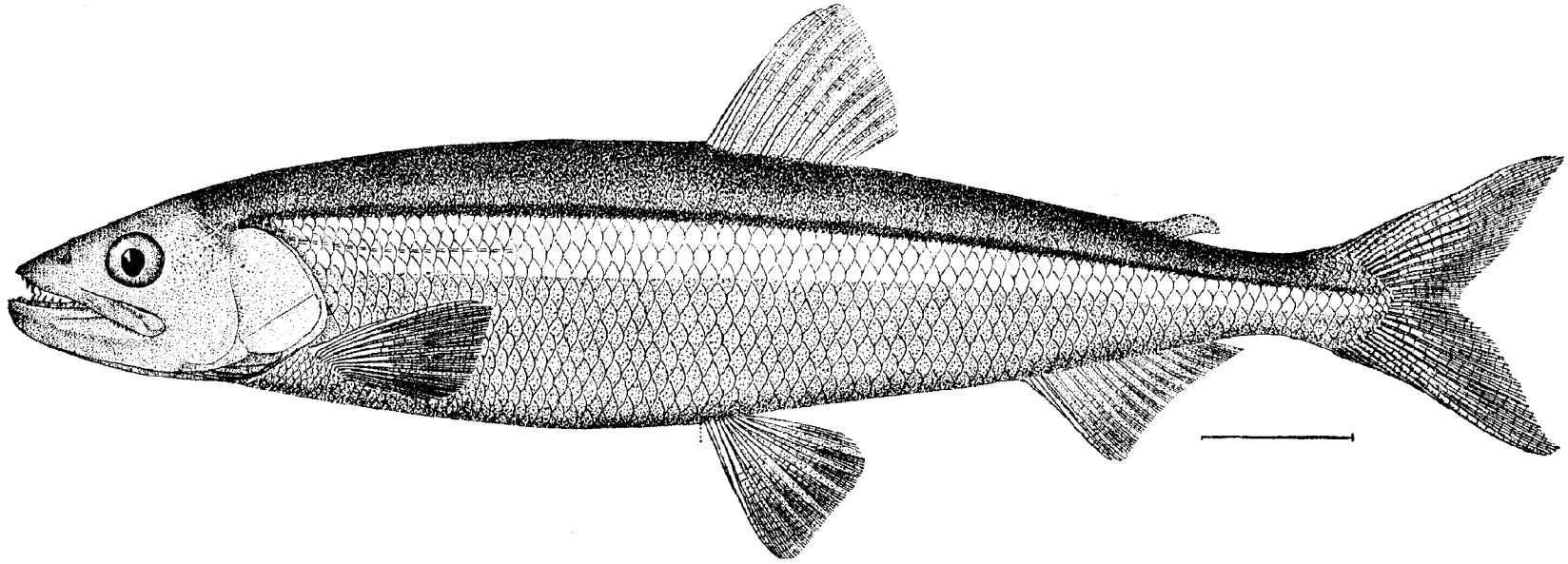
Drawing by H. L. Todd, from No. 27698, U. S. National Museum, collected at Alaska, 1880, by U. S. Steamer Corwin.



## THE LAURETTA WHITEFISH.

Coregonus Laurettæ, Bean. (p. 542.)

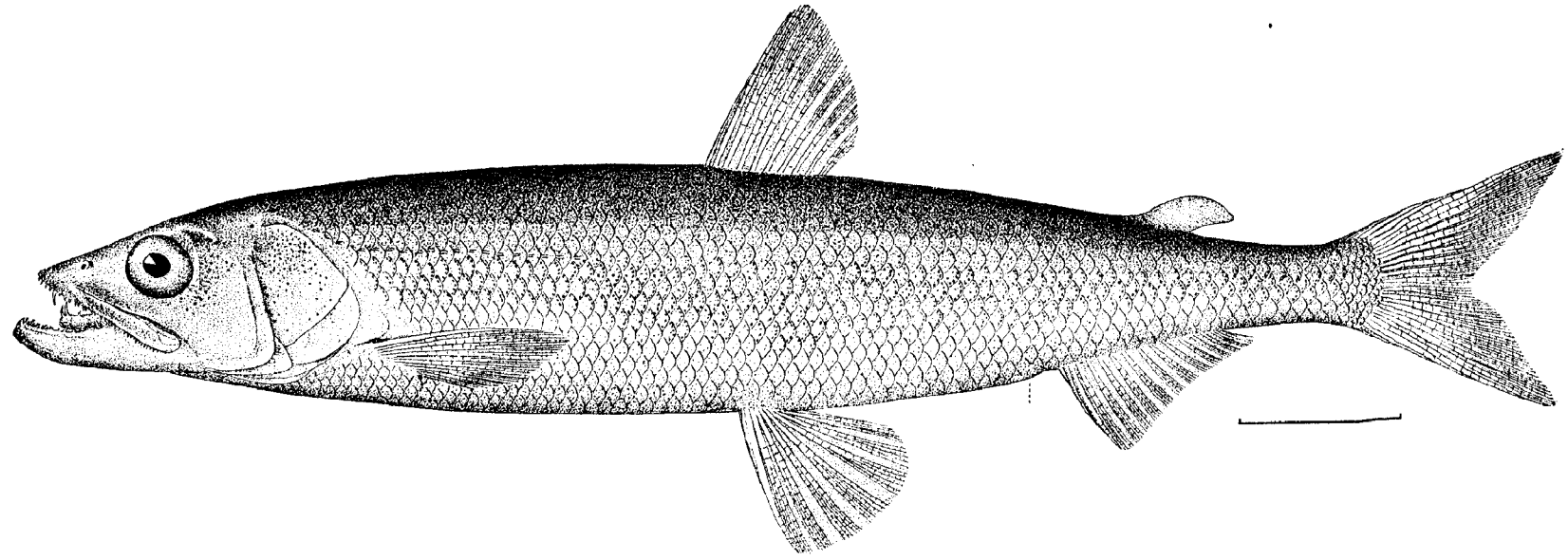
Drawing by H. L. Todd, from No. 27695, U. S. National Museum, collected at Point Barrow, Alaska, July, 1880, by U. S. Steamer Corwin.



## THE EASTERN SMELT.

Osmerus mordax (Mitch.), Gill. (p. 543.)

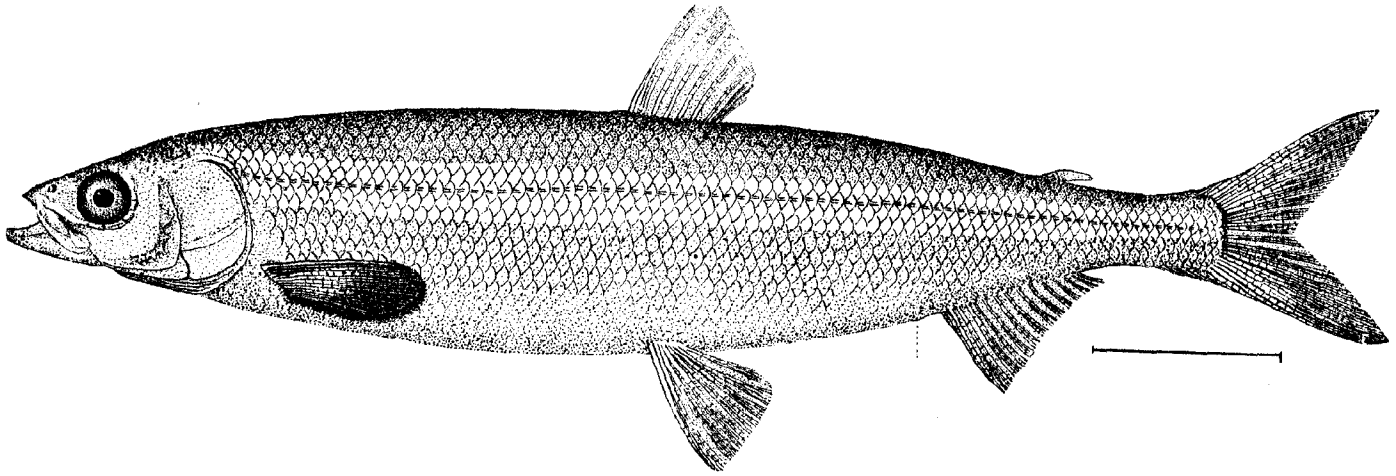
Drawing by H. L. Todd, from No. 21435, U. S. National Museum, collected at Wood's Holl, Mass., 1878, by Vinal N. Edwards.



## THE ALASKA SMELT.

Osmerus dentex, Steindachner. (p. 544.)

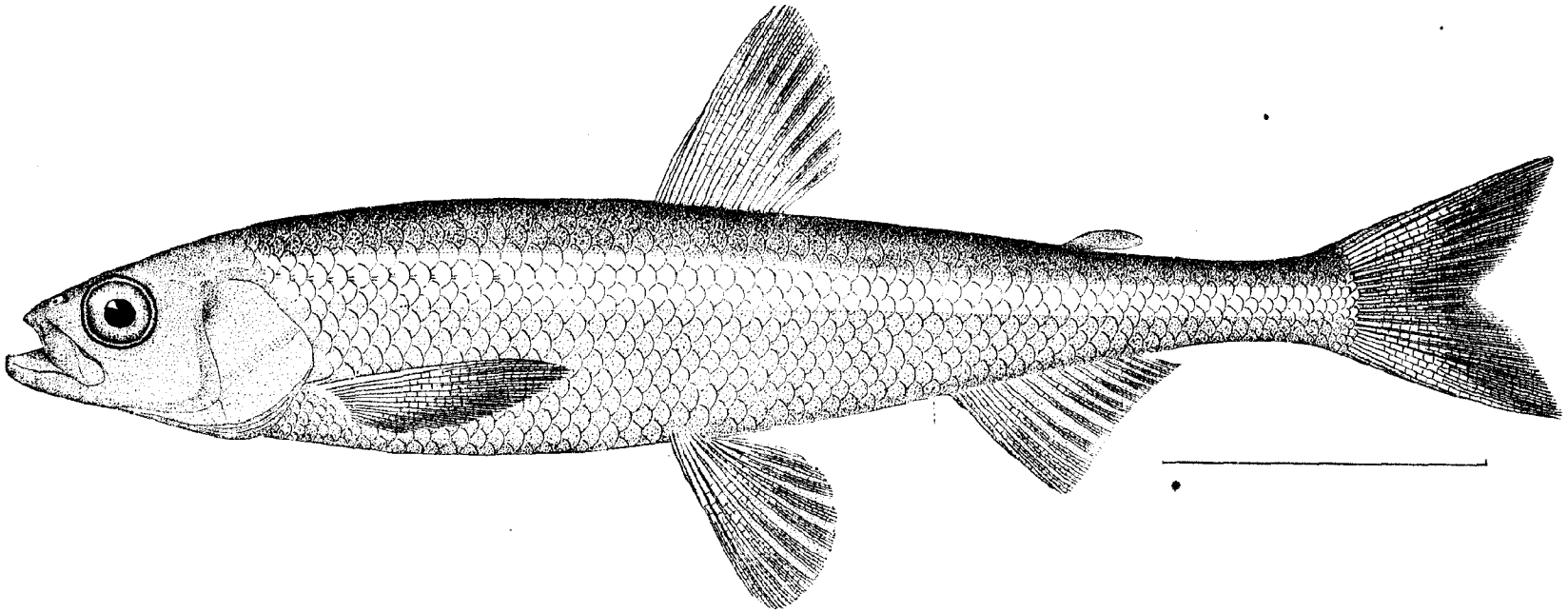
Drawing by H. L. Todd, from No. 27914, U. S. National Museum, collected at Port Clarence, Alaska, 1880, by Dr. T. H. Bean.



## THE CALIFORNIA SURF SMELT.

Hypomesus pretiosus (Grd.), Gill. (p. 544.)

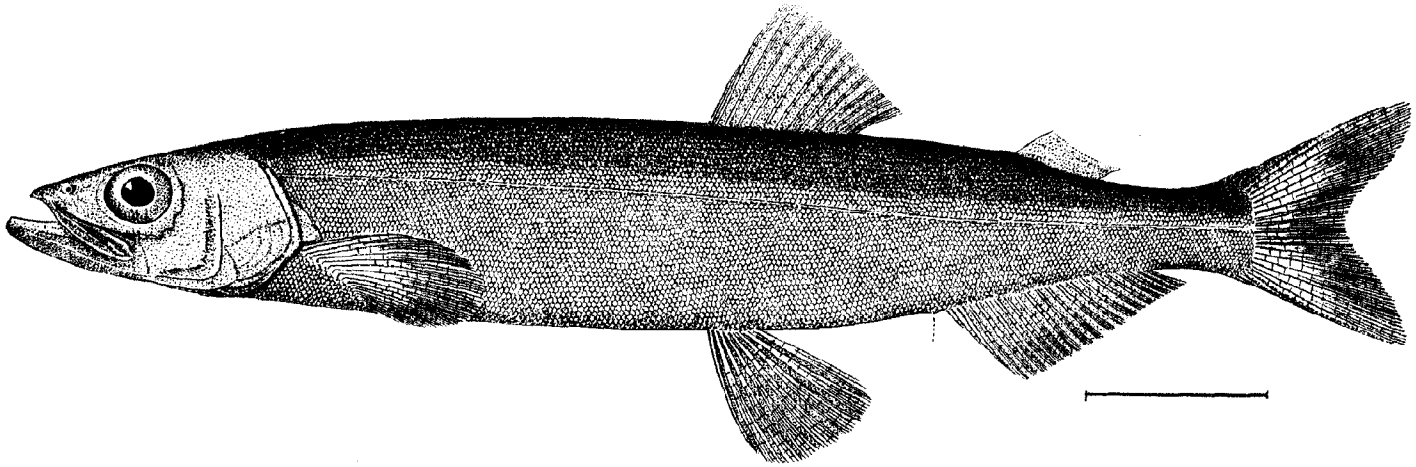
Drawing by H. L. Todd, from No. 27995, U. S. National Museum, collected at Yakutat Bay, 1880, by Dr. T. H. Bean.



## THE ALASKA SURF SMELT.

Hypomesus olidus (Pallas), Gthr.

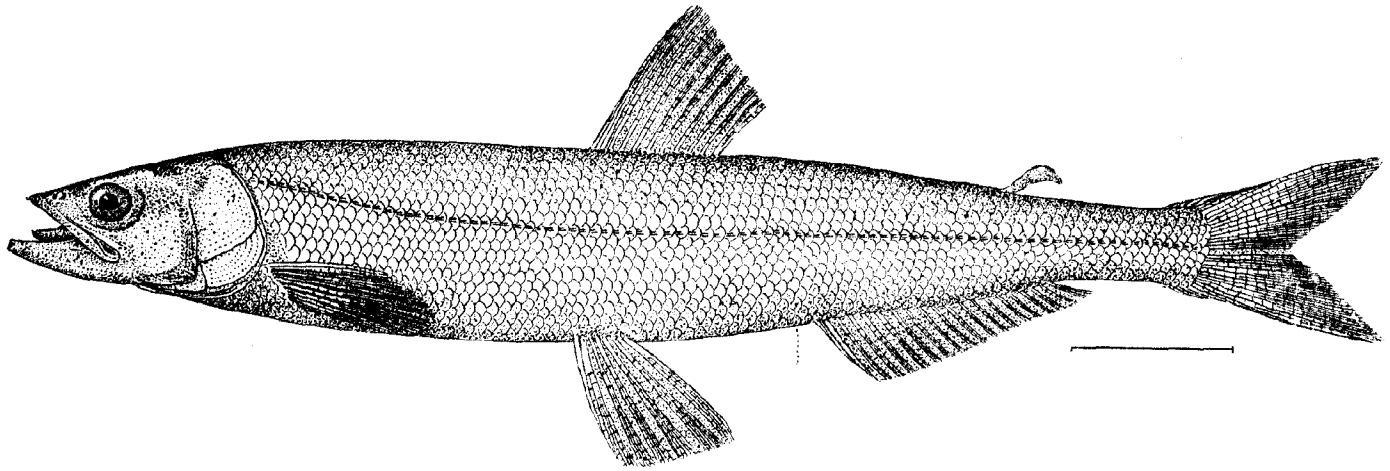
Drawing by H. L. Todd, from No. 23973, U. S. National Museum, collected at Saint Michael's, Alaska, May 20, 1877, by L. M. Turner.



## THE CAPELIN.

Mallotus villosus (Müller), Cuv. (p. 544.)

Drawing by H. L. Todd, from No. 3418, U. S. National Museum, collected at Grosswater Bay, by Dr. E. Coues.

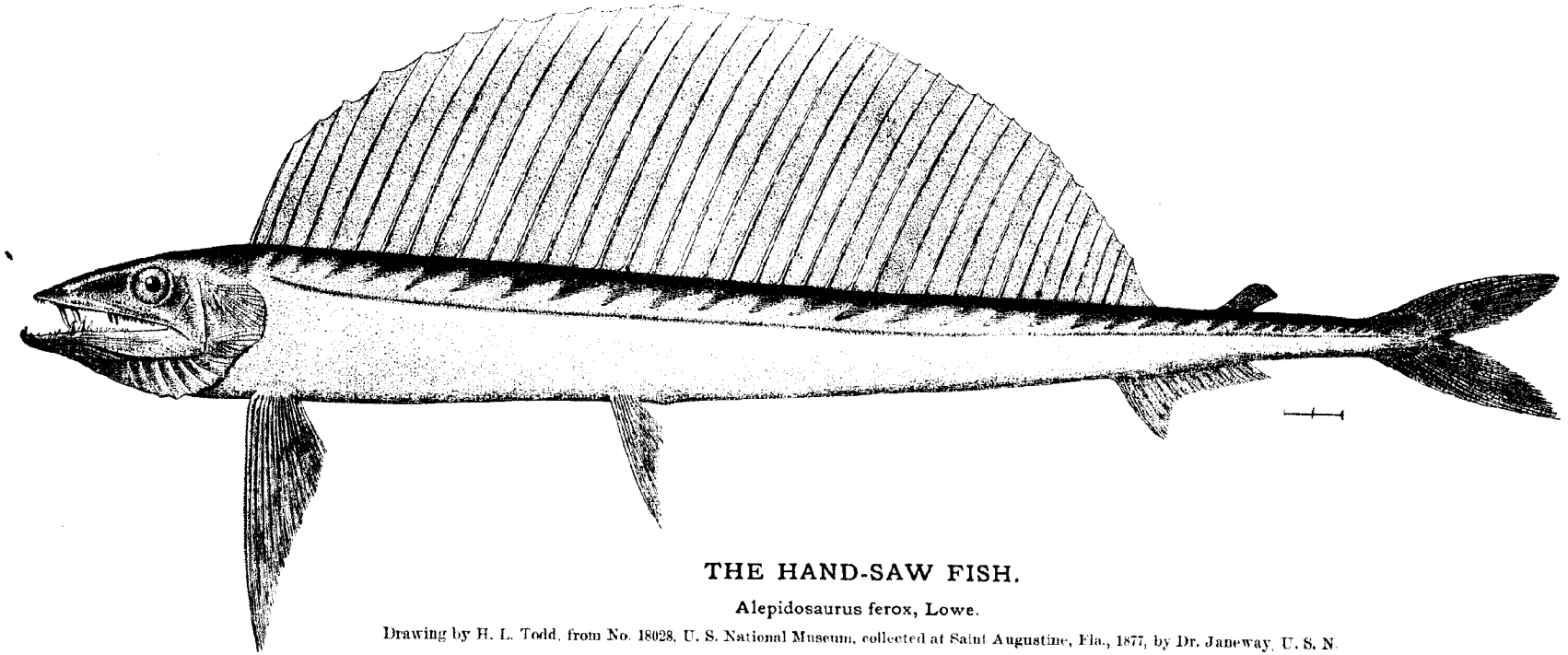


## THE EULACHON.

Thaleichthys pacificus (Rich.), Girard. (p. 547.)

Drawing by H. L. Todd, from No. 28001, U. S. National Museum, collected at Chilkat River, Alaska, June, 1880, by Marcus Baker.

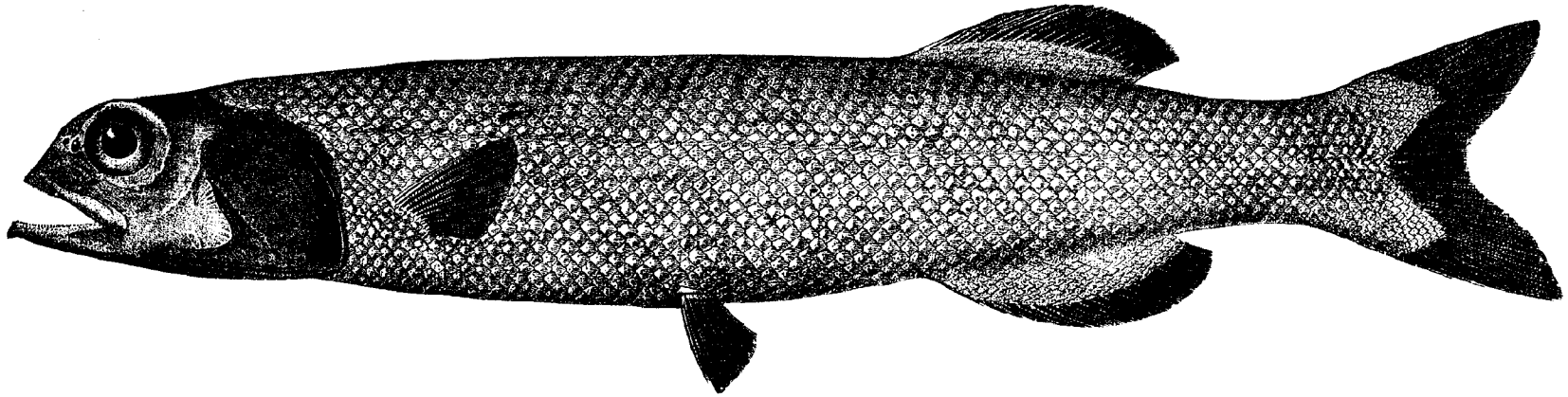
PLATE 201.



## THE HAND-SAW FISH.

Alepidosaurus ferox, Lowe.

Drawing by H. L. Todd, from No. 18028, U. S. National Museum, collected at Saint Augustine, Fla., 1877, by Dr. Janeway, U. S. N.

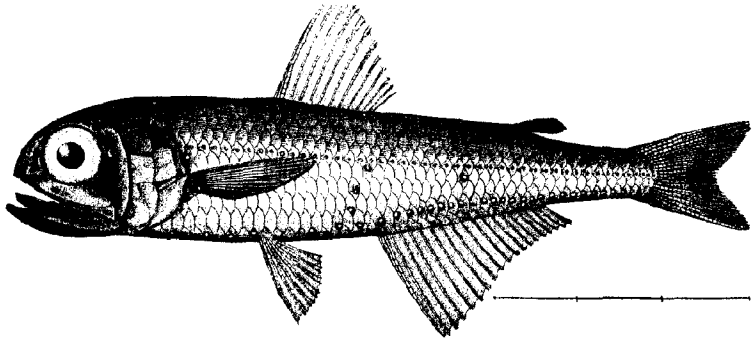


## BAIRD'S ALEPOCEPHALUS.

Alepocephalus Bairdii, Goode & Bean.

Drawing by H. L. Todd, from No. 22468, U. S. National Museum, collected on Grand Bank, by Christian Johnson, of the schooner William Thompson.

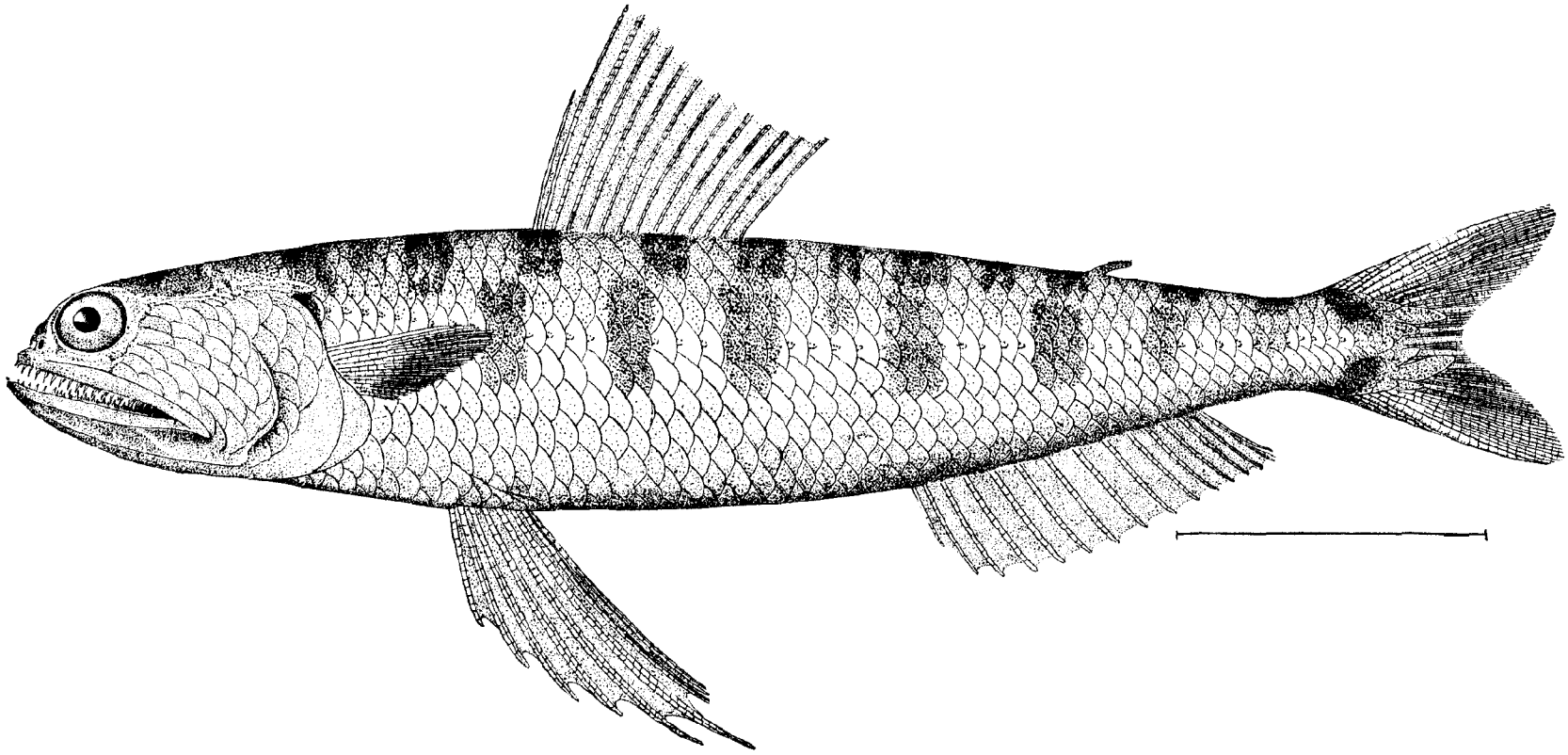
PLATE 202.



## MÜLLER'S SCOPELUS.

Scopelus Mülleri (Gmel.), Collett.

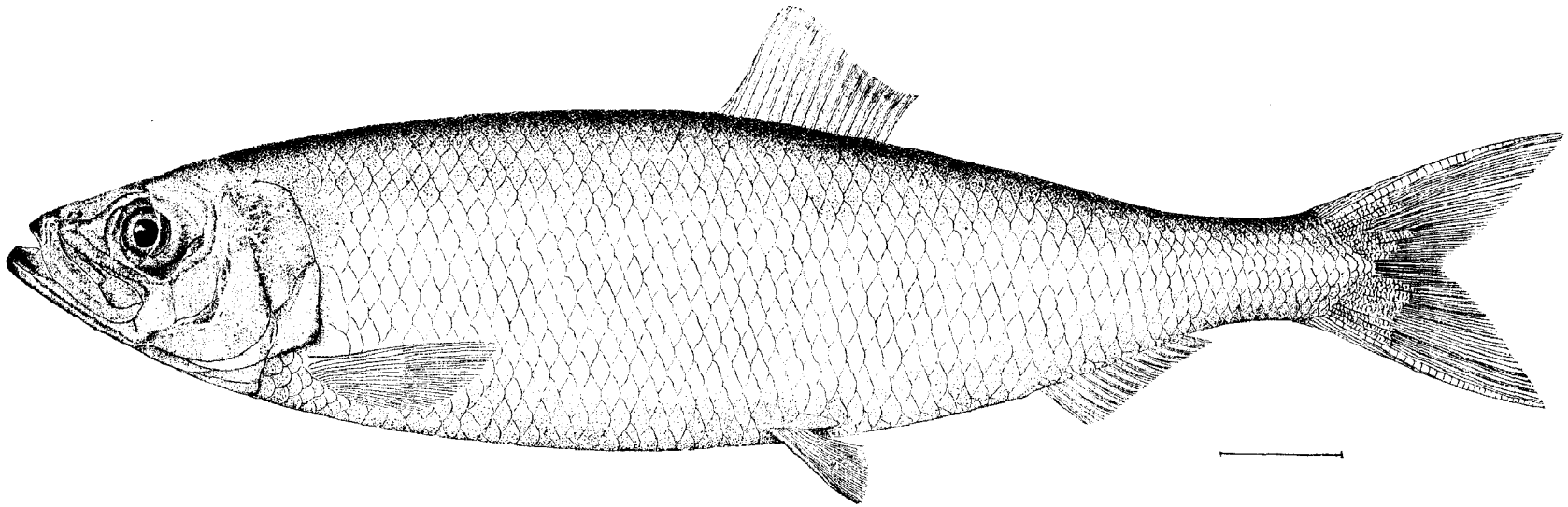
Drawing by H. L. Todd, from No. 20943, U. S. National Museum, collected by F. Mather.



## THE SNAKE-FISH.

Trachinocephalus myops (Forster), Gill.

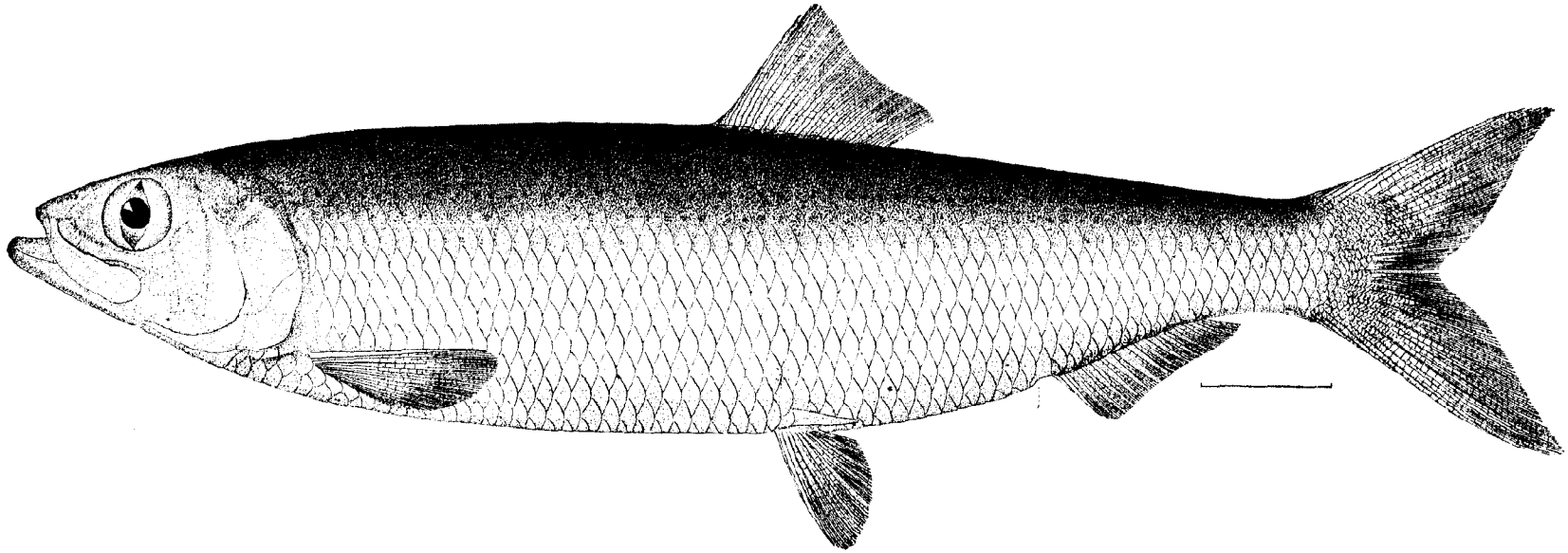
Drawing by H. L. Todd, from No. 16951, U. S. National Museum, collected at Wood's Holl, Mass., 1876, by Vinal N. Edwards.



## THE HERRING.

Clupea harengus L. (p. 549.)

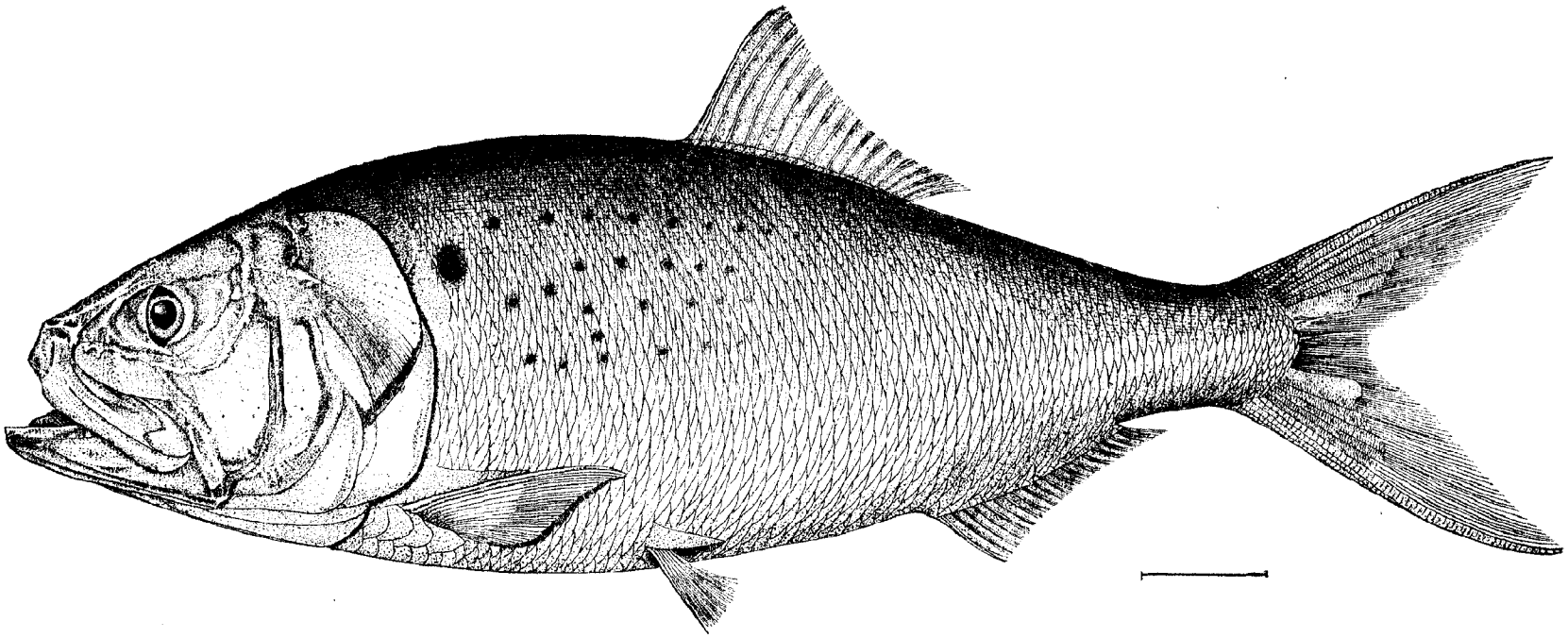
Drawing by H. L. Todd, from No. 16667, U. S. National Museum, collected in Washington Market, District of Columbia, June, 1875, by J. H. Richards.



## THE CALIFORNIA HERRING.

Clupea mirabilis, Girard. (p. 568.)

Drawing by H. L. Todd, from No. 24865, U. S. National Museum, collected at San Diego, Cal., January, 1880, by Jordan & Gilbert.

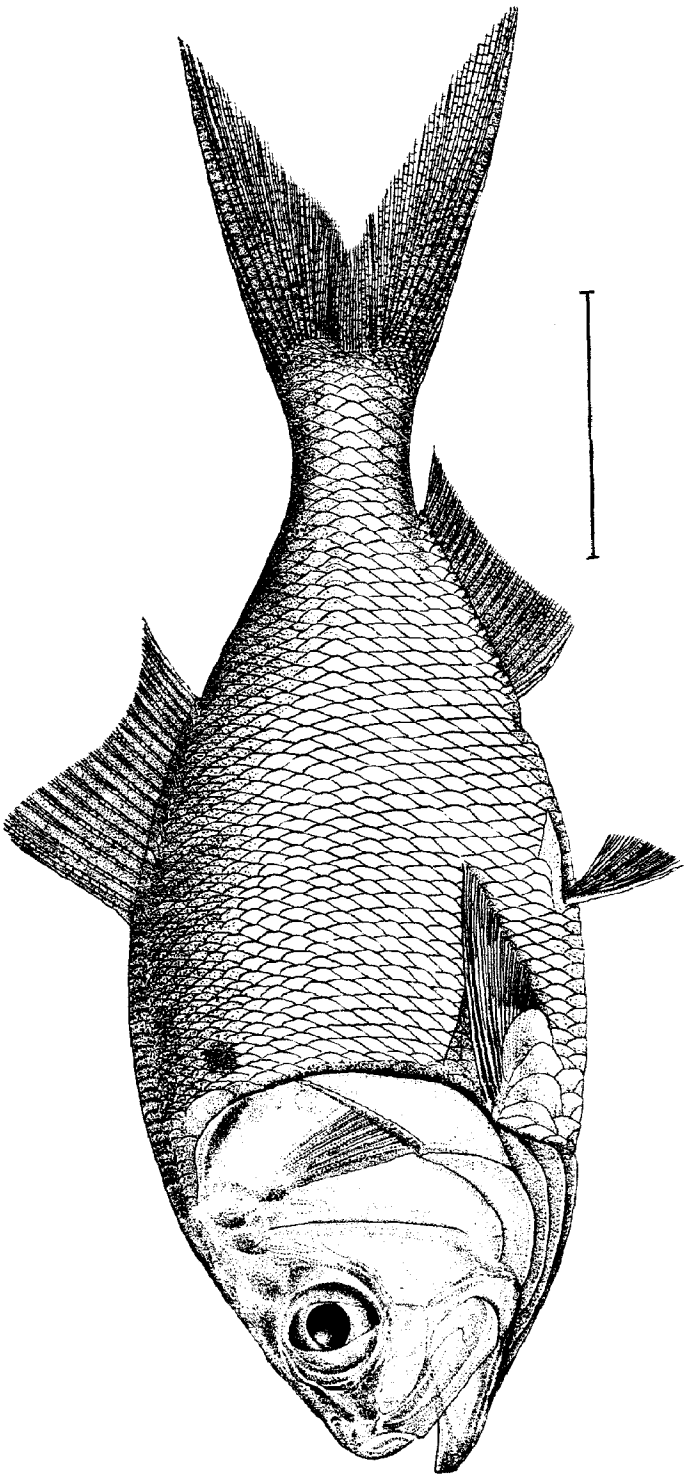


## THE MENHADEN OR MOSSBUNKER.

Brevoortia tyrannus (Latrobe), Goode. (p. 569.)

Drawing by H. L. Todd, from No. 20666, U. S. National Museum, collected at Wood's Holl, Mass., October 18, 1877, by Vinal N. Edwards.

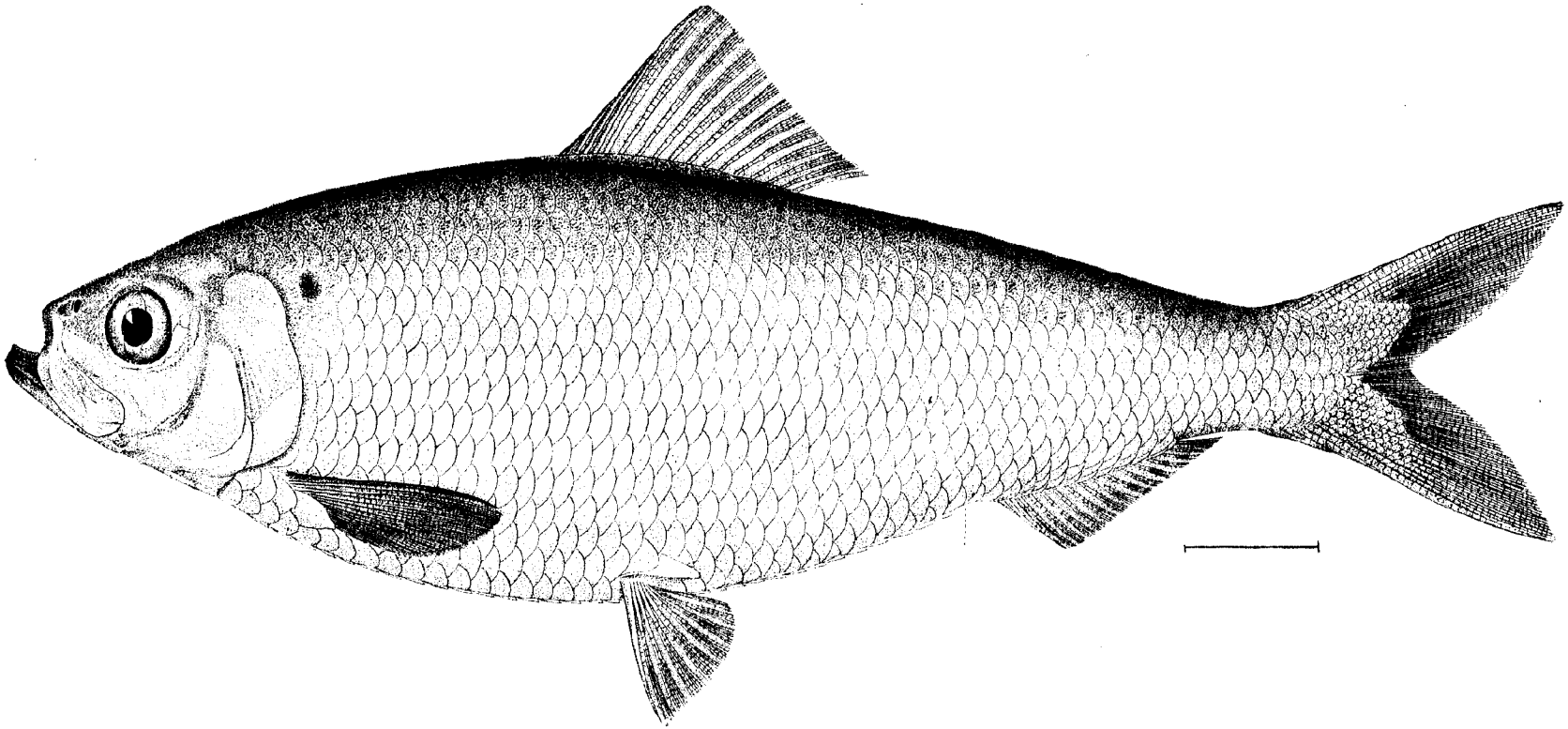
PLATE 205.



## THE GULF MENHADEN.

Brevoortia patronus, Goode. (p. 575.)

Drawing by H. L. Todd, from No. 892 A, U. S. National Museum, collected at Brazos Santiago, Tex., by General Van Vleet.

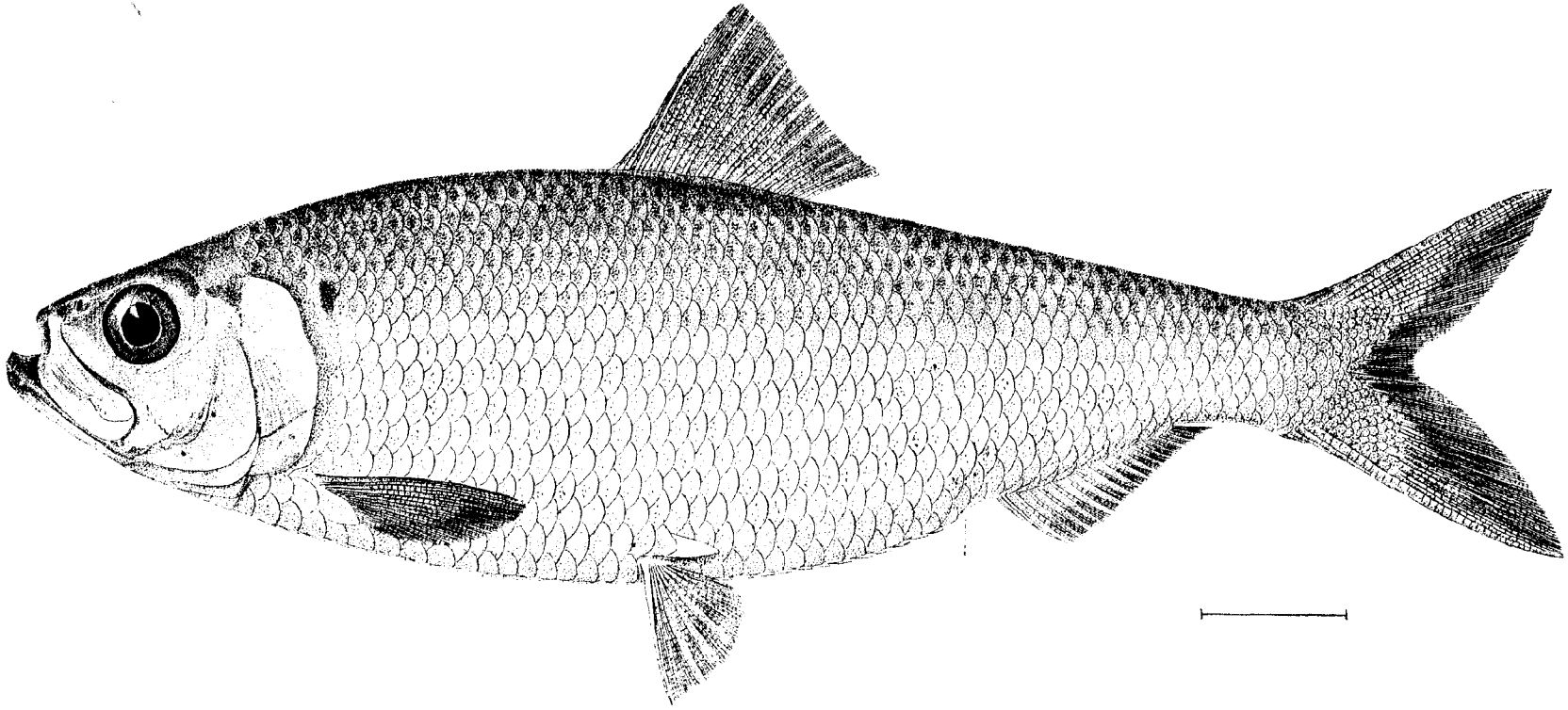


THE BRANCH HERRING. (Female.)

Clupea vernalis, Mitchill. (p. 579.)

Drawing by H. L. Todd, from No. 27197, U. S. National Museum, obtained from Potomac River, March 29, 1880, by U. S. Fish Commission.

PLATE 207.

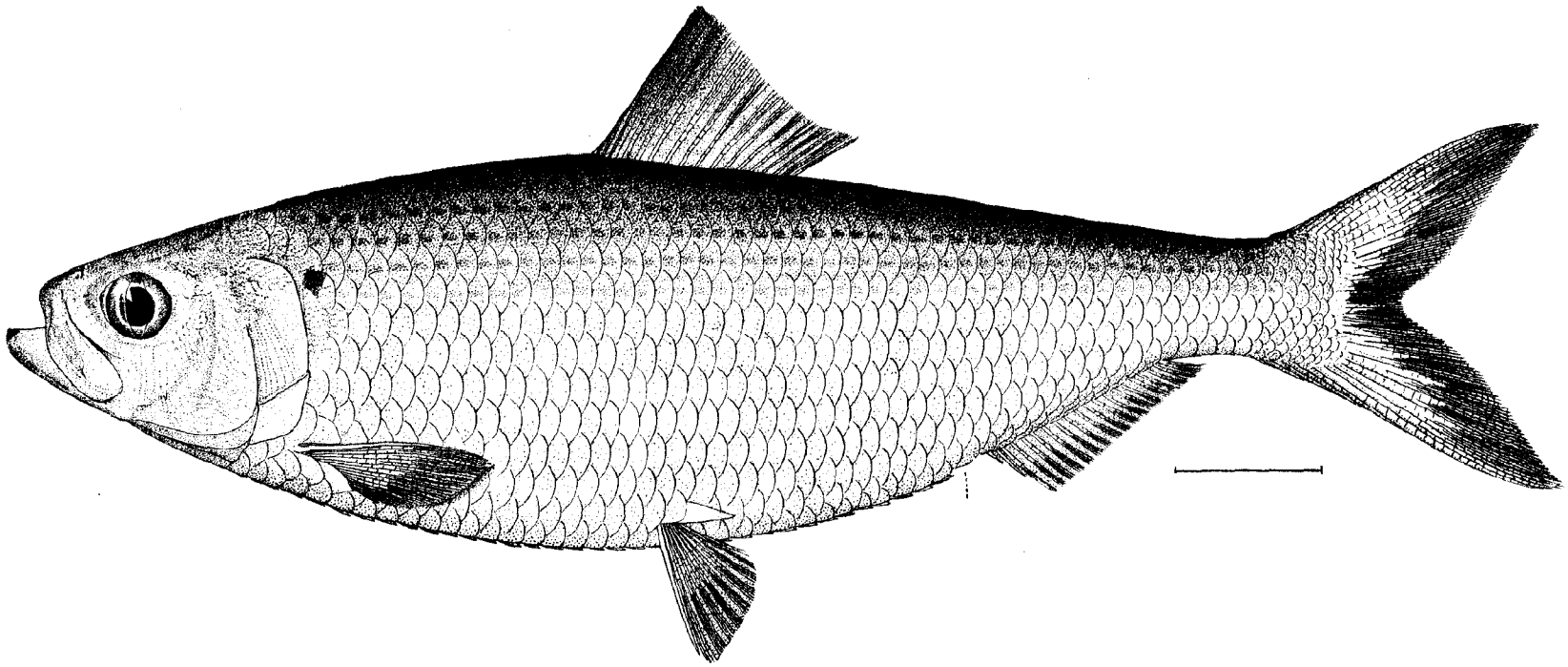


## THE BRANCH HERRING. (Male.)

Clupea vernalis, Mitchill. (p. 579.)

Drawing by H. L. Todd, from No. 25196, U. S. National Museum, obtained from Potomac River, March 27, 1880, by U. S. Fish Commission.

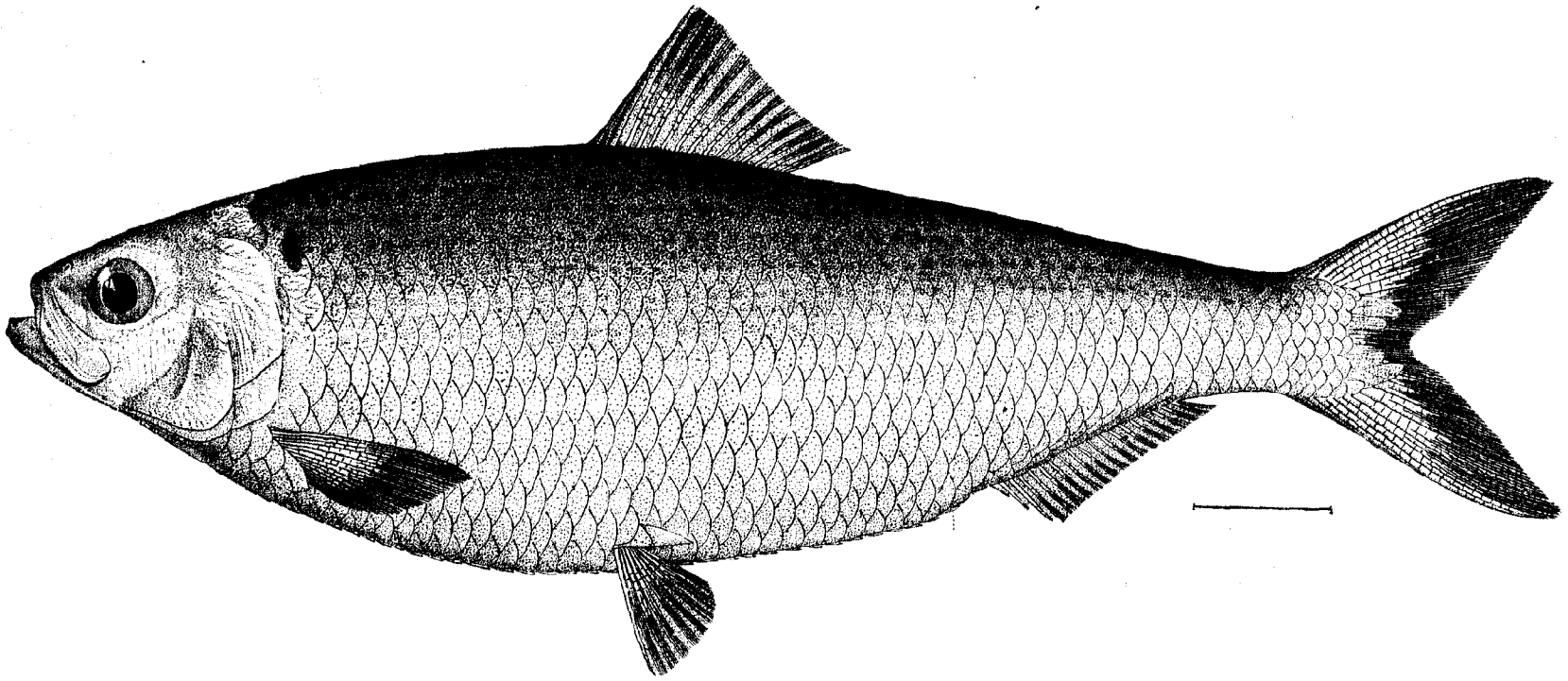
PLATE 208.



## THE GLUT OR SUMMER HERRING. (Male.)

Clupea æstivalis, Mitchill. (p. 580.)

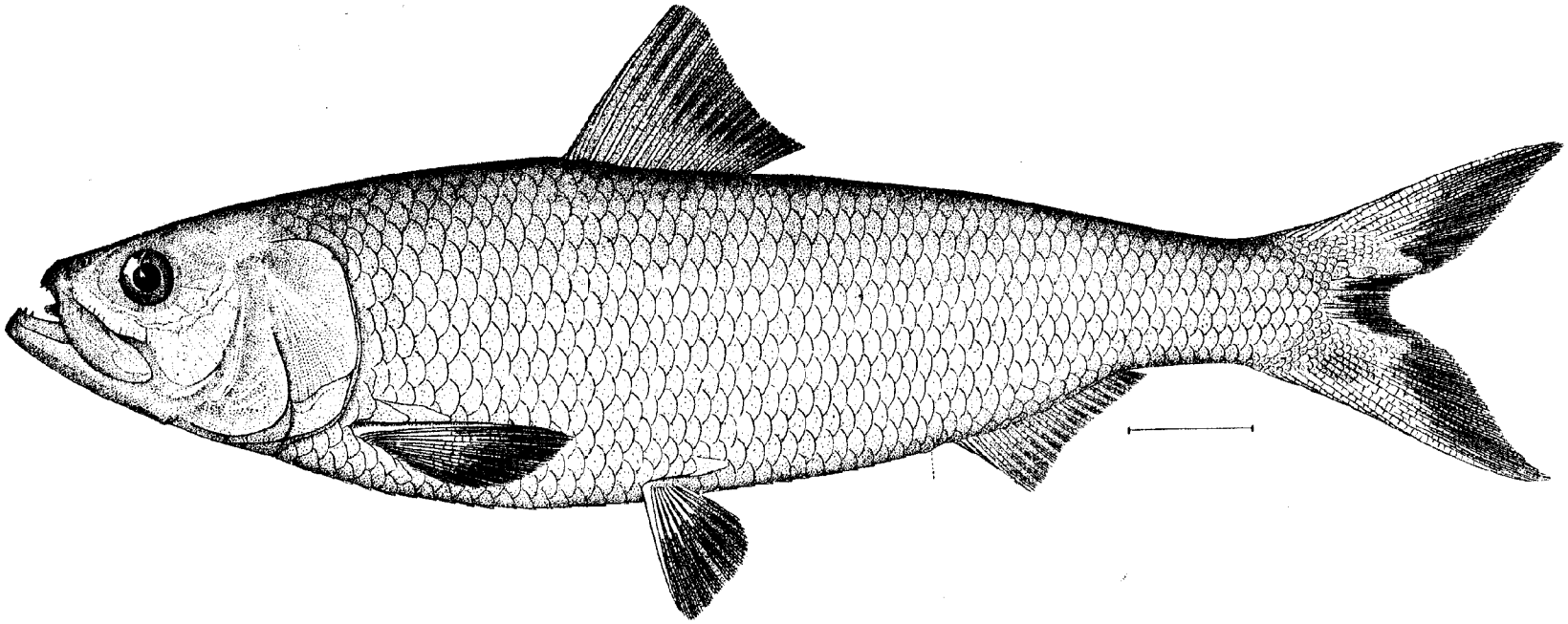
Drawing by H. L. Todd, from No. 32639, U. S. National Museum, obtained from the Washington Market, District of Columbia, April, 1883, by H. L. Todd.



## THE GLUT HERRING. (Female.)

**Clupea æstivalis, Mitchill.** (p. 580.)

Drawing by H. L. Todd, from No. 32640, U. S. National Museum, obtained at Washington Market, District of Columbia, April 21, 1883, by H. L. Todd.

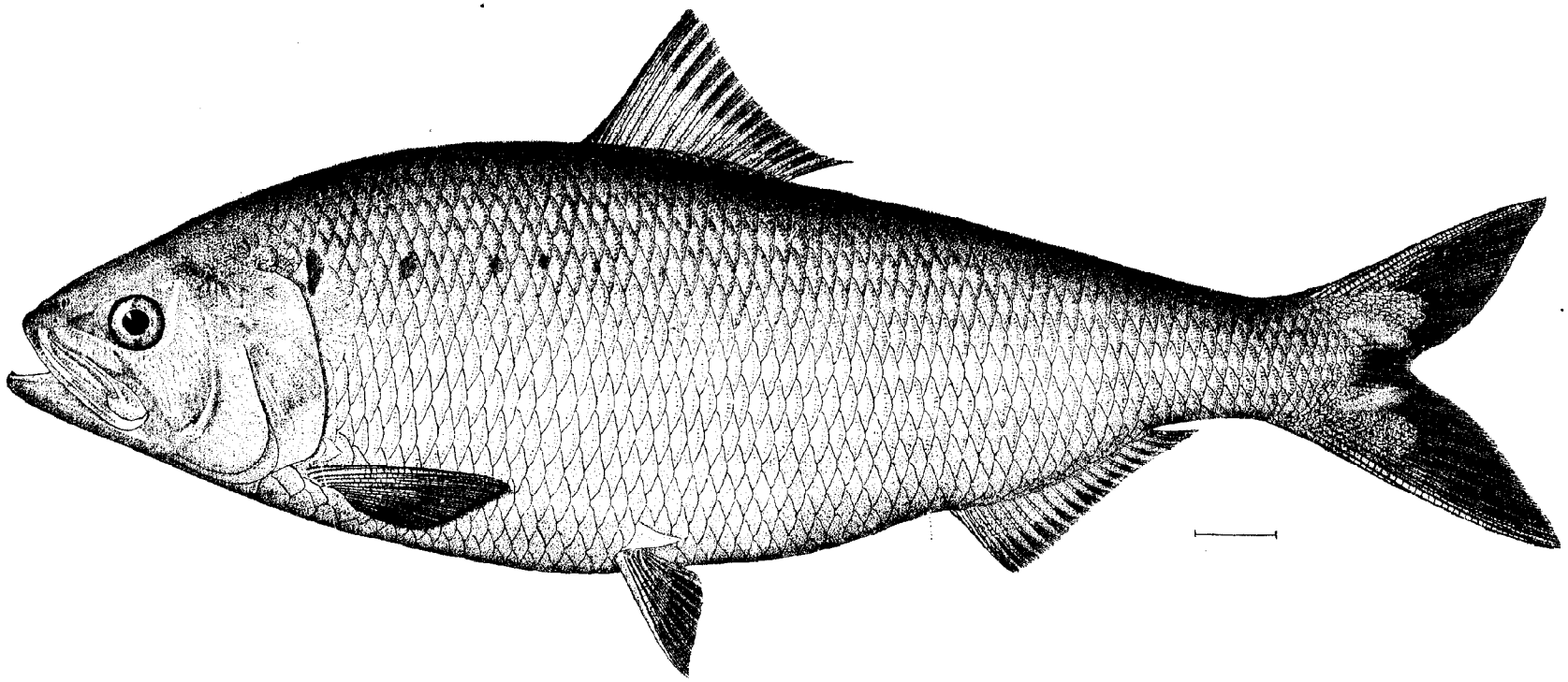


## THE INLAND ALEWIFE OR SKIPJACK.

Clupea chrysochloris (Raf.), J. & G. (p. 594.)

Drawing by H. L. Todd, from No. 30159, U. S. National Museum, collected at Pensacola, Fla., by Silas Stearns.

PLATE 211.

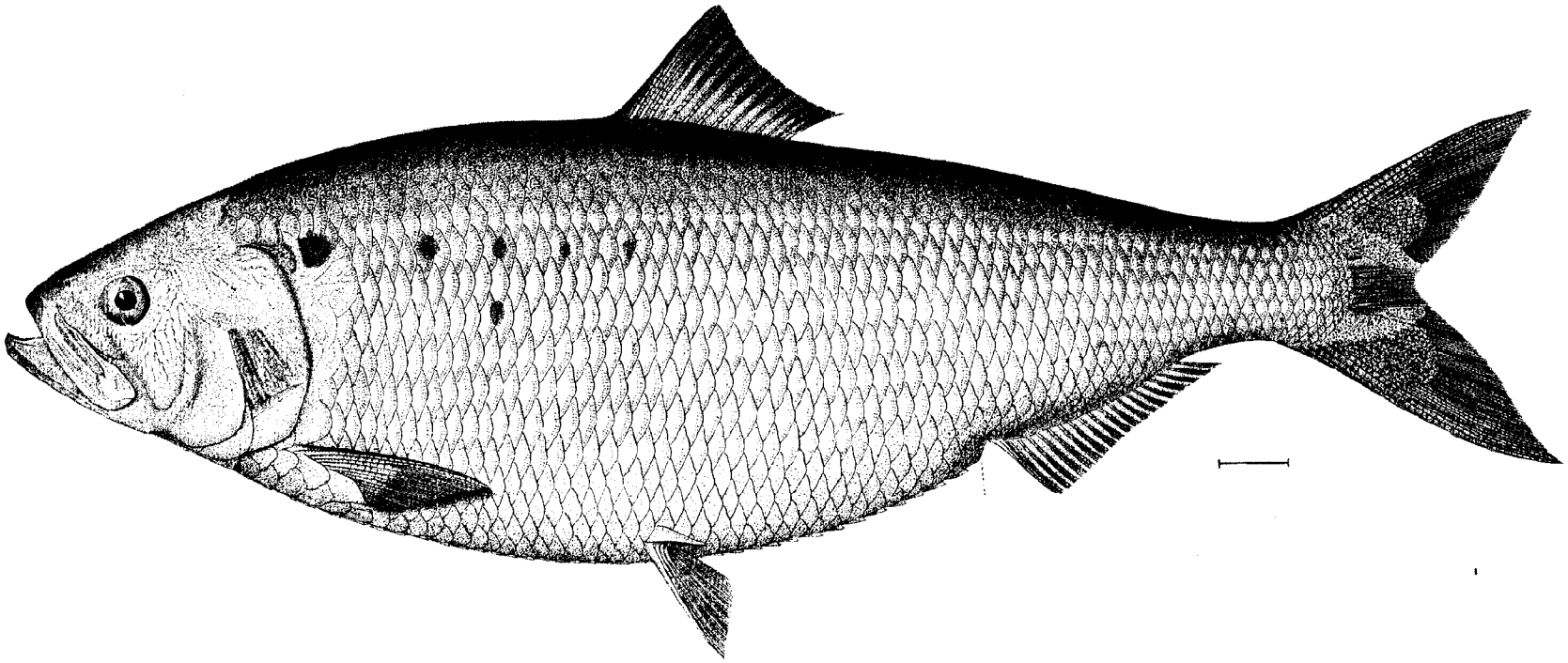


## THE SHAD. (Male.)

Clupea sapidissima, Wilson. (p. 594.)

Drawing by H. L. Todd, from No. 25096, U. S. National Museum, collected at Norfolk, Va., March 12, 1880, by U. S. Fish Commission.

PLATE 212.



THE SHAD. (Female.)

Clupea sapidissima, Wilson. (p. 594.)

Drawing by H. L. Todd, from No. 25095, U. S. National Museum, collected at Norfolk, Va., March 10, 1880, by U. S. Fish Commission.

PLATE 213.

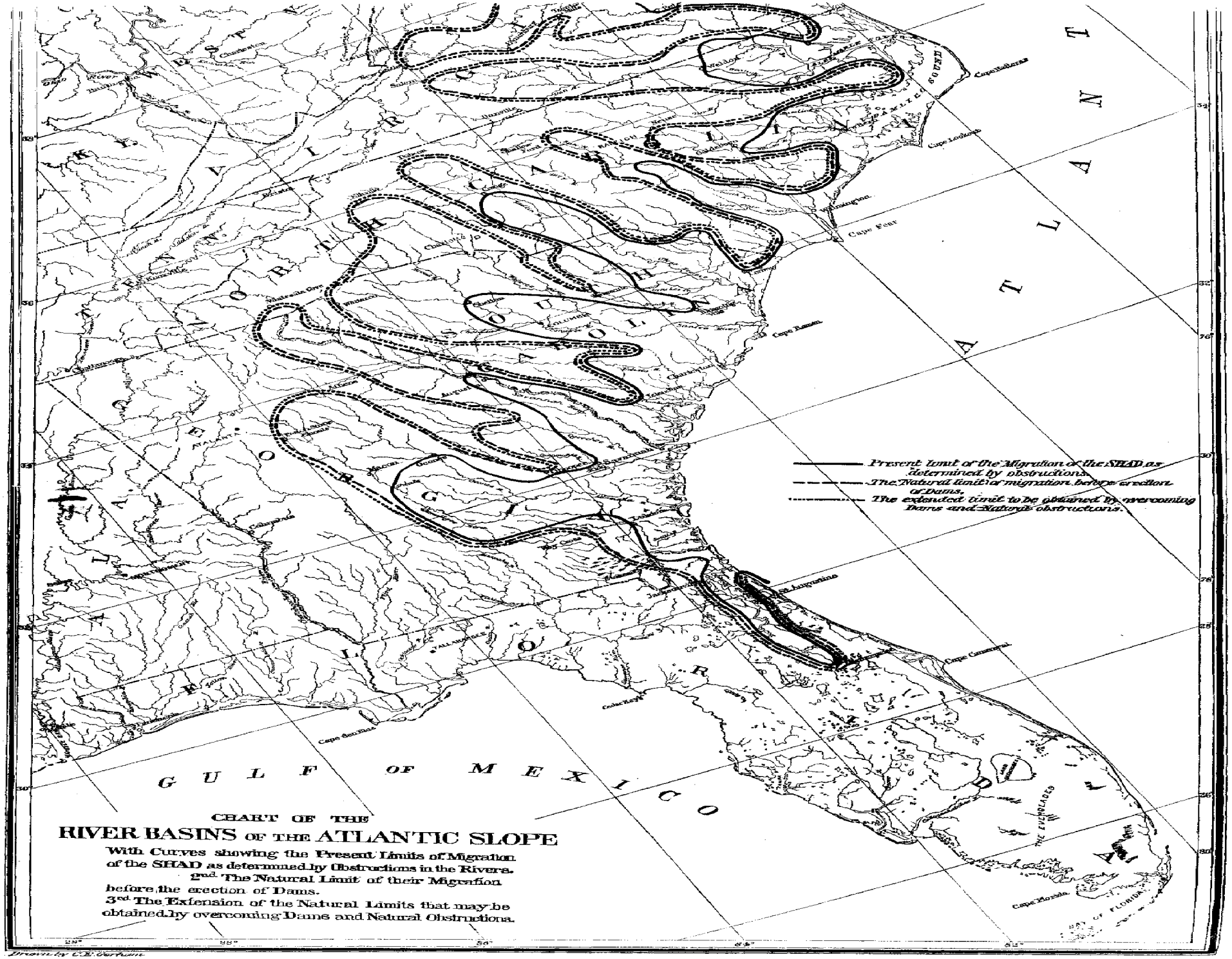


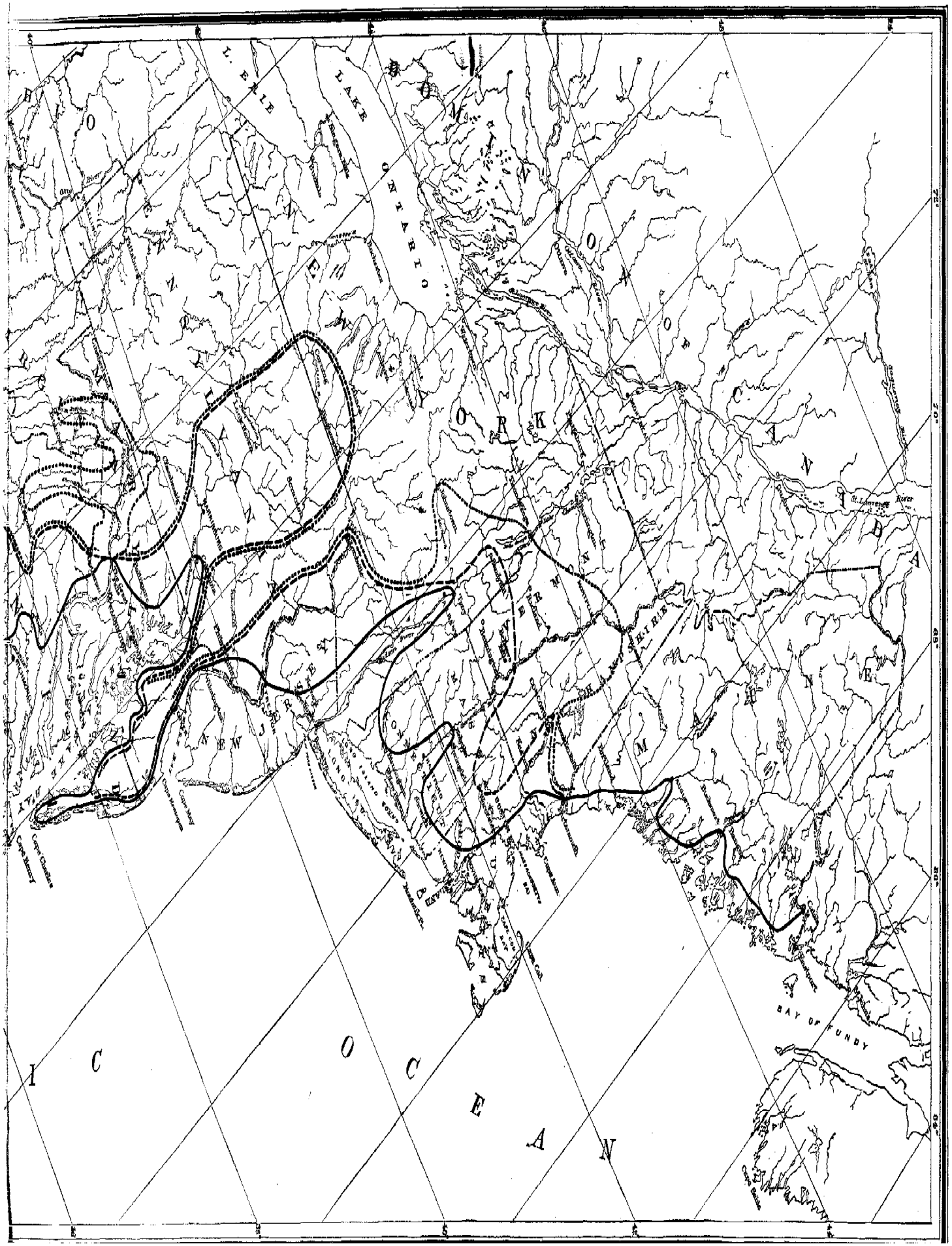

CHART OF THE

# RIVER BASINS OF THE ATLANTIC SLOPE

With Curves showing the Present Limits of Migration of the SHAD as determined by Obstructions in the Rivers.
2nd. The Natural Limit of their Migration before the erection of Dams.
3rd. The Extension of the Natural Limits that may be obtained by overcoming Dams and Natural Obstructions.

Drawn by C.E. Dorman

MAP OF THE RIVER BASINS


L. ERIE
LAKE ONTARIO
NEW YORK
VERMONT
NEW HAMPSHIRE
MAINE
BAY OF FUNDY
ATLANTIC OCEAN

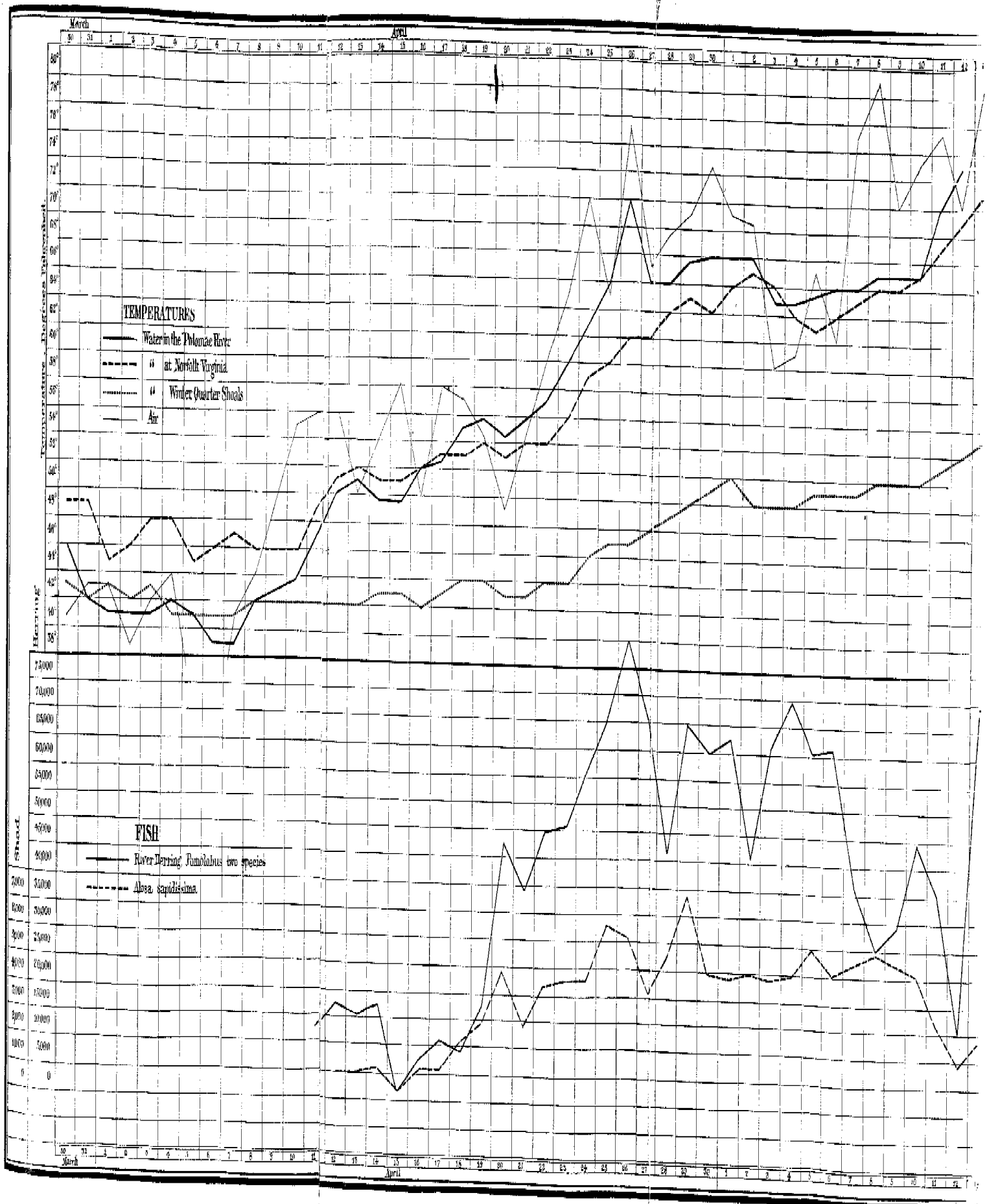
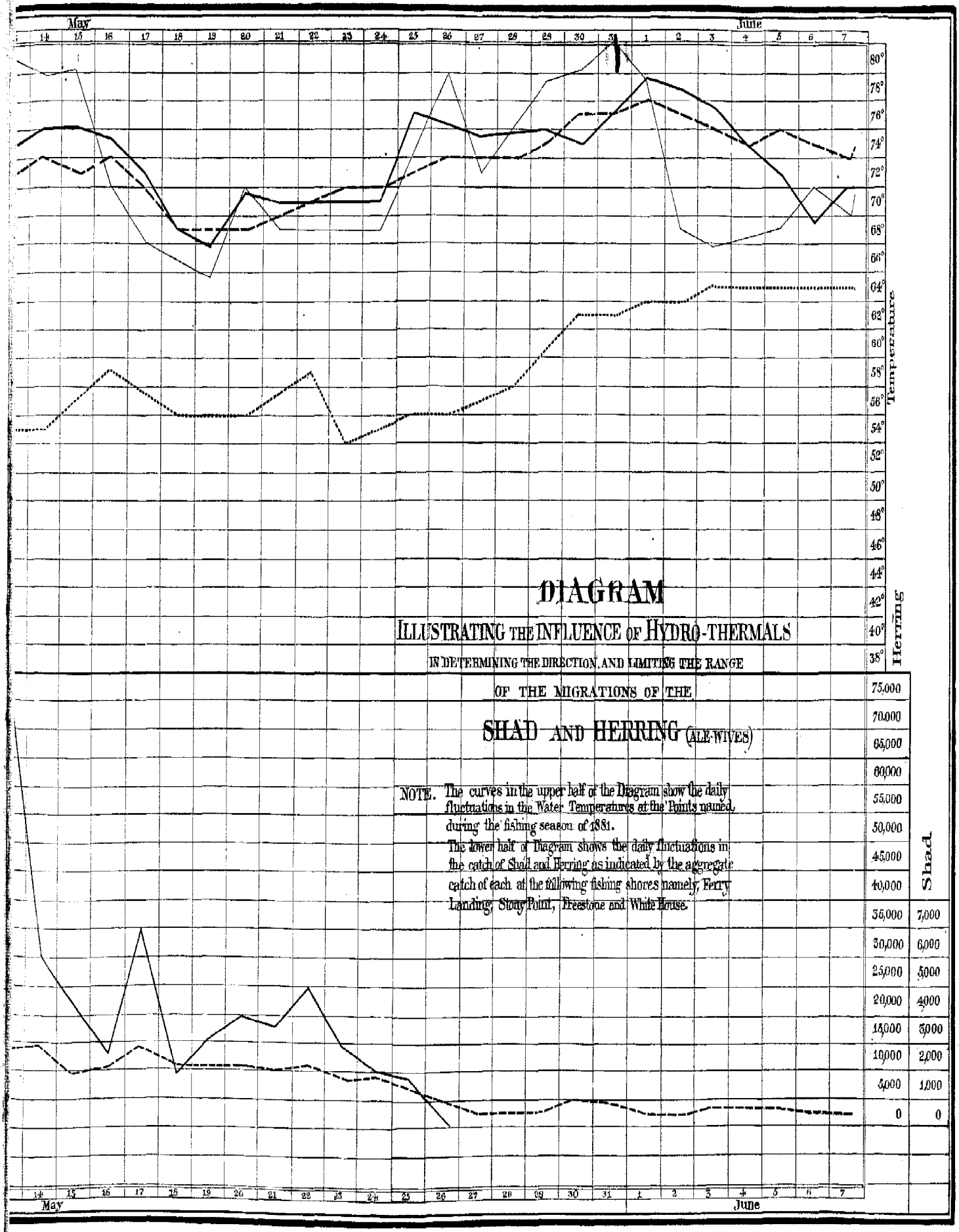
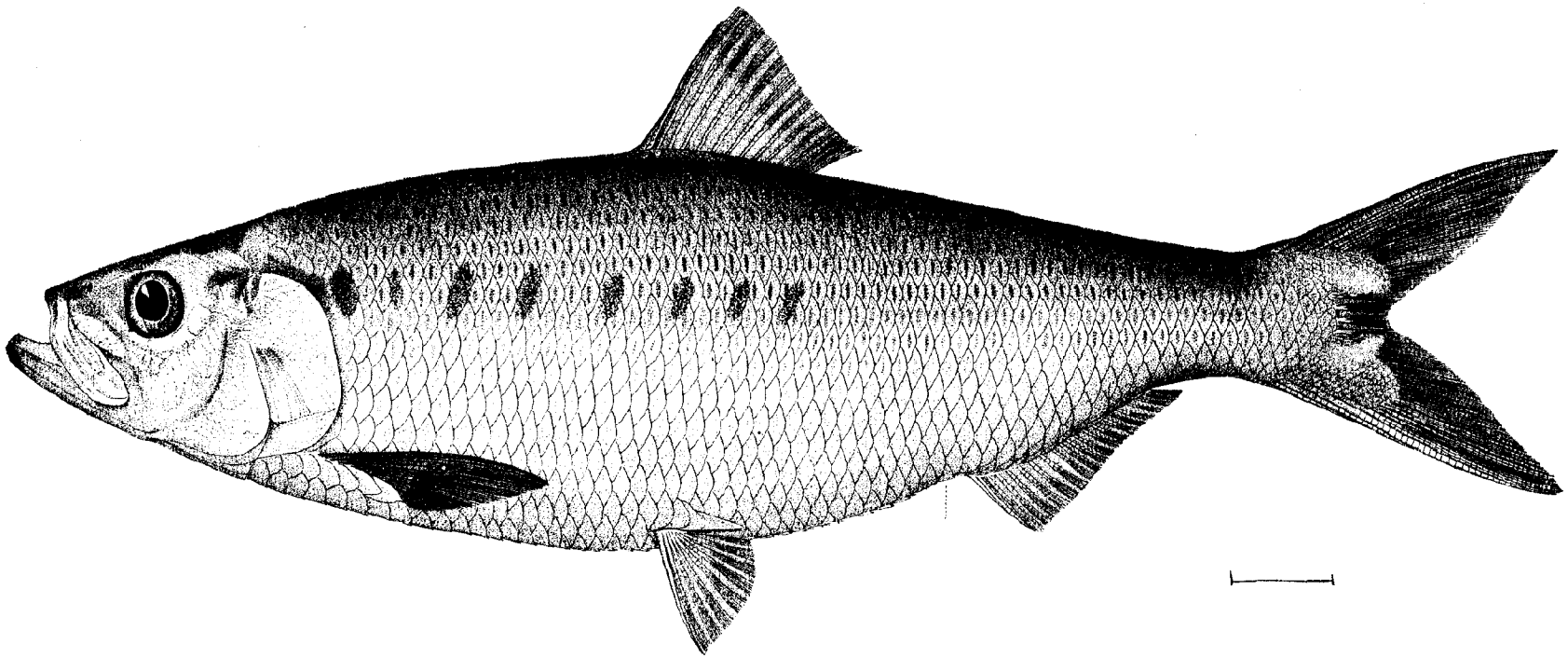



DIAGRAM ILLUSTRATING THE INFLUENCE OF HYDRO-THERMALS IN DETERMINING THE DIRECTION AND LIMITING THE RANGE OF THE MIGRATIO.

Prepared by Col. M. McDonald.




IS OF THE SHAD AND HERRING (ALEWIVES).

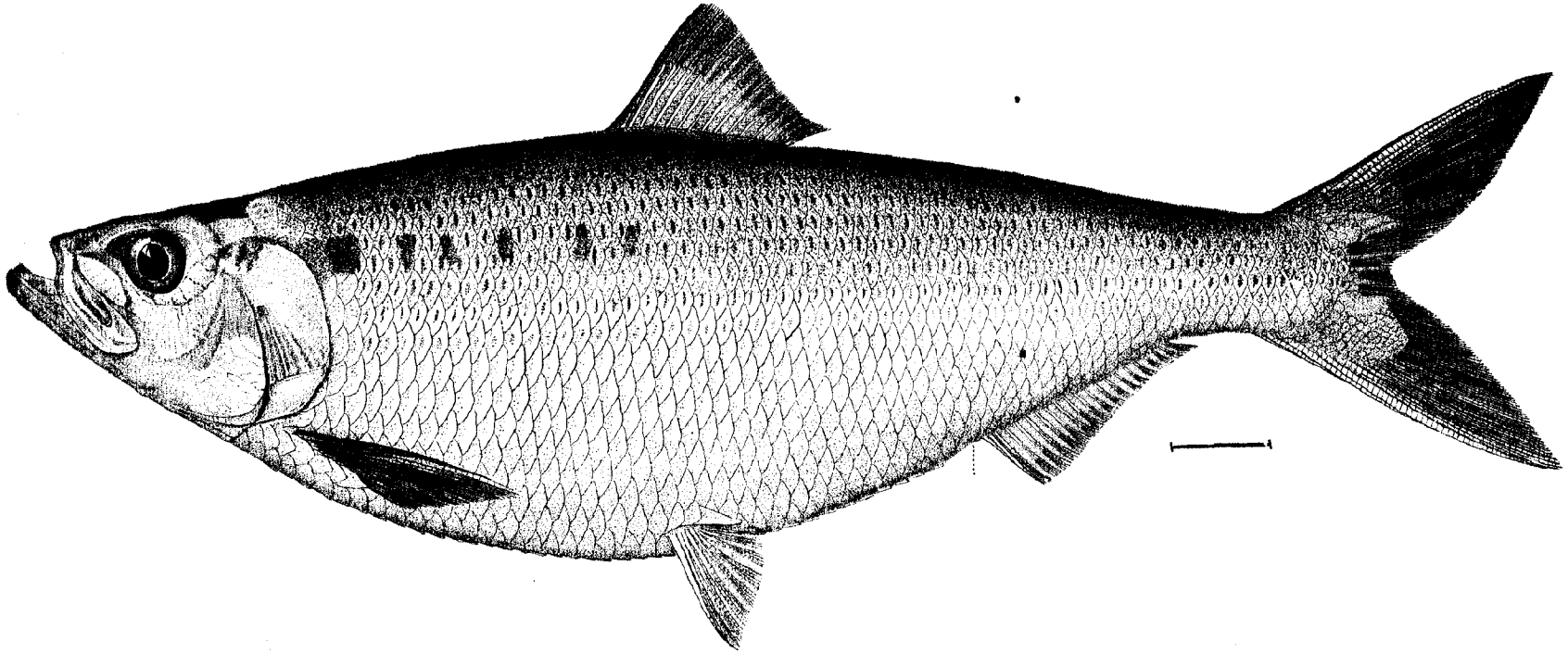


## THE HICKORY SHAD OR MATTOWACCA. (Male.)

Clupea mediocris, Mitch. (p. 607.)

Drawing by H. L. Todd, from No. 25148, U. S. National Museum, obtained from Potomac River, March 19, 1880, by H. L. Todd.

PLATE 216 A.

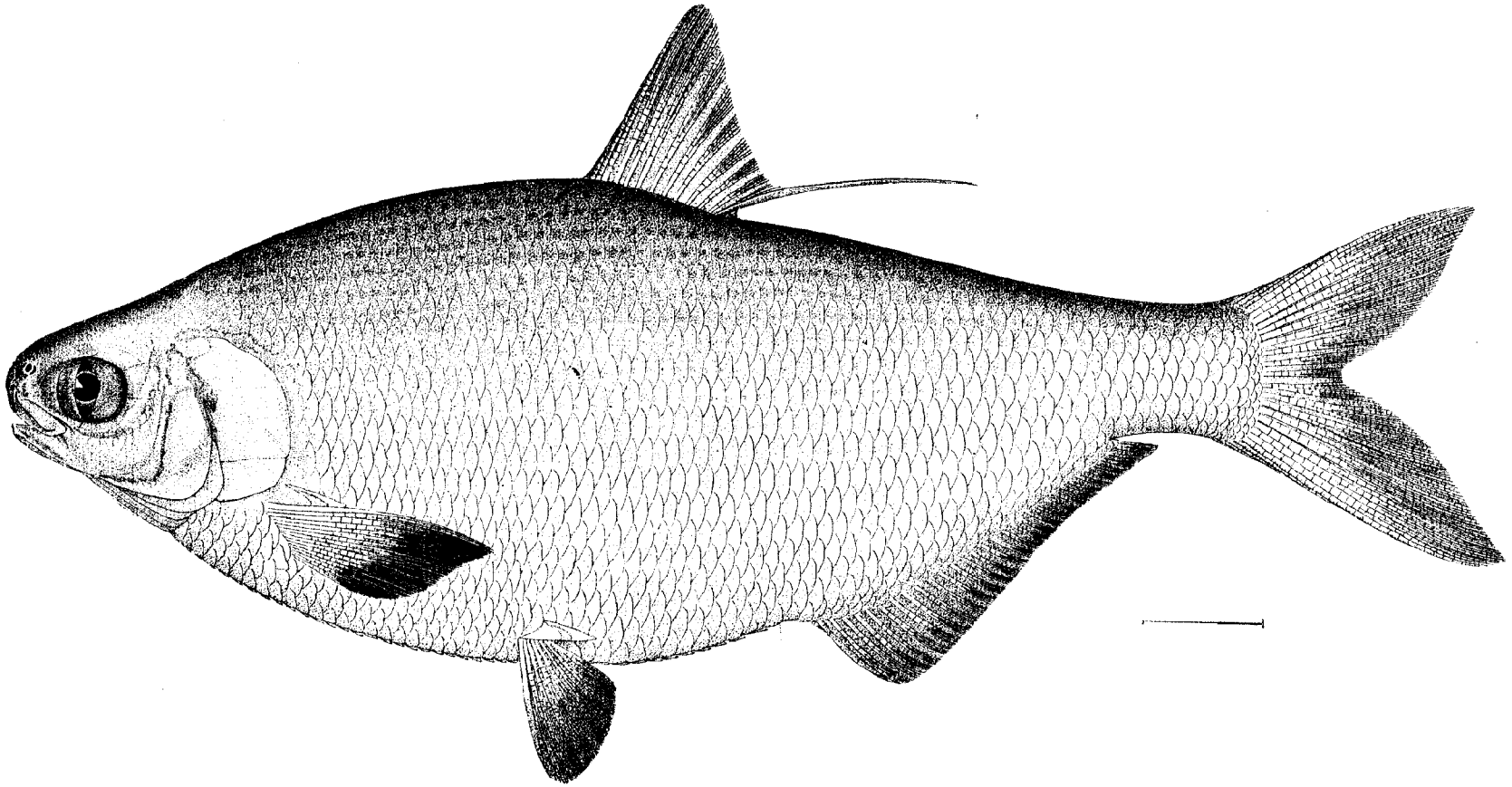


THE HICKORY SHAD OR MATTOWACCA. (Female.)

Clupea mediocris, Mitch. (p. 607.)

Drawing by H. L. Todd, from No. 25132, U. S. National Museum, collected at Potomac River, March, 1880, by Dr. T. H. Bean.

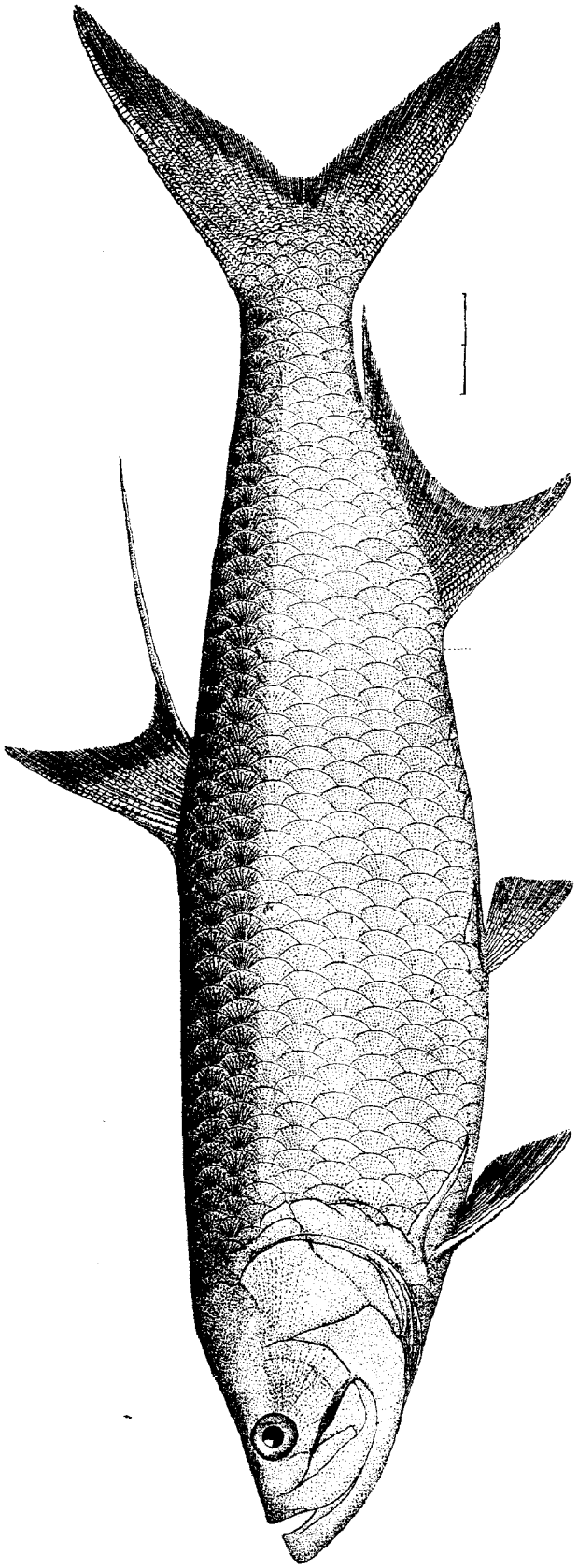
PLATE 216 *b*.



## THE MUD SHAD OR GIZZARD SHAD.

Dorosoma cepedianum (Le S.), Gill., subspec. heterurum. (p. 610.)

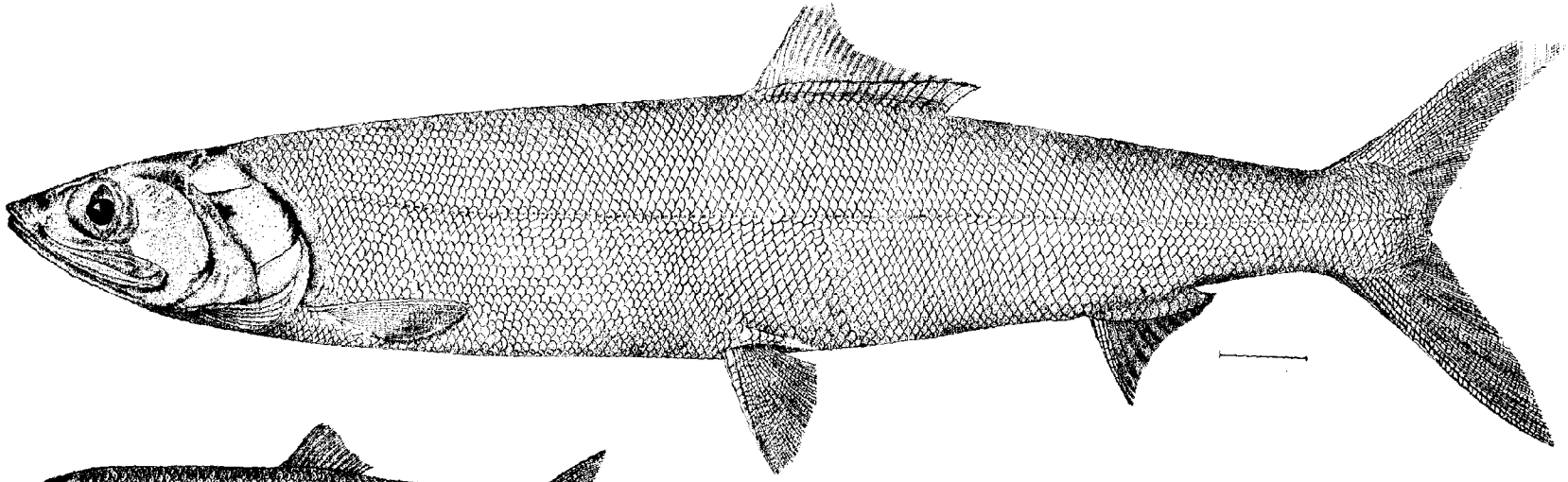
Drawing by H. L. Todd, from No. 20034, U. S. National Museum, collected at Cumberland River, Tennessee, May, 1877, by Mr A. Winchell.



## THE TARPUM OR GRAND-ECAILLE.

**Megalops thrissoides (Schn.), Gthr.** (p. 610.)

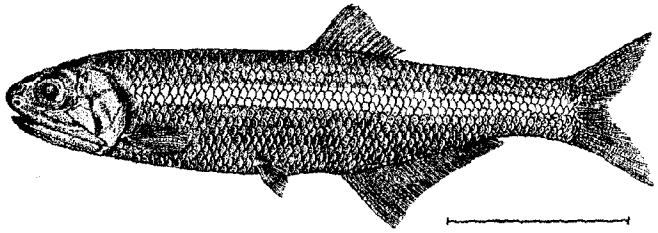
Drawing by H. L. Todd, from No. 14924, U. S. National Museum, collected at New Jersey, 1874, by Mr. E. G. Blackford.



## THE BIG-EYED HERRING.

Elops saurus, L. (p. 611.)

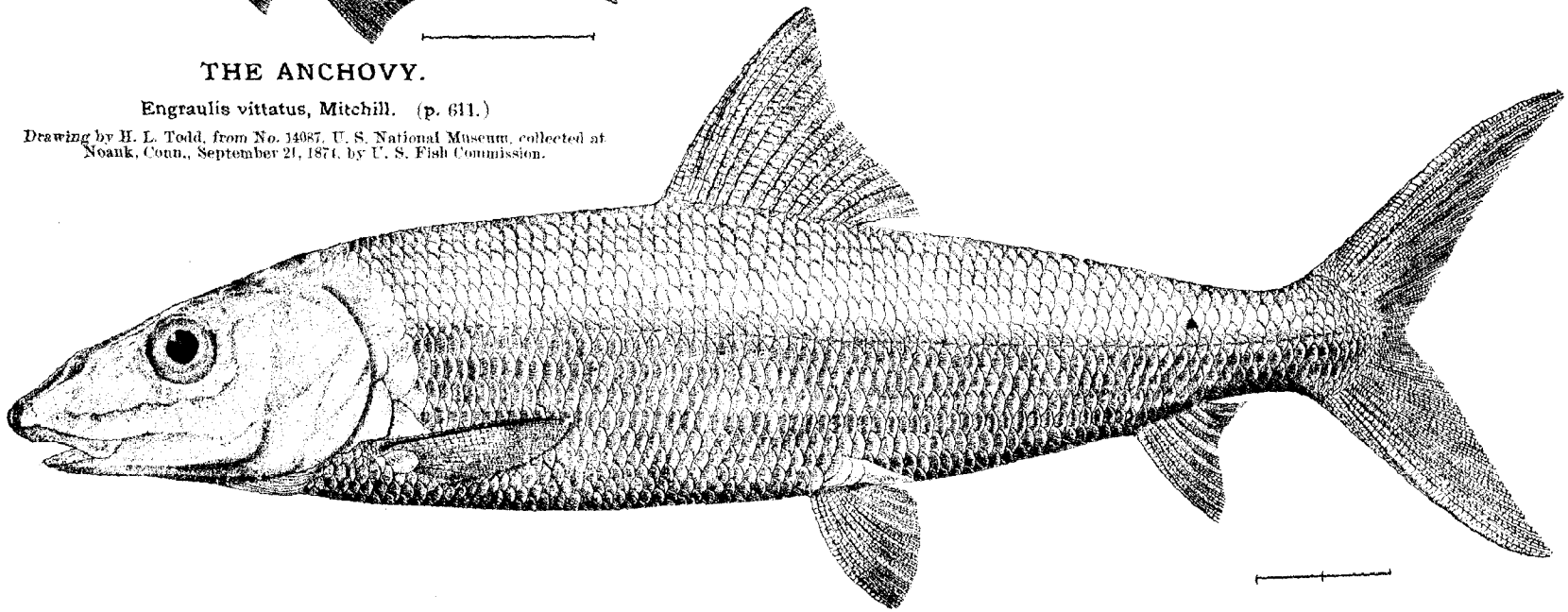
Drawing by H. L. Todd, from specimen in U. S. National Museum, from Massachusetts.



## THE ANCHOVY.

Engraulis vittatus, Mitchill. (p. 611.)

Drawing by H. L. Todd, from No. 34087, U. S. National Museum, collected at Noank, Conn., September 21, 1874, by U. S. Fish Commission.

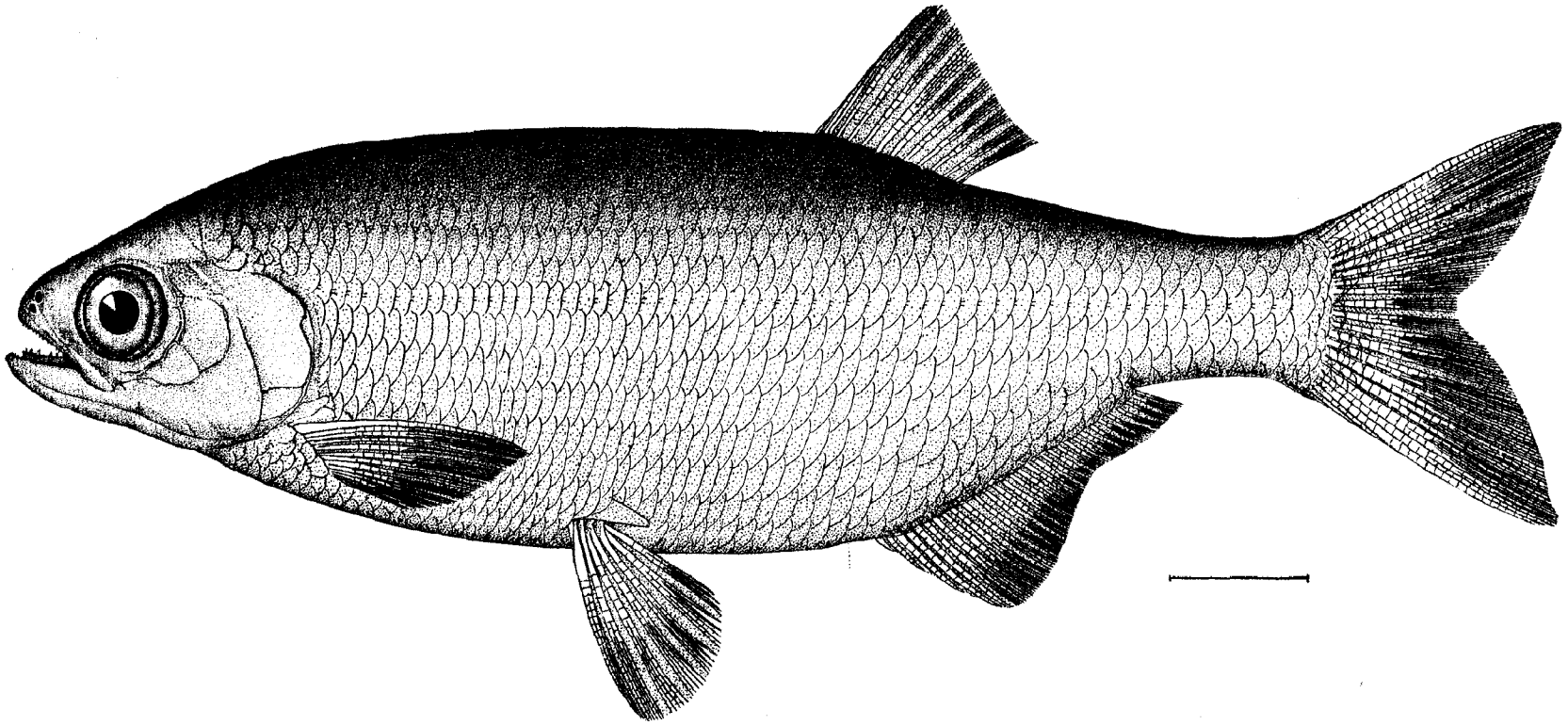


## THE LADY-FISH OR BONE-FISH.

Albula vulpes (L.), Goode. (p. 612.)

Drawing by H. L. Todd, from No. 25962, U. S. National Museum, collected three miles southeast of Eastern Point, Newport, R. I., August 11, 1880, by Captain Rockliff, U. S. Fish Commission.

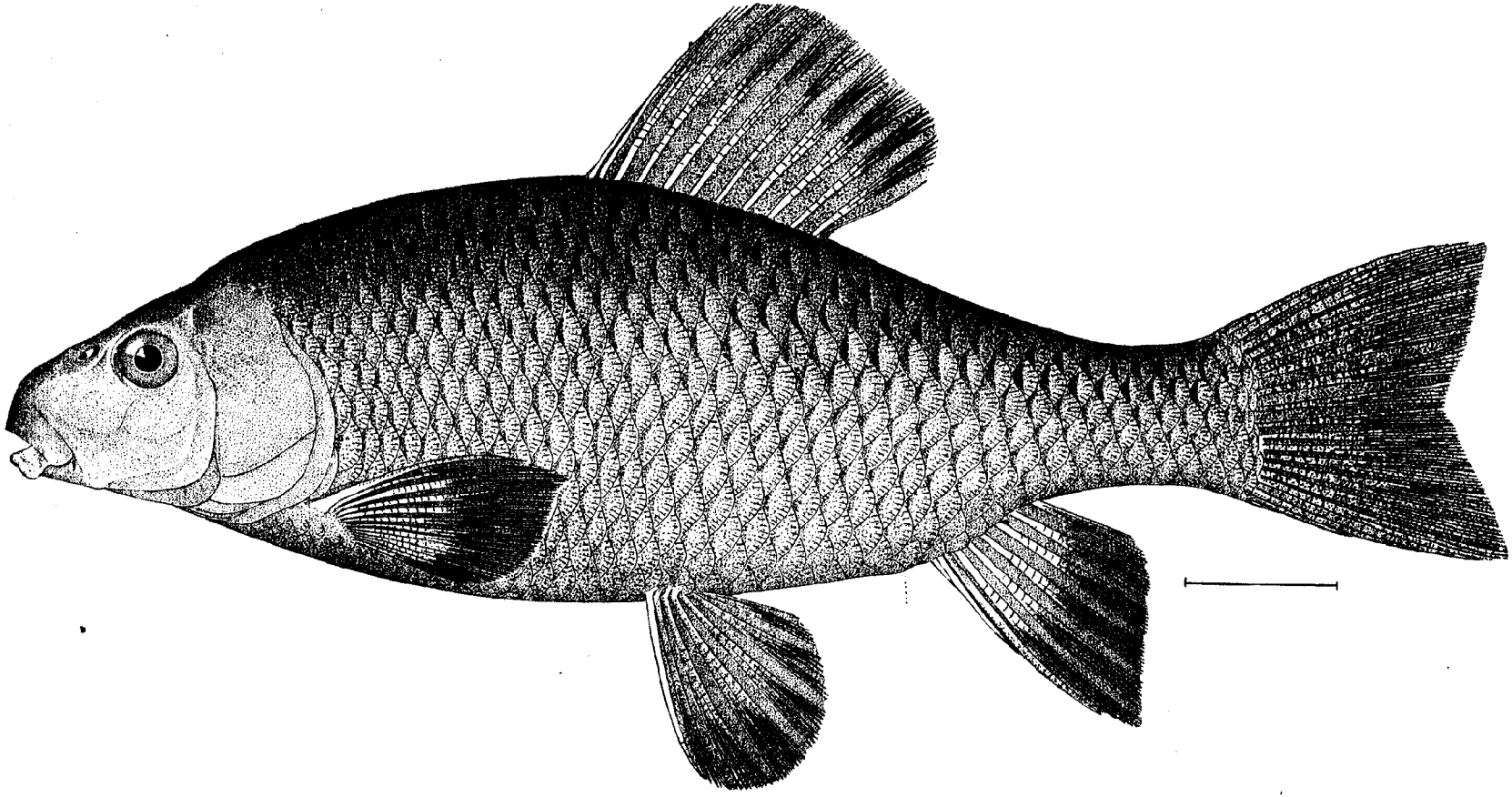
PLATE 218.



## THE MOON-EYE.

Hyodon tergisus, Le S. (p. 612.)

Drawing by H. L. Todd, from No. 8710, U. S. National Museum, collected at Ecorse, Michigan, February, 1872, by George Clark.

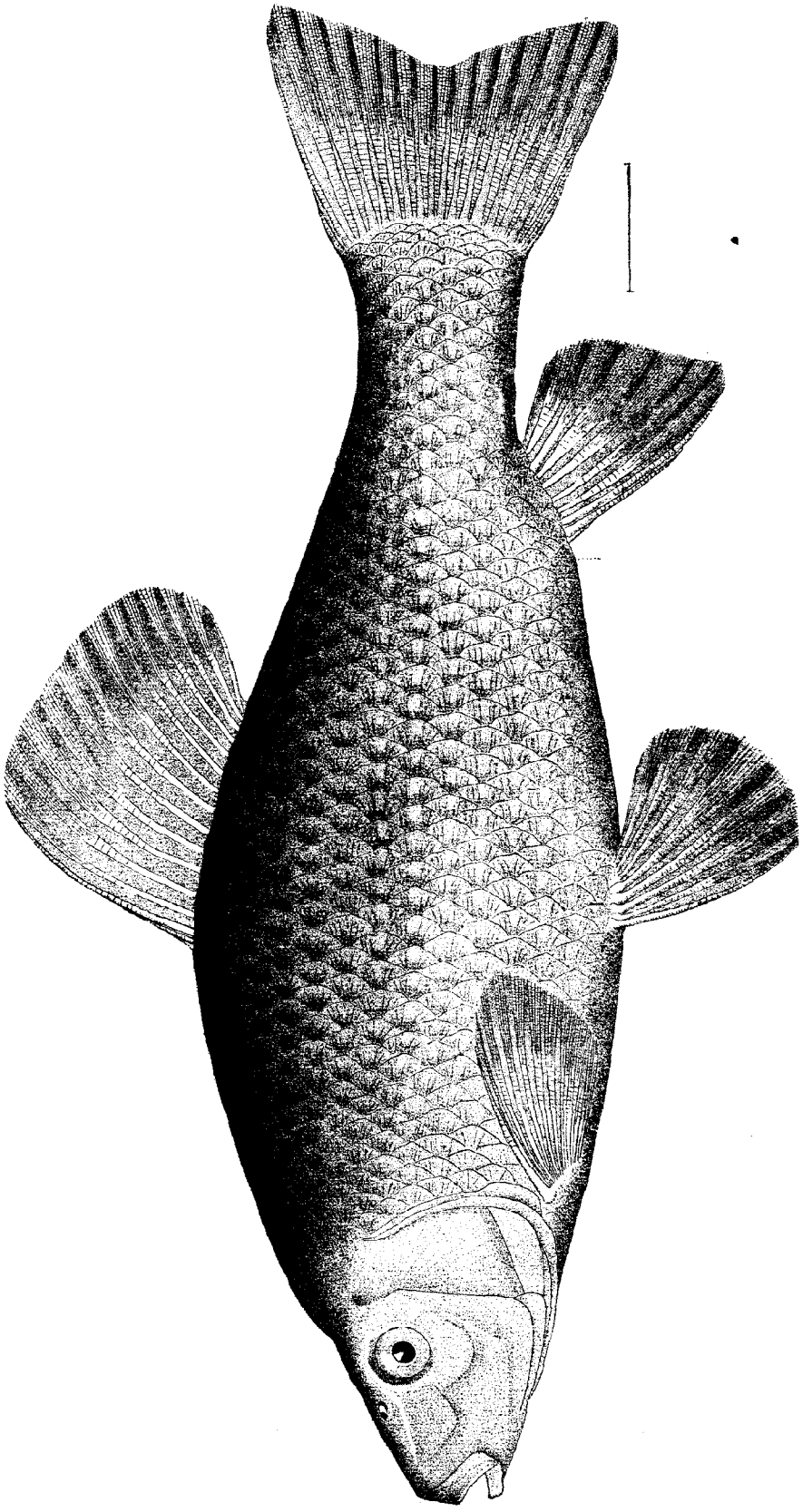


## THE CHUB SUCKER.

Erimyzon sucetta (Lac.), Jordan. (p. 614.)

Drawing by H. L. Todd, from No. 27867, U. S. National Museum, collected at Nippersink Lake, Illinois, by Prof. S. A. Forbes.

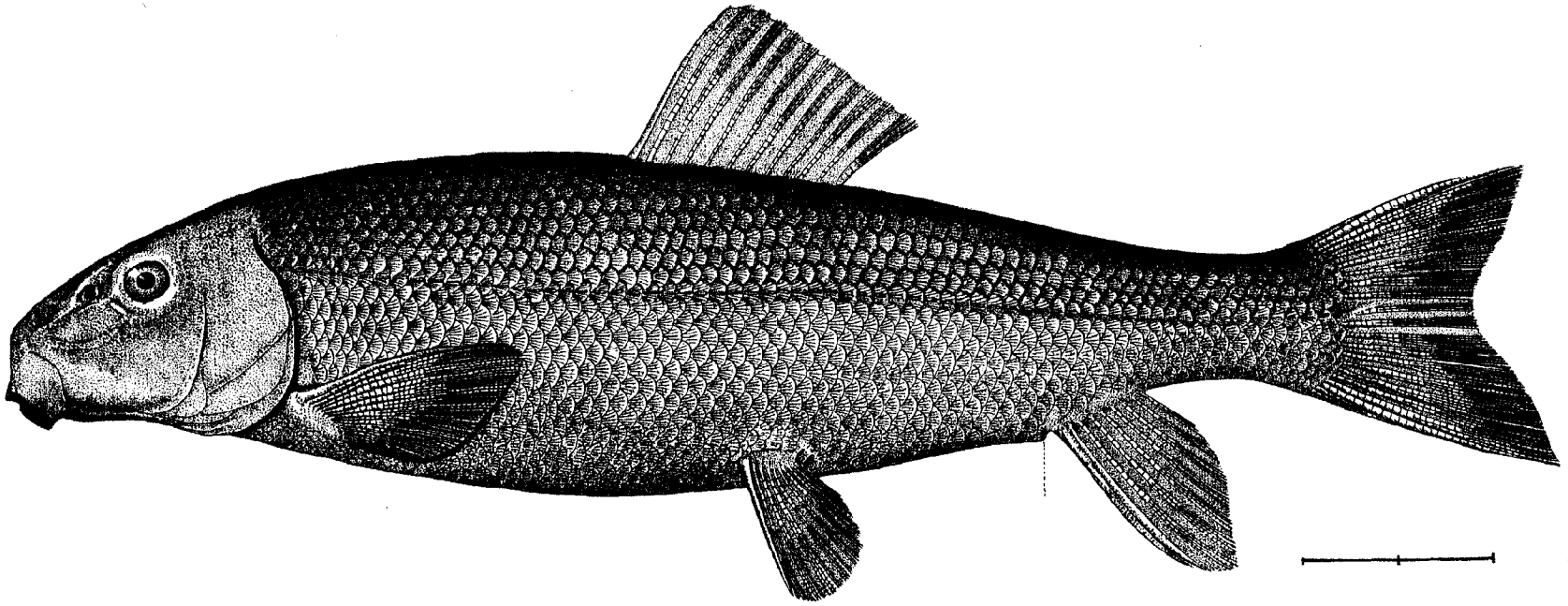
PLATE 220.



## GOODE'S SUCKER

Erimyzon Goodei, Jordan. (p. 614.)

Drawing by Miss M. Smith, from No. 2539, U. S. National Museum, collected at Ogechee Ponds, near Savannah, Ga., March 6, 1880, by Col. M. McDonald.

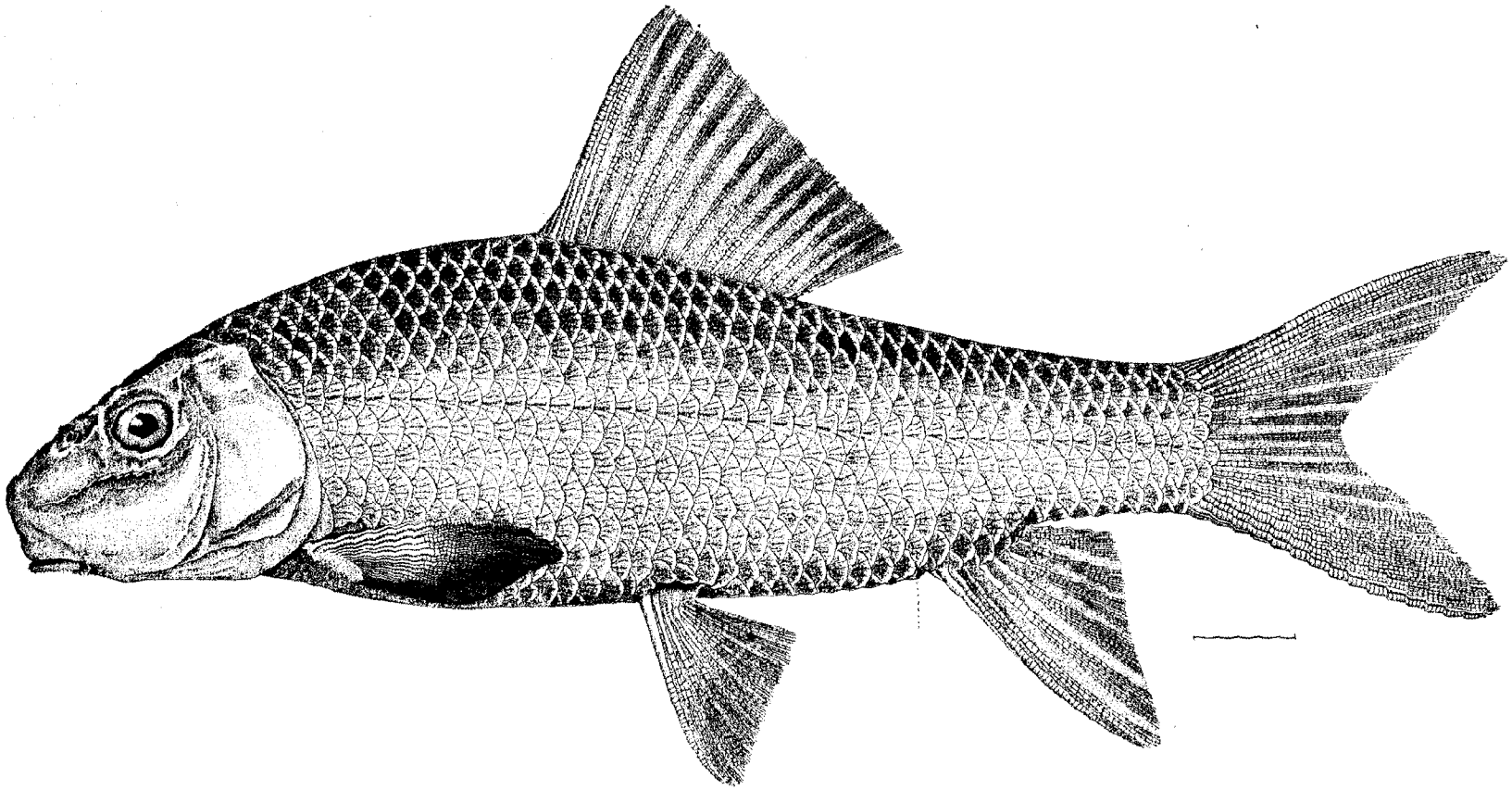


## THE RED HORSE.

Moxostoma macrolepidotum (Le S.), Jordan. (p. 614.)

Drawing by H. L. Todd, from No. 9393, U. S. National Museum, collected at Ecorse, Michigan, February, 1872, by George Clark.

PLATE 222 A.

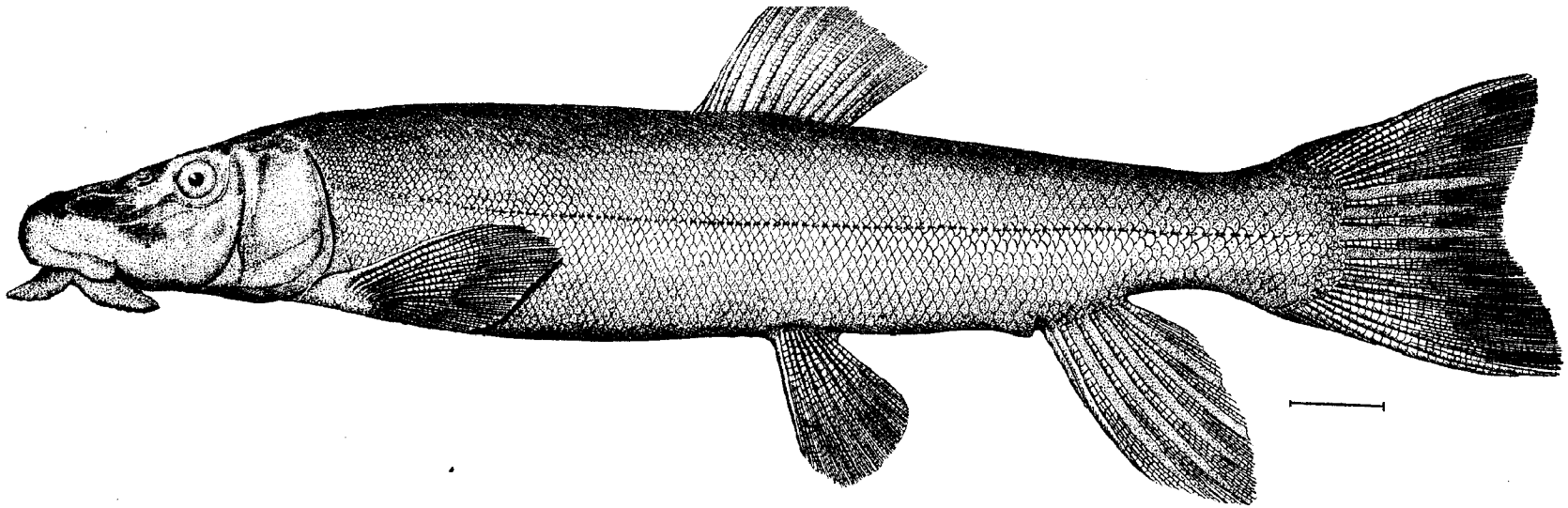


## THE CARP MULLET.

Moxostoma *carpio* (Val.), Jordan. (p. 614.)

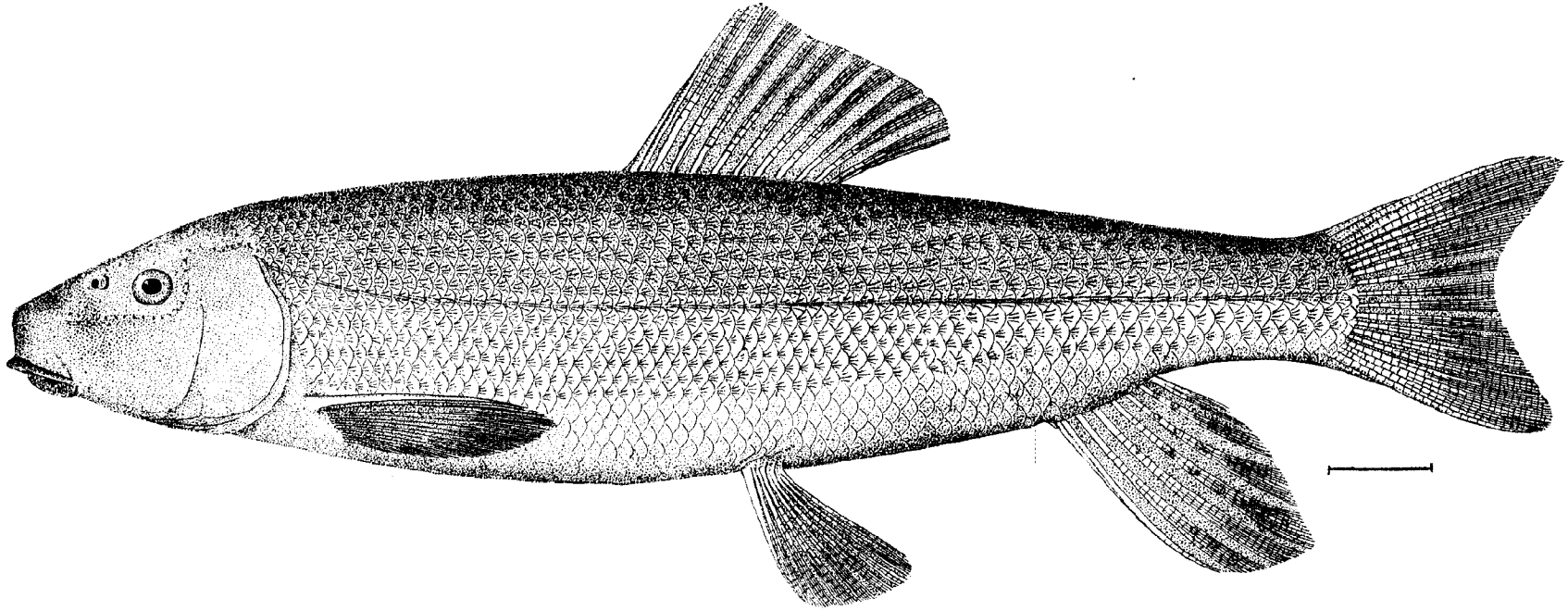
Drawing by H. L. Todd, from No. 10793, U. S. *National Museum*, collected at Cincinnati, Ohio, by J. W. Milner.

PLATE 222 B.



THE MONTANA SUCKER.

Catostomus retropinnis, Jordan. (p. 615.)

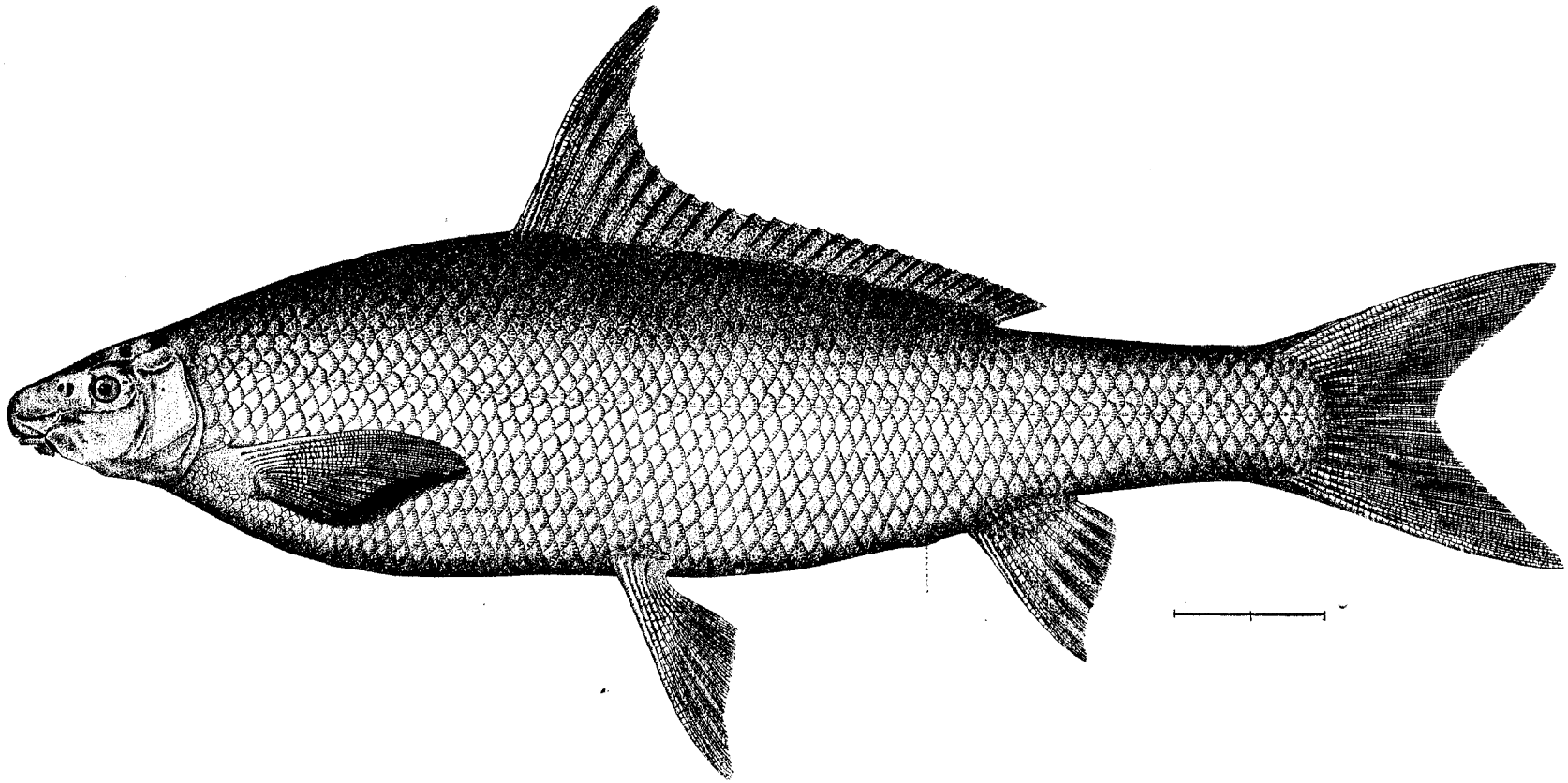


THE BROOK SUCKER OR COMMON SUCKER.

Catostomus Commersoni (Lac.), Jordan. (p. 615.)

Drawing by H. L. Todd, from No. 10548, U. S. National Museum, collected at Ecorse, Michigan, by J. W. Milner.

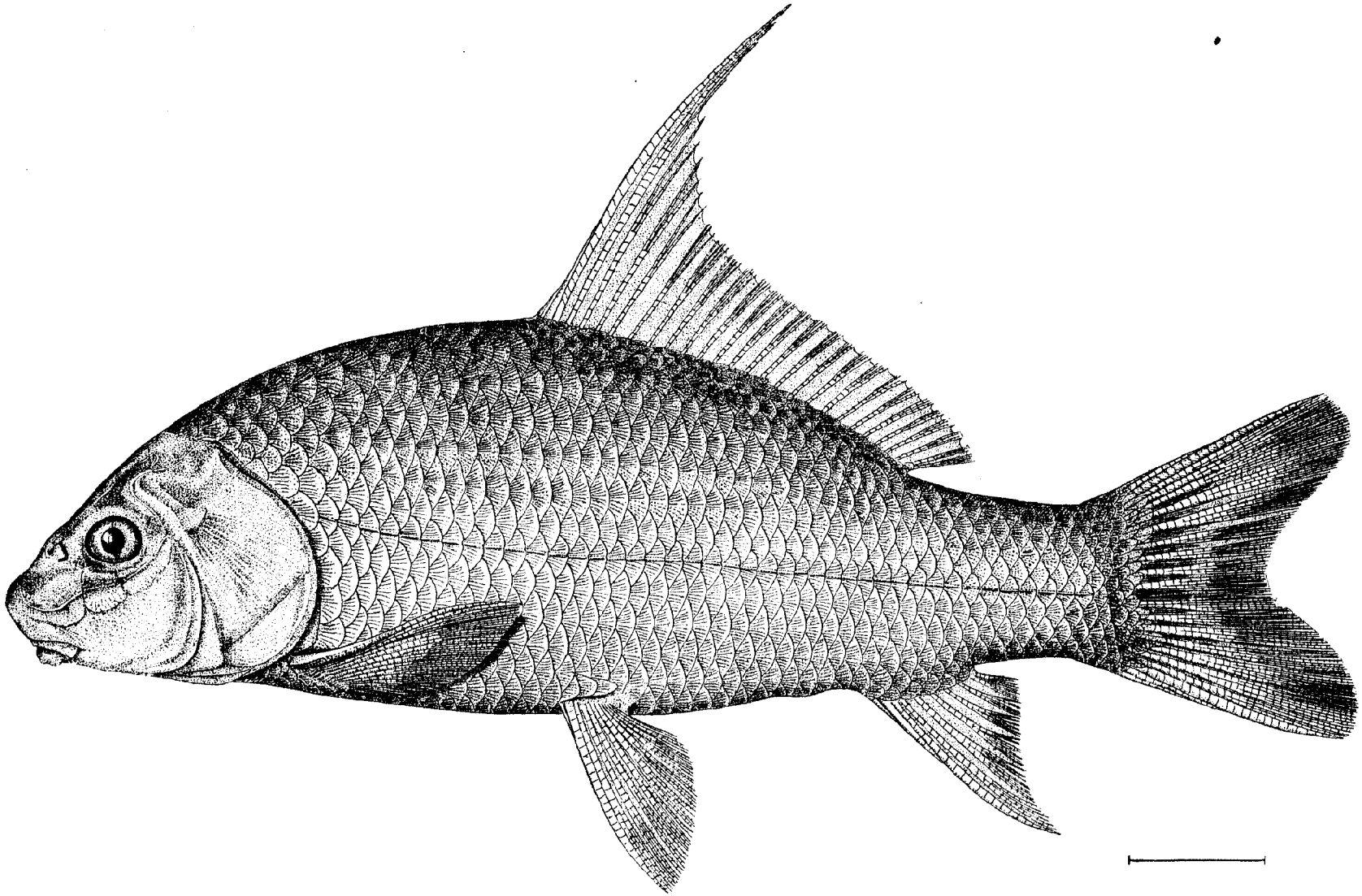
PLATE 223.



## THE BLACK HORSE.

Cycleptus elongatus (Le S.), Ag. (p. 615.)

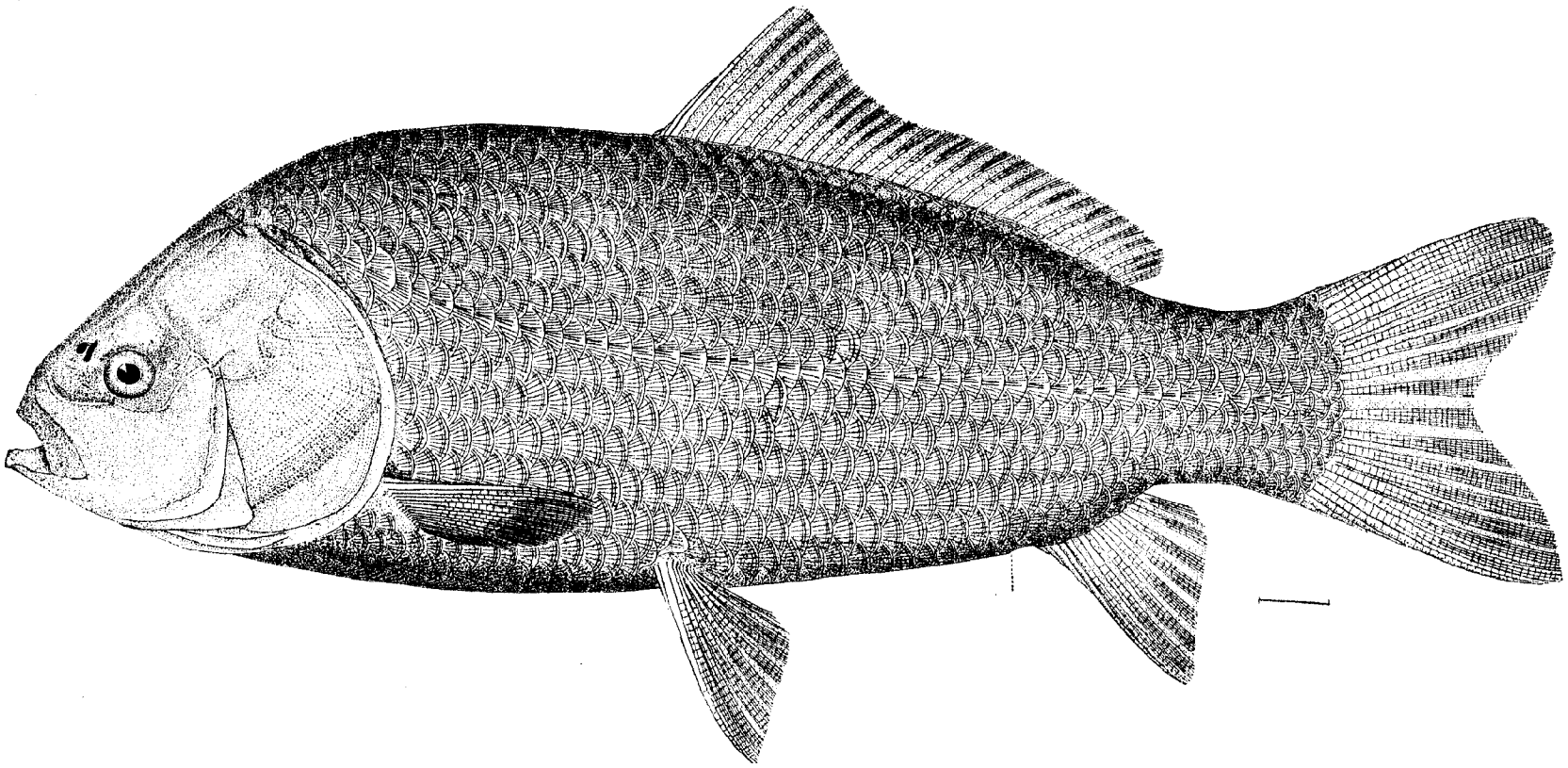
Drawing by H. L. Todd, from No. 10790, U. S. National Museum, collected at Cincinnati, Ohio, by J. W. Milner.



## THE QUILL-BACK.

Carpiodes cyprinus (Le S.), Ag. (p. 615.)

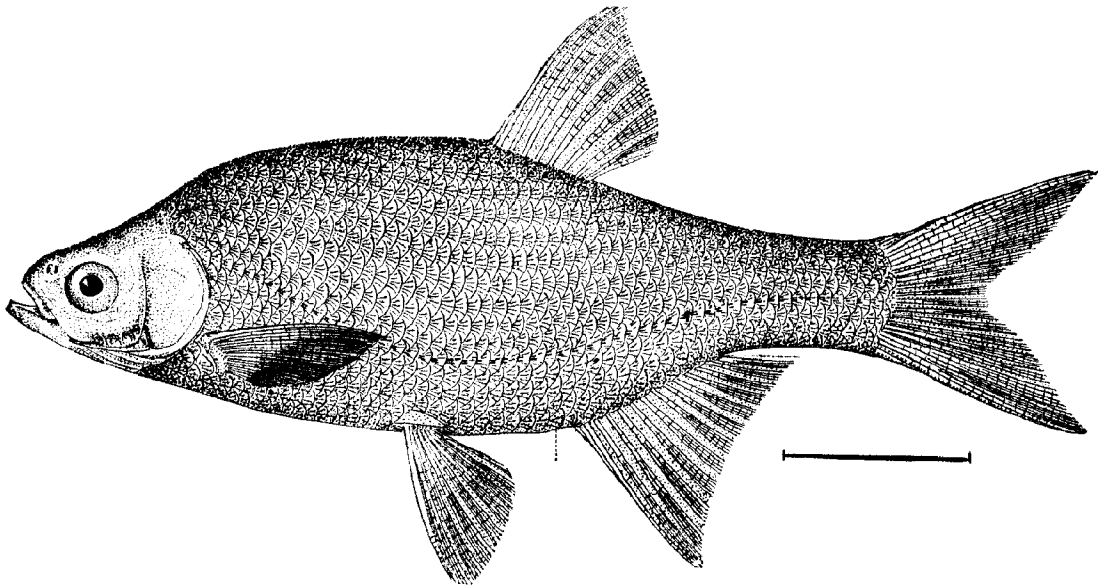
Drawing by H. L. Todd, from No. 33073, U. S. National Museum, collected at Havre de Grace, Maryland, June, 1882, by Dr. T. H. Bean.



## THE RED MOUTH BUFFALO-FISH.

Ictiobus bubalus (Raf.), Ag. (p. 615.)

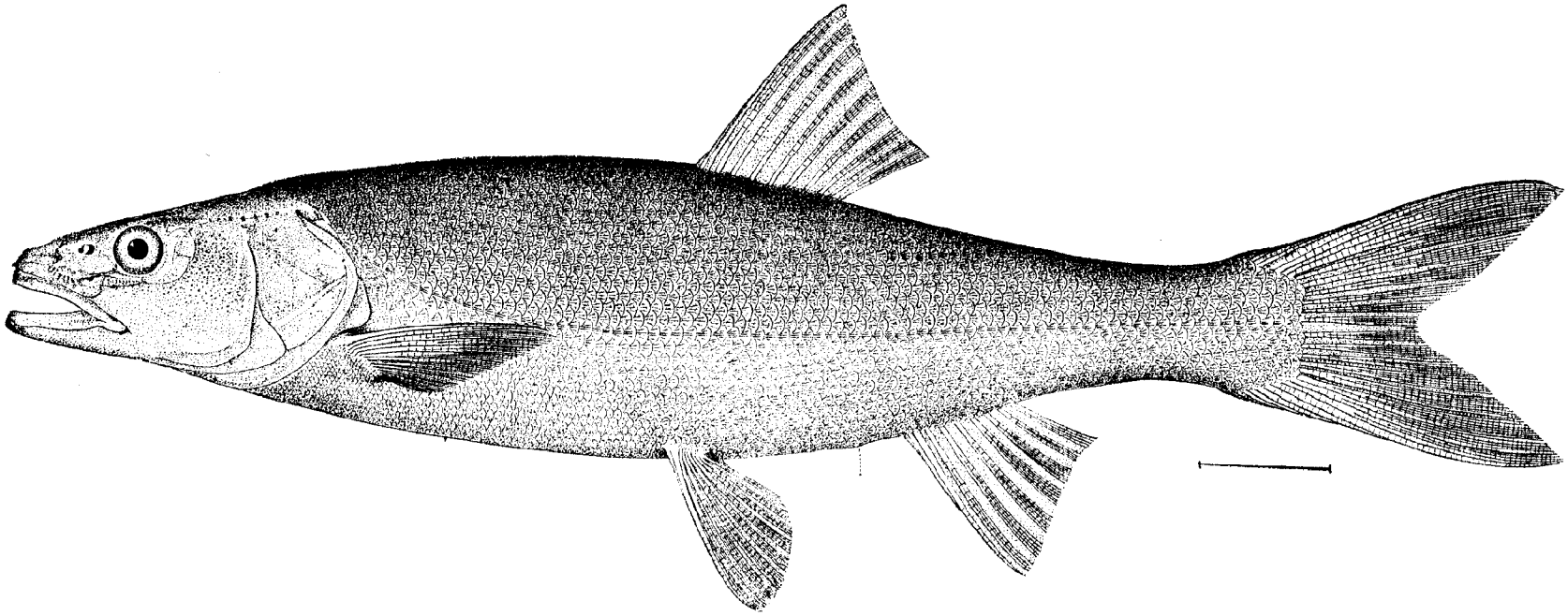
Drawing by H. L. Todd, from No. 20774, U. S. National Museum, collected at Normal, Illinois, 1877, by Prof. S. A. Forbes.



## THE GOLDEN SHINER OR BREAM.

Notemigonus chrysoleucus (Mitch.), Jordan. (p. 616.)

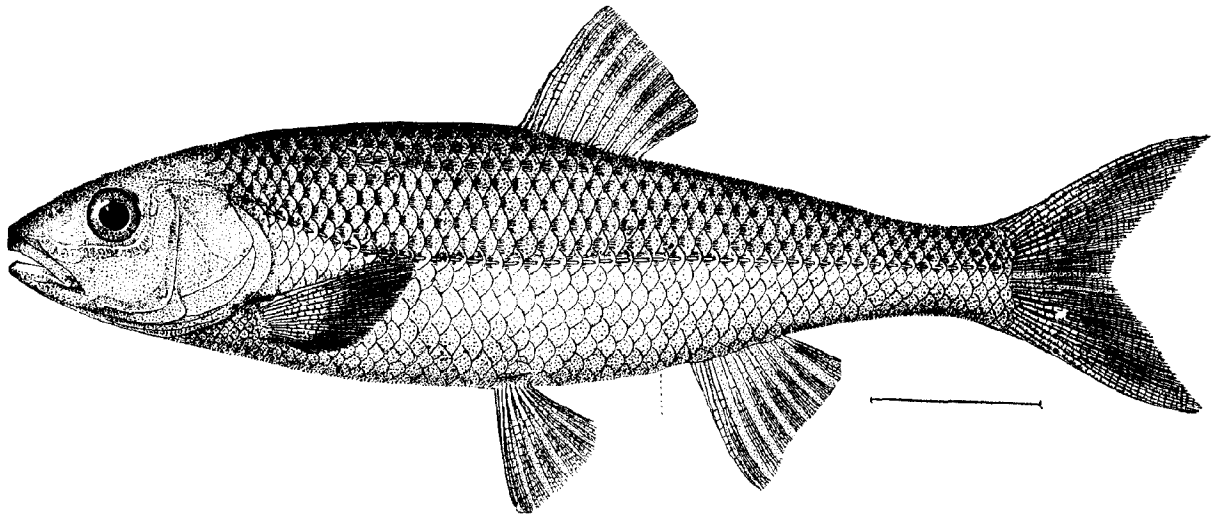
Drawing by H. L. Todd, from No. 20243, U. S. National Museum, collected at Hackensack River, 1875, by Prof. S. F. Baird.



## THE SACRAMENTO "PIKE."

Ptychochilus oregonensis (Rich.), Grd. (p. 616.)

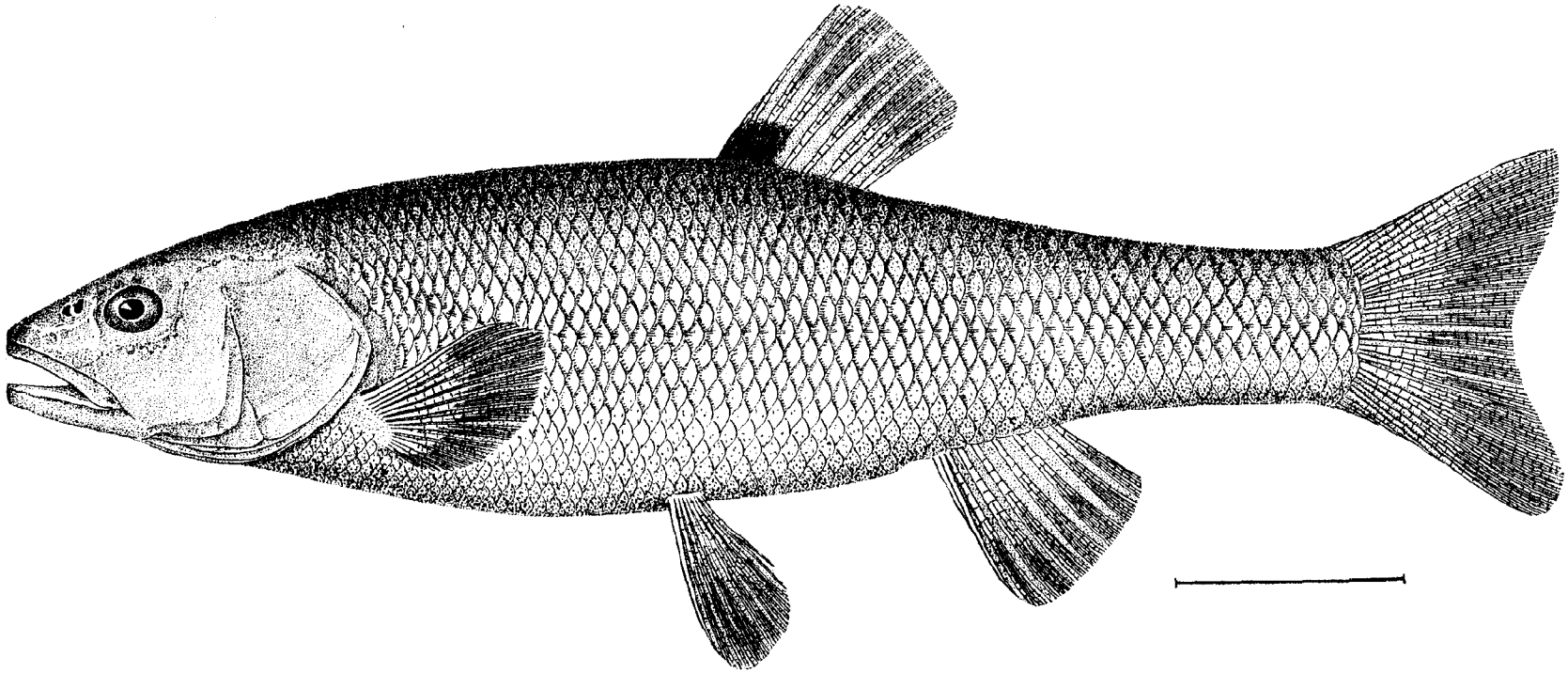
Drawing by H. L. Todd, from No. 27291, U. S. National Museum, collected at Columbia River, 1880, by Prof. D. S. Jordan.



## THE FALL-FISH OR SILVER CHUB.

Semotilus bullaris (Raf.), Jordan. (p. 616.)

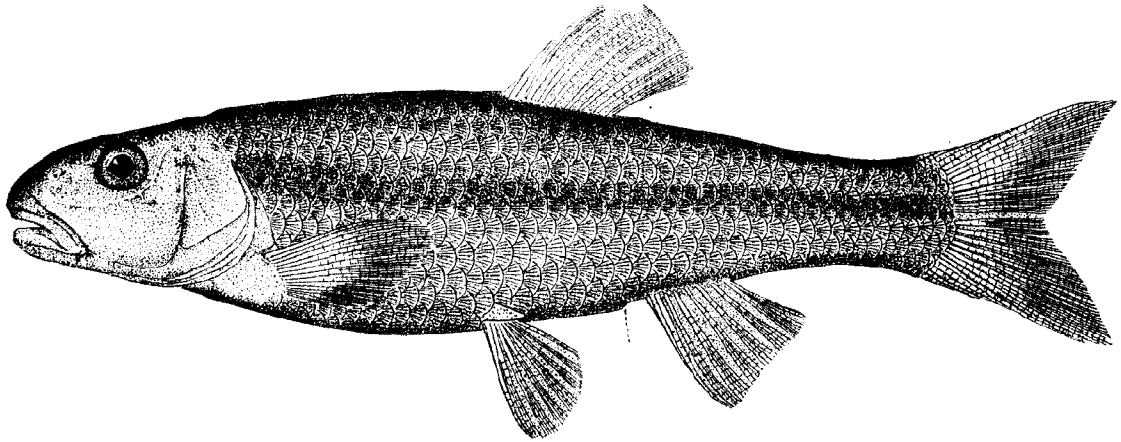
Drawing by H. L. Todd, from No. 15359, U. S. National Museum, collected at Bainbridge, Pennsylvania, May, 1875, by Dr. T. H. Bean.



## THE HORN DACE.

Semotilus corporalis (Mitch.), Putnam. (p. 617.)

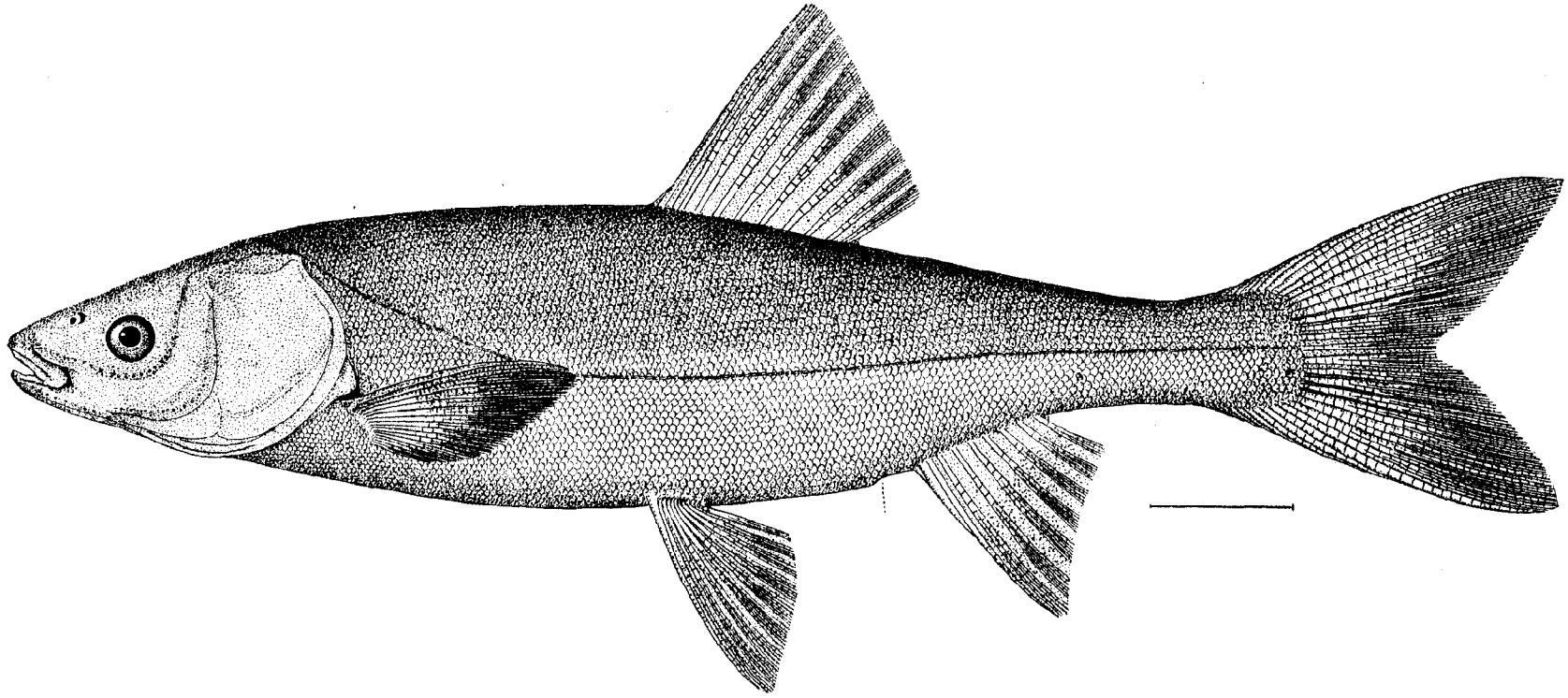
Drawing by H. L. Todd, from No. 19163, U. S. National Museum, collected at Aux Plains River by R. Kennicott.



## THE HORNY HEAD OR RIVER CHUB.

Ceratichthys biguttatus (Kirtland), Girard. (p. 617.)

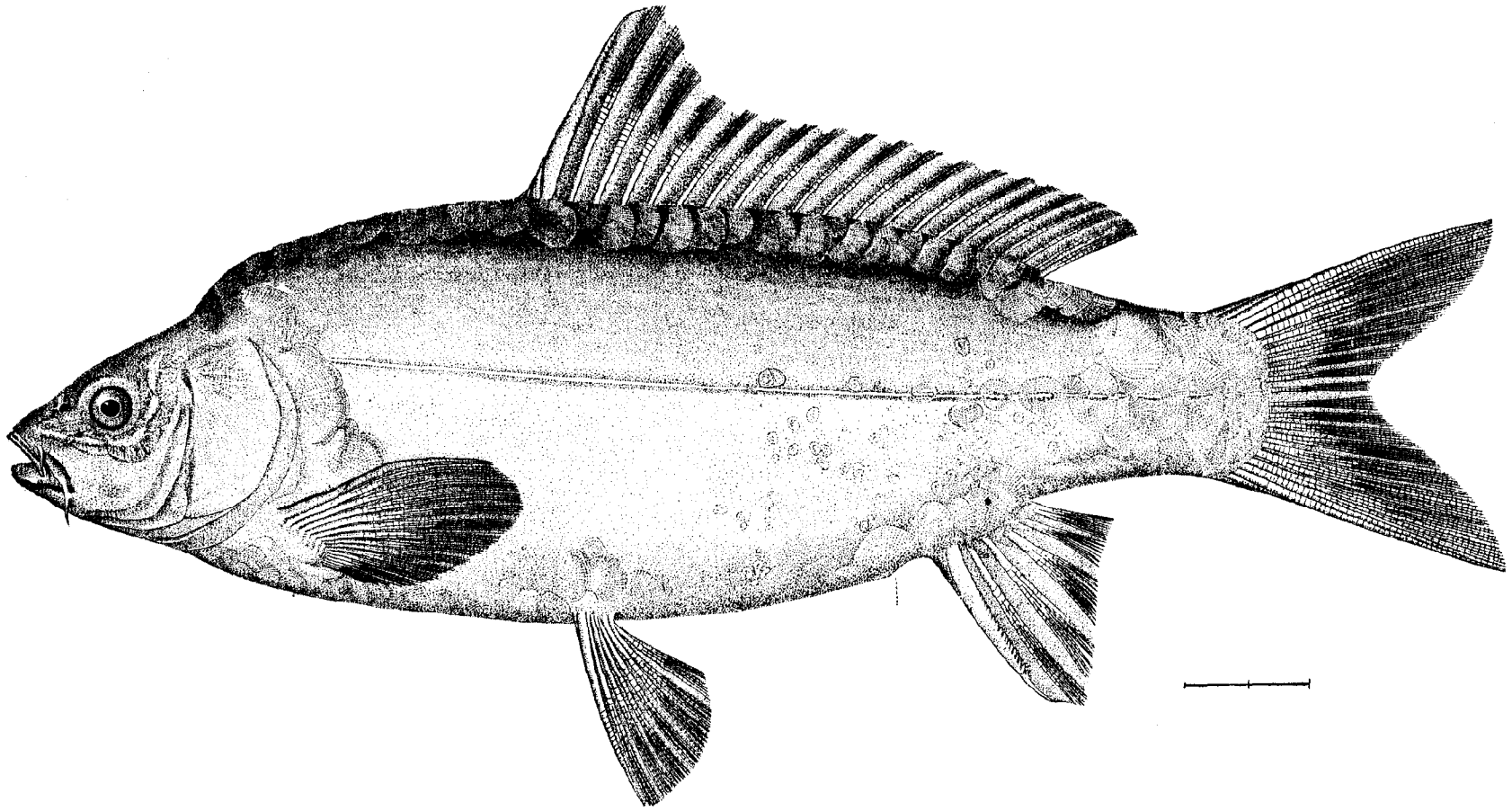
Drawing by H. L. Todd, from No. 16969, U. S. National Museum, collected at Bainbridge, Pennsylvania, 1875, by Dr. T. H. Bean.



## THE ORTHODON CHUB.

Orthodon microlepidotus (Ayres), Girard. (p. 618.)

Drawing by H. L. Todd, from No. 27139, U. S. National Museum, collected at Sacramento River, California, 1880, by Jordan and Gilbert.

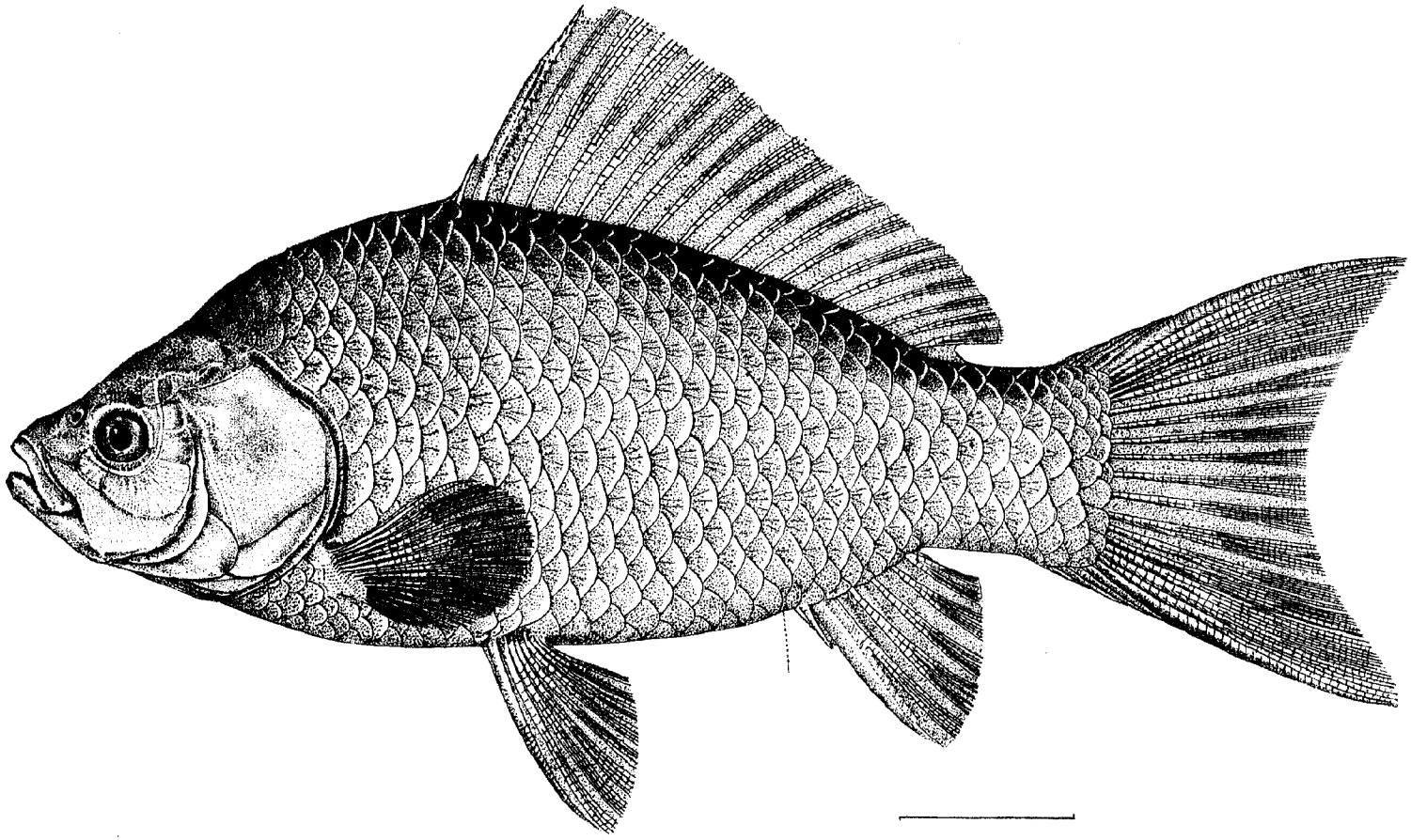


## THE LEATHER CARP.

Cyprinus carpio (var. coriaceus). (p. 618.)

Drawing by H. L. Todd, from No. 25217, U. S. National Museum, collected at the Carp Ponds, Washington, D. C., April 26, 1880, by U. S. Fish Commission.

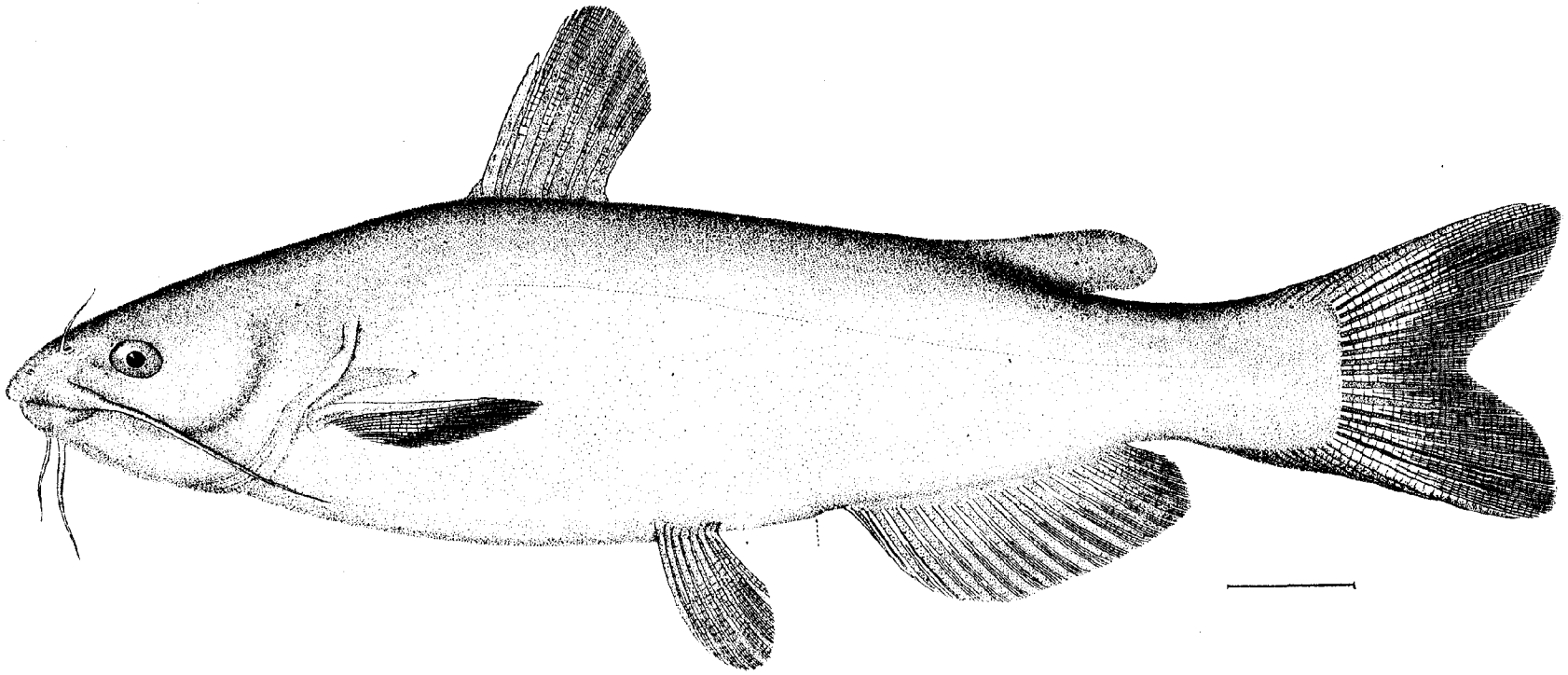
PLATE 230.



## THE GOLD FISH.

Carassius auratus (L.), Bleeker.

Drawing by H. L. Todd, from No. 22107, U. S. National Museum, collected at the Carp Ponds, Washington, D. C., January 24, 1878, by William Palmer.

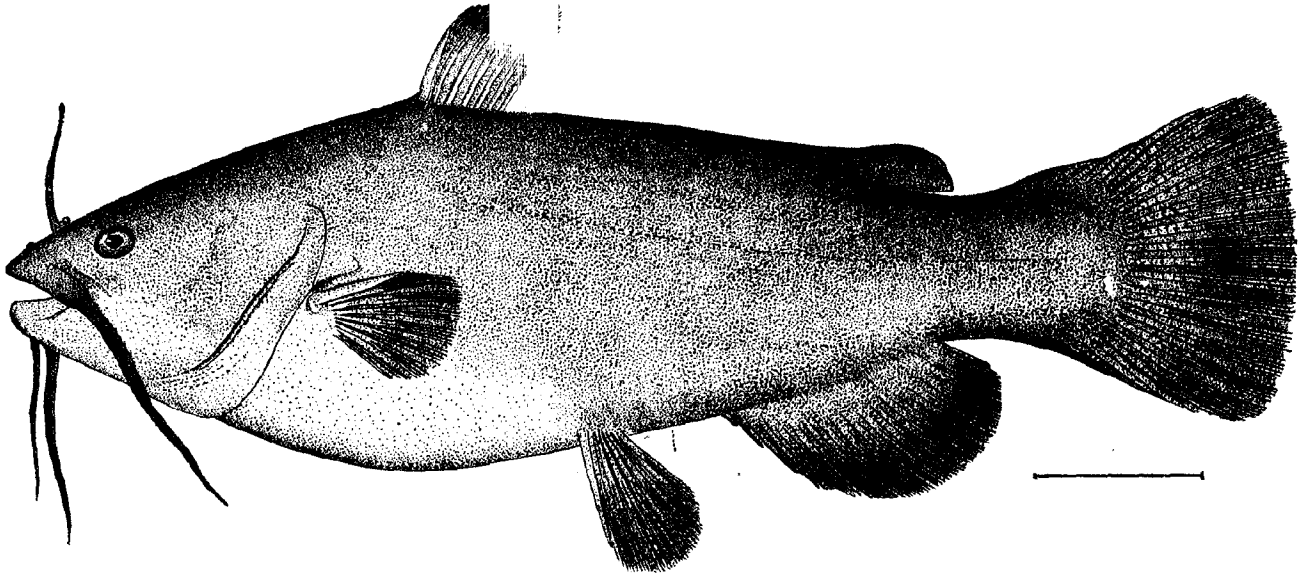


## THE CHANNEL CATFISH OF THE POTOMAC.

Ictalurus albidus (Le S.), J. & G. (p. 628.)

Drawing by H. L. Todd, from No. 20925, U. S. National Museum, collected at Potomac River, 1877, by Prof. D. S. Jordan.

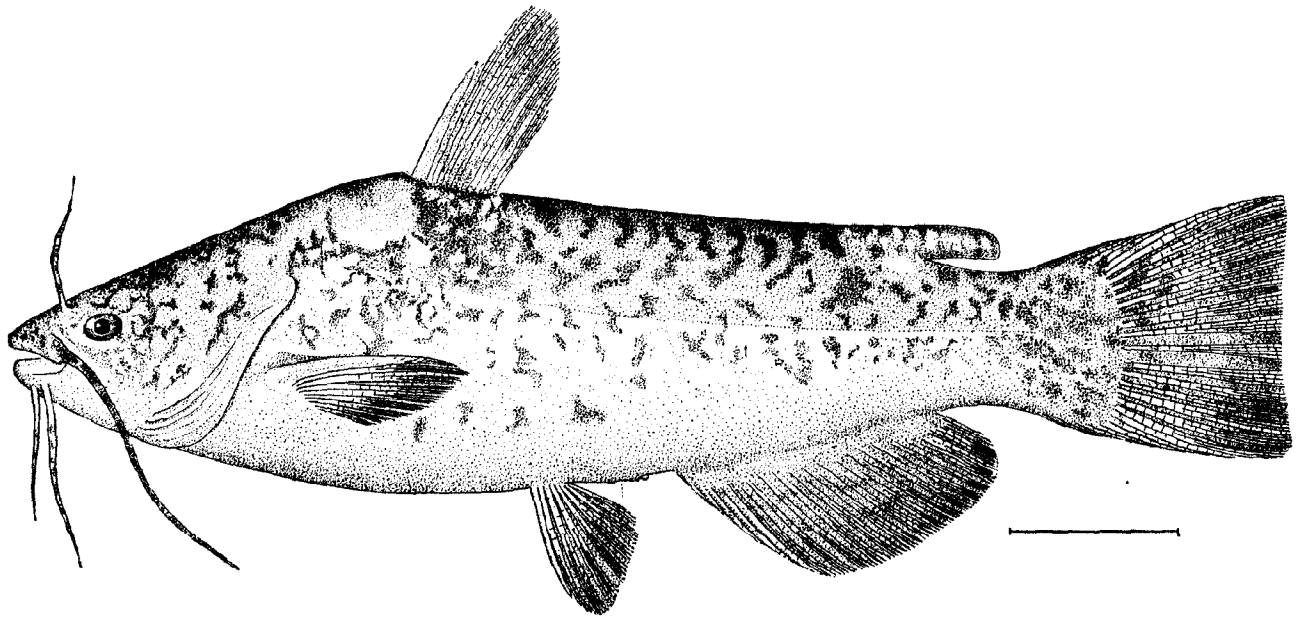
PLATE 232.



## THE BULL-HEAD.

Amiurus melas (Raf.), Jord. & Copeland. (p. 628.)

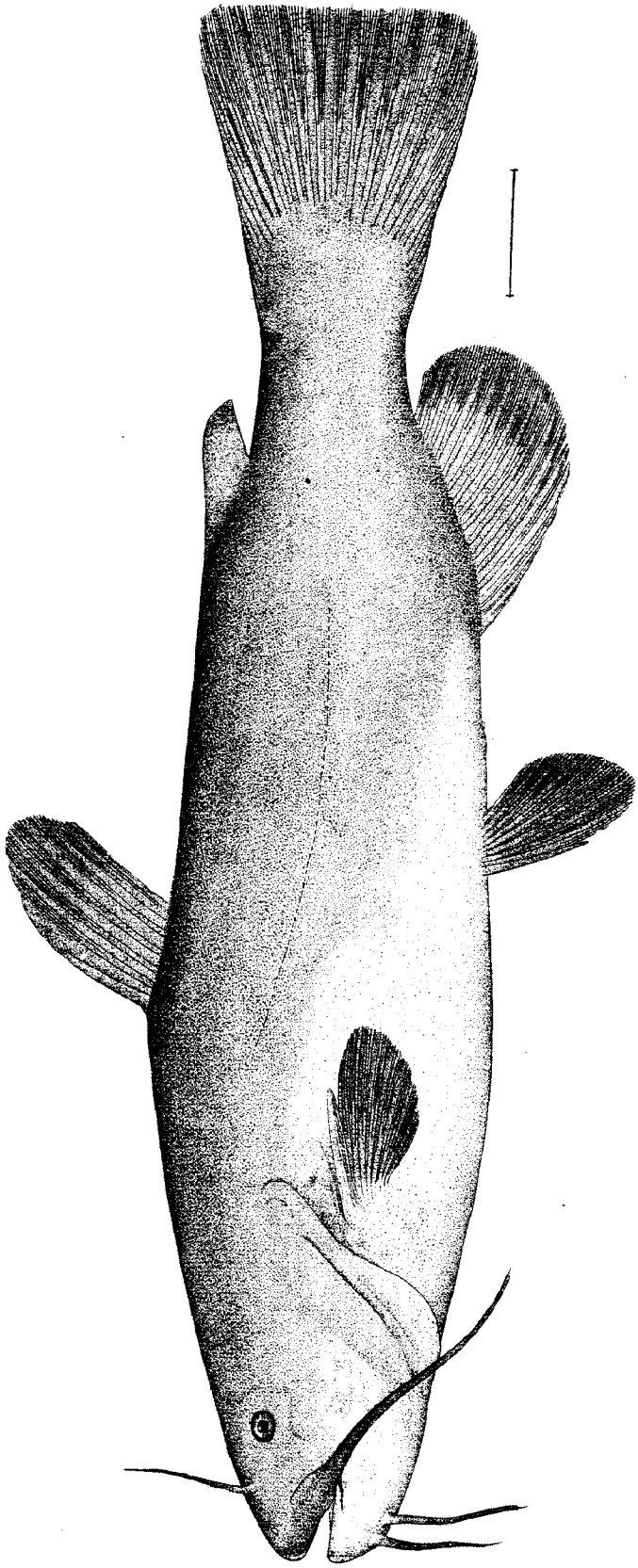
Drawing by H. L. Todd, from No. 1497, U. S. National Museum, collected at Aux Plains River by R. Kennicott.



## THE BULL-HEAD OR CATFISH.

Amiurus catus (L.), Gill.

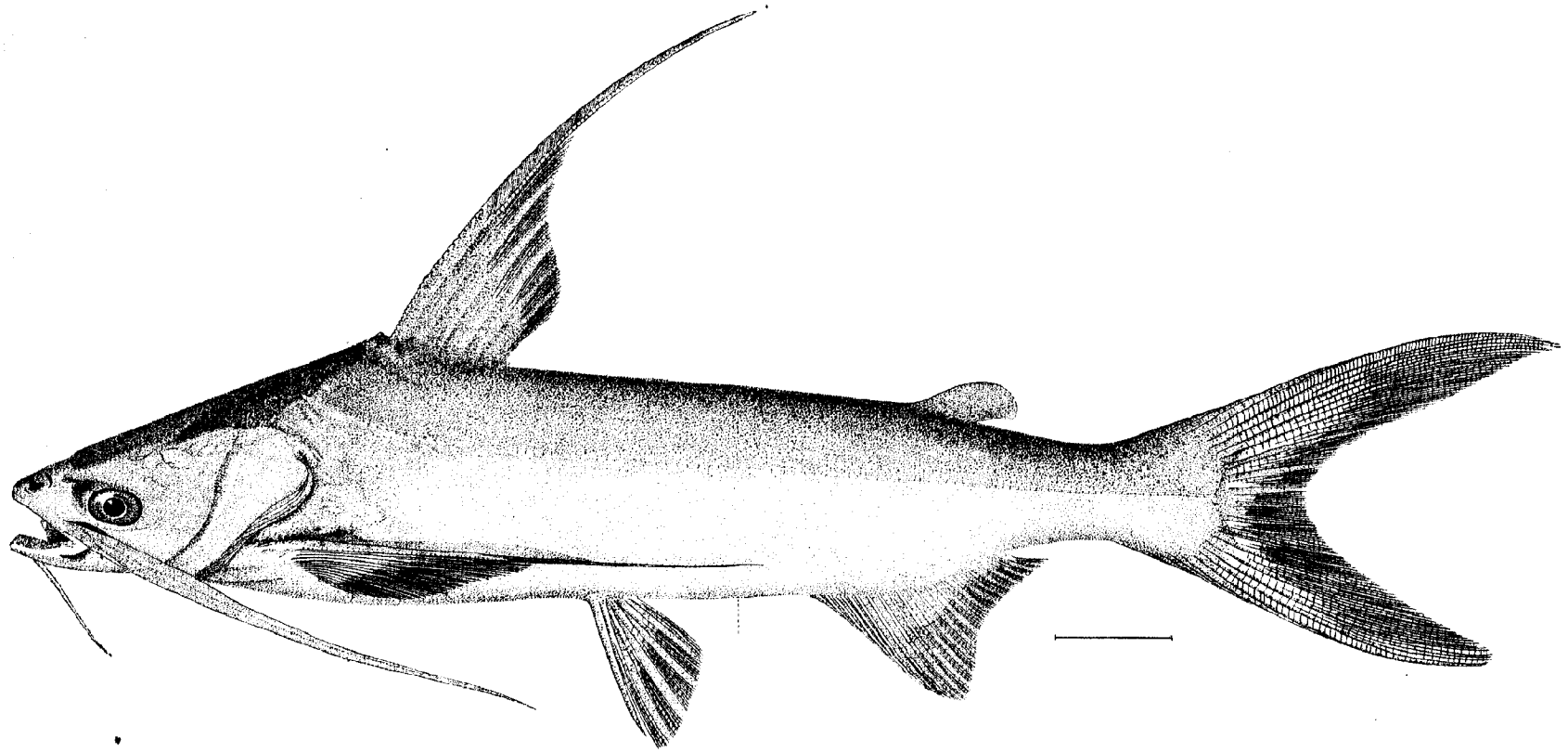
Drawing by H. L. Todd, from No. 33075, U. S. National Museum, collected at Havre de Grace, Md., June, 1882, by Dr. T. H. Bean.



## THE BULL-HEAD.

**Amiurus vulgaris (Thompson), Nelson.**

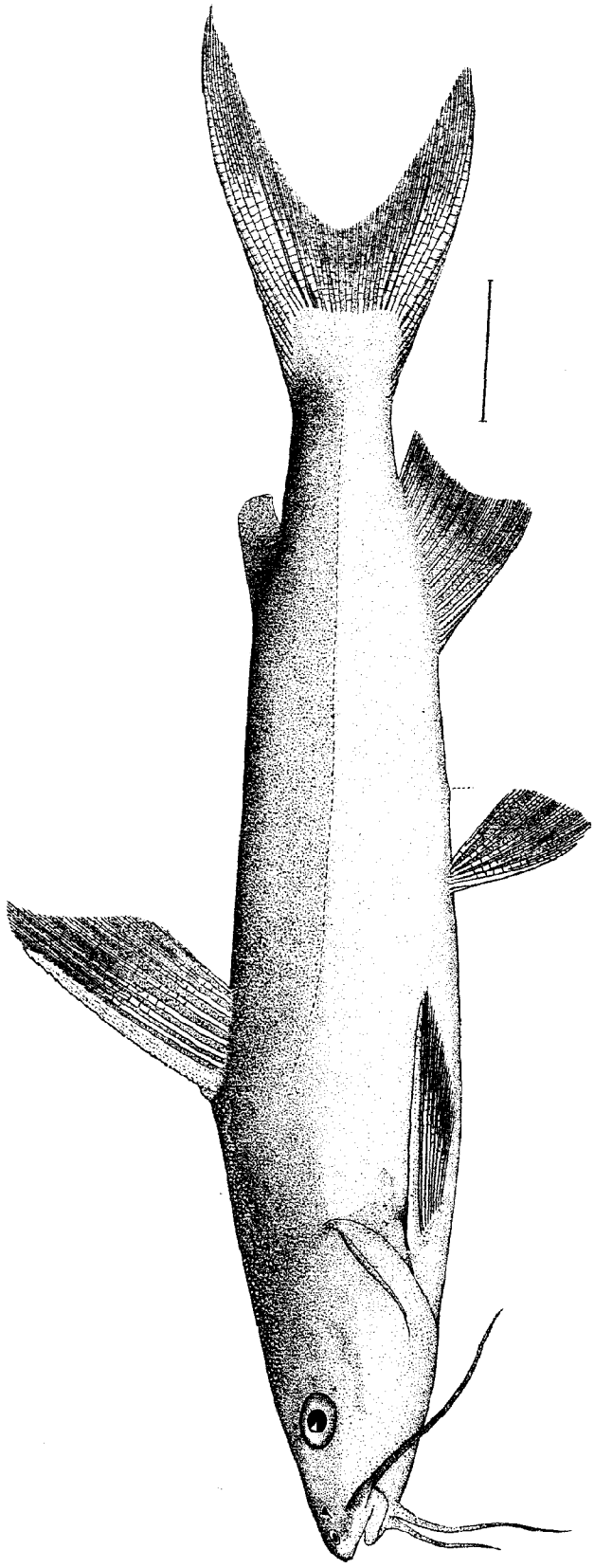
Drawing by H. L. Todd, from No. 31946, U. S. National Museum, collected at Winnepeg, Manitoba, 1883, by Historical and Scientific Society.



## THE GAFF TOPSAIL CATFISH.

Ælurichthys marinus (Mitch.), B. & G. (p. 628.)

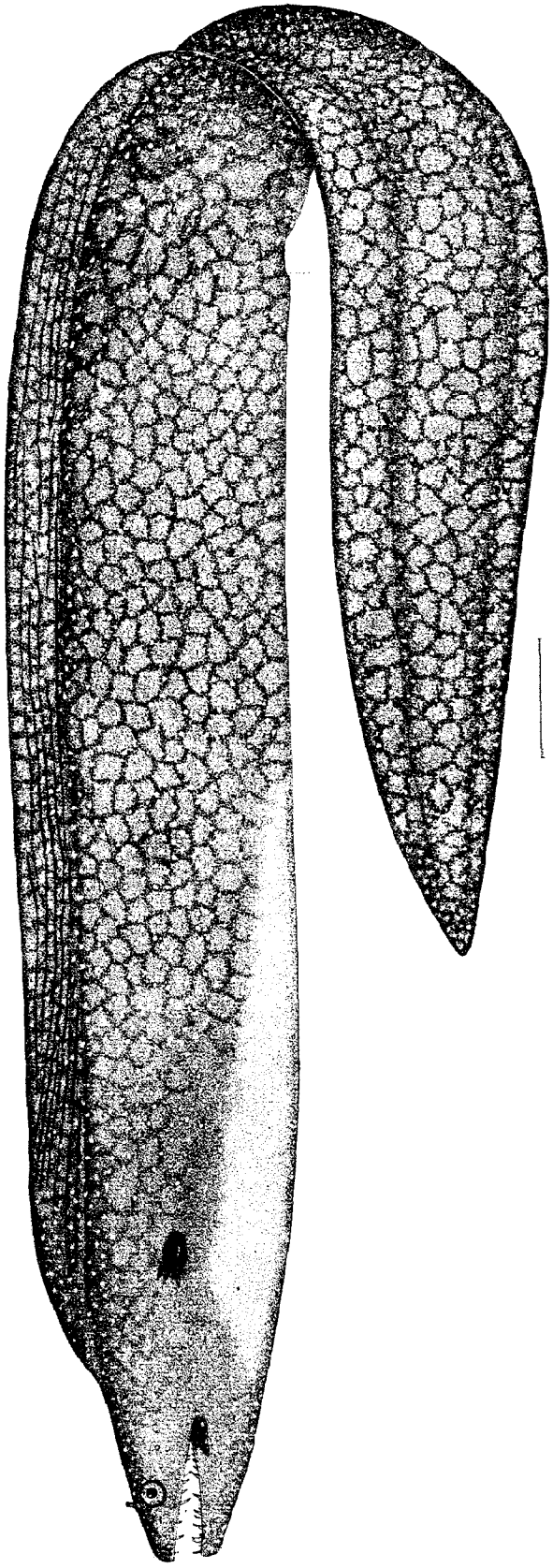
Drawing by H. L. Todd, from No. 10422, U. S. National Museum, collected at Wood's Holl, Mass., 1871, by Prof. S. F. Baird.



## THE SALT-WATER CATFISH.

Arius felis (L.), J. & G. (p. 629.)

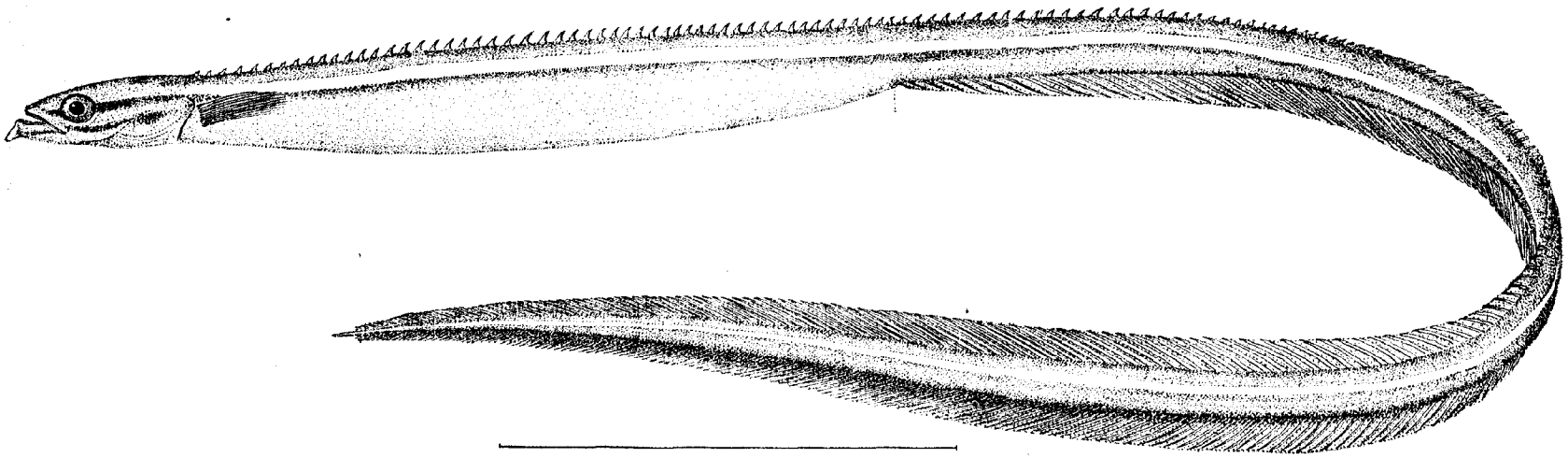
Drawing by H. L. Todd, from No. 2487, U. S. National Museum, collected at Pensacola, Fla., 1878, by Silas Stearns.



THE SPOTTED MORAY.

Gymnothorax moringa (Cuv.), Goode & Bean. (p. 629.)

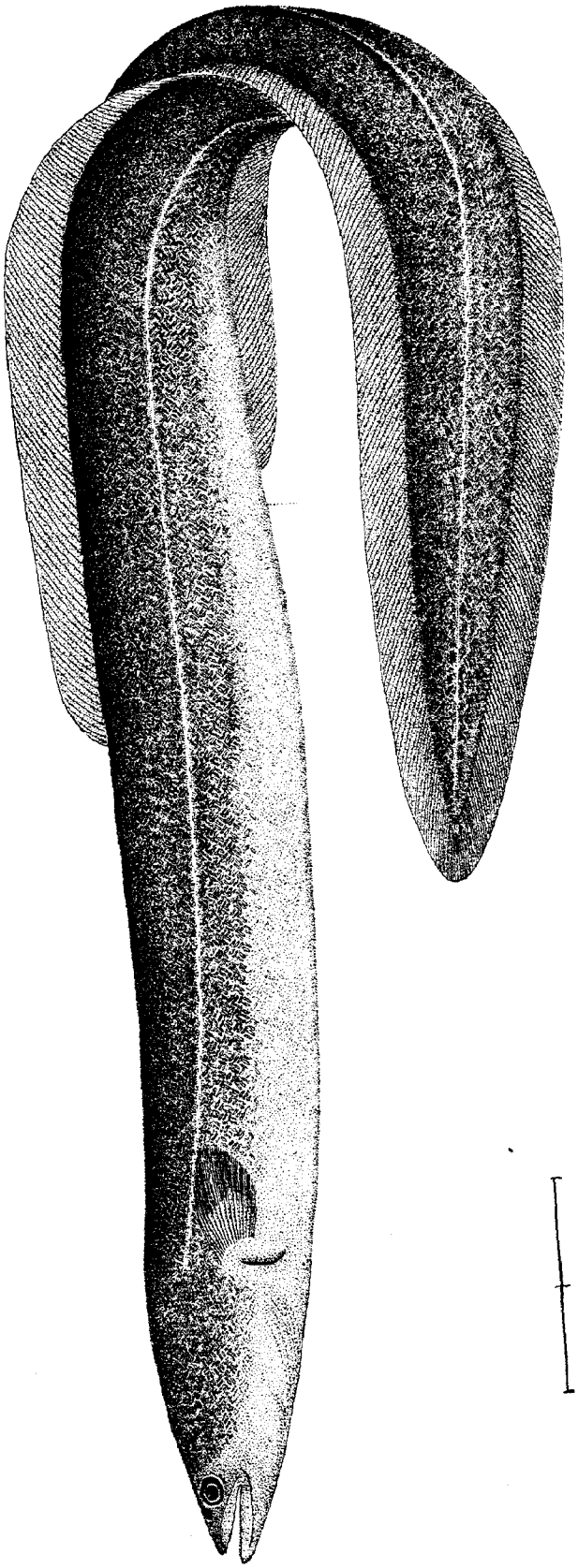
Drawing by H. L. Todd, from No. 6994, U. S. National Museum, collected at Garden Key, Florida.



## THE SPINY-BACK EEL.

Ptilichthys Goodei, Bean.

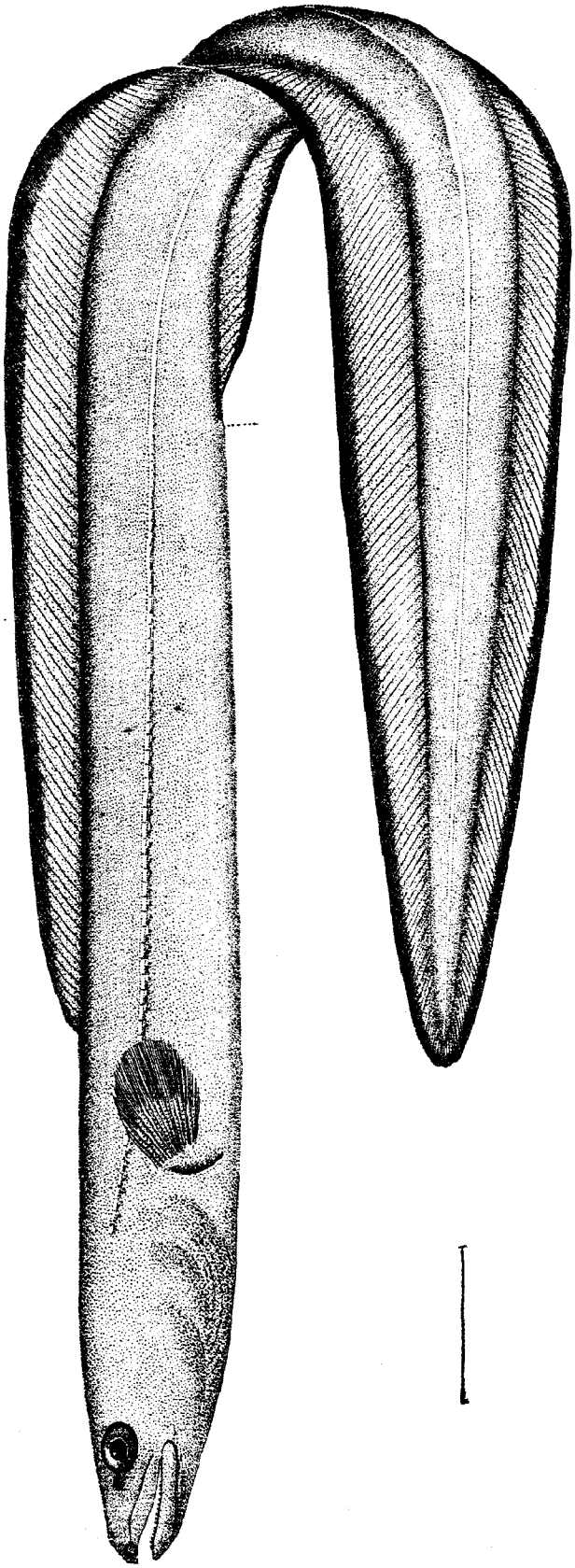
Drawing by H. L. Todd, from No. 26619, U. S. National Museum, collected at Iliuliuk, Alaska, July 28, 1880, by Dall & Bean.



## THE COMMON EEL.

Anguilla vulgaris, Turton. (p. 630.)

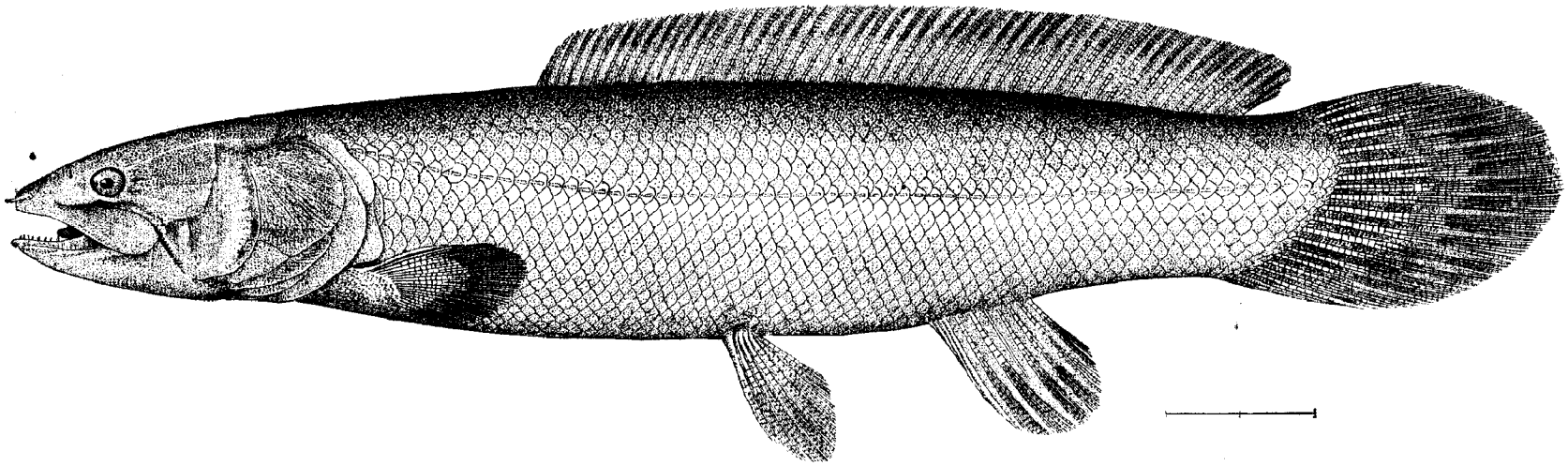
Drawing by H. L. Todd, from No. 20470, U. S. National Museum, collected at Holyoke, Mass., 1876, by U. S. Fish Commission.



## THE CONGER SEA EEL.

Leptocephalus conger (L.), J. & G. (p. 656.)

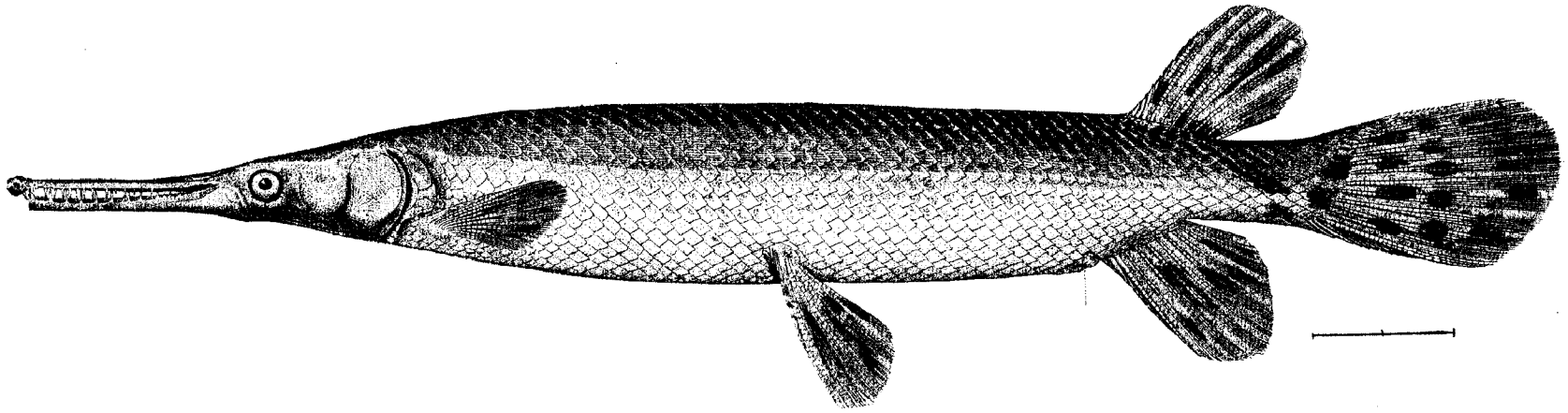
Drawing by H. L. Todd, from No. 16027, U. S. National Museum, collected at Noank, Conn., October 18, 1874, by J. H. Latham.



## THE BOWFIN OR MUDFISH.

Amia calva, L. (p. 659.)

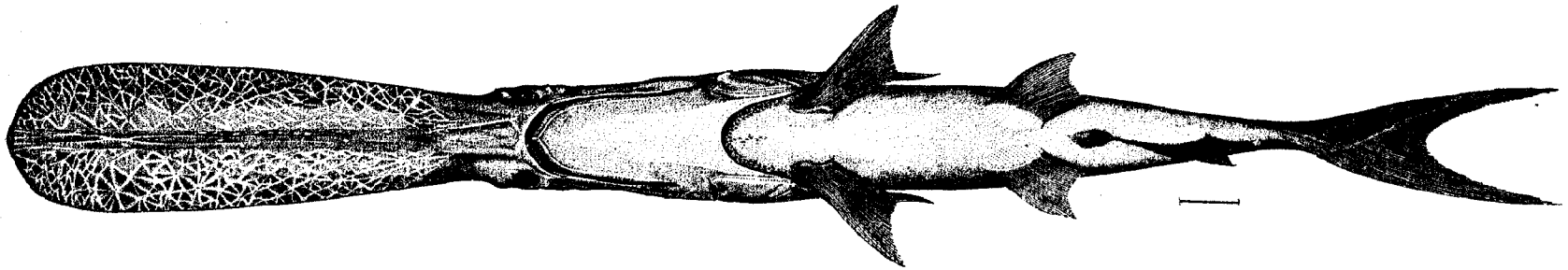
Drawing by H. L. Todd, from No. 6702, U. S. National Museum.



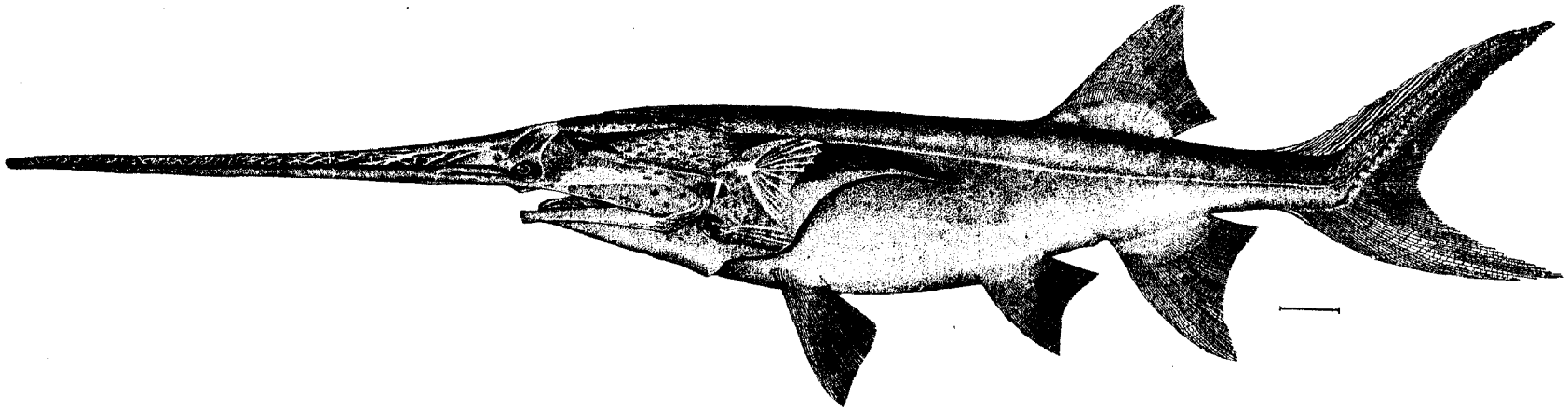
## THE SHORT-NOSED GAR PIKE.

Lepidosteus platystomus, Raf. (p. 664.)

Drawing by H. L. Todd, from No. 3241, U. S. National Museum, collected at Cleveland, Ohio, by Prof. S. F. Baird.



UNDER VIEW.

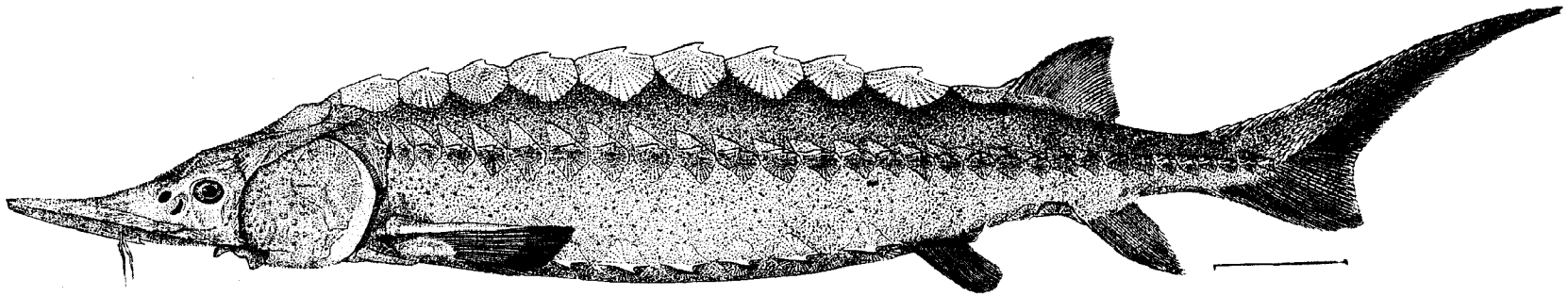


SIDE VIEW.

## THE PADDLE-FISH.

Polyodon spatula (Walb.), J. & G. (p. 660.)

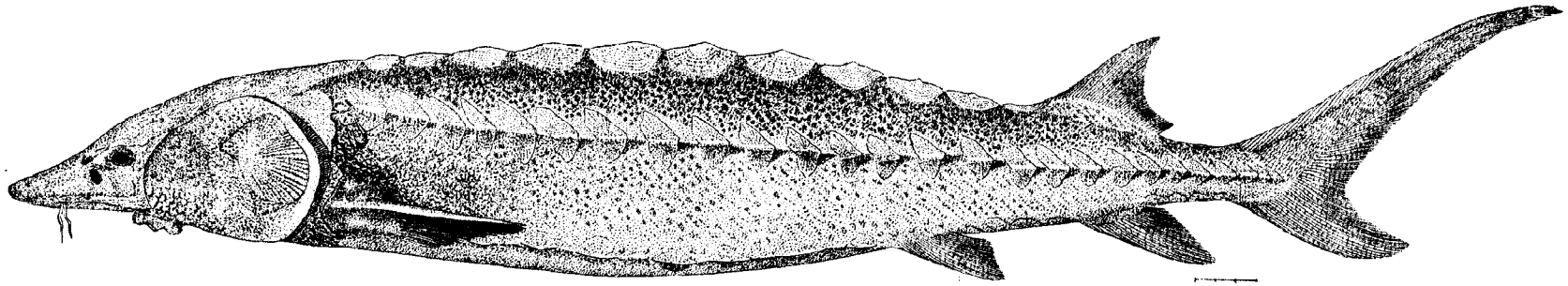
Drawings by H. L. Todd, from No. 12235, U. S. National Museum, collected at Cincinnati, Ohio, by J. W. Milner.



## THE COMMON STURGEON.

Acipenser sturio L. (=A. oxyrhynchus). (p. 660.)

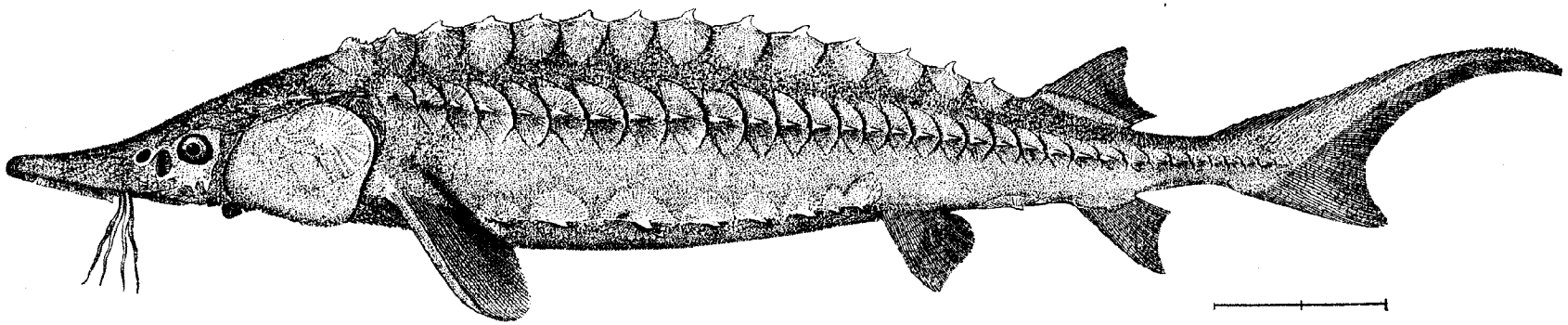
Drawing by H. L. Todd, from No. 22495, U. S. National Museum, collected in Potomac River by William Woltz.



## THE SHORT-NOSED STURGEON.

Acipenser brevirostris, Le S.). (p. 660.)

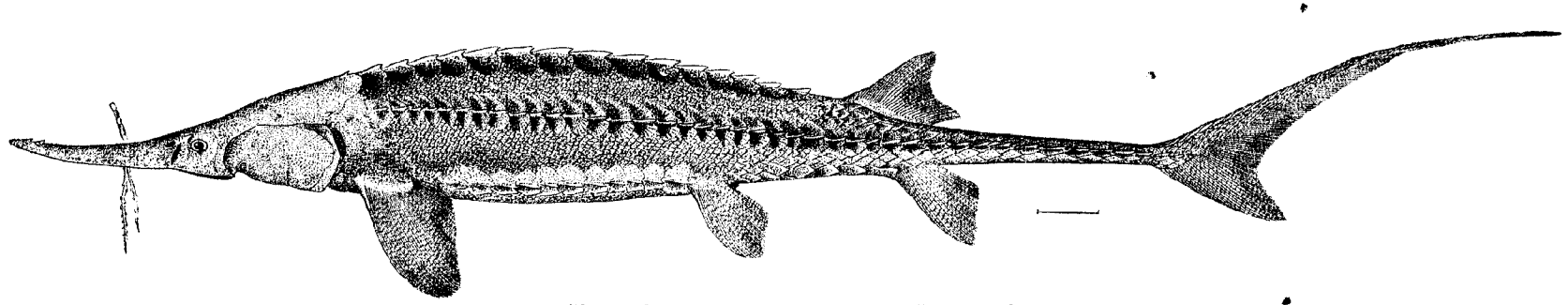
Drawing from a photograph of a specimen collected at Wood's Holl, Mass., 1871.



## THE LAKE STURGEON.

Acipenser rubicundus, Le S. (p. 661.)

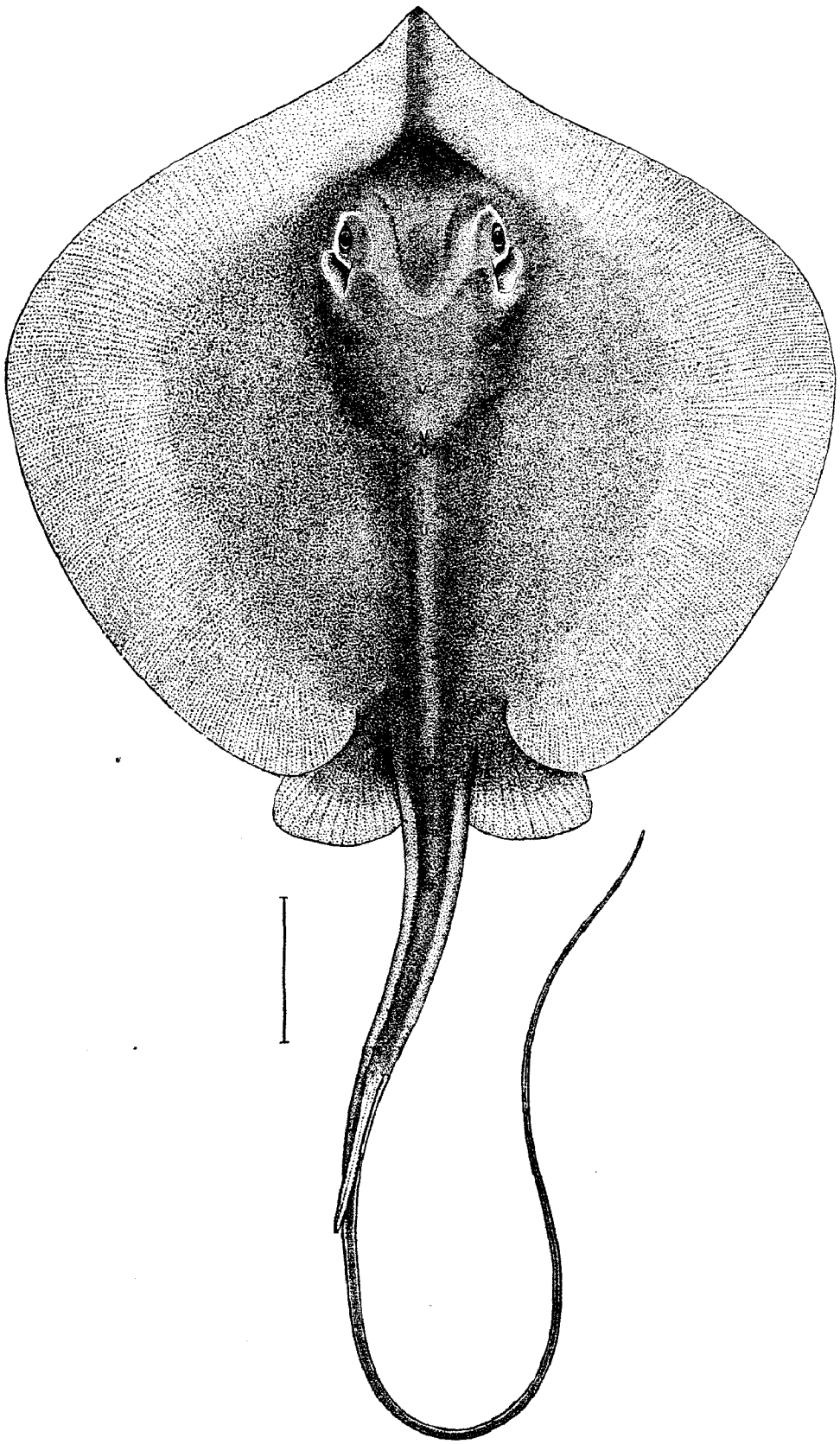
Drawing by H. L. Todd, from No. 10252, U. S. National Museum, collected at Ecorse, Michigan, by J. W. Milner.



## THE SHOVEL-NOSE STURGEON.

Scaphirhynchus platyrhynchus (Raf.), Gill. (p. 663.)

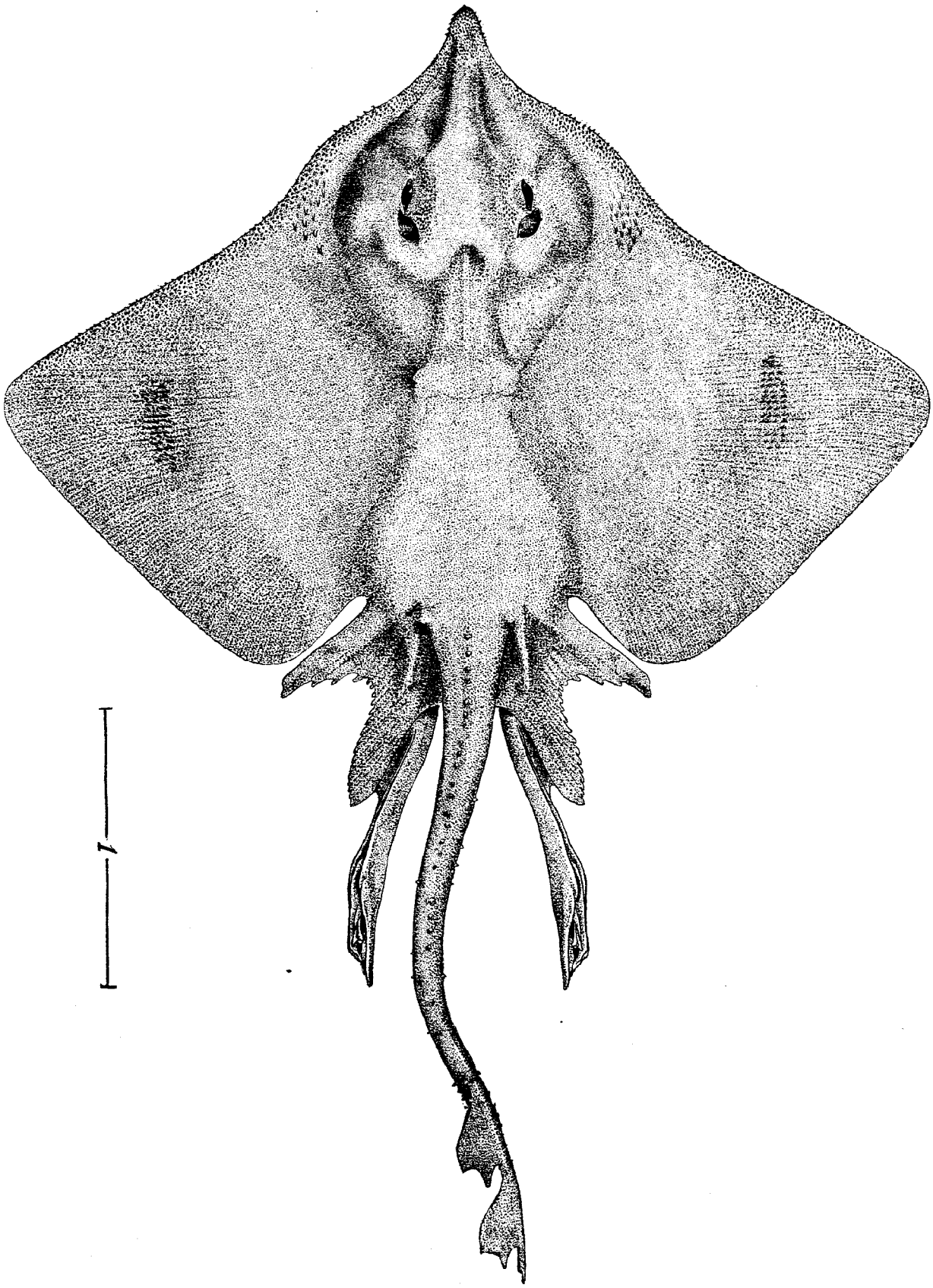
Drawing by H. L. Todd, from No. 22159, U. S. National Museum, collected at Mount Carmel, Illinois, 1878, by Robert Ridgway.



## THE SOUTHERN STING RAY.

Trygon sabina, Le S. (p. 665.)

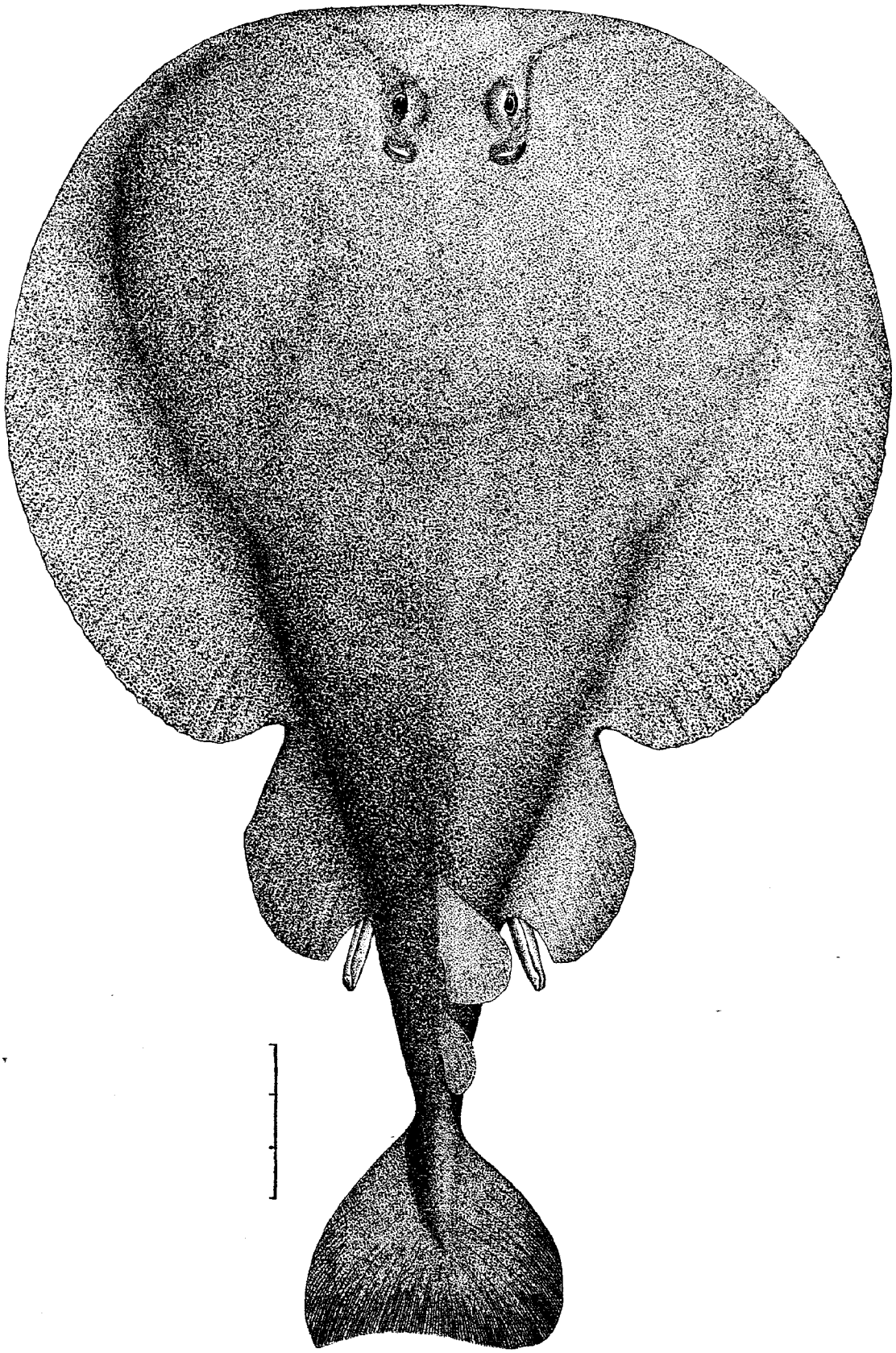
Drawing by H. L. Todd, from No. 31043, U. S. National Museum, collected at Galveston, Texas, by Prof. D. S. Jordan.



THE BARN-DOOR SKATE.

Raia lævis, Mitchill. (p. 667.)

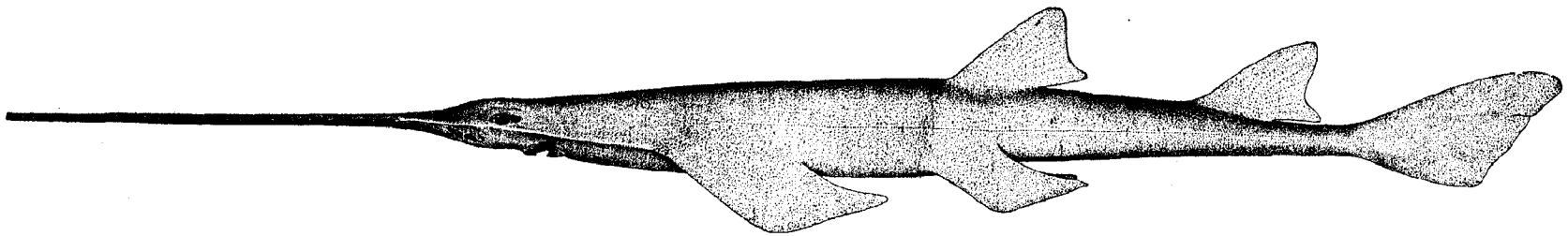
Drawing by H. L. Todd, from No. 21577, U. S. National Museum, collected at Gloucester, Massachusetts, October, 1878, by U. S. Fish Commission.



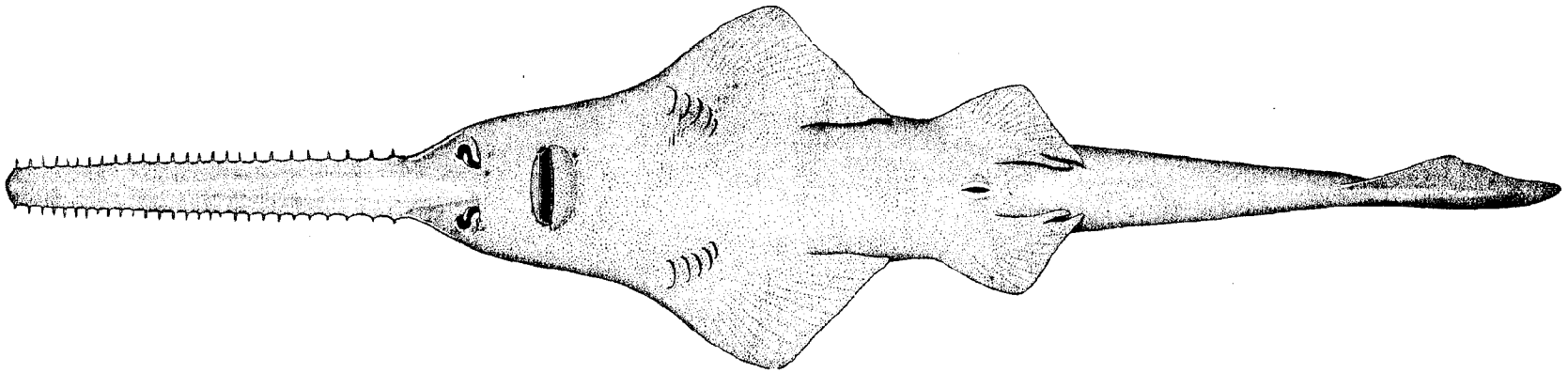
## THE TORPEDO.

Torpedo occidentalis, Storer. (p. 667.)

Drawing by H. L. Todd, from cast of specimen in U. S. National Museum, collected at Wood's Holl, Mass., 1871, by U. S. Fish Commission.



SIDE VIEW.

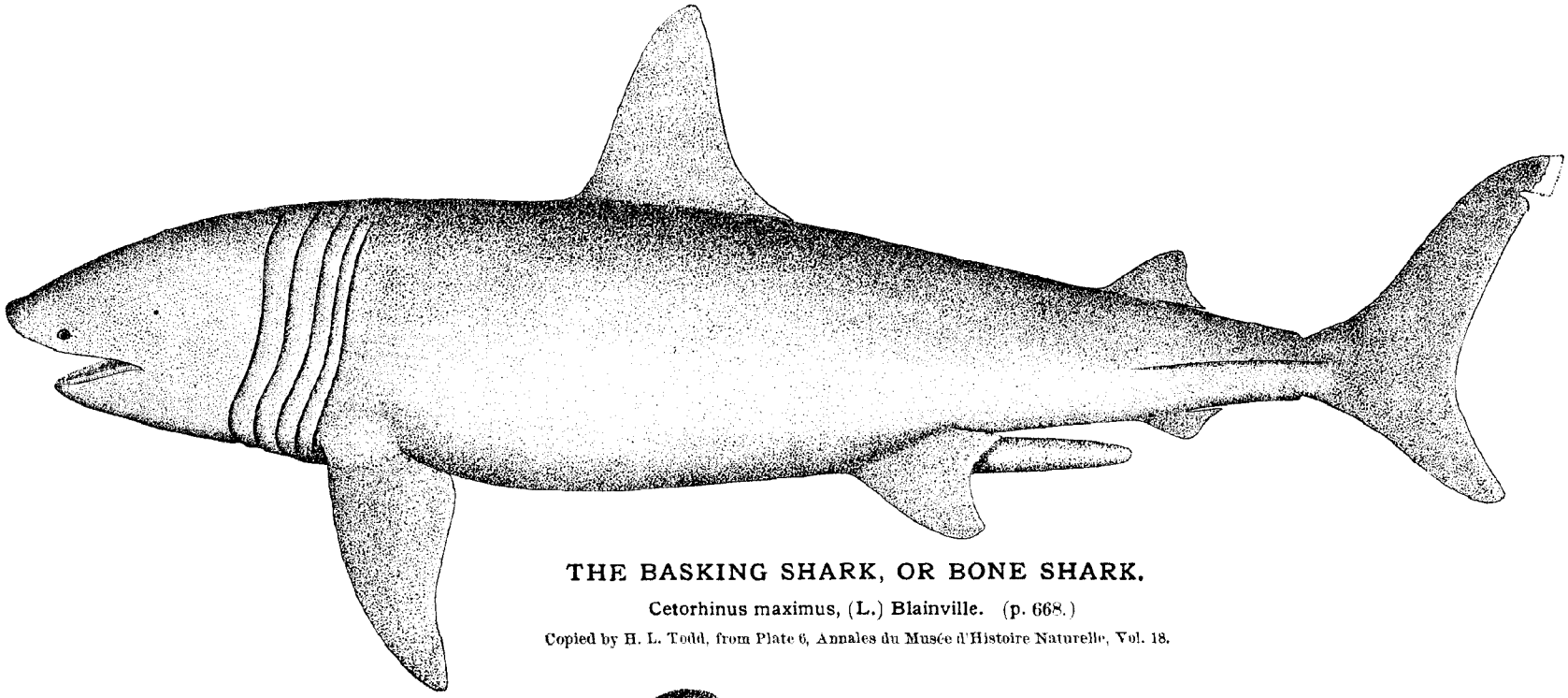


UNDER VIEW.

## THE SAWFISH.

Pristis pectinatus, Latham. (p. 668.)

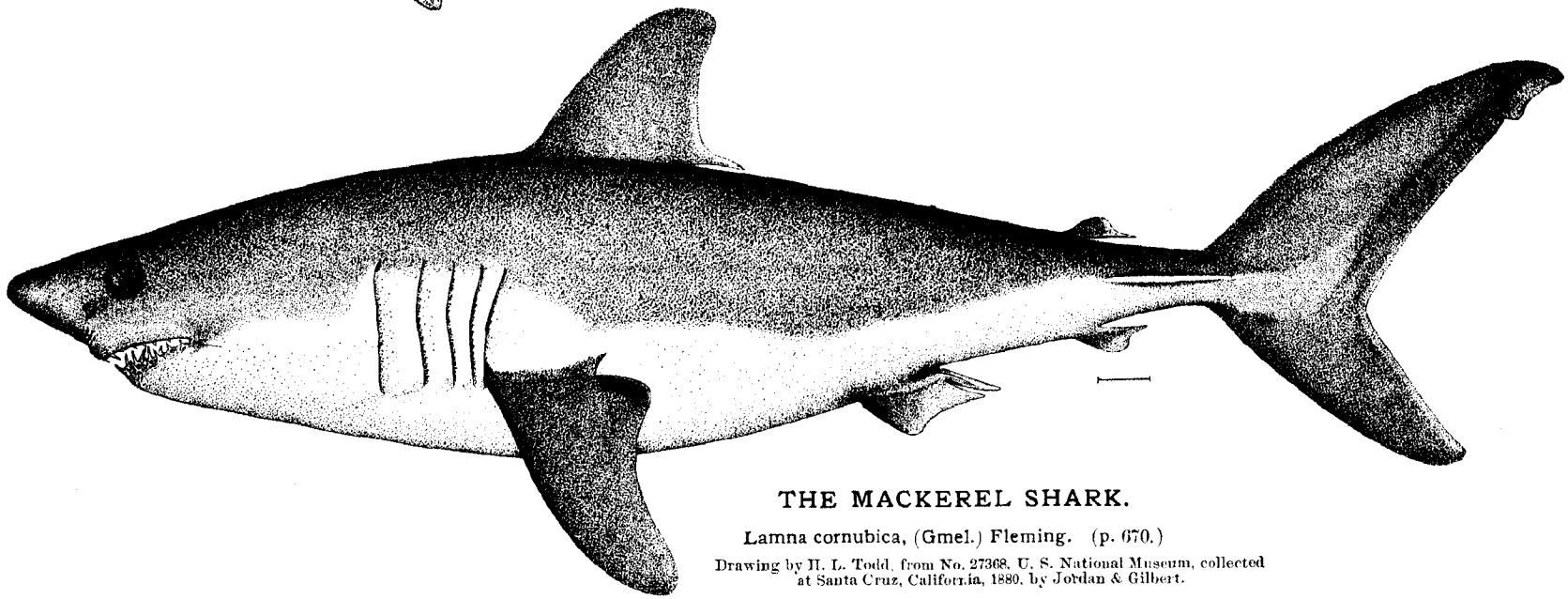
Drawings by H. L. Todd, from No. 30678, U. S. National Museum, collected at Pensacola, Florida, by Silas Stearns.



## THE BASKING SHARK, OR BONE SHARK.

Cetorhinus maximus, (L.) Blainville. (p. 668.)

Copied by H. L. Todd, from Plate 6, Annales du Musée d'Histoire Naturelle, Vol. 18.

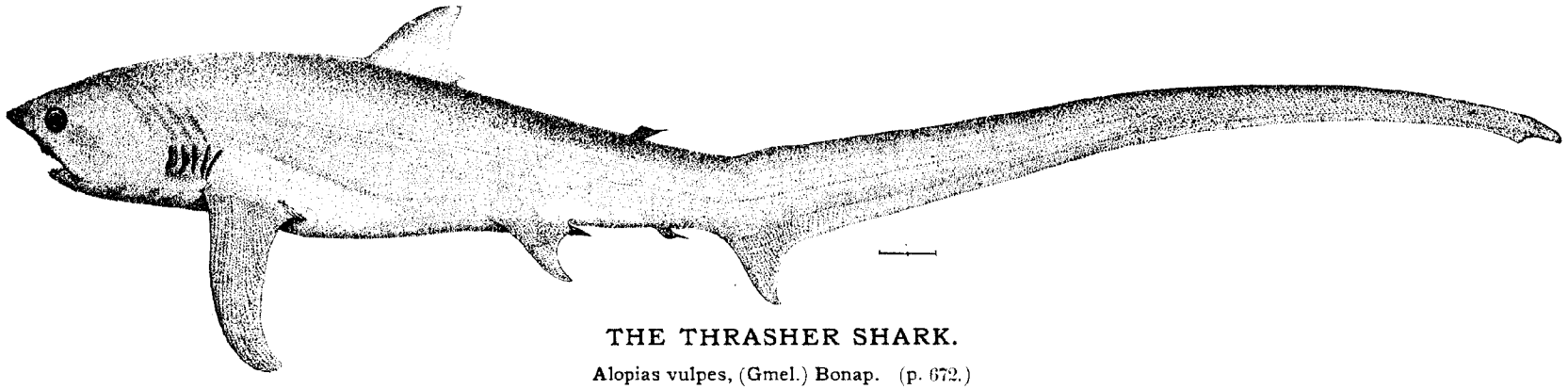


## THE MACKEREL SHARK.

Lamna cornubica, (Gmel.) Fleming. (p. 670.)

Drawing by H. L. Todd, from No. 27368, U. S. National Museum, collected at Santa Cruz, California, 1880, by Jordan & Gilbert.

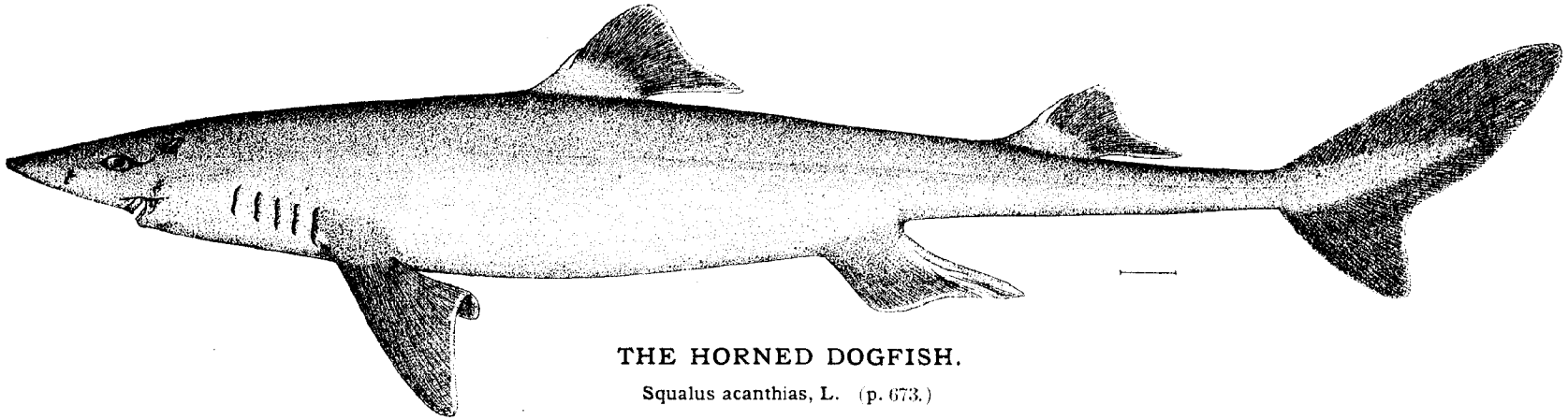
PLATE 249.



## THE THRASHER SHARK.

Alopias vulpes, (Gmel.) Bonap. (p. 672.)

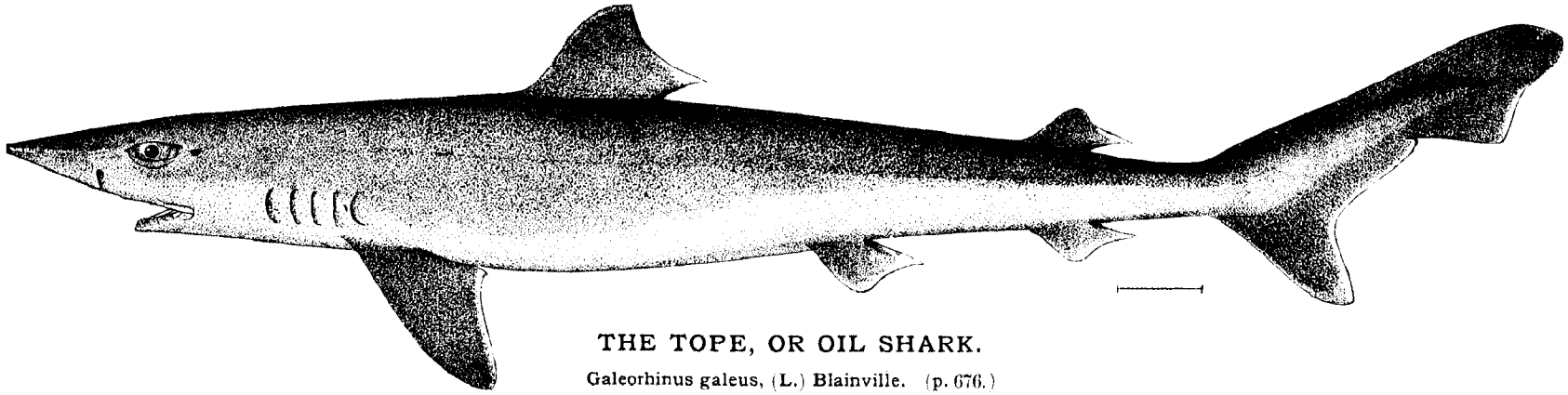
Drawing by H. L. Todd, from No. 25962, U. S. National Museum, collected at Eastern Point, Newport, Rhode Island, August 11, 1880, by Captain Rocklift.



## THE HORNED DOGFISH.

Squalus acanthias, L. (p. 673.)

Drawing by H. L. Todd, from No. 22316, U. S. National Museum, collected at Gloucester, Mass., 1878, by U. S. Fish Commission.



## THE TOPE, OR OIL SHARK.

Galeorhinus galeus, (L.) Blainville. (p. 676.)

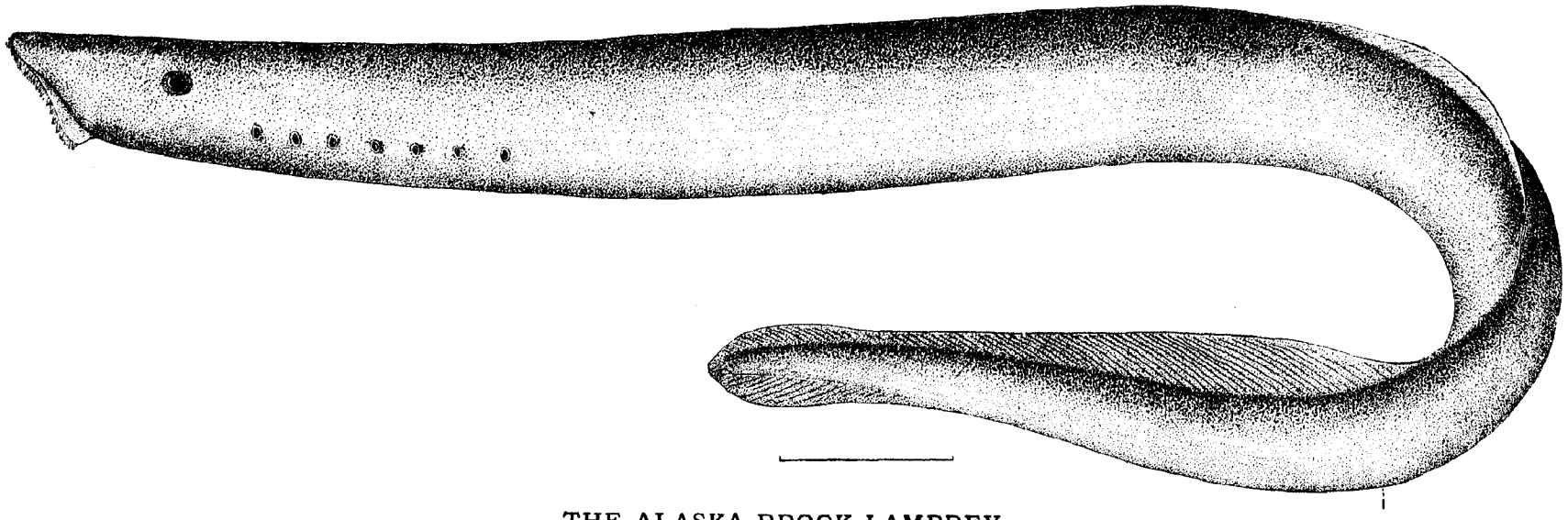
Drawing by H. L. Todd, from No. 26973, U. S. National Museum, collected at Monterey, California, 1880, by Jordan & Gilbert.

PLATE 250.

## THE SEA LAMPREY.

Petromyzon marinus, L. (p. 677.)

Drawing by H. L. Todd, from No. 10654, U. S. National Museum, collected at Wood's Holl, Massachusetts, by Vinal N. Edwards.

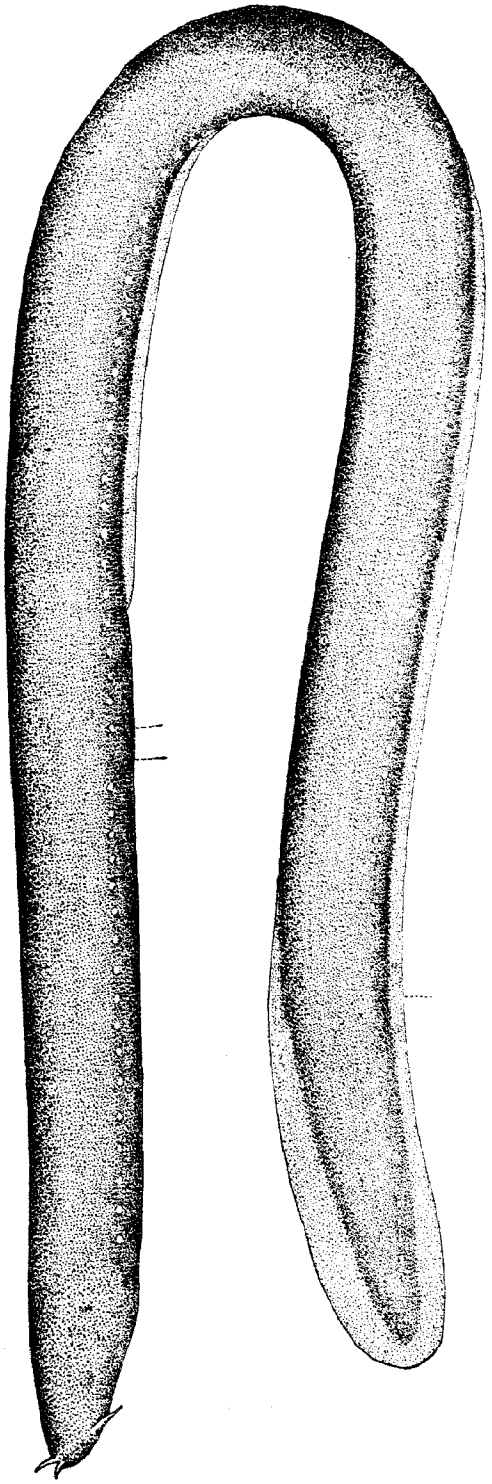


## THE ALASKA BROOK LAMPREY.

Ammocœtes aureus, Bean. (p. 679.)

Drawing by H. L. Todd, from No. 21524, U. S. National Museum, collected at Yukon River, Alaska, by L. M. Turner.

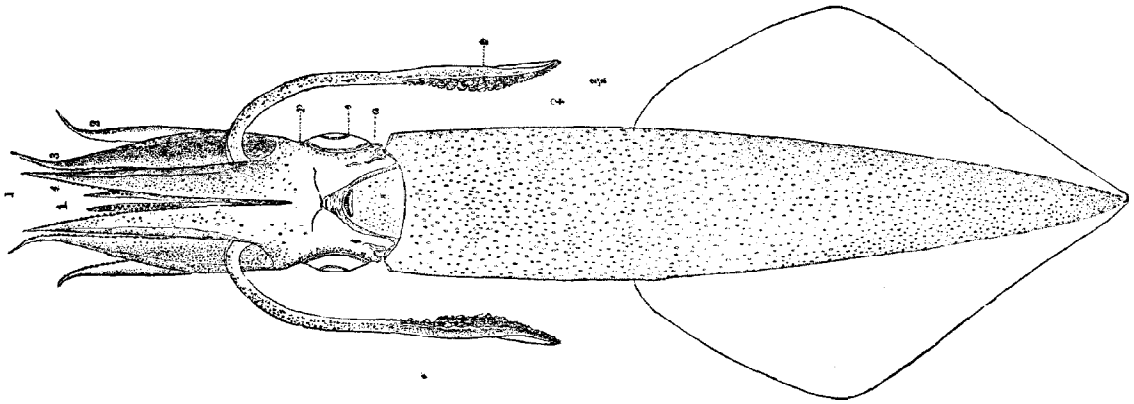
PLATE 251.



## THE SLIME EEL, OR HAG.

Myxine glutinosa, L. (p. 681.)

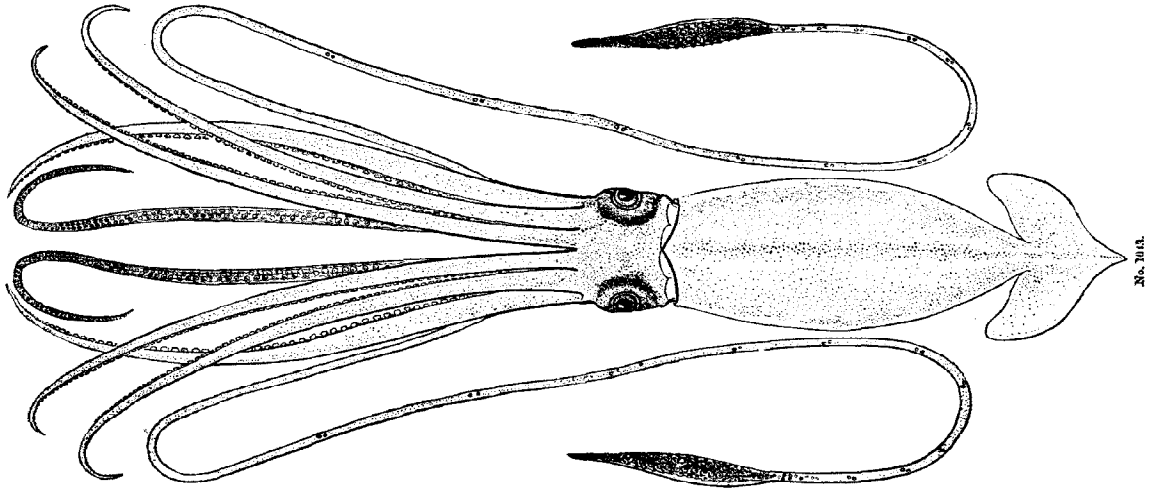
Drawing by H. L. Todd, from No. 23466, U. S. National Museum, collected at sea, by Capt. R. L. Morrison.



## THE COMMON SQUID.

Loligo Pealei (Le S.).

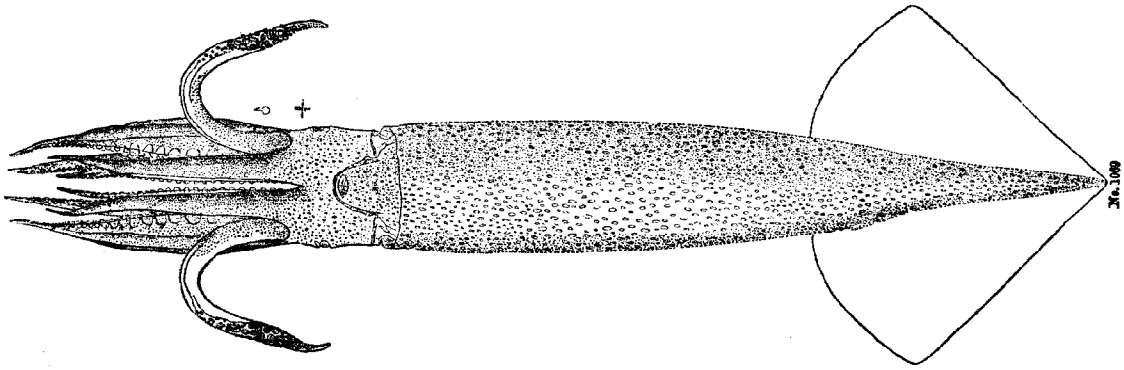
Drawing of female from Vineyard Sound, Massachusetts.



## THE GIANT SQUID.

Architeuthis princeps, Verrill.

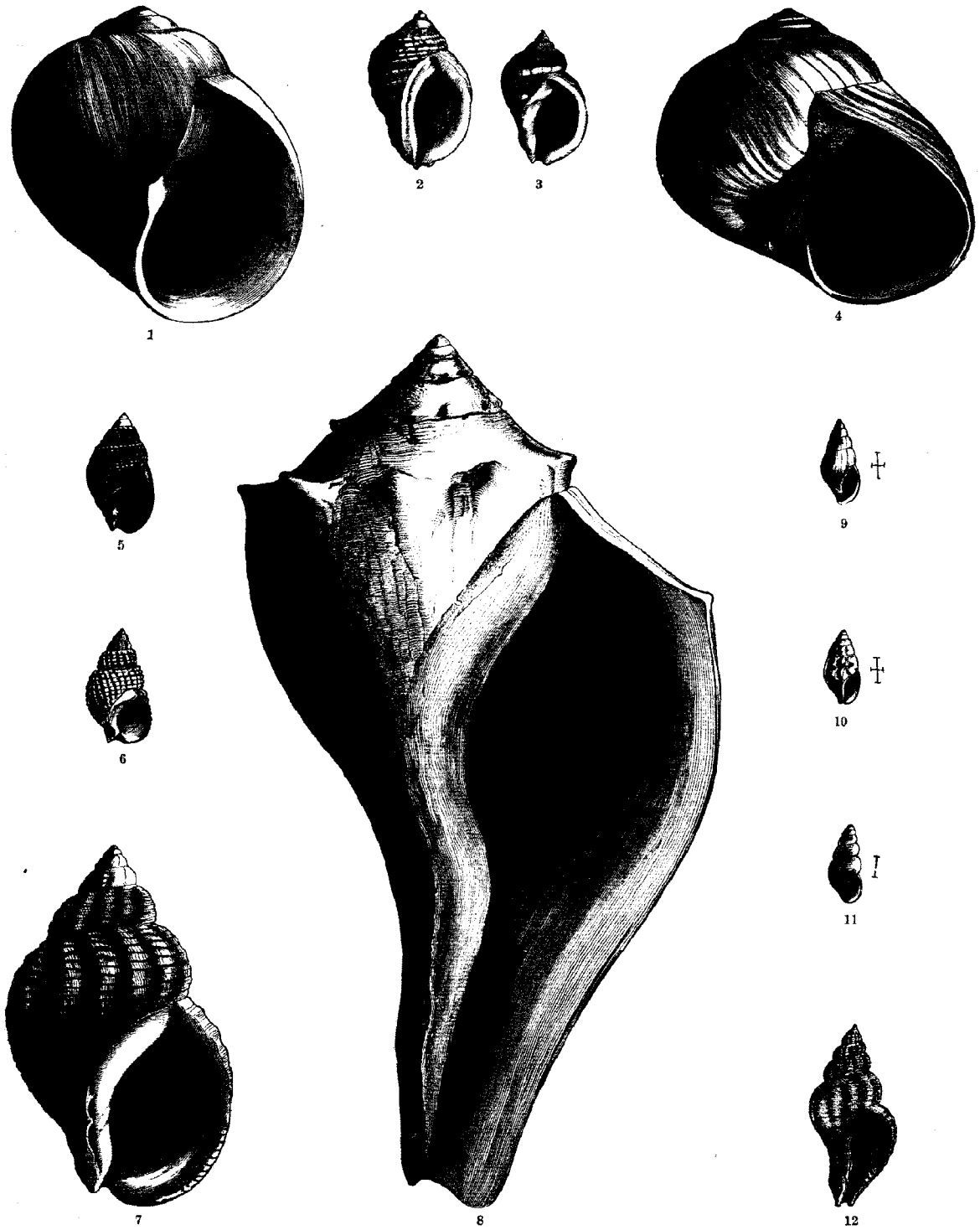
Drawing by Prof. A. E. Verrill, from specimen obtained at Fortune Bay, Newfoundland, December, 1874.



## THE SHORT-FINNED SQUID.

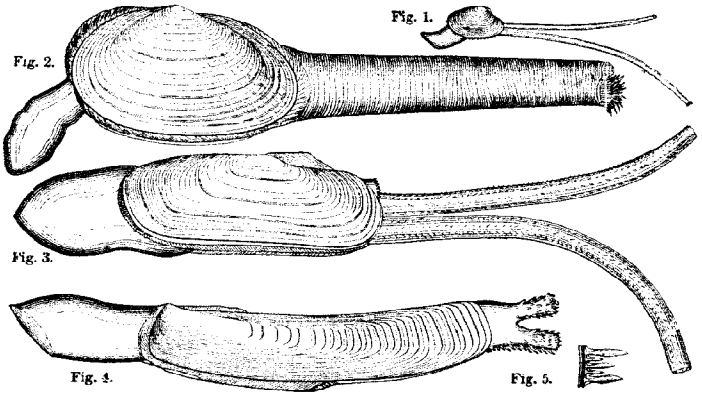
Ommastrephes illecebrosus (Le S.), Verrill.

Drawing of young male from Provincetown, Mass.




## SEA SNAILS, PERIWINKLES, DRILLS, AND BORERS.

FIG. 1. *Lunatia heros*, p. 700.
FIG. 2. *Purpura lapillus*, p. 698.
FIG. 3. *Purpura lapillus*, banded variety.
FIG. 4. *Neverita duplicata*, p. 700.
FIG. 5. *Ilyanassa obsoleta*, p. 696.
FIG. 6. *Tritia trivittata*.
FIG. 7. The Whelk, *Buccinum undatum*, p. 699.
FIG. 8. The Periwinkle, *Tulgur carica*, p. 694.
FIG. 9. *Astyris zonalis*.
FIG. 10. *Astyris lunata*.
FIG. 11. *Rissoa aculeus*.
FIG. 12. The Drill or Borer, *Urosalpin cinereia*, p. 697.



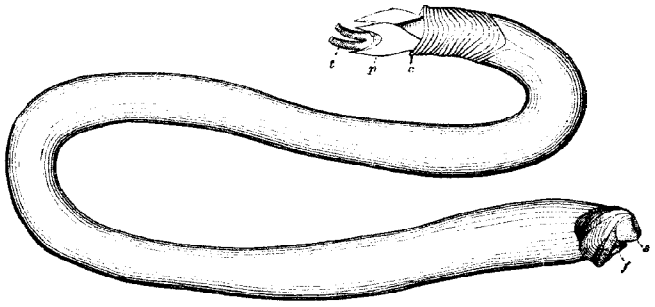




Fig. 7.

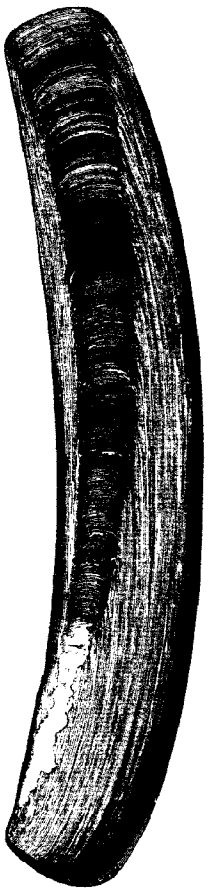


Fig. 6.

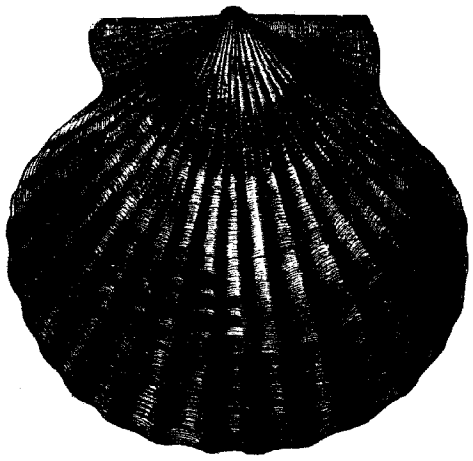


Fig. 8.

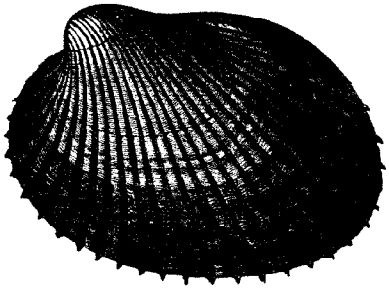


Fig. 9.

FIG. 1. *Angulus tener.*
See Report U. S. Fish Commission. Part I, p. 677. Animal reduced one-half.

FIG. 2. The long clam, soft clam, or Nanninose, *Mya arenaria.*
With animal in extension, reduced to one-half the natural size.

FIG. 3. *Tagelus gibbus.*
See Report U. S. Fish Commission. Part I, p. 675, with animal. The siphon not fully extended. One-half natural size.

FIG. 4. The Razor Clam, *Ensatella americana*, p. 707.
With animal extended. One-half natural size.

FIG. 5. The Razor Clam with some of the terminal papillæ enlarged.

FIG. 6. The Razor Clam, *Ensatella americana.*
Shell natural size.

FIG. 7. The Ship Worm, *Teredo navalis.*
Enlarged two diameters.

FIG. 8. The Scallop, *Pecten irradians*, p. 709.
Natural size.

FIG. 9. The Bloody Clam, *Argina pexata.*
Natural size.

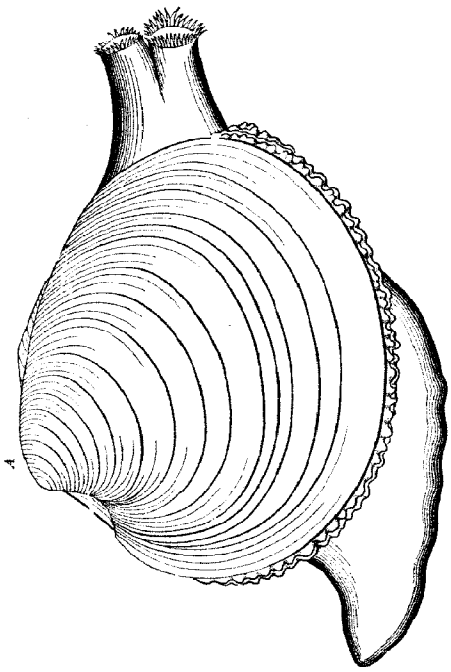


Fig. 1.

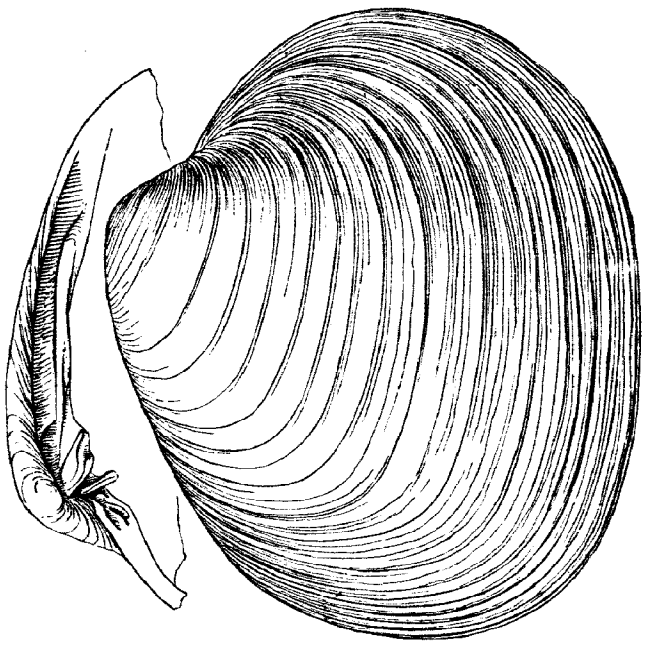


Fig. 2.

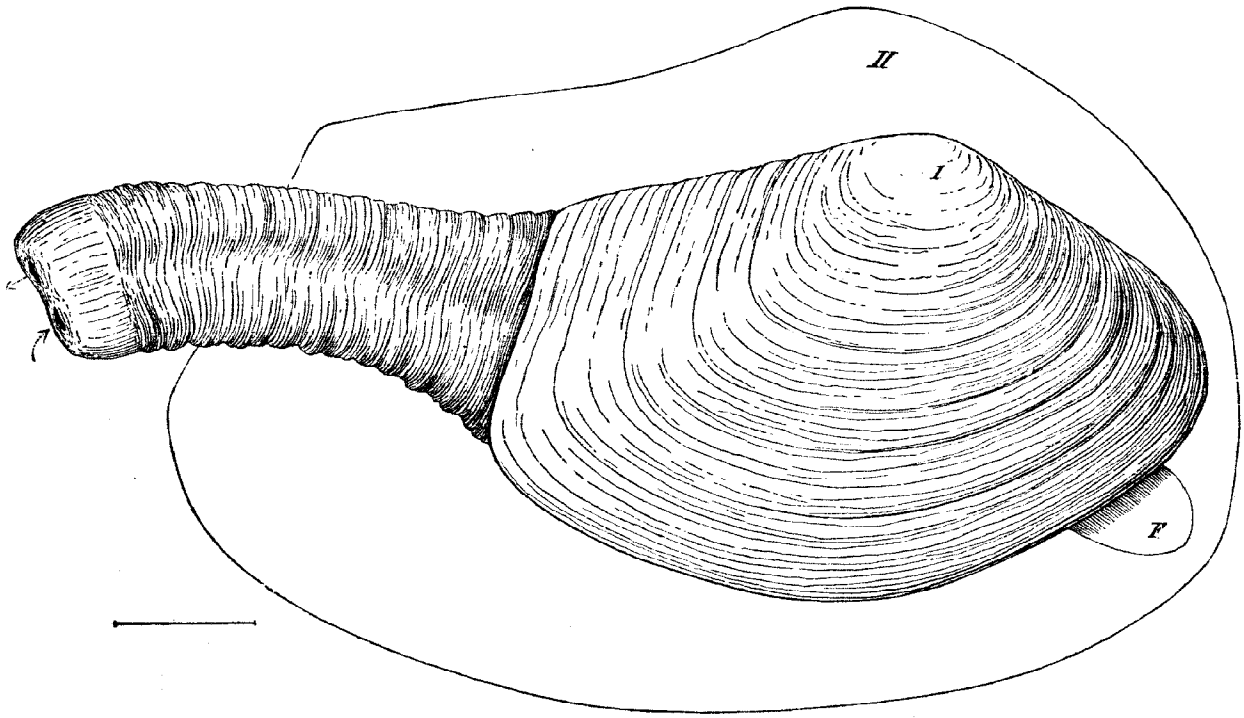
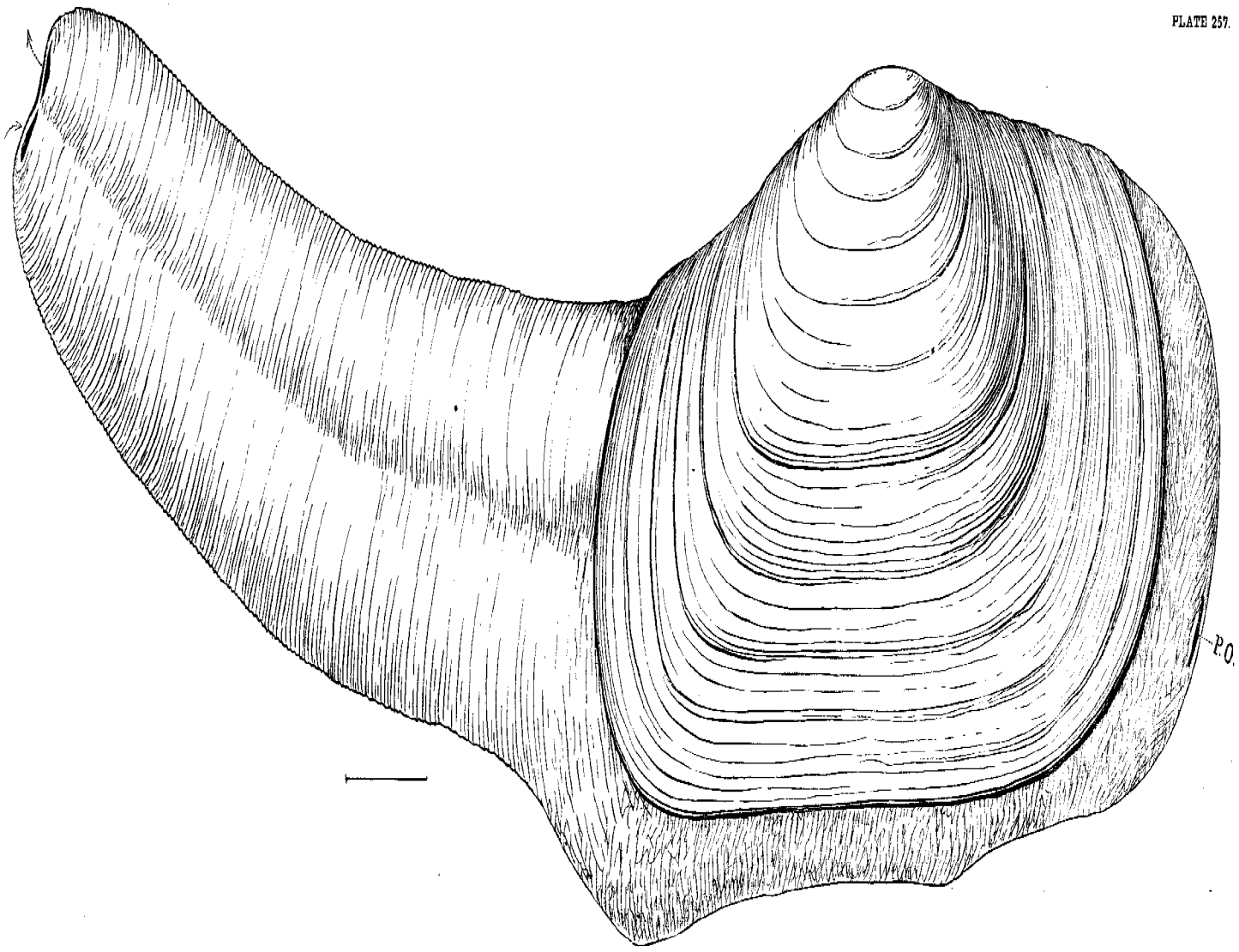



Fig. 3.

FIG. 1. The Quahaug or Little-necked Clam, *Venus mercenaria*.
Natural size.

FIG. 2. The Quahaug of Puget Sound, *Saxidomus nuttalli*.
Natural size of large specimen. Drawn by J. H. Emerton.

FIG. 3. The Gaper Clam of the West Coast, *Schizoth œrus nuttalli* (Conrad).
(I.) Specimen of ordinary size, reduced about one-fourth in length. The siphons are somewhat contracted; the foot (F) expands about as usual.
(II.) Outline of the left valve of a larger specimen, reduced to the same extent. Drawn from nature by R. E. C. Stearns.




## THE GEODUCK, OR GIANT CLAM OF THE PACIFIC.

Glycimeris generosa.

Natural size; specimens with siphons partly contracted; weight when alive, 6½ pounds. Drawn by R. E. C. Stearns.

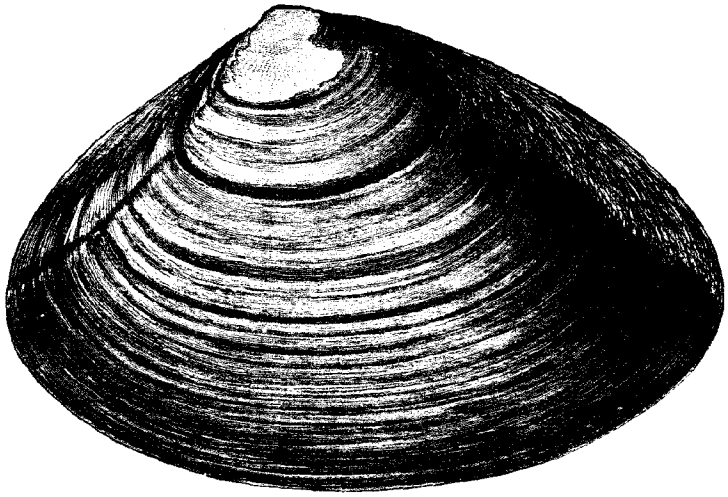


Fig. 1.

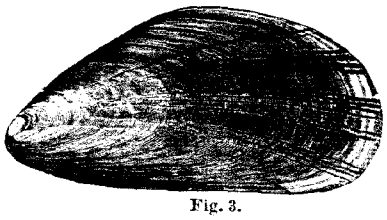


Fig. 3.

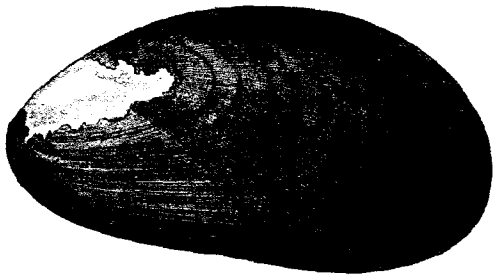


Fig. 4.

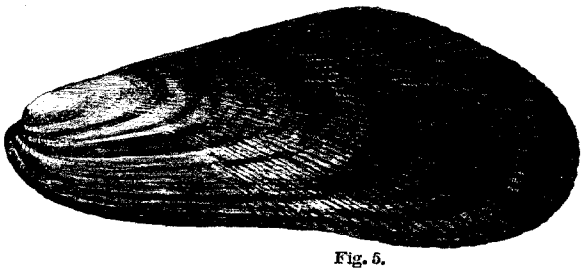


Fig. 5.

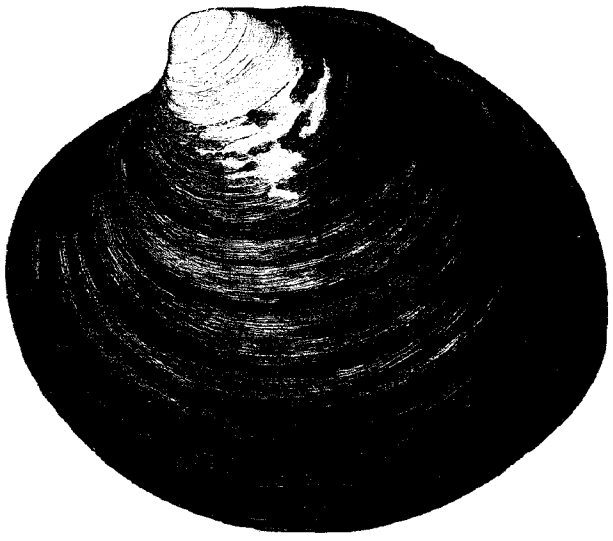


Fig. 2.

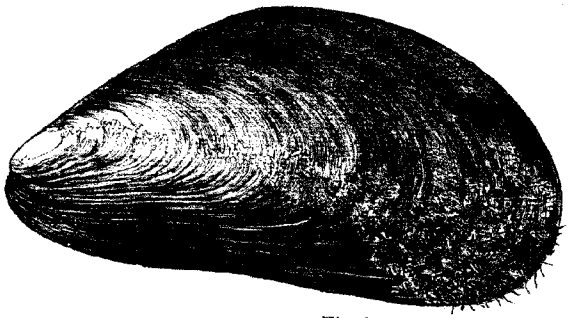


Fig. 6.

## MUSSELS AND SEA CLAMS.

FIG. 1. The Beach Clam or Hen Clam, *Spisula solidissima*, p. 708.
Natural size.

FIG. 2. The Sea Clam, *Cyprina islandica*.
Natural size.

FIG. 3. The Mussel, *Mytilus edulis*, p. 709.

FIG. 4. The Black Horse Mussel, *Modiola nigra*.

FIG. 5. The Rough Mussel, *Modiola plicatula*, p. 709.

FIG. 6. The Horse Mussel, *Modiola modiolus*, p. 709.

# PLATE 259.

## *EXPLANATION OF FIG.* 1.

A. Hinge or anterior umbonal end of the left valve of an adult oyster, upon which the soft parts of the animal are represented as they lie in *situ*, but with the greater part of the mantle of the right side removed.

*a u*. The auricle of the right side of the heart contracted.

B. Posterior or ventral end of the left valve, which in life is usually directed upward more or less, and during the act of feeding and respiration is separated slightly from the margin of its fellow of the opposite side to admit the water needful for respiration, and which also contains the animal's food in suspension.

B*m*. Body-mass, traversed superficially by the generative ducts *g e*.

*b j*. The organ of Bojanus, or "renal" organ, of the right side of the oyster. (The ducts which it sends into the mantle are not shown, nor is its connection with the genito-urinary sinus *s* indicated.)

*b p*. The large branchial pores which open from the subdivided cavities of the pouch-like gills *g* into the cloaca *cl*.

*br*. The anterior branchiocardiac "vein," which conveys part of the blood from the gills to the auricle.

*c*. Right pericardiac membrane, which has been thrown back over M in order to expose the heart *ve* and *au*.

*c l*. Cloacal space, through which the water used in respiration passes out, and into which the excrement of the animal is discharged from the vent *v*.

*d*. Nervous commissure of the right side, which connects the parieto-splanchnic with the supra-œsophageal ganglion.

*g*. Gills, which extend as four flattened transversely, subdivided sacks from the palps *p* to the point *y*, at the edge of the mantel.

*g e*. Superficial net-work of the generative ducts as they appear when the oyster is spawning.

*h*. Groove in the hinge end of the left valve, which receives the ridge developed in the corresponding situation on the right one.

*l*. Dark brown elastic body or ligament by which the valves are held together at the hinge.

M. Great adductor muscle, which is here viewed from the end, and which is attached to the inner faces of the valves over the dark purple scars. It opposes the elastic ligament and closes the valves, and corresponds to the posterior adductor muscle of dimyary mollusks.

*m*. Mouth.

*m t*. Mantle of the left side fringed with two rows of tentacles; *m t'*, portion of the mantel of the right side.

*n* to *z* marks the extent to which the right and left leaves of the mantle are joined together; the hood thus formed above and at the sides of the palps is called the cucullus.

P. Palps exposed, a part of the cucullus on the right being cut away.

*p d*. Pedal muscle of right side, which is also inserted upon the shell of the same side.

*p g*. Parieto-splanchnic ganglion.

*s*. Genital opening of the right side.

*s g*. Supraœsophageal ganglion.

*v*. Vent or anus.

*v e*. Ventricle of the heart, which is dilated, or in the condition of diastole.

*x x x*. Areas at the edge of the inner surface of the shell, where intruded mud has been inclosed by a thin lamina of shelly matter deposited by the mantle.

*y*. Point at the posterior extremity of the gills, where the right and left leaves of the mantle are joined together by the membrane which supports the gills.

## *EXPLANATION OF FIG.* 2.

This figure was drawn from a dissection of a hardened specimen which had been removed from the shell, and is viewed from the left side, the superficial tissues of the left half of the body-mass having been removed in order to display the surface of the "liver" L, with its large clusters of minute follicles, and part of the course of the intestine *i*. At *j* the widened pyloric part of the intestine is shown, which incloses the crystalline style. The ventricle *ve* and auricle are much contracted, and a spacious pericardiac space is shown on either side of it. *g e*. Stratum of reproductive follicles. The remaining letters of reference are the same as in Fig. 1.

## *EXPLANATION OF FIG.* 3.

This figure of the viscera of the oyster is also drawn in part from the hardened soft parts, but is viewed from the right side. The great ducts *d* of the "liver" L are shown cut open longitudinally, and are represented as opening directly into the cavity of the stomach *st*, in front of which the œsophagus *oe* is also shown running back from the mouth *m*. This figure shows almost the entire intestine, with its widened anterior end *j*, and its course and curvature as here represented is what will be found constant, even when hundreds of specimens are examined. Nearly all the substance of the body-mass has been carefully removed from the right half of the body, and where the edges of the body have been cut through the stratum of reproductive tissue *g e* is also shown. The corrugated outer surface of the inner or lower palp at P. The remaining letters have the same significance as in the previous figures.

## *EXPLANATION OF FIG.* 4.

This represents a section or slice cut from the soft parts of an oyster at the level of the dotted line *o* in Fig. 3, and viewed from its anterior surface. The tissues and structures which have been cut across in this section are as follows:

*a'*. The dorsal or posterior branch of the great splanchnic artery.

*a''*. The anterior or ventral branch of the splanchnic artery.

*b r*. Branchial vessels.

*c*. The connective tissue which envelopes the organs contained in the body-mass and forms the principal portion of the substance of the animal in winter.

*g*. The gills cut across, showing their hollow interiors.

*g e*. Stratum of reproductive follicles, which immediately underlies the mantel layer *m t*. Intestinal canal cut through at two points, *i i* posteriorly and anteriorly, showing the manner in which the intestinal walls are folded inwards upon themselves.

L L. Right and left lobes of the liver, embedded in the connective tissue and most considerably developed at the sides and below the stomach.

*s b*. Suprabranchial space.

*s t*. Stomach, showing its irregular form and connection by means of spacious ducts with the "liver."

*v c*. Vena cava.

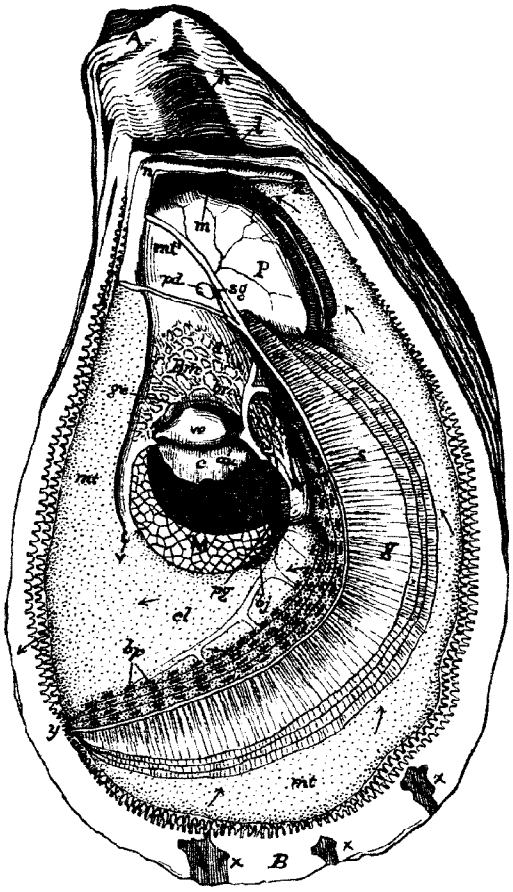



Fig. 1.

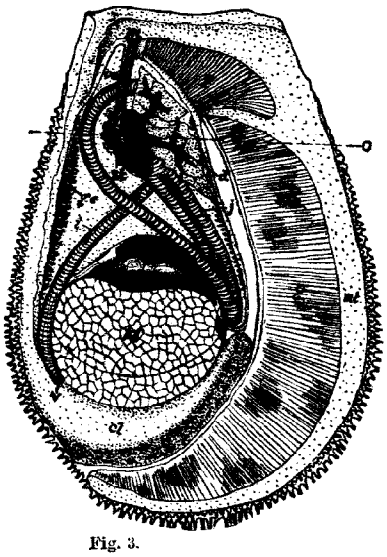



Fig. 3.

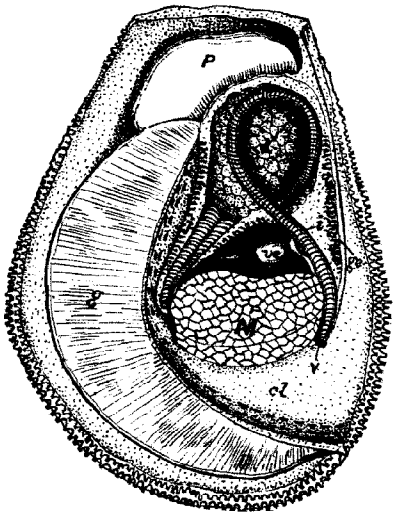



Fig. 2.

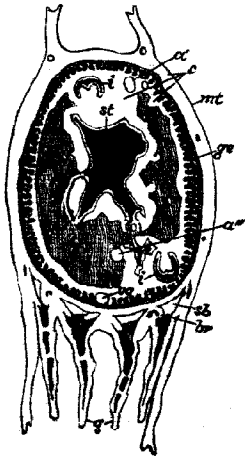
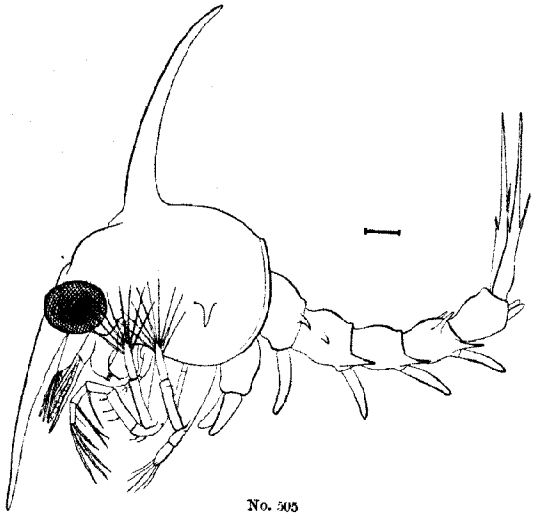



Fig. 4.

For explanation of figures see opposite page.



No. 505
Fig. 2.

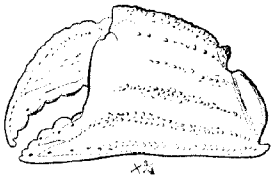
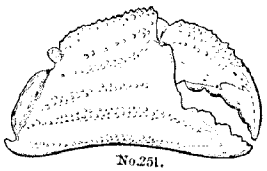
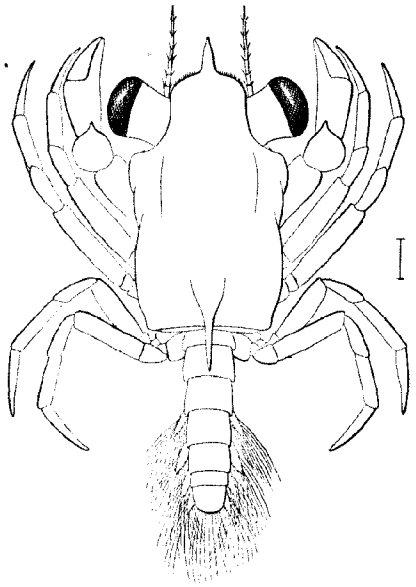


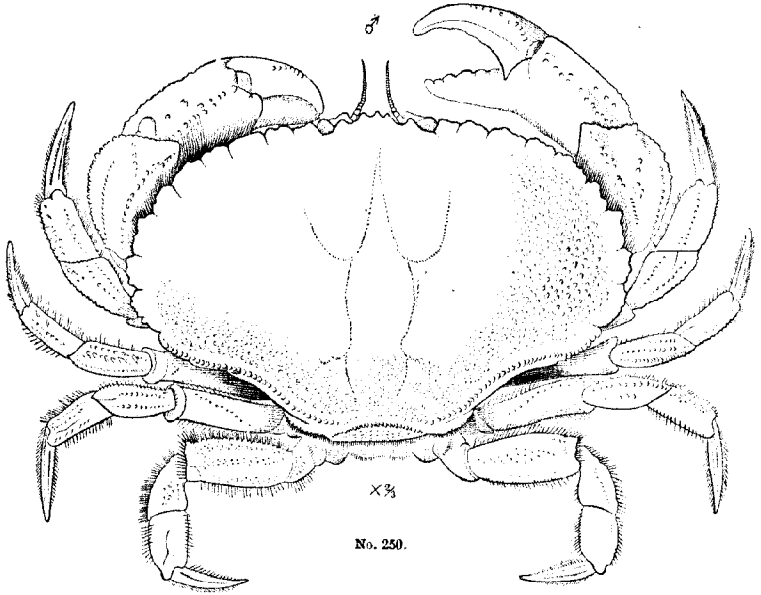
Fig. 5.



No.251.
Fig. 6.

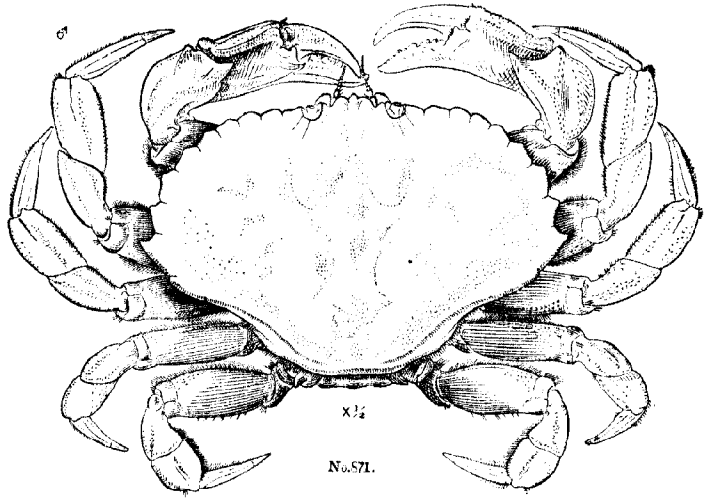


No. 506
Fig. 3.



No. 250.

Fig. 4.



No.871.

Fig. 1.

FIG. 1. The Rock Crab, *Cancer irroratus*, Say; male, one-half natural size.

FIG. 2. Zoëa of the same, in the last stage before it changes to the megalops condition; lateral view, enlarged seventeen diameters.

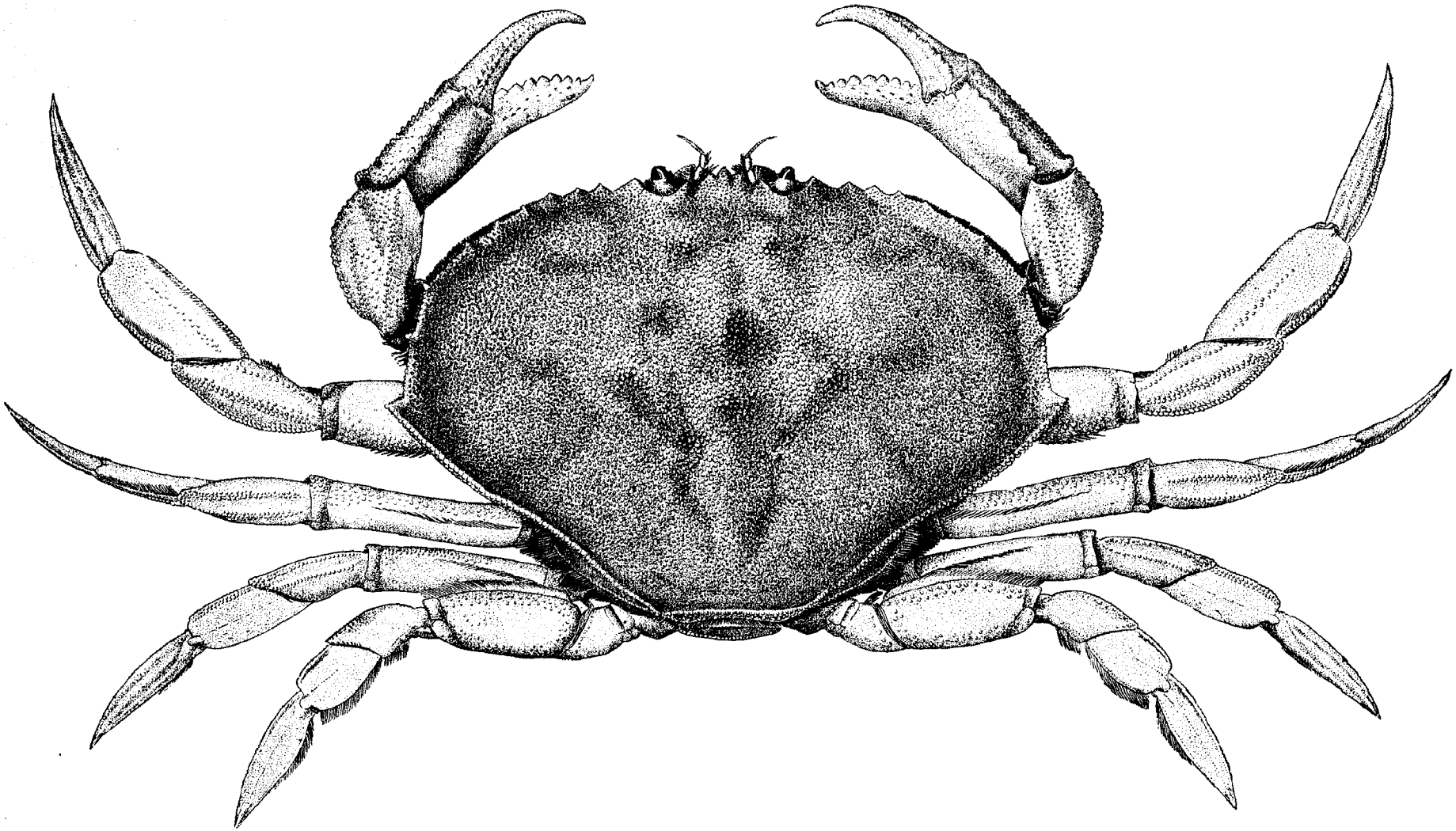
FIG. 3. Megalops stage of the same, just after the change from the zoëa condition; dorsal view, enlarged thirteen diameters.

FIG. 4. The Jonah Crab, *Cancer borealis*, Stimpson; male, two-thirds natural size.

FIGS. 5, 6. Terminal joints of the big claws of the same, viewed from the outer side, natural size.

Drawings by J. H. Emerton.

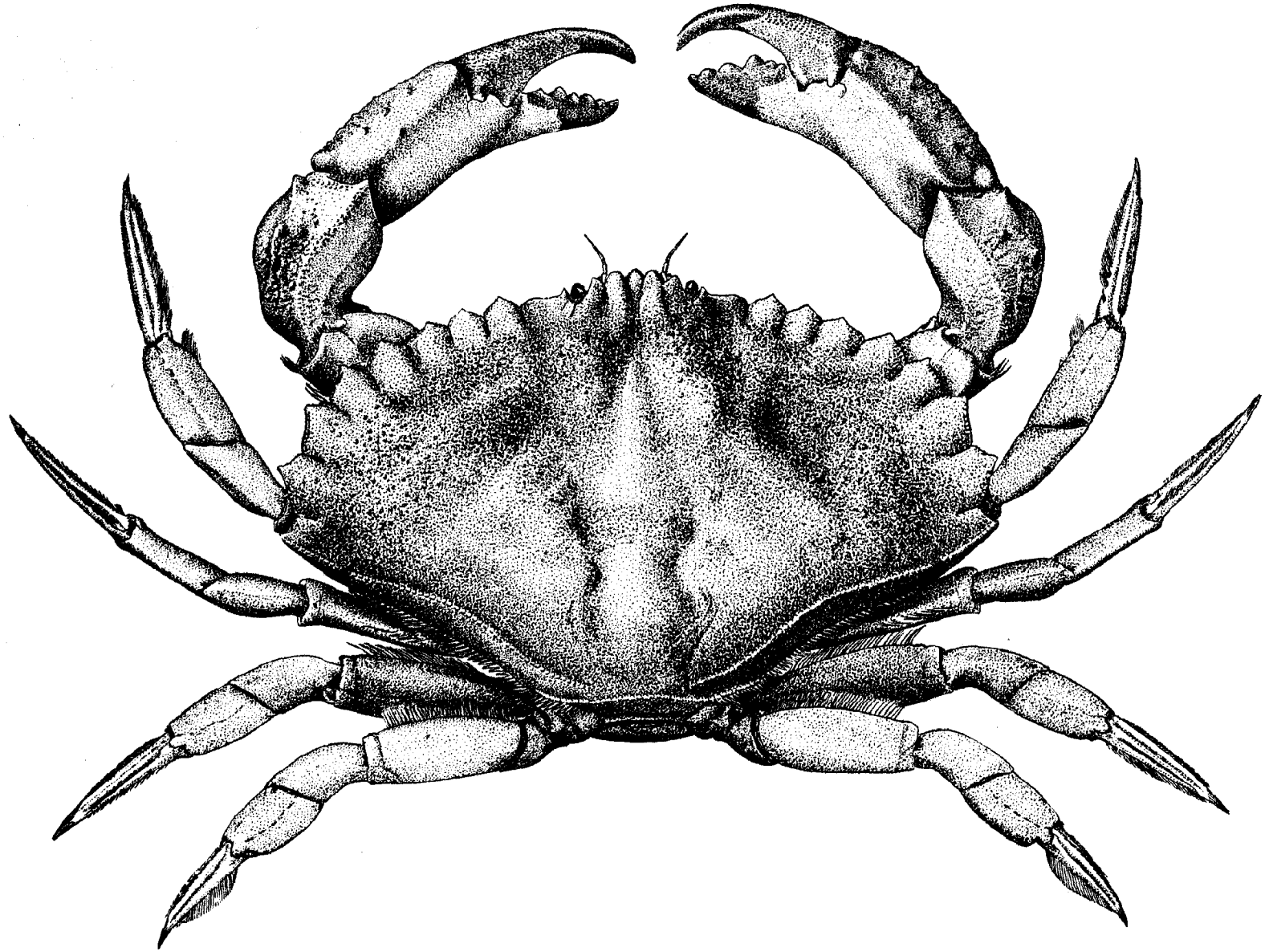
PLATE 260.



**THE COMMON CRAB OF THE PACIFIC COAST.** (Male, somewhat smaller than natural size.)

Cancer magister, Dana. (p. 770.)

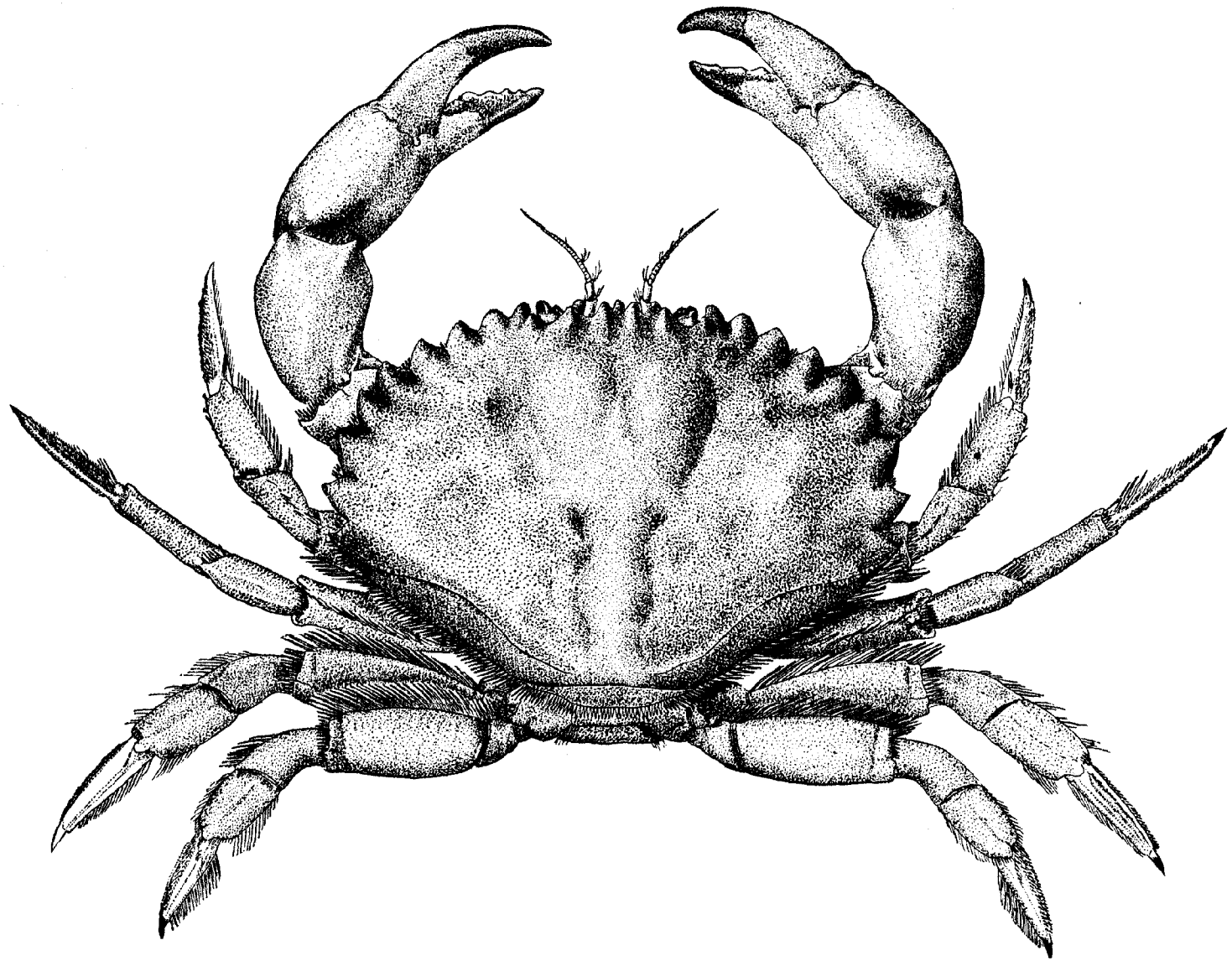
Drawing by H. L. Todd, from No. 2553, U. S. National Museum. California. William Stimpson.



**THE RED CRAB. (Male, natural size.)**

Cancer productus, Randall. (p. 771.)

Drawing by H. L. Todd, from No. 2529, U. S. National Museum. San Francisco, Cal., H. Hemphill.

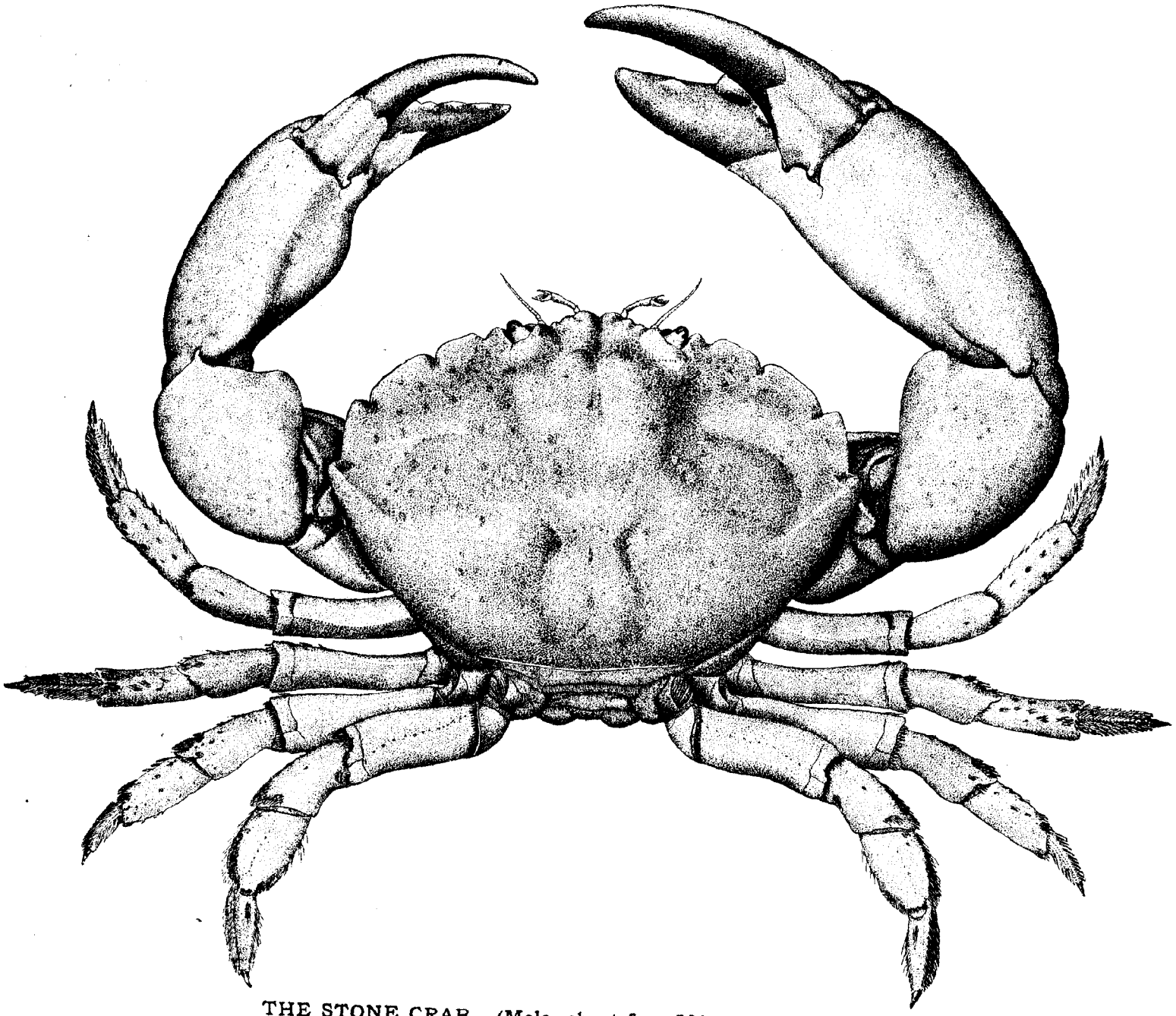


**THE CALIFORNIA ROCK CRAB. (Natural size.)**

Cancer antennarius, Stimpson. (p. 771.)

Drawing by H. L. Todd, from No. 2033, U. S. National Museum. California, William Stimpson.

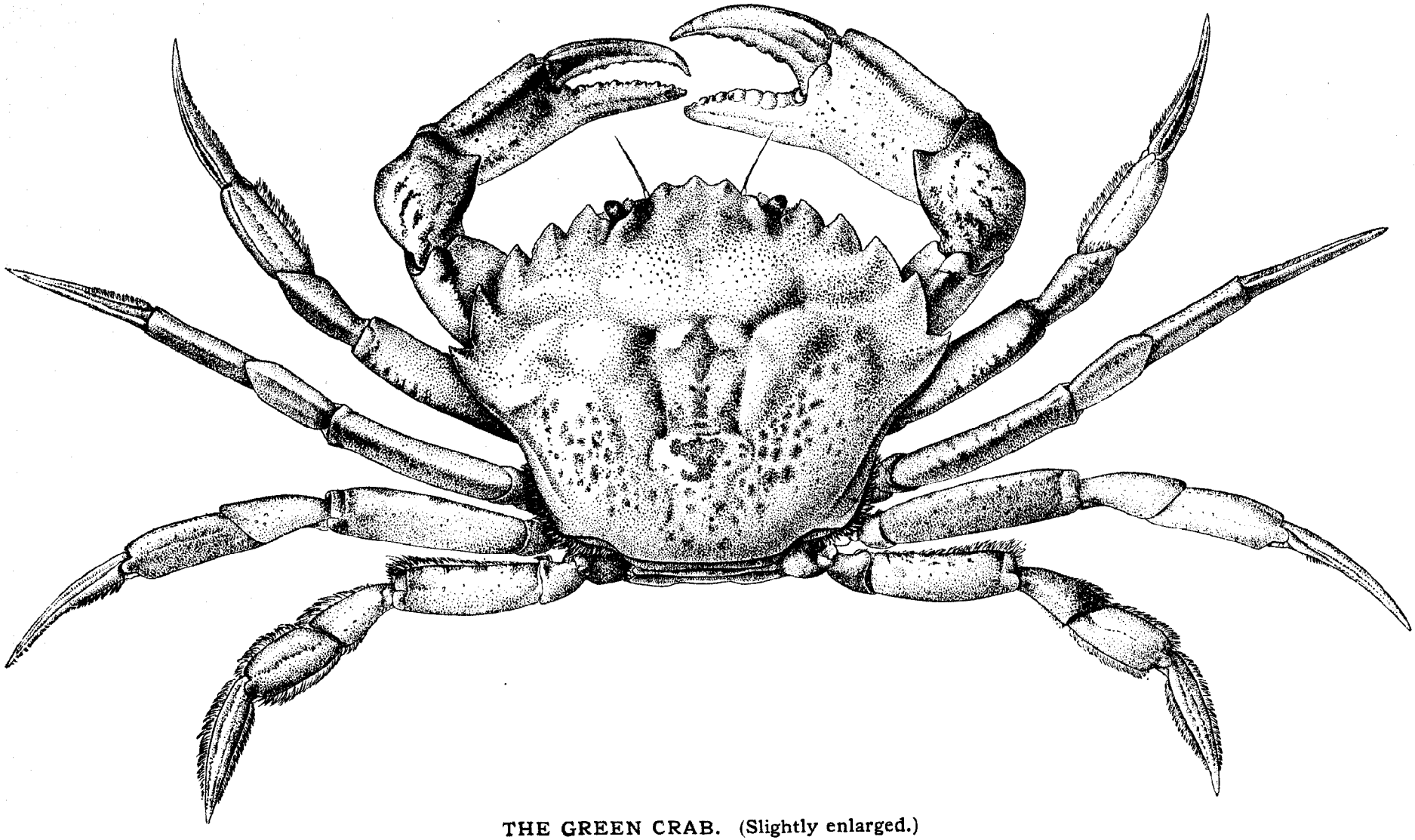
PLATE 263.



THE STONE CRAB. (Male, about four-fifths the natural size.)

Menippe mercenarius, Gibbes. (p. 772.)

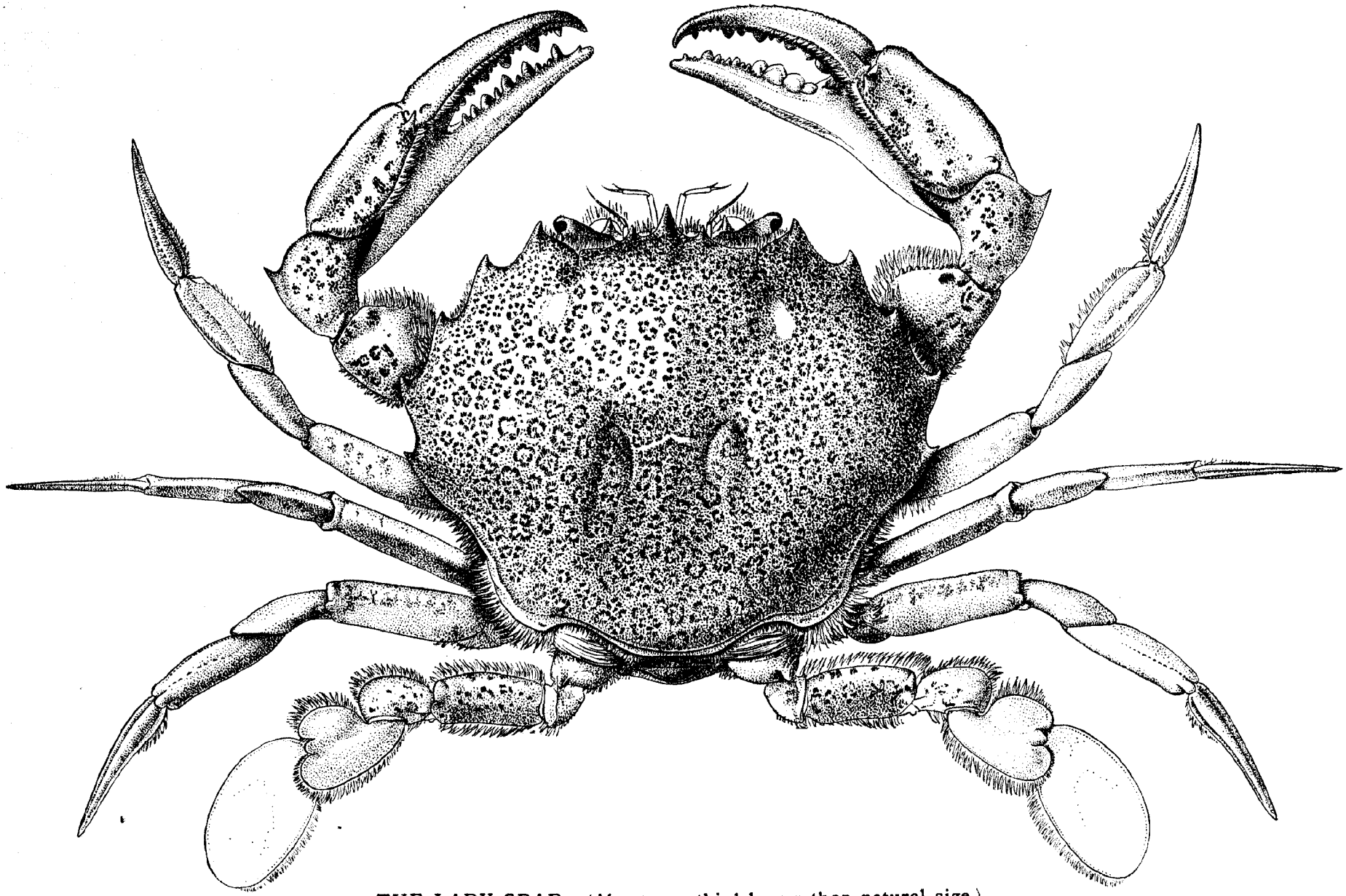
Drawing by H. L. Todd, from specimen obtained at Charleston, S. C.



**THE GREEN CRAB.** (Slightly enlarged.)

Carcinus mænas, Leach. (p. 774.)

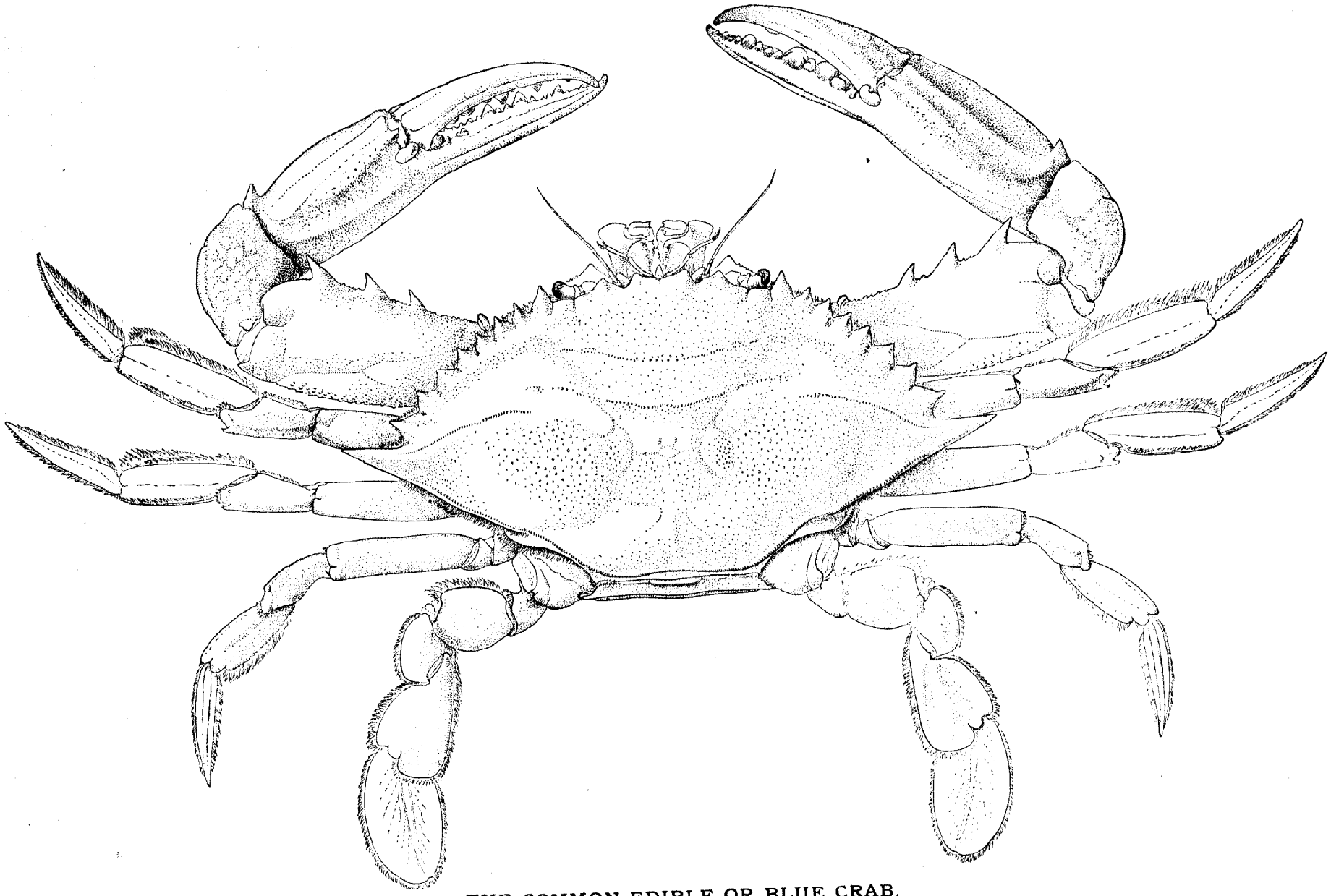
Drawing by J. H. Emerton, from specimen obtained at Wood's Holl, Mass., 1882.



THE LADY CRAB. (About one-third larger than natural size.)

Platyonichus ocellatus, Latreille. (p. 774.)

Drawing by J. H. Emerton, from specimen obtained at Wood's Holl, Mass., 1882.

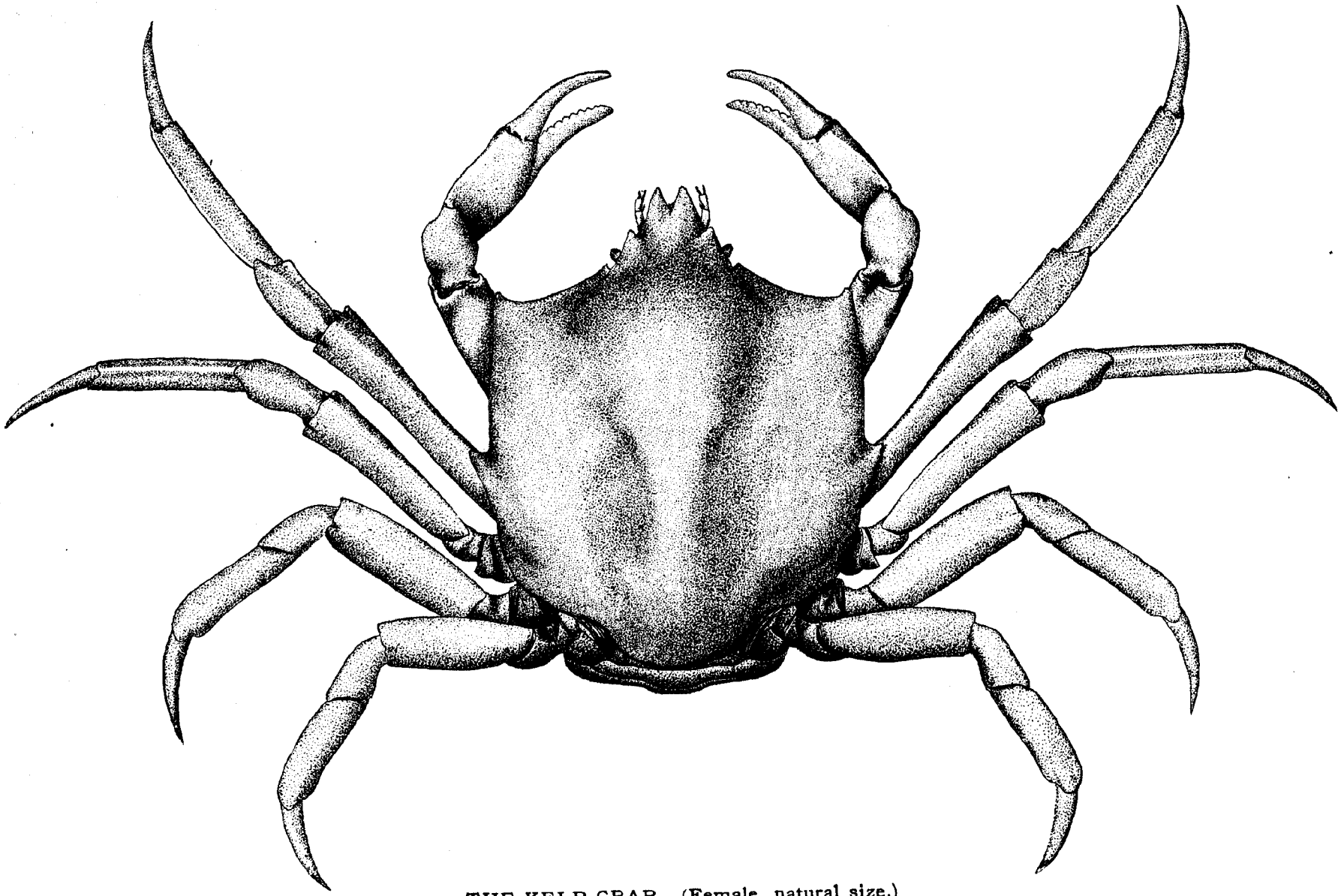


## THE COMMON EDIBLE OR BLUE CRAB.

Callinectes hastatus, Ordway. (p. 775.)

Drawing by J. H. Emerton, from specimen obtained at Wood's Holl, Mass., 1882.

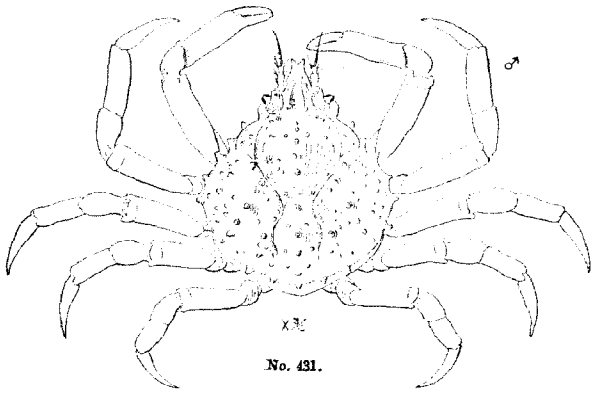
PLATE 267.



**THE KELP CRAB. (Female, natural size.)**

Epialtus productus, Randall. (p. 778.)

Drawing by H. L. Todd, from No. 2139, U. S. National Museum. Pacific coast of the United States, Dr. Suckley.



No. 431.

Fig. 4.

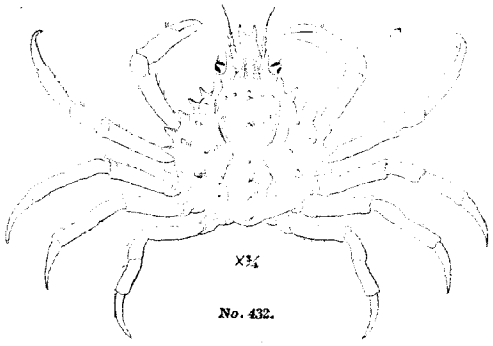


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Fig. 5.

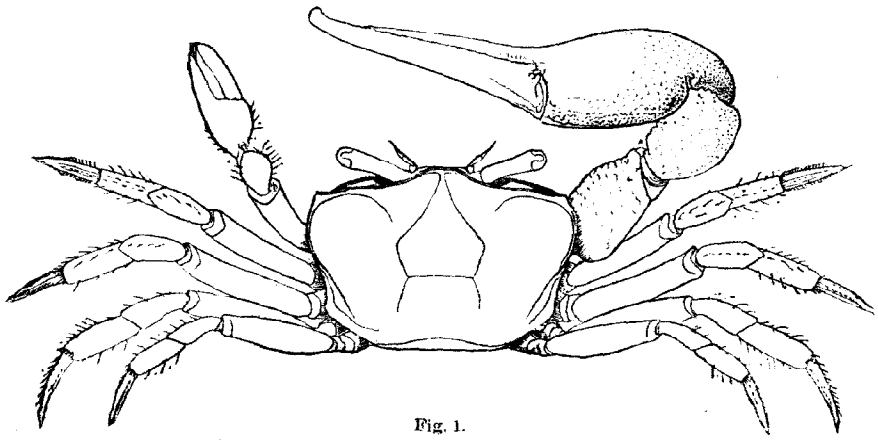
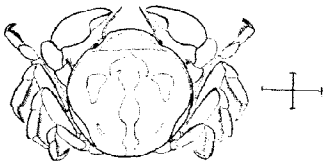


Fig. 1.



No. 502

Fig. 2.

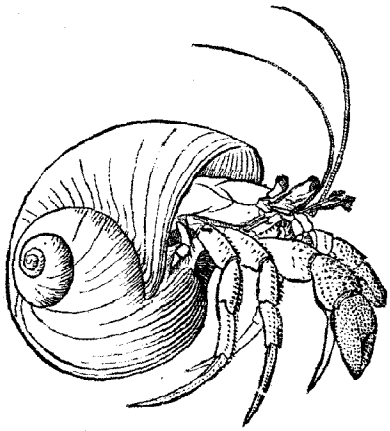
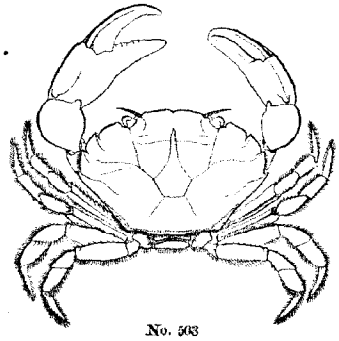
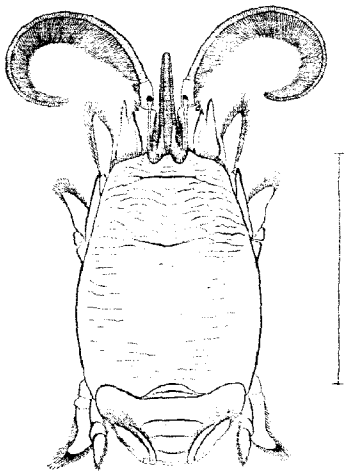


Fig. 7.



No. 503

Fig. 3.



No. 507

Fig. 6.

FIG. 1. The Fiddler Crab, *Gelasimus pugilator*, Latreille; male, slightly enlarged.

FIG. 2. The Oyster Crab, *Pinnotheres ostreum*, Say; male, enlarged four diameters.

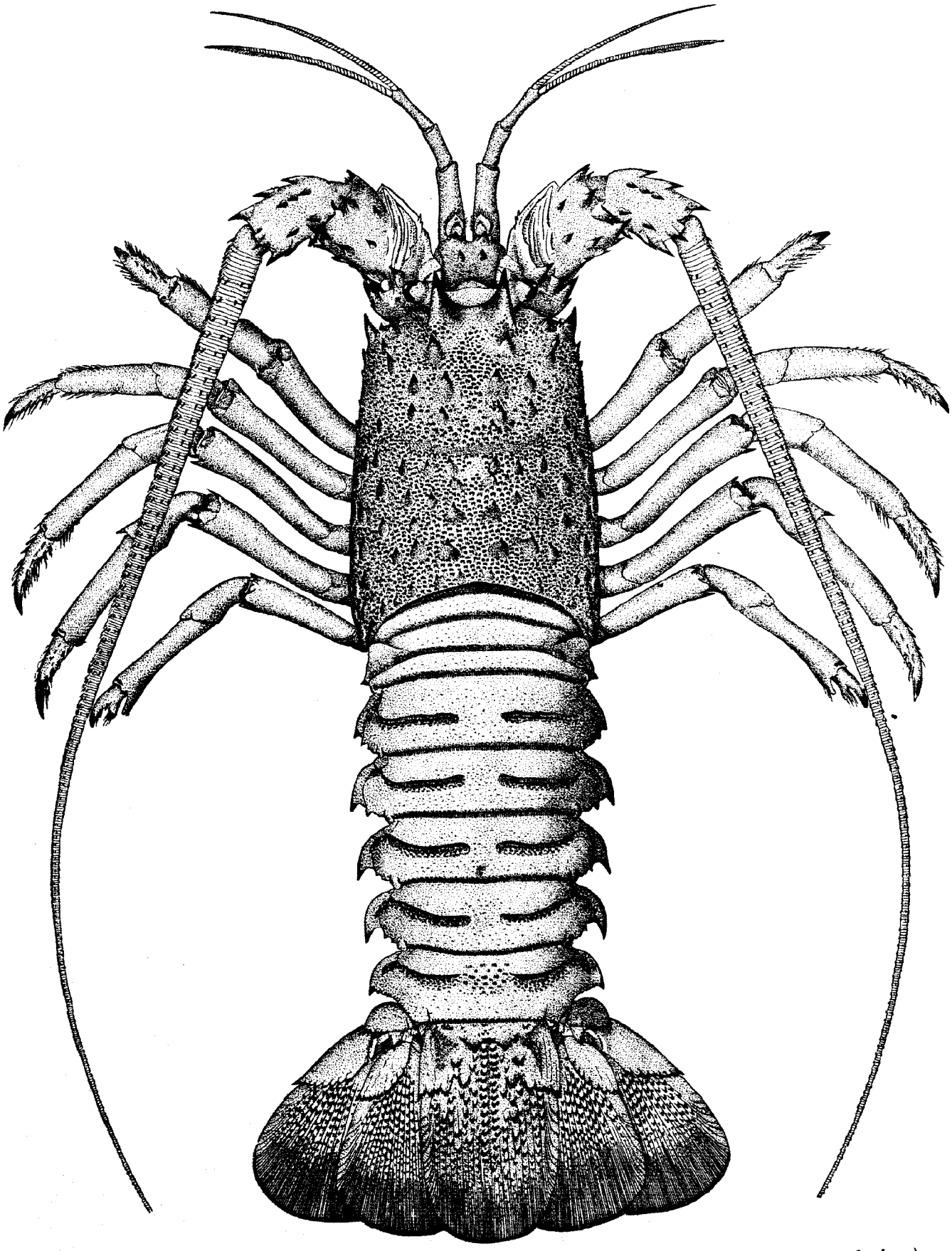
FIG. 3. The Mud Crab, *Panopeus depressus*, Smith; male, natural size.

FIGS. 4, 5. The Spider Crabs. Fig. 4, *Libinia emarginata*, Leach; male. Fig. 5, *Libinia dubia*, Edwards; male. Both three-fourths natural size of small specimens.

FIG. 6. The Sand Bug or Bait Bug, *Hippa talpoida*, Say; enlarged about two diameters.

FIG. 7. The Hermit Crab, *Eupagurus bernhardus*, Brandt; about two-thirds natural size.

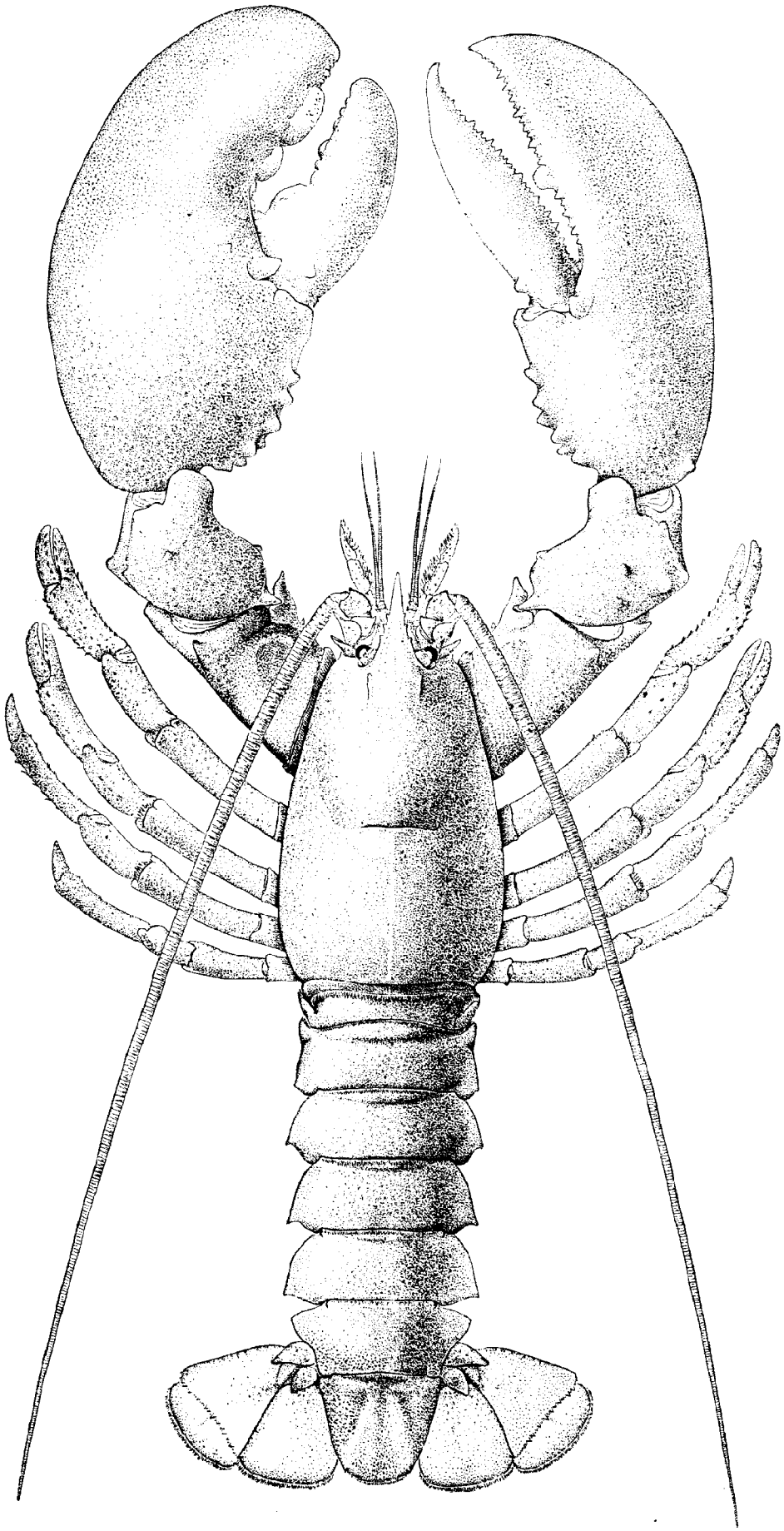
Drawings by J. H. Emerton.



THE SPINY LOBSTER, OR ROCK LOBSTER. (Somewhat smaller than natural size.)

Panulirus interruptus, Randall. (p. 780.)

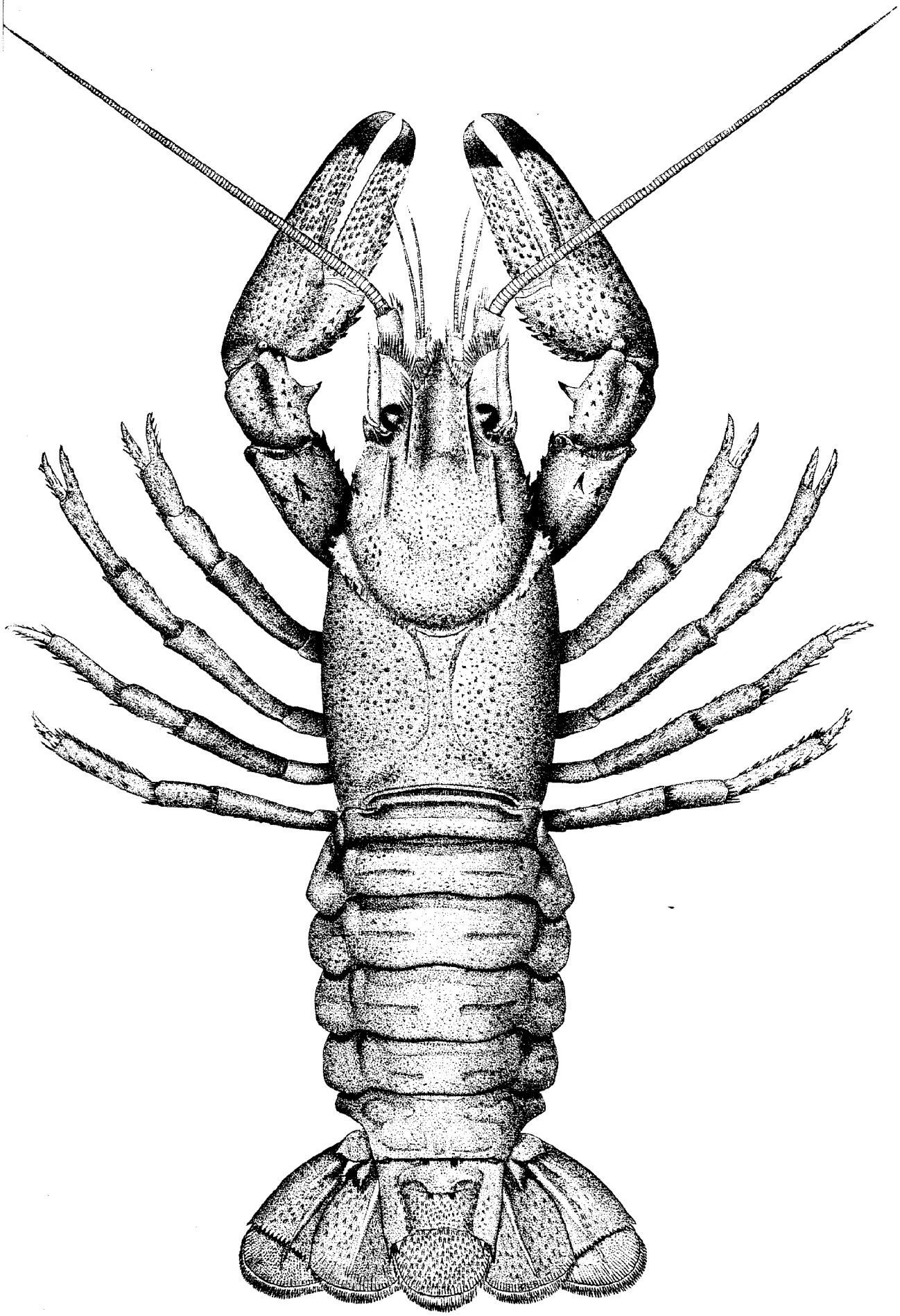
Drawing by H. L. Todd, from specimen obtained on the coast of California.



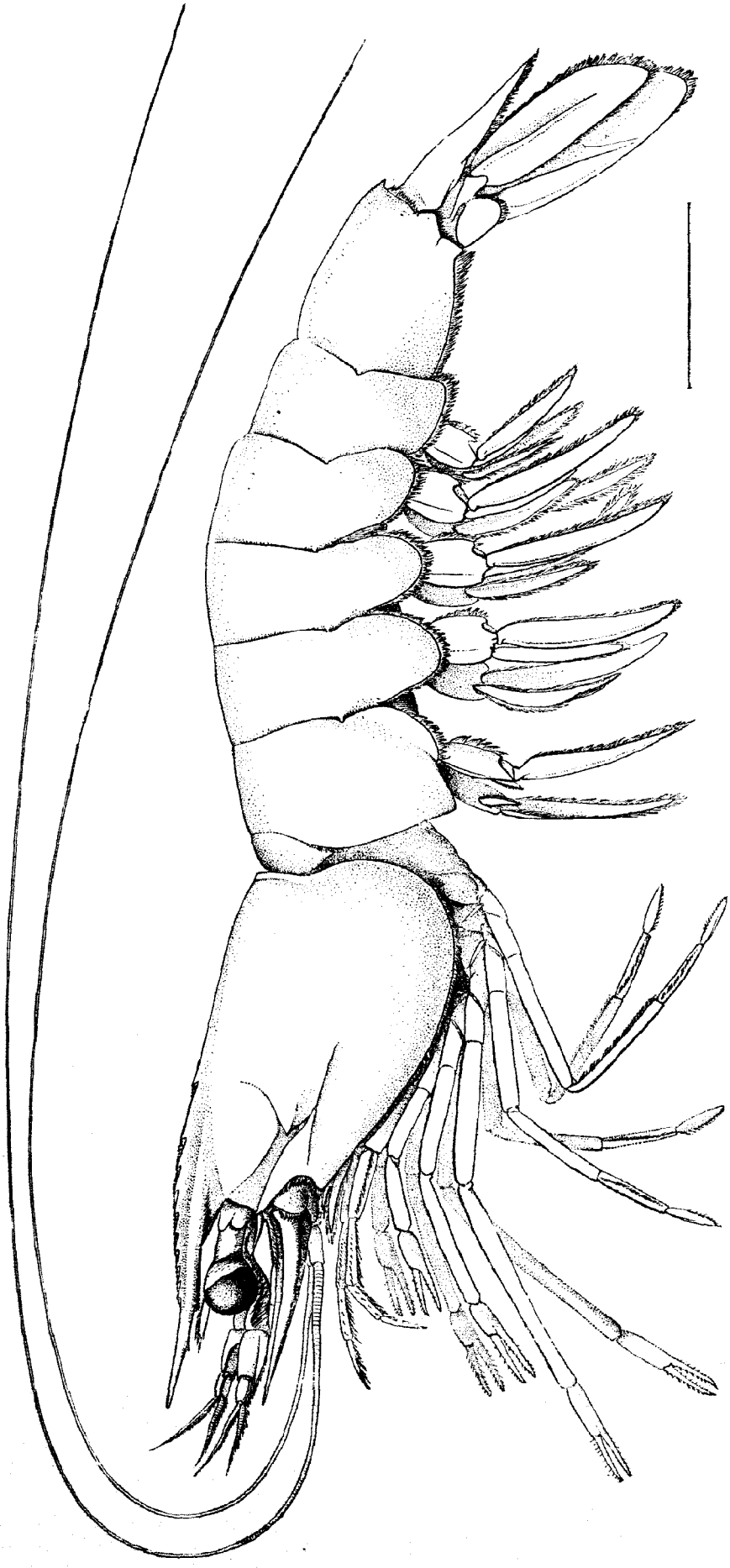
**THE AMERICAN LOBSTER.** (Male, much below natural size.)

Homarus americanus, Edwards. (p. 781.)

Drawing by J. H. Emerton, from specimen obtained at Eastport, Me., 1882.



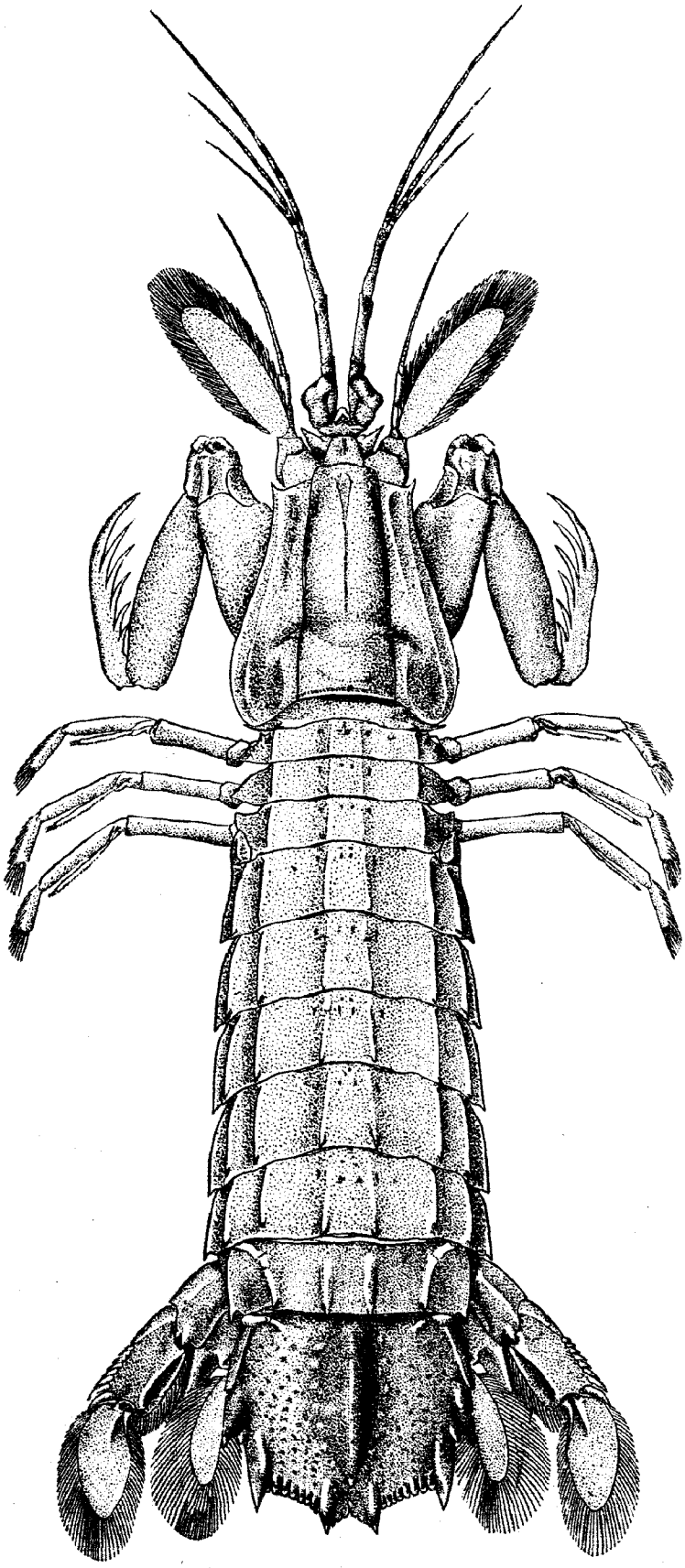
THE RIVER CRAY-FISH. (One and one-half times natural size.)



THE SOUTHERN SHRIMP. (About one-fifth larger than natural size.)

Penæus setiferus, Edwards. (p. 821.)

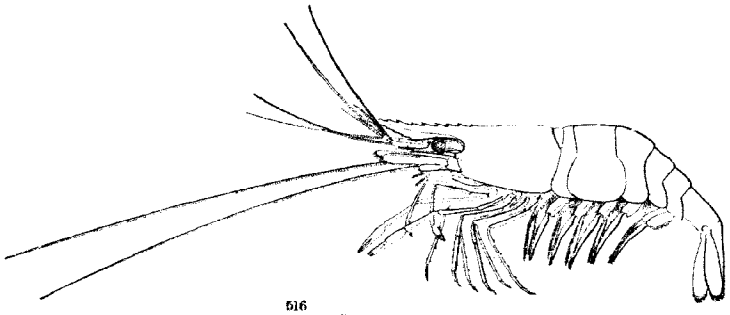
Drawing by J. H. Emerton, from specimen obtained on the coast of Louisiana.



**THE MANTIS SHRIMP.** (Natural size.)

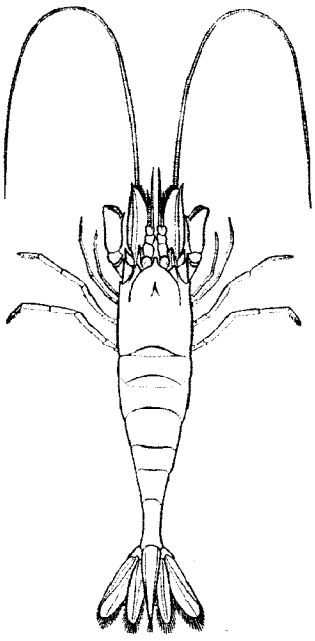
Squilla empusa, Say. (p. 823.)

Drawing by H. L. Todd, from No. 3752, U. S. National Museum. Wood's Holl, Mass., Vinal N. Edwards.



516

Fig. 2.



No. 513

Fig. 1.

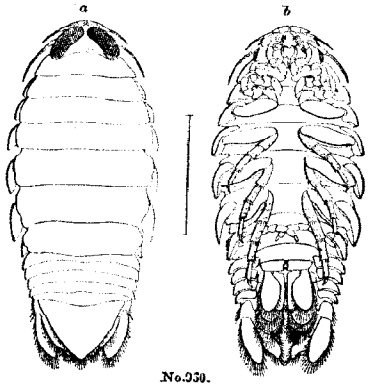


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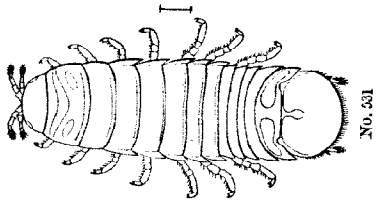
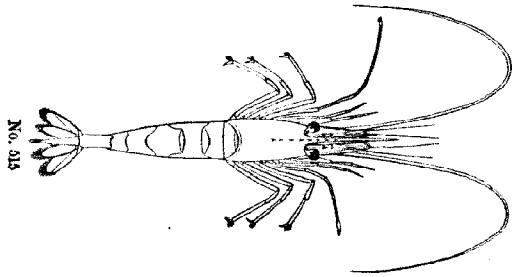
Fig. 8.

Fig. 9.



No. 531

Fig. 7.



No. 515

Fig. 3.

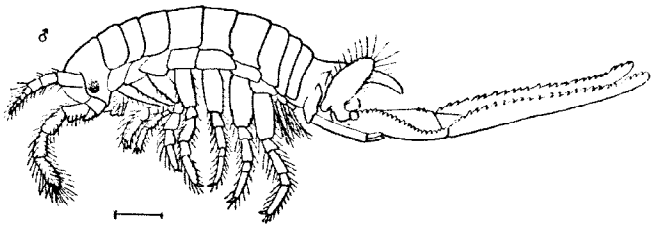
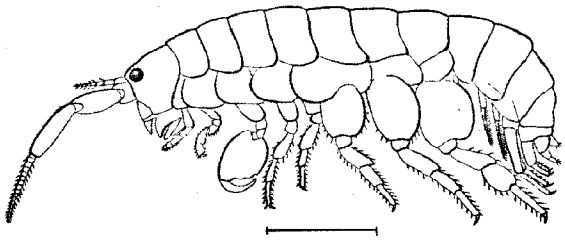
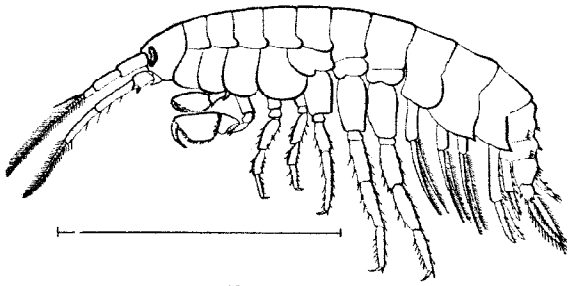


Fig. 6.



No. 521

Fig. 4.

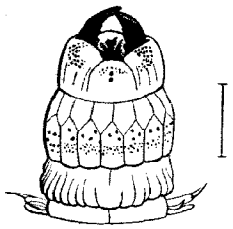


524

Fig. 5.

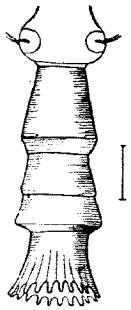
FIG. 1. The Common Shrimp, *Crangon vulgaris*, Fabr.; male, natural size.
FIG. 2. The Common Prawn, *Palæmonetes vulgaris*, Stimpson; male, enlarged one and one-half diameters.
FIG. 3. The Deep-water Prawn, *Pandalus Montagui*, Leach; slightly smaller than natural size.
FIG. 4. The Beach-Flea, *Orchestia agilis*, Smith; male, enlarged five diameters.
FIG. 5. The Scud, *Gammarus locusta*, Gould; male, enlarged two diameters.
FIG. 6. The Boring Amphipod, *Chelura terebrans*, Phillipi; enlarged about fourteen diameters.
FIG. 7. The Gribble, *Limnoria lignorum*, White; enlarged ten diameters.
FIG. 8. The Salve Bug, *Æga psora*, Krōyer; young specimen, enlarged three diameters.
FIG. 9. The Horse-shoe Crab, *Limulus Polyphemus*, Latreille; much smaller than natural size.

Drawings by J. H. Emerton, S. I. Smith, and O. Harger.

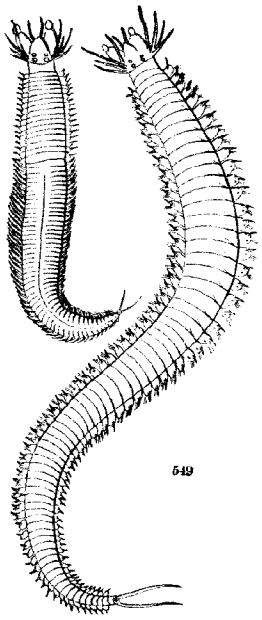


No. 551
Fig. 3.

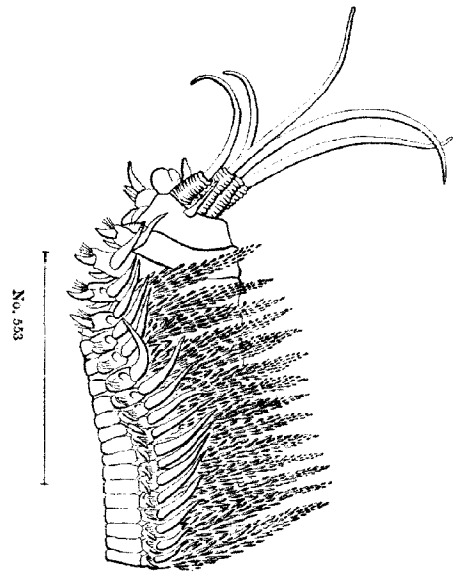
No. 578
Fig. 8.



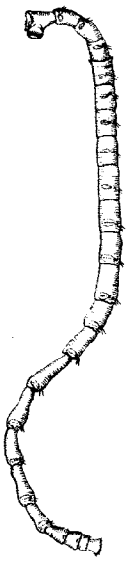
No. 579
Fig. 9.



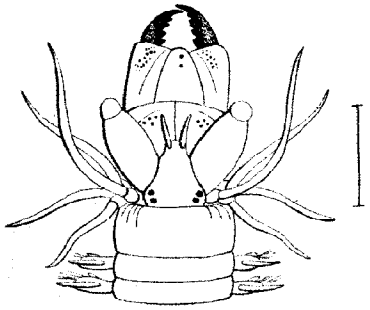
549
Fig. 1.



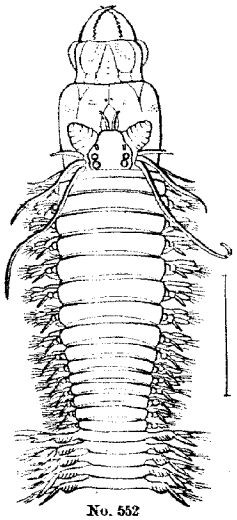
No. 553
Fig. 5.



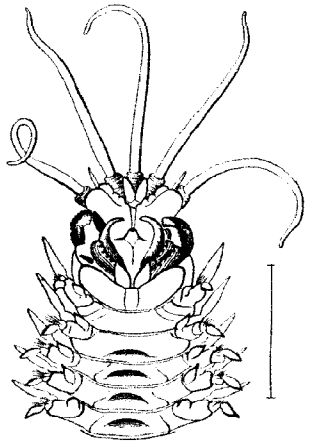
No. 577
Fig. 7.



No. 550
Fig. 2.



No. 552
Fig. 4.



No. 554
Fig. 6.

## MARINE ANNELIDS. (Used as bait.)

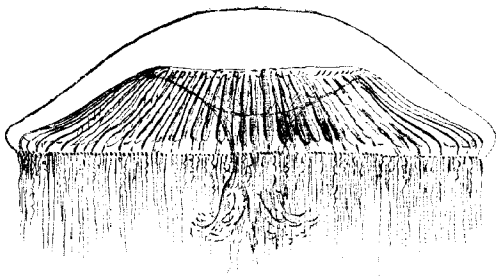
FIGS. 1, 2, 3. *Nereis pelagica*, Linn. Fig. 1, larger figure, female; smaller, male; natural size. Fig. 2, head. Fig. 3, proboscis, enlarged.

FIG 4. *Nereis limbata*, Ehlers; male; anterior part of body, head, and extended proboscis, enlarged.

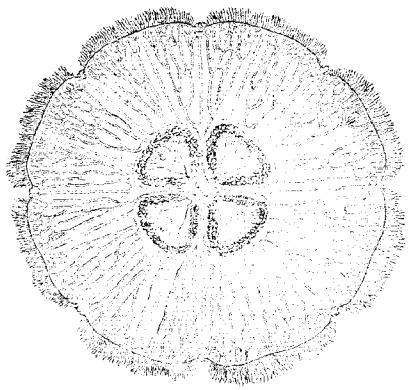
FIGS. 5, 6. *Diopatra cuprea*, Claparède. Fig. 5, head and anterior part of body, showing part of the branchiæ, side view. Fig. 6, ventral view, showing the mouth open and jaws thrown back, enlarged.

FIGS. 7, 8, 9. *Clymenella torquata*, Verrill. Fig. 7, entire animal, side view, natural size. Fig. 8, head and extended proboscis, front view, enlarged. Fig. 9, posterior and caudal segments, dorsal view, enlarged.

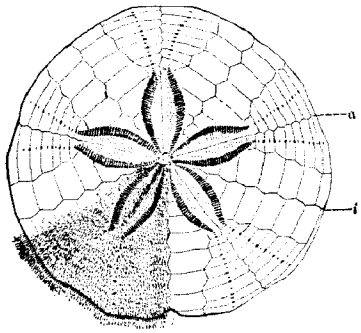
Drawings mostly by J. H. Emerton.



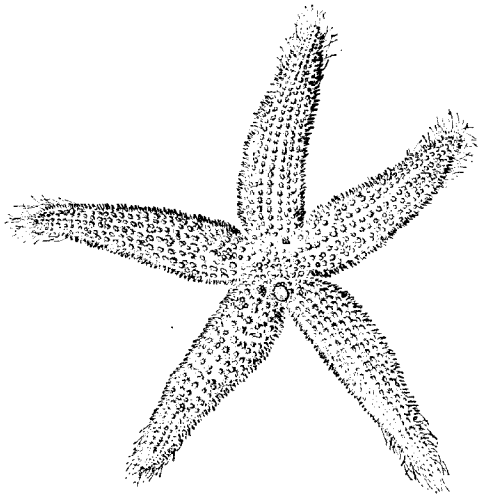
No. 612
Fig. 5



No. 613
Fig. 6.




617
Fig. 3.



616
Fig. 4.

Fig. 2.

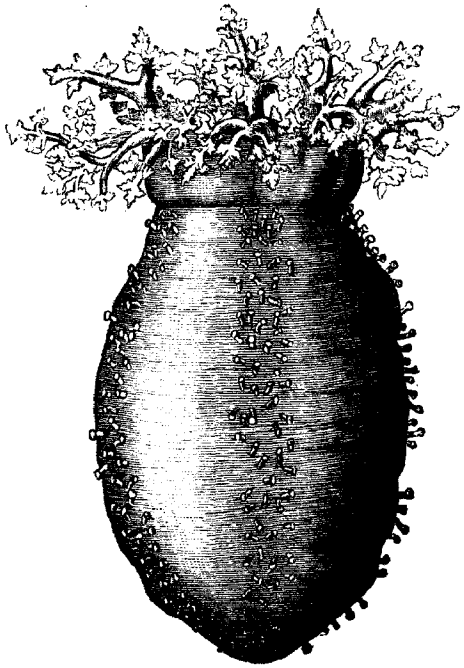
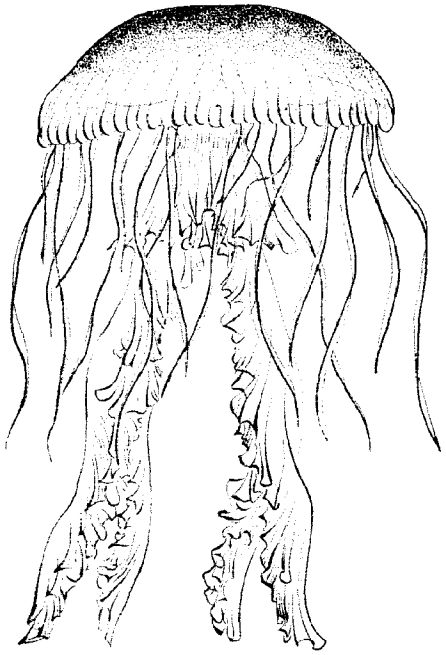


Fig. 1.



No. 614
Fig. 7.

FIG. 1. The Sea-Cucumber, *Pentacta frondosa*, Jæger; much smaller than natural size. (p. 838.)
FIG. 2. The Common Sea-Urchin, *Strongylocentrotus dröbachiensis* A. Ag.; side view, much smaller than natural size.
FIG. 3. The Sand Dollar, *Echinarachnius parma*, Gray; upper surface, with the spines mostly removed, natural size; *a*, ambulacral zones; *i*, inter-ambulacral zones. (p. 839.)
FIG. 4. The Star-fish or "Five Finger," *Asterias Forbesii*, Verrill; much smaller than natural size. (p. 840.)
FIGS. 5, 6, 7. The Jelly Fishes. Fig. 5, *Zygodactyla groenlandica*, Agassiz; profile view, one-half natural size. Fig. 6, *Aurelia flavidula*, Peron and Le Sueur; dorsal view, about one-fourth natural size. Fig. 7, *Dactylometra quinquecirra*, Agassiz; lateral view, one-fourth natural size. (p. 841.)

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Sect.1,Plates

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AUTHOR

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| DATE LOANED | BORROWER'S NAME | DATE RETURNED |
|---|---|---|
| 12/6/74 | Frank Edwards | |
| 11.22.78 | Peter Hanson | |
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