

## ANALYSIS OF THE FISHES OF CHILE.

BY  
HENRY W. FOWLER.

*Curator of Fishes,  
The Academy of Natural Sciences of Philadelphia.*

The various groups of fishes indicated in my «Fishes of Chile»<sup>1</sup> are now defined in the present work by means of the indented analyses given below. In some cases changes have been made, the discarded items following affording source clues. Generic names have also been added in proper sequence. Fifty-one additional unfinished detailed outline drawings are given, representing species not figured in the original work. It is inevitable during the preparation of a work like the present that findings in the literature render necessary changes. Other adjustments will surely eventuate with the study of future materials, together with the increased and perfected knowledge of adjacent faunas. The arrangement of the various groups down to the species is maintained in accordance with the original catalog. This appears more desirable in order to find ready reference to the species. Finally I have added an 'Appendix' listing doubtful, obscure or extralimital species, besides errata. Several new names are proposed in the higher groups besides a specific name for one twice preoccupied.

## ANALYSIS OF HIGHER GROUPS

a<sup>1</sup>. **ACRANIATA.** Front end of central nervous axis not dilated into a brain and skull absent; notochord perfect, persists through life, extends throughout length of body, enclosed in membranous sheath; heart lengthwise, tubular, gives off branchial tubes uniting in aorta.

Class **LEPTOCARDII.**

Family **BRANCHIOSTOMIDAE.**

**Branchiostoma** Costa.

*Branchiostoma elongatum* (Sundevall).

<sup>1</sup>)—Fishes of Chile, Systematic Catalog. Revista Chilena Hist. Nat., Santiago de Chile, años 45—47. (1941—1943) 1945, part. 1, pp. 1-36, figs. 1-18; pt. 2, pp. 1-171 (115 figures unnumbered).

—Description of a new genus of Parapercid Fishes from Chile., Op. cit., vol. 48, 1944 (1945), pp. 1—12, fig. (**Porteridia** proposed).



a<sup>2</sup>. **CRANIOTA**. Front end of central nervous axis dilated into a brain and contained in a skull; notochord not extending forward beyond pituitary body of brain; heart more perfected, divided into 2 parts.

b<sup>1</sup>. Skull imperfect, without jaws; nostril single, median; gills purse-shaped. Class **MARSIPOBRANCHII**.

c<sup>1</sup>. Nasal tube duct-like, with cartilaginous rings, penetrating palate; gill opening remote from head, opening directly into pharynx; no eyes.

Order **MYXINIA** new form (*Hyperotreti*).

c<sup>2</sup>. Nasal tube a blind sac, not penetrating palate; gill opening close behind head, communicating with a common branchial passage which opens directly into pharynx; eyes well developed in adult.

Order **PETROMYZONIA** new form (*Hyperoartii*).

b<sup>2</sup>. Skull perfected, with jaws; nostrils paired, not median; gills not purse shaped. Class **PISCES**.

d<sup>1</sup>. Skull without system of membrane bones, as opercles, etc.; ventrals with claspers.

e<sup>1</sup>. Jaws distinct from skull; teeth distinct; gills 5 to 7, joined by outer edge of skin, each as separate external slit along side of pharynx. Subclass **ELASMOBRANCHII**.

f<sup>1</sup>. Anal fin present.

g<sup>1</sup>. Gill openings 6 or 7; dorsal fin single.

Order **DIPLOSPONDYLI**.

g<sup>2</sup>. Gill openings 5; dorsal fins double.

Order **ASTEROSPONDYLI**.

f<sup>2</sup>. No anal fin.

h<sup>1</sup>. Gill openings lateral.

i<sup>1</sup>. Pectoral fins normal. Order **CYCLOSPONDYLI**.

i<sup>2</sup>. Pectoral fins modified, large, expanded horizontally and extended forward at base in front, which is separated from neck by deep notch containing gill openings.

Order **SQUATINIA** new form (*Squatinae*).

h<sup>2</sup>. Gill openings ventral.

Order **RAJIA** new form (*Rajae*).

e<sup>2</sup>. Jaws joined to skull; teeth united as bony plates; gill opening single on each side of pharynx, containing 4 gills within branchial chamber. Subclass **HOLOCEPHALI**.

Order **CALLORHINCHIA** new form (*Callorhinchoidei*).

Family **CALLORHINCHIDAE**.

**Callorhynchus** Lacépède.

*Callorhynchus callorynchus* (Linnaeus).



d<sup>2</sup>. Skull with well developed system of membrane bones, as opercles, suborbital chain, etc.; gill opening single on each side of body; ventral fins without claspers.

Subclass **TELEOSTOMI.**

j<sup>1</sup>. Gill opening before pectoral.

k<sup>1</sup>. **PHYSOSTOMI.** Air bladder when present joined by air duct with intestinal canal and persistent through life; spines seldom present in fins; pectorals usually on plane of abdomen; ventrals abdominal, spineless and basal segments rudimentary.

l<sup>1</sup>. Shoulder girdle attached to skull by posttemporal bone.

m<sup>1</sup>. Vertebrae all more or less similar, anterior ones not especially modified.

n<sup>1</sup>. Body not truly eel-like; maxillary perfected, rarely absent precoracoid arch present.

o<sup>1</sup>. Hypercoracoid and hypocoracoid well developed, not coalescent; dorsal spineless. Order **ISOSPONDYLI.**

o<sup>2</sup>. Hypercoracoid and hypocoracoid coalesced in simple lamella, imperforate plate; dorsal with many spines.

Order **HETEROMI.**

Family **NOTACANTHIDAE.**

**Gigliolia** Goode and Bean.

*Gigliolia moseleyi* Goode and Bean.

n<sup>2</sup>. Body eel-like; shoulder girdle not attached to skull; maxillary absent or united with palatines; no precoracoid arch. Order **APODES.**

m<sup>2</sup>. Anterior vertebrae modified, coossified with ossicula auditus.

p<sup>1</sup>. Maxillary normal; no barbel; subopercle and symplectic present. Order **HETEROGNATHI.**

p<sup>2</sup>. Maxillary imperfect, forms base of usually prominent barbel; subopercle and symplectic present.

Order **NEMATOGNATHI.**

l<sup>2</sup>. Shoulder girdle not connected with skull in usual way, posttemporal barely touching cranium; mostly bathypelagic. Order **INIOMI.**

k<sup>2</sup>. **PHYSOCLISTI.** Air bladder ductless with age; parietals, if present, separated by supra-occipital; pectoral arch suspended from skull; no mesocoracoid; ventral without basal segments.

q<sup>1</sup>. Fins without spines.

r<sup>1</sup>. Cranium normal.

s<sup>1</sup>. Pectoral with vertical base.

t<sup>1</sup>. Ventrals inserted far behind pectorals; lower pharyngeals fully united. Order **SYNENTOGNATHI.**



- t<sup>2</sup>. Ventrals below or before pectorals.  
Order **ANACANTHINI**.
- s<sup>2</sup>. Pectoral with horizontal or subhorizontal base.  
Order **ALLOTRIOGNATHI**.  
Family **TRACHIPTERIDAE**.  
**Trachipterus** Gouan.  
*Trachipterus altivelis* Kner.
- r<sup>2</sup>. Cranium twisted with age, so both eyes are on one side of head.  
Order **HETÉROSOMATA**.
- q<sup>2</sup>. Fins spinous.
- u<sup>1</sup>. Ventrals thoracic.
- v<sup>1</sup>. Head without laminated disk above.
- w<sup>1</sup>. Ventrals close together, separated, first ray usually longest, others graduated shorter to innermost.
- x<sup>1</sup>. Lower pharyngeals separated.
- y<sup>1</sup>. No suborbital stay.
- z<sup>1</sup>. Ventrals with 3 to 13 soft rays; gills normal; scales various; spines well developed.  
Order **BERYCIA** new form (*Berycoidei*).  
Family **TRACHICHTHYIDAE**.  
**Trachichthys** Shaw.  
*Trachichthys fernandezianus* Guenther.
- z<sup>2</sup>. Ventrals usually absent; gills pectinated or tufted; branchial apparatus reduced; few or no dorsal spines.  
Order **LOPHOBRANCHII**.
- z<sup>3</sup>. Ventral rays not more than 5; gills normal; spines typical.  
Order **PERCOMORPHI**.
- y<sup>2</sup>. Suborbital with bony stay; ventrals thoracic; nostrils 2 each side.  
Order **CATAPHRACTI**.
- x<sup>2</sup>. Lower pharyngeals completely united.
- aa<sup>1</sup>. Nostril single on each side of snout.  
Order **CHROMIDES**.
- aa<sup>2</sup>. Two nostrils on each side of snout.  
Order **PHARYNGOGNATHI**.
- w<sup>2</sup>. Ventrals variably widely separate or close and united, inner rays of each fin longest.  
Order **GOBIOIDEA**.
- v<sup>2</sup>. Head above with transversely laminated disk.  
Order **DISCOCEPHALI**.
- u<sup>2</sup>. Ventrals jugular or mental.
- bb<sup>1</sup>. No ventral sucker.  
Order **JUGULARES**.
- bb<sup>2</sup>. Ventral sucker present.  
Order **XENOPTERYGII**.
- j<sup>2</sup>. Gill opening in or near axil, more or less behind pectoral base.  
Order **PLECTOGNATHI**.



## ANALYSIS OF FAMILIES AND SPECIES

Order **HYPEROTRETI**

## Hag Fishes

a<sup>1</sup>. Gill openings 6 to 14 each side, leading by a duct to the branchial sac. Family **HOMEIDAE** (*Eptatretidae*).

**Polistotrema** Gill.

b<sup>1</sup>. Gill openings 14. *Polistotrema polytrema* (Girard).

b<sup>2</sup>. Gill openings 6. **Homea** Fleming.

*Homea decatrema* (Regan).

a<sup>2</sup>. Gill openings single on each side, with diverging ducts to 8 branchial sacs. Family **MYXINIDAE**.

c<sup>1</sup>. Eight teeth in first series, 8 or 9 in second, 2 most anterior united; pores 30 to 36 + 56 to 64 + 9 to 12.

**Myxine** Linnaeus.

*Myxine australis* Jenyns.

c<sup>2</sup>. Ten teeth in each series, 3 most anterior in first series and 2 most anterior in second series united; pores 22 + 62 + 9.

*Myxine tridentiger* Garman.

c<sup>3</sup>. Ten or 11 (9 in young) teeth in first series, 9 to 11 (generally 10 or 11) in the second, the 2 most anterior united; pores 28 to 34 + 63 to 69 + 9 to 13.

*Myxine affinis* Guenther.



Figure 1.—*Myxine affinis* Guenther. From Garman 1899.

Order **HYPEROARTII**

## Lampreys

Family **PETROMYZONIDAE**

## Lampreys

a<sup>1</sup>. A single supraoral lamina.

b<sup>1</sup>. Disk small, with labial teeth close together, almost imbricating; gular pouch small or absent. **Velasia** Gray.



c<sup>1</sup>. Inner pair of supraoral cusps spatulate; front lingual plate bicuspid, cusps very strong; length of first dorsal base well over its distance from second dorsal.

*Velasia chilensis* Gray.

c<sup>2</sup>. Inner pair of supraoral cusps ovate or triangular and acutely pointed; front lingual plate usually tricuspid; length of first dorsal base less to little more than its distance from second dorsal.

*Velasia stenostoma* Ogilby.

b<sup>2</sup>. Disk large, with labial teeth well separated; gular pouch developed; front lingual tooth bicuspid; first dorsal base lower than its distance from second.

*Geotria* Gray.

*Geotria australis* Gray.

a<sup>2</sup>. Two tricuspid supraoral laminae.

d<sup>1</sup>. Enlarged cusps of front lingual laminae very strong, hiding the denticulated ridges.

*Mordacia* Gray.

e<sup>1</sup>. Gular sac absent or very small; teeth of oral disk mostly on common radially arranged base.

*Mordacia acutidens* (Philippi).

e<sup>2</sup>. Gular sac large; wreath of radially arranged teeth of oral disk on separate base.

*Mordacia anwandteri* (Philippi).

d<sup>2</sup>. Enlarged cusps on front lingual lamina small, the denticulated ridge evident.

*Caragola* Gray.

*Caragola lapicida* Gray.

## Class PISCES

### Fishes

### Sub-Class ELASMOBRANCHII

### Shark-like Fishes

### Order DIPLOSPONDYLI

### Notidanoid Sharks

### Family HEPTRANCHIDAE

### Grisets

a<sup>1</sup>. Gill openings 7.

*Heptranchias* Rafinesque.

*Heptranchias perlo* (Bonnaterre).

a<sup>2</sup>. Gill openings 6.

*Hexanchus* Rafinesque.

*Hexanchus griseus* (Bonnaterre).



Figure 2.—*Hexanchus griseus* (Bonnaterre).



Order **ASTEROSPONDYLI**

a<sup>1</sup>. Eye without nictitating membrane.

b<sup>1</sup>. Caudal moderate or small, less than half of entire fish.

c<sup>1</sup>. **SCYLIORHINOIDEI**. Caudal peduncle without keel each side; teeth raptorial; nasoral grooves present or absent; caudal axis little raised, subcaudal not produced.

Family **SCYLIORHINIDAE**.

d<sup>1</sup>. **Cephaloscyllinae** new. Belly capable of great inflation; labial folds absent or rudimentary; hind nasal valves present.

**Cephaloscyllium** Gill.

*Cephaloscyllium ventriosum* (Garman).

d<sup>2</sup>. **Halaelurinae** new. Belly not inflatable; labial folds around mouth angles; hind nasal valves present.

e<sup>1</sup>. First dorsal origin at end of first  $\frac{2}{3}$  of ventral bases.

**Halaelurus** Gill.

f<sup>1</sup>. Eye  $3\frac{4}{5}$  to  $4\frac{1}{2}$  in head; anal fin little longer than first dorsal; no enlarged tubercles on back.

*Halaelurus bivius* (A. Smith).



Figure 3.—*Halaelurus bivius* (Andrew Smith). From Philippi 1887.

f<sup>2</sup>. Eye 6 in head; anal fin subequal with first dorsal; usually 2 series of predorsal tubercles.

*Halaelurus chilensis* (Guichenot).

e<sup>2</sup>. First dorsal origin above middle of ventral base; caudal tipped black, other fins with white.

*Halaelurus canescens* (Guenther).

c<sup>2</sup>. **ISUROIDEI**. Caudal peduncle with lateral keel each side; caudal lunate or subcaudal well developed; no nasoral groove; spiracles present, rarely absent. Family **ISURIDAE**.

g<sup>1</sup>. Teeth subulate, edges smooth.

h<sup>1</sup>. **Isurinae**. Teeth without basal denticles; second dorsal nearly in front of anal.

**Isurus** Rafinesque.

*Isurus glaucus* (Mueller and Henle).

h<sup>2</sup>. **Lamninae**. Teeth with basal denticle each side in adult; second dorsal above anal.

**Lamna** Cuvier.

*Lamna nasus* (Bonnaterre).



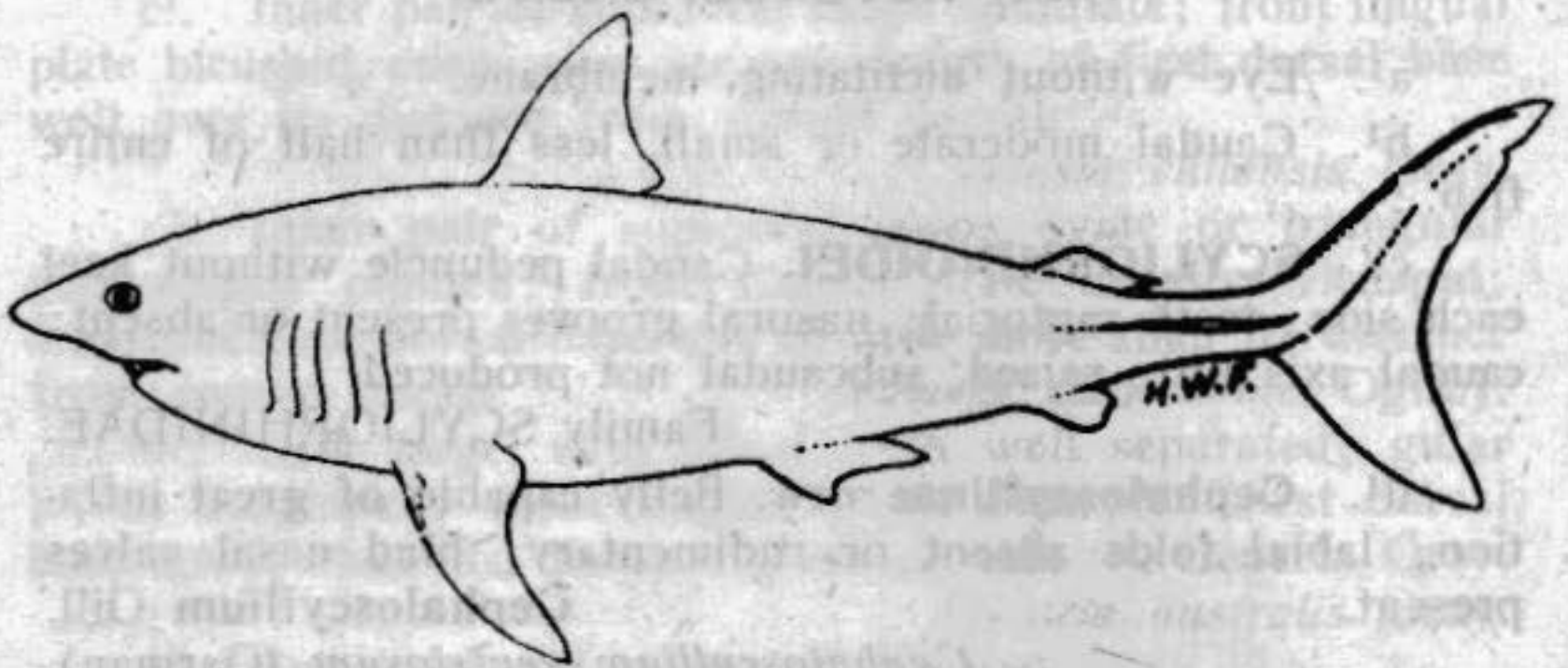


Figure 4.—*Lamna nasus* (Bonnaterre). From Philippi 1887.

g<sup>2</sup>. **Carcharodontinae.** Teeth large, triangular, edges serrated, without basal denticles; size large.

**Carcharodon** Mueller and Henle.

*Carcharodon carcharias* (Linnaeus).

b<sup>2</sup>. **ALOPIOIDEI.** Caudal longer than body, axis rather low; snout short, conic.

Family ALOPIDAE.

**Alopias** Rafinesque.

*Alopias vulpinus* (Bonnaterre).



Figure 5.—*Alopias vulpinus* (Bonnaterre).

a<sup>2</sup>. **GALEORHINOIDEI** new. Nictating membrane present; head attenuated, sometimes expanded across interorbital region; teeth various, compressed or triangular, sometimes in bands or pavements; nasoral grooves absent; caudal axis slightly raised, subcaudal produced.

i<sup>1</sup>. Head not expanded across interorbital region.

Family GALEORHINIDAE.



j<sup>1</sup>. Teeth compressed, triangular, a single series functional.

k<sup>1</sup>. **Scoliodontinae.** Spiracles absent.

l<sup>1</sup>. First dorsal near pectorals. **Eulamia** Gill.

m<sup>1</sup>. Pectoral length equals its base; subcaudal small.  
*Eulamia robusta* (Philippi).

m<sup>2</sup>. Pectoral length twice its base; subcaudal moderate.  
*Eulamia philippi* (Fowler).

l<sup>2</sup>. First dorsal near ventrals. **Glyphis** Agassiz.  
*Glyphis glaucus* (Linnaeus).

k<sup>2</sup>. **Galeorhininae.** Spiracles small, oblique; teeth short, serrated, notched, oblique; caudal pit rudimentary; subcaudal short.

**Galeorhinus** Blainville.

*Galeorhinus galeus* (Linnaeus).

j<sup>2</sup>. Teeth in bands or pavement, more than one series functional.

n<sup>1</sup>. **Triakinae.** new. Teeth compressed, cusps 3 to 5.

o<sup>1</sup>. No spiracles. **Triaenodon** Mueller and Henle.  
*Triaenodon nigricans* (Philippi).

o<sup>2</sup>. Spiracles present. **Triakis** Mueller and Henle.  
*Triakis maculata* Kner and Steindachner.

n<sup>2</sup>. **Mustelinae.** Teeth in pavement, blunt; labial folds large; subcaudal not produced. **Mustelus** Linck.

p<sup>1</sup>. Ventral close behind first dorsal in interdorsal space.  
*Mustelus mento* Cope.

p<sup>2</sup>. Ventral midway in interdorsal space.  
*Mustelus edulus* Pérez.

i<sup>2</sup>. **SPHYRNOIDEI.** Head well expanded across inter-orbital region, kidney-shaped to greatly hammer-shaped.

Family SPHYRNIDAE.

**Sphyrna** Rafinesque.

*Sphyrna peruana* (Philippi).

## Order **CYCLOSPONDYLI**

### Family **SQUALIDAE**

#### Spiny Dog Sharks

a<sup>1</sup>. **Etmopterinae.** Dorsal spines with lateral grooves; notch below terminal part of caudal.

b<sup>1</sup>. Teeth unicuspid, unlike in 2 jaws; nostrils oblique.  
**Scymnodon** Bocage and Capello.  
*Scymnodon macracanthus* (Regan).

b<sup>2</sup>. Teeth pleuricuspid; nostrils slightly oblique.  
**Etmopterus** Rafinesque.



c<sup>1</sup>. Scales placoid, with a central spine and with spinules.  
*Etmopterus paessleri* Loennberg.

c<sup>2</sup>. Scales granular anteriorly, setiform posteriorly.  
*Etmopterus granulosus* (Guenther).

a<sup>2</sup>. **Squalinae.** Dorsal spines without lateral grooves;  
caudal not notched subterminally; teeth alike in both jaws.

**Squalus** Linnaeus.

*Squalus fernandinus* Molina.

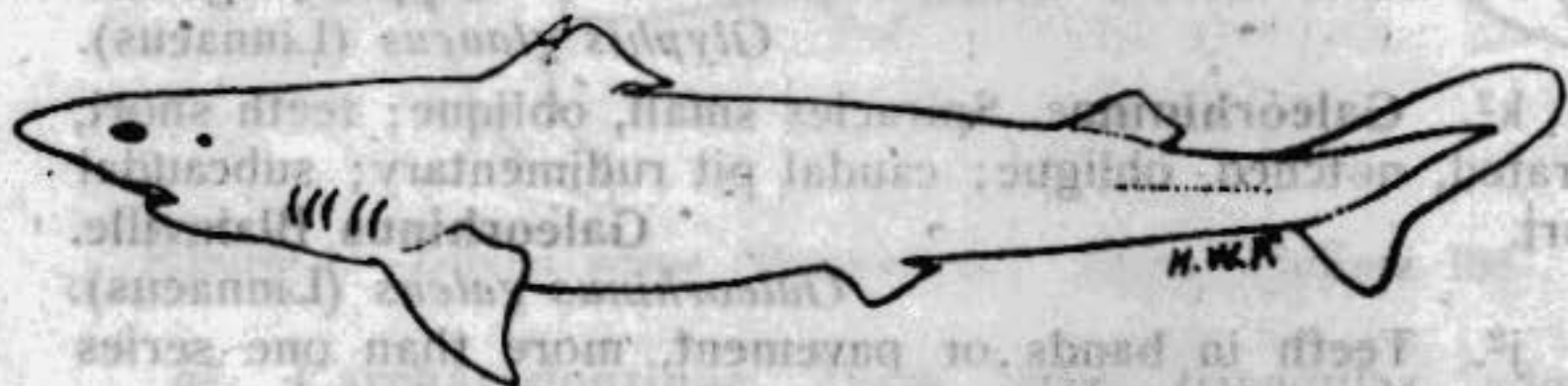


Figure 6.—*Squalus fernandinus* Molina. From Philippi 1887.

### Order SQUATINAE

#### Family SQUATINIDAE

#### Angel Sharks

#### *Squatina* Duméril

a<sup>1</sup>. Subcaudal obliquely truncate; margins of pectoral  
fins forming a right angle. *Squatina philippi* (Garman).

a<sup>2</sup>. Subcaudal pointed; margins of pectorals much curved.  
*Squatina armata* (Philippi).

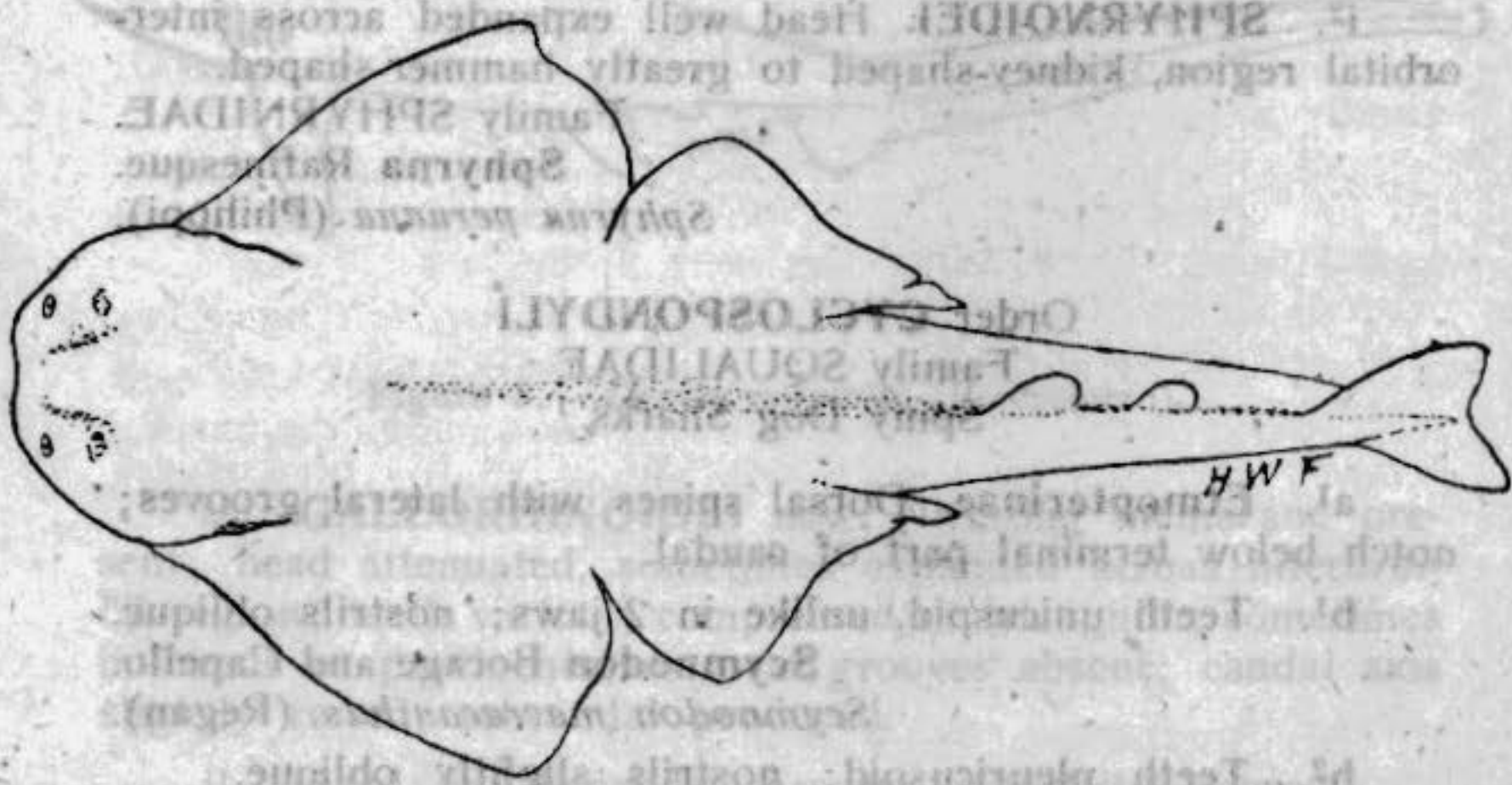


Figure 7.—*Squatina armata* (Philippi). From Philippi 1887.



## Order RAJAE

a<sup>1</sup>. **RHINOBAIDOIDEI.** Disk narrow, elongate, short to broad; skull produced in median rostral cartilage, long to short; teeth in pavement; nasoral grooves absent or incipient; electric organs absent or incipient; pelvis transverse; tail with 2 dorsals and well developed caudal.

Family RHINOBATIDAE.

**Tarsistes** Jordan.

*Tarsistes philippi* Jordan.

a<sup>2</sup>. **TORPEDINOIDEI.** Disk broadly rounded; snout short, obtuse; teeth raptorial, small, in bands; nasoral groove present; electric organs well developed; pelvis arched backward with lateral prepelvic extensions; tail short, with 2 dorsals, 1 dorsal or none and well developed.

Family TORPEDINIDAE.

**Discopyge** Tschudi.

*Discopyge tschudii* Heckel.

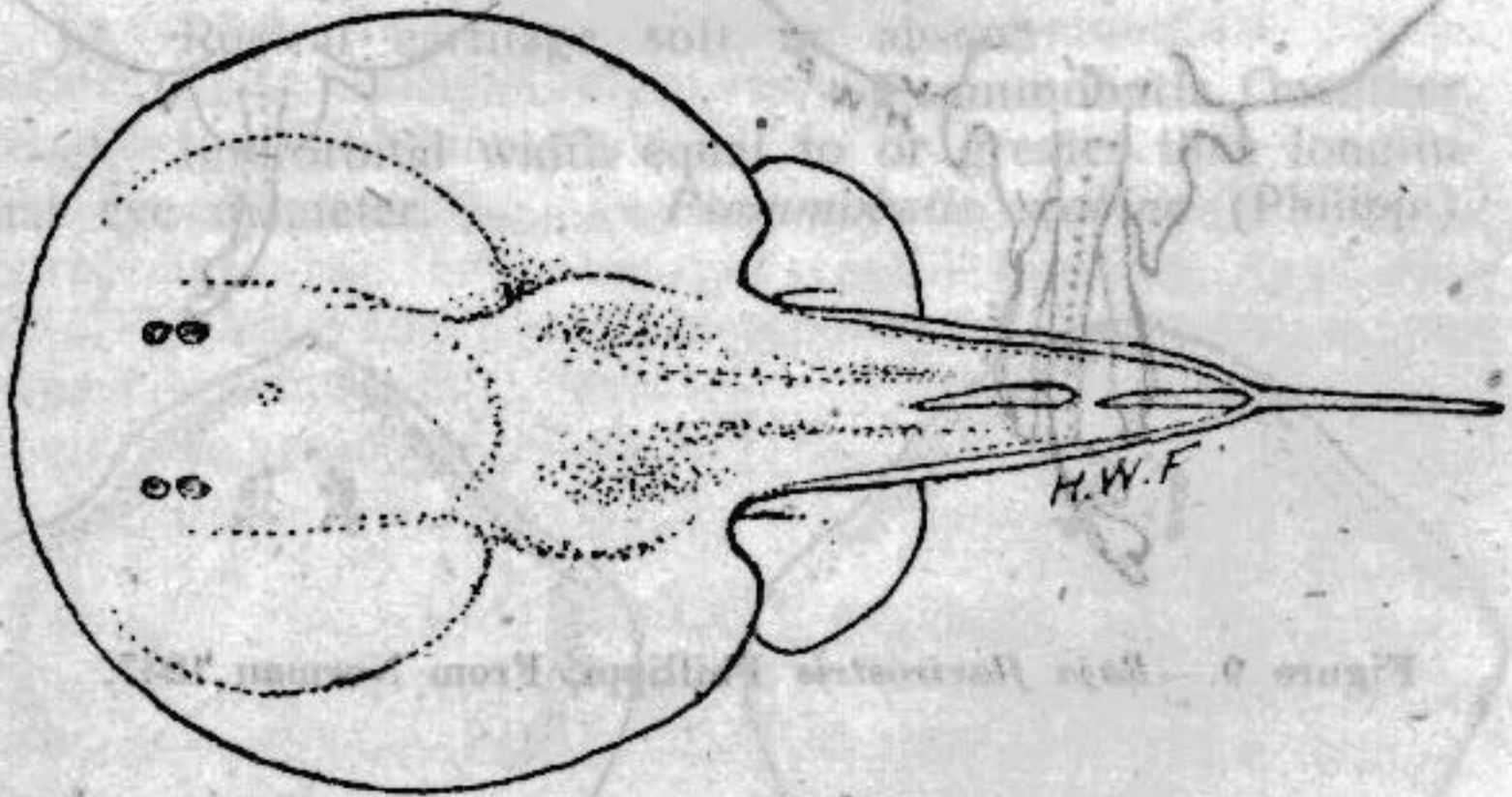


Figure 8.—*Discopyge tschudii* Heckel. From Heckel 1845.

a<sup>3</sup>. **RAJOIDEI.** Dorsal rather angular to rounded; skull extended in narrow pointed rostral cartilages, rarely obsolete; teeth small, in pavement; nasoral grooves present; electric organs rudimentary or absent; pelvis transverse, with lateral prepelvic extensions; tail moderate to slender, usually with 2 small dorsals and more or less imperfect membranous caudal.

Family RAJIDAE.



b<sup>1</sup>. Rostral cartilage produced forward from skull, pointed. **Raja Linnaeus.**

c<sup>1</sup>. Terminal parts of lateral line tubules on lower surface pigmented, appearing as small blackish spots and streaks; snout  $3\frac{1}{4}$  to  $3\frac{3}{4}$  ( $2\frac{3}{4}$  to  $3\frac{1}{4}$  in young) times eye plus spiracle; vent much nearer end of tail than tip of snout; a single large nuchal spine. **Raja flavirostris Philippi.**

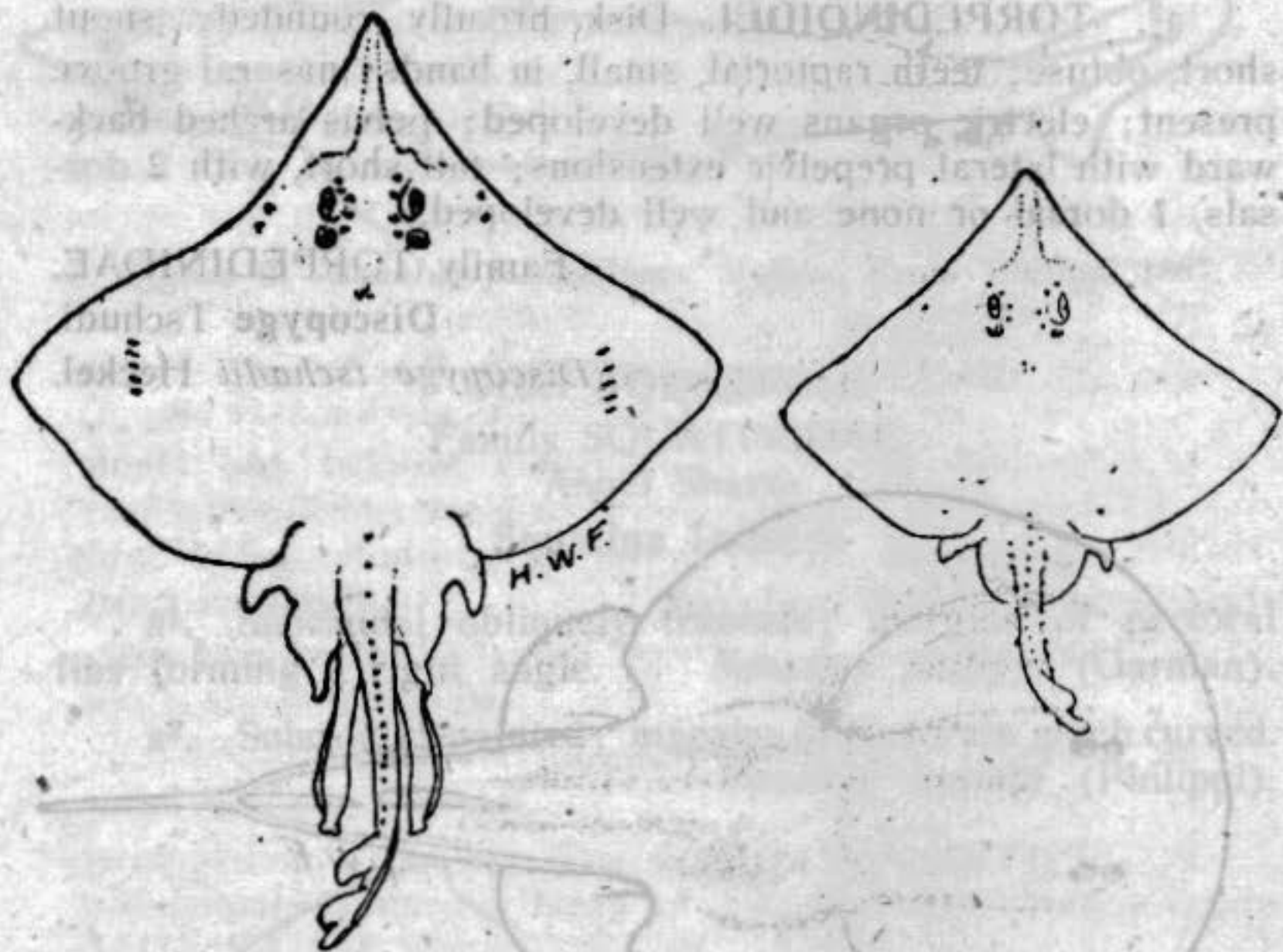


Figure 9.—*Raja flavirostris* Philippi. From Norman 1937.

c<sup>2</sup>. No pigment spots or streaks on lower surface; snout shorter, not acutely pointed, length never more than  $3\frac{1}{4}$  times eye plus spiracle.

d<sup>1</sup>. One to 3 pairs of enlarged scapular spines; spines scattered over disk of moderate size and fairly well separated; a continuous series of median spines from nuchal region to first dorsal fin. **Raja magellanica Philippi.**



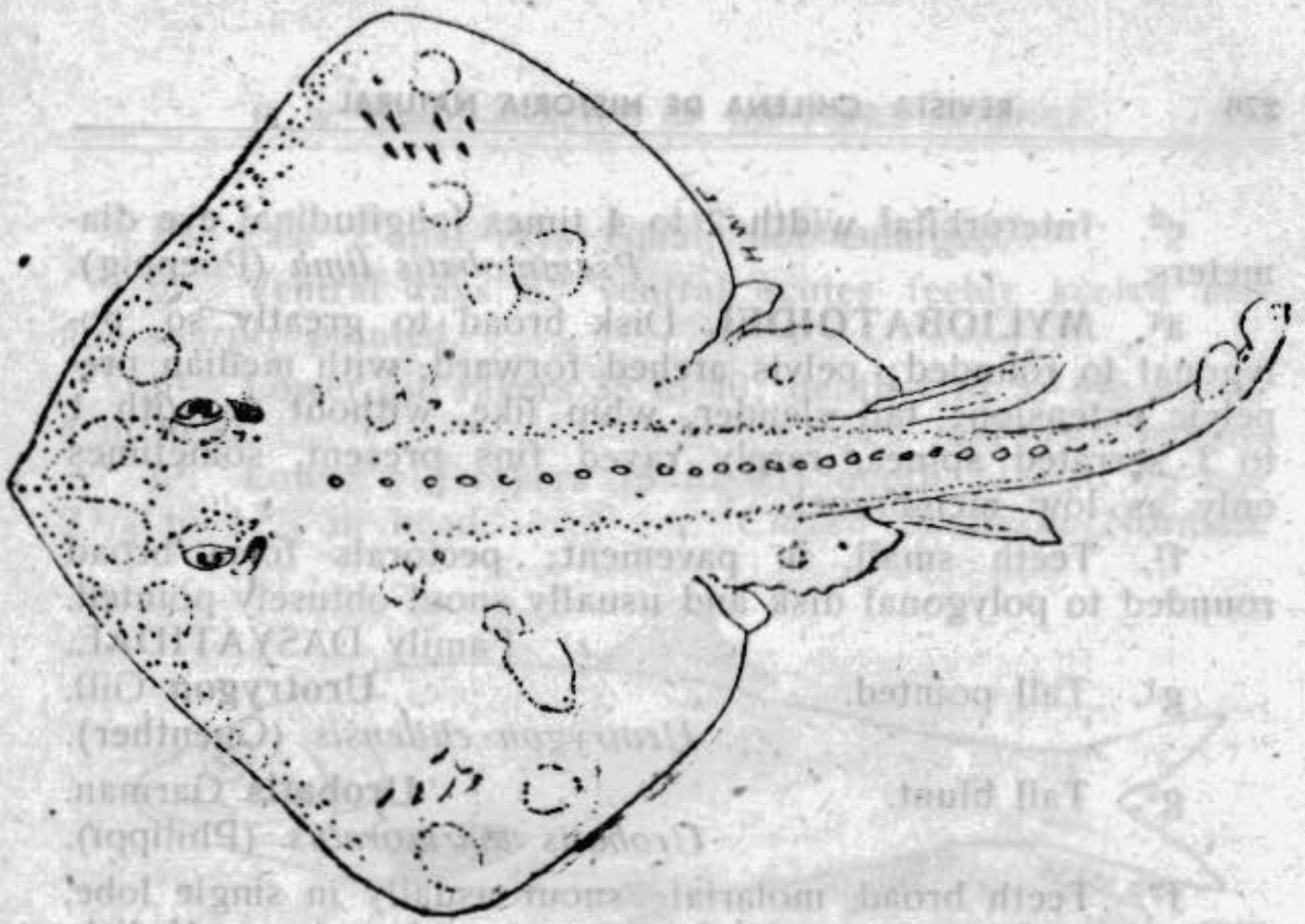


Figure 10.—*Raja magellanica* Philippi. From Norman 1937.

d<sup>2</sup>. No enlarged scapular spines; spines scattered over disk smaller and closer together; no ocular spines.

*Raja brachyurops* Fowler.

b<sup>2</sup>. Rostral cartilage soft or absent.

*Psammobatis* Guenther.

e<sup>1</sup>. Interorbital width equal to or greater than longitudinal eye diameter.

*Psammobatis scobina* (Philippi).

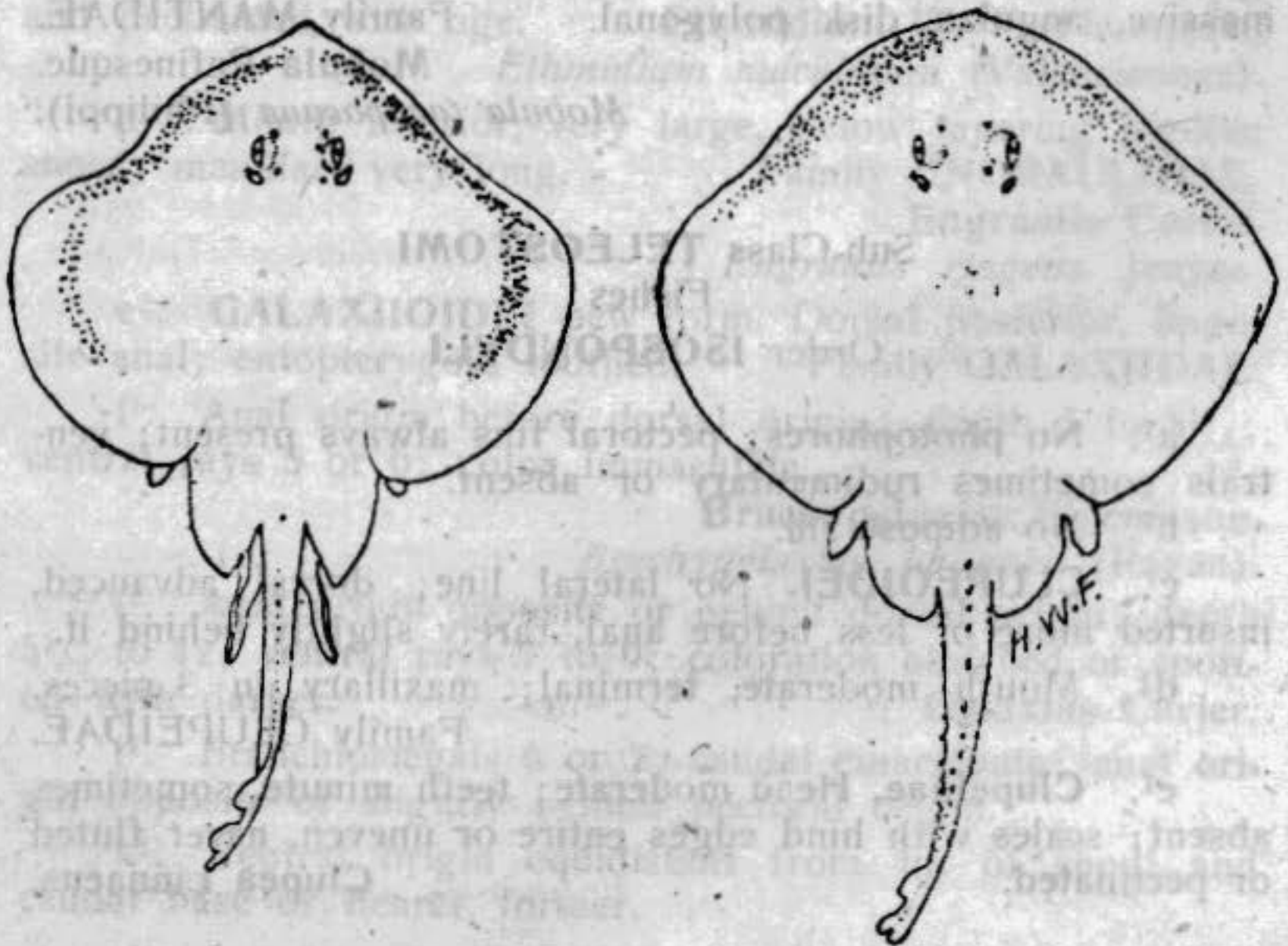


Figure 11.—*Psammobatis scobina* (Philippi). From Norman, 1937.



e<sup>2</sup>. Interorbital width 2 to 4 times longitudinal eye diameters. *Psammobatis lima* (Poeppig).

a<sup>4</sup>. **MYLIOBATOIDEI**. Disk broad to greatly so, polygonal to rounded; pelvis arched forward, with median pre-pelvic extension; tail slender, whip like, without or with 1 to 3 serrated spines, rarely rayed fins present, sometimes only as low membranes.

f<sup>1</sup>. Teeth small, in pavement; pectorals form broad rounded to polygonal disk and usually snout obtusely pointed. Family **DASYATIDAE**.

g<sup>1</sup>. Tail pointed. **Urotrygon** Gill.  
*Urotrygon chilensis* (Guenther).

g<sup>2</sup>. Tail blunt. **Urobatis** Garman.  
*Urobatis marmoratus* (Philippi).

f<sup>2</sup>. Teeth broad, molarial; snout usually in single lobe, sometimes divided; pectorals form broad polygonal disk, angular. Family **MYLIOBATIDAE**.

h<sup>1</sup>. **Myliobatinae**. Snout in a single lobe; pelvis arched. **Holorhinus** Gill.  
*Holorhinus californicus* (Gill).

h<sup>2</sup>. **Rhinopterinae**. Snout in 2 separate lobes. **Rhinoptera** Cuvier.  
*Rhinoptera chilensis* (Philippi).

f<sup>3</sup>. Teeth minute, very numerous, in bands; snout very wide, with 2 lateral lobes; pectorals and body very wide, massive, angular, disk polygonal. Family **MANTIDAE**.  
**Mobula** Rafinesque.  
*Mobula tarapacana* (Philippi).

## Sub-Class **TELEOSTOMI**

### Fishes

## Order **ISOSPONDYLI**

a<sup>1</sup>. No photophores; pectoral fins always present; ventrals sometimes rudimentary or absent.

b<sup>1</sup>. No adipose fin.

c<sup>1</sup>. **CLUPEOIDEI**. No lateral line; dorsal advanced, inserted more or less before anal, rarely slightly behind it.

d<sup>1</sup>. Mouth moderate, terminal; maxillary in 3 pieces. Family **CLUPEIDAE**.

e<sup>1</sup>. **Clupeinae**. Head moderate; teeth minute, sometimes absent; scales with hind edges entire or uneven, never fluted or pectinated. **Clupea** Linnaeus.



f<sup>1</sup>. Last 2 anal rays equal, not enlarged.

g<sup>1</sup>. Ventral rays 8; ventral scutes feebly keeled and not sharply pointed.

h<sup>1</sup>. Lower gill rakers 38 to 40; depth 4 to 5; eye nearly 4 in head. *Clupea juegensis* Jenyns.

h<sup>2</sup>. Lower gill rakers 75 to 95; depth 3½ to 4; eye 3½ to 4¼ in head. *Clupea bentincki* Norman.

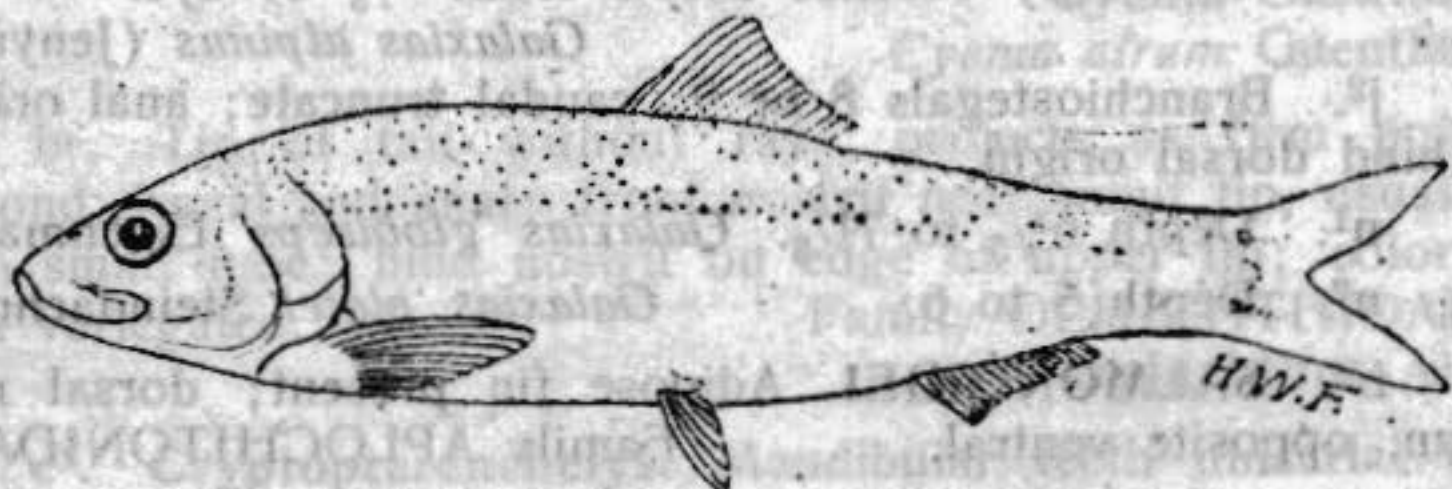


Figure 12.—*Clupea bentincki* Norman, From Norman 1937.

g<sup>2</sup>. Ventral rays 7; ventral scutes strongly keeled and acutely pointed; lower gill rakers 25 to 30.

*Clupea arcuata* Jenyns.

f<sup>2</sup>. Last 2 anal rays enlarged; opercle with well developed radiating striae.

e<sup>2</sup>. **Brevoortiinae** new. Head large; no teeth; scales with hind edges fluted or pectinated, or serrated in young and pectinated with age. **Ethmidium** W. F. Thompson.

*Ethmidium maculatum* (Valenciennes).

d<sup>2</sup>. Mouth inferior, very large, below tapering pig-like snout; maxillary very long. **Family ENGRAULIDAE.**

**Engraulis** Cuvier.

*Engraulis ringens* Jenyns.

e<sup>2</sup>. **GALAXIIOIDEI** new form. Dorsal posterior, opposite anal; entopterygoid toothed. **Family GALAXIIDAE.**

i<sup>1</sup>. Anal origin before dorsal origin; depth 5 to 5¼; ventral rays 5 or 6; color immaculate.

**Brachygalaxias** Eigenmann.

*Brachygalaxias bullocki* (Regan).

i<sup>2</sup>. Anal origin opposite or behind dorsal origin; depth 5⅓ to 12; ventral rays 7 to 9; coloration blotched or spotted with darker. **Galaxias** Cuvier.

j<sup>1</sup>. Branchiostegals 6 or 7; caudal emarginate; anal origin opposite or slightly behind pectoral origin.

k<sup>1</sup>. Ventral origin equidistant from tip of snout and caudal base or nearer former.



- l<sup>1</sup>. Head 5 (young) to  $6\frac{1}{2}$  (adult).  
*Galaxias attenuatus* (Jenyns).
- l<sup>2</sup>. Head 7 to  $7\frac{1}{2}$  (young).  
*Galaxias gracillimus* (Canestrini).
- k<sup>2</sup>. Ventral origin nearer caudal base than to snout tip.
- m<sup>1</sup>. Maxillary reaches below front edge of eye or slightly beyond.  
*Galaxias maculatus* (Jenyns).
- m<sup>2</sup>. Maxillary reaches below front  $\frac{1}{3}$  of eye.  
*Galaxias alpinus* (Jenyns).
- j<sup>2</sup>. Branchiostegals 8 or 9; caudal truncate; anal origin behind dorsal origin.
- n<sup>1</sup>. Depth  $6\frac{3}{5}$  to  $7\frac{1}{3}$ . *Galaxias globiceps* Eigenmann.
- n<sup>2</sup>. Depth 5 to 6. *Galaxias platei* Steindachner.
- b<sup>2</sup>. **SALMONOIDEI.** Adipose fin present; dorsal median, opposite ventral. Family APLOCHITONIDAE.
- Aplochiton** Jenyns.
- o<sup>1</sup>. Depth 6 to 7; anal lobe not reaching base of last anal ray.  
*Aplochiton taeniatus* Jenyns.
- o<sup>2</sup>. Depth  $4\frac{3}{4}$  to  $5\frac{3}{7}$ ; anal lobe extends beyond base of last anal ray, sometimes beyond tip of last ray.  
*Aplochiton zebra* Jenyns.
- a<sup>2</sup>. **STOMIATOIDEI.** Photophores usually along lower side of body and tail; eggs enclosed in sacs of ovarium and excluded by oviducts; pectorals sometimes rudimentary or absent, when ventrals may be well developed or absent.
- p<sup>1</sup>. Hyoid barbel well developed; pectorals present.  
Family STOMIATIDAE.
- q<sup>1</sup>. **Stomiatinae.** Pectorals present; one dorsal, opposite anal. **Stomias** Cuvier.  
*Stomias atriventer* Garman.
- q<sup>2</sup>. **Idiacanthinae** new. No pectorals; dorsal long, with many rays, begins before ventral and ends above anal.  
**Idiacanthus** Peters.  
*Idiacanthus niger* Regan.
- p<sup>2</sup>. Barbel rudimentary or absent.
- r<sup>1</sup>. No pseudobranchiae; scales deciduous; adipose fin present. Family GONOSTOMIDAE.  
**Cyclothone** Goode and Bean.  
*Cyclothone signata* Garman.
- r<sup>2</sup>. Pseudobranchiae present; no scales.  
Family MAUROLICIDAE.  
**Maurolicus** Cocco.  
*Maurolicus muelleri* (Gmelin).



Order **APODES**

## Eels

a<sup>1</sup>. **ENCHELYCEPHALI**. Gill opening well developed, leads to large interbranchial slits; tongue present; opercles and branchial bones well developed.

b<sup>1</sup>. Tip of tail abruptly truncate; coloration uniform.

Family **CYEMIDAE**.

**Cyema** Guenther.

*Cyema atrum* Guenther.

b<sup>2</sup>. Tip of tail without rays, projects as firm point beyond dorsal and anal; front nostril near snout tip, usually in a small tube; hind nostril on edge of upper lip; coloration variegated.

Family **OPHICHTHIDAE**.

**Ophichthus** Ahl.

c<sup>1</sup>. **Cryptopterenchelys**. Mandibular teeth uniserial or or nearly so; vomerine teeth uniserial, or slightly biserial anteriorly; coloration uniform.

d<sup>1</sup>. End of dorsal and anal hidden in a groove; gill openings close, with interspace less than either.

*Ophichthus ater* Peters.

d<sup>2</sup>. Ends of dorsal and anal exposed, elevated; gill openings well separated, each equals interspace.

*Ophichthus dicellurus* (Richardson).

c<sup>2</sup>. Mandibular teeth in 2 to 4 series.

e<sup>1</sup>. **Muraenopsis**. Vomerine teeth in 2 to 4 series; along middle of side row of 20 to 23 round white spots.

f<sup>1</sup>. Dorsal fin uniform.

*Ophichthus remiger* (Valenciennes).

f<sup>2</sup>. Dorsal fin with black edge.

*Ophichthus pacifici* Guenther.

e<sup>2</sup>. **Scytalophis**. Vomerine teeth biserial throughout; uniform brown, paler below.

*Ophichthus callaensis* Guenther.

a<sup>2</sup>. **COLOCEPHALI**. Gill opening small, rounded, leads to interbranchial slits; no tongue; opercles feeble; pectoral usually absent.

Family **ECHIDNIDAE**.

g<sup>1</sup>. Both front and hind nostrils tubular.

**Murenophis** Cuvier.

*Murenophis appendiculata* Guichenot.

g<sup>2</sup>. Hind nostril without tube.

**Lycodontis** McClelland.



h<sup>1</sup>. **Rabula.** Dorsal begins over or behind gill opening; teeth biserial in both jaws, inner series longest, movable and readily lost; front canines large.

*Lycodontis porphyreus* (Guichenot).

h<sup>2</sup>. **Lycodontis.** Dorsal begins before gill opening.

i<sup>1</sup>. Teeth simple, none with basal lobes; brown with irregular darker marblings.

j<sup>1</sup>. Tail long as rest of body.

*Lycodontis wieneri* (Sauvage).

j<sup>2</sup>. Tail considerably shorter than combined head and trunk.

*Lycodontis chilensis* (Guenther).

i<sup>2</sup>. Some or all of teeth with basal lobe, all uniserial; tail rather shorter than rest of body; brown, with irregular blackish venules.

*Lycodontis modestus* (Kaup).

## Order HETEROGNATHI

Characins

### Family CHARACIDAE

Characins

#### **Cheirodon** Girard.

a<sup>1</sup>. Serrae on caudal peduncle of male 10 to 16; northern, from Rio Maipo northward.

*Cheirodon pisciculus* Girard.

a<sup>2</sup>. Serrae on caudal peduncle of male 19 to 26 (rarely 16).

b<sup>1</sup>. Teeth quidentate; San Xavier to Rio Cautin.

*Cheirodon galsudae* Eigenmann.

b<sup>2</sup>. Teeth tridentate; Valdivia to Puerto Varas.

*Cheirodon australe* Eigenmann.

## Order NEMATOGNATHI

Cat Fishes

a<sup>1</sup>. Air-bladder well developed, simple or with transverse constrictions.

b<sup>1</sup>. Maxillary vestigial, premaxillaries alone forming margin of upper jaw; largely marine.

Family TACHYSURIDAE.

**Tachysurus** Lacépède.

*Tachysurus barbatus* (Lacépède).

Figure 13.



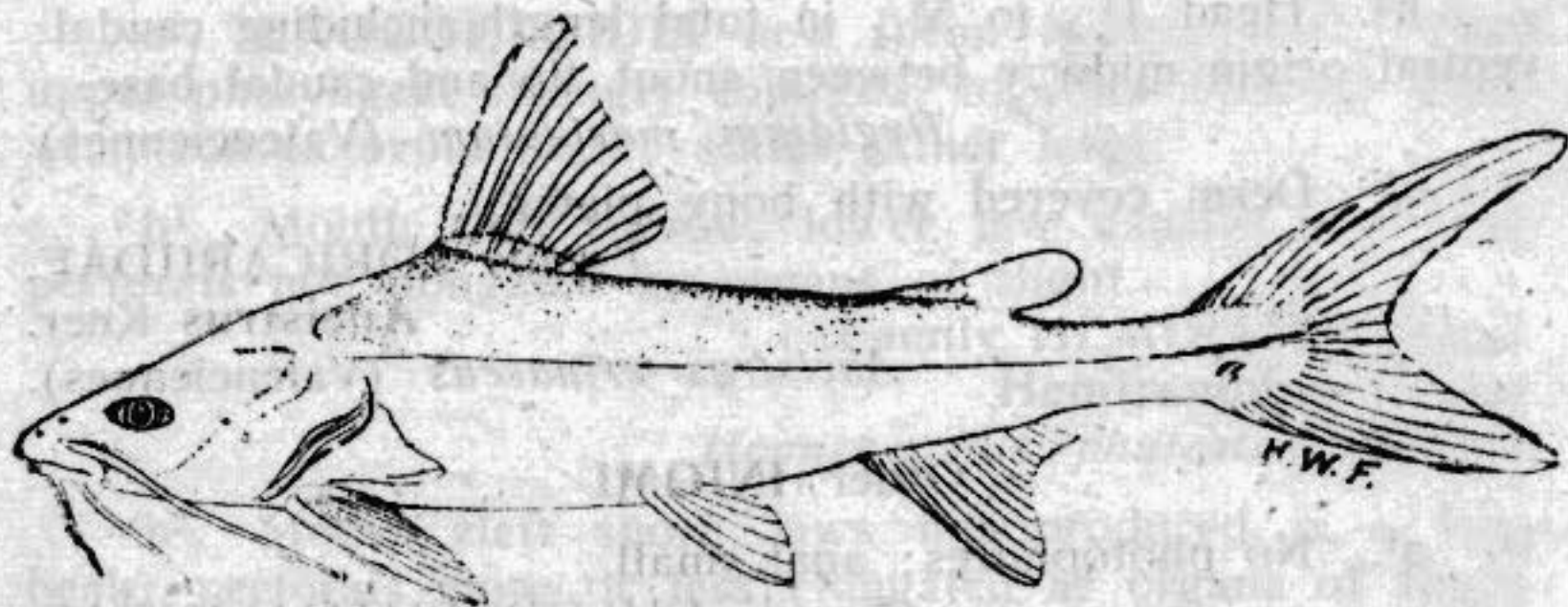


Figure 13.—*Tachysurus barbatus* (Lacépède). From Valenciennes 1847.

b<sup>2</sup>. Maxillary well developed, furnished with teeth and forms sides of jaw; fresh waters of Chile.

Family DIPLOMYSTIDAE.

**Diplomyste** Duméril.

*Diplomyste chilensis* (Molina).

a<sup>2</sup>. Air-bladder vestigial, one on either side of the coalesced vertebrae and entirely surrounded by a bony capsule.

c<sup>1</sup>. Derm naked.

d<sup>1</sup>. Maxillary barbel single; opercle and preopercle unarmed.

Family NEMATOGENYIDAE.

**Nematogenys** Girard.

*Nematogenys inermis* (Guichenot).

d<sup>2</sup>. Maxillary barbel double; opercle and preopercle with bony prickles.

Family PYGIDIDAE.

e<sup>1</sup>. Caudal peduncle tapering; caudal fulcra few.

**HATCHERIA** Eigenmann.

f<sup>1</sup>. Depth  $7\frac{1}{2}$ ; west slope of Andes.

*Hatcheria maldonadoi* Eigenmann.

f<sup>2</sup>. Depth  $5\frac{3}{7}$ ; west slope of Andes.

*Hatcheria bullocki* Fowler.

f<sup>3</sup>. Depth 7; east slope of high Andes.

*Hatcheria macraei* (Girard).

e<sup>2</sup>. Caudal peduncle greatly compressed; caudal fulcra numerous.

**Pygidium** Meyen.

g<sup>1</sup>. Ventral origin nearer snout tip than bases of median caudal rays; back and sides profusely spotted with large or small spots.

*Pygidium chiltoni* Eigenmann.

g<sup>2</sup>. Ventral origin usually nearer bases of median caudal rays than tip of snout.

h<sup>1</sup>. Head  $6\frac{1}{4}$  to  $6\frac{1}{3}$  in total length (including caudal); ventral origin midway between eye and caudal base.

*Pygidium areolatum* (Valenciennes).



h<sup>2</sup>. Head  $4\frac{3}{4}$  to  $5\frac{3}{4}$  in total length including caudal; ventral origin midway between snout tip and caudal base.

*Pygidium maculatum* (Valenciennes).

c<sup>2</sup>. Derm covered with bony plates.

Family LORICARIIDAE.

*Ancistrus* Kner.

*Ancistrus erinaceus* (Valenciennes).

### Order INIOMI

a<sup>1</sup>. No photophores; anal small.

Family CHLOROPHTHALMIDAE.

*Chlorophthalmus* Bonaparte.

*Chlorophthalmus gracilis* Guenther.

a<sup>2</sup>. Photophores present; ventral inserted usually close before or below dorsal, which is median or advanced; adipose fin usually present.

Family MYCTOPHIDAE.

b<sup>1</sup>. **Myctophum**. Caudal peduncle moderate, compressed.

c<sup>1</sup>. Anal photophores 7 to 10 + 3 to 6; maxillary moderate.

*Myctophum* Rafinesque.

*Myctophum affine* (Luetken).

c<sup>2</sup>. Anal photophores 15 + 3; maxillary expanded posteriorly.

*Myctophum tenisoni* Norman.

b<sup>2</sup>. **Rhinoscopelus**. Caudal peduncle slender, tapering; scales firm, hard, persistent.

*Rhinoscopelus* Luetken.

*Rhinoscopelus cocco* (Cocco).

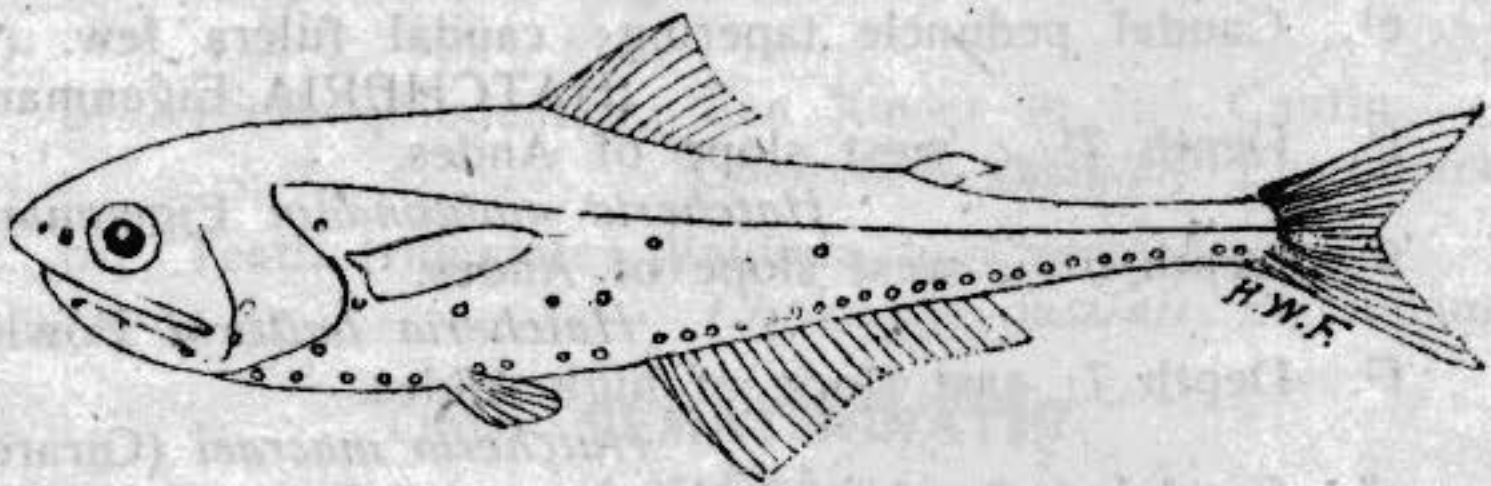


Figure 14.—*Rhinoscopelus cocco* (Cocco).

### Order SYNENTOGNATHI

a<sup>1</sup>. **SCOMBERESOCOIDEI**. Mouth usually large; third upper pharyngeals moderately enlarged, separate, fourth usually present; scales very small.

Family SCOMBERESOCIDAE.

*Scomberesox* Lacépède.

*Scomberesox equirostrum* Le Sueur.



a<sup>2</sup>. **EXOCOETOIDEI** new form. Mouth small; third upper pharyngeal strongly enlarged, together forming somewhat convex ovoid plate; scales rather large.

b<sup>1</sup>. Mouth cleft narrow, lower jaw usually produced; pectorals not elongated as organs of flight.

Family **HEMIRAMPHIDAE**.

**Hemiramphus** Cuvier.

*Hemiramphus phurcatus* Philippi.

b<sup>2</sup>. Mouth cleft short, jaws not produced in a long beak; pectorals more or less elongated as organs of flight.

Family **EXOCOETIDAE**.

c<sup>1</sup>. Ventrals inserted anteriorly, much nearer snout tip than caudal base, not used in flight, their tips not reaching nearly to front of dorsal.

**Exocoetus** Linnaeus.

*Exocoetus obtusirostris chiliensis* Abbott.

c<sup>2</sup>. Ventrals inserted posteriorly, more or less nearer caudal base than snout tip, used in flight, their tips reaching past middle of anal base.

**Cypsilurus** Swainson.

*Cypsilurus lineatus* (Valenciennes).

### Order **ANACANTHINI**

#### Spineless Jugular Fishes

a<sup>1</sup>. **CORYPHAENOIDEI** new. Caudal absent; tail very long, tapering behind; suborbitals very broad; chin with barbel, rarely absent. Family **CORYPHAENOIDIDAE**.

b<sup>1</sup>. Branchiostegals 6; vent, usually close before anal fin.

c<sup>1</sup>. Snout a little produced; no strongly marked ridges on head; suborbital ridge not reaching opercle; dorsal spine trenchant, serrate anteriorly. **Coryphaenoides** Gunner.

d<sup>1</sup>. Snout pointed, long as large eye; eye greater than interorbital space; head behind eye with scattered, spinescent and rather large scales.

*Coryphaenoides holotrachys* (Guenther).

d<sup>2</sup>. Eye greatly exceeds snout; head behind eye covered with small close-set scales.

*Coryphaenoides ariommus* Gilbert and Thompson.

d<sup>3</sup>. Snout obtuse, over twice length of small eye; eye nearly 2 in interorbital; head behind and below eye covered with very small and crowded scales.

*Coryphaenoides fernandezianus* (Guenther).



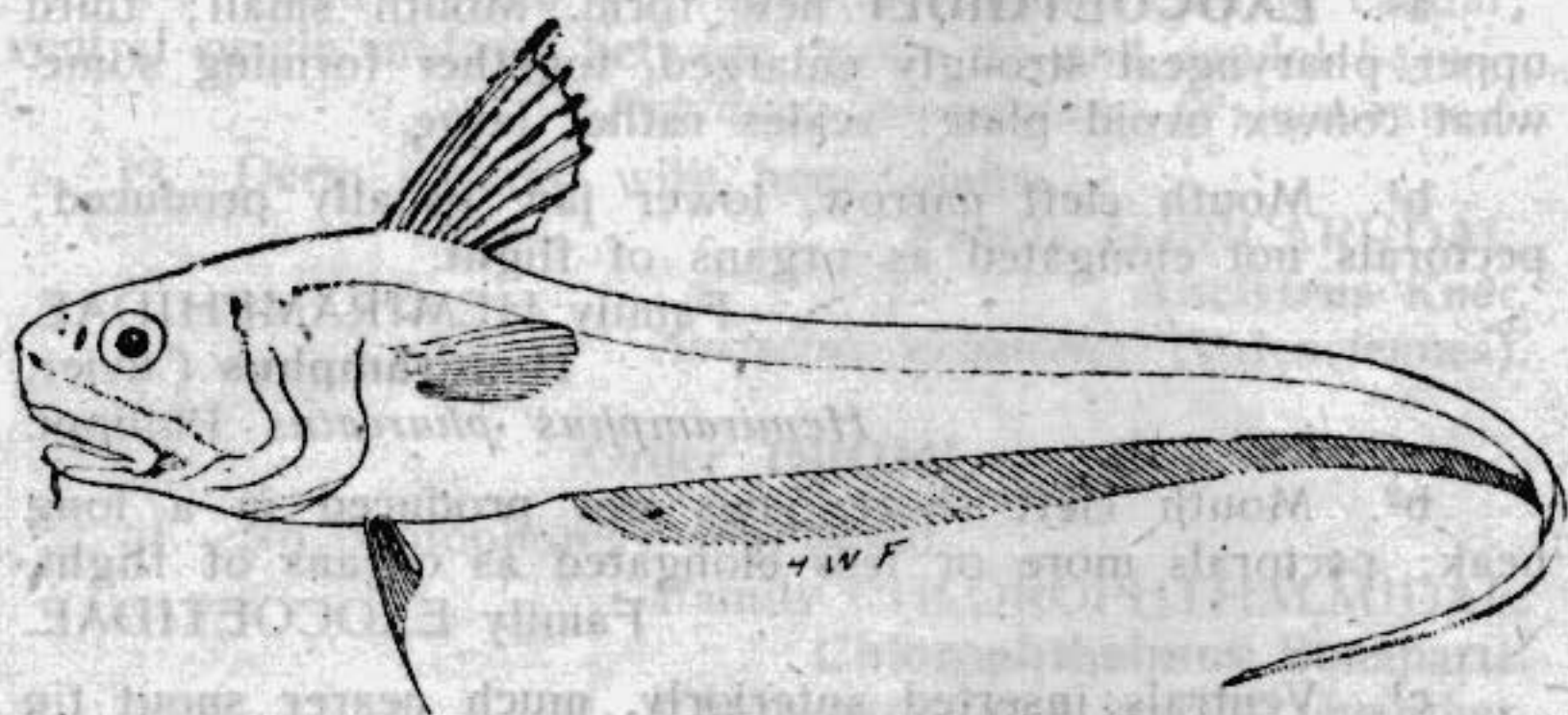


Figure 15.—*Coryphaenoides fernandezianus* (Guenther). From Guenther 1887.

c<sup>2</sup>. Snout usually greatly produced; head with prominent ridges armed with modified scales; suborbital ridge reaching preopercle; dorsal spine smooth and rounded anteriorly.

**Coelorhinchus** Giorna.

e<sup>1</sup>. Orbit very large, snout length  $1\frac{3}{4}$  in its diameter; interdorsal space  $1\frac{1}{3}$  in orbit.

*Coelorhinchus fasciatus* (Guenther).

e<sup>2</sup>. Orbit slightly less than snout; interdorsal space  $1\frac{1}{2}$  in orbit.

*Coelorhinchus chilensis* Gilbert and Thompson.

e<sup>3</sup>. Orbit very large, snout length  $1\frac{1}{5}$  in its diameter; interdorsal space 3 in orbit.

*Coelorhinchus patagoniae* Gilbert and Thompson.

b<sup>2</sup>. Branchiostegals 7; vent remote from anal fin.

**Macruroplus** Bleeker.

*Macruroplus pudens* (Gilbert and Thompson).

a<sup>2</sup>. **GADOIDEI**. Caudal present; body tapering or coniform behind, with numerous procurrent rays above and below.

f<sup>1</sup>. Caudal fin usually distinct or rarely confluent with dorsal and anal.

g<sup>1</sup>. Frontal bones without triangular excavated area above; chin with barbel, rarely obsolete. Family GADIDAE.

h<sup>1</sup>. **Lotinae**. Ventrals broad, with 4 to 9 rays, never much longer than head.

i<sup>1</sup>. Teeth in villiform bands, those of outer row not enlarged.

j<sup>1</sup>. Vomerine teeth present.

**Salilota** Guenther.

*Salilota australis* (Guenther).



- j<sup>2</sup>. No vomerine teeth. **Physiculus** Kaup.  
*Physiculus marginatus* (Guenther).
- i<sup>2</sup>. Teeth in villiform bands, those of outer row in both jaws enlarged; no vomerine teeth. **Lotella** Kaup.  
*Lotella fernandeziana* Rendahl.
- h<sup>2</sup>. **Phycinae**. Ventral fins narrow, filamentous, with 2 or 3 rays. **Laemonema** Guenther.  
*Laemonema multiradiatum* Thompson.
- g<sup>2</sup>. Frontal bones paired, with triangular excavated area above; divergent frontal crests continuous from forked occipital crest. Family **MERLUCCIIDAE**.
- k<sup>1</sup>. **Merlucciinae** new form. Tail tapers back to well developed caudal fin. **Merluccius** Rafinesque.  
*Merluccius gayi* (Guichenot).
- k<sup>2</sup>. **Macruroninae** new. Tail tapers back to a point, with well developed dorsal and anal confluent with small caudal around its end. **Macruronus** Guenther.  
*Macruronus novae-zealandiae* (Hector).
- g<sup>3</sup>. Caudal small, little distinct, confluent with dorsal and anal around long tail; mouth small; filament at front of dorsal; barbel present. Family **MURAENOLEPIDAE**.  
**Muraenolepis** Guenther.
- l<sup>1</sup>. Depth  $6\frac{2}{3}$ ; dorsal filament 3 times eye.  
*Muraenolepis orangiensis* Vaillant.
- l<sup>2</sup>. Depth  $4\frac{1}{2}$  to  $4\frac{3}{4}$ ; dorsal filament longer than eye.  
*Muraenolepis microps* Loennberg.

Order **HETEROSOMATA**

## Flat Fishes

- a<sup>1</sup>. Ventral with short base, that of eyed side if somewhat extended, never with front ray in advance of first ray of blind side; caudal vertebrae without transverse extensions. Family **HIPPOGLOSSIDAE**.
- b<sup>1</sup>. Teeth in bands in both jaws; dorsal and anal rays not scaled. **Thysanopsetta** Guenther.  
*Thysanopsetta naresi* Guenther.
- b<sup>2</sup>. Teeth uniserial in both jaws; dorsal and anal rays more or less scaled on both sides.
- c<sup>1</sup>. Teeth very small, no canines in front. **Hippoglossina** Steindachner.
- d<sup>1</sup>. Depth  $2\frac{1}{5}$ ; head  $2\frac{4}{5}$ ; dextral.  
*Hippoglossina macrops* Steindachner.
- d<sup>2</sup>. Depth  $3\frac{1}{5}$ ; head  $3\frac{1}{8}$ ; sinistral.  
*Hippoglossina mystacium* Ginsburg.



c<sup>2</sup>. Teeth strong or moderate, some distinct canines anteriorly; dorsal origin in front of or above front part of eye; tip of first interhaemal spine feeble, not projecting.

**Paralichthys** Girard.

e<sup>1</sup>. Scales 94 to 140 in lateral line; dorsal 66 to 84; anal 51 to 64; eye 4 to 8 in head.

f<sup>1</sup>. Lower gill rakers 15 to 18.

*Paralichthys adspersus* (Steindachner).

f<sup>2</sup>. Lower gill rakers 9 to 11.

g<sup>1</sup>. Scales 140 in lateral line; maxillary reaches to beyond eye, which is  $7\frac{2}{3}$  in head.

*Paralichthys fernandezianus* Steindachner.

g<sup>2</sup>. Scales 103 to 107 in lateral line.

*Paralichthys patagonicus* Jordan.

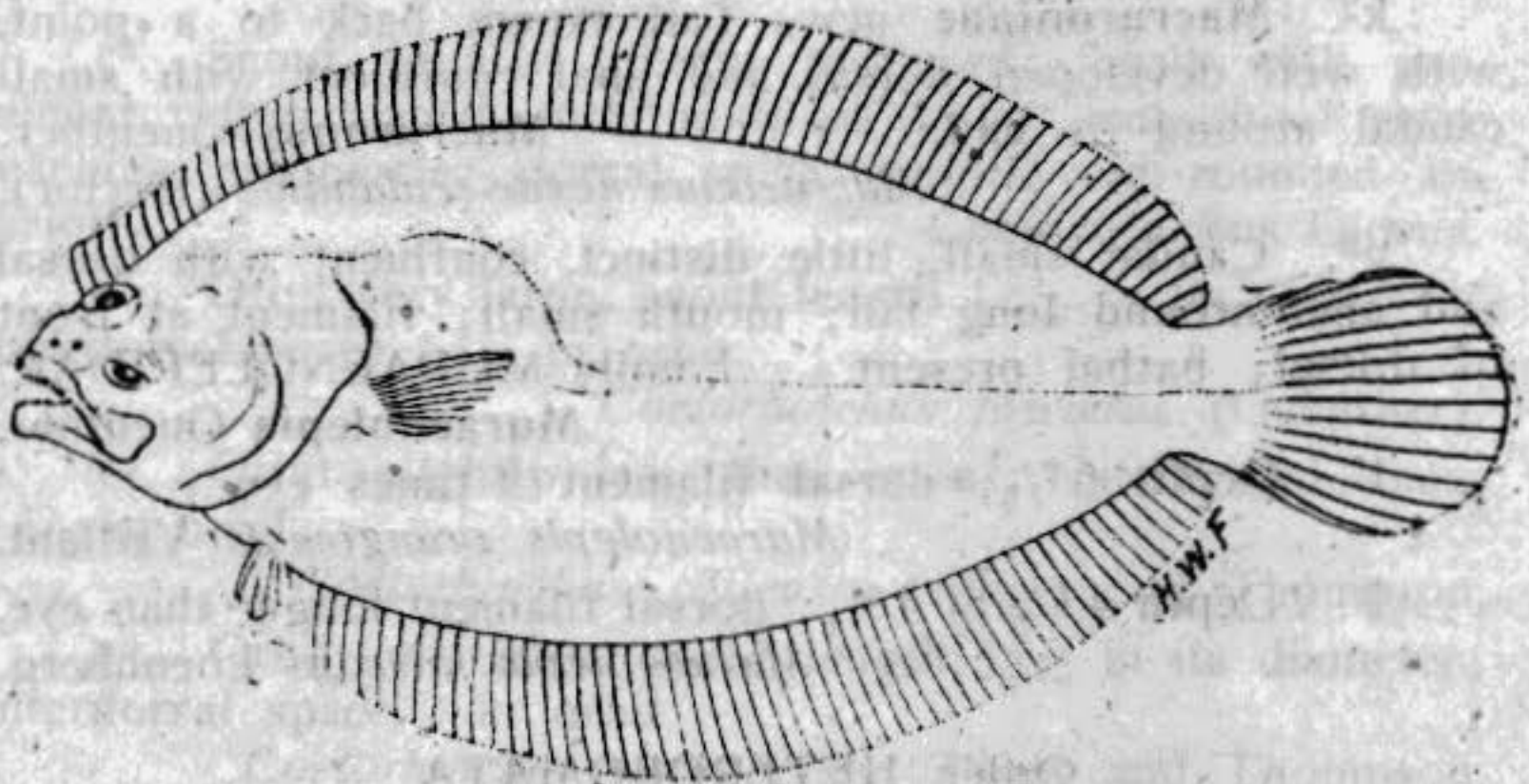


Figure 16.—*Paralichthys patagonicus* Jordan, From Norman 1934.

g<sup>3</sup>. Scales 94 in lateral line; maxillary reaches opposite hind eye edge; eye  $5\frac{1}{2}$  in head.

*Paralichthys hilgendorffii* Steindachner.

e<sup>2</sup>. Scales 80 in lateral line; dorsal rays 72 or 73; anal 56; lower gill rakers 18 to 21.

*Paralichthys microps* (Guenther).

e<sup>3</sup>. Scales 73 in lateral line; dorsal rays 87; anal 70; lower gill rakers 20.

*Paralichthys coeruleosticta* Steindachner.

a<sup>2</sup>. Ventral fin of blind side with short base; that of eyed side elongate, extends forward to urohyal; caudal vertebrae with well developed apophyses. Family BOTHIDAE.

**Achiropsetta** Norman.

*Achiropsetta tricholepis* Norman.



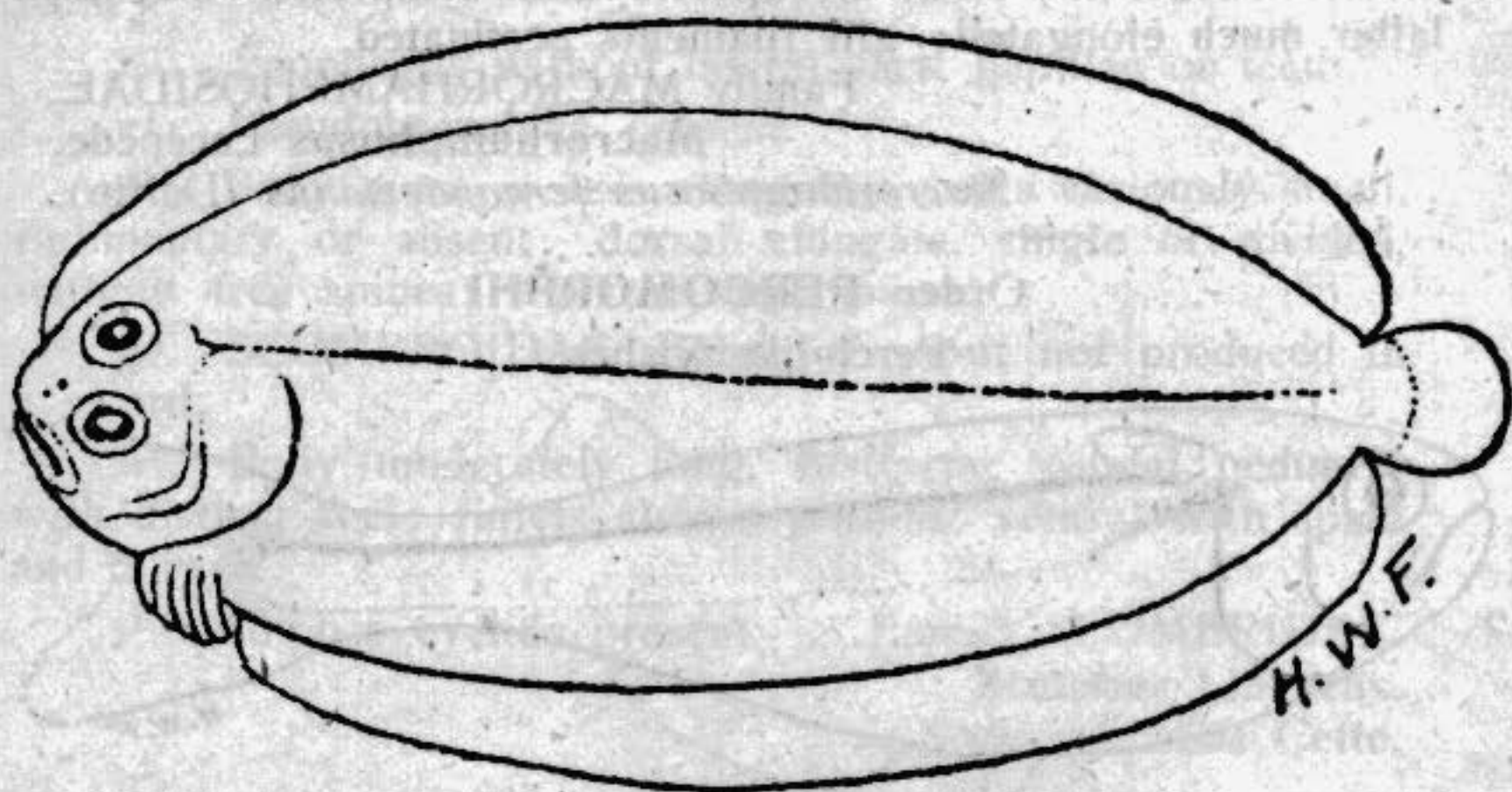


Figure 17.—*Achirosetta tricholepis* Norman. From Norman 1934.

## Order **LOPHOBRANCHII**

### Tuft Gills

a<sup>1</sup>. **LOPHOBRANCHII.** No preopercle; symplectic much elongated; gill filaments few, rather large, form rounded lobes. Family SYNGNATHIDAE.

b<sup>1</sup>. Trunk uniformly slender to long tapering tail. **Syngnathus** Linnaeus.

c<sup>1</sup>. Rings 18 + 42; dorsal rays 36. **Syngnathus acicularis** Jenyns.

c<sup>2</sup>. Rings 17 + 32 to 35; dorsal rays 29 to 31. **Syngnathus pelagicus** Linnaeus.

b<sup>2</sup>. Trunk expanded elongately ellipsoid as seen in lateral profile to long slender tail; rings 20 or 21 + 50; dorsal rays 35 to 37. **Leptonotus** Kaup.  
*Leptonotus blainvillianus* (Eydoux and Gervais).

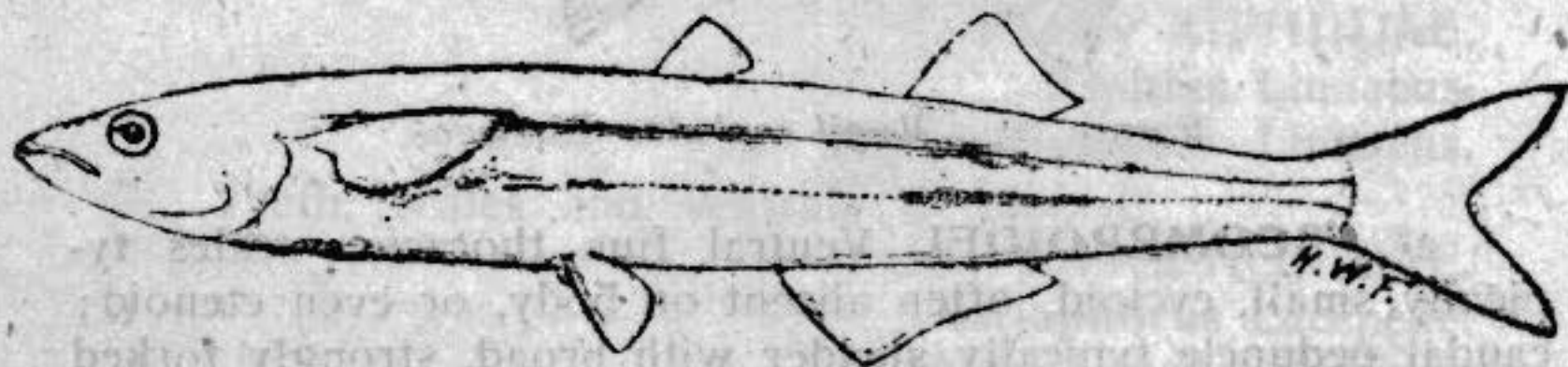


Figure 18.—*Austromeniidia smitti* (Lahille). From Norman 1937.



a<sup>2</sup>. **AULOSTOMI.** Preopercle and symplectic distinct, latter much elongated; gill filaments pectinated.

Family **MACRORHAMPHOSIDAE.**

**Macrorhamphosus** Lacépède.

*Macrorhamphosus fernandezianus* (Delfin).

Order **PERCOMORPHI**

Perch-like Fishes

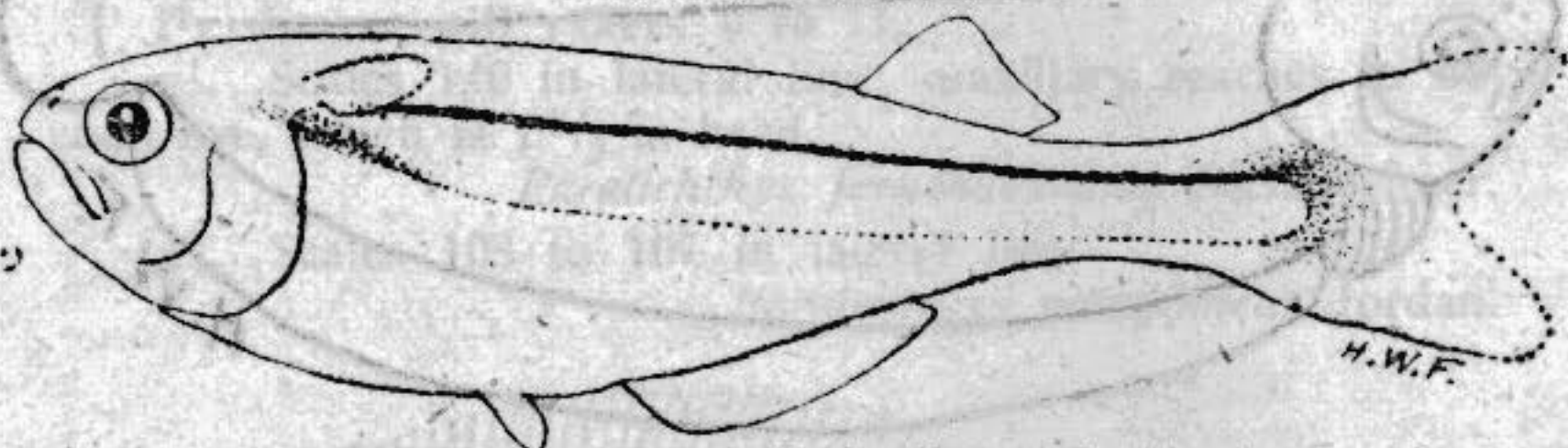


Figure 19.—*Notocheirus hubbsi* Clark. From Clark's photograph.

a<sup>1</sup>. **ATHERINOIDEI** (*Percesoces*). Ventral fins abdominal, each with spine and 5 rays; dorsal spines few, usually forming separate fin.

b<sup>1</sup>. Head and body slender, elongated; stomach not gizzard like; carnivorous. Family **ATHERINIDAE.**

b<sup>2</sup>. Head short, broad; stomach gizzard like; mud and vegetation feeders. Family **MUGILIDAE.**

**Mugil** Linnaeus.

*Mugil cephalus* Linnaeus.

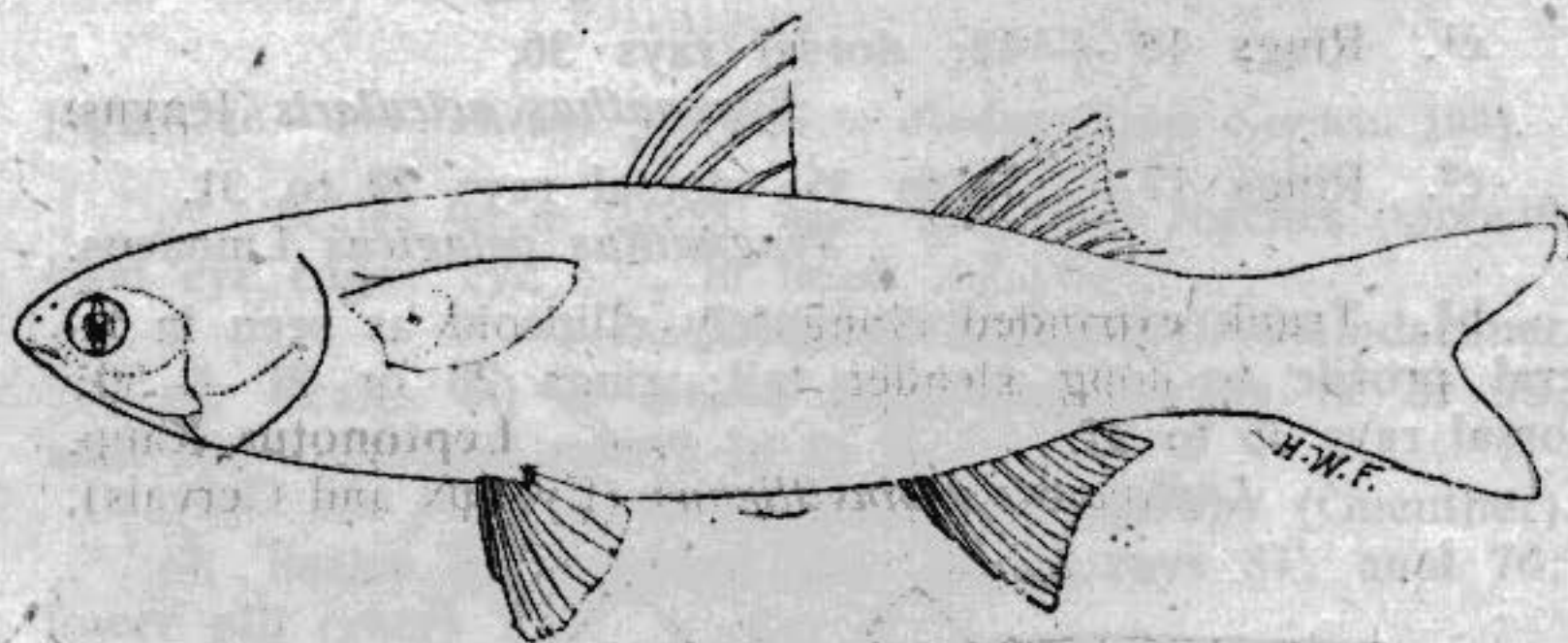


Figure 20.—*Mugil cephalus* Linnaeus.

a<sup>2</sup>. **SCOMBROIDEI.** Ventral fins thoracic; scales typically small, cycloid, often absent on body, or even ctenoid; caudal peduncle typically slender with broad, strongly forked caudal fin.



c<sup>1</sup>. Premaxillaries not protractile (rarely so in *Lepidopidae*).

d<sup>1</sup>. Esophagus without lateral sacs, papillae or teeth.

e<sup>1</sup>. Pseudobranchiae present.

f<sup>1</sup>. Body more or less elongate; scales variously small, rudimentary or absent; dorsal elongate, single or divided, without free spines; no free anal spines.

g<sup>1</sup>. SCOMBROIDAE. Bones of snout not produced in a sword.

h<sup>1</sup>. Body moderately long, fusiform; caudal peduncle with distinct keel; finlets always present; ventral with spine and 5 rays.

i<sup>1</sup>. Adipose eyelids present.

Family SCOMBRIDAE.

**Scomber** Linnaeus.

*Scomber colias* Certe.

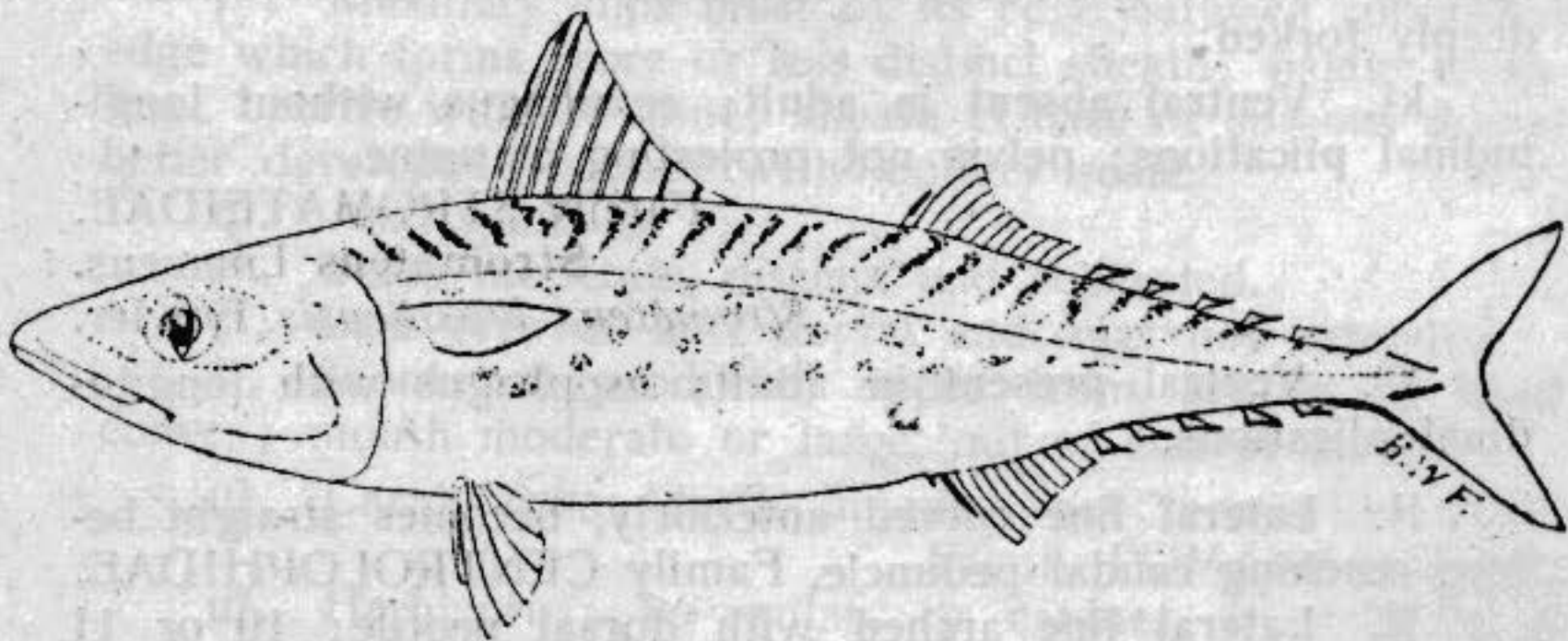


Figure 21.—*Scomber colias* Certe.

i<sup>2</sup>. No adipose eyelids.

Family THUNNIDAE.

h<sup>2</sup>. Body elongated; caudal peduncle without keel; finlets present or absent; ventral with spine and 5 rays or variously reduced.

Family GEMPYLIDAE.

g<sup>2</sup>. XIPHIOIDAE. Bones of snout produced into a sword.

j<sup>1</sup>. Teeth absent with age; scales absent; no ventrals.

Family XIPHIIDAE.

**Xiphias** Linnaeus.

*Xiphias gladius* Linnaeus.

j<sup>2</sup>. Teeth, scales and ventrals developed.

Family ISTIOPHORIDAE.

**Istiophorus** Lacépède.

*Istiophorus audax* Philippi.



f<sup>2</sup>. LEPIDOTOIDAE. Body deep; pseudobranchiae present; scales moderate and large, strongly imbricate, with extension, in certain parts at least serve to connect rows of scales; dorsal and anal elongate, without distinct spinous division.

Family LEPIDOTIDAE.

**Lepidotus** Aso.

*Lepidotus chilensis* (Guichenot).

e<sup>2</sup>. CORYPHAENOIDAE. No pseudobranchiae; body oblong; snout short and very deep; scales very small; dorsal without spinous part, all rays branched and articulated, begins on head.

Family CORYPHAENIDAE.

**Coryphaena** Linnaeus.

*Coryphaena hippurus* Linnaeus.

d<sup>2</sup>. STROMATEOIDAE. Esophagus with lateral sacs; body compressed; gill membranes free or attached to isthmus; spinous dorsal and ventral rudimentary or absent; caudal deeply forked.

k<sup>1</sup>. Ventral absent in adult; esophagus without longitudinal plications; pelvis not projecting as spine.

Family STROMATEIDAE.

**Stromateus** Linnaeus.

*Stromateus brasiliensis* Fowler.

k<sup>2</sup>. Ventral present in adult; esophagus with longitudinal plications.

l<sup>1</sup>. Lateral line curved anteriorly, becomes straight before reaching caudal peduncle. Family CENTROLOPHIDAE.

l<sup>2</sup>. Lateral line arched with dorsal profile; 10 or 11 slender dorsal spines.

Family NOMEIDAE.

c<sup>2</sup>. CARANGOIDAE. Premaxillaries more or less protractile, not beak like; scales small or absent, sometimes with enlarged lateral scutes; spinous dorsal short or replaced by series of isolated spines; anal with one or 2 spines detached from rest of fin.

m<sup>1</sup>. Body shorter to orbicular; dorsal spines connected by membrane, sometimes obsolete with age.

n<sup>1</sup>. Scales minute or obsolete, cycloid, those along lateral line sometimes armed; tail deeply forked.

Family CARANGIDAE.

n<sup>2</sup>. Scales moderate or weakly ciliate, never armed along lateral line; tail not deeply forked.

Family POMATOMIDAE.

**Pomatomus** Lacépède.

*Pomatomus saltatrix* (Linnaeus).



m<sup>2</sup>. Body elongate, slender; scales small; several free dorsal spines caudal a little forked.

Family RACHYCENTRIDAE.

**Rachycentron** Kaup.

*Rachycentron canadum* (Linnaeus).

a<sup>3</sup>. Ventrals thoracic; scales usually well developed, typically ctenoid; caudal peduncle usually compressed, moderately deep; tail normal, not greatly forked.

o<sup>1</sup>. **PERCOIDEI**. Pectoral rays all more or less similar or uniform and branched.

p<sup>1</sup>. Maxillary not sheathed by preorbital or only covered by edge of latter; vomer usually toothed; opercle usually ends in spine; scaly sheath at base of spinous dorsal little developed; ventral fin with axillary scale small or absent.

Family SERRANIDAE.

p<sup>2</sup>. Maxillary slips most of its edge between suborbital edge which forms more or less distinct sheath; palate toothless; opercle without spine; sheath at base of spinous dorsal better developed; ventral with axillary scale.

q<sup>1</sup>. Anal spines 3.

r<sup>1</sup>. Teeth moderate, distinct and separated.

s<sup>1</sup>. Last rays of soft dorsal and anal not extended.

t<sup>1</sup>. Snout not produced, upper front profile of head convex; mouth moderate or large, not at end of snout.

u<sup>1</sup>. Carnivorous; teeth in jaws not incisor-like.

Family POMADASYIDAE.

u<sup>2</sup>. Herbivorous; no molars or canines, front teeth in jaws incisor like.

Family GIRELLIDAE.

t<sup>2</sup>. Snout more or less produced; small mouth at end of snout; teeth villiform, without canines; some spines and rays of vertical and pectoral fins very long; body usually deep, compressed.

Family HISTIOPTERIDAE.

**Pentaceros** Cuvier.

*Pentaceros knerii* Steindachner.

s<sup>2</sup>. Last rays of soft dorsal and anal extended; teeth absent, small or deciduous; body elongately fusiform, scarcely compressed.

Family EMMELICHTHYIDAE.

**Emmelichthys** Richardson.

*Emmelichthys cyanescens* (Guichenot).

r<sup>2</sup>. Teeth continuous, form sharp trenchant edge to each jaw.

Family OPLEGNATHIDAE.

**Oplegnathus** Richardson.

*Oplegnathus insignis* (Kner).

q<sup>2</sup>. Anal spines 2 or 1 (very rarely 3 in *Sciaenidae*); palate toothless.



v<sup>1</sup>. Maxillary partly or entirely concealed below preorbital. Family SCIAENIDAE.

v<sup>2</sup>. Maxillary exposed. Family BRANCHIOSTEGIDAE.

o<sup>2</sup>. **CIRRHITOIDEI**. Lower pectoral rays simple, more or less thickened.

w<sup>1</sup>. No vomerine teeth.

x<sup>1</sup>. One of simple lower pectoral rays prolonged and projecting beyond hind fin margin; preopercle not serrated.

y<sup>1</sup>. Teeth unicuspid, conic, acute.

Family CHEILODACTYLIDAE.

y<sup>2</sup>. Both jaws with flat tricuspid or lanceolate teeth.

Family APLODACTYLIDAE.

x<sup>2</sup>. None of simple pectoral rays passing beyond hind margin of fin.

z<sup>1</sup>. Palate toothless.

Family LATRIDAE.

z<sup>2</sup>. Vomerine and palatine teeth present.

Family SCORPIDAE.

**Scorpi** Valenciennes.

*Scorpi chilensis* Guichenot.

## Order CATAPHRACTI

### Mail-cheeked Fishes

a<sup>1</sup>. Head not cuirassed.

b<sup>1</sup>. Post-temporal bifurcate and connected with cranium by its extensions in normal manner.

c<sup>1</sup>. Myodome or chamber for rectus muscles of eye more or less developed.

d<sup>1</sup>. **SCORPAENOIDEI**. Dorsal continuous.

e<sup>1</sup>. Actinosts moderate, inserted on hind edges of hypercoracoid and hypocoracoid; ribs typically borne on enlarged parapophyses.

f<sup>1</sup>. Mouth cleft large, terminal, snout not especially produced; dorsal begins well behind eye, spine 12 to 13.

Family SCORPAENIDAE.

f<sup>2</sup>. Mouth cleft small, terminal, at end of produced snout; dorsal begins over eye, spines 17 to 21.

Family CONGIPODIDAE.

e<sup>2</sup>. **COTTOIDEI**. Actinosts large and partly intervening between hypercoracoid and hypocoracoid; ribs sessile on vertebrae 30 to 50; no anal spines; body not uniformly scaled.

Family COTTIDAE.

**Normanichthys** Clark.

*Normanichthys crockeri* Clark.



d<sup>2</sup>. **NEOPHRYNICHTHYOIDEI** new. Two separate dorsals; body scaleless; ventrals close together.

Family NEOPHRYNICHTHYIDAE.

**Neophrynichthys** Guenther.

*Neophrynichthys marmoratus* Gill.

b<sup>2</sup>. **AGONOIDEI** new. Post-temporal expanded and connected with cranium by an extensive suture.

Family AGONIDAE.

**Agonopsis** Gill.

*Agonopsis chiloensis* (Jenyns).

b<sup>3</sup>. **LIPAROIDEI** new. Myodome completely wanting; ventrals completely united, forming a round sucking disk, which is rarely obsolete.

g<sup>1</sup>. No spinous dorsal. Family LIPAROPIDAE.

**Cyclopterichthys** Steindachner.

*Cyclopterichthys amissus* Vaillant.

g<sup>2</sup>. Spinous dorsal little developed.

Family LIPARIDAE.

a<sup>2</sup>. **TRIGLOIDEI**. Head completely cuirassed; 3 lower pectoral rays detached as feelers; mouth with teeth.

Family TRIGLIDAE.

## Order JUGULARES

### Jugular-fin Fishes

a<sup>1</sup>. Post-temporal forked, articulated or joined with skull; gill arches 4.

b<sup>1</sup>. **TRACHINOIDEI**. Spinous dorsal short, weak; soft dorsal long, similar to anal; squamation less complete and less ctenoid than in Percoidei; skull depressed, crests wanting, not strongly armed; suborbital stay absent or sometimes suborbitals enlarged.

c<sup>1</sup>. Lips not fringed.

d<sup>1</sup>. Jaws without pair of canines in front.

e<sup>1</sup>. Premaxillary without large tooth posteriorly.

f<sup>1</sup>. **TRACHINOIDAE**. Lateral line complete; scales very small, cycloid forming oblique bands; skull not strongly armed.

Family TRACHINIDAE.

g<sup>2</sup>. Lateral line interrupted.

h<sup>1</sup>. **NOTOTHENOIDAE**. Scales ctenoid, not in oblique bands; skull unarmed.

i<sup>1</sup>. Opercle and subopercle both not spiny.

Family NOTOTHENIIDAE.



j<sup>1</sup>. Head very large; snout spatulate; mouth cleft very wide; eyes lateral; lateral line sometimes with granulated scutes; palate toothless; 2 dorsals, first with 7 spines.

Family CHAENICHTHYIDAE.

**Champscephalus** Gill.

*Champscephalus esox* (Guenther).

j<sup>2</sup>. Head broad, thick; mouth horizontal, lower jaw longer; eyes lateral, somewhat directed upwards; 2 separated dorsals, first with 8 spines; vomer with teeth, none on palatines; opercle with strong spine, head otherwise unarmed.

Family BOVICTIDAE.

i<sup>2</sup>. Opercle and subopercle both forming a prominent spine; short upper lateral line with tubules extends to near middle of second dorsal and lower lateral line reduced to a series of pores.

Family HARPAGIFERIDAE.

**Harpagifer** Richardson.

*Harpagifer bispinis* (Schneider).

e<sup>2</sup>. Premaxillary with larger tooth posteriorly; eye lateral; body with fine scales; lateral line continuous.

Family MUGILOIDIDAE.

**Pinguipes** Cuvier.

*Pinguipes chilensis* (Molina).

d<sup>2</sup>. Jaws with pair of front canines, other teeth in villiform bands, also on vomer, none on palatines; eye lateral, directed upwards; scales small, ctenoid; mouth slightly oblique; dorsals more or less continuous, first with 4 or 5 stiff spines.

Family PARAPERCIDAE.

**Porteridia** Fowler.

*Porteridia chilensis* (Norman).

c<sup>2</sup>. **URANOSCOPOIDAE.** Lips fringed; mouth vertical; eyes superior; lateral line concurrent with back anteriorly; dorsal spines slender, not pungent; ventrals with spine and 3 rays.

Family DACTYLOSCOPIDAE.

**Gillellus** Gilbert.

*Gillellus australis* Fowler and Bean.

b<sup>2</sup>. **BLENNIOIDEI.** Dorsal and anal rays typically correspond to number of vertebrae; spinous dorsal (when present) variously long as soft dorsal, which is similar to anal; ventrals jugular or mental, with spine and 4 soft rays or reduced.

k<sup>1</sup>. Some or all dorsal rays spinous, not articulated; caudal usually distinct, rounded; body naked, or with large or small scales; ventrals jugular or absent, soft rays less than 5.



- l<sup>1</sup>. Body scaly. Family CLINIDAE.  
 l<sup>2</sup>. Body scaleless. Family BLENNIIDAE.  
 k<sup>2</sup>. No fin spines except few in dorsal posteriorly; caudal not distinct or separated from other vertical fins; body naked or with small, imbedded cycloid scales.

m<sup>1</sup>. **ZOARCIOIDEI** new. Ventral fins jugular, inserted much behind eye, often wanting, never filamentous.

n<sup>1</sup>. Pseudobranchiae present; dorsal rays all articulated or only few posteriorly spinous. Family ZOARCIDAE.

n<sup>2</sup>. **BROTULOIDEI**. Pseudobranchiae small or absent; no fin spines.

o<sup>1</sup>. No ventrals; no scales. Family LYCODAPODIDAE.

o<sup>2</sup>. Ventrals well developed, short.

Family BROTULIDAE.

**Cataetyx** Guenther.

*Cataetyx messieri* (Guenther).

m<sup>2</sup>. **OPHIDIOIDEI**. Ventral fins well developed, mental or just behind chin, not far from eye; pseudobranchiae well developed; body scaly. Family OPHIDIIDAE.

a<sup>2</sup>. **HAPLODOCI**. Post-temporal small, undivided, joined with skull; gill arches 3; no pseudobranchiae.

Family BATRACHOIDIDAE.

**Aphos** Hubbs and Schultz.

*Aphos porosus* (Valenciennes).

### Family ATHERINIDAE

#### Silversides

a<sup>1</sup>. **Atherinopsinae**. Spinous dorsal present (rarely absent in *Basilichthys*).

b<sup>1</sup>. Upper jaw not protractile.

c<sup>1</sup>. Scales scalloped; teeth in several series, slightly larger in outer row above; no teeth on pterygoids or vomer.

**Cauque** Eigenmann.

d<sup>1</sup>. Scales 70 to 90; head 4 to  $4\frac{1}{2}$  in length; pectorals reach half way to depressed ventral tips; teeth quadriserial.

e<sup>1</sup>. Origin of first dorsal over middle third of depressed ventral; caudal peduncle depth  $2\frac{1}{5}$  to  $3\frac{1}{4}$  in its length; scales 70 to 90; anal rays 14 to 14.

*Cauque mauleanum* (Steindachner).

e<sup>2</sup>. Origin of first dorsal over last fifth of depressed ventral.

f<sup>1</sup>. Caudal peduncle depth  $3\frac{2}{5}$  in its length; scales 73 to 78; anal rays 16 or 17; scales not scalloped apically; Río Malleco.

*Cauque molinae* Fowler.



f<sup>2</sup>. Caudal peduncle depth  $3\frac{1}{2}$  in its length; scales 84; anal rays 17. *Cauque wiebrichi* Eigenmann.

f<sup>3</sup>. Caudal peduncle depth less than 3 in its length; scales 87 to 90; scales slightly scalloped; Río Itata.

*Cauque itatanum* (Steindachner).

d<sup>2</sup>. Scales 54 to 67; head  $3\frac{7}{10}$  to 4 in length; anal rays 15; pectoral reaches half way to anal; teeth irregularly biserial; least depth  $2\frac{1}{3}$  in its length.

*Cauque brevianalis* (Guenther).

c<sup>2</sup>. Scales entire; premaxillary teeth in band; dorsal spines none (rarely) to 7. **Basilichthys** Girard.

g<sup>1</sup>. Scales 100 to 112 (rarely 95); Santiago southward.

*Basilichthys australis* Eigenmann.

g<sup>2</sup>. Scales 80 to 95; Valparaiso southward.

*Basilichthys microlepidotus* (Jenyns).

g<sup>3</sup>. Scales 70 to 74; Juan Fernández.

*Basilichthys gracilis* (Steindachner).

b<sup>2</sup>. Upper jaw protractile, skin of snout not directly continued with that of top of head; snout pointed; usually 3 patches of teeth on vomer, large patch on pterygoid; scales entire. **Austromenidia** Hubbs.

h<sup>1</sup>. Spinous dorsal origin over middle of depressed ventral to last fourth of same.

i<sup>1</sup>. Head 5; lower gill rakers 20 to 30; scales 92 to 104; D. VI or VII, 1, 10 to 12; A. I, 17 to 20.

*Austromenidia smitti* (Lahille).

i<sup>2</sup>. Head  $4\frac{2}{5}$  to  $4\frac{1}{2}$ ; lower gill rakers 25; scales 86 to 91; D. VII-I, 9 to 10; A. 15 or 16.

*Austromenidia laticlavia* (Valenciennes).

h<sup>2</sup>. Spinous dorsal over depressed ventral tips.

j<sup>1</sup>. Head 5; lower gill rakers 12 to 16; scales 90 to 105; D. VI to VII, I, 10 to 12; A. I, 17 to 20.

*Austromenidia nigricans* (Richardson).

j<sup>2</sup>. Head 4 to  $4\frac{3}{5}$ ; lower gill rakers 25; scales 83 to 90 (92); D. VI to VIII-I, 10 or 11; A. I, 16 to 18.

*Austromenidia regia* (Humboldt).

a<sup>2</sup>. **Notocheirinae** new. No spinous dorsal; body of elongate ovoid form; pectoral well elevated, above beginning of silvery lateral band; postclavicles closely approximated anteriorly nearly at ventral profile. **Notocheirus** Clark.

*Notocheirus hubbsi* Clark.



## Family THUNNIDAE

## Tunnies

a<sup>1</sup>. Second dorsal and anal with front lobes not prolonged.

b<sup>1</sup>. Pectoral very long, falcate, reaches much beyond front of anal; size moderate. **Germo Jordan.**

*Germo alalunga* (Bonnaterre).

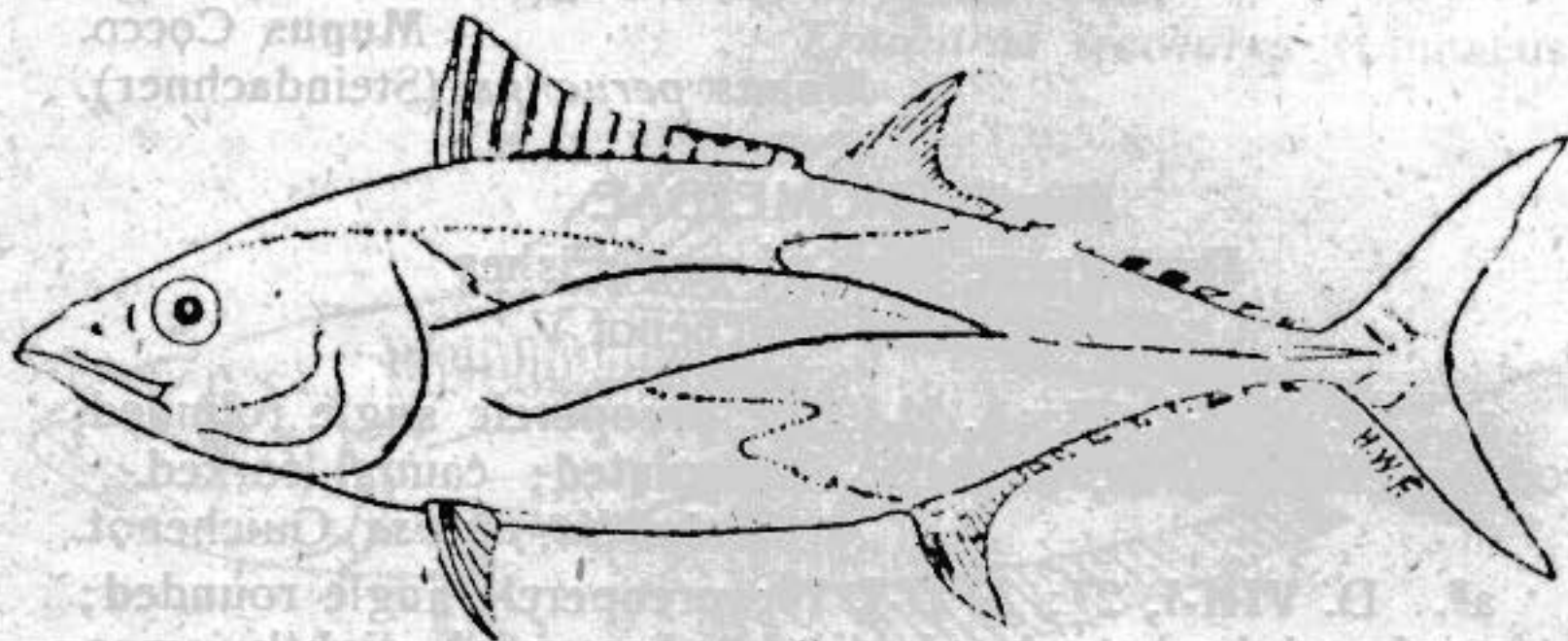


Figure 22.—*Germo alalunga* (Bonnaterre).

b<sup>2</sup>. Pectoral short; size small. **Sarda Cuvier.**

*Sarda chiliensis* (Cuvier).

a<sup>2</sup>. Second dorsal and anal with front lobes prolonged; pectoral moderate. **Neothunnus Kishinouye.**

*Neothunnus macropterus* (Schlegel).

## Family GEMPYLIDAE

## Snake Mackerels

a<sup>1</sup>. Lateral line descending below hind part of spinous dorsal; dorsal and anal finlets 6. **Thyrsites Cuvier.**

*Thyrsites atun* (Euphrasen).

a<sup>2</sup>. Lateral line nearly straight; dorsal finlets 5.

**Thyrsitops Gill.**

*Thyrsitops lepidopodes* (Cuvier).

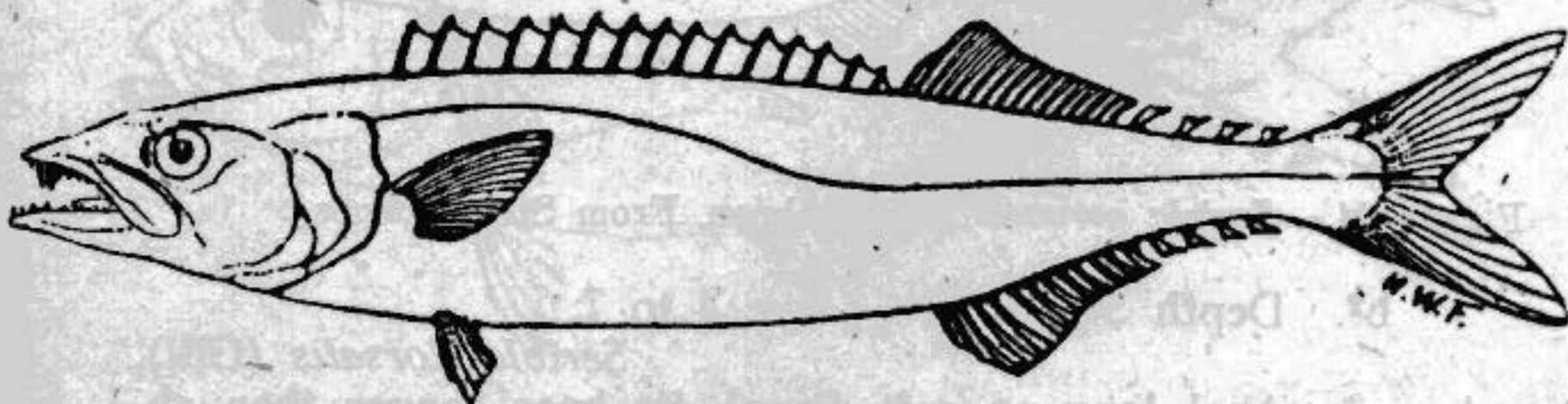


Figure 23.—*Thyrsitops lepidopodes* (Cuvier). From Cuvier.



## Family CENTROLOPHIDAE

## Rudder Fishes

a<sup>1</sup>. Dorsal spines short, not graduating to higher soft rays, or increase only to fourth, then subequal.

**Palinurichthys** Bleeker.

*Palinurichthys caeruleus* (Guichenot).

a<sup>2</sup>. Dorsal spines graduating to higher soft rays.

**Mupus** Cocco.

*Mupus peruanus* (Steindachner).

## Family NOMEIDAE

## Portuguese Man of war Fishes

**SeriOLELLA** Guichenot

a<sup>1</sup>. D. VIII-I, 38; A. II-I, 24; preopercle angle rounded, produced backwards, slightly denticulated; caudal forked.

*SeriOLELLA porosa* Guichenot.

a<sup>2</sup>. D. VIII-I, 27; A. II-I, 19; preopercle angle rounded; not produced backwards, denticulated; caudal slightly emarginate.

*SeriOLELLA violacea* Guichenot.

## Family CARANGIDAE

## Crevalles

a<sup>1</sup>. **SeriOLINAE**. Anal much shorter than soft dorsal, its base not longer than abdomen. **SeriOLA** Cuvier.

b<sup>1</sup>. Depth  $4\frac{1}{2}$  to  $4\frac{4}{5}$ ; eye  $3\frac{3}{4}$  to  $3\frac{4}{5}$ .

*SeriOLA peruana* Steindachner.

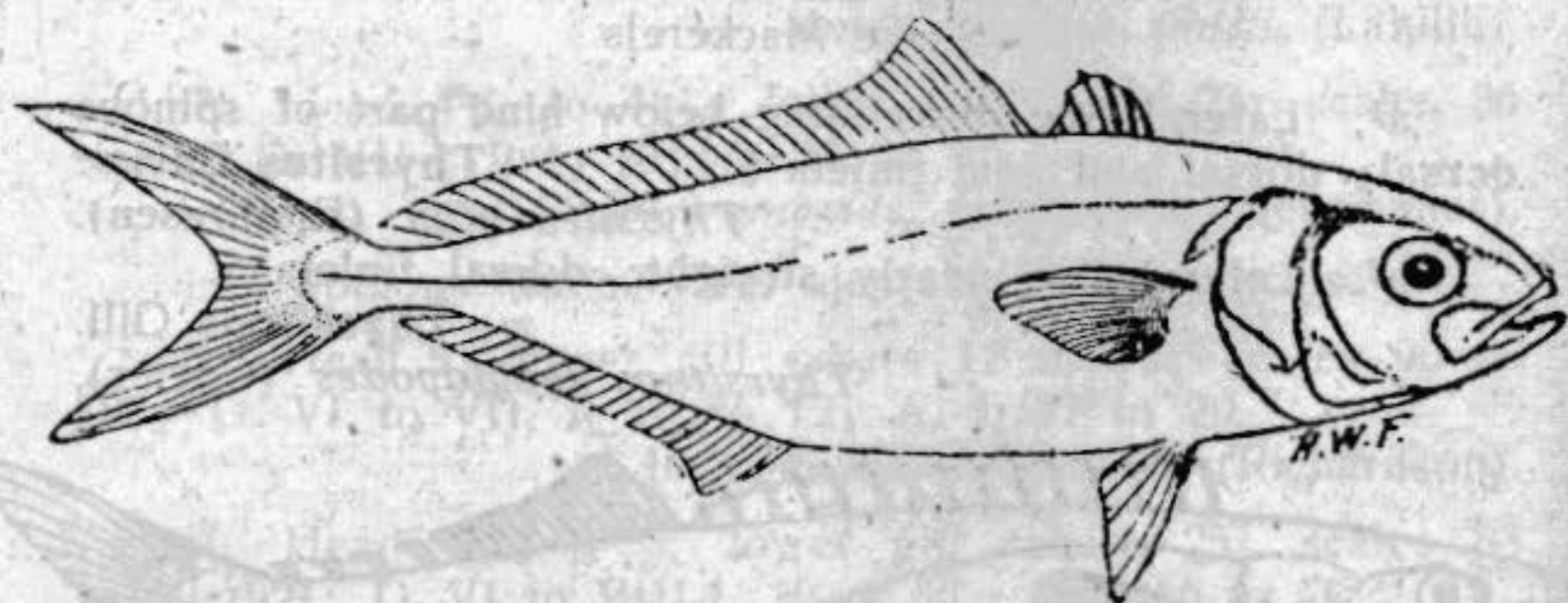


Figure 24.—*SeriOLA peruana* Steindachner. From Steindachner.

b<sup>2</sup>. Depth  $3\frac{1}{8}$  to  $4\frac{1}{5}$ ; eye 4 to 7.

*SeriOLA dorsalis* (Gill).

a<sup>2</sup>. Anal long as soft dorsal, its base longer than abdomen.



c<sup>1</sup>. **Caranginae.** Ventrals present; lateral line arched anteriorly, usually armed posteriorly; pectorals long, falcate.

d<sup>1</sup>. Lateral line with deep scutes its entire length.

**Trachurus Rafinesque.**

e<sup>1</sup>. Depth  $3\frac{2}{5}$  to  $4\frac{1}{4}$ ; arch of lateral line shorter than straight section; bony scutes deep; pectoral reaches beyond beginning of straight section of lateral line.

*Trachurus trachurus* (Linnaeus).

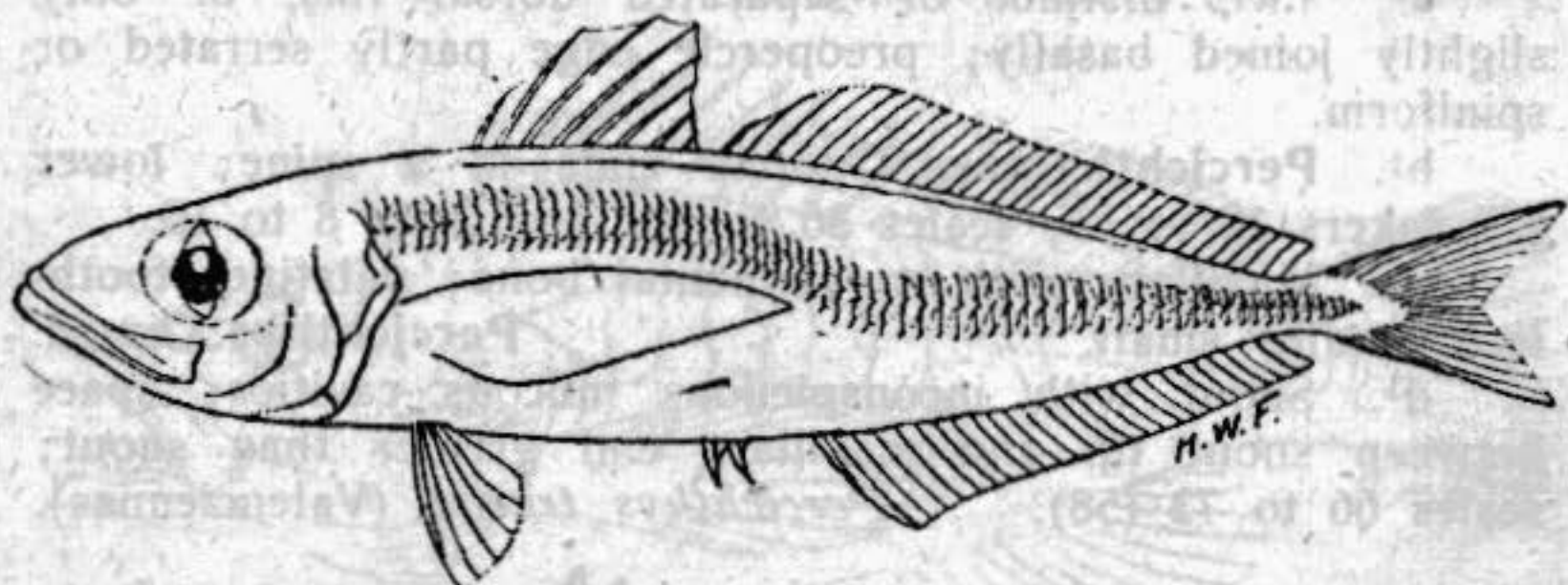


Figure 25.—*Trachurus trachurus* (Linnaeus).

e<sup>2</sup>. Depth  $4\frac{1}{2}$  to  $5\frac{1}{3}$ ; arch of lateral line long as straight section; bony scutes narrow; pectoral not reaching straight section of lateral line.

*Trachurus symmetricus* (Ayres).

d<sup>2</sup>. Lateral line with scutes only in posterior straight section.

**Caranx Lacépède.**

*Caranx georgianus* Valenciennes.

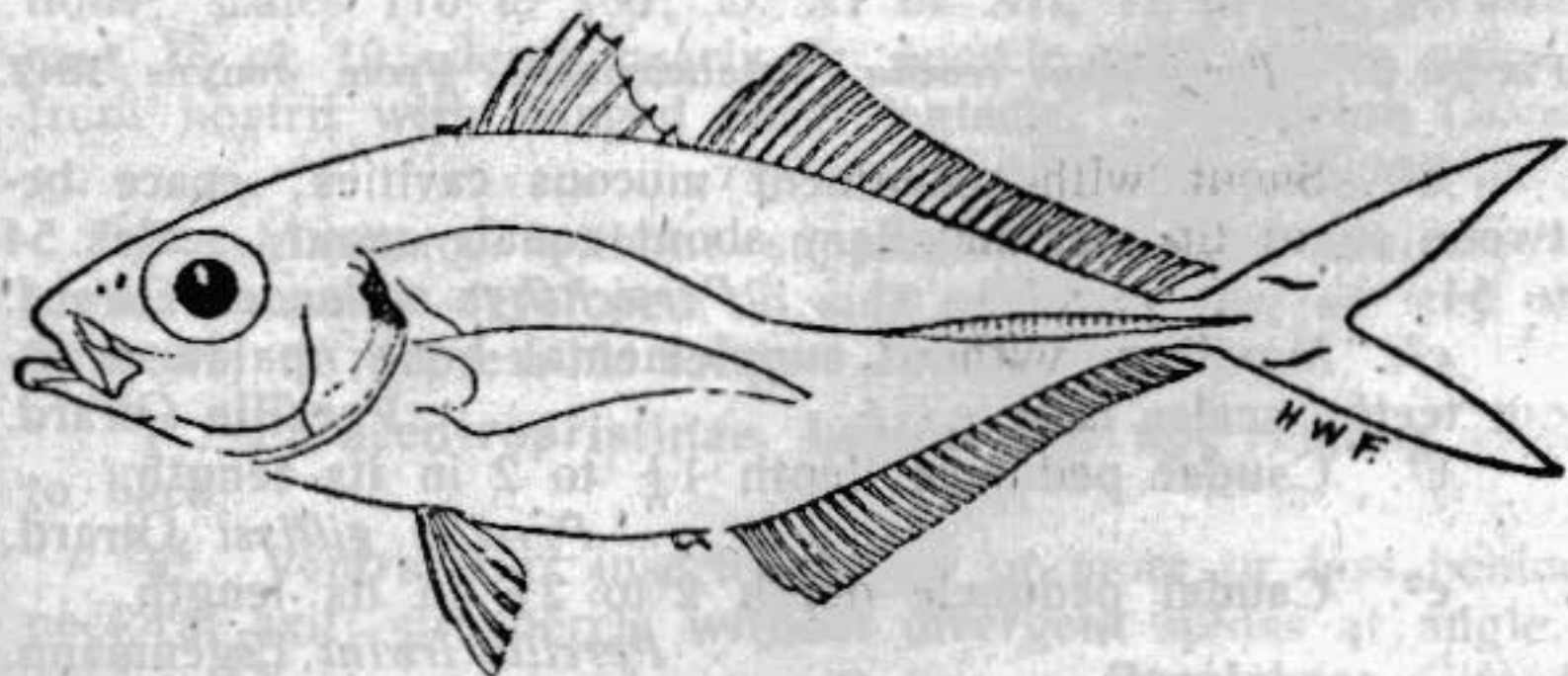


Figure 26.—*Caranx georgianus* Valenciennes. From Guichenot 1848.



a<sup>2</sup>. **Paroninae** new. Ventrals none; body compressed, elevated; mouth cleft wide; maxillary reaches to or beyond hind eye edge; branchiostegals 10; scales very minute; lateral line little arched, unarmed, axial; D. V-VII, I, 33 to 36; A. II-I, 34 to 37; pectoral short, not falcate. **Parona** Berg.  
*Parona signata* (Jenyns).

Family SERRANIDAE  
Sea Bass

a<sup>1</sup>. Two distinct or separated dorsal fins, or only slightly joined basally; preopercle edge partly serrated or spiniform.

b<sup>1</sup>. **Percichthyinae**. Opercle ends in a spine; lower gill rakers 10 to 13; scales 36 to 70; anal rays 8 to 10.

c<sup>1</sup>. Maxillary with supplemental bone; palatines toothless; scales small. **Percichthys** Girard.

d<sup>1</sup>. Snout with inconspicuous mucous cavities; space between snout tip and maxillary end greater than snout; scales 66 to 73 (58). *Percichthys trucha* (Valenciennes).

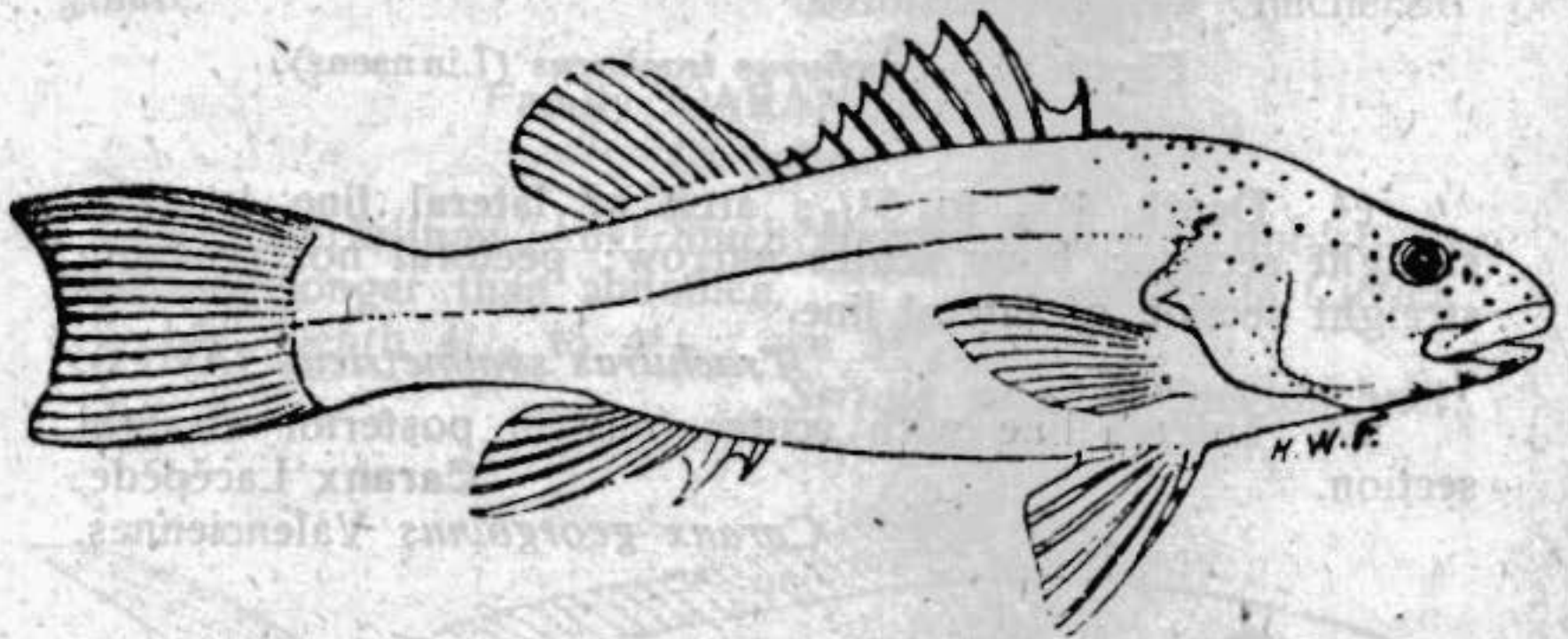


Figure 27.—*Percichthys trucha* (Valenciennes). From Jenyns 1842.

d<sup>2</sup>. Snout with prominent mucous cavities; space between snout tip and maxillary about equals snout; scales 54 to 64. *Percichthys melanops* Girard!

c<sup>2</sup>. Maxillary without supplemental bone; palate without teeth; scales large. **Percilia** Girard.

e<sup>1</sup>. Caudal peduncle depth  $1\frac{1}{2}$  to 2 in its length.

*Percilia gillissi* Girard.

e<sup>2</sup>. Caudal peduncle depth 2 to  $2\frac{1}{2}$  in its length.

*Percilia irwini* Eigenmann.

a<sup>2</sup>. Dorsal fin single, sometimes deeply divided.

f<sup>1</sup>. Maxillary with distinct supplemental bone; dorsal usually divided or deeply notched.



g<sup>1</sup>. **Acanthistiinae** new. Orbital regions without spinous projections.

h<sup>r</sup>. Canine teeth present; scales all or partly ctenoid.

i<sup>1</sup>. Opercular spines 3; scales 90 to 160; D. XI to XIII, 15 to 18; pectoral rays 19 to 21. **Acanthistius** Gill.

*Acanthistius pictus* (Tschudi).

i<sup>2</sup>. Opercular spines 2; scales 50 to 60; D. X, 19 to 21; pectoral rays 14 to 16.

**Gilbertia** Jordan and Eigenmann,  
*Gilbertia semicineta* (Valenciennes).



Figure 28.—*Gilbertia semicineta* (Valenciennes). From Guichenot 1848.

h<sup>2</sup>. No canines; opercular spines 2; scales 115 to 120; D. X, 10; pectoral rays 17; depth  $2\frac{1}{5}$  to  $2\frac{2}{3}$ .

**Hemilutjanus** Bleeker.

*Hemilutjanus macrophthalmos* (Tschudi).

g<sup>2</sup>. **Polyprioninae**. Orbital region with spinous projections; scales 110 to 180; D. XI or XII, 11 to 13; pectoral rays 18 or 19; depth nearly 3; opercle with strong spine; front nostril with fringed nasal tentacle. **Polyprion** Oken.

*Polyprion oxygeneios* (Schneider).

f<sup>2</sup>. Maxillary without supplemental bone; canines, if present, usually developed on side of lower jaw as well as in front; no depressible teeth.

j<sup>1</sup>. **Paracentropristinae**. Lateral line not running close to back.

k<sup>1</sup>. Ventral fins inserted below or more or less behind pectoral axil; preopercle without divergent spines at angle.

**Paralabrax** Girard.

l<sup>1</sup>. D. X, 13 to 14; A. III, 7.

*Paralabrax humeralis* (Valenciennes).



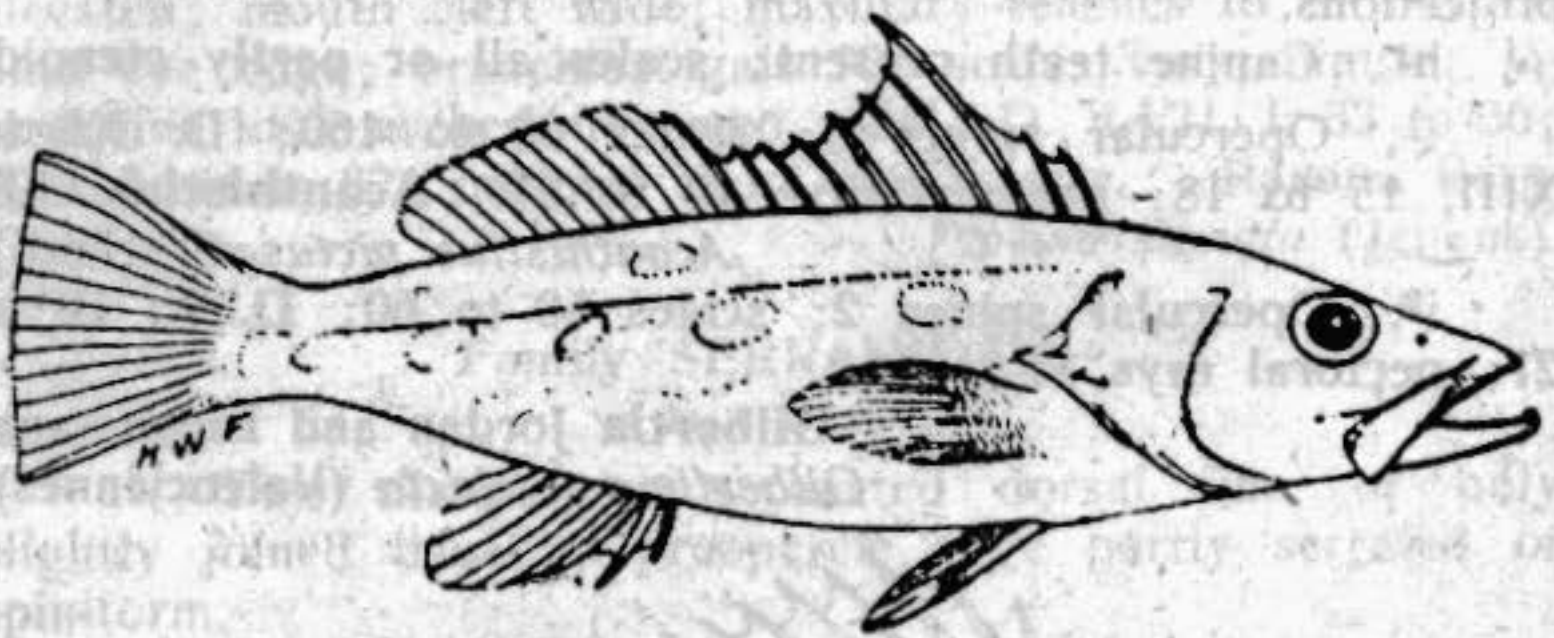


Figure 29.—*Paralabrax humeralis* (Valenciennes). From Jenyns 1842.

l<sup>2</sup>. D. X, 19; A. III, 10.

*Paralabrax semifasciatus* (Girard).

k<sup>2</sup>. Ventral fins anterior, inserted more or less in advance of pectoral axil, well separated; preopercle with numerous, strong, diverging spines at angle, radiating from 1 or 2 centers.

**Diplectrum** Holbrook.

*Diplectrum conceptione* (Valenciennes).

j<sup>2</sup>. **Anthiinae**. Lateral line greatly elevated, running close to edge of back.

m<sup>1</sup>. Pectoral very long, reaches  $1\frac{3}{4}$  to caudal base; dorsal rays 19 to 20.

**Caprodon** Schlegel

*Caprodon longimanus* (Guenther).

m<sup>2</sup>. Pectoral shorter than head; dorsal rays 10 to 18.

n<sup>1</sup>. Lateral line extends abruptly upward and backward to below sixth dorsal spine, then gradually curves downward.

**Hemianthias** Steindachner.

*Hemianthias peruanus* (Steindachner).

n<sup>2</sup>. Lateral line single, lost on upper surface of caudal peduncle or under last dorsal rays.

**Callanthias** Lowe.

*Callanthias platei* Steindachner.

## Family POMADASYIDAE

### Grunts

a<sup>1</sup>. **Pomadasyinae**. Body oblong, back not especially elevated.

b<sup>1</sup>. Anal spines 3.

c<sup>1</sup>. Chin with central groove behind symphysis of mandible; soft dorsal and anal scaleless; A. III, 7 or 8.

**Pomadasys** Lacépède.

*Pomadasys bipunctatus* Kner.



c<sup>2</sup>. Chin without central groove behind symphysis of mandible; soft dorsal and anal naked or partly scaled; A. III, 10 to 13.

**Isacia** Jordan and Fesler.

*Isacia conceptionis* (Cuvier).

b<sup>2</sup>. Anal spines 2: D. IX, 1, 20 to 22; scales 66; eye very small, 9 in head; mouth large maxillary not quite reaching eye.

**Cilus** Delfin.

*Cilus montti* Delfin.

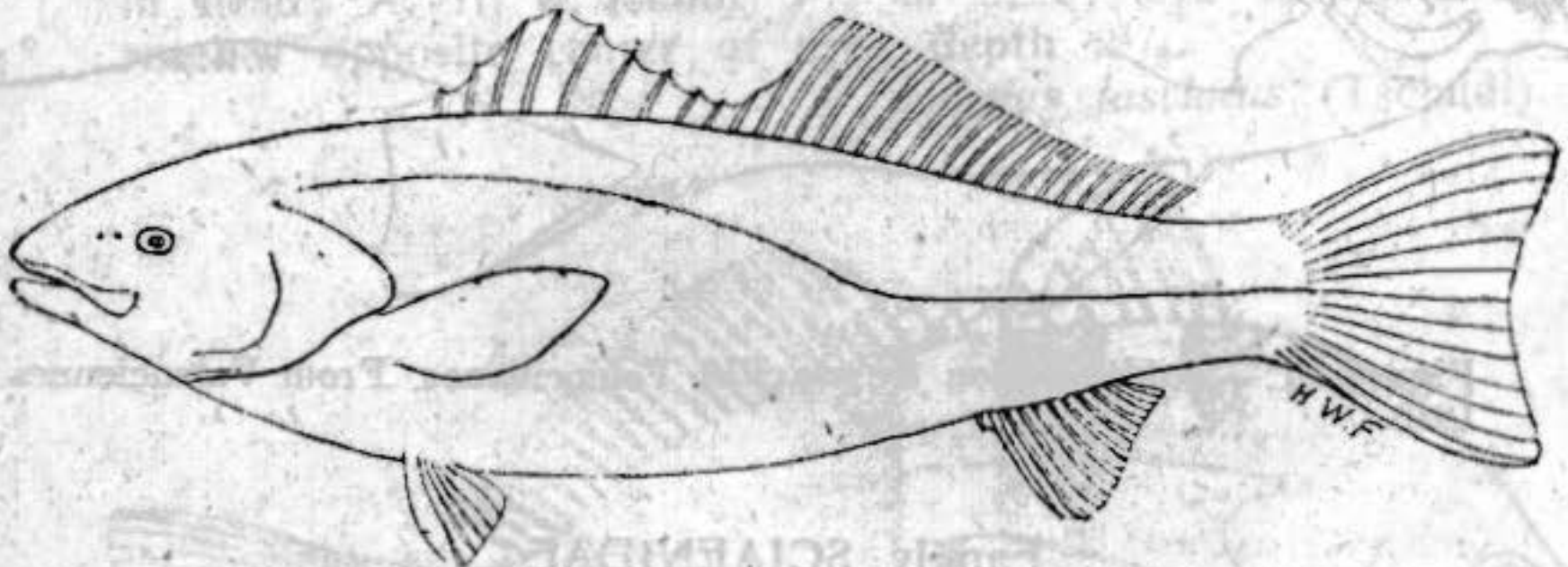


Figure 30.—*Cilus montti* Delfin. From Delfin 1900.

a<sup>2</sup>. **Anisotrematinae** new. Body ovoid, back elevated; chin with central groove behind symphysis of lower jaw; soft dorsal and anal usually with fine scales on basal parts of fin membranes; A. III, 7 to 13.

**Anisotremus** Gill.

*Anisotremus scapularis* (Tschudi).

## Family GIRELLIDAE

### Girelles

a<sup>1</sup>. Dorsal spines 14 or 15; dorsal continuous, spinous fin low.

**Girella** Gray.

b<sup>1</sup>. Ten narrow pale vertical bands; D. XIV, 13; head  $3\frac{3}{5}$ ; eye  $3\frac{1}{2}$  in head.

*Girella albostriata* Steindachner.

b<sup>2</sup>. Almost black, with 7 or 8 rather narrow light bands separating the broad interspaces; D. XIV, 13; head  $3\frac{1}{5}$ ; eye 4 in head.

*Girella feliciana* Clark.

a<sup>2</sup>. Dorsal spines 12 or 13; soft dorsal and anal elevated.

**Doidyxodon** Valenciennes.

c<sup>1</sup>. Color uniform dark brown; D. XIII, 18; A. III, 12.

*Doidyxodon laevifrons* (Tschudi).

c<sup>2</sup>. Color uniform dark green, or banded with darker; D. XII, 15; A. III, 12; scales about 60.

*Doidyxodon freminvillii* Valenciennes.



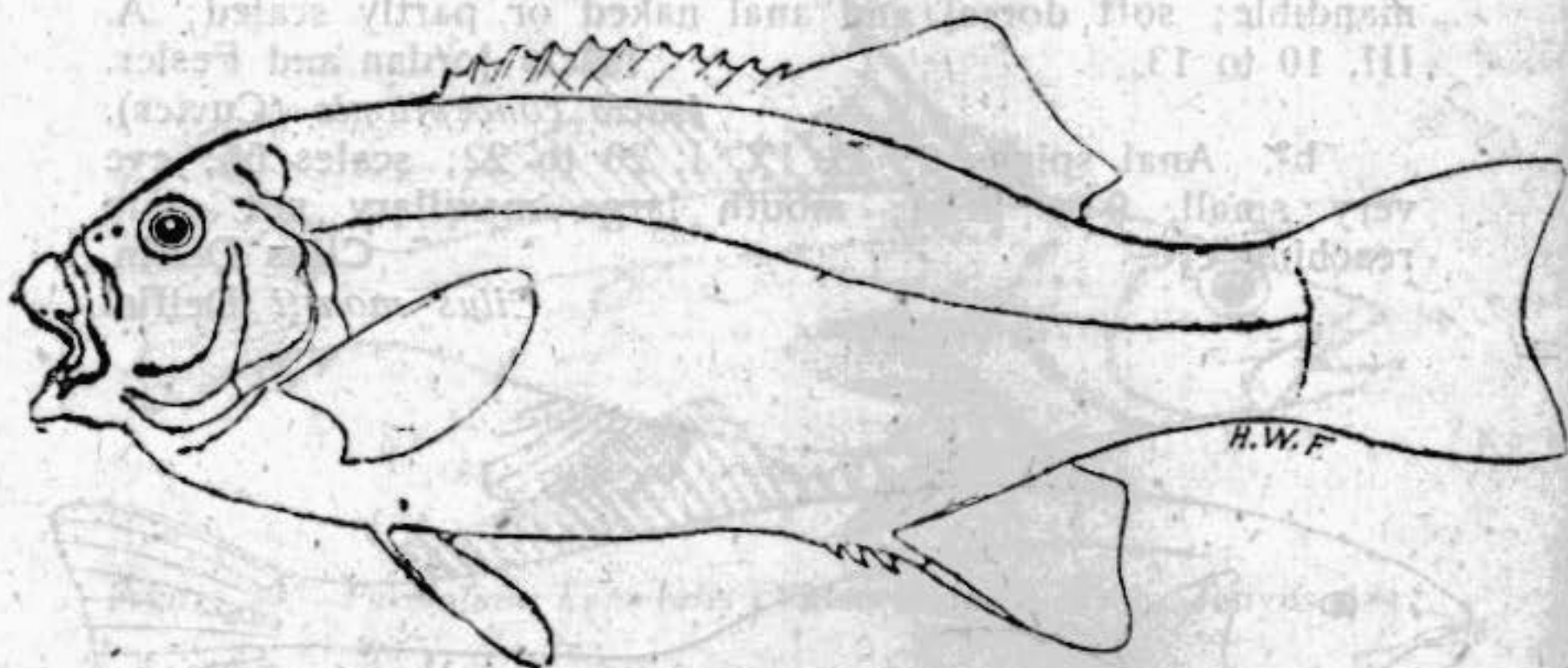


Figure 31.—*Doididyxodon freminvillii* Valenciennes. From Valenciennes 1846.

Family SCIAENIDAE  
Croakers

a<sup>1</sup>. **Otolithinae.** Mouth large, lower jaw prominent and projecting in front canines, when present, not lance-shaped, tapering from base to tip; preopercle serrate; vertebrae 24 to 26.

**Cynoscion** Gill.

*Cynoscion analis* (Jenyns).

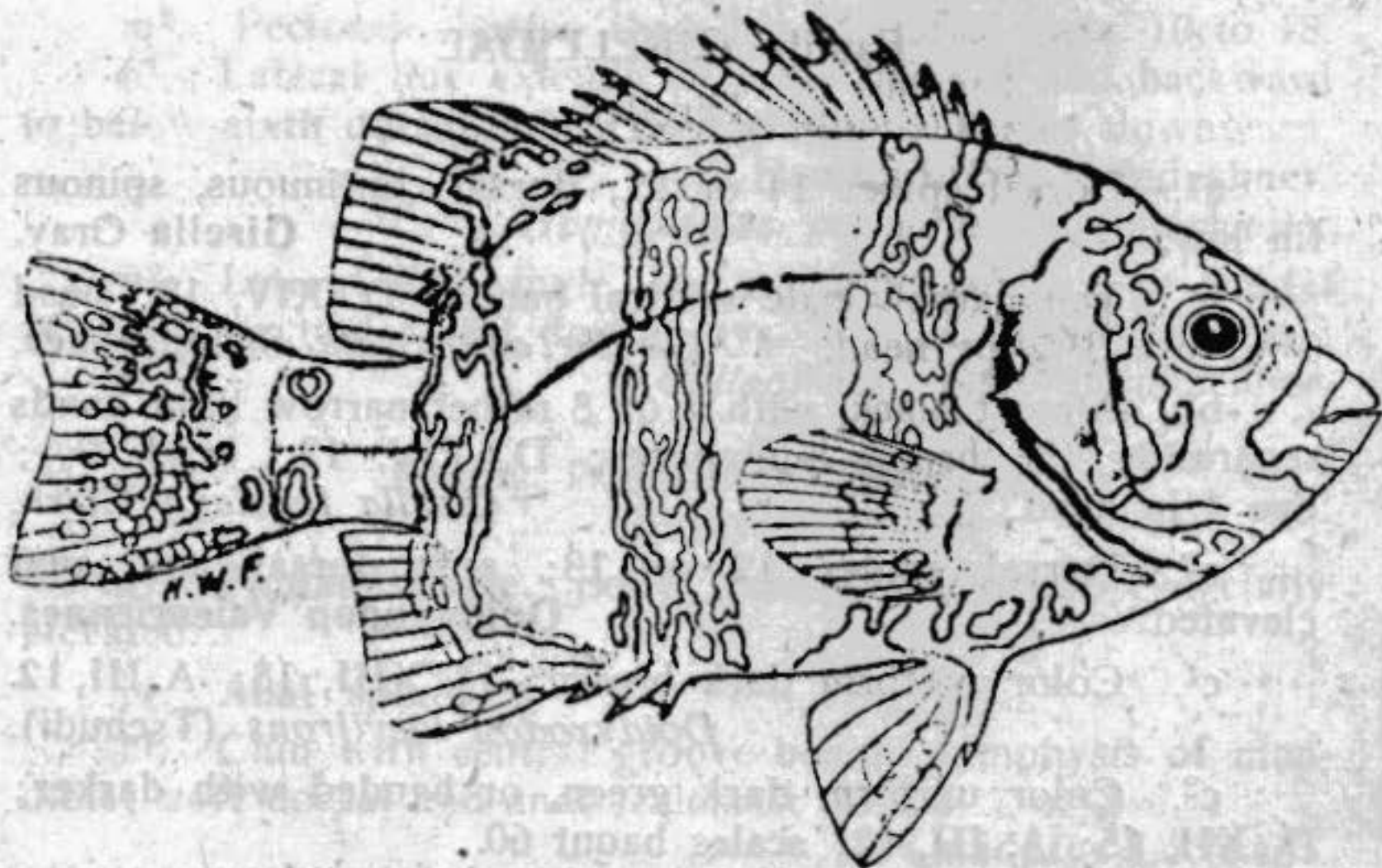


Figure 32.—*Oplegnathus insignis* (Kner). From Kner 1867.



a<sup>2</sup>. **Sciaeninae.** Mouth less conspicuous and small; no canines; preopercle entire or serrate; vertebrae 23 to 32.

b<sup>1</sup>. Lower jaw without barbels. **Johnius** Bloch.

c<sup>1</sup>. Second anal spine small, slender,  $3\frac{1}{4}$  to  $4\frac{1}{2}$  in head.

d<sup>1</sup>. Snout  $3\frac{3}{4}$  in head; eye 5; lower gill rakers 15; depth  $3\frac{1}{2}$ . *Johnius gilberti* (J. F. Abbott).

d<sup>2</sup>. Snout  $4\frac{1}{5}$  in head; eye  $5\frac{1}{2}$ ; maxillary reaches opposite middle of pupil; lower gill rakers 12; depth  $3\frac{1}{10}$ . *Johnius deliciosus* (Tschudi).

c<sup>2</sup>. Second anal spine long and stout, length 2 to 3 in head; A. II, 8; snout  $3\frac{2}{3}$  in head; eye 3; maxillary reaches opposite center of eye; depth  $2\frac{1}{2}$ .

*Johnius fasciatus* (Tschudi).

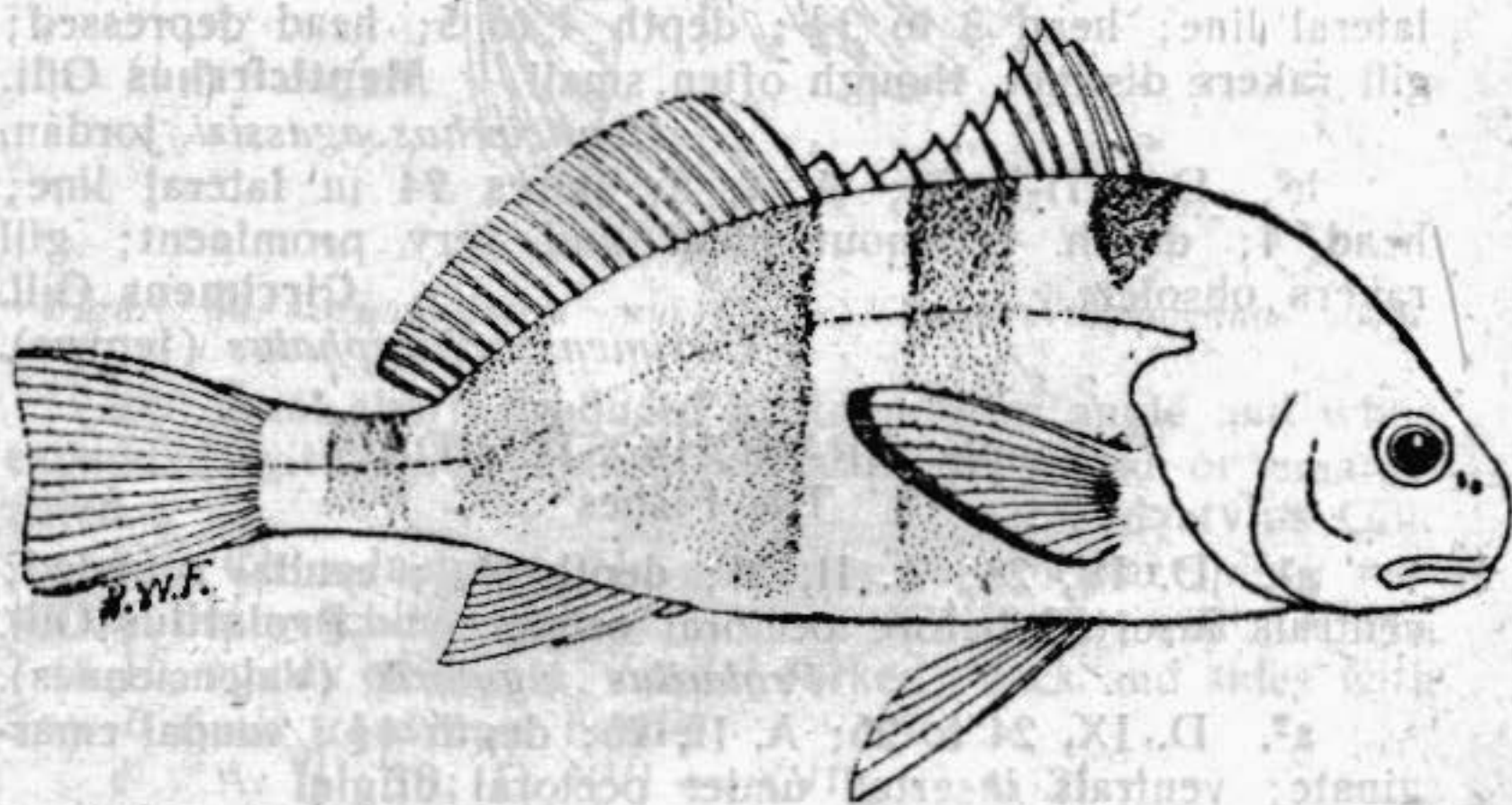


Figure 33.—*Johnius fasciatus* (Tschudi). From Tschudi 1844.

b<sup>2</sup>. Lower jaw with one or more barbels, either at symphysis or on rami; closed lower jaw included in upper.

e<sup>1</sup>. Lower jaw with several barbels, usually several in number and lateral. **Micropogon**

*Micropogon furnieri* (Desmarest).

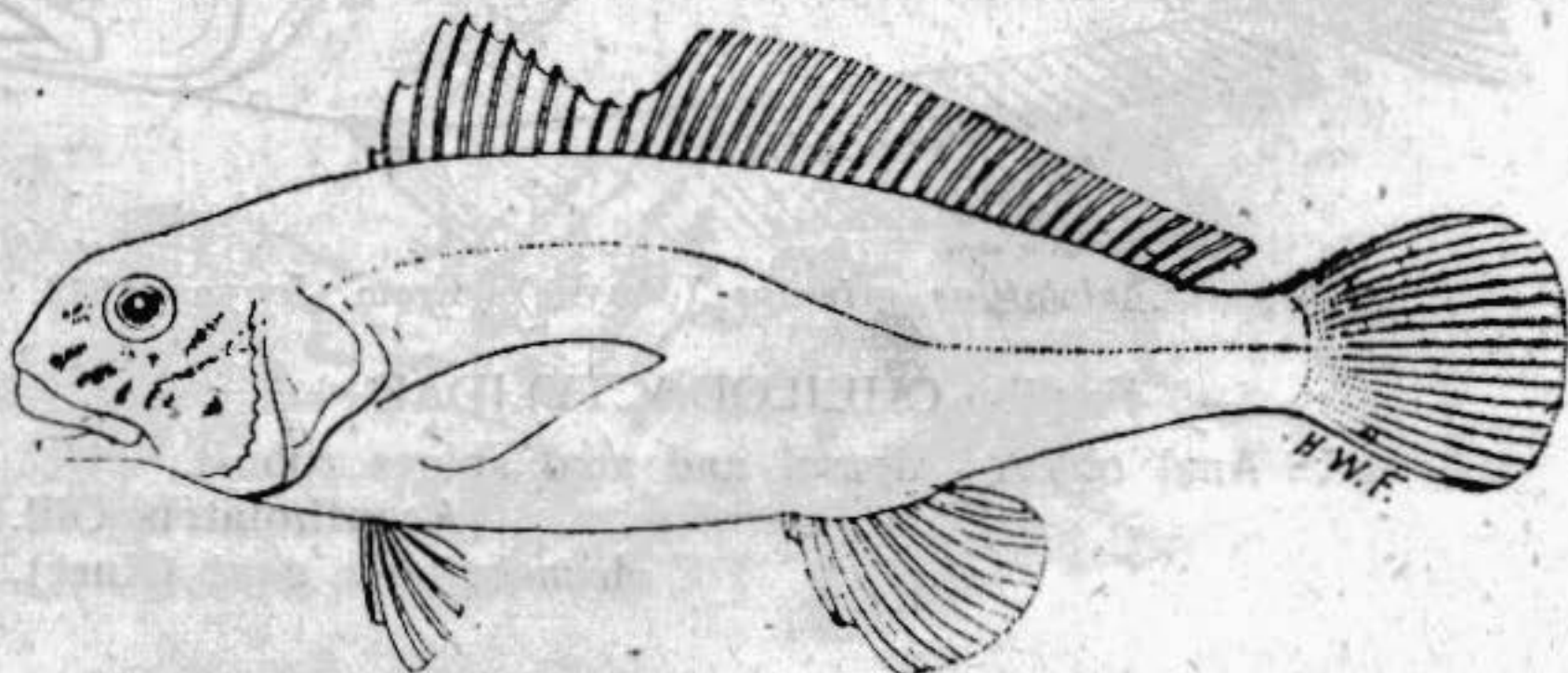


Figure 34.—*Micropogon furnieri* (Desmarest). From Desmarest 1823.



e<sup>2</sup>. Lower jaw with a single thickish barbel at its tip.  
 f<sup>1</sup>. Air-bladder large; anal spines 2; back more or less elevated. **Sciaena** Linnaeus.

g<sup>1</sup>. Scales 60; maxillary reaches beyond middle of eye; conspicuous black undulating lines follow series of scales on whole body above pectoral; paired fins and anal blackish with broad whitish margins. *Sciaena reedi* (Guenther).

g<sup>2</sup>. Scales 65; maxillary reaches middle of eye; silvery base of pectoral blackish. *Sciaena imberbis* (Guenther).

f<sup>2</sup>. Air-bladder absent; anal spine single, weak; back not elevated.

h<sup>1</sup>. D. X-I, 18 to 25; A. I, 7 to 9; pores 50 to 55 in lateral line; head 3 to 3½; depth 4 to 5; head depressed; gill rakers distinct, though often small. **Menticirrhus** Gill.

*Menticirrhus agassizi* Jordan.

h<sup>2</sup>. D. XII-I, 23; A. I, 8; pores 74 in lateral line; head 4; depth 4; snout blunt and very prominent; gill rakers obsolete. **Cirrimens** Gill.

*Cirrimens ophicephalus* (Jenyns).

#### Family BRANCHIOSTEGIDAE

##### Tile Fishes

a<sup>1</sup>. D. IV, 28; A. II, 21; depth 5⅓; caudal rounded; ventrals inserted before pectoral origin. **Prolatilus** Gill.

*Prolatilus jugularis* (Valenciennes).

a<sup>2</sup>. D. IX, 24 to 26; A. II, 26; depth 4½; caudal emarginate; ventrals inserted under pectoral origin.

**Caulolatilus** Gill.

*Caulolatilus princeps* (Jenyns).

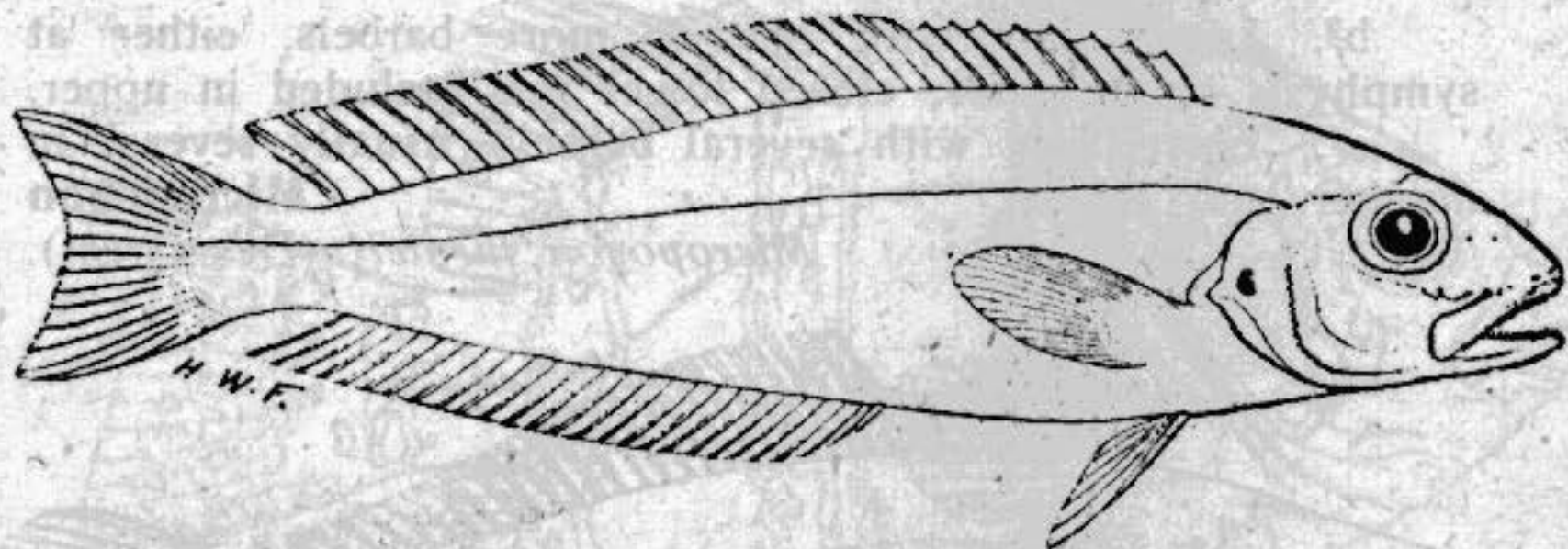


Figure 35.—*Caulolatilus princeps* (Jenyns). From Jenyns 1842.

#### Family CHEILODACTYLIDAE

a<sup>1</sup>. Anal oblong; dorsal and anal spines robust.

**Acantholatris** Gill.

*Acantholatris gayi* (Xner).



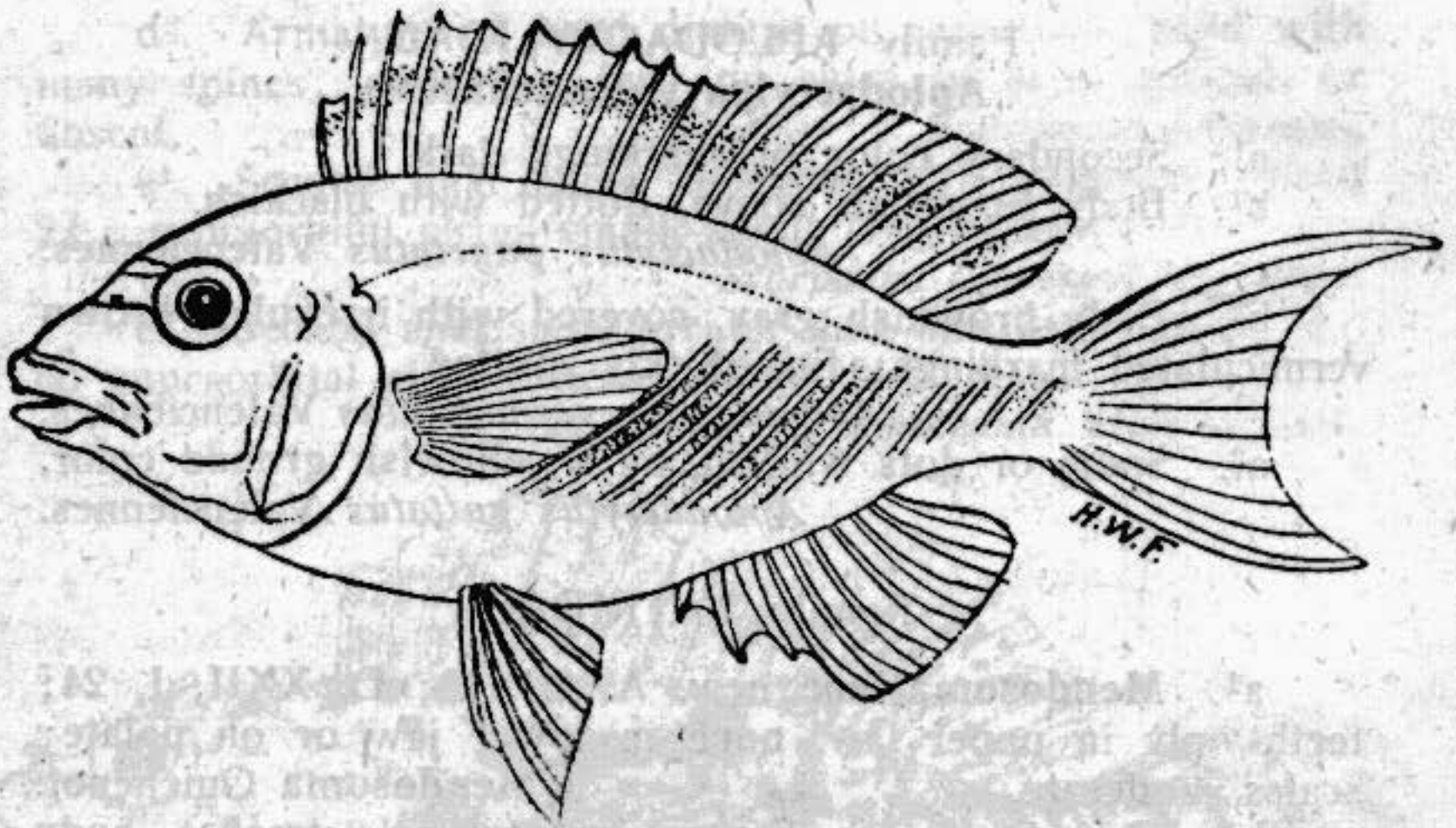


Figure 36.—*Acantholatris gayi* (Kner). From Valenciennes 1839.

a<sup>2</sup>. Anal short, produced at its anterior angle and when expanded with rayed margin vertically truncated or emarginated.

**Chirodactylus** Gill.

b<sup>1</sup>. **Chirodactylus**. No posterior supraocular spine; maxillary not reaching eye; D. XVI or XVII, 29 to 31; A. III, 7 to 10, spines moderate; caudal forked; back and sides with 5 or 6 dark transverse bands.

c<sup>1</sup>. A. III, 10; D. XVI or XVII, 29 to 31.

*Chirodactylus variegatus* (Valenciennes).

c<sup>2</sup>. A. III, 7, spines small; D. XVII, 29.

*Chirodactylus antonii* (Valenciennes).

b<sup>2</sup>. **Diceratodactylus** new. Short posterior supraocular spine each spine side; maxillary reaches opposite eye; D. XIV, 17; A. III, 5, spines large; back and sides with dark blotches, some of which may be saddle like.

*Chirodactylus bicornis* (Steindachner).

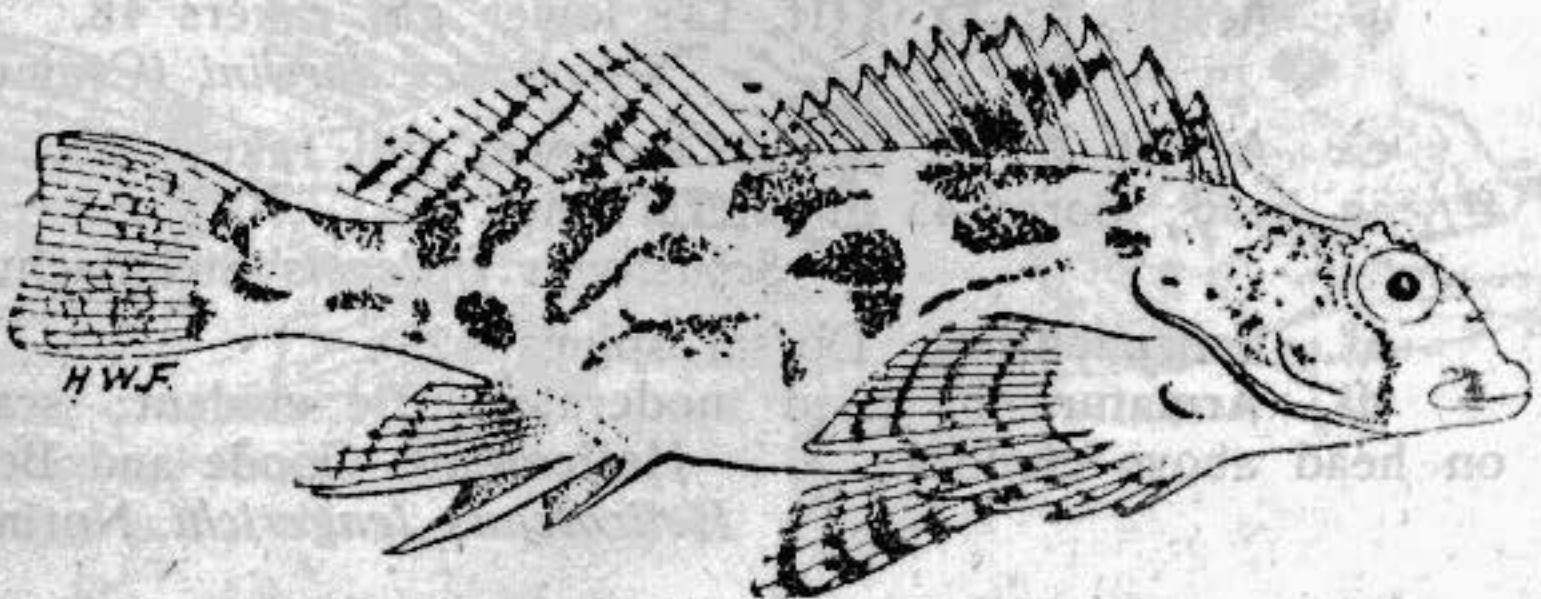


Figure 37.—*Chirodactylus bicornis* (Steindachner). From Steindachner 1898.



## Family APLODACTYLIDAE

**Aplodactylus Valenciennes**a<sup>1</sup>. Secondary color or markings dark.b<sup>1</sup>. Body brownish above, dotted with blackish.*Aplodactylus punctatus* Valenciennes.b<sup>2</sup>. Body brownish gray, covered with irregular, brown vermiculated markings; fins thickly spotted.*Aplodactylus vermiculatus* Valenciennes.a<sup>2</sup>. Spots or dots whitish, on a yellowish ground color.*Aplodactylus guttatus* Valenciennes.

## Family LATRIDAE

a<sup>1</sup>. **Mendosomatinae** new. A. III, 18; D. XXII, I, 24; teeth only in upper jaw, none in lower jaw or on palate; scales moderate. **Mendosoma** Guichenot.b<sup>1</sup>. Greenish, with brown longitudinal streaks; body oblong. *Mendosoma lineatum* Guichenot.b<sup>2</sup>. Above blue, below gray, also fins; body elongate.*Mendosoma caerulescens* Guichenot.b<sup>3</sup>. Above gray, below silvery; fins dark gray; lateral line clearly brown; body partly ovate.*Mendosoma fernandezianum* (Guichenot).a<sup>2</sup>. **Latridinae**. A. III, 27; D. XVII, I, 36; teeth villiform, in both jaws, no canines; scales 110.**Latris** Richardson.*Latris hecateia* Richardson.

## Family SCORPAENIDAE

## Rock Fishes

a<sup>1</sup>. **Sebastinae**. Dorsal spines 13 to 17.b<sup>1</sup>. Dorsal spines 13 or 14; palatine teeth present.**Sebastes** Gill.c<sup>1</sup>. A. III, 6; D. XIII, 14; lower gill rakers 21.*Sebastes oculatus* (Cuvier).c<sup>2</sup>. A. III, 6; D. XIII, 13; lower gill rakers 18.*Sebastes darwini* (Cramer).c<sup>3</sup>. A. III, 6; D. XIII, 13; lower gill rakers 22; eye 4<sup>1</sup>/<sub>4</sub> in head; pores 45 in lateral line.*Sebastes chilensis* Steindachner.a<sup>2</sup>. **Scorpaeninae**. Dorsal spines 12.d<sup>1</sup>. Armature of head moderate, little evident; scales on head above ctenoid. **Helicolenus** Goode and Bean.*Helicolenus lengerichi* Norman.



d<sup>2</sup>. Armature of head distinct or prominent, head with many spines; scales on top and sides of head cycloid, or absent.

**Scorpaena** Linnaeus.

e<sup>1</sup>. Second anal spine subequal with maxillary; head  $2\frac{1}{2}$ ; supraorbital cirrus small, about long as eye.

*Scorpaena thomsoni* Guenther.

e<sup>2</sup>. Second anal spine greater than maxillary; head  $2\frac{1}{2}$ ; no supraorbital cirrus; dermal flaps few.

*Scorpaena fernandeziana* Steindachner.

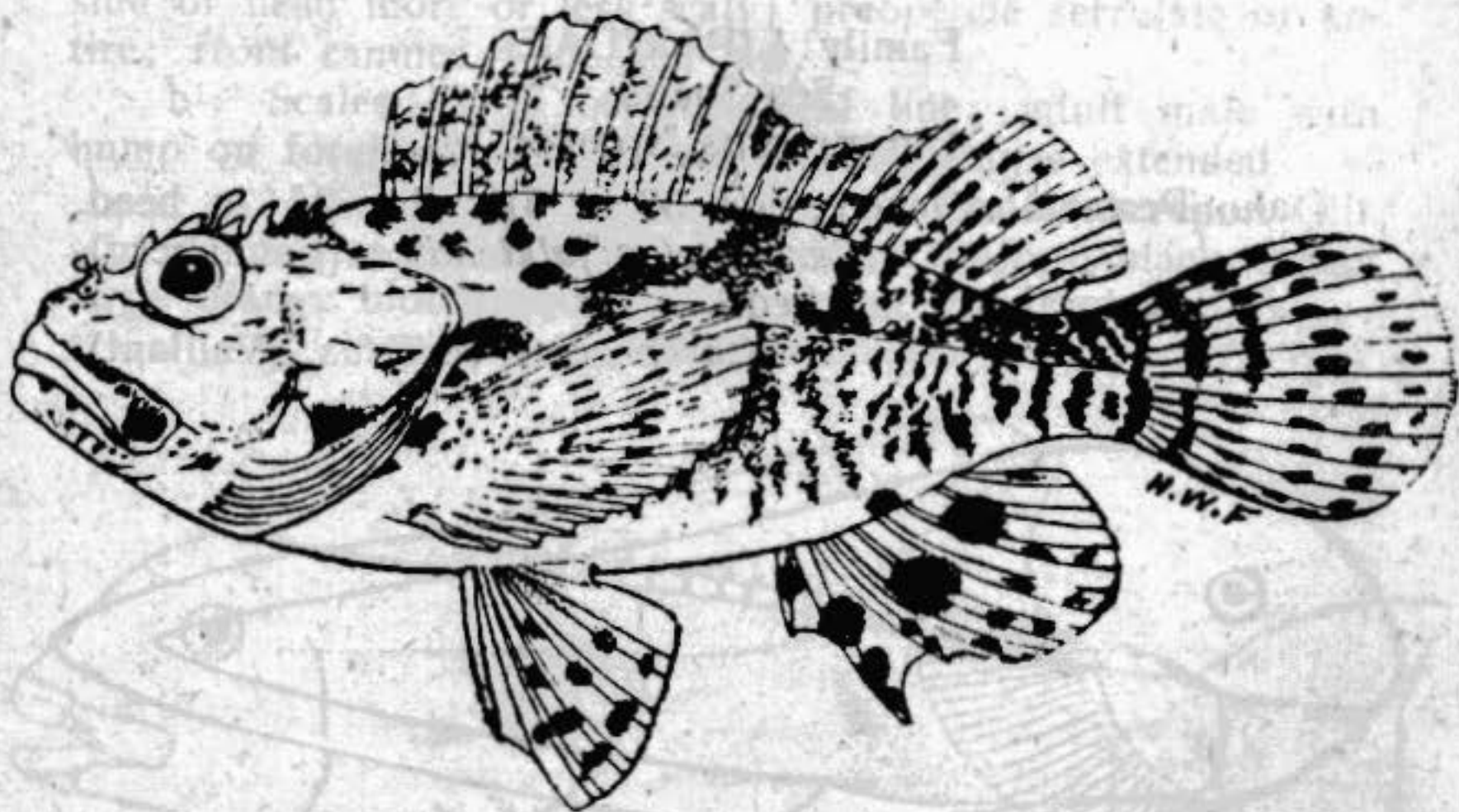


Figure 38.—*Scorpaena fernandeziana* Steindachner. From Steindachner 1875.

e<sup>3</sup>. Second anal spine  $1\frac{2}{5}$  in maxillary; head  $2\frac{1}{8}$ ; supraorbital cirrus broad, little longer than eye; dermal flaps on body very numerous.

*Scorpaena histrio* Jenyns.

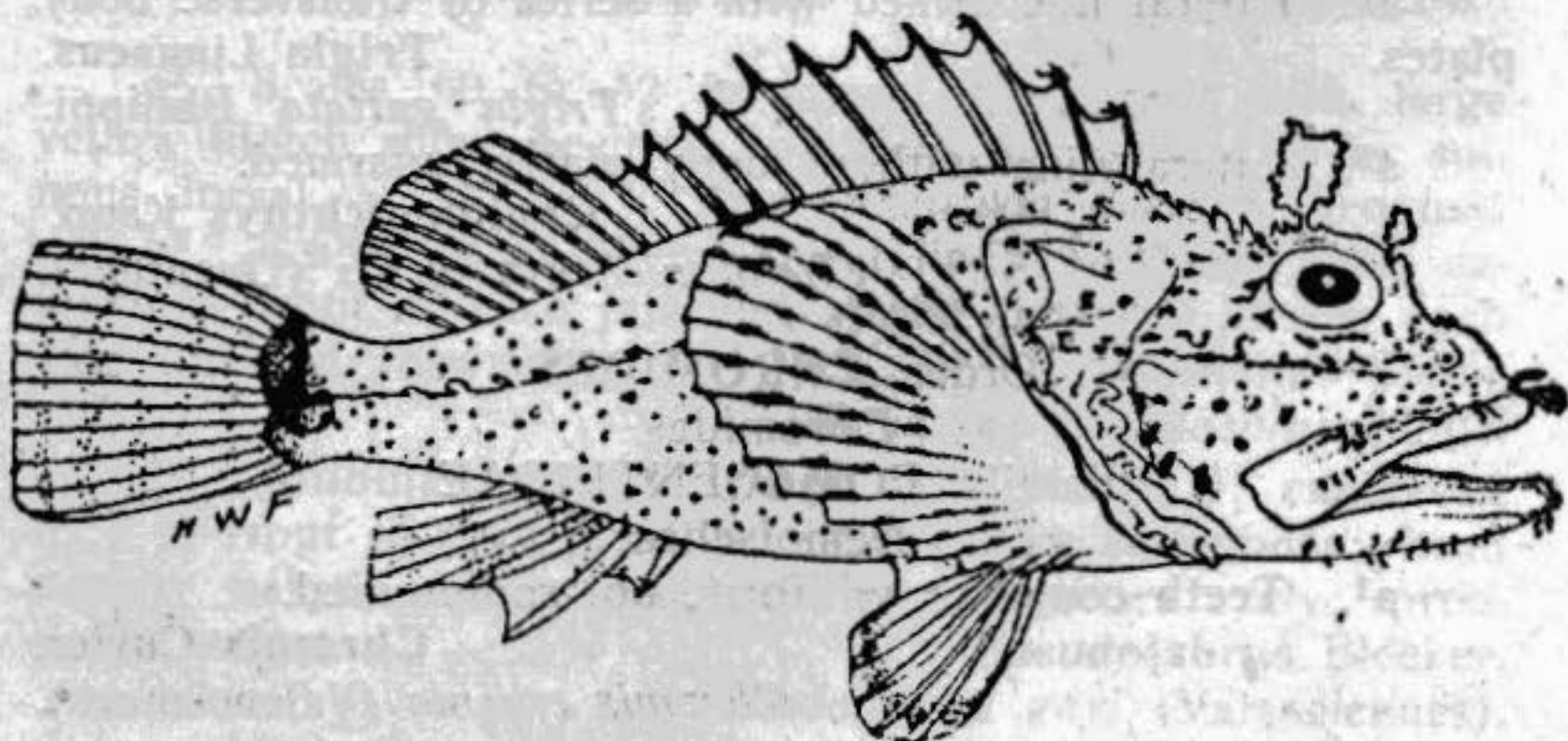


Figure 39.—*Scorpaena histrio* Jenyns. From Jenyns 1842.



## Family CONGIOPODIDAE

a<sup>1</sup>. Dorsals with notch dividing fins; caudal emarginate; skin smooth; largely blotched with black.

**Congiopodus Perry.**

*Congiopodus peruvianus* (Cuvier).

a<sup>2</sup>. Dorsals continuous, not notched; caudal convex behind; skin rasplike; orange red, back blackish and fins spotted with black.

**Agriopus Cuvier.**

*Agriopus hispidus* Jenyns.

## Family LIPARIDAE

Sea Snails

**Careproctus Xroeyer.**

a<sup>1</sup>. Pectoral notched, rays 30 or 31; disk  $2\frac{1}{2}$  in head.

*Careproctus falklandica* (Lonnberg).

a<sup>2</sup>. Pectoral not notched?

*Careproctus pallidus* (Vaillant).

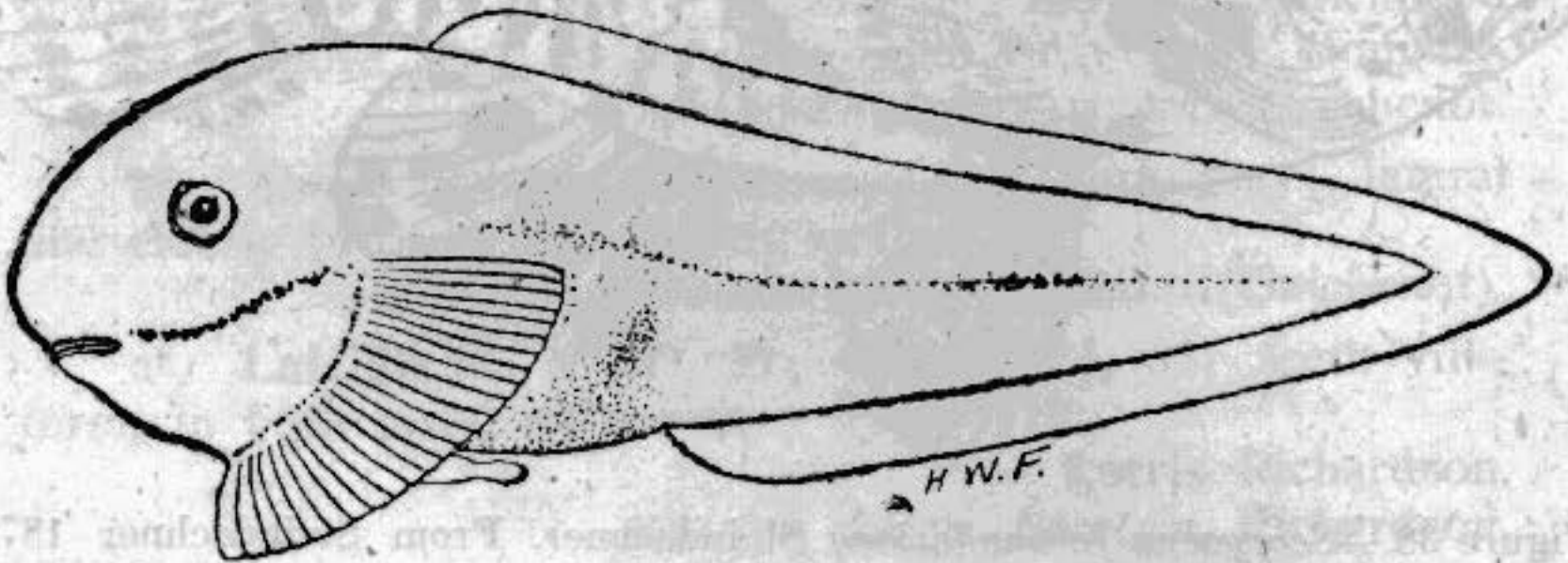


Figure 40.—*Careproctus pallidus* (Vaillant). From Vaillant 1888.

## Family TRIGLIDAE

Gurnards

a<sup>1</sup>. Lateral line armed with a series of transverse bony plates.

**Trigla Linnaeus.**

*Trigla guttata* Philippi.

a<sup>2</sup>. Lateral line without bony plates, unarmed.

**Chelidonichthys Kaup.**

*Chelidonichthys pictus* (Guenther).

## Order CHROMIDES

Chromides

## Family POMACENTRIDAE

Demoiselles

a<sup>1</sup>. Teeth conic, or villiform, not compressed.

**Chromis Cuvier.**

*Chromis crusma* (Valenciennes).



- a<sup>2</sup>. Teeth somewhat compressed, not conic or villiform.  
**Nexilosus** Heller and Snodgrass.  
*Nexilosus latifrons* (Tschudi).

### Order PHARYNGOGNATHI

Labroid Fishes

Family LABRIDAE

Wrasse Fishes

a<sup>1</sup> **Bodianinae.** Dorsal spines usually 12 (11 to 14); side of head more or less scaly; preopercle serrulate or entire; front canines 4 in each jaw.

b<sup>1</sup>. Scales 45 to 60 in lateral line; adult male with hump on forehead; caudal subtruncate, angles extended.

**Pimelometopon** Gill.

c<sup>1</sup>. Scales 45 to 50 in lateral line; uniform black, except large orange blotch above pectoral fin.

*Pimelometopon maculatus* (Pérez).

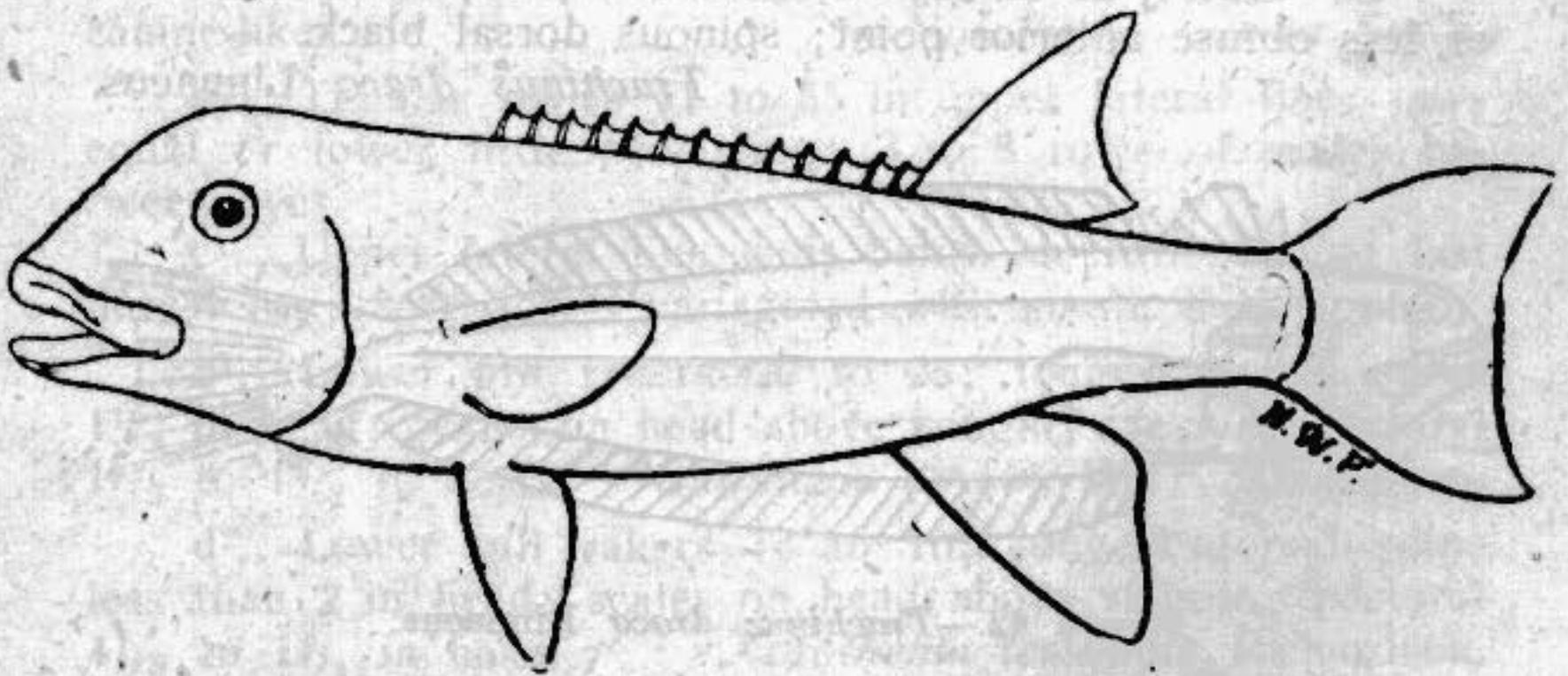


Figure 41.—*Pimelometopon maculatus* (Pérez). From Philippi 1887.

c<sup>2</sup>. Scales 60 to 62 in lateral line; red, with large yellow blotch above pectoral and black one anteriorly on spinous dorsal.

*Pimelometopon darwini* (Jenyns).

b<sup>2</sup>. Scales 32 or 33 in lateral line; 4 strong, conic canines in front of each jaw and strong posterior canine each side directed forward.

**Bodianus** Bloch.

*Bodianus diplotaenius* (Gill).

a<sup>2</sup>. **Julidinae.** Dorsal spines usually 8 or 9; canines 2 to 4 in front of each jaw, also hind canine sometimes; head usually naked, cheeks and opercles sometimes scaly; preopercle entire.

**Pseudolabrus** Bleeker.

*Pseudolabrus gayi* (Valenciennes).



a<sup>3</sup>. **Grausinae** new. Dorsal spines 16, rays 17, spines all low; A. I, 14; large conic canines 12 above and 14 below forward; scales 100; vertical fins with crowded round black spots; each scale on body with basal black spot, forming reticulated appearance.

**Graus** Philippi.

*Graus nigra* Philippi.

a<sup>4</sup>. **Malapterinae**. Dorsal spines 3, scarcely developed, similar to 29 soft rays; A. II, 19; cheeks and opercles scaly; teeth uniserial, without hind canines; lateral line complete.

**Malapterus** Valenciennes.

*Malapterus reticulatus* Valenciennes.

### Order JUGULARES

Jugular-fin Fishes

Family TRACHINIDAE

Weever Fishes

**Trachinus** Linnaeus

a<sup>1</sup>. D. VI, 29 to 31; A. 30 to 34; preopercle with more or less obtuse anterior point; spinous dorsal black.

*Trachinus draco* Linnaeus.

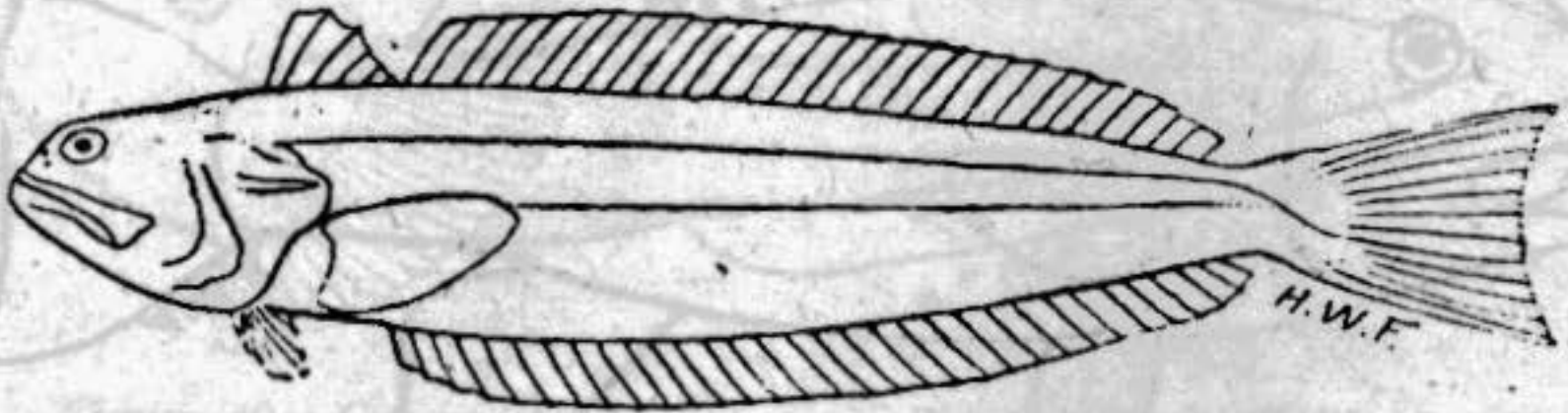


Figure 42.—*Trachinus draco* Linnaeus.

a<sup>2</sup>. D. VII, 25; A. 28; preopercle with 4 strong spines beneath; on each side before eye, rather long recurved spine; uniform gray, first dorsal black edged.

*Trachinus cornutus* Valenciennes.

Family NOTOTHENIIDAE

Nototheniids

a<sup>1</sup>. Two or 3 lateral lines; maxillary usually extending below eye; pectoral rounded or vertically truncated.

b<sup>1</sup>. Teeth usually in bands, but sometimes irregularly biserial or triserial, with some teeth of outer series enlarged and canine-like; snout not much longer than eye; usually less than 100 scales in lateral line. **Notothenia** Richardson.



b<sup>2</sup>. Teeth above biserial, outer row enlarged, spaced, canine-like; group of stronger teeth on each premaxillary; lower teeth uniserial, spaced, canine-like; snout much longer than eye; scales 110 to 120 scales in longitudinal series.

**Dissostichus** Smitt.

*Dissostichus eleginoides* Smitt.

a<sup>2</sup>. One lateral line; maxillary not reaching eye in adult; pectoral very obliquely truncated, upper rays longest.

**Eleginops** Gill.

*Eleginops maclovinus* (Valenciennes).

**Notothenia** Richardson.

In my «Fishes of Chile» the species there listed are arranged alphabetically. In the plan below they are arranged according to Norman (1937).

a<sup>1</sup>. Opercles fully scaled.

b<sup>1</sup>. Tubular scales 60 to 65 in upper lateral line; lower jaw more or less strongly projecting; 9 or 10 rows of scales between eyes; 2 lateral lines; many teeth in jaws spaced, canine-like.

*Notothenia canina* Smitt.

b<sup>2</sup>. Tubular scales 41 to 55 in upper lateral line; jaws equal or lower little projecting; 3 to 8 rows of scales between eyes.

c<sup>1</sup>. Upper lateral line ends below or little behind last dorsal ray; soft dorsal variegated with small, dark spots.

d<sup>1</sup>. Lower gill rakers 20 to 25; longest dorsal spine  $1\frac{1}{2}$  in head; scales on head above roughly ctenoid; pectoral  $1\frac{1}{5}$  to  $1\frac{1}{2}$  in head. *Notothenia jordani* W. F. Thompson.

d<sup>2</sup>. Lower gill rakers 14 to 16; longest dorsal spine less than 2 in head; scales on head above smooth; pectoral  $1\frac{1}{2}$  to  $1\frac{3}{4}$  in head. *Notothenia tessellata* Richardson.

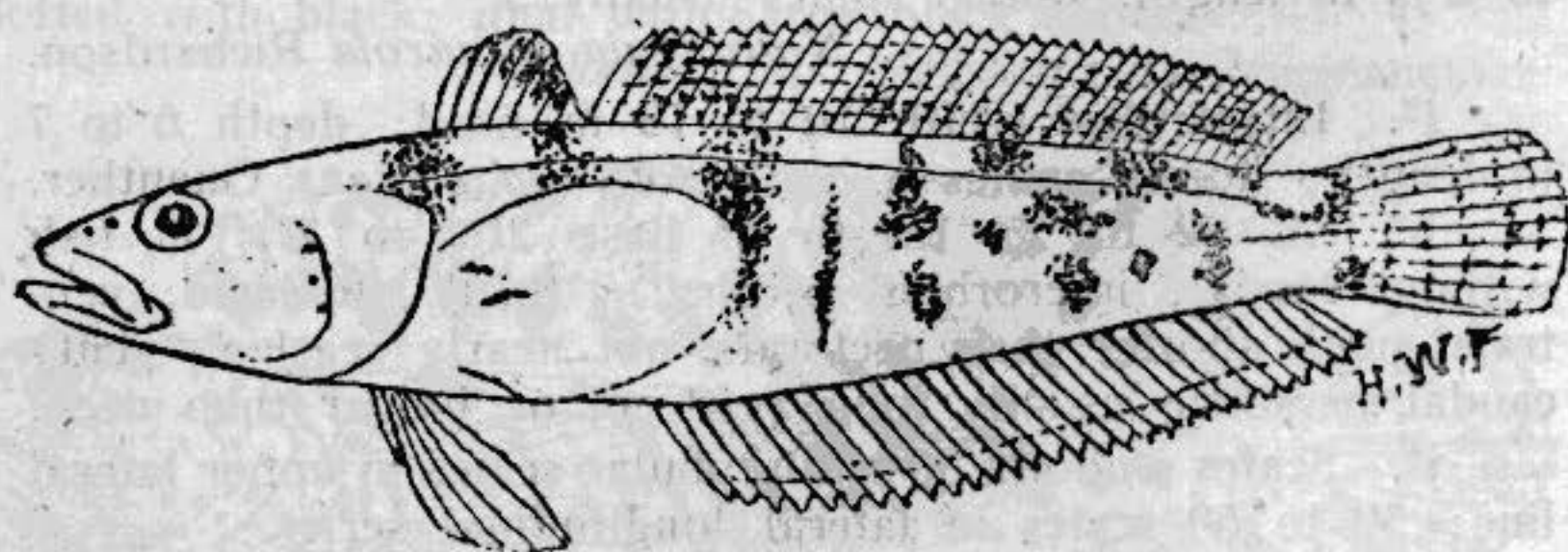


Figure 43.—*Notothenia tessellata* Richardson. From Norman.

c<sup>2</sup>. Upper lateral line extends to well beyond last dorsal ray; soft dorsal plain or with indistinct markings.



e<sup>1</sup>. D. IV or V, 34 to 37; least depth of caudal peduncle  $\frac{2}{7}$  to  $\frac{2}{5}$  length of head; eye  $4\frac{1}{3}$  to  $4\frac{1}{2}$  in head; lower gill rakers 16 to 19. *Notothenia brevicauda* Loennberg.

e<sup>2</sup>. D. VI to VIII (occasionally V), 34 to 37; least depth of caudal peduncle  $\frac{2}{7}$  to  $\frac{1}{4}$  of head.

f<sup>1</sup>. Lower gill rakers 15 to 19; interorbital width  $5\frac{4}{5}$  to  $7\frac{1}{3}$  in head; eye 4 to 5 in head; scales on head above smooth; 5 or 6 rows of scales between eyes; ventrals shorter than pectorals, not or only just reaching vent.

*Notothenia wiltoni* Regan.

f<sup>2</sup>. Lower gill rakers 14 to 16; interorbital width 7 to 8 in head; scales on head above smooth; 5 rows of scales between eyes; ventrals long as or longer than pectorals, extend to anal origin or beyond.

*Notothenia longipes* Steindachner.

b<sup>2</sup>. Tubular scales 30 to 40 in upper lateral line; jaws equal or lower little projecting.

g<sup>1</sup>. Depth  $3\frac{2}{3}$  to 4; interorbital width  $3\frac{3}{4}$  to  $4\frac{1}{2}$  in head (narrower in young); lower gill rakers 13 to 16.

*Notothenia squamiceps* Peters.

g<sup>2</sup>. Depth 4 to 5; interorbital width  $5\frac{1}{2}$  to nearly 8 in head; lower gill rakers 9 to 12.

*Notothenia sima* Richardson.

a<sup>2</sup>. Opercle only scaly on upper portion; upper surface of head naked.

h<sup>1</sup>. A. 27 to 32, length of base 2 in fish without caudal; interorbital width  $4\frac{2}{3}$  to 13 in head; ventral long as or nearly long as pectoral, extend to or nearly to vent; caudal peduncle deeper than long.

i<sup>1</sup>. Interorbital width  $4\frac{2}{3}$  to 6 in head; depth  $3\frac{2}{3}$  to  $4\frac{1}{2}$  in length; dorsal spines usually 5.

*Notothenia cornucola* Richardson.

i<sup>2</sup>. Interorbital width 10 to 13 in head; depth 6 to 7 in length; dorsal spines 6. *Notothenia elegans* Guenther.

h<sup>2</sup>. A. 22 to 25, length of base  $2\frac{1}{3}$  to  $2\frac{2}{3}$  in fish without caudal; interorbital width  $2\frac{1}{2}$  to  $3\frac{1}{2}$  in head; ventrals much shorter than pectorals, not nearly reaching vent; caudal peduncle usually long as deep, or longer than deep.

j<sup>1</sup>. Scales smooth, 36 to 46 tubular scales in upper lateral line; 50 to 60 scales in lateral longitudinal series.

*Notothenia macrocephala* Guenther.

j<sup>2</sup>. Scales ctenoid, 51 to 56 tubular scales in upper lateral line; 67 to 73 scales in lateral longitudinal series.

*Notothenia microlepidota* Hutton.



Family BOVICHTIDAE (= BOVICTIDAE)  
Toritos

a<sup>1</sup>. Head and body naked; opercle with very strong spine and an upper extension which articulates with the post-temporal; posterior anal rays enlarged and partly free.

**Bovichtus** Valenciennes.

*Bovichtus chilensis* Regan.

(= *Bovictus chilensis* Regan).

a<sup>2</sup>. Head and body fully scaled; opercle with weak spine; soft dorsal and anal rays unbranched; lower pectoral rays simple, more or less thickened and partly free terminally.

**Cottoperca** Steindachner.

*Cottoperca gobio* (Guenther).

Family CLINIDAE

a<sup>1</sup>. Dorsal fins 3, composed chiefly of spines and with only a few posterior rays.

b<sup>1</sup>. A single dorsal fin.

c<sup>1</sup>. Teeth uniserial; D. XXXVI or XXXVII, 4 to 6; A. II, 20 to 24. **Myxodes** Cuvier.

d<sup>1</sup>. Anterior dorsal spines subequal with those following; brownish green with some whitish spots on body and on vertical fins. *Myxodes viridis* Valenciennes.

d<sup>2</sup>. Three anterior dorsal spines longer than others; grayish, spotted with blackish; dorsal with 8 blackish spots.

*Myxodes cristatus* Valenciennes.

c<sup>2</sup>. Teeth in bands in jaws; palate toothed.

e<sup>1</sup>. D. spines XXIV to XXVI.

f<sup>1</sup>. Eyes lateral.

**Auchenionchus** Gill.

g<sup>1</sup>. D. XXIV, 10; A. II, 21; depth 5; head 4; short fringed tentacle posteriorly above orbit; nuchal tentacle very short, papillate; yellowish, dotted with brownish black, forming 4 large spots on dorsal base; inside mouth and tongue dotted with black; anal with large black spots.

*Auchenionchus variolosus* (Valenciennes).

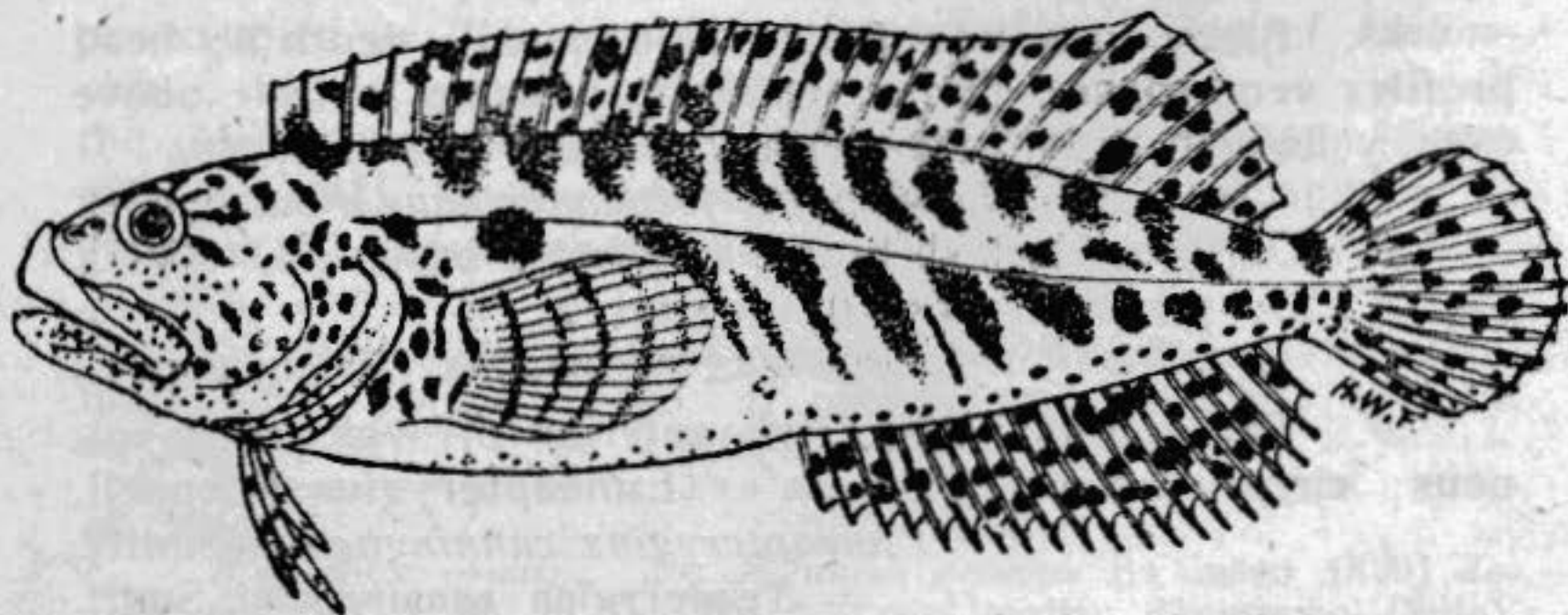


Figure 44.—*Auchenionchus variolosus* (Valenciennes). From Valenciennes 1836.



g<sup>2</sup>. D. XXV, 10 to 12; A. II, 21 (20).

h<sup>1</sup>. Depth  $6\frac{1}{2}$ ; small fringed tentacle above orbit, and very minute one at nostril and neck; brown, back, vertical fins and pectorals dotted with red.

*Auchenionchus guttulatus* (Valenciennes).

= *Labrisomus guttulatus* (Valenciennes).

h<sup>2</sup>. Depth  $4\frac{3}{5}$ ; no tentacles or cirri; black, except throat and belly; throat between pectorals and opercles marked with black spots and belly reticulated with black.

*Auchenionchus niger* (Philippi)

= *Labrisomus niger* (Philippi).

g<sup>3</sup>. D. XXVI, 11 or 12; A. II, 23 or 24; depth 5; head 4.

i<sup>1</sup>. Head above covered with warts; no orbital tentacle, minute one on nostril and neck; brownish, marbled with darker.

*Auchenionchus microcirrhis* (Valenciennes).

= *Labrisomus microcirrhis* (Valenciennes).

i<sup>2</sup>. Above eye 8 short bristles; short fringed tentacle on side of neck, another at nostril; blackish-brown, indistinctly spotted with black.

*Auchenionchus crinitus* (Jenyns).

f<sup>2</sup>. Eyes close together, interorbital space narrow.

**Calliclinus Gill.**

*Calliclinus geni-guttatus* (Valenciennes).

e<sup>2</sup>. D. spines XVI or XVII (XXI).

**Labrisomus Swainson.**

j<sup>1</sup>. Color variable, with brown or black spots, or dark cross-bands.

k<sup>1</sup>. No black white-edged caudal blotch.

l<sup>1</sup>. D. XVII or XIX, 12 or 13; A. II, 18 to 20; dermal flaps on nape well developed; eye less than snout; depth 3 to  $3\frac{3}{5}$ .

*Labrisomus philippi* (Steindachner).

l<sup>2</sup>. D. XXI, 12; A. II, 19; no dermal flaps at nape; eye greater than snout; depth  $4\frac{1}{4}$ .

*Labrisomus coventryi* Fowler.

k<sup>2</sup>. Black white-edged blotch on caudal; depth 4; head profiles very convex above; moderate palmate tentacle above eye; yellowish gray, sides with 2 obscure brown spots.

*Labrisomus fernandezianus* (Guichenot).

j<sup>2</sup>. Uniform blackish brown or grayish brown; D. XVIII, 11; A. 23; pectoral rays 10; ventral 2.

*Labrisomus peruvianus* (Valenciennes).

a<sup>2</sup>. Three dorsal fins, two anterior of which are spinous; cirrus above orbit.

**Enneapterygius Rueppell.**

*Enneapterygius cunninghami* (Smitt).

= *Tripterygion cunninghami* Smitt.



Family **BLENNIIDAE**  
Blennies

a<sup>1</sup>. **Blenniinae**. Teeth fixed, in one row in each jaw.

b<sup>1</sup>. Gill opening reduced to small, short slit above upper angle of pectoral base. **Petroscirtes** Rueppell.

*Petroscirtes biocellatus* (Valenciennes).

b<sup>2</sup>. Gill opening wide, typically forming fold over or across throat. **Blennius** Linnaeus.

D. XIII, 16 to 18; A. 20 or 21; interorbital width  $\frac{1}{2}$  of head; short, slightly palmate filament long as eye; color yellowish, clouded with brown; 3 longitudinal dark spots below posterior half of dorsal, subocellated, last largest and most distinct; from median line 8 or 9 descending bands, alternating with oblong lanceolate spots; large black spot at first 3 dorsal spines; dorsal dotted with brown; throat with 3 angulated dark bands.

*Blennius riverosi* new species.

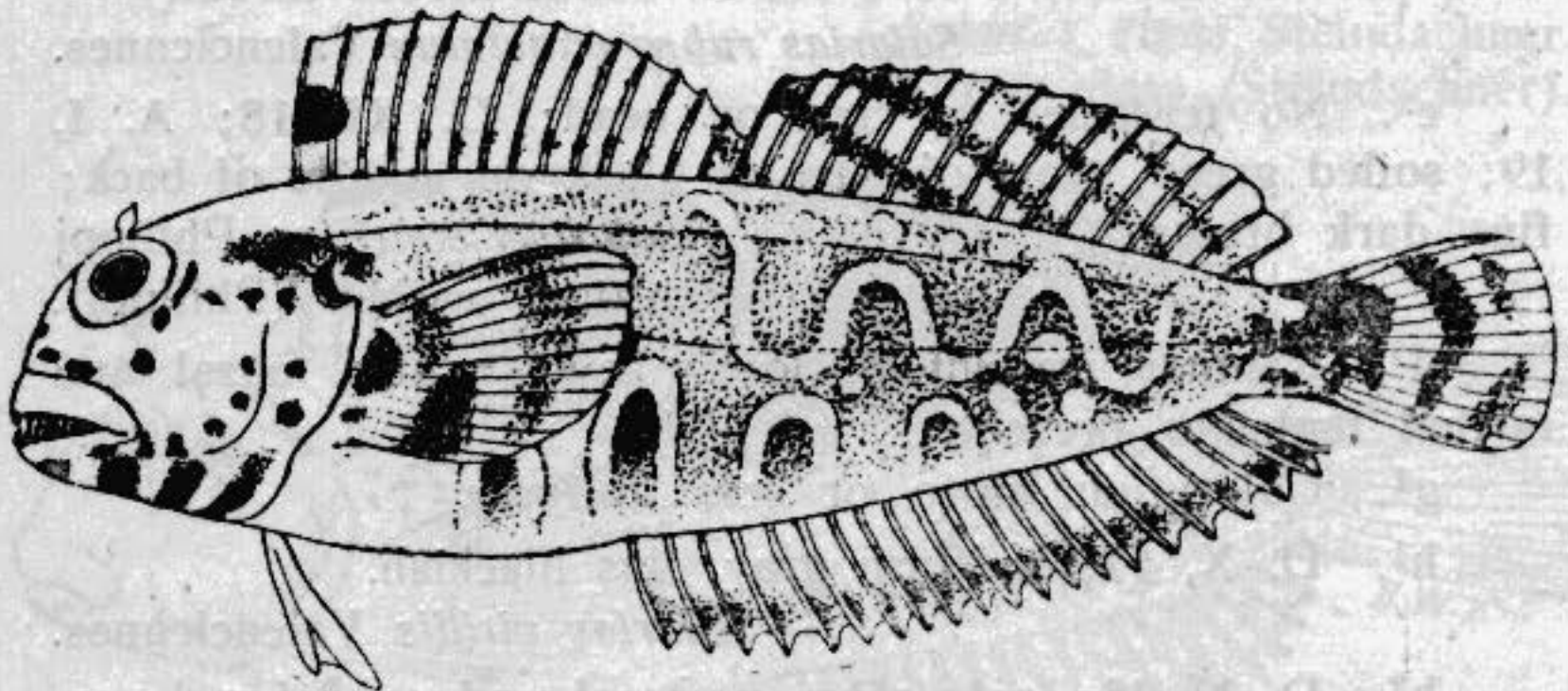


Figure 45.—*Blennius riverosi* new species. From Jenyns 1842.

The above new name for this fish is based on the two citations<sup>1)</sup> of Jenyns, both of which specific names are preoccupied in *Blennius*. The subsequent inclusion of *Blennechis fasciatus* Jenyns in *Petroscirtes* by Guenther, in view of the dentition as shown by Jenyns, appears erroneous. Jenyns gives D. XIII, 16 (his figure showing D. XIV, 16) and the A. given as 20 (figure shows 21).

(1) *Blennechis fasciatus* (preoccupied by *Blennius fasciatus* Bloch 1786) Jenyns, Zool. Voy. Beagle, vol. 4, Fish., 1842, p. 84, pl. 17, fig. 1 (type locality, Concepción, Chile).

*Petroscirtes fasciatus* Fowler, Rev. Chilena Hist. Nat., 1941-43 (1945), p. 150 (compiled).

*Blennechis ornatus* (not *Blennius ornatus* Swainson 1839) Jenyns, op. cit., p. 85, pl. 17, fig. 2 (type locality, Coquimbo, Chile).



(For Prof. Francisco Riveros Zuñiga, Director of the Revista Chilena de Historia Natural).

a<sup>2</sup>. **Salariinae.** Teeth small, numerous, movable or flexible and placed on gums. **Salarias** Cuvier.

d<sup>1</sup>. No canines.

e<sup>1</sup>. Tentacles or cirri on head.

f<sup>1</sup>. D. XIII, 16, fin hardly notched; A. 16; depth  $4\frac{1}{3}$ ; 5 round blotches across back, narrowing at top of side, then widen to form circular area at upper half of side; narrow lines from middle of gape, below and posteriorly from eye, form v-shaped marks, with apex posterior; lower half of pectoral black; narrow dark basal cross line on caudal.

*Salarias chilensis* Clark.

f<sup>2</sup>. D. XI, 17, deeply notched; A. 20; depth 5; brown, marbled with black and dotted with reddish; black spot on front part of dorsal; 2 or 3 brown bands across throat.

*Salarias rubro-punctatus* Valenciennes.

e<sup>2</sup>. No tentacles or cirri on head; D. XI, 18; A. I, 19; soiled green, more obscure or black on middle of back; fins dark brown.

*Salarias concolor* Philippi

= *Alticus concolor* (Philippi).

d<sup>2</sup>. Canines present in lower jaw; ocular, nasal and nuchal tentacles present.

g<sup>1</sup>. Coloration more or less uniform.

h<sup>1</sup>. D. X, 17; uniform gray, fins blackish.

*Salarias viridis* Valenciennes.

h<sup>2</sup>. D. X, 18; pale olive, pectoral and caudal pale canines not mentioned.

*Salarias modestus* Philippi

= *Alticus modestus* (Philippi).

g<sup>2</sup>. Coloration variegated; D. XI or XII, 17 or 18, more or less notched; A. I or II, 18 or 19.

i<sup>1</sup>. Ten dark brown blotches along bases of dorsal; 6 dark blotches along middle of side of tail; small dark spot behind eye; anal with dark subterminal band.

*Salarias petersoni* Fowler.

i<sup>2</sup>. Brown, dotted with red; fins blackish.

*Salarias variolatus* Valenciennes.



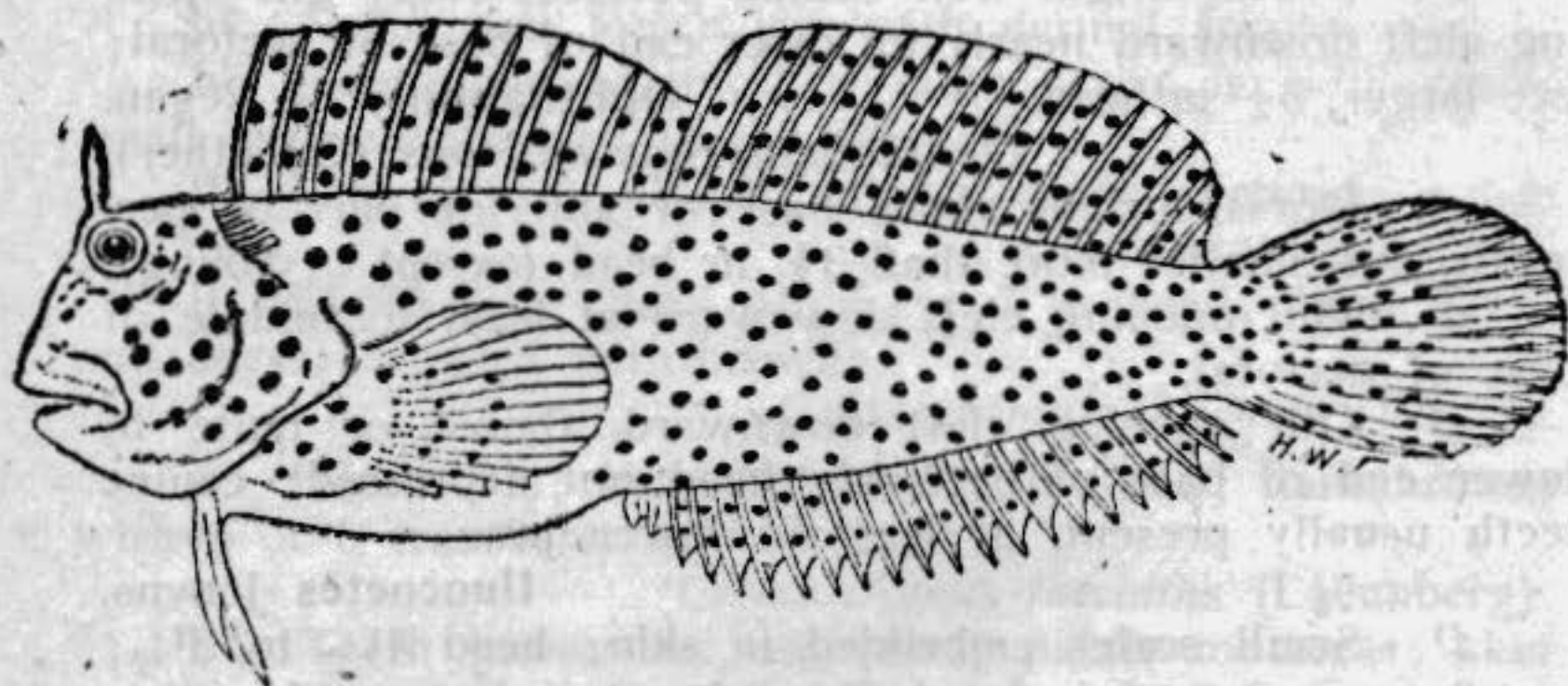


Figure 46.—*Salaria variolatus* Valenciennes. From Valenciennes 1836.

i<sup>3</sup>. Body with fine short darker vermiculated marks; dorsals uniformly dark above; anal darker, tips of rays paler.

*Salaria gigas* Steindachner.

= *Alticus gigas* (Steindachner).

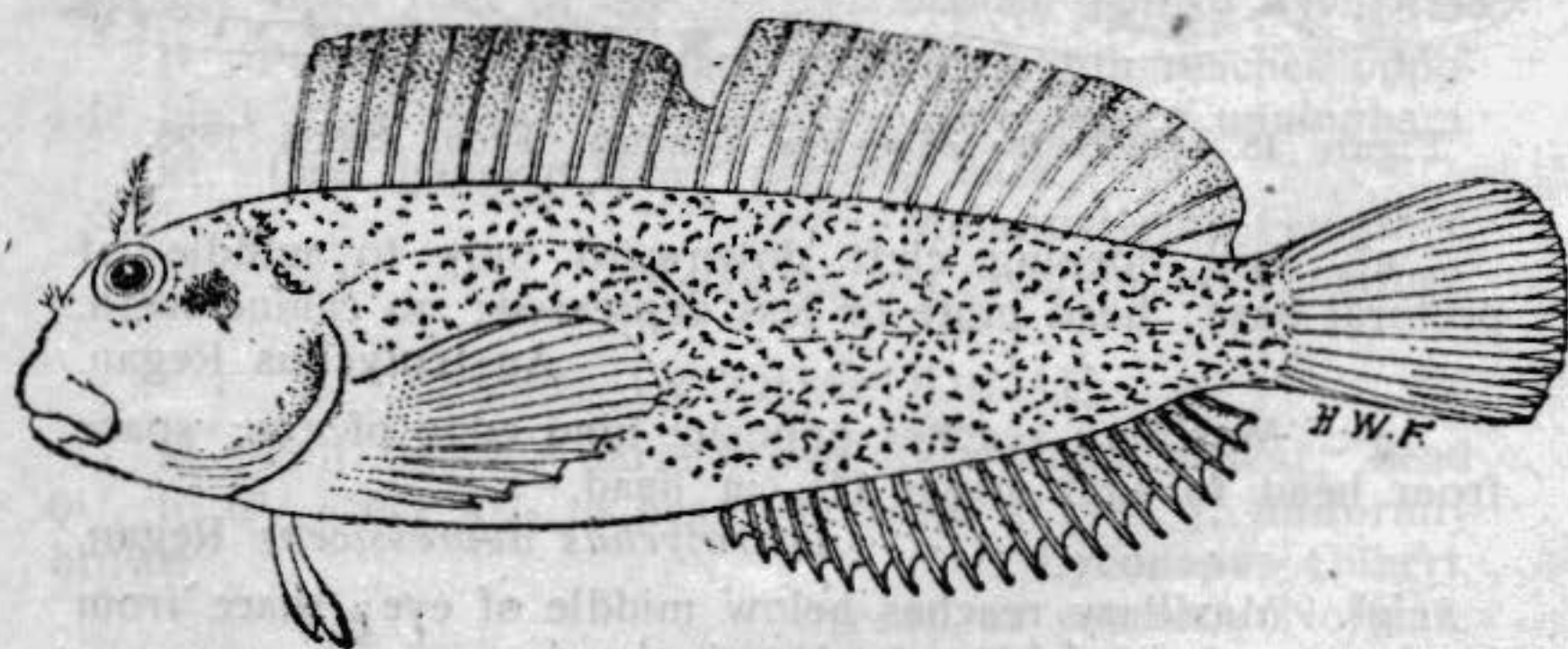


Figure 47.—*Salaria gigas* Steindachner. From Steindachner 1898.

i<sup>4</sup>. Dark band along dorsal bases; broad dark band from eye and upper part of snout, narrows backward to caudal base medially.

*Salaria eques* (Steindachner).

= *Alticus eques* (Steindachner).

#### Family ZOARCIDAE

##### Wolf Eels

a<sup>1</sup>. Zoarcinae. Ventral fins present.

b<sup>1</sup>. Snout and lower jaw without fringes.



c<sup>1</sup>. Dorsal origin well behind pectoral base; gill opening cleft downward nearly to lower end of base of pectoral; eye larger,  $3\frac{1}{2}$  in head.

**Ophthalmolycus** Regan.

*Ophthalmolycus macrops* (Guenther).

c<sup>2</sup>. Dorsal origin above base or anterior part of pectoral; eye smaller more than  $3\frac{1}{2}$  in head (except in young).

d<sup>1</sup>. Gill opening cleft downward at least to middle of base of pectoral.

e<sup>1</sup>. Gill opening cleft downward almost or quite to lower end of base of pectoral; head not depressed; canine teeth usually present, at least in lower jaw.

**Iluocoetes** Jenyns.

f<sup>1</sup>. Small scales embedded in skin; head  $4\frac{1}{2}$  to  $5\frac{1}{2}$ ; eye 3 (young) to 6 in head; 1 or 2 pairs of upper front canines.

*Iluocoetes fimbriatus* Jenyns.

f<sup>2</sup>. No visible scales; head  $5\frac{1}{2}$  to 6; eye 6 to 7 in head; no upper canines.

*Iluocoetes elongatus* (Smitt).



Figure 48.—*Iluocoetes elongatus* (Smitt). From Smitt 1898.

e<sup>2</sup>. Gill opening cleft downward only to middle of pectoral base; head more or less depressed; no canine teeth.

**Austrolychus** Regan.

g<sup>1</sup>. Maxillary reaches opposite hind edge of eye; space from head to anal origin  $1\frac{3}{4}$  in head.

*Austrolychus depressiceps* Regan.

g<sup>2</sup>. Maxillary reaches below middle of eye; space from head to anal origin  $1\frac{1}{3}$  to  $1\frac{1}{2}$  in head.

*Austrolychus laticinctus* (Berg).



Figure 49.—*Austrolychus laticinctus* (Berg), From Berg 1895.

d<sup>2</sup>. Gill opening small, above pectoral; head not depressed.

**Phucocoetes** Jenyns.

*Phucocoetes latitans* Jenyns.



b<sup>2</sup>. Snout and lower jaw with dermal fringes.

h<sup>1</sup>. Teeth conical, in 2 or more series in both jaws; small scales embedded in the skin.

i<sup>1</sup>. Gill opening almost entirely above pectoral; palate toothless. **Crossostomus** Lahille.

j<sup>1</sup>. Depth  $6\frac{3}{5}$ ; head  $6\frac{3}{5}$ ; eye 7 in head; head, body and dorsal marbled with brown.

*Crossostomus chilensis* (Regan).

j<sup>2</sup>. Depth  $7\frac{1}{2}$ ; head 5; eye  $5\frac{3}{5}$  in head; dark brown, with 5 or 6 transverse whitish bars.

*Crossostomus fasciatus* (Loennberg).

h<sup>2</sup>. Teeth incisor-like, uniserial; palate toothless; skin naked; gill opening cleft downward to middle of pectoral base.

**Platea** Steindachner.

*Platea insignis* Steindachner.

a<sup>2</sup>. **Myneainae** new. No ventral fins.

k<sup>1</sup>. Gill opening cleft downward to middle of pectoral base. **Maynea** Cunningham.

l<sup>1</sup>. Pectoral over 2 in head; gape of mouth reaches opposite front part of eye. *Maynea puncta* (Jenyns).

l<sup>2</sup>. Pectoral  $1\frac{4}{5}$  in head; gape of mouth reaches opposite hind edge of eye. *Maynea patagonica* Cunningham.

k<sup>2</sup>. Gill opening above pectoral base.

**Melanostigma** Guenther.

*Melanostigma gelatinosum* Guenther.

#### Family LYCODAPODIDAE

a<sup>1</sup>. Gill opening large; pseudobranchiae absent; head  $6\frac{1}{4}$  to  $6\frac{3}{4}$ ; eye  $4\frac{1}{2}$  in head; pectoral  $2\frac{3}{5}$  to 3; uniformly brown. **Lycodapus** Gilbert.

*Lycodapus australis* Norman.

a<sup>2</sup>. Gill opening very narrow; pseudobranchiae present; head 7; eye 6 in head; pectoral 2; young with 11 broad cross bands, lighter in middle and darker on edges; with age cross bands broken into irregularly reticulated lines, passing from one band more or less to another.

**Gymnelis** Reinhardt.

*Gymnelis pictus* Guenther.

#### Family OPHIDIIDAE

Cusk Eels

**Genypterus** Philippi

a<sup>1</sup>. Depth  $6\frac{2}{3}$  to  $9\frac{1}{2}$ ; head  $4\frac{1}{2}$  to 5; interorbital width  $6\frac{1}{2}$  to  $8\frac{1}{2}$  in head.



b<sup>1</sup>. Depth  $7\frac{1}{2}$  to  $9\frac{1}{2}$ ; eye 5 to 7 in head; yellowish, back and upper parts of sides marbled with brown.

*Genypterus blacodes* (Schneider).

b<sup>2</sup>. Depth  $6\frac{2}{3}$  to  $7\frac{1}{2}$ ; eye 7 to  $7\frac{3}{4}$  in head; back and upper parts of sides blackish, with some rather small and irregularly arranged white spots.

*Genypterus chilensis* (Guichenot).

a<sup>2</sup>. Depth 6 to  $6\frac{1}{2}$ ; head 4; interorbital width  $5\frac{1}{2}$  in head; whole body chocolate brown to blackish, covered with large white hieroglyphic-like markings.

*Genypterus maculatus* (Tschudi).



Figure 50.—*Genypterus maculatus* (Tschudi). From Tschudi 1846.

## Order XENOPTERYGII

Clingfishes

### Family GOBIESOCIDAE

Clingfishes

#### *Gobiesox* Lacépède

Clingfishes

a<sup>1</sup>. **Sicayases.** Both jaws with a single series of incisors.

b<sup>1</sup>. D. 10; A. 7; premaxillary with 8 to 10 teeth, vertically implanted, the 2 outer on each side small and conical, others flat and cutting; 4 lower horizontal cutting teeth, laterally with 3 small incisors.

*Gobiesox sanguineus* (Mueller and Troschel).

b<sup>2</sup>. D. 7; A. 6; both jaws with incisors, upper somewhat bent outwards, lower subhorizontal; one or several canine like posterior lateral teeth each side.

*Gobiesox chilensis* (Brisout de Barneville).

a<sup>2</sup>. **Gobiesox.** Several series of teeth in upper jaw, strong, somewhat crowded in front, bluntly conical, with minute ones behind; below 6 subhorizontal incisors anteriorly, longer than other teeth.

*Gobiesox marmoratus* Jenyns.



Order **PLECTOGNATHI**

## Plectognathous Fishes

a<sup>1</sup>. **SCLERODERMI**. Jaws with distinct teeth; body with scales or distinct movable plates or incased in movable carapace of hexagonal plates, jaws, bases of fins, and tail only free.

b<sup>1</sup>. Body enclosed in immovable carapace of strong hexagonal plates, only jaws, bases of tail and fins free; no spinous dorsal.

Family **OSTRACIIDAE**.

**Ostracion** Linnaeus.

*Ostracion cubicus* Linnaeus.

a<sup>2</sup>. **GYMNODONTES**. Jaws each modified into sort of beak, each jaw with an enamel-like covering and without distinct teeth; scales rhomboid or spine like, with root-like insertions; spinous dorsal absent.

b<sup>1</sup>. Caudal region normal, caudal peduncle developed.

Family **DIODONTIDAE**.

**Diodon** Linnaeus.

*Diodon hystrix* Linnaeus.

b<sup>2</sup>. Caudal region aborted, body truncated behind dorsal and anal; jaws without median suture.

Family **MOLIDAE**.

**Mola** Koelreuter.

*Mola mola* (Linnaeus).



## APPENDIX

In the introduction to my «Fishes of Chile» I included a number of species not actually recorded from the confines of Chile, chiefly of Sub-Antarctic origin or affiliation, which have been excluded in the preceding «Analysis». Also in this exclusion are a number of references which I have been unable to trace or verify, besides others deemed of doubtful status. These are cited below with the page indicating location in my above mentioned work.

<i>Cetorhinus maximus</i> (Gunner) .....	p. 15
<i>Hypoprion heterodus</i> Philippi .....	p. 17
„ <i>isodus</i> Philippi .....	p. 17
<i>Centroscyllium fabricii</i> (Reinhardt) .....	p. 23
<i>Echinorhinus brucus</i> (Bonnaterre) .....	p. 25
<i>Discopyge chilensis</i> (Guichenot) .....	p. 27
<i>Raja doello-juradoi</i> Pozzi .....	p. 28
„ <i>maclovina</i> Norman .....	p. 28
„ <i>multispinis</i> Norman .....	p. 29
„ <i>scaphiops</i> Norman .....	p. 29
„ <i>albomaculata</i> Norman .....	p. 29
„ <i>griseocauda</i> Norman .....	p. 30
<i>Psammobatis brevicaudatus</i> Cope .....	p. 33
<i>Stolephorus alburnus</i> Kner and Steindachner .....	p. 5
<i>Engraulis dentex</i> Guichenot .....	p. 6
<i>Haplochiton fasciatus</i> Philippi .....	p. 13
„ <i>lata</i> Philippi .....	p. 13
„ <i>amblycephalus</i> Philippi .....	p. 13
„ <i>palenae</i> Philippi .....	p. 13
„ <i>landbeckii</i> Philippi .....	p. 13
<i>Pygidium quechuorum</i> Steindachner .....	p. 28
<i>Micromesistius australis</i> Norman .....	p. 34
<i>Merluccius hubbsi</i> Norman .....	p. 37
<i>Mancopsetta maculata</i> (Guenther) .....	p. 46
<i>Melamphaes nordenskjoeldii</i> Loennberg .....	p. 46
<i>Protocampus hymenolomus</i> (Richardson) .....	p. 49
<i>Mugil petrosus</i> Guichenot .....	p. 58
„ <i>plumieri</i> Guichenot .....	p. 58
<i>Gasterochisma melampus</i> Richardson .....	p. 59
<i>Seriolella pertusa</i> Philippi .....	p. 67
<i>Perca concolor</i> Philippi .....	p. 73
„ <i>pacia</i> Philippi .....	p. 73
<i>Alphestes ajer</i> (Bloch) .....	p. 76
<i>Centropristis carinatus</i> Philippi .....	p. 79



<i>Corvina albida</i> Philippi .....	p. 87
„ <i>cornuta</i> Philippi .....	p. 87
„ <i>carinata</i> Philippi .....	p. 87
<i>Umbrina fernandeziana</i> Philippi .....	p. 89
„ <i>argentata</i> Philippi .....	p. 89
<i>Scioena argentea</i> Philippi .....	p. 89
<i>Corvina trispinosa</i> Guichenot .....	p. 90
<i>Caulolatilus princeps</i> (Jenyns) .....	p. 91
<i>Chilodactylus reedii</i> Philippi .....	p. 93
„ <i>gracilis</i> Philippi .....	p. 93
„ <i>griseus</i> Philippi .....	p. 93
<i>Scorpius obscurus</i> Philippi .....	p. 97
<i>Sebastes macrophthalmus</i> Philippi .....	p. 105
<i>Bunocottus apus</i> Xner .....	p. 110
<i>Bodianus diplotaenius</i> (Gill) .....	p. 117
<i>Graus fernandezianus</i> Philippi .....	p. 119
<i>Labrus guttatus</i> Delfin .....	p. 119
<i>Leptojulius bimaculatus</i> Schmeltz .....	p. 120
<i>Pseudojulis modestus</i> Schmeltz .....	p. 120
<i>Gobius chilensis</i> Philippi .....	p. 121
<i>Notothenia macrophthalma</i> Norman .....	p. 130
„ <i>ramsayi</i> Regan .....	p. 130
„ <i>trigramma</i> Regan .....	p. 133
<i>Clinus nuchipinnis</i> Schmeltz .....	p. 148
„ <i>delalandii</i> Schmeltz .....	p. 148
„ <i>magallanicus</i> Philippi .....	p. 148
<i>Pogonilycus elegans</i> Norman .....	p. 159
<i>Maynea brevis</i> Norman .....	p. 161
<i>Melanostigma microphthalmus</i> Norman .....	p. 162

## ERRATA TO FISHES OF CHILE 1945.

## Part 1.

- p. 3 Orden Amphioxi, read Order Amphioxi.  
 p. 4 Polistostrema decatrema (Regan), read Homea decatrema (Regan).

## Part 2.

- p. 16 Family Ophichthyidae, read Family Ophichthidae.  
 p. 16 Ophichthys ater Peters, read Ophichthus ater Peters.  
 p. 21 Add figure legend Cheirodon galsudae Eigenmann.  
 p. 22 „ „ „ Diplomyste chilensis (Molina).  
 p. 24 Family Nematogenyidae, read Nematogenyidae.  
 p. 24 Add figure legend Nematogenys inermis (Guichenot).  
 p. 25 „ „ „ Hatcheria bullocki Fowler.  
 p. 26 „ „ „ Pygidium areolatum (Valenciennes)



- p. 32 Transfer figure of *Coryphaenoides holotrachys* (Guenther), where it is wrongly named, to p. 33 under *Coelorhynchus fasciatus* (Guenther).
- p. 34 Add figure legend *Macruroplus pudens* (Gilbert and Thompson).
- p. 37 Add figure legend *Merluccius gayi* (Guichenot).
- p. 51 " " " *Cauque molinae* Fowler.
- p. 52 *Basilichtys australis*, read *Basilichthys australis*.
- p. 60 Add figure legend *Sarda chiliensis* (Cuvier).
- p. 61 Family *Gempylidae*, read *Gempylidae*.
- p. 61 Add figure legend *Thyrsites atun* (Euphrasen).
- p. 83 *Girella filiciana* Clark, read *Girella felicianae* Clark.
- p. 95 *Mendosoma lineata* Guichenot, read *Mendosoma lineatum* Guichenot.
- p. 105 *Helicolenus Lengerichi*, read *Helicolenus lengerichi*.
- p. 106 *Scorpaena Thomsoni*, read *Scorpaena thomsoni*.
- p. 107 *Congiopodus Peruvianus*, read *Congiopodus peruvianus*.
- p. 109 *Normanichthys Crockeri*, read *Normanichthys crockeri*.
- p. 111 *Agonopsis Chiloensis*, read *Agonopsis chiloensis*.
- p. 112 *Careproctus Falklandica*, read *Careproctus falklandica*.
- p. 115 *Chromis Crusma*, read *Chromis crusma*.
- p. 117 *Pimelometopon Darwini*, read *Pimelometopon darwini*.
- p. 118 *Pseudolabrus Gayi*, read *Pseudolabrus gayi*.
- p. 120 *Gobius Chiloensis*, read *Gobius chiloensis*.
- p. 127 *Notothenia Jordani*, read *Notothenia jordani*.
- p. 134 *Eleginops maclovinus Valenciennes*, read *Eleginops maclovinus* (Valenciennes).
- p. 137 *Bovictidae*, read *Bovichtidae*.
- p. 137 *Bovictus Chilensis*, read *Bovichtus chilensis*.
- p. 141 *Pinguipes Chilensis*, read *Pinguipes chilensis*.
- p. 142 *Parapercis chilensis* (Norman), read *Porteridia chilensis* (Norman).
- p. 147 *Labrisomus Coventryi*, read *Labrisomus coventryi*.
- p. 149 *Tripterygion Cunninghamsi*, read *Tripterygion cunninghamsi*.
- p. 152 *Salarias Petersoni*, read *Salarias petersoni*.
- p. 157 *Astrolycus laticinctus*, read *Austrolycus laticinctus*.
- p. 158 *Crossostomus Chilensis*, read *Crossostomus chilensis*.
- p. 160 *Maynea Patagonica*, read *Maynea patagonica*.
- p. 163 *Cataetyx Messieri*, read *Cataetyx messieri*.
- p. 164 *Genypterus Chilensis*, read *Genypterus chilensis*.