

II.—A REVIEW OF THE FLOUNDERS AND SOLES (PLEURONECTIDÆ) OF AMERICA AND EUROPE.

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In this paper we have tried to give the synonymy of all the genera and species of flounders and soles (*Pleuronectida*) found in the waters of America and Europe, together with analytical keys by which the groups may be distinguished.

The material we have examined includes (1) all the flounders in the museum of the Indiana University, which contains a large representation of the species found on our Pacific coast, in the Gulf of Mexico, and in the Mediterranean; (2) much, but not all, of the material contained in the United States National Museum, more especially the specimens collected by Dr. Jordan and by Dr. Gilbert; and (3) all the flounders contained in the Museum of Comparative Zoology, at Cambridge, Mass. This museum is rich in South American forms, the collections made by Professor Agassiz, Dr. Steindachner, and others for this museum being very extensive. Only the collections in the Indiana University have been studied by the junior author; for all statements regarding other specimens, and, in general, for everything said regarding the South American species, the senior author is responsible. We are under special obligations to Prof. Alexander Agassiz, director of the Museum of Comparative Zoology, and to Mr. Samuel Garman, curator of the fishes, for many courtesies in connection with our studies in that museum.

We regard the order of *Heterosomata* ("flat-fishes," with both eyes on the same side of the head) as constituting a single family, *Pleuronectida*. We find ourselves unable to separate the soles as a distinct family from the flounders. The characters which mark them as a group seem no more important than those which set off one subfamily of flounders from another.

The group of "*Bibroniida*" recently recognized by some of the Italian ichthyologists as a separate family ("*Bibronidi*") is composed entirely of larval forms in the early stages of their development. In this condition the eyes are symmetrical and the body translucent. Several generic names have been given to these peculiar forms (*Peloria*, *Bibronia*, *Coccolus*, *Charybdia*, *Bascanius*, *Delothyris*), but, of course, these genera can have no permanent place in the system. *Peloria* has been shown by Dr. Emery to be the young of *Platophrys* (*Rhomboidichthys*). The others seem to belong to the *Cynoglossina* or to some allied group, but we are not yet certain as to the correct identification of any of them.

We recognize among the *Pleuronectida* seven subfamilies—*Hippoglossina*, *Pleuronectina*, *Samarina*, *Platessina*, *Oncopterina*, *Soleina*, and *Cynoglossina*. The *Samarina* and *Oncopterina* are all of recent discovery. The other groups correspond exactly to the five "subgenera" (*Hippoglossus*, *Rhombus*, *Platessa*, *Solea*, and *Plagusia*) recognized by Cuvier. These subfamilies are natural groups and are in most cases easily distinguished, although some few aberrant genera exist which serve as links joining one group to another. Thus *Isopsetta* of the *Platessina* is certainly a near ally of *Psettichthys*, which is as certainly a genuine member of the *Hippoglossina*.

The *Hippoglossina* and the *Platessina* are largely arctic in their distribution, few of the former group and none of the latter extending into the tropics. The *Oncopterina* seem to take the place of the *Platessina* in antarctic waters, but the species of this group are few in number. The *Pleuronectina* and the soles are, on the other hand, essentially warm-water fishes, their representatives in the north being comparatively few. The *Samarina* are few in number and belong to the East Indian fauna.

As the tropical *Hippoglossina* and all the *Pleuronectina* are sinistral species, the eyes and color being on the left side of the body, it follows that the tropical flounders are nearly all left-sided species, while those of arctic and antarctic waters are chiefly dextral species, the eyes and color on the right.

Still more curious is the relation between the number of vertebræ and the geographical distribution of the various species.

It has been already noticed by Dr. Günther and others that in some groups of fishes northeru representatives have the number of vertebræ increased. In no group is this more striking than in the flounders, as the following table showing the numbers of the vertebræ in various species will clearly show. The numbers inclosed in brackets are copied from Dr. Günther; the others represent our own count of specimens contained in the museum of the Indiana University.

Numbers of vertebræ in flounders.

I.—HIPPOGLOSSINÆ.

<i>Hippoglossus hippoglossus</i>	16 + 34 = 50
<i>Atheresthes stomias</i>	12 + 37 = 49
<i>Hippoglossoides platessoides</i>	13 + 32 = 45
<i>Isopsetta exilis</i>	11 + 34 = 45
<i>Isopsetta jordani</i>	11 + 32 = 43
<i>Psettichthys melanostictus</i>	11 + 29 = 40
<i>Paralichthys oblongus</i>	11 + 30 = 41
<i>Paralichthys dentatus</i>	10 + 30 = 40
<i>Paralichthys lethostigma</i>	10 + 27 = 37
<i>Paralichthys albigutta</i>	10 + 27 = 37
<i>Paralichthys californicus</i>	10 + 25 = 35
<i>Xystreurus liolepis</i>	12 + 25 = 37
<i>Ancylosetta quadrocellata</i>	9 + 26 = 35

II.—PLEURONECTINÆ.

<i>Monolea sessilicauda</i>	[43]
<i>Lepidorhombus whiffiagonis</i>	[11 + 30 = 41]
<i>Citharichthys sordidus</i>	11 + 29 = 40
<i>Platophrys lunatus</i>	9 + 30 = 39
<i>Arnoglossus laterna</i>	10 + 28 = 38
<i>Arnoglossus grohmanni</i>	10 + 28 = 38
<i>Zengopterus punctatus</i>	[12 + 25 = 37]
<i>Platophrys ocellatus</i>	10 + 27 = 37
<i>Pleuronectes maculatus</i>	11 + 25 = 36
<i>Pleuronectes rhombus</i>	12 + 24 = 36
<i>Syacium papillosum</i>	11 + 25 = 36
<i>Citharichthys arctifrons</i>	10 + 26 = 36
<i>Syacium micurum</i>	10 + 25 = 35
<i>Phrynorhombus regius</i>	10 + 25 = 35
<i>Citharichthys spilopterus</i>	10 + 24 = 34
<i>Citharichthys macrops</i>	10 + 24 = 34
<i>Etropus microstomus</i>	10 + 24 = 34
<i>Etropus crossotus</i>	10 + 24 = 34
<i>Azevia panamensis</i>	33
<i>Pleuronectes maximus</i>	12 + 19 = 31

.III.—PLATESSINÆ.

<i>Glyptocephalus zachirus</i>	13 + 52 = 65
<i>Glyptocephalus cynoglossus</i>	[58]
<i>Microstomus pacificus</i>	12 + 40 = 52
<i>Microstomus kitt</i>	[13 + 35 = 48]
<i>Parophrys vetulus</i>	11 + 33 = 44
<i>Platessa platessa</i>	[14 + 29 = 43]
<i>Isopsetta isolepis</i>	10 + 32 = 42
<i>Lepidopsetta bilineata</i>	11 + 29 = 40
<i>Limanda limanda</i>	[40]
<i>Liopsetta glacialis</i>	13 + 27 = 40
<i>Pleuronichthys decurrens</i>	14 + 26 = 40
<i>Pleuronichthys verticalis</i>	13 + 25 = 38
<i>Platessa glabra</i>	11 + 26 = 37
<i>Platessa flesus</i>	[12 + 24 = 36]
<i>Pseudopleuronectes americanus</i>	10 + 26 = 36
<i>Hypsopsetta guttulata</i>	11 + 24 = 35
<i>Platichthys stellatus</i>	12 + 23 = 35

IV.—SOLEINÆ.

<i>Brachirus zebra</i>	[8+41 = 49]
<i>Solea solea</i>	9+40 = 49
<i>Solea kleini</i>	10+37 = 47
<i>Solea aurantiaca</i>	[46]
<i>Monochirus ocellatus</i>	9+28 = 37
<i>Monochirus luteus</i>	8+29 = 37
<i>Monochirus hispidus</i>	9+25 = 34
<i>Achirus fasciatus</i>	8+20 = 28
<i>Achirus inscriptus</i>	9+19 = 28

V.—CYNOGLOSSINÆ.

<i>Symphurus atricauda</i>	10+42 = 52
<i>Symphurus nigrescens</i>	9+40 = 49
<i>Symphurus plagiusa</i>	9+38 = 47

The subdivision of the flounders into genera leaves room for considerable variety of opinion. Most of the species are well defined and easily recognized, but they do not fall readily into generic groups unless we regard almost every well-marked species as the type of a distinct genus. A natural result of an attempt at sharply defining the genera is to reach what seems an extreme degree of generic subdivision. On the other hand, attempts to unite these smaller groups to form larger ones often leave these larger ones at once unnatural and ill-defined.

It will probably appear to some that the process of generic subdivision has been in this paper carried too far. It is possible that this is true, but the arrangement which we have adopted seems to bring out the relations of the different forms better than can be done by a more "conservative" view of the genera. For those who would reduce the number of groups we suggest the following list of genera as representing a not unnatural mode of arrangement.

I.—HIPPOGLOSSINÆ.

ATHERESTHES.

PLATYSOMATICHTHYS.

HIPPOGLOSSUS.

HIPPOGLOSSOIDES { *Lyopsetta*.
 { *Eopsetta*.
 { *Hippoglossoides*.

PSETTICHTHYS.

HIPPOGLOSSINA { *Hippoglossina*.
 { *Xystreureys*.

PARALICHTHYS { *Paralichthys*.
 { *Ancylosetta*.

II.—PLEURONECTIDÆ.

PHRYNORHOMBUS.

ZEUGOPTERUS.

LEPIDORHOMBUS.

CITHARUS.

PLEURONECTES { *Bothus*.
 { *Pleuronectes*.

ARNOGLOSSUS.

PLATOPHYRYS.

CITHARICHTHYS { *Syacium*.
 { *Orthopsetta*.
 { *Citharichthys*.
 { *Azevia*.
 { *Etropus*.
 { *Thysanopsetta*.

MONOLENE.

III.—PLATESSINÆ.

PLEURONICHTHYS { *Pleuronichthys*.
 { *Hypsopsetta*.

ISOPSETTA.

PLATESSA { *Parophrys.*
Inopssetta.
Lepidopssetta.
Limanda.
Pseudopleuronectes.
Platessa.
Pleuron.
Liopssetta.
Platichthys.

MICROSTOMUS.
 CYNICOGLOSSUS.

IV.—ONCOPTERINÆ.

ONCOPTERUS.

V.—SOLEINÆ.

APIONICHTHYS { *Apionichthys.*
Achiropsis.

GYMNACHIRUS.

ACHIRUS { *Achirus.*
Baiostoma.

MONOCHIRUS { *Monochirus.*
Microchirus.
Quenselia.

SOLEA.
 BRACHIRUS.

VI.—CYNOGLOSSINÆ.

SYMPHURUS { *Symphurus.*
Bascanius.
Delothyris.
Charybdia.
Bibronia.
Acedia. } Larval forms.

ANALYSIS OF SUBFAMILIES OF PLEURONECTIDÆ.

- a. *Flounders*: Edge of preopercle free; mouth with developed teeth; pectoral and ventrals well developed (one pectoral* or one ventral occasionally absent).
- b. Mouth nearly symmetrical, the dentition nearly equally developed on both sides, the gape usually, but not always, wide.
- c. Ventral fins symmetrical, similar in position and in form of base, the ventral fin of the eyed side not being extended along the ridge of the abdomen. HIPPOGLOSSINÆ I.
- cc. Ventral fins unsymmetrical, dissimilar in position and usually also in form, the ventral fin of the eyed side being extended along the ridge of the abdomen. Eyes and color on the left side PLEURONECTINÆ II.†

* Both pectorals are wanting in the genus *Mancopssetta* Gill (= *Lepidopssetta* Gthr.), an antarctic member of the *Pleuronectinæ*.

† In the *Samarina*, the eyes and color are on the right side, the mouth is small but nearly symmetrical, the ventral fins are both lateral but with base somewhat prolonged, the gill-rakers are minute, and in most of the species some of the dorsal rays are filamentous and simple, resembling spines. The group, like the *Oncopterinæ*, seems to lie between *Pleuronectinæ* and *Platessinæ*. It seems to include the genera *Samaris*, *Lophoneotes*, *Pacilopssetta*, and *Nematops*, all belonging to the Indo-Pacific fauna.

bb. Mouth unsymmetrical, the jaws on the eyed side with nearly straight outline, the bones on the blind side strongly curved; teeth chiefly on the blind side.

d. Ventral fins unsymmetrical, that of the eyed side extended along the ridge of the abdomen, snout with a free ray or other appendage in connection with the first ray of the dorsal. Eyes and color on the right side.

ONCOPHRINÆ III.

dd. Ventral fins nearly or quite symmetrical, that of the eyed side with short base; eyes and color on the right side (with occasional exceptions).

PLATESSINÆ IV.

aa. Soles. Edge of preopercle adnate, usually obscured by the scales; mouth very small, much twisted toward the blind side, and with rudimentary teeth; pectoral and ventral fins generally small, occasionally obsolete.

e. Eyes on the right side, separated by a bony ridgeSOLEINÆ V.

ee. Eyes on the left side, not separated by a bony ridge....CYNOGLOSSINÆ VI.

ANALYSIS OF GENERA OF PLEURONECTIDÆ FOUND IN AMERICA AND EUROPE.

Subfamily I.—HIPPOGLOSSINÆ.

(Large-mouthed flounders with the ventral fins symmetrical.)

Mouth symmetrical, the jaws and the dentition nearly equally developed on both sides; gape usually wide, the maxillary more than one-third length of head. Lower pharyngeals narrow, usually with but one or two rows of sharp teeth; teeth in jaws usually acute. Eyes large; edge of preopercle free. Pectoral and ventral fins well developed, *the ventral fins similar in position and in form of base, the ventral fin of the eyed side not being attached along the ridge of the abdomen. Septum of gill cavity without foramen.*

a. *Vertebrae and fin-rays much increased in number* (the vertebrae about 50, the dorsal rays about 100, the anal rays about 85); body comparatively elongate; caudal fin lunate; lateral line simple; anal spine mostly obsolete. Dextral species, Arctic in distribution. (Genera allied to *Hippoglossus*.)

c. Large teeth in both jaws *arrow-shaped*, biserial, some of them depressible; upper eye with vertical range; gill-rakers short; scales deciduous, ciliated; lateral line without arch; flesh soft. Vertebrae (*stomias*) 12+37=49.ATHERETHES, 1.

cc. Large teeth not arrow-shaped, biserial above, uniserial below; scales very small, cycloid; gill-rakers long and slender; eyes strictly lateral.

d. Lateral line without anterior arch; lower pharyngeal teeth uniserial.

PLATYSOMATICHTHYS, 2.

dd. Lateral line with an interior arch; lower pharyngeal teeth biserial; vertebrae (*hippoglossus*) 16+34=50HIPPOGLOSSUS, 3.

aa. *Vertebrae and fin-rays in moderate number* (vertebrae less than 46, dorsal rays less than 95, anal rays less than 75); caudal fin double truncate or rounded, the median rays longest.

f. Lateral line without distinct anterior arch; vertebrae, 40 to 46; body normally dextral;* caudal peduncle distinct; scales ciliated; anal spine usually strong. Species of subarctic distribution. (Genera allied to *Hippoglossoides*.)

*Frequently sinistral in *Hippoglossoides classodon*.

- g.* Lateral line simple (without accessory dorsal branch); teeth sharp, those of lower jaw uniserial; dorsal beginning above eye.
- h.* Teeth in the upper jaw biserial.
- i.* Scales comparatively large, thin, and deciduous (lateral line 70); body slender, the flesh soft; vertebræ (*exilis*) 11+34=45.
LYOPSETTA, 4.
- ii.* Scales small and adherent (lateral line 96); body robust, the flesh firm; vertebræ (*jordani*) 11+32=43.....EOPSETTA, 5.
- hh.* Teeth in the upper jaw uniserial; scales small and flesh firm; vertebræ (*platessoides*) 13+32=45.....HIPPOGLOSSOIDES, 6.
- gg.* Lateral line with an accessory dorsal branch; vertebræ 40 to 42; scales small, firm, ctenoid; dorsal fin beginning before the eye; teeth sharp, unequal, some of them canine-like; mouth not large; lower pharyngeal teeth sharp, uniserial; vertebræ (*melanostictus*) 11+29=40.....PSETTICHTHYS, 7.
- ff.* Lateral line with a strong arch in front; no accessory branch; vertebræ in smaller number (35 to 41); teeth uniserial; anal spine usually obsolete; body normally sinistral.* (Species chiefly of the temperate or sub-tropical seas, none of them Arctic and none European.) (Genera allied to *Paralichthys*.)
- k.* Dorsal fin beginning above the pupil; gill-rakers short and thick; teeth rather small; no canines; body indifferently dextral or sinistral (in some species at least).
- l.* Scales ctenoid.....HIPPOGLOSSINA, 8.
- ll.* Scales cycloid; caudal fin subsessile, the caudal peduncle extremely short; skin of shoulder-girdle with patches of cup-shaped scales; vertebræ (*liolepis*) 12+25=37.....XYSTREURYS, 9.
- kk.* Dorsal fin beginning in advance of eye.
- m.* Scales weakly ciliated; caudal fin with a distinct peduncle; teeth unequal, some of the anterior canine-like; gill-rakers rather long and slender; vertebræ, 35 to 41.....PARALICHTHYS, 10.
- mm.* Scales very strongly ctenoid on both sides of body; mouth smallish, with small, sharp teeth; anterior rays of dorsal notably exserted, the rays of the anterior part of the fin longer than some of those further back, thus forming a more or less distinct lobe; gill membranes considerably united; gill-rakers short and broad; caudal peduncle short; left ventral produced; vertebræ (*quadrocellata*) 9+26=35.....ANCYLOPSETTA, 11.

Subfamily II.—PLEURONECTINÆ.

(Large-mouthed flounders, with the ventral fins unsymmetrical.)

Mouth symmetrical, the dentition nearly equally developed on both sides; gape usually wide (narrow in *Platophrys*, *Etropus*, etc.), the maxillary commonly more than one-third length of head. Lower pharyngeals narrow, each with one or more rows or a narrow band of small, sharp teeth; teeth in jaws acute. Eyes not minute; pectorals and ventrals usually well developed. Edge of preopercle free. Ventral fins dissimilar in form or in position, that of the left or eyed side inserted on the ridge of the abdomen, its base extended along this ridge, its rays more or less wide apart. Caudal fin rounded or subtruncate; no ac-

*Dextral in some species of *Hippoglossina*; occasionally dextral in some species of *Paralichthys* and *Xystreurus*.

cessory lateral line; anal spine usually weak or obsolete; a pelvic spine sometimes developed. Vertebrae in moderate or small number, 31 to 40 (except in *Monolele*). Body sinistral. Species chiefly tropical or subtropical in distribution.

a. Pectoral fin of both sides present; dorsal rays less than 100.

b. Septum of gill cavity between gill arches and the termination of the shoulder-girdle with a large foramen; the emargination below the shoulder-girdle near the isthmus not deep; lateral line with a strong arch in front; last rays of dorsal and anal inserted more or less on the right side of the median line; teeth subequal, in bands.

c. Vomer toothless; ventral fins free from the anal; caudal fin sessile; scales small, each with very long spinules; vertebrae (*regius*) 10 + 25 = 35..... PHRYNORHOMBUS, 12.

cc. Vomer with teeth.

d. Ventral of eyed side united to the anal; scales small, very rough; body ovate; vertebrae (*punctatus*) 12 + 25 = 37.

ZEUGOPTERUS, 13.

dd. Ventral fins free from the anal; scales ciliated, deciduous; body oblong, much compressed; vertebrae (*whiff-iajonis*) 11 + 30 = 41.

LEPIDORHOMBUS, 14.

bb. Septum of gill cavity below gill arches, without foramen; a deep emargination near the isthmus; ventral fins free from anal.

e. Vomer with teeth; lateral line with a strong arch in front.

f. Teeth unequal, those of the upper jaw biserial, some of them canine-like; scales weakly ciliated; body elongate; mouth very large..... CITHARUS, 15.

ff. Teeth subequal, in villiform bands; body broadly ovate; caudal fin sessile; interorbital area broad; scales small, cycloid, or wanting; vertebrae 31 to 36..... PLEURONECTES, 16.

ee. Vomer toothless; ventral fins free from anal; caudal fin sessile.

h. Lateral line with a distinct arch in front; teeth small, uniserial, or imperfectly biserial.

i. Interorbital area a narrow ridge, sometimes with a median groove.

j. Scales cycloid or weakly ciliated, deciduous; vertebrae 10 + 28 = 38..... ARNOGLOSSUS, 17.

ii. Interorbital space more or less broad, deeply concave; scales small, ctenoid, adherent; body ovate (pectoral of left side usually filamentous in the male); vertebrae (*lunatus*) 9 + 30 = 39..... PLATOPHYRUS, 18.

ll. Lateral line without arch in front; scales ciliated.

k. Teeth in upper jaw biserial, in the lower uniserial, the front teeth of upper jaw enlarged; vertebrae 35 or 36.

SYACIUM, 19.

kk. Teeth in both jaws uniserial; interorbital space very narrow, the ridges coalescing between the eyes.

l. Mouth not very small, the maxillary more than one-third length of head.

m. Gill-rakers very short and thick, tubercle-like; scales small, firm, ctenoid..... AZEVIA, 20.

mm. Gill-rakers slender, of moderate length; scales thin, deciduous, ciliated; vertebrae 34 to 40.... CITHARICHTHYS, 21.

11. Mouth very small, the teeth subequal, the maxillary less than one-third length of head.
- n. Teeth uniserial; vertebræ $9 + 25 = 34$ETROPUS, 22.
- nn. Teeth in villiform bandsTHYSANOPSETTA, 23.
- aa. Pectoral fin of blind side wanting; eyes very close together; caudal fin subsessile; teeth small, uniserial; mouth moderate; lateral line of eyed side arched, that of right side nearly straight; dorsal fin beginning on snout, its anterior rays not exerted, its rays all simple and very numerous; scales small; body thin, very elongate; vertebræ (*sessilicauda*) 43; (deep-sea flounders, of uncertain relationship).
- MONOLENE, 24.

Subfamily III.—ONCOPTERINÆ.

(Small-mouthed flounders, with the right ventral fin extending along the ridge of the abdomen, dorsal beginning at the snout, a bony prominence of some sort connected with its first ray; eyes and color on the right side.)

- a. Left side of snout with a horizontal slit-like cavity, into which a curved, bony, ray-like appendage is depressible; lateral line with an anterior arch and with numerous accessory branches nearly at right angles with it; scales cycloid; right ventral fin free from the anal fin; left ventral fin present; gill-rakers short and slender.....ONCOPTERUS, 25.

Subfamily IV.—PLATESSINÆ.

Mouth small, unsymmetrical, the jaws on the eyed side with nearly straight outline, the bones on the blind side strongly curved; dentition chiefly developed on the blind side; eyes large; edge of preopercle not hidden by the scales; pectoral fins well developed; vertical fins well separated; ventral fins nearly or quite symmetrical; anal spine usually strong (obsolete in *Microstomus*). Body dextral (except frequently in *Platichthys stellatus*). Species arctic or subarctic in distribution.

- a. Vertebræ in moderate number (from $10 + 26 = 36$ to $11 + 33 = 44$); dorsal rays 65 to 80; anal rays 45 to 60.
- b. Teeth small, acute, in several series; lateral line nearly straight, with an accessory dorsal branch; lower pharyngeals narrow, with small biserial teeth; scales cycloid. (Genera allied to *Pleuronichthys*).
- c. Lips thick—each with several longitudinal folds; dorsal fin beginning on the blind side; vertebræ 38 to 40.PLEURONICHTHYS, 26.
- cc. Lips simple; dorsal fin beginning on the median line; vertebræ (*guttulatus*) $11 + 24 = 35$ HYP SOPSETTA, 27.
- bb. Teeth chiefly uniserial, all more or less blunt, conical or incisor-like. (Genera allied to *Platessa*).
- d. Lateral line with an accessory dorsal branch.
- e. Lateral line without distinct arch in front.
- f. Teeth compressed, incisor-like, close-set.
- g. Scales closely imbricated, mostly cycloid; upper eye on median line; vertebræ (*vetulus*) $11 + 33 = 44$PAROPHRYA, 28.
- gg. Scales scarcely imbricated, all very strongly etenoid; eyes both lateral.....INOPSETTA, 29.

- ff.* Teeth conical, separated, not incisor-like; scales closely imbricated, all strongly ctenoid; mouth comparatively large (approaching that of *Psetticichthys*); vertebræ (*isolepis*) $10 + 32 = 42$ISOPSETTA, 30.
- ee.* Lateral line with a distinct arch in front; scales imbricated, rough-ctenoid; vertebræ (*bilineata*) $11 + 29 = 40$.LEPIDOPSETTA, 31.
- dd.* Lateral line without accessory dorsal branch.
- h.* Lateral line with a distinct arch in front; scales imbricated, rough-ctenoid; vertebræ (*limanda*) 40.....LIMANDA, 32.
- nn.* Lateral line without distinct arch in front.
- i.* Scales regularly imbricate, all (on eyed side) ctenoid in both sexes; no stellate tubercles on head nor on bases of dorsal and anal fins; teeth, incisor-like, close-set; lower pharyngeals very narrow, each with two rows of separate, conical teeth; fin rays scaly.....PSEUDOPLEURONECTES, 33.
- ii.* Scales imperfectly imbricated, or else not all ctenoid.
- j.* Scales chiefly cycloid in both sexes; lower pharyngeals small and narrow, separate, each with 1 to 4 rows of small, bluntish teeth.....PLATESSA, 34.
- ij.* Scales rough-ctenoid in the male, more or less cycloid in the female (fin rays scaly in the male, naked in the female); lower pharyngeals very large, more or less united in the adult, their surface somewhat concave, the teeth in five or six rows, large, blunt, close-set; teeth in jaws incisor-like; fin-rays of dorsal, and anal without tubercles at base.....LIOPSETTA, 35.
- iji.* Scales all in both sexes and on both sides of the body represented by coarse scattered stellate tubercles; similar tubercles between bases of dorsal and anal rays; lateral line without scales; lower pharyngeals broad, each with three rows of blunt, coarse teeth; teeth incisor-like.....PLATICHTHYS, 36.
- aa.* Vertebræ in increased number (varying from $13 + 35 = 48$ to $13 + 52 = 65$); dorsal rays 90 to 120; anal rays 70 to 100; teeth broad, incisor-like; scales small, all cycloid. (Genera allied to *Glyptocephalus*).
- k.* Left side of skull normal; anal spine obsolete; vertebræ 48 to 52.....MICROSTOMUS, 37.
- kk.* Left side of skull, with large mucous cavities; anal spine strong; vertebræ 58 to 65.....GLYPTOCEPHALUS, 38.

Subfamily V.—SOLEINÆ.

(Soles with the eyes on the right side, and separated by a bony ridge.)

Body oblong or elongate, with the eyes and color on the right side; eyes moderate or small, separated by a distinct bony ridge, the upper eye usually more or less in advance of the lower; mouth small, more or less twisted towards the blind side; teeth little developed, in villiform bands; edge of preopercle adnate, usually concealed by the scales; gill openings more or less narrowed, the gill membranes adnate to the shoulder-girdle above; blind side of head usually with fringes; pectoral fins small, sometimes wanting; ventral fins developed, one or both of them sometimes obsolete; scales usually ctenoid, rarely wanting; lateral line straight, usually single.

- a. Gill openings very small, separate, each reduced to a slight slit below angle of opercle; right ventral beginning at the chin, confluent with the anal; pectoral fins wanting or very small; lateral line present, straight; eyes small; snout dilated, the dorsal beginning upon it.
- b. Scales present, ctenoid; caudal fin somewhat confluent with dorsal.
- c. Left ventral rudimentary, with two rays APIONICHTHYS, 39.
- cc. Left ventral well developed, with five rays ACHIROPIS, 40.
- bb. Scales none; caudal fin not confluent with dorsal and anal. GYMNACHIRUS, 41.
- aa. Gill openings of moderate extent, confluent below.
- d. Vertical fins well separated.
- e. Right ventral fin with extended base, confluent with the anal fin; vertebrae about 28; body ovate in outline, the depth nearly half the length; pectoral fins rudimentary or wanting; lateral line straight; scales well developed, ctenoid, those on the head more or less enlarged, those of the blind side of the head with fringes ACHIRUS, 42.
- ee. Right ventral fin with short base, free from the anal; vertebrae 34 to 50; body elliptical or elongate, the depth one-third to two-fifths the length; lateral line single* on both sides.
- f. Vertebrae 34 to 40; body oblong; pectoral fins usually small, sometimes wanting on the blind side MONOCHIRUS, 43.
- ff. Vertebrae 47 to 50; body elongate; pectoral fins subequal, present on both sides SOLEA, 44.
- dd. Vertical fins fully confluent around the short tail, body oblong; scales very small, ctenoid; vertebrae (zebra) 8 + 41 = 49 BRACHIRUS, 45.

Subfamily VI.—CYNOGLOSSINÆ.

(Soles with the eyes on the left side, not separated by a bony ridge.)

Body elongate, more or less lanceolate in outline, with the eyes and color on the left side; eyes small, very close together, with no distinct interorbital ridge between them; mouth small, twisted toward the blind side; teeth little developed, in villiform bands; edge of preopercle covered by the scales; gill openings narrow, the gill membranes adnate to the shoulder girdle above, joined together and free from the isthmus below; pectoral fins wanting (in the adult); ventral fins small, that of the blind side often wanting; vertical fins more or less confluent; scales ctenoid; lateral line sometimes wanting, sometimes duplicated.

- a. Ventral fin of eyed side only present, free from the anal; no pectoral fins; no lateral line; head without fringes SYMPHURUS, 46.

Subfamily I.—HIPPOGLOSSINÆ.

Genus I.—ATHERESTHES.

Atheresthes Jordan & Gilbert, Proc. U. S. Nat. Mus., 1880, 51 (*stomias*).

TYPE: *Platysomatichthys stomias* Jordan & Gilbert.

The single species which constitutes this genus† is one of the most

* Two lateral lines on the blind side in the Asiatic genus, *Pardachirus*.

† Arrow-shaped canine-teeth are also found in the Asiatic genus *Psettodes* Bennett, a curious group somewhat allied to *Atheresthes*. In *Psettodes*, the caudal fin is rounded, the dorsal fin begins on the nape, above middle of the cheek, the scales are small and ctenoid, and there are no gill-rakers.

remarkable of the flounders. Of all the group, it approaches in form and general characters most nearly to the Gadoid fishes, from which we may presume the flounders to be descended, although Dr. Gill has suggested the possibility of their descent from Trachypteroid fishes.

ANALYSIS OF SPECIES OF ATHERESTHES.

- a. Head about $3\frac{3}{4}$ in length; depth, $3\frac{1}{4}$; D. 103, A. 86; Lat. 1. 135. Gill-rakers about $4 + 12$, long and slender; interorbital ridge broad, scaly; eyes large; vertebrae, $12 + 37 = 49$. Color olive brown, the margins of the scales darker; blind side dusted with dark points; inside of mouth and gill-cavity black.

STOMIAS, 1.

1. ATHERESTHES STOMIAS.

(THE ARROW-TOOTHED HALIBUT.)

[Plate I.]

Platysomatichthys stomias Jordan and Gilbert, Proc. U. S. Nat. Mus., 1880, 51, 301, (San Francisco).

Atheresthes stomias Jordan and Gilbert, Proc. U. S. Nat. Mus., 1880, 57, 454 (off San Francisco). Bean, Proc. U. S. Nat. Mus., 1881, 242 (San Francisco, Port Etches, Afognak Island, Popoff Island, Shumagins). Jordan and Gilbert, Proc. U. S. Nat. Mus., 1881, 66 (Point Reyes to Farallones). Jordan and Gilbert, Syn. Fish. N. A., 820, 1882. Bean, Proc. U. S. Nat. Mus., 1883, 354 (Wrangel and Nabu Bay, Alaska). Jordan, Nat. Hist. Aquat. Anim., 1884, 188, plate 53 (Point Reyes).

Habitat.—Coast of Alaska, southward in deep water to near San Francisco.

This species is not uncommon in the deep water off San Francisco, and is brought in in considerable numbers from the sweep-nets (*parranzelle*) used in this region. Farther northward it is taken on the coast of Alaska, and it is properly a member of the Alaskan fauna.

Genus II.—PLATYSOMATICHTHYS.

Reinhardtius Gill, Cat. Fishes East. Coast N. A., 1861, 50. (*Nomen nudum*.)

Platysomatichthys Bleeker, Comptes Rendus, Acad. Sci. Amsterdam, xiii, 1862, 426. (*pinguis* = *hippoglossoides*.)

Reinhardtius Gill, Proc. Ac. Nat. Sci. Phila., 1864, 218. (*hippoglossoides*.)

TYPE: *Pleuronectes pinguis* Fabricius = *Pleuronectes hippoglossoides* Walbaum.

But a single species of this genus is known, an Arctic fish, in some degree intermediate between the true halibut and *Atheresthes*.

We continue to use the name *Platysomatichthys* for this genus, as the earlier name *Reinhardtius* was introduced without explanation or special designation of a type, although there is no question as to what species the author would have included in the group if he had taken the trouble to define it.

ANALYSIS OF SPECIES OF PLATYSOMATICHTHYS.

- a. Head, $3\frac{1}{2}$ in length; depth, nearly 3; D. 100, A. 75; Lat. 1. 160; interorbital space, broad, flat, scaly; color brown, nearly plainHIPPOGLOSSOIDES, 2.

2. PLATYSOMATICHTHYS HIPPOGLOSSOIDES.

(THE GREENLAND HALIBUT.)

[Plate II.]

- Pleuronectes cynoglossus* Fabricius, Fauna Grønlandica, 1780, 163 (Greenland, not of Linnæus).
Pleuronectes hippoglossoides Walbaum, Artedi Piscium, 115, 1792 (based on Fabricius).
Reinhardtius hippoglossoides Gill, Cat. Fish. E. Coast N. A., 1861, 50 (name only). Gill, Proc. Ac. Nat. Sci. Phila., 1864, 218.
Platysomatichthys hippoglossoides Goode & Bean, Bull. Essex Inst., ii, 7, 1879 (coast of Massachusetts and northward in deep water). Collett, Norske Nord Havs Exped., 1880, 142 (Finmark, Hammerfest). Jordan & Gilbert, Syn. Fish. N. A., 1882, 819. Goode, Nat. Hist. Aquat. Anim., 1884, 197, pl. 56 (George's Bank and northward), and of late American writers generally.
Pleuronectes pinguis Fabricius, Zoologiske Bidrag., 1824, 43 (Greenland).
Hippoglossus pinguis Reinhardt, "Kgl. Dansk. Vidensk. Selsk., 116, 1838."
Platysomatichthys pinguis Bleeker, l. c., 426, 1862.
Hippoglossus grænlandicus Günther, iv, 404, 1862 (Greenland).

Habitat.—Arctic parts of the Atlantic, south to Finland and the Grand Banks.

Genus III.—HIPPOGLOSSUS.

Hippoglossus Cuvier, Règne Animal, ii, 1817 (*hippoglossus*).

TYPE: *Pleuronectes hippoglossus* L.

This genus contains but one species, the well-known halibut, abundant on both coasts of the North Atlantic and of the North Pacific.

ANALYSIS OF SPECIES OF HIPPOGLOSSUS.

- a. Head, $3\frac{1}{2}$; depth, about 3; D. 105, A. 78; Lat. 1. 150 or more; interorbital space, broad, flat, scaly; gill-rakers, few, short, compressed, wide-set; color, dark brown; vertebrae, $16 + 34 = 50$HIPPOGLOSSUS, 3.

3. HIPPOGLOSSUS HIPPOGLOSSUS.

(THE HALIBUT.)

[Plate III.]

- Pleuronectes hippoglossus* Linnæus, Systema Naturæ, ed. x, 269, 1758 (European Ocean) (of Gmelin, Bloch, and early writers generally).
Hippoglossus hippoglossus Jordan, Cat. Fish. N. A., 1885, 133.
Hippoglossus vulgaris Fleming, British Animals, 1828, 197. Günther, iv, 403, 1862. Day, Fishes Great Britain, ii, 5, pl. xciv, and of European writers generally.

* Only an outline of the very extensive synonymy of this common food-fish is here given.

Hippoglossus vulgaris Storer, Fish. Mass., 145, 1839. DeKay, New York Fauna, Fishes, 1842, 294, pl. 49, f. 157. Storer, Synopsis Fish. N. A., 1847, 475. Lockington, Rep. Com. Fisheries, California, 1878-'79, 39 (Farallone Islands). Lockington, Proc. U. S. Nat. Mus., 1879, 71 (San Francisco). Bean, Proc. U. S. Nat. Mus., 1879, 63 (Unalashka and St. Michael's, Alaska, Eastport, Maine). Jordan & Gilbert, Proc. U. S. Nat. Mus., 1880, 454 (Puget Sound, San Francisco). Goode, Proc. U. S. Nat. Mus., 1880, 471 (Fisher's Island, Connecticut, &c.); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 66 (San Francisco, Cape Flattery). Bean, Proc. U. S. Nat. Mus., 1881, 242 (San Francisco, Puget Sound, Port Althorp, Chugachik Bay, St. Paul, Unalashka, St. Michael's). Jordan & Gilbert, Syn. Fish. N. A., 1882, 819. Bean, Cat. Col. Fish. U. S. Nat. Mus., 1883, 20 (Port Althorp, Alaska). Dresel, Proc. U. S. Nat. Mus., 1884, 244, (Davis Straits, Greenland). Goode, Nat. Hist. Aquatic Anim., 1884, 189, plate 54 (Sandy Hook, Montauk Point, Block Island, and northward), and of American writers generally.

Hippoglossus maximus "Gottsche, Wiegmann's Archiv, 1835, 164."

Hippoglossus gigas Swainson, Nat. Hist. Class'n Anim., ii, 1839.

Hippoglossus ponticus Bonaparte, Catalogo Metodico, 1846, 47 (Black Sea, after Pallas).

Hippoglossus americanus Gill, Proc. Acad. Nat. Sci. Phila., 1864, 220.

Habitat.—All northern seas, southward in deep water to France, Sandy Hook, and San Francisco.

The halibut, the largest and most widely distributed of all the *Pleuronectida*, is too well known to require discussion here.

Genus IV.—LYOPSETTA.

Lyopsetta Jordan and Goss, Cat. Fish. N. A., 1885, 135 (*exilis*).

TYPE: *Hippoglossoides exilis* Jordan & Gilbert.

This genus contains but a single species, a small, soft-bodied flounder, of the waters of the North Pacific. In its technical characters *Lyopsetta* is very close to *Hippoglossoides*, of which it might well be regarded a subgenus. The introduction of the name *Lyopsetta* is to be regretted from its close resemblance to *Liopsetta*, a word of similar sound, but very different meaning. At the time of the introduction of *Lyopsetta*, *Liopsetta* was regarded as an obsolete synonym.

ANALYSIS OF SPECIES OF LYOPSETTA.

- a. Body rather slender, the flesh soft; mouth rather small, the maxillary $2\frac{1}{2}$ in head; teeth small, slender, close-set, nearly uniform. Eyes very large, $3\frac{1}{2}$ in head, separated by a sharp, scaly ridge. Scales rather large, thin, deciduous, weakly ctenoid; pectorals small, the right pectoral nearly 2 in head. Gill-rakers short, slender, $x+9$. Head, 4; depth, $3\frac{1}{2}$; D. 78, A. 62, Lat. 1., 71. Vertebrae $11+34=45$. Pale brown, with dark points; bronze spots sometimes present; fins dusky; dorsal, anal, and ventrals edged with yellow.....EXILIS, 4.

4. LYOPSETTA EXILIS.

Hippoglossoides exilis Jordan & Gilbert, Proc. U. S. Nat. Mus., 1880, 154 (off San Francisco). Jordan & Gilbert, Proc. U. S. Nat. Mus., 1880, 454 (Puget Sound, San Francisco, Monterey Bay). Jordan and Gilbert, Proc. U. S. Nat. Mus., 1881, 67 (San Francisco, Point Reyes, Seattle, Puget Sound). Jordan & Gilbert, Syn. Fish. N. A., 1882, 827.

Habitat.—North Pacific, in rather deep water. San Francisco to Puget Sound, and probably northward.

This small flounder is brought in in large quantities by the sweep-nets off San Francisco. It is of little value as a food-fish.

Genus V.—EOPSETTA.

Eopsetta Jordan & Goss, Cat. Fish. N. A., 1885, 135 (*jordani*).

TYPE: *Hippoglossoides jordani* Lockington.

This genus contains but a single species, a large flounder which is abundant on the coast of California. It is very close to the genus *Hippoglossoides*, and its separation as a distinct genus is perhaps hardly justified.

ANALYSIS OF SPECIES OF EOPSETTA.

- a. Body broadly ovate; maxillary $2\frac{3}{4}$ in head; teeth in two series above, the inner series much smaller, the outer canine-like in front, gill membranes somewhat united; gill-rakers strong, $x + 15$; eyes large, $3\frac{1}{4}$ in head, separated by a narrow, blunt, scaly ridge; scales small, firm, strongly ciliated, smooth on blind side; anal spine strong; head $3\frac{1}{4}$; depth $2\frac{1}{4}$. D. 94, A. 72, Lat. l. 96. Vertebrae $11 + 32 = 43$. Color, olive-brown, nearly uniform. JORDANI, 5.

5. EOPSETTA JORDANI.

(THE "CALIFORNIA SOLE.")

Hippoglossoides jordani Lockington, Proc. U. S. Nat. Mus., 1879, 73 (San Francisco). Lockington, Rep. Com. Fisheries, California, 1878-'79, 40 (San Francisco, Farallone Islands). Lockington, Scientific Press Supplement, April, 1879, 120. Jordan & Gilbert, Proc. U. S. Nat. Mus., 1880, 454 (Puget Sound, San Francisco, Monterey Bay). Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 67 (Monterey, Puget Sound, San Francisco). Jordan & Gilbert, Syn. Fish. N. A., 1882, p. 826. Jordan, Nat. Hist. Aquat. Anim., 1884, 187.

Habitat.—Coast of California, Puget Sound to Monterey.

This is one of the commonest flat-fishes of the California coast, being found in abundance in shallow water from Monterey northward. It is a good food-fish, and large numbers are dried each year by the Chinese.

Genus VI.—HIPPOGLOSSOIDES.

Hippoglossoides Gottsche, Wiegmann's Archiv, 1835, 164 ("limanda" = *platessoides*).
Drepanopsetta Gill, Cat. Fish. East Coast N. Am., 1861, 50 (*platessoides*).
Pomatopsetta Gill, Proc. Ac. Nat. Sci. Phila., 1864, 217 ("dentata" = *platessoides*).

TYPE: *Pleuronectes platessoides* Fabricius.

This genus, as here restricted, contains two closely related species, the one of the North Pacific, the other of the North Atlantic. Both are essentially Arctic species, inhabiting shallow waters in the regions where they are most abundant.

ANALYSIS OF SPECIES OF HIPPOGLOSSOIDES.

a. Teeth small, unequal, the anterior largest; gill-rakers short, $X+10$ in number; maxillary $2\frac{3}{4}$ in head; eye $5\frac{1}{2}$ in head; interorbital space with an obtuse, prominent ridge, with usually about six series of scales; head, $3\frac{1}{4}$; depth, $2\frac{1}{4}$; D. 88 (80 to 93); A. 70 (64 to 75); Lat. 1. 90; vertebræ $13+32=45$; color nearly plain brown.

PLATESSOIDES, 6.

aa. Teeth small, subequal; gill-rakers slender, $X+16$; maxillary $2\frac{1}{2}$ in head; eye large, 4 in head; interorbital space a narrow, knife-like ridge with usually a single series of scales; head, $3\frac{1}{4}$; depth, $2\frac{1}{4}$; D. 80 (77 to 84); A. 61 (59 to 64); Lat. 1. 100; color brown, sometimes mottled with darker.....ELASSODON, 7.

6. HIPPOGLOSSOIDES PLATESSOIDES.

(THE SAND DAB.)

[Plate IV.]

Pleuronectes linguatula Müller, Zool. Dan. Prodrömus, 45, 1776 (not of Linnæus).

Pleuronectes platessoides Fabricius, Fauna Gröulandica, 1780, 164 (Greenland), and of numerous copyists.

Citharus platessoides Reinhardt, Kongl. Dansk. Vid. Selsk, 116, 1838.

Drepanopsetta platessoides Gill, Cat. Fish. East Coast N. Am., 1861, 50 (name only).

Hippoglossoides platessoides Gill, Proc. Acad. Nat. Sci. Phila., 1864, p. 217. Collett, Norske Nord-Havs. Exped., 1880, 144 (Norway to Spitzbergen). Goode, Proc. U. S. Nat. Mus., 1880, 471. Jordan and Gilbert, Syn. Fish. N. A., 1882, 826. Stearns, Proc. U. S. Nat. Mus., 1883, 125 (Labrador). Goode, Nat. Hist. Aquatic Anim., 1884, 197, pl. 55 (Wood's Holl and northward), and of recent American writers generally.

Pleuronectes limandoides Bloch, Ausl. Fische, iii., 24 tab. 186, 1787 (Europe), and of various copyists.

Hippoglossoides limandoides Günther, Cat. Fish., iv, 405, 1862. Day, Fishes Great Britain and Ireland, vol. ii, p. 9, pl. xcv.

Hippoglossoides limanda Gottsche, Wieg. Archiv, 1835, 168 (not *Pl. limanda* L.).

Pleuronectes limandanus Parnell, Edinburgh New Phil. Journ., 1835, 210.

Platessa dentata Storer, Fish. Mass., 143, 1839. (Boston and Provincetown; not *Pl. dentatus* Linnæus.) DeKay, N. Y. Fauna, Fish, p. 298, 1842. Storer, Syn. Fish. N. A., 1846, p. 476.

Hippoglossoides dentatus Günther, Cat. Fish., iv., 406, 1862. Günther, Voy. Challenger, Fishes, 1880, 3. (Station 49, south of Halifax.)

Pomatopsetta dentata Gill, Proc. Acad. Nat. Sci. Phila., 1864, p. 217.

Habitat.—North Atlantic, south to Cape Cod, and the coasts of England and Scandinavia.

The identity of the American and European representatives of this species (*platessoides* and *limandoides*) is now conceded by all writers. A little difference is recognized between Arctic and subarctic examples, the former having a somewhat greater number of fin-rays.

Thus, Greenland specimens, according to Collett, have D. 88, A. 69, specimens from Finmark have D. 92, A. 72; these representing the var. *platessoides*. Specimens from England (var. *limandoides*) have D. 80, A. 66, while those from intermediate localities present in general fin formulæ likewise intermediate, showing that no sharp division is possible.

This is a rather common food-fish of the deeper waters northward, on both sides of the ocean.

7. HIPPOGLOSSOIDES ELASSODON.

[Plate V.]

Hippoglossoides elassodon Jordan and Gilbert, Proc. U. S. Nat. Mus., 1860, 278 (Seattle, Tacoma, Washington Territory). Jordan & Gilbert, Proc. U. S. Nat. Mus., 1880, 454 (Puget Sound) and elsewhere. Bean, Proc. U. S. Nat. Mus., 1881, 242 (Puget Sound, St. Paul, Humboldt Harbor, Shumagins, Ilulink, Unalashka, St. Michael's). Jordan and Gilbert, Syn. Fish. N. A., p. 826, 1882. Bean, Proc. U. S. Nat. Mus., 1883, p. 20 (Unalashka). Jordan, Nat. Hist. Aquat. Anim., 1884, 188, pl. 52.

Habitat.—North Pacific, south to Puget Sound.

This is a rather abundant shore fish in Puget Sound, and it seems to be still more common northward, being, in Alaska, a food-fish of some importance.

Genus VII.—PSETTICHTHYS.

Psettichthys Girard, Proc. Ac. Nat. Sci. Phila., 1854, 140 (*melanostictus*).

TYPE: *Psettichthys melanostictus* Girard.

This genus contains but a single species, found on the coast of California. It is nearly related to *Hippoglossoides*, but possesses the peculiar accessory dorsal branch to the lateral line, characteristic of so many of the Pacific coast flounders.

ANALYSIS OF SPECIES OF PSETTICHTHYS.

- a. Body elliptical; mouth rather small; maxillary $2\frac{1}{2}$ in head; teeth large, sharp, uniserial; eyes very small, 5 in head, separated by a broad, flat, scaly interspace; gill-rakers slender, X + 14; scales very small, ctenoid, adherent; accessory lateral line long; first rays of dorsal exerted, the longest 3 in head; head 4; depth $2\frac{1}{2}$; D. 85, A. 60, Lat. 1. 112; vertebrae $11+29=40$; color dark grayish brown, everywhere finely speckled with darker MELANOSTICTUS, 8.

8. PSETTICHTHYS MELANOSTICTUS.

[Plate VI.]

Psettichthys melanostictus Girard, Proc. Acad. Nat. Sci. Phila., 1854, p. 140 (San Francisco; Astoria, Oregon). Girard, U. S. Pacif. R. R. Exped., Fishes, p. 154, 1859. Günther, Cat. Fish., iv, 420, 1862 (copied). Lockington, Rep. Com. Fisheries Cal. 1878-79, p. 40 (San Francisco; Farallone Islands). Lockington, Proc. U. S. Nat. Mus., 1879, p. 76 (San Francisco). Jordan and Gilbert, Proc. U. S. Nat. Mus., 1880, p. 453 (Puget Sound, San Francisco, Monterey Bay). Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, p. 67 (Monterey; Puget Sound). Jordan, Nat. Hist. Aquatic Animals, 1884, 186, pl. 51 (Monterey to Wrangel, Alaska).

Hippoglossoides melanostictus, Jordan and Gilbert, Syn. Fish. N. A., 1882, p. 828.

Habitat.—Pacific coast of North America, from Alaska south to Monterey.

This is one of the commoner flounders of the Pacific coast, being everywhere known by the name of "Sole." It lives near the shore, and reaches a length of about twenty inches.

In color this species is quite unlike the species of *Hippoglossoides*, but in most other respects the two groups are closely allied.

Genus VIII.—HIPPOGLOSSINA.

Hippoglossina Steindachner, Ichth. Beiträge, v, 13, 1876 (*macrops*).

TYPE: *Hippoglossina macrops* Steindachner.

This genus is intermediate between *Hippoglossoides* and *Paratichthys*, agreeing with the former in the insertion of the dorsal and in general appearance, and with the latter in the direction of the lateral line. Two species, the one from Japan, the other from Patagonia, have been lately referred to *Hippoglossina*. A fourth species, apparently still undescribed, is in the museum at Cambridge, from Japan. Some of these species are dextral, and perhaps all of them are normally so, or perhaps, as in the case of *Xystreurus liolepis*, all are indifferently dextral or sinistral.

ANALYSIS OF AMERICAN SPECIES OF HIPPOGLOSSINA.

- a. [Eye very large, $3\frac{1}{2}$ in head; body elliptical; dorsal beginning over middle of eye; pectoral of left side half head, much longer than maxillary, which is $2\frac{3}{4}$ in head and reaches middle of eye; interorbital space a narrow ridge; teeth very small, sharp, uniserial; scales of left side all strongly ctenoid, those of blind side ciliated only on posterior third of body; head $2\frac{3}{4}$; depth $2\frac{1}{2}$ to $2\frac{3}{4}$; D. 66 or 67; A. 52; Lat. 1. 75 to 80; no anal spine. Color, brownish, with obscure darker blotches; body sinistral (in the only specimen known)] (*Steindachner*)..... MACROPS, 9.
- aa. [Eye small, $4\frac{1}{2}$ or more times in head; upper eye slightly before lower; snout $4\frac{1}{2}$ in head; interorbital space flat, with minute scales, half vertical diameter of eye; dorsal beginning above eye, of moderate height; mouth wide, maxillary extending beyond middle of orbit; lateral line with a semicircular curve; pectoral 2 in head; ventrals well developed, symmetrical. Grayish, minutely mottled with brown. Head $3\frac{1}{2}$; depth, $2\frac{3}{4}$; D. 72; A. 56.] (*Günther*)MICROPS, 10.

9. HIPPOGLOSSINA MACROPS.

Hippoglossina macrops Steindachner, Ichth. Beitr., v, 13, pl. iii, 1876 (Mazatlan).

Habitat.—Pacific coast of Mexico, Mazatlan.

We know this species from the description and excellent figure published by Dr. Steindachner.

10. HIPPOGLOSSINA MICROPS.

Hippoglossina microps Günther, Voyage, II. M. S. Alert. Jan. 4, 1881 (Patagonia).

Habitat.—West coast of Patagonia.

This specimen is known only from Günther's short description of a specimen four inches in length.

Genus IX.—XYSTREURYS.

Xystreurus Jordan & Gilbert, Proc. U. S. Nat. Mus., 1880, 34 (*liolepis*).

TYPE: *Xystreurus liolepis* Jordan & Gilbert.

This genus is very close to *Hippoglossina*, differing chiefly in the sessile caudal fin and the smooth scales. In its peculiar gill-rakers it agrees with those of a Japanese species of *Hippoglossina* examined by us. The typical species, like some other Pacific coast flounders, is al-

most indifferently dextral or sinistral. The lately-described *Hippoglossina punctatissima* Steindachner, from Japan, seems to belong to *Xystreurus*.

ANALYSIS OF SPECIES OF XYSTREURYS.

- a. Body broadly elliptical; mouth small; maxillary reaching pupil, $2\frac{3}{8}$ in head; eyes large, $4\frac{1}{4}$ in head, separated by a very narrow, blunt, scaly ridge; teeth small, conical, blunt, uniserial, those below subequal, those above larger in front. Gill-rakers very short, broad, weak, $2+7$. Scales small, cycloid, with many accessory scales. Skin of shoulder girdle and gill arches with cup-shaped, tubercular scales. Dorsal inserted above pupil; no anal spine. Pectoral of eyed side falcate, varying much in length, usually much longer than head; anterior nostril of blind side with a short flap. Head $3\frac{3}{8}$, depth $1\frac{1}{8}$; D. 80; A. 62; Lat. 1. 123; vertebrae $12+25=37$. Olive-brown, mottled with darker, sometimes with very distinct round black blotches or ocelli; pectoral of colored side barred.....LIOLEPIS. 11.

11. XYSTREURYS LIOLEPIS.

- Xystreurus liolepis* Jordan and Gilbert, Proc. U. S. Nat. Mus., 1880, p. 34 (Santa Barbara). Jordan and Gilbert, Proc. U. S. Nat. Mus., 1880, p. 454 (Santa Barbara; San Pedro). Jordan and Gilbert, Proc. U. S. Nat. Mus., 1881, p. 66 (Santa Barbara). *Paralichthys liolepis* Jordan and Gilbert, Syn. Fish. N. A., p. 825, 1882.

This species is rather common on the coast of California, from Point Concepcion southward. It is a very variable species, the coloration and the length of the pectoral fins having a wide range of variation.

Genus X.—PARALICHTHYS.

- Paralichthys* Girard, U. S. Pac. R. R. Surv., Fish., 1859, 146 (*maculosus* = *californicus*).
Pseudorhombus Bleeker, Comptes Rendus, Acad. Sci. Amsterd., xiii, 1862, notice sur quelques genres de la famille des Pleuronectidæ, 5 (*polyepilos*).
Tropsetta Gill, Proc. Ac. Nat. Sci. Phila., 1862, 330 (*californicus* = *maculosus*).
Chænopsetta Gill, Proc. Ac. Nat. Sci. Phila., 1864, 218 (*ocellaris* = *dentatus*).

TYPE: *Pleuronectes maculosus* Girard = *Hippoglossus californicus* Ayres.

This genus, as now restricted, contains a considerable number of species, inhabiting both coasts of America and the eastern and southern coasts of Asia. As indicated by the reduced number of vertebrae, the species range further southward than do those of the type of *Hippoglossoides*.

The name *Pseudorhombus* has been often used for this genus by European writers, but the preferable name of *Paralichthys* has clear priority.

ANALYSIS OF SPECIES OF PARALICHTHYS.

- a. Gill-rakers in large number, about $9+20$, as long as the eye and very slender; body elongate, rather robust; head small, $3\frac{3}{8}$ to $4\frac{1}{4}$ in length; maxillary about as long as pectoral and about half length of head; depth of body $2\frac{1}{4}$ to $2\frac{3}{8}$ in length; caudal peduncle very long; interorbital space flattish, its width less than vertical diameter of eye; scales moderate, somewhat ciliated, about 100 pores in the lateral line; arch of lateral line $3\frac{1}{4}$ in straight part; dorsal rays 67 to 71; anal rays 51 to 57; vertebrae $10+25=35$; color grayish brown, uniform, or mot-

- tled with blackish and pale, the head sometimes sprinkled with black dots; young brownish, with spots of light bluish. (Eyes and color normally sinistral, but reversed examples almost equally common.)..... CALIFORNICUS, 12.
- aa. Gill-rakers in moderate number (6 + 13 to 5 + 16), rather long and slender.
- b. Dorsal rays 70 to 75; anal rays 54 to 60.
- c. Scales not very small, about 100 in the course of the lateral line; head small, $4\frac{1}{2}$ in length; depth, $2\frac{1}{2}$; interorbital space rather broad and flattish, $\frac{2}{3}$ diameter of eye; eyes small, $5\frac{1}{2}$ in head; gill-rakers rather short, 4 + 15, the longest about $\frac{2}{3}$ eye; pectoral $1\frac{1}{2}$ in head; curve of lateral line high and short, 4 in straight part, its height $1\frac{1}{2}$ in its length; mouth moderate, the maxillary $2\frac{1}{2}$ in head; teeth rather few, the anterior canines large; color dark brown, more or less mottled and spotted with paler..... BRASILIENSIS, 13.
- cc. Scales very small, about 120 in the lateral line; head $3\frac{1}{2}$ in length; depth, $2\frac{1}{2}$; eyes small, wide apart; gill-rakers X + 17; curve of lateral line nearly 5 in straight part, barely twice as long as high; maxillary $2\frac{1}{2}$ in head; color brownish-gray, thickly mottled with many larger and smaller spots, points and rings; side with three or four larger spots of irregular form and ocellated with paler..... ADSPERSUS, 14.
- bb. Dorsal rays, 85 to 93 in number; anal rays, 67 to 73; gill-rakers, 5 + 15 or 16 in number, long and slender, the longest $\frac{2}{3}$ length of eye; body ovate, the depth about $2\frac{1}{2}$ in length; head about $3\frac{1}{2}$; caudal peduncle long; maxillary about half head, reaching past posterior margin of eye; mouth large, oblique, the gape curved; canines large, conical, wide-set; interorbital area a rather flattish ridge, in the adult about equal to vertical diameter of eye, narrower in the young, forming a bony ridge; scales cycloid, each with numerous small, accessory scales; lateral line with about 95 pores, its arch 4 times in straight part; color brownish olive, always with numerous paler and darker spots of various sizes and with obscure ocelli; vertebrae 11 + 30 = 41. DENTATUS, 15.
- aaa. Gill-rakers few, shortish, wide set, the numbers 2 + 8 to 3 + 10.
- d. Body ovate, more or less compressed, and opaque; the depth about $2\frac{1}{2}$ in length; no distinct, definitely-placed ocelli; scales cycloid.
- e. Dorsal rays in large number (85 to 92, as in *P. dentatus*); anal rays 65 to 73; pores of the lateral line about 100; accessory scales few; gill-rakers 2 + 10, lanceolate, dentate, wide-set, and much shorter than the eye; eyes small; interorbital space in adult broad, flattish, and scaly, as wide as length of eye; caudal peduncle rather long; depth about $2\frac{1}{2}$ in length; head about $3\frac{1}{2}$; length of arch of lateral line nearly one-third that of straight part; color dusky olive, darker than in *P. dentatus*, and with very few darker mottlings or spots. LETHOSTIGMA, 16.
- cc. Dorsal rays in moderate number (70 to 80); anal rays 54 to 61.
- f. Scales very small, about 120 in the lateral line; depth of body about half length; head $3\frac{1}{2}$ in length; gill-rakers roughly toothed, 3 + 9 in number; arch of lateral line $4\frac{1}{2}$ in straight portion; mouth very large, oblique, the broad maxillary more than half head, and reaching past eye; D. 78, A. 59; coloration brownish, the body and fins spotted with darker..... SQUAMILENTUS, 17.
- ff. Scales moderate, 90 to 100 pores in the lateral line.
- g. Interorbital width about equal to length of eye; dorsal rays 75 to 81; anal rays 59 to 61; gill-rakers 2 or 3 + 9 or 10; coloration grayish-brown, with numerous (more or less distinct) whitish blotches, which are rarely obsolete; vertebrae 10 + 27 = 37..... ALBIGUTTA, 18.
- gg. Interorbital width not half the length of the eye; dorsal rays 76; anal rays 60; form of *P. albigutta*; eye large ($4\frac{1}{2}$ in head); maxillary

2½ in head (as long as pectoral); teeth rather small; arch of lateral line a little longer than high, its length $5\frac{1}{10}$ in the straight part; gill-rakers 3+11, shorter and thicker than in *P. brasiliensis*, the longest about half eye; color brown, the body and fins irregularly blotched and with obscure ocelli; pectorals barred; eyes speckled.

PATAGONICUS, 19.

dd. Body oblong, strongly compressed, semi-translucent; scales weakly ciliated; about 93 pores in lateral line; curve of lateral line about 3½ times in straight part; mouth large, oblique; maxillary narrow, its length 2½ in head; interorbital area a very narrow, bony, scaleless ridge; head 3½ to 4 in length; depth 2½; gill-rakers 2+8 in number, about half as long as eye; D. 77, A. 62; coloration light grayish, thickly mottled with darker; four large horizontally oblong, black ocelli, each surrounded by a pinkish area; one just behind middle of the body, below the dorsal; one opposite this, above anal; two similar smaller spots below last rays of dorsal and above last of anal; vertebrae, 11+30=41 OBLONGUS, 20.

12. PARALICHTHYS CALIFORNICUS.

(BASTARD HALIBUT; MONTEREY HALIBUT.)

Pleuronectes maculosus Girard, Proc. Acad. Nat. Sci. Phila., 1854, 155 (young, San Diego).

Paralichthys maculosus Girard, U. S. Pacif. R. R. Exped., Fishes, p. 147, 1859 (not *Rhombus maculosus* Cuvier, also a species of *Paralichthys*). Günther, Cat. Fish., iv, 431, 1862 (copied). Gill, Proc. Acad. Nat. Sci., Phila., 1864, p. 197. Lockington, Rep. Com. Fisheries, California, 1878-79, p. 41 (Monterey; Tomales Bay). Lockington, Proc. U. S. Nat. Mus., 1879, p. 79 (San Francisco). Jordan and Gilbert, Proc. U. S. Nat. Mus., 1880, 454. (San Francisco, Monterey Bay, San Luis Obispo, Santa Barbara, San Pedro, San Diego.) Jordan and Gilbert, Proc. U. S. Nat. Mus., 1881, 66 (Tomales Bay; Monterey; San Diego). Jordan, Nat. His. Aquat. Anim., 1884, 182.

Hippoglossus californicus Ayres, Proc. Cal. Acad. Nat. Sci., 1859, p. 29, and 1860, fig. 10 (adult, San Francisco).

Pseudorhombus californicus Günther, Cat. Fish., iv, 426, 1862 (copied).

Uropsetta californica Gill, Proc. Acad. Nat. Sci. Phila., 1862, 330. Gill, Proc. Acad. Nat. Sci. Phila., 1864, 198.

Paralichthys californicus Jordan and Gilbert, Syn. Fish. N. A. 1882, 821.

Habitat.—Coast of California; Tomales Bay to San Diego.

This large flounder is one of the common food-fishes of the Pacific coast, where it takes the place occupied on the Atlantic side by *Paralichthys dentatus*. It reaches a length of three feet and a weight of sixty pounds. From its resemblance to the halibut, it usually goes by the name of bastard halibut. It is readily distinguished from the Atlantic members of the same genus by its fewer fin-rays and by its more numerous gill-rakers.

The specific name *californicus* must be used for this fish, the earlier name, *maculosus*, being preoccupied in the genus *Paralichthys*. As was first shown by Mr. Lockington, the small fish, called *Paralichthys maculosus*, is simply the young of the larger fish, then called *Uropsetta californica*. Unlike other species of the genus, *Paralichthys californicus* is almost as frequently dextral as sinistral.

13. PARALICHTHYS BRASILIENSIS.

Hippoglossus brasiliensis Ranzani, Nov. Spec. Pisc., 10, tab. iii, 1840 (Brazil).

Pseudorhombus brasiliensis Günther, Fishes Centr. Amer, 473, 1869 (Brazil, Guatemala).

Platessa orbignyana Valenciennes, D'Orbigny Voy. S. Amer. Mérid. Poiss., pt. 5, pl. 16, f. 1, 1847.

Rhombus aramaca Castelnau, Anim. nouv. ou rares, Poiss., 78, pl. 40, f. 3 (not of Cuvier).

Pseudorhombus vorax Günther, Cat. Fish. Brit. Mus., iv, 1862, 429 ("South America").

Habitat.—South America, said to range northward to Guatemala. This species is known to us from numerous specimens from Rio Janeiro and from Maldonado, in the Museum of Comparative Zoology.

The locality "Guatemala" given by Günther seems to be somewhat doubtful, and the species may not occur in West Indian waters at all.

14. PARALICHTHYS ADSPERSUS.

? *Hippoglossus kingi* Jenyns, Voyage Beagle, Fishes, 1842, 123, pl. 26. (Valparaiso: from a drawing only.)

Pseudorhombus adpersus Steindachner, Ichthyol. Notizen, v, 1867, 9, Plate II. (Chinchas Islands.)

Paralichthys adpersus Jordan and Gilbert, Proc. U. S. Nat. Mus., 1882, p. 370. (Capo San Lucas.) Jordan and Gilbert, Bull. Fish. Com., 1882, pp. 108 and 111. (Mazatlan, Panama.) Jordan, Cat. Fish. N. A., 1885, 133.

Habitat.—Pacific coast of tropical America. Cape San Lucas to Peru. Numerous specimens of this species were obtained by Professor Gilbert at Mazatlan and Panama. As all these have been destroyed by fire, we have taken our description from Callao specimens in the Museum of Comparative Zoology. The species is very close to *P. brasiliensis*, differing chiefly in the smaller scales. This may prove identical with the remarkable *H. kingi* of Jenyns, in which case it must stand as *Paralichthys kingi*.

15. PARALICHTHYS DENTATUS.

(THE SUMMER FLOUNDER.)

Pleuronectes dentatus Linnaeus, Syst. Nat., 1, 458, 1766, and of numerous copyists. Mitchell, Trans. Lit. & Phil. Soc. N. Y., p. 390, 1815 (New York).

Platessa dentata Storer, Hist. Fish. Mass., p. 143, 1839.

Pseudorhombus dentatus Goode and Bean, Proc. U. S. Nat. Mus., 1879, 123.

Paralichthys dentatus Goode, Nat. Hist. Aquat. Anim., 1884, 178. (Detailed account; includes *P. lethostigma*.) Jordan, Cat. Fish. N. A., 1885, 134.

Pleuronectes melanogaster Mitchell, Trans. Lit. and Phil. Soc. N. Y., p. 390, 1815. (Doubled example.)

Platessa ocellaris DeKay, N. Y. Fauna, Fishes, 1842, 300, Pl. 47, fig. 152.

Pseudorhombus ocellaris Günther, iv, 430, 1862 (copied). Jordan and Gilbert, Proc. U. S. Nat. Mus., 1878, 370 (Beaufort).

Chanopsetta ocellaris Gill, Proc. Ac. Nat. Sci., 1864, 218.

Paralichthys ocellaris Jordan and Gilbert, Proc. U. S. Nat. Mus., 1882, p. 617 (Charleston).

Paralichthys ophryas Jordan and Gilbert, Syn. Fish. N. A., p. 822, 1882 (Charleston).

Habitat.—Atlantic coast of United States from Cape Cod to Florida.

This species is the common flounder of the coasts of the Northern States, its range apparently not extending much south of Charleston. Of the species found in that region it is the most important from a commercial point of view. It reaches a length of about 3 feet and a weight of about 15 pounds.

It has been confounded by nearly all writers with the more southern species now called *lethostigma*, from which it is best distinguished by its much greater number of gill-rakers and by its mottled coloration. On account of this confusion it is impossible wholly to disentangle its synonymy from that of *P. lethostigma*.

So far as the proper nomenclature of the two is concerned, this confusion makes little difference. There is no doubt that this is the original *Pleuronectes dentatus* of Linnæus, as the original Linnæan type is still preserved in London. This has been examined by Dr. Bean and its identity with the present species fully established.

It seems also certain that this is the *Platessa ocellaris* of DeKay, who properly distinguishes his *ocellaris* from his *oblonga*, the latter being *P. lethostigma*.

A little doubt must be attached to the *melanogaster* of Mitchill, very scantily described from a doubled (black-bellied) example of this species or of *P. lethostigma*. As the former species is much more common about New York than the latter it is probable that Mitchill's fish belonged to it. We have also received a doubled example from New York corresponding exactly to Mitchill's description. We may therefore regard the name *melanogaster* as a synonym of *dentatus*.

The differences in the gill-rakers of these species was first noticed by Jordan and Gilbert in 1883. These authors erroneously referred all these synonyms to the species with the few gill-rakers and described the present one as new under the name of *Paralichthys ophryas*. The discovery of the Linnæan type of *Pleuronectes dentatus* has rendered a reconsideration of this matter necessary, and it is evident that to the "*P. ophryas*" belong also the prior names of *dentatus*, *melanogaster*, and *ocellaris*.

The name *Platessa orbignyana* Valenciennes, applied to a South American example and doubtfully referred by Dr. Günther to his *Pseudorhombus dentatus*, belongs to *Paralichthys brasiliensis*.

16. PARALICHTHYS LETHOSTIGMA.

(THE SOUTHERN FLOUNDER.)

[Plate VII.]

- Platessa oblonga* DeKay, New York Fauna, Fishes, p. 299, pl. 48, fig. 156, 1842. (New York; not *Pleuronectes oblongus* Mitchill.) Storer, Syn. Fish. N. A., 1846, p. 477.
Pseudorhombus oblongus Günther, Cat. Fish., iv, 426, 1862 (copied).
Pseudorhombus dentatus Goode, Proc. U. S. Nat. Mus., 1879, 110. (St. John's River, St. Augustine.) Goode and Bean, Proc. U. S. Nat. Mus., 1879, 123 (Pensacola).
Chanopsetta dentata Gill, Proc. Acad. Nat. Sci. Phil., 1864, 218.

Paralichthys dentatus Jordan and Gilbert, Proc. U. S. Nat. Mus., 1882, p. 302. (Galveston, New Orleans, Pensacola.) Jordan and Gilbert, Proc. U. S. Nat. Mus., 1882, p. 617. (Charleston.) Bean, Cat. Col. Fish, U. S. Nat. Mus., 1883, p. 45 (Galveston).

Paralichthys dentatus Jordan and Gilbert, Synopsis Fish. N. A., 1882, 822.

Paralichthys lethostigma Jordan and Gilbert, Proc. U. S. Nat. Mus., 1884, 237 (Jacksonville, Florida).

Habitat.—South Atlantic and Gulf coast of United States, north to New York.

This species is the common large flounder of the South Atlantic and Gulf coasts of the United States, ranging as far north as New York. It very closely resembles *Paralichthys dentatus*, with which it has been repeatedly confounded. It is, however, sharply distinguished by the character of the gill-rakers. It is also always darker in color, and almost uniform, while the *dentatus* is usually profusely spotted. Its only tenable name is the very recent one of *Paralichthys lethostigma*.

17. PARALICHTHYS SQUAMILENTUS.

Paralichthys squamilentus Jordan and Gilbert, Proc. U. S. Nat. Mus., 1882, p. 303 (Pensacola). Jordan and Gilbert, Syn. Fish. N. A., p. 823, 1882 (Pensacola, Charleston). Bean, Cat. Coll. Fish, U. S. Nat. Mus., 1883, p. 45 (Pensacola).

Habitat.—South Atlantic and Gulf coasts of United States.

This species is very close to *Paralichthys albigutta*, from which it differs chiefly in the small scales. It seems to be rather rare. Besides the original types from Pensacola another referred to the same species is in the National Museum from Charleston.

18. PARALICHTHYS ALBIGUTTA.

Pseudorhombus dentatus Jordan & Gilbert, Proc. U. S. Nat. Mus., 1878, 370 (Beaufort). *Paralichthys albigutta* Jordan and Gilbert, Proc. U. S. Nat. Mus., 1882, p. 302 (Pensacola; Beaufort). Jordan and Gilbert, Syn. Fish. N. A., 1882, p. 823. Jordan and Swain, Proc. U. S. Nat. Mus., 1884, p. 233 (Cedar Keys).

Habitat.—South Atlantic and Gulf coast of the United States.

This species is common on the South Atlantic and Gulf coasts. It has the few gill-rakers of *Paralichthys lethostigma*, the mottled coloration of *Paralichthys dentatus*, while from both it is distinguished by its smaller number of dorsal and anal rays. In the number of its vertebrae it agrees with *P. lethostigma*. It seems to reach a smaller size than either of these species.

19. PARALICHTHYS PATAGONICUS.

Pseudorhombus dentatus Günther, Cat. Fish. Brit. Mus., iv, 425, 1862 (Port Famine). *Paralichthys patagonicus* Jordan, sp. nov. (east coast of Patagonia).

This species is extremely close to *P. albigutta*, from which it is separated only by characters of slight importance. The locality inhabited by it is, however, widely distant. The types of the species are in the Museum of Comparative Zoology. There are three specimens, the largest about 8 inches long, No. 11399, from the east coast of Patagonia.

20. PARALICHTHYS OBLONGUS.

(THE FOUR-SPOTTED FLOUNDER.)

[Plate VIII.]

Pleuronectes oblongus Mitchill, Trans. Lit. and Phil. Soc., 1, 391, 1815 (New York).*Chanopsetta oblonga* Gill, Proc. Acad. Nat. Sci. Phila., 1864, p. 218.*Paralichthys oblongus* Goode, Proc. U. S. Nat. Mus., 1880, p. 472 (Southern New England). Jordan and Gilbert, Syn. Fish. N. A., 1882, p. 824 (specimens from Wood's Holl, Mass.).*Platessa quadrocellata* Storer, Proc. Boston Soc. Nat. Hist., 1847, p. 242. Storer, Hist. Fish. Mass., p. 397, pl. 31, fig. 3 (Provincetown).*Habitat*.—Coasts of New England and New York.

This species is rather common on the coast of Cape Cod and the neighboring islands, but it has been rarely noticed elsewhere. The limits of its range are not yet definitely known.

It is a very strongly marked species. Its translucency of coloration indicates that it lives in deeper water than the other species of the genus.

Genus XI.—ANCYLOPSETTA.

Ancylopsetta Gill, Proc. Acad. Nat. Sci. Phil., 1864, 224 (*quadrocellata*).*Notosema* Goode & Bean, Bull. Mus. Comp. Zool., XIX, 193, 1883 (*dilecta*).TYPE: *Ancylopsetta quadrocellata* Gill.

This genus is also very close to *Paralichthys*, differing in the subsessile caudal fin, the short gill-rakers, the rough scales, and in the prolongation of the anterior rays of the dorsal fin. These characters are found in *quadrocellata* as well as in *dilecta*, the distinctions of the supposed genus, *Notosema*, being chiefly of degree. Besides the two species here mentioned, a third as yet undescribed, the types having been accidentally destroyed, was obtained by Professor Gilbert at Panamá.

ANALYSIS OF SPECIES OF ANCYLOPSETTA.

- a. Anterior (produced) rays of dorsal shorter than head; pectoral of eyed side about two-thirds length of head. Body oval, very deep. Depth of caudal peduncle half length of head; head 4 in length; depth, $1\frac{1}{2}$. Gill-rakers very short, 2+6 or 7. Mouth small; maxillary reaching middle of eye, $2\frac{1}{2}$ to $2\frac{3}{4}$ in head; teeth small, the canines scarcely differentiated; eyes moderate, separated by a very narrow, sharp, scaly ridge; scales of both sides ctenoid; ventral of eyed side produced, about half as long as head; no anal spine; color dark olive, with four large oblong ocellated blackish spots, the first above the arch of the lateral line, the three posterior forming an isosceles triangle, the hindmost being on the lateral line. D. 70; A. 55; Lat. 1. 85—58 pores in straight part; vertebrae, 9+26=35.

QUADROCELLATA, 21.

- aa. [Anterior (produced) rays of dorsal longer than the head, the longest half depth of body, pectoral of eyed side nearly as long as head; body elliptical; head $3\frac{1}{2}$ in length, depth 2; gill-rakers subtriangular, moderately numerous; mouth moderate, the maxillary $2\frac{1}{2}$ in head; teeth unequal, those in front much largest; eyes large, 3 in head, the interorbital space very narrow; scales highly ctenoid; ventral of eyed side produced, more than three times length of right ventral; color dark brown, speckled with darker, three large subcircular ocellated spots nearly as

large as eye, with white center, dark iris, narrow, dark margin, and a brown encircling outline, these arranged in an isosceles triangle, the apex on the lateral line, the others before it and distant from the lateral line a distance equal to their own diameter. D. 69, A. 56, Lat. 1, with 48 pores in straight part.] (*Goode & Bean*).....DILECTA, 22.

21. ANCYLOPSETTA QUADROCELLATA.

- Ancylosetta quadrocellata* Gill, Proc. Acad. Nat. Sci. Phil., 1864, p. 224 (Pensacola).
(Not *Platessa quadrocellata* Storer).
Pseudorhombus quadrocellatus Jordan & Gilbert, Proc. U. S. Nat. Mus., 1878, p. 370
(Beaufort).
Paralichthys ommatus Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, p. 616 (Charleston).
Jordan & Gilbert, Syn. Fish. N. A., p. 824, 1882. Jordan & Swain, Proc. U. S. Nat. Mus., 1884, p. 234 (Cedar Keys).

Habitat.—South Atlantic and Gulf coasts of the United States.

This species is not rare along the South Atlantic and Gulf coasts of the United States. On referring the species to the genus *Paralichthys* it became necessary to change the specific name *quadrocellatus*, pre-occupied in the latter genus. We, however, now consider it best to retain *Ancylosetta* as a group distinct from *Paralichthys*.

22. ANCYLOPSETTA DILECTA.

- Notosema dilecta* Goode & Beau, Bull. Mus. Comp. Zool., xix, 193, 1883 (Gulf Stream, off the coast of South Carolina).
Ancylosetta dilecta Jordan, Cat. Fish. N. A., 1885, 134.
Paralichthys stigmatias Goode, Nat. Hist. Aquat. Anim., 1884, 182 (name only, by inadvertence for *dilectus*).

Habitat.—Gulf Stream.

This species is known from the original types obtained in the deep waters (75 fathoms) of the Gulf Stream, off the Carolina coast.

Genus XII.—PHRYNORHOMBUS.

Phrynorhombus Günther, Catal. Fishes Brit. Mus., iv, 414, 1862 (*unimaculatus*).

TYPE: *Rhombus unimaculatus* Risso = *Pleuronectes regius* Bonnaterre.

This genus is allied to *Zeugopterus*, from which it differs chiefly in the separation of the ventral and anal fins. It is, in our opinion, worthy of separation. But a single species is known. The peculiar flannel-like character of the scales is similar to that of *Monochirus hispidus*.

ANALYSIS OF SPECIES OF PHRYNORHOMBUS.

- a.* First ray of dorsal produced in a filament, about one-third as long as head; first ray of pectoral sometimes filamentous; scales small, each with about four long spinules; eyes moderate, separated by a high, narrow scaly ridge; snout short, abruptly projecting; gill-rakers short, about X + 10; month curved, the maxillary not quite half head. Depth, 2 in length; head 3½; D. 78 to 79, A. 67, Lat. 1. 70; vertebrae 10 + 25 = 35; color, dark gray, with dusty marblings and black spots, one at the end of the curve of the lateral line; a reddish ocellus edged with black on middle of tail; fins much blotchedREGIUS, 23.

23. PHRYNORHOMBUS REGIUS.

(THE TOP-KNOT.)

La Petite Limandelle, Duhamel, "Traité sur la Pesche, iii, sect. 9, p. 270, pl. 6, f. 5."
Pleuronectes regius, "la Calimande royale" Bonnaterre, Encyclopédie Méthodique,
 1788 (after Duhamel).

Pleuronectes calimanda Lacépède, Hist. Nat. Poiss., iv, 1803 (after Duhamel).

Pleuronectes punctatus "Fleming, Werner, Mem., ii, 241" (not of Bloch.)

Rhombus unimaculatus Risso, Europe Méridionale, iii, 252, f. 35, 1826 (Nice).

Phrynorhombus unimaculatus Günther, iv, 414, 1862 (Dalmatia; Plymouth).

Scophthalmus unimaculatus Steindachner, Ichth. Bericht., vi, 1868, 49 (Barcelona).

Zeugopterus unimaculatus Day, Fish. Great Britain, ii, 17, pl. xcix (Belfast).

Rhombus uniocellatus Nardo, Prodr. Ichth. Adriat., 135, 1827.

Habitat.—Coasts of Southern Europe, north to England.

This small flounder reaches a length of 5 or 6 inches. Our specimens are from Venice. We adopt the earliest name, *regius*, for this species, as it seems to belong to this fish without doubt.

Genus XIII.—ZEUGOPTERUS.

Zeugopterus Gottsche, Wiegmann's Archiv, 1835, 178 (*hirtus*).

Scophthalmus Bonaparte, Catalogo Metodico dei Pesci Europei, 1843, 49 (*hirtus*).
 (Not of Rafinesque.)

Zeugopterus Steenstrup, Oefvers. Dansk. Vidensk. Selsk. Forhandl., 1865, 95–112.

TYPE: *Pleuronectes hirtus* Abilgaard = *Pleuronectes punctatus* Bloch.

This genus is distinguished from *Pleuronectes* both by the union of the ventral and anal fins, and by the perforation instead of emargination of the septum of the gill-cavity. This latter character was first noticed by Professor Steenstrup, who used it to define his genus *Zeugopterus*, which is equivalent to *Lepidorhombus*, *Zeugopterus*, and *Phrynorhombus* of the present paper. But one species is known, widely diffused in Northern Europe.

ANALYSIS OF SPECIES OF ZEUGOPTERUS.

- a. Body ovate, covered with small but very rough shagreen-like scales; blind side smooth; caudal peduncle very short, the last rays of dorsal and anal inserted on the left side of it almost meeting across the base of the caudal fin; none of the dorsal rays exerted; lateral line indistinct; eyes large, separated by a very narrow, scaly ridge; snout very short; gill-rakers short, thickish; lips thick; maxillary half as long as head. Left ventral inserted at chin, fully confluent with anal; right ventral long. Brown, with round black spots, one behind the curve of the lateral line, and one behind this on the straight portion; one near upper edge of gill opening, and one above upper eye; an oblique band from lower eye to subopercle. Depth 2 in length; head 3; D. 93 to 99; A. 70 to 80. Vertebrae 12 + 25 = 37.

PUNCTATUS, 24.

24. ZEUGOPTERUS PUNCTATUS.

(THE BLACK FLUKE.)

Pleuronectes punctatus Bloch, Ausländische Fische, iii, 31, tafel 189, 1787. Gmelin, Syst. Natura, p. 1235, 1788. Bloch & Schneider, Systema Ichth., 1801, p. 155.

Zeugopterus punctatus Collett, Norges Fiske, 1875, 139. Day, Fishes Great Britain, vol. ii, p. 18, plate 6.

Pleuronectes hirtus Abildgaard, Müller, Zoöl. Danica, 1788, III, 36, taf. 103.

Rhombus hirtus Yarrell, Brit. Fish., ed. 2, ii, 334. Günther, iv, 413, 1862, and of several authors.

Pleuronectes kitt Bloch & Schneider, Systema Ichthyologia, 1801, 162.

Habitat.—Coasts of Northern Europe, south to France.

The specimens of this species which we have examined are from the North Sea.

Genus XIV.—LEPIDORHOMBUS.

Lepidorhombus Günther, Catal. Fishes, iv, 411, 1862 (*megastoma*).

TYPE: *Pleuronectes megastoma* Donovan = *Pleuronectes whiff-iajonis* Walbaum.

This genus contains one or two European species, related to *Zeugopterus*, but in general appearance resembling the species of *Arnoglossus*.

ANALYSIS OF SPECIES OF LEPIDORHOMBUS.

- a. Dorsal rays, 85 to 87; anal rays, 67 to 69; depth, $2\frac{1}{2}$ in length; head, $3\frac{1}{2}$; interorbital space a very narrow scaly ridge; mouth very large, the maxillary $2\frac{1}{2}$ in head; the anterior teeth hooked backwards, about 4 in head; eyes very large, the lower somewhat before the other; anterior rays of dorsal short, but considerably exserted; scales small, very deciduous. Lat. 1. about 100. Vertebrae $11+30=41$. Color, yellowish brown, dorsal and anal with some dark blotches. WHIFF-IAGONIS, 25.
- aa. Dorsal rays, 78 to 80; anal rays, 58 to 64; depth, $2\frac{1}{2}$ in length; otherwise essentially as in the preceding, of which it is probably a variety. NORVEGICUS, 26.

25. LEPIDORHOMBUS WHIFF-IAGONIS.

(THE WHIFF, MERRY SOLE, or SAIL FLUKE.)

Passer Cornubiensis, "Jago in Ray, Syn. Pisc., 163, f. 2," 1713.

Whiff Pennant, "British Zoology, iii, 238, 1776."

Pleuronectes whiff-iajonis Walbaum, Artedi Piscium, iii, 120, 1792 (after Pennant).

Pleuronectes megastoma Donovan, "Brit. Fish., iii, pl. 41, 1802," and of many authors.

Rhombus megastoma Günther, iv, 411, and of numerous authors.

Zeugopterus megastoma Collett, Norges Fiske, 138, 1875.

Arnoglossus megastoma Day, British Fishes, iv, 21.

Pleuronectes bosci Risso, Ichth. Nice, 1810, 319, pl. vii, f. 33 (Nice).

Arnoglossus bosci Günther, iv, 416.

Pleuronectes pseudopolus "Pennant, British Zool., iii, 324, pl. 411, ed. of 1812."

Rhombus cardina Cuvier, Règne Animal, ed. 2, 1828 (excl. syn. pars), based on the Whiff of Ray and la Petite Limandelle of Duhamel.

Zeugopterus velivolans (Richardson) "Yarrell, Brit. Fish., ed. 3, 1, 656," 1859.

Zeugopterus gotteche "Winther, Ichth. Dan. Mar., 38."

Habitat.—Coasts of Europe, most abundant northward.

This species is not uncommon in Northern Europe, where it is held in slight esteem as a food-fish, being thin, dry, and bony. It reaches a length of probably less than 2 feet.

Its names, "whiff," "merry sole," and "sail-fluke," are said to be derived from its habit of frequently swimming at the surface of the water "with its tail erected above the water, like a boat under sail."

Dr. Day has adopted Giglioli's determination of the identity of this species with the *Arnoglossus bosci*. The descriptions of the latter species certainly agree closely with our specimen of *Lepidorhombus*. We have therefore placed *bosci* in the synonymy of *Whiff-iajonis*. Vinciguerra apparently regards *bosci* as specifically distinct from the others, although he places both in the genus *Arnoglossus*. The appropriate specific name of *megastoma* has been usually taken for this species, but the unmusical name of *whiff-iajonis* applied to it by Walbaum has ten years' priority. This name is given in honor of the "Reverend George Jago, of Loo."

Our specimen is from the coast of France.

26. LEPIDORHOMBUS NORVEGICUS.

Pleuronectes cardina Fries, Vet. Akad. Handl., 1838, 181 (not of Cuvier).
Rhombus norvegicus Günther, Cat. Fish. Brit. Mus., iv, 1862, 139 (after Fries). Collett, Norges Fiske, 1875, 139. (Christiania; Bergen; Bodö.)

Habitat.—South coast of Norway to the Arctic circle.

This species is known to us from descriptions only. According to Professor Collett, "it is distributed, although in scanty numbers, from the south coasts up to the polar circle." It would appear to be very close to the preceding species, differing somewhat in the numbers of the fin-rays.

Genus XV.—CITHARUS.

Pleuronectes Bonaparte, Catalogo Metodico dei Pesci Europei, 1846 (*linguatula*, the only Linnæan species mentioned).

Citharus Bleeker, Comptes Rendus Acad. Sci. Amsterdam, xiii. *Pleuronect.*, 6, 1862 (*linguatula*).

TYPE: *Pleuronectes linguatula* L.

This well-marked genus, an ally of *Lepidorhombus* and of *Arnoglossus* contains but a single species—a rather rare inhabitant of the Mediterranean.

ANALYSIS OF THE SPECIES OF CITHARUS.

- a. Body elongate, with soft flesh and large caducous scales. Mouth very large, oblique; the maxillary 2 in head; lower jaw projecting; some canine teeth, especially in front of upper jaw; two or three rather large teeth on vomer; eyes large, close together; left ventral on the abdominal ridge, a little in advance of right; its base scarcely lengthened; gill-rakers slender, of moderate length, X+9; no foramen in gill septum; dorsal beginning before the eye on right side; caudal pointed; fins all high, but fragile; head, $3\frac{3}{8}$ in length; depth, $2\frac{3}{4}$; D. about 65; anal, 45; lat. l., 37; color, grayish, translucent.....LINGUATULA, 27.

27. CITHARUS LINGUATULA.

Pleuronectes linguatula Linnæus, Syst. Nat., ed. x, p. 270, 1758 (after Artedè), and of early authors.

Citharus linguatula Günther, Cat. Fish., iv, 418, 1862. Steindachner, Ichthyol. Berichte 1868, Sechste Fortsetzung, p. 51 (Barcelona, Alicante, Cadiz), and of most recent authors.

Pleuronectes citharus Spinola, "Ann. Mus., x, 166," 1807.

Pleuronectes macrolepidotus Delaroché, "Ann. Mus., xiii, 353," 1809 (and of other European writers, probably not of Bloch).

Solea limanda Rafinesque, Indico, 1810, 14 (after Linnæus).

Solea cithara Rafinesque, Indico, 1810, 52 (based on *Citharus* of Rondelet).

Pleuronectes solea var. *patarachia*, "Naccari, Ichth. Adriat., 11."

Habitat.—Mediterranean Sea.

This species is known to us from specimens in the Museum of Comparative Zoology, from Cette (Theodore Lyman), and from Cadiz (Dr. Steindachner). It does not seem to be very common anywhere.

Genus XVI.—PLEURONECTES.

Pleuronectes Artedi, Genera Piscium, 1738 (includes all flounders).

Rhombus Klein, Pisc. Missus, IV, 34, 1740 (*rhombus*; pre-Linnæan).

Pleuronectes (Artedi) Linnæus, Syst. Nat., ed. x, 1758, 271 (includes all flounders then known).

Rhombus (Klein) Walbaum, Artedi Piscium, 1792 (*rhombus*; non-binomial).

Bothus Rafinesque, Caratteri di Alcuni Nuovi Generi, etc., 1810, 23 (*rumola* = *rhombus*), etc.

Scophthalmus Rafinesque, Indico di Ittiologia Siciliana, 1810, 53 (*rhombus*; *maximus*).

Rhombus Cuvier, Règne Animal, 1817, and of most writers (not of Lacépède) (first subdivision of *Pleuronectes*).

Pleuronectes Fleming, British Animals, 1828, 196 (first restriction of *Pleuronectes*, in which the name *Pleuronectes* is retained; *maximus*).

Psetta Swainson, Nat. Hist. Classif. Anim., ii, 302, 1839 (*maximus*) (not *Psetta* Cuvier).

Pleuronectes DeKay, New York Fauna, Fishes, 1842, 301 (*maximus*).

Psetta Bonaparte, Catalogo Metodico dei Pesci Europei, 1846, 49 (*rhombus*; *maximus*).

Passer Valenciennes, Voyage de la Venus, 1855, 341 (substitute for *Rhombus*, preoccupied; type "le turbot;" not *Passer* Brisson, a genus of birds).

Lophopsetta Gill, Proc. Ac. Nat. Sci. Phila., 1862, 216 (*maculatus*).

Bothus Jordan & Gilbert, Synopsis Fish. N. A., 1882, 815, and in Proc. U. S. Nat. Mus. 1882, 577 (*rhombus*).

Psetta Jordan & Gilbert, Proc. U. S. Nat. Mus. 1882, 577 (*maximus*).

TYPE: *Pleuronectes maximus* Linnæus.

We here include in the genus *Pleuronectes* three species, the Turbot, the Brill, and the "Window-Pane." The Turbot and the Window-Pane are both evidently very closely related to the Brill, although in size and appearance they are quite unlike each other. The Turbot differs strikingly from the other two in a single character, the reduced or rudimentary condition of the scales. This character, however, shows a considerable range of variation in the same species, some turbot being distinctly scaly and others wholly naked, and it is apparently a character which the species has acquired comparatively recently. We have therefore regarded it as of subgeneric value only. We, however, place the two scaly species in a distinct subgenus, *Bothus*, and in the view of a genus taken by many recent authors, *Bothus* and *Pleuronectes* should be regarded as sufficiently distinct. If the non-binomial names of Klein, as reprinted or revived by Walbaum in 1792, be admitted,

Rhombus would take the place of *Bothus* as the name of this subgenus. Our reasons for considering the Turbot as the type of the genus *Pleuronectes* may be briefly stated:

In the earliest restriction of the Linnæan genus, *Pleuronectes*, in which the latter name is retained for one of the subdivisions, the Turbot has been retained as the type. We therefore find ourselves compelled to transfer the name *Pleuronectes* from the small-mouthed flounders to the present group.

The genus *Pleuronectes*, as it appears in the tenth edition of the *Systema Naturæ*, is intended to contain all flat-fishes, 18 of which are characterized and named.

Omitting foreign species, the following table shows the European species included by Linnæus, and the generic names which have since his time been specially based on each of these species:

Hippoglossus.....	<i>Hippoglossus</i> Cuvier, 1817.
Cynoglossus.....	<i>Glyptocephalus</i> Gottsche, 1836.
Platessa..	<i>Platessa</i> Cuvier, 1817; <i>Pleuronectes</i> Swainson, 1839; <i>Pleuronectes</i> Bleeker, 1862.
Flesus.....	<i>Flesus</i> Moreau, 1871.
Limanda.....	<i>Limanda</i> Gottsche, 1835.
Solea.....	<i>Solea</i> Quensel, 1806.
Linguatula.....	<i>Pleuronectes</i> Bonaparte, 1846; <i>Citharus</i> Bleeker, 1862; <i>Bothus</i> Rafinesque, 1810; <i>Scophthalmus</i> Rafinesque, 1810.
Rhombus.....	<i>Rhombus</i> Cuvier, 1817 (preoccupied).
Maximus.....	<i>Pleuronectes</i> Fleming, 1828; <i>Psetta</i> Swainson, 1839; <i>Passer</i> Valenciennes, 1855 (preoccupied).
Passer.....	(An abnormal specimen of <i>Flesus</i> .)

The first subdivision of the genus *Pleuronectes*, after the removal of the soles, seems to have been that of Cuvier. Cuvier subdivides the group into three subgenera, *Hippoglossus*, *Rhombus*, and *Platessa*, retaining the name *Pleuronectes* for the group as a whole, but for none of his subdivisions.

Fleming, next after him, makes use of these subdivisions, but rejecting the name of *Rhombus*, he distinctly adopts the generic name *Pleuronectes* for the "Turbot" group. His genera are, therefore, *Pleuronectes* the "Turbot," *Solea* the "Sole," *Platessa* the "Fluke," and *Hippoglossus* the "Halibut." *Pleuronectes maximus*, the "Common Turbot," is evidently intended as the type of *Pleuronectes*, as understood by him. This is, so far as we have ascertained, the first restriction of the name *Pleuronectes*, to any group of flounders, and if it be so the name *Pleuronectes* must go with the Turbot and its relatives. In that case it would take the place of the preoccupied name *Rhombus*, and of the prior but almost forgotten name of *Bothus*, unless we see fit to place the Turbot and the Brill in different genera, in which case *Bothus* should be used for the Brill.

The next restriction seems to be that of Swainson, in 1839, who indicates *Pl. platessa* as the type of *Pleuronectes*.

Next is the restriction made by DeKay, 1842, who again makes the Tur-

bot the type of *Pleuronectes* by adopting the then nearly obsolete name of *Pleuronectes* in place of *Rhombus*. In 1846 Bonaparte retained the name *Pleuronectes* for a group composed of *Citharus*, *Arnoglossus*, &c. The only Linnæan species mentioned by him, *linguatula*, may be regarded as his type.

In 1862 Bleeker, and following him Günther and nearly all modern authors, have regarded *Pleuronectes platessa* as the type of *Pleuronectes*.

The reason for this view lies apparently in the fact that Artedi before Linnæus had mentioned the species later called *platessa* first in his list of species of *Pleuronectes*. This reason is now regarded as an insufficient one, and the name *Pleuronectes* must retain the signification given it by the first author, who has properly restricted it. We must therefore follow Fleming* in regarding *Pleuronectes maximus* as the proper type of *Pleuronectes*.

ANALYSIS OF THE SPECIES OF PLEURONECTES.

- a. Scales wanting or rudimentary, the blind side nearly or quite naked; eyed side covered with scattered bony tubercles or warts. Vertebræ, 31. (*Pleuronectes*.)
- b. Body broadly ovate, thick, and opaque, the depth about $1\frac{1}{2}$ in the length; head 3 in length, its tubercles much smaller than those on the body; interorbital space flattish, about as wide as eye; anal spine inconspicuous; none of the dorsal rays exerted; gill-rakers rather strong, not as long as eye, about 5+13 in number; lower pharyngeals small, narrow, each with a band of small pointed teeth. D, 62 to 69; A, 45 to 50; vertebræ 12+19=31. Color, grayish or brownish, usually sprinkled with small dark spots.....MAXIMUS, 28.
- x. Scales obsolete..... var. *maximus*, 28, (a).
- x. Scales rudimentary..... var. *maoticus*, 28, (b).
- aa. Scales cycloid, imbricate, well developed on both sides of the body; no bony tubercles. Vertebræ 36. (*Bothus*.)
- c. Anterior rays of dorsal little exerted, the longest about 4 in head; body elliptical ovate, nearly opaque; scales very small; blind side well scaled; no bony tubercles; interorbital space flattish, nearly as wide as eye; gill-rakers moderate, 4+12 in number; lower pharyngeals small, narrow, each with a band of pointed teeth. Head 3 in length; depth $1\frac{1}{2}$. D. 72 to 83; A. 53 to 61; Lat. l. about 130. Vertebræ 12+24=36. Grayish brown, with darker spots and mottlings.....RHOMBUS, 29.
- cc. Anterior rays of dorsal much exerted, free for more than half their length, their length nearly half head; body broadly ovate, subtranslucent; interorbital space flattish; gill-rakers long and slender, about 8+22; blind side of body well scaled; no bony tubercles; head $3\frac{3}{4}$; depth $1\frac{1}{2}$. D. 65; A. 52; Lat. l. about 120. Vertebræ 11+25=36. Color light olive grayish, everywhere on the left side closely spotted with paler and with blackish, the dark spots of various sizes.....MACULATUS, 30.

*Fleming's definition is as follows:

"Gen. XLVI. PLEURONECTES, TURBOT.—Mouth entire; teeth numerous, slender; lateral line curved. Eyes on the left side." The species mentioned by him are:

P. maximus—Common Turbot.

P. rhombus—Brill.

P. megastoma—Whiff.

P. punctatus—Top-knot.

P. arnoglossus—Scald-fish.

28. PLEURONECTES MAXIMUS.

(THE TURBOT.)

[Plates IX and X.]

a. Var. *maximus*.*Rhombus aculeatus* Rondelet, De Piscibus, and of early pre-Linnæan writers.*Pleuronectes maximus* Linnæus, Syst. Nat., ed. x, 271, 1758, and ed. 'xii, 459 (and of early writers generally).*Scophthalmus maximus* Rafinesque, Indice, 14.*Rhombus maximus* Günther, iv, 407, 1862. Steindachner, Ichthyol. Berichte, vi, 1868, 48 (Lisbon, Vigo, Trieste, Constantinople, Odessa, Cadiz). Day, Fishes Great Britain and Ireland, vol. ii, p. 11, plate xcvi.*Psetta maxima* Swainson, Nat. Hist. Fish., ii, 302, 1839.*Pleuronectes cyclops* "Donovan, British Fishes, iv, pl. 90," 1801.*Pleuronectes tuberculatus* Shaw, Gen'l Zool., iv, 312, 1803.*Rhombus aculeatus* Gottsche, Wieg. Archiv, 1835, 172.b. Var. *mæoticus*.*Pleuronectes mæoticus* Pallas, Zoogr. Ross. As., iii, 419, 1811.*Rhombus mæoticus* Günther, iv, 409, 1862 (Erzeroum).*Rhombus stellosus* Bennett, "Proc. Zool. Soc., 1835, 92" (Erzeroum).*Rhombus torosus* Rathke, Fauna der Krym., 349, 1837 (Crimea).*Rhombus rhombitis* Rathke, Fauna der Krym., 351, 1837 (Crimea).

Habitat.—All coasts of Europe except the extreme north. Variety *mæoticus* in the Black Sea and extending into the Mediterranean.

This species is the famous turbot of Europe, a broad, thick flounder, reaching a large size, its surface nearly scaleless and covered with rough warts. In spite of numerous statements to the contrary, the turbot has never been found in American waters. The fish so called by the Bahama and Key West fishermen, and which they often maintain is the turbot of Europe, is a trigger-fish, *Balistes carolinensis* Gmelin.

The turbot is an excellent food-fish, generally common on the coasts of Europe, and everywhere highly prized. It is the most valuable of the European flounders.

According to Dr. Steindachner, there is a complete gradation between the ordinary turbot in which the scales are obsolete and concealed, and the scaly turbot (var. *mæoticus*), which is more or less completely scaly, at least on the left side. Seindachner observes (Ichth. Berichte, ii, 48, 1868):

"Completely scaled on the sides of the body and the head (in part also on the blind side) is a very large individual from Lisbon and two smaller ones from Vigo, and from the Baltic Sea; for the greater part scaly on four examples from Trieste; only here and there on two examples from Odessa and Constantinople, and finally naked on numerous examples from Trieste, Cadiz, and the German Ocean."

The turbot reaches a weight of 40 to 50 pounds or more.

Rhombus torosus Rathke, described from the Crimea, is apparently a local variety of *Pl. maximus*, having the warts on the body elliptical

and the blind side wholly smooth, which is said not to be the case in var. *mæoticus*. *Rhombus rhombitis* is much the same, but sparsely covered with conoid warts.

We find also references to *Rhombus hybridus* Malm (Goteborg, Mus. Arsskr., iii, 1881, 24). We have not seen the original description.

29. PLEURONECTES RHOMBUS.

(THE BRILL.)

- Rhombus lavis* Rondelet, De Piscibus, and of many early non-binomial writers.
Pleuronectes rhombus Linnæus, Systema Naturæ, ed. x, 271, 1758 (after Artedi), and of early writers generally.
Scophthalmus rhombus Rafinesque, Indice di Ittiologia Siciliana, 1810, 53.
Psetta rhombus Bonaparte, Pesc. Europ., 49.
Pleuronectes cristatus Lichteustein, in Bloch & Schneider, Syst. Ichth., 1801, 153 (European Ocean).
Bothus rumolo Rafinesque, Caratteri di Alcuni Nuovi Generi, &c., 1810, 23 (Sicily).
Rhombus vulgaris Cuvier, Règne Animal, 1817 (and of various authors).
Pleuronectes loderma Nardo, Ichth. Adriat. No. 132 (Venice).
Rhombus barbatus Risso, Eur. Merid., iii, 251, 1826 (Nice).
Rhombus lævis Gottsche, Wieg. Archiv, 1835, 175. Günther, iv, 410, 1862. Steindachner, Ichthyol. Berichte, vi, 1868, 48 (Bilbao, Corunna, Vigo, Lisbon, Cadiz, Malaga). Day, Fishes Great Britain, ii, 14, pl. xxvii, and of most recent authors.
Pleuronectes passer Gronow, Syst. ed. Gray, 1854, 90.
Rhombus linnæi Malm, Bohusläns Fauna, 513 (Sweden).

Habitat.—All coasts of Europe, except the very extreme north.

The brill is a common food-fish of Europe, especially southwards. It is less esteemed than the turbot and reaches a very much smaller size. It rarely exceeds 8 or 10 pounds in weight.

30. PLEURONECTES MACULATUS.

(THE WINDOW-PANE.)

- Pleuronectes maculatus* Mitchell, Rept. in Part. Fish. N. Y., 1814, 9 (New York). De Kay, New York Fauna, Fishes, p. 301, tab. 47, fig. 151, 1842. Storer, Syn. Fish. N. A., 1846, p. 479. Storer, Hist. Fish. Nat. Mass., 1867, 204 (Provincetown, Holmes' Hole).
Lophopsetta maculata Gill, Proc. Acad. Nat. Sci. Philad., 1862, 216, and 1864, p. 220. Jordan & Gilbert, Proc. U. S. Nat. Mus., 1878, p. 371 (Beaufort).
Bothus maculatus Jordan & Gilbert, Syn. Fish. N. A., 1882, p. 815.
Pleuronectes aquosus Mitchell, Trans. Lit. and Phil. Soc., 1, 389, pl. 2, fig. 3, 1815 (New York).
Rhombus aquosus Cuvier, Règne Animal. Günther, Cat. Fish., iv, 411, 1862 (New York).

Habitat.—Atlantic coast of United States, from Cape Cod to South Carolina.

This small flounder much resembles the European Brill, but is smaller, thinner, and more translucent in body. Its weight rarely exceeds a pound or two, and its value as a food-fish is but slight; nevertheless, it is a near ally of the European Turbot, and in its technical character it very closely agrees with the latter species.

Genus XVII.—ARNOGLOSSUS.

Arnoglossus Bleeker, Comptes Rendus Acad. Sci. Amsterd., xiii, 1862, 6 (*Arnoglossus laterna*).

TYPE: *Pleuronectes arnoglossus* Bloch & Schneider = *Pleuronectes laterna* Walbaum.

This genus is composed of several species of small translucent flounders, found in the Mediterranean and the East Indies. They much resemble the species of *Citharichthys*, which they represent in the Old World fauna, the arch of the lateral line in *Arnoglossus* constituting the chief difference. The characters of the different European species have not been well set forth by authors, and possibly all the nominal species are reducible to two or three.

We find also in the Zoological Record a reference to *Arnoglossus soleiformis* Malm, Goteborg. Mus., Arsskr., iii, 1881, 24. We have not seen the original description of the fish briefly noticed in this paper, and know nothing of the species thus named. We have also provisionally placed in *Arnoglossus* two American species which we have not seen. These have been referred by their describers to other genera, *Hemirhombus* and *Citharichthys*; but as both have uniserial teeth and an arched lateral line, they would belong technically to *Arnoglossus* rather than to either of these groups. But the one (*finbriatus*) differs from *Arnoglossus* in the small scales and tubercular gill-rakers, while the other has small, firm, strongly ctenoid scales, nothing being said of its gill-rakers. Possibly the two should constitute one or two additional genera between *Arnoglossus* and *Azevia*; but we do not wish to attempt to define these groups without having seen any of their species.

Bleeker has questioned the propriety of distinguishing *Arnoglossus* from *Platophrys*, as the broad interorbital characteristic of *Platophrys* is subject to much variation. As the two genera differ also in various other respects of form, dentition, squamation, &c., we think it best to keep them separate.

ANALYSIS OF SPECIES OF ARNOGLOSSUS.

- a. Mouth small, the maxillary reaching front of pupil, its length about 3 in head; scales rather large, thin, and caducous, weakly ctenoid; 40 to 60 in the lateral line; gill-rakers slender. (*Arnoglossus*.)
- b. [Dorsal fin with four anterior rays produced. D. 95, A. 77, lat. 1. 60. Maxillary $3\frac{1}{2}$ in head; interorbital space a very narrow, sharp ridge. Depth $2\frac{1}{2}$ in length. Color uniform grayish.] (*Günther*).....LOPHOTES, 31.
- bb. Dorsal fin with its second ray much produced, nearly as long as head; body rather deep, the depth $2\frac{1}{2}$ in length; maxillary about reaching front of pupil, 3 in head; eye large, 4 in head; interorbital space not very narrow, with a median groove; D. 80 to 90 (83 in specimens examined), A. 60 to 67 (63 in our specimens); lat. 1. about 55. Curve of lateral line $3\frac{1}{2}$ in straight part; gill-rakers slender and weak, X+6. Vertebrae 10+28=38. Color dark brown, with darker markings; fins spotted.....GROHMANNI, 32.

- aa. Mouth larger, the maxillary reaching middle of eye, its length $2\frac{1}{2}$ to $2\frac{1}{2}$ in head; none of the dorsal rays much produced; body more elongate, the depth $2\frac{3}{4}$ in length. Dorsal rays 86 to 90; anal rays 67 to 70; Lat. l. about 50.
- c. [Maxillary nearly 3 in head; color grayish, dotted with brown.] CONSPERSUS, 33.
- cc. Maxillary $2\frac{1}{2}$ in head; eye large, 4 in head, the interorbital space very narrow, without median groove; curve of lateral line $3\frac{1}{2}$ in straight part; gill-rakers slender and weak, about $X+7$ in number; vertebrae $10+23=33$; color nearly uniform translucent grayish..... LATERNA, 34.
- aaa. Mouth very large, the maxillary about half length of head; scales small, 65 to 70 in the lateral line; species of uncertain position.
- d. [Scales cycloid; mouth very large, the maxillary half length of head; teeth uniserial, those in front of jaws larger, those below largest; some of the teeth depressible; eye 5 in head, the interorbital ridge low, about one-fourth width of eye; gill-rakers tubercular, $X+9$; anterior nostril with a filament one-third length of snout; first ray of dorsal longer than second; lateral line with a slight arch, its length $3\frac{1}{2}$ in the straight portion, none of the dorsal rays produced; head $3\frac{1}{2}$; depth nearly 2; D. 80; A. 60; Lat. l. 70; color grayish-brown; the dorsal and anal fins each with two roundish dark blotches on their posterior half, each larger than the eye; a similar dark blotch on base of caudal; pectoral with a dark band at base, its outer half marked with a dark blotch, which is reticulated and mottled with lighter; the intervening part of the fin pearly white, with dark specks on the rays] (*Goode & Bean*)... FIMBRIATUS, 35.
- dd. [Scales strongly ctenoid, firmly fixed; lateral line with the "curved portion bold and sharply defined"; eye large, $3\frac{1}{2}$ in head, about eight times the diameter of the interorbital space, which is very narrow and scaleless; maxillary nearly half length of head; dorsal fin beginning on the blind side, before the eyes; pectoral about as long as head; caudal fin subsessile; ventral of eyed side enlarged in the male, its length $3\frac{1}{2}$ in body, about three times length of right ventral; head 4; depth $2\frac{1}{2}$; D. 93; A. 73; Lat. l. 66 (20+46); color light brownish-gray; a dark blotch as long as eye on anterior rays of anal; another paler at end of curve of lateral line; a few obscure dusky blotches elsewhere on body] (*Goode & Bean*)..... VENTRALIS, 36.

31. ARNOGLOSSUS LOPHOTES.

? *Bothus imperialis* Rafinesque, Caratteri, 1810, 23 (Palermo).
Arnoglossus lophotes Günther, iv, 417, 1862 (European, probably British).

Habitat.—Mediterranean Sea.

We do not know the species called *Arnoglossus lophotes*. In fact only the original types, dried skins from unknown locality, seem to be known as yet. Among the Mediterranean fishes, this one approaches most nearly to the description given by Rafinesque of his *Bothus imperialis*. The name *imperialis* should therefore perhaps be adopted in place of *lophotes*. According to Doderlein, the "Tappa or Linguata Impiriali" of the Sicilian fishermen is *Arnoglossus bosci*. This, according to Day, would be *Lepidorhombus whiffiagonis*, but Rafinesque's description cannot well be applied to the latter species. The following is a translation of Rafinesque's description:

"*Bothus imperialis*.—Almost three times longer than broad, dorsal fin beginning before the eyes; lateral line arched at the base; left side smooth olive, clouded with dusky; right side white; tail even. It is

called *Tappa Impiriali* or *Linguata Impiriali*. It is still better than the *Linguata* to eat. It is rarely taken, because it lives on the sandy or muddy bottoms of the sea, where it creeps under the sand or the mud. It is very distinct from the preceding (*B. tappa*) being larger; it has the following numbers of fin-rays, that is, dorsal nearly 100; anal nearly 80; ventrals 8; pectorals 12; caudal 15."

According to Day, Proc. Zool. Soc. Lond., 1882, 748, pl. 53, as quoted in the Zoological Record for 1882, this *Arnoglossus lophotes* is identical with *Arnoglossus grohmanni*. If so the latter species may have been the original *Arnoglossus imperialis*.

32. ARNOGLOSSUS GROHMANNI.

? *Bothus imperialis* Rafinesque, Caratteri di alcuni nuovi generi e specie, 1810, 23 (Palermo).

Pleuronectes grohmanni Bonaparte, Fauna Ital., Pesci, 1837.

Arnoglossus grohmanni Günther, Cat. Fish., iv, 417, 1862. (Mediterranean.) Steindachner, Ichthyol. Bericht. Akad. Wissen. Wien, 1868, Sechste Fortsetzung, p. 50. (Barcelona, Cadiz, Malaga.)

This small flounder seems to be rather common in the Mediterranean. It reaches a larger size than *A. laterna*, and it is less transparent than the latter. The numerous specimens examined by us were collected by Dr. Jordan at Venice.

33. ARNOGLOSSUS CONSPERSUS.

Arnoglossus conspersus Canestrini, "Archiv Zool., i, 10, tav. 1, f. 2, 1861." Günther, iv, 416 (copied). Steindachner, Ichthyol. Bericht. Akad. Wissen. Wien, 1868, Sechste Fortsetzung, p. 50 (Malaga). Vinciguerra, Risultate Ittiol. del Violante, 1883, 104 (Genoa).

Habitat.—Mediterranean Sea.

We have not seen this species, and regard it as distinct from *Arnoglossus laterna*, chiefly because it is so considered by Dr. Steindachner. Dr. Vinciguerra gives a comparison of the two species, thinking them very doubtfully distinct, but without reaching a positive conclusion.

34. ARNOGLOSSUS LATERNA.

(THE SCALD-FISH.)

Arnoglossus (Perpeire) Rondelet, De Piscibus, xi, c. 14, 324, 1554.

Pleuronectes laterna Walbaum, Artodi Piscium, 204, 1792 (after Rondelet).

Arnoglossus laterna Günther, Cat. Fish., iv, 415, 1862. (Cannes, Broxham, Plymouth.) Steindachner, Ichthyol. Bericht. Akad. Wissen. Wien, 1868, Sechste Fortsetzung, p. 50. (Barcelona, Alicante, Malaga.) Day, Brit. Fishes, vol. ii, p. 22, plate xcix, fig. 2.

Pleuronectes arnoglossus Bloch and Schneider, 1801, p. 157.

Pleuronectes diaphanus Shaw, Gen'l Zool., iv, 309, 1803.

Pleuronectes casurus Pennant, "Brit. Zool., 1812, iii, 325, pl. 53."

Pleuronectes icotardi Risso, Ichth. Nice, 318, 1810.

? *Bothus tappa* Rafinesque, Caratteri, 1810, 23 (Palermo).

Solea arnoglossa Rafinesque, Indice, 1810, 52 (after Perpeire of Rondelet).

Rhombus nudus Risso, Eur. Mérid., iii, 251, 1826.

Pleuronectes pellucidus Nardo, Ichth. Adriat., 134, 1824.

Habitat.—Coasts of Southern Europe, north to England.

This small flounder reaches a length of about six inches. It is common in the Mediterranean and as far north as the English coast. Our specimens were collected by Dr. Jordan in Venice.

35. ARNOGLOSSUS (?) FIMBRIATUS.

Hemirhombus fimbriatus Goode & Bean, Proc. U. S. Nat. Mus., 1885, 591. (Deep waters of the Gulf of Mexico.)

Habitat.—Deep waters of the Gulf of Mexico.

We know this species from the original description only. As the authors of the species say that "the teeth are uniserial in both jaws" we are unable to see why they have placed it in *Hemirhombus*. So far as the description goes it agrees better with *Arnoglossus*, in which genus we have provisionally placed it. But the gill-rakers in *fimbriatus* are said to be tubercular, as in *Azevia*, while those of *Arnoglossus* are slender. The proper position of the species is therefore uncertain.

36. ARNOGLOSSUS (?) VENTRALIS.

Citharichthys ventralis Goode & Bean, Proc. U. S. Nat. Mus., 1885, 592. (Deep waters of Gulf of Mexico.)

Habitat.—Deep waters of Gulf of Mexico.

We know this species from the original description only. It is certainly not a *Citharichthys*. Among the known genera it seems to come nearest *Arnoglossus* or to *Lepidorhombus*, but the latter genus has a pedunculate caudal and teeth on the romer, while the former has cycloid or scarcely ctenoid deciduous scales.

Genus XVIII.—PLATOPHRYS.

Solea Rafinesque, Indice di Ittiologia Siciliana, 1810, 52 (*rhomboides*) (not of Quensel, 1806).

Platophrys Swainson, Nat. Hist. Class'n Fishes, ii, 1839, 302 (*ocellatus*).

Feloria Cocco, Intorno ad Alcuni Pesci del mar di Messina, Giorn. del Gabin., 1844, pp. 21-30, Lettere di Messina (*heckeli*, a larval form of *P. podas*) (not *Pelorus* of Montfort, 1808).

? *Coccolus** (Bonaparte) Cocco, l. c. (*annectens*: larval form—probably of *P. podas*, with the right eye in transitu to the left side).

Bothus Bonaparte, Catalogo Metodico, 1846, 49 (*podas*) (not of Rafinesque).

Rhomboidichthys Bleeker, Act. Soc. Sci. Indo-Nederl. Manad. & Makassar, 67 (*myriaster*), 1857-'8.

Platophrys Bleeker, Comptes Rendus Acad. Sci. Amstérd., 1862, xiii *Pleuron*, 5 (*ocellatus*).

* "Parvus mole et pleuronectiformis, medius inter *Pleuronectidas* et *Bibroninos* hic piscis videtur! Attamen dum illi oculos unilaterales habeant, iste vero bilaterales; in hoc novo genere oculi, alter a latere, altero in vertice vix ad appositum latus convenus positi sunt." (Bonaparte: quoted by Facciola, Su di Alcuni Rari Pleuronettidi.)

TYPE: *Rhombus ocellatus* Agassiz.

This well-marked genus is widely diffused in the warm seas. The sexual differences are greater than usual among flounders, and the different sexes have often been taken for different species. As a rule, in the males the pectoral fin of the left side is much prolonged, the inter-orbital area is much widened and very concave, and there are some tubercles about the snout and lower eye. The young fishes, as is usually the case, resemble the adult females. This genus has been generally called *Rhomboidichthys*, but the appropriate name, *Platophrys*, is earlier, as Bleeker has already noticed.

Lately Dr. Emery has shown that the larval flounder, known as *Peloria heckeli*, is in all probability the young of *Pleuronectes podas*.

The generic name *Coccolus*, based on forms slightly more mature than those called *Peloria*, probably belongs here also.

We have seen no larval forms so young as those which have been described as *Peloria heckeli*. We have, however, examined small transparent flounders, one with the eyes quite symmetrical, taken in the Gulf Stream, and another with the eyes on the left side, taken at Key West. Both these may be larvæ of *Platophrys ocellatus*. The figures published by Emery seem to make it almost certain that the corresponding European forms belong to *P. podas*, although some doubt as to this is expressed by Facciola.

The species of *Platophrys* are widely distributed through the warm seas, no tropical waters being wholly without them. The group called *Engyprosopon* seems to be worthy of generic distinction from *Platophrys*, as its scales are large and rough ctenoid. All the known species of *Engyprosopon* are Asiatic.

All the species of *Platophrys* are extremely closely related and can be distinguished with difficulty. On the other hand the variations due to differences of age and sex are greater than in any other of our genera.

A species apparently belonging to *Platophrys* has been scantily described by Schneider (*Systema Ichthyologia*, 1801, 156) under the name of *Pleuroneotes surinamensis*. His types were small, smooth individuals ("exempla satis parva et glabra"), with the fins scaly, the mouth small, the lateral line arched in front, and the dorsal rays 96, the anal rays 55. These may be the young of any of the West Indian species, possibly of *P. lunatus* or *ocellatus*.

The following analysis of the species of *Platophrys* will doubtless be found to be very unsatisfactory. There are certainly three species (*podas*, *maculifer*, and *lunatus*) which are known to be distinct in their adult state. The young forms of *maculifer* and *lunatus* are not well known, nor is it known how they differ from *ocellatus*, *spinusosus*, and other species which presumably reach a smaller size. Only a thorough study of the species, in all stages of development, in their native waters can give us the characters by which the species can be really discriminated.

ANALYSIS OF SPECIES OF PLATOPHRYS.

- a. Anal rays—at least anteriorly—each with a spinule at base (these are formed by a slight widening of the tip of the interhæmal spines, each being covered by a little rough scale); front of dorsal with similar projections.
- b. Color brownish, more or less marked with spots of light blue and brownish, which are usually edged with darker, these usually arranged in rings; a large black blotch on the lateral line; mouth small, the maxillary 4 in head; interorbital width ranging with age and sex from $2\frac{1}{2}$ to $4\frac{1}{4}$ in head; snout short, scarcely forming a re-entrant angle at its base; an angle opposite upper eye; depth $1\frac{1}{2}$ in length, D. 85 to 91, A. 70.
PODAS, 37.
- bb. Color brown, covered with pale rounded spots; fins dotted with brown; a faint dark spot at first third of lateral line; snout with horny points; mouth small, the maxillary reaching front of eye. Eyes very wide apart, $2\frac{3}{4}$ in head; the interorbital space $1\frac{1}{2}$ in head; pectoral fin short; curve of lateral line 5 in straight part. Depth $1\frac{3}{4}$ in length. D. about 74; anal about 57. Scales about 80. (Described from specimens $4\frac{1}{2}$ inches long, which have been partly dried before being placed in alcohol) SPINOSUS, 38.
- aa. Anal rays without spinules at their base.
- c. Anterior profile of head convex before the interorbital area, the very short snout scarcely forming a re-entrant angle at its base; form elliptic-ovate, the outlines more regular than in *Pl. lunatus*.
- d. Dorsal rays 85 to 95.
- e. Scales not very small, about 75 pores in the lateral line. (No blue markings, at least in young specimens.)
- f. Mouth small, the maxillary 3 in head; no spines about the snout; eye $3\frac{1}{4}$ in length; interorbital width 3 in head (in types); pectoral short; curve of lateral line 6 times in straight part; color dark brown, with numerous stellate white spots, the most distinct of them with darker edgings; these generally scattered over the body, but some of them on sides of body are gathered together in little rings. (Perhaps these spots are blue rather than white in life.) Fins mottled with dark brown, the pectoral finely barred. Head 4 in length; depth $1\frac{1}{2}$; D. 89, A. 65, scales 75. Specimens examined, $3\frac{1}{2}$ inches long. CONSTELLATUS, 39.
- ff. Mouth smaller, the maxillary $3\frac{1}{2}$ in head; eye $3\frac{1}{2}$ in head; interorbital space $2\frac{1}{2}$; teeth small, biserial above; arch of lateral line 2 in head. Head 4 in length; depth $1\frac{1}{4}$. D. 85 to 90. A. 64 to 67. Lat. 1. 72 to 78. Color light grayish, tinged with reddish, with small round spots of darker gray, and with lighter rings inclosing spaces of the ground color; vortical fins, similarly colored, with a small black spot at base of each 9th or 10th ray; two black spots on lateral line; some other black spots on body and on caudal fin. Vertebrae, 37. OCELLATUS, 40.
- ee. Scales smaller, 90 to 95 pores in the lateral line. Mouth small, oblique, the maxillary $3\frac{1}{2}$ in head; teeth in both jaws in two irregular series; arch of lateral line $2\frac{1}{2}$ in head. Head 4; depth $1\frac{1}{2}$. D. 90 to 95. A. 70. Lat. 1. 90 to 95. Color of adult reddish gray, the body everywhere covered with rings formed of round, sky-blue spots, which are not confluent and are not edged with black; besides these, very few detached spots or other blue markings; head with similar blue spots, but no rings; area inclosed in the blue rings not different from the ground color; caudal with blue spots, other fins with none; dorsal and anal mottled; a large, diffuse, dusky spot at front of straight part of lateral line, one better defined on middle of lateral line; a faint one farther back; pectorals grayish, with dark bars. MACULIFRONS, 41.

- dd.* Dorsal rays, 105; anal rays, 80; pectoral short; interorbital space $2\frac{1}{2}$ in head; depth $1\frac{1}{2}$ in length; scales 91; body deep; color (specimen $4\frac{1}{2}$ inches long) grayish, much spotted and mottled with whitish; no blue (in young example).....ELLIPTICUS, 42.
- cc.* Anterior profile of head strongly concave before interorbital area, the projecting snout leaving a marked re-entrant angle above it.
- g.* Mouth not very small; the maxillary 3 in head; head $3\frac{1}{2}$ in length; depth 2; D. 95; A. 70; lat. l. 90. Teeth small, in an irregular double series in each jaw; color dark olive, with many rings, curved spots, and small round dots of sky-blue edged with darker on body, these largest near middle of sides, where some are as large as the eye; three obscure dark blotches on straight part of lateral line; head and vertical fins with sharply defined blue spots, which are mostly round; spots on opercles, larger and curved; pectorals with dark bars; vertebrae 9+30=39.
LUNATUS, 43.
- gg.* Mouth small; the maxillary $3\frac{1}{2}$ in head; head $3\frac{1}{2}$; depth $1\frac{1}{2}$; D. 86 to 88; A. 62 to 67; lat. l. 80; teeth very small, biserial above; color highly variegated with different shades of gray, the pale blotches rounded, very irregular in size and position; no blue spots; no black spots along lateral line; a large whitish cloud between the eyes.
LEOPARDINUS, 44.

37. PLATOPHRYS PODAS.

- Rhomboides* Rondelet, De Piscibus, 1554.
- Pleuronectes podas* Delaroché, "Ann. Mus., xiii, 354, tab. 24, fig. 14, 1809."
- Rhomboidichthys podas* Günther, Cat. Fish., iv, 432, 1862. (Sicily.) Vinciguerra, Risultati Ittiologici del Violante, 1883, 106. Emery, Contribuzioni all' Ittiologi, 405. (Interesting discussion of larval forms.)
- Bothus podas* Steindachner, Ichthyol. Bericht., 1868, Sechste Fortsetzung, p. 51. (Barcelona, Cadiz, Gibraltar, Santa Cruz de Teneriffe.)
- Solea rhomboide* Rafinesque, Indice, 1810, 52 (after Rondelet).
- Bothus rhomboides* Bonaparte, Catalogo Metodico, 1836, 49.
- Pleuronectes argus* Risso, Ichth. Nice, 1810, 317 (not of Gmelin).
- Pleuronectes mancus* Risso, Ichth. Nice, 1810, 317 (not of Bronssonet, whose species was from the Pacific Ocean = *Platophys mancus*).
- Rhomboidichthys mancus* Günther, iv, 432, and of many European writers.
- Rhombus diaphanus* Rafinesque, 1814 (larval form). Ricchiardi, "Soc. Toscana Sci. Nat., 1881."
- Rhombus candidissimus* Risso, Europe Méridionale, iii, 253, 1826 (larval form).
- Rhombus generi* Risso, Europe Mérid., 1826, iii, 254.
- Rhombus heterophthalmus* Bennett, "Proc. Comm. Zool. Soc., 1831, 147."
- Rhombus madeirensis* Lowe, "Proc. Zool. Soc., 1833, 143." (Madeira.)
- Petoria heckeli* Cocco, "Alcuni Pesci del mar di Messina," 1844, 20 (larval form).
- ? *Coccolus annectens* (Bonaparte) Cocco, l. c. (larva).
- Rhombus serratulus* Valenciennes, "Webb & Berthelot, Iles Canar. Poiss., 82, pl. 18, fig. 1," 1835-'50.
- Pleuronectes cuspidatus* "Machado, Catalogo, 26" (fide Steindachner).

Habitat.—Mediterranean fauna.

This species is not rare in the Mediterranean and adjacent islands. The specimens examined by us are from Genoa and Fayal. The two species mentioned by numerous authors under the names of *podas* and *mancus* have been shown by Dr. Steindachner to be the two sexes of the same fish, while Dr. Emery has shown that the translucent fish,

Peloria heckeli = *Rhombus candidissimus* = *Rhombus diaphanus*, is the larva of the same form, as is probably also the *Coccolus annectens* of Bonaparte.

38. PLATOPHRYS SPINOSUS.

Rhomboidichthys spinosus Poey, Synopsis, p. 409, 1868. Poey, Enum. Pis. Cub., p. 139, 1875.

Habitat.—West Indian fauna.

The original description of this species is a very scanty one. In all respects, unless it be the color, it agrees with the European *Pl. podas*.

We have found two small specimens sent by Professor Poey to the Museum of Comparative Zoology, which may be the types of this species. They are $4\frac{1}{2}$ inches long, and have been partly dried in the sun. A result of this has been to increase the prominence of the interhæmal spines. Whether these be the original types or not, the species is an extremely doubtful one. The eyes are farther apart in these specimens than in any of *P. ocellata* which we have examined. They agree in this respect with Agassiz's figure of *Rhombus ocellatus*.

39. PLATOPHRYS CONSTELLATUS.

Platophrys constellatus Jordan, sp. nov.

Habitat.—Galapagos Archipelago.

This species is described from three specimens, the largest $3\frac{1}{2}$ inches long, numbered 11146 on the register of the Museum of Comparative Zoology. They are from James Island, in the Galapagos. The species is closely related to *P. ocellatus* and others, but in color, at least, it is different, and its habitat is remote.

40. PLATOPHRYS OCELLATUS.

Rhombus ocellatus Agassiz, Spix Pisc. Brasil., 1829.

Platophrys ocellatus Swainson, Nat. Hist. Class'n Fishes, ii, 1839. (Name only.)

Rhomboidichthys ocellatus Günther, Cat. Fish. Brit. Mus., 1862, iv. (Bahia, Cuba.)

Poey, Synopsis, 1868, 408. (Havana.)

Rhombus bahianus Castelnau, Anin. nouv. rares Amérique du Sud, 1855. (Bahia.)

Platophrys nebularis Jordan & Gilbert, Proc. U. S. Nat. Mus., 1894, 31, 143. (Key West.)

Habitat.—Tropical America; sandy shores from Long Island to Rio Janeiro.

We know this species from the numerous small specimens taken by Dr. Jordan at Key West, which have been described as *Platophrys nebularis*. A specimen similar to these has been taken by Dr. Bean on the south coast of Long Island.

This seems to be the same as the Cuban species called *Rhomboidichthys ocellatus* by Poey, and some of the specimens sent by Poey to the Museum of Comparative Zoology are apparently identical with the types of *nebularis*.

In the Museum of Comparative Zoology we have compared speci-

mens of the real *Platophrys ocellatus* (No. 11423, Rio Janeiro, Agassiz), with a representative specimen of *P. nebularis* (No. 26147, from the Tortugas, Florida), and are unable to find any differences.

We adopt, therefore, the name *Platophrys ocellatus* for all, and regard it as one of the widely-distributed flounders, like *Etropus crossotus* and *Citharichthys spilopterus*.

41. PLATOPHRYS MACULIFER.

? *Pleuronectes maculiferus* Poey, Mem., ii, p. 316, 1860. (Cienfuegos.)

? *Rhomboidichthys maculiferus* Poey, Synopsis, p. 403, 1863. Poey, Enum. Pis.Cub., p. 139, 1875.

Platophrys ellipticus Jordan, Proc. U. S. Nat. Mus., 1886, 51 (Havana) (not of Poey ?).

We identify specimens taken by Dr. Jordan at Havana and by him described as *Platophrys ellipticus*, with this species simply because we cannot place them anywhere else. In the Museum of Comparative Zoology are other specimens similar to these, sent to Cambridge by Poey. In several respects these species agree fairly with Poey's *ellipticus*, but that species is said to have 104 dorsal rays.

42. PLATOPHRYS ELLIPTICUS.

? *Pleuronectes ellipticus* Poey, Memoriae, ii, 315, 1860. (Cuba.)

? *Rhomboidichthys ellipticus* Günther, iv, 434, 1862 (copied). Poey, Synopsis, 403, 1863. Poey, Enumeratio, 139, 1875.

Habitat.—West Indian fauna.

Poey describes his *Pl. ellipticus* as having 104 dorsal rays. In none of our other species does the number of these rays reach 100. Among the specimens sent by Poey to the museum at Cambridge is one, 4 $\frac{3}{4}$ inches long, which has 105 dorsal rays. We have therefore assumed that the species to which this specimen belongs is the real *ellipticus*, and that the one heretofore called *ellipticus* is Poey's *maculifer*. Both these assumptions are open to considerable doubt.

43. PLATOPHRYS LUNATUS.

Solea lunata et punctata (THE SOLE) Catesby, Nat. Hist. Carolina, tab. 27, 1725 (Bahamas).

Pleuronectes lunatus Linn., Syst. Nat., ed. x, 269, 1758 (based on Catesby), and of the various copyists.

Rhomboidichthys lunatus Günther, Cat. Fish., vol. iv, p. 433 (Jamaica). Poey, Synopsis, p. 403, 1863.

Rhomboidichthys lunulatus Poey, Enum. Pis. Cub., p. 133, 1875.

Platophrys lunatus Jordan, Proc. U. S. Nat. Mus., 1886, 51 (Havana).

Pleuronectes arjys Bloch, Ichthyol., tab. 48, 1783.

? *Pleuronectes surinamensis* Bloch & Schneider, Syst. Ichth., 1801, 156 (Surinam); and of copyists.

Habitat.—West Indian fauna.

This handsome and curiously colored species is not rare in the waters of the West Indies. The specimens examined by us are from Cuba, Sombrero, St. Thomas, and other localities in the West Indies. The

original figure of this species published by Catesby is a very good one and leaves no room for doubt as to the species intended. The figure of Bloch, called *Pleuronectes argus*, is also fairly accurate, and can refer to no other species.

This species reaches a length of some 18 inches, and is the largest in size of the American species of *Platophrys*. We have never seen any young examples which certainly belong to it, and till its development is traced some of the species known from small examples only must be doubtful.

44. PLATOPHRYS LEOPARDINUS.

Rhomboidichthys leopardinus Günther, Cat. Fish., iv, 1862, 434 (locality unknown).
Platophrys leopardinus Jordan, Proc. U. S. Nat. Mus., 1884, p. 260 (Guaymas).

Habitat.—Gulf of California.

This species is known only from the original type from unknown locality, and from a single specimen in the U. S. National Museum, taken by Mr. H. F. Emeric, at Guaymas.

Genus XIX.—SYACIUM.

Syacium Ranzani, Novis Speciebus Piscium, Diss. Sec., 1840, 20 (*micrurum*).
Hemirhombus Bleeker, Comptes Rendus Acad. Sci. Amsterd., xiii, Pleuron, 4 (1862), (*guineënsis*).
Aramaca Jordan & Goss, Cat. Fish. N. A., 1885, 133 (*patula*).

TYPE: *Syacium micrurum* Ranzani.

This genus contains a considerable number of species, mostly American and African, which form a transition from *Platophrys* to *Citharichthys*. They fall readily into two groups or subgenera, distinguished by the width of the interorbital space. As this width is dependent on age and as it is subject to various intergradations, the group *Aramaca* founded on it cannot be admitted as a distinct genus.

The name *Syacium*, based especially on *Syacium micrurum*, must take the place of *Hemirhombus*.

ANALYSIS OF SPECIES OF SYACIUM.

- a. [Snout before upper orbit with three conspicuous spinous processes; maxillary reaching beyond eye, $2\frac{1}{2}$ in head; interorbital space scaly, concave, 2 in eye (in specimens of $3\frac{1}{2}$ inches); eye $2\frac{1}{2}$ in head; spines on snout about 3 in eye; no produced fin rays; pectoral as long as head without snout; head blunt, higher than long, the profile straight; lateral line without arch; head 3; depth 2; D. 78, A. 62; scales 48; color grayish, with large distant black blotches on dorsal and anal; one or two on basal half of caudal and on end of caudal peduncle; pectoral with dark bands.] (*Günther*) CORNUTUM, 45.
- aa. Snout and orbits without spines or spinous processes.
- b. Scales larger, 50 to 57 in the lateral line; interorbital space very broad, greater than the long diameter of the eye in the males, about equal to the vertical diameter in the females; accessory scales very numerous; maxillary $2\frac{1}{2}$ in head; its tip scaly; anterior teeth canine-like: gill-rakers short, strong, not one-third

length of eye; first rays of dorsal nearly on median line, their tips much exserted; pectoral fin in males $1\frac{1}{2}$ to 2 times length of head; eye large, $4\frac{1}{2}$ in head; head $3\frac{1}{2}$; depth $2\frac{1}{2}$; D. 81 to 88, A. 63 to 70; vertebræ $10 + 26 = 36$; color nearly plain brown, with darker dots or mottlings, no ring-like spots or ocelli; fins mottled; left pectoral barred; blind side sometimes wholly or partly dusky, especially in Northern specimens PAPILLOSUM, 46.

bb. Scales rather small, 60 to 70 in the lateral line.

c. Color dark brown, with many rings and spots of light gray and blackish, some of the dark rings with a black central spot; a diffuse dusky blotch on lateral line above pectoral, and one near base of caudal peduncle; fins with numerous inky spots and dark markings; blind side pale; scales small, firm, moderately ctenoid; eyes large, 4 in head, nearly even in front, the male with the interorbital space deeply concave; its width two-thirds the vertical depth of the eye; female with interorbital area much narrower, with a more or less perfect median groove; its width about equal to depth of pupil; maxillary $2\frac{1}{2}$ to 3 in head; the outer teeth canine-like; gill-rakers very short and thick, about $X + 7$ in number; head $3\frac{1}{2}$ in length; depth, $2\frac{1}{2}$; D. 87 to 92, A. 54 to 68; scales 65 to 70 pores; vertebræ $9 + 24 = 33$; pectoral $1\frac{1}{2}$ in head in the female, reaching nearly to base of caudal in the male MICRURUM, 47.

cc. Color light brown, with grayish and light bluish dots, some darker areas and a few round brown spots ocellated with lighter; interorbital space with a vertical brown bar bordered by lighter; fins mottled and spotted; interorbital space in adult male broader than eye; insertion of dorsal on blind side of head; pectoral fins in males about 3 in body; head, 4 in length; depth, $2\frac{1}{2}$; D. 92, A. 72, Lat. l. 60; gill-rakers short and broad, $X + 7$; maxillary $2\frac{1}{2}$ in head, its tip scaly LATIFRONS, 48.

ccc. Color light olive-brown, nearly uniform, the vertical fins with elongate dark spots; eyes $4\frac{1}{2}$ in head, the lower slightly advanced; interorbital space very narrow, as broad as pupil (in both sexes!), somewhat concave; maxillary $2\frac{1}{2}$ in head; pectoral $1\frac{1}{2}$ in head; head $3\frac{1}{2}$ in length; depth $2\frac{1}{2}$; D. 86, A. 69, Lat. l. 58 OVALE, 49.

45. SYACIUM CORNUTUM.

Rhomboidichthys cornutus Günther, Shore Fishes Challenger, 1880, 7, pl.

Habitat.—Coast of Brazil, in deep water.

This species is known from Günther's description and figure. In very young examples the conspicuous processes about the head are undeveloped.

46. SYACIUM PAPILLOSUM.

Aramaca Maregrave, Hist. Brasil., 1648, 181.

Pleuronectes papillosus Linnæus, Syst. Nat., x, 271, 1758 (based on Maregrave), and of the earlier copyists.

Aramaca papillosa Jordan, Proc. U. S. Nat. Mus., 1886, 602 (synonymy confused with *S. micrurum*).

? *Pleuronectes macrolepidotus* Bloch, Ausländische Fische, vi, 25, tab. 190, 1787 (and of some copyists) (apparently based on Maregrave).

Pleuronectes aramaca Donndorf, Beyträge zur xiii Ausgabe des Linnæischen Natursystems, 1793, 336 (after Maregrave).

Rhombus aramaca Cuvier, Règne Animal, ed. ii, 1827 (after Maregrave).

Citharichthys aramaca Jordan and Gilbert, Synopsis Fish., N.A., 1882, 816. (Pensacola.)

Rhombus soleaformis Agassiz, Spix Pisc. Brasil., 86, tab. 47, 1829. (Atlantic Ocean.)

Hemirhombus soleaformis Günther, Cat. Fish., iv, 423, 1862. (Copied.)

Aramaca soleaformis Jordan, Proc. U. S. Nat. Mus., 1886.

- Hippoglossus intermedius* Ranzani, *Novis Speciebus Piscium Dissertatio Secundo*, 1840, 14, pl. 4. (Brazil.)
Hemirhombus patulus Bean MSS, Jordan and Gilbert, *Proc. U. S. Nat. Mus.*, 1882, p. 304. (Pensacola.) Goode and Bean, *Proc. U. S. Nat. Mus.*, 1882, p. 414. (Pensacola.) Bean, *Cat. Col. Fish U. S. Nat. Mus.*, 1883, p. 45. (Pensacola.)
Citharichthys patulus Jordan and Gilbert, *Syn. Fish. N. A.*, p. 964, 1882, addenda. Jordan, *Proc. U. S. Nat. Mus.*, 1884, p. 38. (Pensacola.)

Habitat.—West Indian fauna. Charleston to Rio Janeiro.

Of the species found in the deep waters about Pensacola and called by Dr. Bean *Hemirhombus patulus* we have numerous specimens. Lately we have received from Mr. Charles C. Leslie, of Charleston, a specimen which shows its presence also in Carolina waters. It has not yet been recorded from Cuba, but in the Museum of Comparative Zoology is a specimen (26104) taken by Mr. Samuel Garman at Kingston, Saint Vincent. But its range extends much farther to the southward, for among the collections made by Professor Agassiz at Rio Janeiro there are many specimens (11375, 4666), the largest about a foot long. These seem to be completely identical with Florida examples, differing only in having the blind side pale, it being usually partly blackish in northern examples.

These Brazilian specimens agree very closely with the figure of *Rhombus soleæformis*, except that Agassiz has represented that species as having a dusky blotch at the shoulder. No such marking is apparent in any of our specimens. The coloration and the breadth of the interorbital both render it unlikely that Agassiz's *soleæformis* could have been *micrurum*.

The *Aramaca* of Maregrave, which is the sole basis of *Pleuronectes papillosus*, *Pleuronectes macrolepidotus*, and *Rhombus aramaca*, cannot well be any known species other than the present one.

According to Maregrave's rude figure and his description, this species has the form of a sole, the eyes wide apart, the left pectoral produced, the mouth very large, the body oblong, and the coloration stone-like (sand-color) on the left side and white on the eyed side. *Micrurum* is not colored in that way, and its eyes are not noticeably far apart.

We therefore adopt for this species the oldest name of *Syacium papillosum*.

The species is common in the deep waters of the Gulf of Mexico, and reaches a length of more than a foot.

47. SYACIUM MICRURUM.

- Syacium micrurum* Ranzani, *Nov. Spec. Pisc. Diss. Sec.*, 1840, 20, pl. 5. (Brazil.)
Hippoglossus ocellatus Poey, *Memorias*, ii, 314, 1860. (Cuba.)
Hemirhombus ocellatus Poey, *Synopsis*, 407, 1868. Poey, *Enumeratio*, 138, 1875.
Citharichthys ocellatus Jordan and Gilbert, *Syn. Fish. N. A.*, 964, 1882. (Key West.) Jordan, *Proc. U. S. Nat. Mus.*, 1884, 143. (Key West.)
Hemirhombus aramaca Günther, iv, 42, 1862. (Cuba; Jamaica.) (Not *Rhombus aramaca* Cuvier.)
Citharichthys æthalion Jordan, *Proc. U. S. Nat. Mus.*, 1886, 52. (Havana.)
Hemirhombus æthalion Jordan, *Proc. U. S. Nat. Mus.*, 1886, 602.

Habitat.—West Indian fauna. Key West to Rio Janeiro.

We have found in the Museum of Comparative Zoology specimens purporting to be the types of *Hemirhombus ocellatus* Poey (No. 11144; Poey's number, 88). These are female specimens, and they differ from the types of *Hemirhombus æthalion*, also from Cuba, only in their greater size.

Numerous specimens (11373) from Rio Janeiro belong to the same species. Among these are males, which have the interorbital space much broader than in the types of *ocellatus* and *æthalion*. Besides these specimens, we have examined others from Hayti, Cuba, and Key West, and there can be no reasonable doubt of their identity, and that all are identical with Günther's *Hemirhombus aramaca*.

This fish is described and fairly well figured by Ranzani under the name of *Syacium micrurum*. It is the type of his genus *Syacium*, a generic name which, strangely enough, has received no notice from subsequent authors until the present time.

48. SYACIUM LATIFRONS.

Citharichthys latifrons Jordan and Gilbert, Bull. U. S. Fish Comm., 1881, 334. (Panama.)

Habitat.—Pacific coast of tropical America. Panama.

This species is known only from the original types, taken by Professor Gilbert at Panama. The several variations in this species have not been studied.

49. SYACIUM OVALE.

Hemirhombus ovalis Günther, Proc. Zool. Soc., 1864, p. 154. Günther, Fish. Central America, p. 472, 1869, plate lxxx, fig. 1. (Panama.) Jordan & Gilbert, Bull. U. S. Fish Com., 1882, p. 108-111. (Mazatlan; Panama.)

Citharichthys ovalis Jordan, Proc. U. S. Nat. Mus., 1885; 391. (Mazatlan; Panama.)

Habitat.—Pacific coast of tropical America: Mazatlan to Panama.

This well-marked species has been well figured by Dr. Günther, from whose account our analysis has been taken. Numerous specimens have been collected at Mazatlan and Panama by Dr. Gilbert. The sexual changes in this species have not been reported.

Genus XX.—AZEVIA.

Azevia Jordan (genus novum). (*Panamensis*.)

TYPE: *Citharichthys panamensis* Steindachner.

This genus is proposed to include a single species hitherto referred to *Citharichthys*, but distinguished by its tubercular gill-rakers, as also by its small, firm scales, and other characters of minor importance.

A second species of this genus was obtained by Professor Gilbert at Mazatlan, and at first recorded by us under the name of *Citharichthys panamensis*. The specimens have, however, all been destroyed by fire.

The name *Azevia* is a Portuguese name for the sole, used at Lisbon, according to Brito-Capello. It probably corresponds to the Cuban name *Acedia*.

ANALYSIS OF SPECIES OF AZEVIA.

- a. Scales quite small, about 75 in the lateral line, ctenoid, and adherent. Body rather elongate. Mouth large, the maxillary about half length of head, the upper jaw somewhat hooked over the lower; about three front teeth in upper jaw, enlarged and hook-shaped; canines strong. Anterior profile gently and evenly convex. Eyes large. Pectoral $1\frac{1}{2}$ in head. Head 4 in length; depth $2\frac{3}{8}$. D. 95 or 96. A. 76 to 78. Scales 73 to 78. Vertebrae 33. Gill-rakers tubercle-like, broader than high. Color brownish, sprinkled with dark dots, and with some whitish rings; large vaguely-defined oval spots on head and body; dorsal with five or six, anal with three dark spots..... PANAMENSIS, 50.

50. AZEVIA PANAMENSIS.

Citharichthys panamensis Steindachner, Ichth. Beitr., iii, 62, 1875. (Panama.) Jordan & Gilbert, Bull. U. S. Fish Com., 1882, 108 and 111. (Panama.) Gilbert, Bull. U. S. Fish Com., 1892, p. 112. (Punta Arenas.)

Habitat.—Pacific coast of Central America.

Our description of this species is taken from the specimens from Panama in the museum at Cambridge, a part of the series of Dr. Steindachner's original types. The species is apparently not uncommon on the west coast of Central America.

Genus XXI.—CITHARICHTHYS.

Citharichthys Bleeker, Comptes Rendus Acad. Sci. Amsterd., xiii, *Pleuron*, 6, 1862. (*Cayennensis* = *Spilopterus*.)

Orthopsetta Gill, Proc. Ac. Nat. Sci. Phila., 1862, 330. (*Sordidus*.)

Metoponops Gill, Proc. Ac. Nat. Sci. Phila., 1864, 198. (*Cooperi* = *Sordidus*.)

TYPE: *Citharichthys cayennensis* Bleeker = *Citharichthys spilopterus* Günther.

This genus includes small flounders of weak organization, especially characteristic of the sandy shores of tropical America. The subgenus *Orthopsetta* includes species of more northern range and somewhat different in form, and especially noteworthy as having an increased number of vertebrae.

We are not certain that *Citharichthys* has priority over *Orthopsetta*, the two having the same ostensible date.

ANALYSIS OF SPECIES OF CITHARICHTHYS.

- a. Vertebrae about 40; interorbital ridge sharply elevated; the head not closely compressed; eyes large. (*Orthopsetta* Gill.)

- b. Dorsal rays 95; anal rays 77; lateral line 65 to 70; head $3\frac{1}{2}$ in length; depth $2\frac{1}{4}$; eyes large, $3\frac{1}{4}$ in head, the interocular space scaly, concave, 4 in eye; a sharp elevated ridge bounding the lower eye; mouth not large; the maxillary 3 in head; teeth sharp, subequal anteriorly, smaller behind; lower pharyngeals narrow, each with a row of slender teeth; gill-rakers slender, close-set, 7+14; scales large, thin, deciduous, slightly ciliate; numerous accessory scales present; pectorals long, $1\frac{1}{2}$ in head; flesh soft. Color dull olive-brownish, the males with spots and blotches of dull orange, the dorsal and anal blackish, similarly mottled with dull orange; females paler, nearly plain. Vertebrae, 11 + 29 = 40..... SORDIDUS, 51.

- bb. Dorsal rays 85 to 90; anal 68 to 72; lat. l. 55 to 60; head $3\frac{1}{2}$ in length; depth $2\frac{1}{2}$; eyes large, separated by a sharp, scaleless ridge; maxillary $2\frac{1}{2}$ in head; teeth slender, rather long; gill-rakers short, rather slender; pectoral $1\frac{1}{2}$ in head; color olivaceous, the scales edged with darker; fins dusky; a small ink-like spot on the middle of each seventh to tenth ray of each of the vertical fins. *STRIGMÆUS*, 52.
- aa. Vertebrae 33 to 36; interorbital ridge low and narrow, the head closely compressed (*Citharichthys*).
- c. Eyes large, 3 to $4\frac{1}{2}$ times in the head.
- d. [Head large, $3\frac{1}{2}$ in length; pectoral of left side elongate, one-third longer than head; maxillary $2\frac{1}{2}$ in head; "lateral line slightly curved over the pectoral"; scales thin, deciduous, cycloid; eye $3\frac{1}{2}$ in head, five times interorbital space, which is a rather prominent narrow sharp ridge; a strong spine on the snout over the upper lip, above this another shorter spine; caudal fin sessile; head, $3\frac{1}{2}$; depth, $2\frac{1}{2}$; D. 91; A. 73; Lat. l. 48. Color grayish-brown.] (*Goode & Bean*)..... *DINOCEROS*, 53.
- dd. Head smaller, about 4 in length.
- e. Body comparatively elongate, the depth about $2\frac{1}{2}$ in length; mouth very small; the maxillary $3\frac{1}{2}$ in head; teeth very small, the anterior scarcely enlarged; eyes large, 4 in head, separated by a very narrow, sharp scaleless ridge, one-sixth diameter of the eye; snout with a small blunt spine; rays of vertical fins all exerted; left pectoral twice length of right. Head, 4 in length; depth, $2\frac{1}{2}$; D. 83; A. 67; Lat. l. 40. Color light brown *ARCTIFRONS*, 54.
- ee. Body comparatively broad, the depth about half the length; mouth larger.
- f. [Snout with a strong sharp spine on eyed side, above upper lip. Eyes large, 3 in head; greatest depth of body over the pectorals; interorbital space with a wide ridge, about half diameter of eye; teeth minute, close-set, stronger on blind side; body extremely thin; D. 73 to 75, A. 60, Lat. l. 40. Ashy gray, with dark lateral line. Deep-water species with loose scales.] (*Goode*).... *UNICORNIS*, 55.
- ff. Snout without distinct spine. Eyes moderate, $3\frac{1}{2}$ to $4\frac{1}{2}$ in head; greatest depth of body under middle of dorsal; interorbital space a narrow, scaly ridge with a slight median groove; maxillary $2\frac{1}{2}$ in head; teeth small, those in front slightly enlarged; body not very thin; gill-rakers moderate, 6+13.
- g. Dorsal rays 80; anal 56; scales large, cycloid; no accessory scales; head 4 in length; depth 2; D. 80, A. 56, Lat. l. 41. Vertebrae 9+25=34. Eye $3\frac{1}{2}$ in head. Color light olive-brown, with some 20 dark brown spots, the largest about as large as eye; four of these spots arranged at equal intervals along the lateral line, the second being most prominent; dorsal and anal with round dark spots, one on the middle of each sixth to seventh ray, besides smaller, irregular spots and mottlings; caudal spotted; two brown spots, one above the other, at base of caudal; shallow-water species.
- MACRIPS, 56.
- gg. Dorsal rays 68; anal 52; scales smaller, the lateral line with about 53 pores; outline regularly oval, without angle; eyes moderate, $4\frac{1}{2}$ in head, close together, the orbital ridges coalescent, the lower larger. Teeth small, uniserial; maxillary $2\frac{1}{2}$ in head; gill-rakers short and very slender, X+12. Color dark brown, with whitish blotches, the fins mottled *UNLERI*, 57.

cc. Eyes quite small, 5 to 6 in head; snout short, forming an angle with the profile; mouth moderate, oblique, the maxillary $2\frac{1}{2}$ to $2\frac{3}{4}$ in head; teeth small, the anterior somewhat enlarged.

h. Scales not very large, 45 to 48 in the lateral line; interorbital area a low narrow ridge which is divided only anteriorly (in Atlantic specimens, usually grooved for its whole length in Pacific coast examples); gill-rakers short and strong, $X + 13$; pectorals about half head; no distinct spine on snout; head $3\frac{1}{2}$; depth $2\frac{3}{4}$; D. 75 to 80; A. 58 to 61; vertebrae, 34; color olive-brownish, somewhat translucent, with darker dots and blotches; a series of distant obscure blotches along bases of dorsal and anal ... *SPILOPTERUS*, 58.

hh. Scales large, 40 to 42 in the lateral line; interorbital area $\frac{1}{2}$ diameter of eye, which is 5 in head; gill-rakers short and slender, about equal to pupil; teeth rather smaller than in *C. spilopterus*; maxillary $2\frac{3}{4}$ in head; head $3\frac{3}{4}$; depth 2 to $2\frac{1}{6}$; D. 77 to 82; A. 59 to 61; color light gray, everywhere soiled and freckled, peppered with black specks; pectoral fin much mottled, the caudal less so.

SUMICHRASTI, 59.

51. CITHARICHTHYS SORDIDUS.

Psettichthys sordidus Girard, Proc. Acad. Nat. Sci. Phila., vii, 1854, 142. Girard, Proc. U. S. Pacif. R. R. Exped., Fishes, 1859, 155. (San Francisco; Tomales Bay.)

Orthopsetta sordida Gill, Proc. Ac. Nat. Sci. Phila., 1862, 330.

Citharichthys sordidus Lockington, Rep. Com. Fisheries of California, 1878-'79, 42. Lockington, Proc. U. S. Nat. Mus. 1879, 83 (San Francisco). Jordan & Gilbert, Proc. U. S. Nat. Mus., 1880, 453 (Puget Sound, San Francisco, Monterey Bay, San Luis Obispo, Santa Barbara, San Pedro, San Diego). Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 67. Jordan & Gilbert, Synopsis Fish. N. A., p. 817, 1882. Bean, Proc. U. S. Nat. Mus., 1883, p. 353 (Johnston Strait, Safety Cove, British Columbia.)

Metoponops cooperi Gill, Proc. Acad. Nat. Sci. Phila., 1864, 198 (Santa Barbara).

Habitat.—Pacific coast of North America, in water of moderate depth; British Columbia to Lower California.

This small flounder is one of the commonest species on the Pacific coast, being found in water of ten fathoms or more depth, in all localities from the Mexican boundary to British Columbia. It rarely exceeds two pounds in weight. In its deciduous scales and soft flesh it much resembles *Lyopsetta exilis* and *Atheresthes stomias*, two species of which are often taken in company with it. Of all the species allied to *Citharichthys*, this one has the most extended range to the northward.

52. CITHARICHTHYS STIGMÆUS.

Citharichthys stigmæus Jordan and Gilbert, Proc. U. S. Nat. Mus., 1882, 410, 411 (Santa Barbara). Jordan & Gilbert, Syn. Fish. N. A., 1882, 965.

Habitat.—Coast of Southern California.

The original type of this species is a young example, taken near Santa Barbara by Capt. Andrea Larco. In the Museum of Comparative Zoology are other specimens collected by Mr. Cary at San Francisco. These have 72 anal rays, while the original type had but 68. In this and other ways they approach *C. sordidus*. Were it not that some of

these are full of spawn at a length of five inches, we should regard them without much hesitation as the young of *C. sordidus*. As it is, it is not unlikely that *C. stigmæus* will prove to be simply the young of the latter species.

53. CITHARICHTHYS DINOCEROS.

Citharichthys dinoceros Goode & Bean, Bull. Mus. Comp. Zool., xxviii, 1886, 156 (off Martinique, St. Lucie, and Barbadoes).

Habitat.—Deep waters of Gulf of Mexico.

This species is known to us from the original description only.

54. CITHARICHTHYS ARCTIFRONS.

Citharichthys arctifrons Goode, Proc. U. S. Nat. Mus., 1880, 341, 472 (Gulf Stream off Southern New England coast). Goode & Bean, Bull. Mus. Comp. Zoology, xix, p. 194 (stations 313, 314, 311, and 336). Jordan & Gilbert, Syn. Fish. N. A., 818, 1882.

Habitat.—Deep waters of the Gulf Stream.

This species is known to us from a small specimen obtained in the Gulf Stream southeast of Martha's Vineyard, and from the descriptions published by Goode & Bean.

55. CITHARICHTHYS UNICORNIS.

Citharichthys unicornis Goode, Proc. U. S. Nat. Mus., 1880, 342 (Gulf Stream southeast of New England). Jordan and Gilbert, Syn. Fish. N. A., p. 818, 1882.

Habitat.—Deep waters of the Gulf Stream.

This species is known to us from descriptions only.

56. CITHARICHTHYS MACROPS.

Citharichthys macrops Dresel, Proc. U. S. Nat. Mus., 1884, p. 539 (Pensacola). Jordan, Proc. U. S. Nat. Mus., 1886, 29 (Beaufort, N. C.).

Habitat.—South Atlantic and Gulf coasts of the United States.

This species is known to us from several specimens dredged in the harbor of Beaufort, N. C., by Prof. Oliver P. Jenkins.

57. CITHARICHTHYS UHLERI.

Citharichthys uhleri Jordan, sp. nov.

Habitat.—West Indian fauna.

This species is based on a single specimen in the Museum of Comparative Zoology. It is $4\frac{1}{2}$ inches in length, and was brought from Hayti by Mr. P. R. Uhler, the well-known entomologist, for whom we have named the species.

The species is close to *Citharichthys macrops*, but its fin-rays and scales are considerably more numerous than in the latter.

58. CITHARICHTHYS SPILOPTERUS.

Citharichthys spilopterus Günther, iv, 1862, 421 (New Orleans, San Domingo, Jamaica). Günther, Fish. Central America, p. 471, 1869, pl. lxxx, fig. 2, (Chiapam). Jordan and Gilbert, Proc. U. S. Nat. Mus., 1882, p. 382 (Panama). Jordan and Gilbert, Proc. U. S. Nat. Mus., 1882, p. 618 (Charleston). Jordan and Gilbert, Proc. U. S. Nat. Mus., 1882, p. 630 (Panama). Jordan and Gilbert, Bull. U. S. Fish Com., 1882, p. 108-111 (Mazatlan and Panama). Jordan and Gilbert, Syn. Fish. N. A., 1882, p. 817. Jordan, Proc. U. S. Nat. Mus. 1886, 53 (Havana).

Citharichthys cayennensis Bleeker, Comptes Rendus Acad. Sci. Amsterd., xiii, 1862, 6 (Cayenne) (name only).

Citharichthys guatemalensis Bleeker, Neder. Tydschr. Dierk., 1864, 73 (Guatemala). Günther, Fish. Central America, 472, 1869 (copied).

Hemirhombus fuscus Poey, Synopsis, 406, 1868. Poey, Enumeratio, 1875, 138.

Habitat.—Both coasts of tropical America, north to New Jersey and Mazatlan.

This little flounder is almost everywhere abundant on the sandy shores of tropical America, in shallow water. Careful comparison of specimens from South Carolina, Brazil, Mazatlan, and Panama shows no tangible difference, and we are compelled to regard all as forming a single species.

It rarely exceeds 5 or 6 inches in length. It usually comes into the markets mixed with other shore-fishes and it nowhere receives any notice as a food-fish.

This species is common in the markets of Havana, and it is evidently the original of Poey's *Hemirhombus fuscus*, although in Poey's description there seems to be some confusion, because the teeth are said to be biserial above, and 60 scales are counted in the lateral line.

A specimen from Poey in the museum at Cambridge is labeled "*Hemirhombus fuscus* type." Collector's number, 87. This belongs to *C. spilopterus*, and it has 48 scales in the lateral line.

Bleeker's *Citharichthys guatemalensis* agrees in all respects with *Citharichthys spilopterus*. We are unable to find any description of *Citharichthys cayennensis*, if, indeed, the species has ever been described.

Specimens of *Citharichthys spilopterus* are in the museum at Cambridge from Panama, Cuba, Pará, Sambaia, Pernambuco, Camaru, Rio das Velhas, Rio Janeiro, and San Matheo.

59. CITHARICHTHYS SUMICHRASTI.

Citharichthys sumichrasti Jordan, sp. nov.

Habitat.—Pacific coast of tropical America.

This species is close to *C. spilopterus*, differing chiefly in the larger scales and in the different coloration. The type, No. 25299, in the Museum of Comparative Zoology, was collected in Rio Zanatenco, Chiapas, by Prof. Francis E. Sumichrast. Another specimen is in the museum labeled Panama: Pitkins.

Genus XXII.—ETROPUS.

Etropus Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 364. (*Crossotus*.)

TYPE: *Etropus crossotus* Jordan & Gilbert.

This genus is very close to *Citharichthys*, from which it differs only in the very small size of the mouth, and in the correspondingly weak dentition. The three known species are similar in appearance to the species of *Citharichthys*, and they inhabit the same waters. Another genus extremely close to *Etropus* and *Citharichthys* is *Thysanopsetta*. The teeth in *Thysanopsetta* are, however, arranged in a band.

ANALYSIS OF SPECIES OF ETROPUS.

- a. Body comparatively elongate, the head anteriorly acute; dorsal rays 91; anal rays 73; scales in the lateral line 54; back less elevated than in other species; head small, the profile forming an angle at the posterior part of upper eye, the snout being abruptly pointed; eyes large, $4\frac{1}{2}$ in head, the lower being before the upper; interorbital space elevated, with two prominent ridges, the space between them concave; ridge above lower eye higher than upper and joining the latter behind upper eye, to form a sharp ridge; upper eye with some vertical range; mouth very small, the maxillary 4 in head, not reaching front of pupil; teeth bluntish, close-set, in one row, chiefly on the blind side; scales and fins much as in *E. crossotus*; the edge of the subopercle on the blind side fringed with white cirri, as in the latter species; scales large, loose, little ciliate; gill-rakers very short and slender; gill membranes broadly united; caudal fin rhombic, rather pointed; pectoral $1\frac{1}{2}$ in head; fin rays scaly; head 5 in length; depth $2\frac{1}{2}$; color light olive-brown, with vague spots and darker markings; fins similarly marked.

ECTENES, 60.

- aa. Body deeper, the head not acute in profile; dorsal rays 76 to 85; anal 56 to 67; scales 38 to 48; teeth sharp, close-set, uniserial.
- b. Body somewhat elongate, pear-shaped, the depth not more than half the length, the body thinner and more compressed than in *E. crossotus*; mouth very small, the maxillary $4\frac{1}{2}$ in head; eye 3 to $3\frac{1}{2}$ in head; interorbital space a narrow, sharp ridge; cirri on subopercle rather few and long; D. 77 to 78; A. 57 to 61; lat. l. 38 to 41. Head 4 in length; depth $2\frac{1}{2}$ to 2. Vertebrae $9 + 25 = 34$. Color grayish, with a few irregular vague dark blotches, none of them larger than the eye; fins speckled; two dark spots at base of caudal..... MICROSTOMUS, 61.
- bb. Body very deep, the depth rather more than half the length; eye $3\frac{1}{2}$ in head; interorbital space a narrow, sharp ridge, divided anteriorly; maxillary about 4 in head; head $4\frac{1}{2}$; depth $1\frac{1}{2}$ to 2 ($1\frac{1}{2}$ in Atlantic specimens). D. 76 to 85; A. 56 to 67; lat. l. 48 (42 to 45 in Atlantic specimens). Vertebrae $9 + 25 = 34$; cirri on subopercle of blind side numerous, white; color light olive-brown, with some darker blotches; vertical fins finely mottled and speckled with black and gray.

CROSSOTUS, 62.

60. ETROPUS ECTENES.

Etropus ectenes Jordan, sp. nov.

Habitat.—Pacific coast of South America.

The types of this species are two examples (11605, Mus. Comp. Zool.) collected at Callao, Peru, by Dr. Jones. There are also a large number of young examples in the collection (11145) obtained at Paraca Bay by the Hassler Expedition.

The species is very readily distinguished from *E. crossotus* by its elongate form, acute head, and by the larger numbers of its fin-rays and scales.

61. ETROPUS MICROSTOMUS.

Citharichthys microstomus Gill, Proc. Ac. Nat. Sci. Phila., 1864, 223. (Beesley's Point, N. Jersey.)

Etropus rimosus Goode & Bean, Proc. U. S. Nat. Mus., 1885, 593. (Coast of Florida, between Pensacola and Cedar Keys, dredged at the depth of 21 fathoms.)

Etropus crossotus Jordan & Evermann, Proc. U. S. Nat. Mus., 1886. (Pensacola.)

Habitat.—Gulf of Mexico.

On re-examining our specimens of *Etropus*, we find that those obtained by Jordan & Evermann from Pensacola differ from the others in the greater elongation of the body and in the somewhat grayer coloration. These correspond fairly to the description of *Etropus rimosus*. All other specimens from the United States coast collected by Dr. Jordan and his associates, are, in our opinion, referable to *Etropus crossotus*.

The original description of *Citharichthys microstomus* Gill, fits this species better than any other known. The fish in question is much too elongate for *Etropus crossotus* (depth $2\frac{3}{8}$ in total length), and the mouth is too small for any of the known species of *Citharichthys* (maxillary 4 in head; mandible $2\frac{1}{2}$).

In the Museum of Comparative Zoology are numerous young specimens collected at Somers Point, New Jersey, by Dr. Stimpson. These seem to belong to the genus *Etropus*. The teeth are equal; the scales are 44, and the depth of the body is $2\frac{1}{2}$ in its length. The eye is 4 in head, the dorsal rays 75 to 80, and the anal rays 56 or 57. The color is light brown, mottled and spotted with darker.

These certainly represent the *Citharichthys microstomus* of Gill, collected in the same neighborhood by the same naturalist. We are unable to distinguish them from *Etropus rimosus*.

62. ETROPUS CROSSOTUS.

Etropus crossotus Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 364 (Mazatlan). Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 305 (Lake Pontchartrain; Mazatlan; Panama; Galveston). Jordan and Gilbert, Proc. U. S. Nat. Mus., 1882, 618 (Charleston). Jordan & Gilbert, Bull. U. S. Fish Comm., 1882, 103-111 (Mazatlan; Panama). Jordan & Gilbert, Syn. Fish. N. A., 1882, 839. Bean, Cat. Fish. Intern. Exh., 1893, 44 (St. John's River). Jordan & Swain, Proc. U. S. Nat. Mus., 1884, 234 (Cedar Keys).

Etropus microstomus Jordan, Proc. U. S. Nat. Mus., 1886, 29. (Beaufort, N. C.) (Not *Citharichthys microstomus* Gill.)

Habitat.—Both coasts of tropical America, north to North Carolina.

This little fish seems to be abundant in all warm and sandy shores of tropical America. It is the smallest and feeblest of all our flounders, and has therefore been generally overlooked by collectors. Its range will doubtless prove to be coextensive with that of its near ally, *Citharichthys spilopterus*.

In the Museum of Comparative Zoology are specimens of this species from Rio Janeiro, Santos, Victoria, Para, and Sambaia, in Brazil. The largest of these is 6 inches in length. Head 5 in length, depth, $1\frac{1}{8}$; scales, 44; D. 85; A. 67.

A re-examination of the specimens collected by Prof. O. P. Jenkins at Beaufort, N. C., and described by Dr. Jordan under the name of *Etropus microstomus*, shows that these are identical with the specimens of *Etropus* from Charleston, Cedar Keys, New Orleans, and Galveston. These differ from the types of *Etropus crossotus* only in the slightly greater depth of the body, and in the slightly larger size of the scales. We now refer them to the latter species without much hesitation, hardly regarding them worthy of even subspecific distinction.

Genus XXIII.—THYSANOPSETTA.

Thysanopsetta Günther, Voyage Challenger, Shore Fishes, 1880, 22 (*naresi*).

TYPE: *Thysanopsetta naresi* Günther.

We have not seen the typical species of *Thysanopsetta*. From the figure and description it would seem that the genus differs from *Etropus* only in having the teeth in villiform bands.

ANALYSIS OF SPECIES OF THYSANOPSETTA.

- a. [Body oblong; head small; eyes $3\frac{1}{2}$ in head, well separated, the interorbital space being flat and scaly; mouth moderate, the maxillary more than one-third head; teeth in villiform bands; scales adherent, ctenoid; a fleshy lobe behind ventrals; lateral line straight; head, 5; depth, $2\frac{1}{2}$; D. 87; A. 59; lat. l. 76 (in plate); color, nearly uniform brownish, the body and fins mottled.] (*Günther*) NARESI, 63.

63. THYSANOPSETTA NARESI.

Thysanopsetta naresi Günther, Voyage Challenger, Shore Fishes, 1880, 22. (Cape Virgin, Straits of Magellan.)

Habitat.—Straits of Magellan.

We know this species from the original figure and description only.

Genus XXIV.—MONOLENE.

Monolene Goode, Proc. U. S. Nat. Mus., 1880, 337 (*sessilicauda*).

TYPE: *Monolene sessilicauda* Goode.

This peculiar genus of deep-sea flounders is probably allied to *Arnoglossus* and *Citharichthys*. Of this we cannot speak with certainty, not having examined any members of the group, and the insertion of the ventral fins has not been described in either of the two known species.

ANALYSIS OF SPECIES OF MONOLENE.

- a. [Dorsal rays, 99 to 103; anal rays, 79 to 84; scales of blind side ctenoid, 23-92-25; head everywhere closely scaly, even to the lips and front of snout; mouth oblique, the maxillary less than one-third length of head; teeth, uniserial, subequal; eyes very close together, the interorbital space a very narrow ridge; arch of lateral line very peculiar, the curve having two angles; head 5 in length; depth, $2\frac{1}{2}$; ashly brown, with spots of darker brown; pectoral barred; vertebræ 43.] (*Goode*)
 SESSILICAUDA, 64.

aa. [Dorsal rays, 124; anal rays, 100; scales of blind side scarcely ctenoid, 30-105-32; snout and lips not scaly; maxillary 3 in head; eyes, large, $2\frac{1}{2}$ in head, separated by a very narrow ridge; head $4\frac{1}{2}$ in length; depth about 3; light brownish gray, the fins dusky, the pectoral black.] (*Goode & Bean*).....ATRIMANA, 65.

64. MONOLENE SESSILICAUDA.

Monolene sessilicauda Goode, Proc. U. S. Nat. Mus., 1890, pp. 337, 338 (deep sea south of New England). Goode, Proc. U. S. Nat. Mus., 1890, 472 (deep sea southern coast of New England, stations 870, 871, 876, 877). Jordan & Gilbert, Syn. Fish. N. A., 1882, p. 841. Goode and Bean, Bull. Mus. of Comp. Zool., xix, p. 184 (station 314; South Carolina).

Habitat.—Deep waters of the Gulf Stream.

This species is known to us from the accounts of Goode & Beau.

65. MONOLENE ATRIMANA.

Monolene atrimana Goode & Bean, Bull. Mus. Comp. Zool., xii, 155, 1886 (deep waters off Barbadoes).

Habitat.—Deep waters of the Caribbean Sea.

This species is known to us from the original description.

Genus XXV.—ONCOPTERUS.

Oncopterus Steindachner, Ueber eine neue Gattung und Art aus der Familie der Pleuronectoiden, 1874, 1 (*darwini*).

TYPE: *Oncopterus darwini* Steindachner.

This singular genus is based on a single species found on the shores of East Patagonia. It has no near allies among the American flounders, but it has several points of resemblance to the genera *Rhombosolea*, *Ammotretis*, and *Peltorhamphus* of the Australian fauna, and we have ventured to associate the four in a subfamily, which may be called *Oncopterinæ*. The *Oncopterinæ* agree in having some sort of peculiar appendage on or near the snout, apparently connected with the first interspinal. They agree with the *Platessinæ* in the general form, the dextral portion of the eyes, and in the structure of the mouth. Their nearest ally in this group is *Pleuronichthys*. In the insertion of the ventrals, they agree with the *Pleuronectinæ* and with the genus *Achirus* of the *Soleinæ*. In both *Peltorhamphus* and *Rhombosolea*, the ventral is continuous with the anal as in *Zeugopterus* and *Achirus*, but in *Oncopterus* the two fins are separate. In *Peltorhamphus* and *Rhombosolea*, the bone connected with the first interspinal extends forward as a sort of nose, meeting the chin (much as in *Achiropsis* and *Apionichthys*). In *Oncopterus* this bone is twisted to the blind side, and has a very peculiar position, described below. The scales are smooth and cycloid in *Oncopterus* and *Rhombosolea*, ctenoid in *Peltorhamphus*. In *Peltorhamphus* and *Oncopterus* the left ventral is present. It is wanting in *Rhombosolea*. *Ammotretis* we have been unable to examine. In *Oncopterus* the lateral line has an anterior arch and many accessory branches. It is straight and simple in the other genera. In all the teeth are sharp, close set, in a band, and chiefly on the blind side.

ANALYSIS OF SPECIES OF ONCOPTERUS.

- a. Body broadly ovate, with regular outlines; mouth small, twisted toward the blind side; its teeth small and in bands; maxillary $3\frac{1}{2}$ in head; eye $5\frac{1}{2}$, twice the concave interorbital area; gill-rakers short and slender; left side above eye with a deep horizontal groove, in which lies a depressible curved bone as long as the maxillary. This seems to be attached to the first interneural, and is probably a modified fin-ray. On its upper edge on either side is a fringe of short fleshy projections resembling the gill fringes, but much shorter. Scales small, mostly smooth. Lateral line with a long, low arch, from which four accessory branches extend vertically upward. Another branch behind curve, and about 6 on head; blind side similar; no anal spine. Right ventral of six rays, placed wide apart along the ridge of the abdomen, but not joining the anal and not extending forward of the isthmus. Left ventral lateral, with narrow base. Color dark brown, everywhere covered with whitish stellate spots. Head $3\frac{1}{2}$ in length. Depth, 2. D., 61. A., 45. V., 6. Scales, 115 DARWINI, 66.

66. ONCOPTERUS DARWINI.

Rhombus sp. Darwin, Jenyns, Voyage of the Beagle, Fishes, 1842 (east coast of Patagonia).

Oncopterus darwini Steindachner, Ueber Eine neue Gattung; etc, Pleuronectoiden, 1874, 1 (San Mathias Bay, Eastern Patagonia).

Habitat.—Eastern coast of Patagonia.

Of this species we have examined numerous specimens in the Museum of Comparative Zoology. Nos. 11397 and 11398 are adult examples from San Mathias Bay. To this lot belong Dr. Steindachner's original types. There is also a bottle of young examples (11311, M. C. Z.) from Rio Grande do Sul.

Genus XXVI.—PLEURONICHTHYS.

Pleuronichthys Girard, Proc. Ac. Nat. Sci. Phila., 1851, 139 (*carnosus*).

Heteroprosopon Bleeker, Comptes Rendus Acad. Amsterdam, xiii, 1862, 8 (*cornutus*).

Parophrys Günther, Cat. Fishes, iv, 454, 1862 (not of Girard).

TYPE: *Pleuronichthys carnosus* Girard.

This well-marked genus contains three American species, which are very closely related to each other. The Asiatic species, *Platessa cornuta* Schlegel, of the coasts of China and Japan, is also a member of this group, having an accessory branch to the lateral line as in the American species. This species bears some resemblance to *Pl. verticalis*.

The species of *Pleuronichthys* are herbivorous. They spawn in the spring, and live in comparatively deep water.

ANALYSIS OF SPECIES OF PLEURONICHTHYS.

- a. Dorsal fin beginning on the level of the lower lip, its first nine rays on the blind side; a blunt tubercle at front of upper eye, another at each end of the narrow interorbital ridge, the posterior largest but usually not spine-like; two or three above the latter, behind the upper eye; some prominences above the opercle; head $3\frac{1}{2}$; depth $1\frac{1}{2}$; D. 72; A. 40; vertebrae $14 + 26 = 40$; color brownish, usually much mottled with brown and gray, often finely speckled on body and fins DECURRENS, 67.

- aa. Dorsal fin beginning on level of upper lip, about five rays being on the blind side.
- b. Interorbital ridge posteriorly with a very strong, backward directed spine; some tubercles on interorbital ridge; head 4; depth 1½; D. 65 to 72, A. 45 to 48; vertebrae 13+25=38; color dark olive brown, much mottled and sometimes with grayish spots; middle of sides often with dark ocellus. VERTICALIS, 68.
- bb. Interorbital ridge prominent, but without spines or conspicuous tubercles; right side of lower jaw with a narrow band of teeth; head 4½; depth 1½; D. 68, A. 48 to 50; color light brown, usually profusely mottled, the colors variable..... CÆNOSUS, 69.

67. PLEURONICHTHYS DECURRENS.

- Pleuronichthys cænopus* Lockington, Proc. U. S. Nat. Mus., 1879, 97 (San Francisco) (not *Pleuronichthys cænopus* Girard).
- Pleuronichthys quadrilobulatus* Jordan and Gilbert, Proc. U. S. Nat. Mus., 1880, 50 (not of Pallas). Jordan, Nat. Hist. Aquat. Anim., 1884, 189 (Monterey, Point Reyes, Farallones).
- Pleuronichthys decurrens* Jordan and Gilbert, Proc. U. S. Nat. Mus., 1880, p. 453 (San Francisco; Monterey Bay). Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, p. 69 (Monterey, San Francisco, Farallones). Jordan and Gilbert, Syn. Fish. N. A., 1882, p. 829.

Habitat.—Pacific coast of United States, south to Monterey.

This species is rather scarce along the California coast, being taken chiefly in deep water. It reaches a larger size than either *P. verticalis* or *P. cænopus*.

68. PLEURONICHTHYS VERTICALIS.

- Pleuronichthys verticalis* Jordan & Gilbert, Proc. U. S. Nat. Mus., 1880, 49 (San Francisco). Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 169. Jordan & Gilbert, Synopsis Fish. N. A., 1882, 829. Jordan, Nat. Hist. Aquat. Anim., 1884, 189 (Monterey, Point Reyes, Farallones).

Habitat.—Coast of California, in deep water.

This species agrees in habits and general characters with *Pleuronichthys decurrens*.

69. PLEURONICHTHYS CÆNOSUS.

- Pleuronichthys cænopus* Girard, Proc. Phil. Acad. Sci., 1854, 139 (San Francisco). Girard, U. S. Pacif. R. R. Exped., Fish., 1859, 151 (San Francisco). Lockington, Rep. Com. Fisheries California, 1878-79, 45 (Farallones). Lockington, Proc. U. S. Nat. Mus., 1879, 97 (San Francisco). Jordan and Gilbert, Proc. U. S. Nat. Mus., 1880, 50 (Santa Catalina Island, San Luis Obispo). Jordan and Gilbert, Proc. U. S. Nat. Mus., 1880, 453 (Puget Sound, San Francisco, Monterey Bay). Jordan and Gilbert, Proc. U. S. Nat. Mus., 1881, 68 (San Diego, Puget Sound). Jordan and Gilbert, Syn. Fish. N. A., 1882, 830. Jordan, Nat. Hist. Aquat. Anim., 1884, 189 (San Diego to Aleutian Islands).

Parophrys cænosa Günther, iv, 456, 1862.

Habitat.—Pacific coast of America, from the Aleutian Islands to San Diego.

This species is comparatively common in rather deep water and about rocks from Alaska southward, being most common about Puget Sound.

Its apparent abundance as compared with the other species of the genus is doubtless due to its inhabiting shallower waters than they.

Genus XXVII.—HYPSOPSETTA.

Hypsopsetta Gill, Proc. Ac. Nat. Sci. Phila., 1864, 195 (*guttulatus*).

TYPE: *Pleuronichthys guttulatus* Girard.

This genus consists of a single species, abundant on the coast of California. It is very close to *Pleuronichthys*, from which it differs only in a few characters of comparatively minor importance. Its range is in shallower and warmer water than that of the species of *Pleuronichthys*, and, in accordance with this fact, its flesh is firmer and its number of vertebræ less than in the latter genus.

ANALYSIS OF SPECIES OF HYP SOPSETTA.

- a. Head without spines or tubercles; accessory lateral line half length of body; outline of body very broadly rhombic; head, $3\frac{3}{4}$; depth, $1\frac{1}{2}$; D. 63, A. 50, lat. 1.95. Vertebræ, $11 + 24 = 35$. Brown, with numerous pale bluish blotches, fading in spirits; blind side largely yellow in life.....GUTTULATA, 70.

70. HYP SOPSETTA GUTTULATA.

(THE DIAMOND FLOUNDER.)

Pleuronichthys guttulatus Girard, Proc. Acad. Nat. Sci. Phila., 1856, p. 137. Girard, Jour. Boston Soc. Nat. Hist., 1857, pl. 25, figs. 1-4. Girard, U. S. Pacif. R. R. Exped., Fishes, p. 152, 1859 (Tomales Bay). Lockington, Rep. Com. Fisheries California, 1878-'79, p. 44. Lockington, Proc. U. S. Nat. Mus., 1879, p. 94 (San Francisco).

Pleuronectes guttulatus Günther, Cat. Fish., iv, 445, 1862 (copied).

Hypsopsetta guttulata Gill, Proc. Ac. Nat. Sci. Phila., 1864, 195. Jordan and Gilbert, Proc. U. S. Nat. Mus., 1880, 453 (San Francisco, San Luis Obispo, Santa Barbara, San Pedro, San Diego). Jordan and Gilbert, Proc. U. S. Nat. Mus., 1881, 68 (Tomales, San Diego). Jordan and Gilbert, Syn. Fish. N. A., 1882, 830. Jordan, Nat. Hist. Aquat. Anim., 1884, 185.

Parophrys ayresi Günther, Cat. Fish. Brit. Mus., iv, 1862, 457 (San Francisco).

Habitat.—Coast of California; Cape Mendocino to Magdalena Bay.

This species is one of the most abundant in the shore waters of the California coast. It is a food-fish of fair quality.

Genus XXVIII.—PAROPHRYS.

Parophrys Girard, Proc. Ac. Nat. Sci. Phila., 1854, 139 (*vetulus*).

TYPE: *Parophrys vetulus* Girard.

This genus consists of a single species, common on the Pacific coast of the United States.

The narrow interorbital space and the vertical range of the upper eye give it a peculiar physiognomy, but in most regards it is not very different from some of the species of *Platessa*.

ANALYSIS OF SPECIES OF PAROPHRYS.

- a. Body elongate-elliptical; snout very prominent, forming an abrupt angle with the descending profile; eyes large, $4\frac{1}{2}$ in head, separated by a very narrow, high ridge, the upper eye encroaching on the dorsal outline; teeth small, trenchant, widened at tip; fin-rays scaleless; scales cycloid, those on cheeks usually ciliated, especially in northern specimens; head $3\frac{1}{2}$; depth $2\frac{1}{2}$; D. 74 to 86; A. 54 to 68; lat. l. 105; vertebrae 11 + 33=44; uniform light olive-brown; the young sometimes spotted with blackish VETULUS, 71.

71. PAROPHRYS VETULUS.

Parophrys vetulus Girard, Proc. Acad. Nat. Sci. Phila., 1854, p. 140 (California). Günther, Cat. Fish., iv, 455 (copied). Lockington, Rep. Com. Fish. Cal., 1878-9, p. 45. Lockington, Proc. U. S. Nat. Mus., 1879, p. 100 (San Francisco). Jordan and Gilbert, Proc. U. S. Nat. Mus., 1880, p. 453 (Puget Sound, San Francisco, Monterey Bay, Santa Barbara). Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 68 (Santa Barbara, Monterey, Puget Sound). Jordan, Nat. Hist. Aquat. Anim., 1884, 185 (Santa Barbara to Alaska).

Pleuronectes vetulus Jordan and Gilbert, Synopsis Fish. N. A., 1882, 831.

Pleuronectes digrammus Günther, Cat. Fish., iv, 445, 1862 (Victoria).

Parophrys hubbardi Gill, Proc. Ac. Nat. Sci. Phila., 1862, 281 (San Francisco).

Habitat.—Pacific coast of North America, Alaska to Santa Barbara.

This small flounder lives in waters of moderate depth. It is, next to *Platichthys stellatus*, probably the most abundant of the flounders of the California coast.

Genus XXIX.—INOPSETTA.

Inopsetta Jordan & Goss, Cat. Fish. N. A., 1885, 136 (*ischyrus*).

TYPE: *Parophrys ischyrus* Jordan & Gilbert.

This genus contains a single species, closely allied to *Platichthys stellatus*, but separated from it by the curious character common to many of our Pacific coast flounders, of having an accessory branch to the lateral line. In technical characters there is not very much to separate *Inopsetta* from *Parophrys*, though the resemblance between *I. ischyra* and *P. vetulus* is not very close.

ANALYSIS OF SPECIES OF INOPSETTA.

- a. Body oblong, robust; snout projecting, forming an angle with the profile; teeth narrow incisors; interorbital space rather broad, scaly; eyes large; lower pharyngeals each with two rows of coarse, blunt teeth; scales thick, firm, adherent, loosely imbricated, all ctenoid on both sides of body, those on head roughest; accessory lateral line short. Head $3\frac{1}{2}$; depth 2. D. 70 to 76; A. 52 to 57; lat. l. 85. Light olive-brown, with dusky blotches, blind side more or less spotted or tinged with rusty ISCHYRA, 72.

72. INOPSETTA ISCHYRA.

Parophrys ischyrus Jordan and Gilbert, Proc. U. S. Nat. Mus., 1880, 276 and 453 (Puget Sound). Jordan and Gilbert, Proc. U. S. Nat. Mus., 1881, 67 (Seattle). Jordan, Aquat. Anim., 1884, 185 (Seattle).

Pleuronectes ischyrus Jordan and Gilbert, Syn. Fish. N. A., 1882, 831.

Inopsetta ischyra Jordan, Cat. Fish. N. A., 1885, 136.

Habitat.—Puget Sound (probably northward to Alaska).

This species is known only from four specimens taken by Dr. Jordan at Seattle in 1880. It is a large rough flounder, with firm white flesh.

Genus XXX.—ISOPSETTA.

Isopsetta Lockington, MSS., Jordan & Gilbert, Synopsis Fish. N. A., 1883, 832 (*isolepis*).

TYPE: *Lepidopsetta isolepis* Lockington.

This genus consists of a single species found on the coast of California. It approaches in many respects very close to the large-mouthed flounders of the type of *Hippoglossoides*, and it may fairly be said to be intermediate between *Psettichthys* and *Lepidopsetta*. Its affinities on the whole seem to be nearest the latter.

ANALYSIS OF SPECIES OF ISOPSETTA.

- a. Body elliptical, much compressed, its outlines very regular; eyes rather large, the upper $4\frac{1}{2}$ in head, the interorbital space broad, flattish, and scaly. Scales rather large, ctenoid, closely imbricated; maxillary $3\frac{3}{8}$ in head; teeth bluntish, conical, close-set, but not forming a cutting edge. Lower pharyngeals each with two rows of bluntish teeth; lateral line with a slight arch in front, and an accessory branch nearly as long as head. Head 4; depth $2\frac{1}{4}$. D. 88; A. 65; lat. 1. 88. Color dark-brown, mottled and blotched with darker. Vertebrae $10 + 32 = 42$.

ISOLEPIS, 73.

73. ISOPSETTA ISOLEPIS.

Lepidopsetta umbrosa Lockington, Proc. U. S. Nat. Mus., 1879, 106. (San Francisco; not of Girard.)

Lepidopsetta isolepis Lockington, Proc. U. S. Nat. Mus., 1880, 325. (San Francisco.)

Parophrys isolepis Jordan & Gilbert, Proc. U. S. Nat. Mus., 1880, 453, 1881, 67 (Puget Sound, San Francisco). Jordan & Gilbert, Syn. Fish. N. A., 1882, 832. Jordan, Nat. Hist. Aquat. Anim., 1884, 186 (Monterey to Puget Sound).

Isopsetta isolepis Jordan, Cat. Fish. N. A., 1885, 136.

Habitat.—Puget Sound to Point Concepcion, in rather deep water.

This small flounder is rather common off the coast of California, where it reaches a length of about 15 inches. It much resembles *Psettichthys melanostictus*, but its small mouth and blunt dentition indicates a real affinity with the small-mouthed flounders, among which it is here placed. Its nearest relative among our species is doubtless *Lepidopsetta bilineata*.

Genus XXXI.—LEPIDOPSETTA.

Lepidopsetta Gill, Proc. Ac. Nat. Sci. Phil., 1864, 195 (*umbrosus*).

TYPE: *Platichthys umbrosus* Girard = *Platessa bilineata* Ayres.

This genus probably contains but a single species, abundant on the Pacific coasts of North America. It is close to *Inopsetta*, from which it is separated by the arch of the lateral line, and still closer to *Limanda*, from which the accessory branch of the lateral line alone separates it.

Pleuronectes variegatus Schlegel, from Japan, may belong to *Lepidopsetta*.

The same name, *Lepidopsetta*, has been lately given by Dr. Günther to a very different genus of flounders. For the group so-called the name *Mancopsetta* of Gill should be used.

ANALYSIS OF SPECIES OF LEPIDOPSETTA.

a. Body broadly ovate, thickish; teeth bluntish, subconical: lower pharyngeals with two rows of blunt teeth. Snout projecting, forming an angle; eyes large, separated by a prominent scaly ridge. Scales small, mostly ctenoid, those on the head very rough, especially in northern specimens (var. *umbrosa*); scales of the blind side smooth; accessory lateral line half length of head. Anal spine present. Head $3\frac{1}{2}$; depth $2\frac{1}{2}$. D. 80; A. 60; lat. 1. 85. Vertebrae, 11 + 29 = 40. Yellowish brown, with numerous round pale blotches BILINEATA, 74.

74. LEPIDOPSETTA BILINEATA

[Plate XI.]

Platessa bilineata Ayres, Proc. Acad. Nat. Sci. Cal., 1855, p. 40 (San Francisco).
Pleuronectes bilineatus Günther, Cat. Fish., 444, 1862 (copied). Jordan & Gilbert, Syn. Fish. N. A., 1882, 833.

Lepidopsetta bilineata Gill, Proc. Ac. Nat. Sci. Phila., 1864, 195. Lockington, Proc. U. S. Nat. Mus., 1879, p. 103 (San Francisco). Lockington, Rep. Com. Fisheries California, 1878-'79, p. 46 (Farallone Islands). Jordan & Gilbert, Proc. U. S. Nat. Mus., 1880, p. 453 (Puget Sound, San Francisco, Monterey Bay). Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 63 (Monterey, Puget Sound). Bean, Proc. U. S. Nat. Mus., 1881, p. 241 (Monterey Bay, San Francisco, Puget Sound). Bean, Cat. Col. Fish. U. S. Nat. Mus., p. 19, 1883 (Port Chatham, Cook's Inlet). Bean, Proc. U. S. Nat. Mus., 1883, p. 353 (Carter Bay, British Columbia). Jordan, Nat. Hist. Aquat. Anim., 184, pl. 50 (Monterey to Alaska).

Platichthys umbrosus Girard, Proc. Ac. Nat. Sci. Phila., 1856, 136. (Puget Sound.)

Pleuronectes umbrosus Günther, iv, 1862, 454. (Esquimaux Harbor.)

Pleuronectes perarouatus Cope, Proc. Ac. Nat. Sci. Phila., 1873. (Alaska.)

Habitat.—Pacific coast of North America, Alaska to Monterey.

This species is one of the commonest of the flounders of the Pacific coast, its abundance apparently increasing towards the northward. It reaches a weight of five or six pounds and is an inhabitant of shallow waters. Specimens from Puget Sound and northward are rougher than Southern specimens and constitute a slight geographical variety, for which the name of *Lepidopsetta bilineata umbrosa* may be used. This is the same as the *perarouatus* of Cope.

Genus XXXII.—LIMANDA.

Limanda Gottsche, Wiegmann's Archiv, 1835, 100 (*limanda*).

Myzopsetta Gill, Proc. Ac. Nat. Sci. Phila., 1864, 217 (*ferruginea*).

TYPE: *Pleuronectes limanda* Linnæus.

This genus is closely allied to *Pseudopleuronectes*, from which it differs only in the presence of an arch on the anterior part of the lateral line. Four species of *Limanda* are now recognized.

ANALYSIS OF SPECIES OF LIMANDA.

- a. Head comparatively large, $3\frac{1}{2}$ to $4\frac{1}{2}$ in length.
- b. Scales rather small, 90 to 100 in the course of the lateral line; scales of right side ctenoid, closely imbricated; those of blind side mostly smooth.
- c. Teeth conical, close-set, forming a continuous series, about 11 + 30 in the lower jaw; snout abruptly projecting, forming in front of upper eye a sharp angle with the descending profile; head rather long; eyes large, separated by a high and very narrow ridge, which is continued in long rugose prominences above the opercle. Head 4; depth $2\frac{1}{2}$; D. 85; A. 62; lat. 1. 100; color brownish olive, with numerous irregular reddish spots; fins similarly marked; blind side largely lemon-yellow..... FERRUGINEA, 75.
- c. Teeth less conical, less closely set, in an irregular series, about 10 + 20 in lower jaw; snout less prominent, forming a slight angle with the profile; head rather smaller; eyes separated by a moderate ridge, broader and lower than in *L. ferruginea*; no rugose prominences above opercle. Head $4\frac{1}{2}$; depth $2\frac{1}{2}$; D. 65 to 78; A. 50 to 62; scales 86 to 96; vertebrae 40; color brownish, with some cloudy markings or dusky spots..... LIMANDA, 76.
- bb. Scales larger, wide apart, about 80 in the course of the lateral line, each scale with 1 to 4 spinules, those mostly erect; scales of blind side more or less rough; lower pharyngeals narrow, with bluntish teeth; interorbital space narrow, scaly; head large; snout not forming a distinct angle with the profile; teeth small, subconical. Head $3\frac{1}{2}$; depth 2; D. 69 to 74; A. 53 or 54; lat. 1. about 80. Color brown, nearly plain, the blind side with tinges of yellow.
ASPERA, 77.
- aa. [Head very short, $5\frac{1}{2}$ in length; snout very short; interorbital space very narrow; teeth small, apparently biserial, chiefly on the blind side; curve of lateral line half as deep as long, as long as head; scales strongly ctenoid, those on blind side smaller and cycloid. Head, $5\frac{1}{2}$; depth, $2\frac{3}{8}$; D. 64; A. 63; lat. 1. 88 = (27+61). Color grayish, mottled with darker, a conspicuous black blotch on outer rays of caudal on each side.] (*Goode*)..... BEANI, 78.

75. LIMANDA FERRUGINEA.

(THE RUSTY DAB.)

[Plate XII.]

- Platessa ferruginea* D. H. Storer, Fish. Mass., 1839, 141, pl. 2 (Cape Ann). DeKay, New York Fauna, Fishes, 1842, 297, pl. 48, f. 155 (New York). Storer, Syn. Fish. N. A., 1846, 476.
- Pleuronectes ferrugineus* Günther, iv, 447, 1862 (Boston). Jordan & Gilbert, Syn. Fish. N. A., 1882, 834.
- Myzopselta ferruginea* Gill, Proc. Ac. Nat. Sci. Phila., 1864, 217.
- Limanda ferruginea* Goode, Proc. U. S. Nat. Mus., 1880, 472 (New England). Goode, Hist. Aquat. Anim., 1884, pl. 49.
- Platessa rostrata* H. R. Storer, Bost. Journal Nat. Hist., vi, 268, 1850 (Labrador).
- Limanda rostrata* Gill, Proc. Ac. Nat. Sci. Phila., 1864, 217.

Habitat.—Atlantic coast of North America, Labrador to New York. This species is rather common northward on our Atlantic coast. It is allied to the European Dab, but has smaller scales and a more prominent snout. Our specimens are from the east coast of Massachusetts.

76. LIMANDA LIMANDA.

(THE DAB.)

Pleuronectes limanda Linnaeus, Syst. Nat., ed. x, p. 270, 1758 (after Artedi) (and of the early copyists). Günther, Cat. Fish., iv, 446, 1862 (Firth of Forth; Plymouth). Day, Brit. Fishes, vol. ii, p. 31, plate civ.

Pleuronectes limandula Lacépède, Hist. Nat., Poiss., iv, 1803 (after "la Limaudello". Duhamel, ix, ch. 1, p. 268, pl. 6, f. 3, 4.)

Limanda vulgaris Gottsche, "Wiegmann's Archiv, 1835, 100."

Limanda oceanica Bonaparte, Catologo, 48, 1846. (*Platessa limanda* L.)

? *Limanda pontica* Bonaparte, l. c., 48, 1846 (Black Sea, after Pallas).

Pleuronectes linguatula Gronow, Syst., ed. Gray, 1854, 88 (not of L.).

Habitat.—Northern coasts of Europe, south to France.

This small flounder is abundant on the coasts of Northern Europe and southward to the coasts of France. Our specimens are from the market at Paris.

Günther speaks of other specimens, more elongate, the depth being but two-fifths the length without caudal. The synonym *Pleuronectes limandula* would appear to belong to this latter type.

77. LIMANDA ASPERA.

[Plate XIII.]

Pleuronectes asper Pallas, Zoogr. Rosso-Asiat., 1811, iii, 425 (east coast of Siberia). Günther, iv, 454, 1862 (copied). Steindachner, Pleuronectiden, etc., aus Decastris Bay, 1870-'5 (Decastris Bay). Jordan and Gilbert, Synopsis Fish. N. A., 1882, 835. (Description from Alaskan specimens collected by Dr. Bean.)

Limanda aspera Bean, Proc. U. S. Nat. Mus., 1881, p. 242 (Sitka, St. Paul, Humboldt Harbor, Shumagins, Port Clarence, Plover Bay, Siberia; Indian Point, Siberia). Bean, Cat. Col. Fish, U. S. Nat. Mus., 1883, p. 20. (Sitka, Alaska.) Bean, Proc. U. S., Nat. Mus., 1883, p. 354 (Port Simpson, Cardenas Bay, British Columbia). Bean, Hist. Aquat. Anim., 1884, 184, pl. 48. (Gulf of Alaska, Unalashka, Sitka, Wrangel.)

Habitat.—Coasts of Alaska and Kamtschatka.

This species is chiefly known from the accounts given by Dr. Bean, who has collected it in various localities in Alaska. Its scales are larger and rougher than in *L. ferruginea* which, in many respects, it resembles. A specimen from the island of Saghalien is in the museum at Cambridge.

78. LIMANDA BEANI.

Limanda beani Goode, Proc. U. S. Nat. Mus., 1880, 473 (southern coast New England, deep-sea stations, 875, 876).

Pleuronectes beani Jordan and Gilbert, Syn. Fish. N. A., p. 835, 1882.

Habitat.—Deep water off the coasts of New England.

We know this species only from the accounts given by Professor Goode.

Genus XXXIII.—PSEUDOPLEURONECTES.

Pseudopleuronectes Bleeker, Comptes Rendus Acad. Amst., Pleuron., 7, 1862 (*planus*).

TYPE: *Pleuronectes planus* Mitchill=*Pleuronectes americanus* Walbaum.

This genus is distinguished from *Platessa* chiefly by the well-imbri-
cated ctenoid scales, and from *Limanda*, which it more closely resembles,
by the want of arch to the lateral line. Besides the typical species, we
refer to this genus a second from the North Pacific.

ANALYSIS OF SPECIES OF PSEUDOPLEURONECTES.

- a. Dorsal rays 65; anal rays 48. Body regularly elliptical; a very slight angle above
eye; interorbital space rather broad, convex, half as wide as eye, and entirely
scaly; a low granular ridge above opercle. Head 4; depth $2\frac{1}{2}$; lat. l. 83. Ver-
tebræ $10 + 26 = 36$. Color dark rusty brown, plain or mottled with darker; fins
nearly plain AMERICANUS, 79.
- aa. [Dorsal rays 58; anal 38. Body subelliptical, the snout rather pointed, and not
forming an angle above eye; interorbital space rather broad, half width of eye;
a rather prominent rugose ridge above opercle, with a smaller similar ridge be-
hind it; both sides of jaws with teeth. Head $3\frac{1}{2}$; depth $2\frac{1}{2}$; lat. l. 70. Color
brown, with vague dusky spots; six or seven blackish vertical bars on dorsal and
anal; similar lengthwise blotches on caudal.] (*Steindachner*). PINNIFASCIATUS, 80.

79. PSEUDOPLEURONECTES AMERICANUS.

(THE COMMON FLAT-FISH OR WINTER FLOUNDER.)

[Plate XIV.]

Flounder, Schöpf, "Schrift. Gesellschaft Naturforschender Freunde, viii, 1788, 148."
(New York.)

Pleuronectes americanus Walbaum, Artedi, Piscium, 1792, 113 (based on the "Floun-
der" of Schöpf). Bloch & Schneider, Syst. Ichth., 1801, 150 (copied).
Günther, iv, 443, 1862 (New York). Jordan & Gilbert, Synopsis, 1882, 837.
Stearns, Proc. U. S. Nat. Mus., 1883, 125 (Labrador).

Pseudopleuronectes americanus Gill, Proc. Ac. Nat. Sci. Phila., 1864, 216. Goode, Nat.
Hist. Aquat. Anim., 1884, 182, pl. 44 (Chesapeake Bay to Bay of Chaleur).

Platessa plana Storer, Fishes Mass., 1839, 140. DeKay, New York Fauna, Fishes, 295,
pl. 49, f. 158, 1842 (New York). Storer, Synopsis, 1846, 476.

Pseudopleuronectes planus Bleeker, Comptes Rendus Amsterd., xliii, 1862, 7.

Platessa pusilla DeKay, New York Fauna, Fishes, 1842, 296, pl. 47, f. 153 (New
York). Storer, Synopsis, 1846, 477.

Habitat.—Atlantic coast of North America from Labrador to Chesa-
peake Bay.

This small flounder is one of the most abundant of the group on our
Atlantic coast. It reaches a length of about 15 inches and a weight of
less than two pounds. It is a very good food-fish and sells readily in
the markets. Along the south coast of Massachusetts this species is
more abundant than any other of the flat-fishes.

The specimens examined by us are from Labrador, Cape Breton, An-
ticosti, Grand Menan, Boston, Provincetown, Wood's Holl, New Bed-
ford, and Somers Point, New Jersey.

80. PSEUDOPLEURONECTES PINNIFASCIATUS.

Pleuronectes pinnifasciatus (Kner) Steindachner, Ueber einige Pleuronectiden, etc., aus Decastris Bay, 1870, 2, pl. 1, f. 1 (Decastris Bay).

Habitat.—Sea of Kamtschatka, Decastris Bay.

This species is known to us only from Dr. Steindachner's description and excellent figure. From this we conclude that it belongs to the group called *Pseudopleuronectes*, although its pharyngeals have not been described. It seems to us nearer to *P. americanus* than to *Liopsetta glacialis*.

Genus XXXIV.—PLATESSA.

Pleuronectes Artedi, Genera, etc., in part.

Pleuronectes Linnæus, Syst. Nat., ed. x, 268, 1758 (includes all known *Pleuronectida*).

Platessa Cuvier, Règne Animal, ii, 1817 (*platessa*), (first subdivision of *Pleuronectes* L.).

Platessa Fleming, Brit. Anim., 1828, 198 (*vulgaris*=*platessa*), (first restriction of *Pleuronectes* L. to *Pl. maximus* and relatives).

Pleuronectes Swainson, Nat. Hist. Class'n Anim., ii, 1839 (*platessa*), (second restriction of *Pleuronectes*).

Platessa DeKay, New York Fauna, Fishes, 1842 (*platessa*).

Pleuronectes Bleeker, Comptes Rendus Acad. Amsterd., xiii, 1862 (*platessa*), (and of most recent authors).

Flesus Moreau, Poissons de France, 1831, 299 (*fesus*).

TYPE: *Pleuronectes platessa* Linnæus.

The reasons for retaining for this genus the name *Platessa* instead of *Pleuronectes* have been given under the head of the latter genus.

It is possible that the numerous related groups or genera, *Pseudopleuronectes*, *Platichthys*, and *Liopsetta*, should not be separated from *Platessa*. Convenience in definition of the groups seems, however, best served by regarding each of these types as forming a distinct genus, though whether they are called genera or subgenera is a matter of minor importance. The group *Flesus* is fairly well defined, and may, perhaps, also merit generic rank.

ANALYSIS OF SPECIES OF PLATESSA.

- a. Teeth incisor-like, compressed, close set, forming a continuous cutting edge; no stellate scales at bases of dorsal and anal rays; lower pharyngeals narrow, the teeth almost uniserial. (*Platessa*.)
- b. Snout projecting, forming a distinct angle above eye. PLATESSA, 81.
 - x. Scales all cycloid, no ciliated scales anywhere; a series of about six small, bony tubercles on ridge above opercles; a small tubercle behind upper eye, and one before lower; interorbital space narrow, smooth. Head, 3½; depth, 2. D. 67 to 77. A. 50 to 57. Vertebrae, 14 + 29 = 43. Color, brownish or dusky, with rather large, round yellowish spots, which fade in spirits. (These spots rarely black, and persistent.) . . . Var. *platessa*, 81 (a).

- xx. Scales not all cycloid, some of those along lateral line, along the base of dorsal and anal and on sides of head and abdomen ciliated, otherwise as in the preceding. D. 62 to 66. A. 46 to 48. Light brownish, with yellow spots. (*Gottsche*).....Var. *pseudoflesus*, 81 (*b*).
- bb. Snout not projecting, not forming a distinct angle above eye; tubercles on ridge above opercle at base of lateral line, coarser than in *Pl. platessa*, and about five in number; a small tubercle behind upper eye; scales small, cycloid in all specimens examined. Head, $3\frac{1}{2}$; depth, 2. D. 68. A. 50. Lat. 1. 78. Color, grayish, mottled with paler and with round black spots; fins very darkQUADRITUBERCULATA, 82.
- aa. Teeth in jaws small, conical, well-separated, not forming a continuous cutting edge; a stellate scale or tubercle at the base of each ray of dorsal and anal; lower pharyngeals rather narrow, each with four or five rows of teeth. (*Flesus* Moreau.)
- c. Body oblong-elliptical, a small angle above eye. Head, $3\frac{1}{4}$ in length; depth, $2\frac{1}{2}$; vertebrae $12 + 24 = 36$FLESUS, 83.
- y. Sides of head and anterior portion of lateral line with coarse stellate scales or tubercles; smaller ones on sides of abdomen, the scales otherwise cycloid; granular ridge above opercle usually without tubercles. D. 60 to 62. A. 39 to 45. Color brownish, irregularly mottled, the blind side rarely spotted with darkerVar. *flesus*, 83 (*a*).
- yy. Sides of head and lateral line nearly or quite destitute of tubercles, the scales all cycloid except those at the bases of the fin-rays and a few about the eyes; ridge above opercle usually with one or two rugose prominences. D. 62 to 64. A. 41 to 48. Color, dark-brown, often marbled with darker, the blind side usually with irregular dark spots.....Var. *glabra*, 83 (*b*).

81. PLATESSA PLATESSA.

(THE PLAICE.)

[Plate XV.]

a. Var. *platessa*.

- Pleuronectes* No. 1, Artedi, Genera, etc.
- Pleuronectes platessa* Linnaeus, Syst. Nat., ed. x, 1758, 269 (after Artedi) (and of the early copyists). Günther, iv, 440 (Firth of Forth; Brighton; Bohuslän). Day, Fish. Great Britain, ii, 25, pl. ci (and of recent writers generally).
- Scophthalmus diurus* Rafinesque, Indice di Ittiologia Siciliana, 1810, 53 (based on the Quarrelet of Rondelet).
- Platessa vulgaris* Fleming, British Anim., 198, 1828 (and of numerous authors).
- Pleuronectes latus* Cuvier, Règne Animal, ed. ii, 1828 (deformed example, France).
- Pleuronectes borealis* "Faber, Isis, 1828, 863" (Iceland).

b. Var. *pseudoflesus* (variety ?).

- Platessa pseudoflesus* Gottsche, Wiegmann's Archiv, 1835, 143 (German Ocean).
- Pleuronectes pseudoflesus* Günther, iv, 441 (copied).

Habitat.—Coasts of northern Europe, south to Italy. This is one of the most common of the flat-fishes of Europe, and is, next to the halibut and the turbot, the one of most importance as a food-fish. It reaches usually a weight of five or six pounds, although speci-

mens of 15 pounds have been recorded. It is rather more northerly in its range than the mud-flounder, it being a comparatively rare species in the Mediterranean.

Our specimens of this species are from the markets of Paris. We have examined others in the Museum at Cambridge, from various localities in France, England, Holland, and Scandinavia. There are also a number of specimens from Trieste (Coll. Salmin). In one lot of these there are large black rounded blotches, inky in color, and permanent in alcohol. These take the place of the usual orange spots, which are evanescent in alcohol. Others from the same locality have the usual coloration.

We know nothing of the species called, "*pseudoflesus*." It seems to us likely that it is a variety, or perhaps accidental variation, of *Platessa platessa*, the chief difference consisting in the presence of ciliated scales on the head and other parts of the body. It must be regarded as a very doubtful species at the best.

The alleged species *Platessa borealis* is also unknown to us. It is said to differ in having smaller teeth—31 on the blind side of the pre-maxillary.

82. PLATESSA QUADRITUBERCULATA.

Pleuronectes quadrituberculatus Pallas, Zoogr. Rosso-Asiat., iii, 423, 1811 (sea between Kamtschatka and Alaska). Bean, Proc. U. S. Nat. Mus., 1881, 241 (Kodiak). Jordan & Gilbert, Syn. Fish. N. A., 1882, 836 (from specimens collected by Dr. W. J. Fisher).

Parophrys quadrituberculatus Günther, iv, 456 (copied).

Pleuronectes pallasi Steindachner, Ichth. Beitr., viii, 45, 1879, plate (Kamtschatka).

Habitat.—Behring Sea.

This small flounder is known to us only from descriptions and from a specimen (28025) collected by Mr. W. J. Fisher at Kodiak, described by Jordan and Gilbert. It seems to be a rare species even in the remote regions it inhabits. Although its pharyngeal teeth have not been examined, there can be little doubt that it will prove a near ally of *Platessa platessa*.

83. PLATESSA FLESUS.

(THE MUD-FLOUNDER OR FLUKE.)

a. Var. *flesus*.

Pleuronectes flesus Linnaeus, Syst. Nat., ed. x, 270, 1758 (after Artedi, and of copyists). Günther, iv, 450, 1862. Steindachner, Ichthyol. Bericht., Sechste Fortsetzung, 53, 1868 (Bilboa, Coruña, Vigo, Barcelona, Cadiz, Gibraltar, Rio Miño, Pomerania, Kattogat; unites *flesus* and *glabra*; Spanish localities belong to the latter). Day, Fish. Great Britain, vol. ii, 33, pl. cv, and of recent authors generally.

Platessa flesus Fleming, British Anim., 1828, 198, and of numerous writers.

Pleuronectes passer Linnaeus, Syst. Nat., ed. x, 271, 1758 (reversed example).

Pleuronectes flesoides Pontoppidan, "Hist. Nat. Daniae, 15^a, tab. 15," 1765 (reversed example).

Pleuronectes roseus Shaw, "Nat. Misc., vii, 238," 1800 (albino example).

Pleuronectes luscus Pallas, Zoogr. Rosso-Asiat., iii, 427, 1811 (Black Sea). "Nordmann, in Domidoff, Voy. Russ. Mérid., iii, 532, Pisc., tab. 27" (Black Sea). Günther, iv, 452 (copied).

Pleuronectes carnaria Brown, "Edinburgh Journal, Nat. and Geol., ii, 99, t. ii" (albino example), 1830.

Platessa melanogaster Higgins, "Zoologist, xiii, 1855, 4596" (doubled example).

Pleuronectes bogdanovi Sandeborg, Bull. Sci. Mosc., iii, pt. 2, p. 236, 1878 (White Sea).

Fleus vulgaris Moreau, Poiss. de France, 1881, iii, 299.

b. Var. *glabra*.

Platessa glabra Rathke, Fauna der Krym., 352, 1837 (Crimea).

Platessa passer Bonaparte, Fauna Italica, Pesci, 1838-1840.

Pleuronectes italicus Günther, Cat. Fish. Brit. Mus., iv, 1862, 452 (Dalmatia).

Habitat.—All coasts of Europe, ascending the streams; the typical form in northern Europe; var. *glabra* in the Mediterranean,

This small species is the common "flounder" or "flake" of Europe. It is almost everywhere very abundant, but it is held in low esteem as a food-fish. It reaches a length of less than a foot. Our specimens of the typical form, *fleus*, are from the markets of Paris, but we have examined others from various localities in northern Europe. The form called *lusca*, from the Black Sea, we have not seen, and do not know whether it differs at all from the typical *fleus* or not.

The common Mediterranean form called *glabra* (*italica*) differs a good deal in appearance from the ordinary *fleus*, but this difference lies mainly in the greater smoothness of the scales about the head.

The numerous specimens before us from Venice and Trieste differ from those of *fleus* only in the entire absence of the stellate tubercles which cover the head and the neighborhood of the lateral line in that species. Steindachner regards the two as unquestionably identical. Still it seems best to regard them as distinct subspecies, especially as no intermediate specimens have come to our notice. Rathke's description of *Platessa glabra* evidently belongs to the form called *italicus* by Dr. Günther. Rathke's *lusca* agrees with the typical *fleus*. The *Pleuronectes bogdanovi* of Sandeborg from the White Sea seems to be nearly the same as the typical *fleus*. It is said to be deeper (depth 2 in length), smoother, with shorter pectorals (2 in head). Teeth truncate, close-set. Body smooth, except for a row of tubercles on eyed side on bases of dorsal and anal, and two or three similar rows on front of lateral line. D, 53 to 56; A, 37 or 38.

Genus XXXV.—LIOPSETTA.

Liopsetta Gill, Proc. Ac. Nat. Sci. Phila., 1864, 217 (*glaber*) (females).

Euchalarodus Gill, Proc. Ac. Nat. Sci. Phila., 1864, 222 (*putnami*) (males).

TYPE: *Platessa glabra* Storer = *Euchalarodus putnami* Gill.

This genus comprises one, two, or three species of small flounders of the Arctic seas. The genus is distinguished by the large, half-united pharyngeals, as also by the peculiar squamation, the scales in the males being very rough, in the females smooth. This difference has given rise

to the nominal genus *Euchalarodus* based on the males, while *Liopsetta* was based on the smoother females, which were erroneously supposed to be scaleless.

The following analysis gives the supposed differential characters of these species, but these characters are of very slight importance, and it is probable that the three nominal species are all varieties of *Liopsetta glacialis*.

ANALYSIS OF SPECIES OF LIOPSETTA.

- a. [Ridge above opercle ending in two obtuse tubercles; scales of blind side smooth, those of the eyed side ciliated (probably in males only); interorbital ridge prominent, acute; head, $4\frac{1}{2}$ in total with caudal; depth, $2\frac{3}{8}$. D., 50 to 57; A., 36 to 41.] (Lilljeborg)..... DVINENSIS, 84.
- aa. Ridge above opercle coarsely rugose, divided toward its end, but without distinct tubercles; scales ctenoid on both sides in males, those of the blind side smoother.
- b. Pectoral fin long, about half length of head in the females, two-thirds head in the males. Head, $3\frac{1}{4}$; depth, 2. D., 55; A., 40; Lat. l., 70. Color, grayish brown, mottled with darker; fins with blackish spots. (Probably identical with the next)..... PUTNAMI, 85.
- bb. Pectoral fin short, barely half length of head even in the males; head, 4; depth, 2; D., 56; A., 37 to 42. Vertebrae, 13+27=40. Color, dark brown, the fins spotted. GLACIALIS,* 86.

84. LIOPSETTA DVINENSIS.

Platessa dvinensis "Lilljeborg, Vet.-Akad. Handl., 1850, p. 360, tab. 20" (mouth of River Dwina). Nilsson, "Skand. Fauna, iv, 617."

Pleuronectes dvinensis Günther, iv, 442 (copied).

Habitat.—Arctic coasts of Russia.

This species is known to us only from the description copied by Günther from Lilljeborg. It is apparently a species very closely related to *Liopsetta glacialis*, and it is most likely identical with the latter.

85. LIOPSETTA PUTNAMI.

(THE EEL-BACK FLOUNDER.)

[Plate XVI.]

- Platessa glabra* Storer, Proc. Boston Soc. Nat. Hist., p. 130, 1843 (female). Storer, Syn. Fish. N. A., p. 477, 1846. Storer, Hist. Fish. Mass., 1867, p. 199, pl. xxxi, fig. 1. Putnam, Bull. Essex Inst., vi, 1874, p. 12 (not of Rathke, 1837).
- Liopsetta glabra* Gill, Proc. Acad. Nat. Sci. Phila., 1864, p. 217.
- Pleuronectes glaber* Gill, in Report U. S. Com. Fish and Fisheries, 1873, p. 794. Goode and Bean, Amer. Jour. Sci. and Arts, xiv, 1877, p. 476; xvii, 1879, p. 40. Goode and Bean, Proc. U. S. Nat. Mus., 1878, 347 (Casco Bay, Beverly Bridge, Salem, Bucksport, Me.). Jordan and Gilbert, Syn. Fish. N. A., 1882, p. 836. Goode, Nat. Hist. Aquat. Anim., 1884, p. 183, pl. 45.
- Euchalarodus putnami* Gill, Proc. Acad. Nat. Sci. Phil., 1864, p. 216-221 (Salem, Mass.) male. Gill, Report U. S. Com. Fish and Fisheries, 1873, p. 794. Goode and Bean, Amer. Jour. Arts and Sci., xiv, 1877.

Habitat.—Atlantic coast of North America, from Cape Cod northward to Labrador and beyond.

* The pharyngeals in *dvinensis* and *glacialis* have not been examined.

This species is rather common along the coast of Northern Massachusetts and northward to Labrador. Specimens are frequently found in the markets, mixed with those of *Pseudopleuronectes americanus*. The numerous specimens in our possession were found in the markets of Indianapolis, having been sent thither from Boston.

The remarkable sexual differences in the species have been fully discussed by Dr. Bean (Proc. U. S. Nat. Mus., 1878, 345), the form formerly called *Euchalarodus putnami* being the male, and that called *Pleuronectes glaber* being the female of the same species. These conclusions of Dr. Bean are fully corroborated by our series of specimens in which both sexes are fully represented.

As the name *Platessa glabra* is preoccupied by Rathke (1837), we must adopt the specific name *putnami* for this species if it be regarded as distinct from *Liopsetta glacialis*. Taking our own notes and the published plate of the latter species as a guide, we can see no difference whatever by which *Liopsetta putnami* may be separated from it. It is possible, however, that differences would appear on actual comparison of specimens. In view of the wide distance between the habitats of the two species, we here leave them separate for the present. Although *Liopsetta putnami* is abundant where found, its ascertained range is somewhat limited. The specimens in the U. S. National Museum represent localities from Salem, Mass., to Belfast, Me. In the Museum of Comparative Zoology the localities represented are Providence, Boston, Salem, Grand Manan, and Labrador.

86. LIOPSETTA GLACIALIS.

[Plate XVII.]

Pleuronectes glacialis Pallas, "Itin., iii, App., 706" (mouth of river Obi). Bloch and Schneider, Syst. Ichth., 1801, p. 150 (copied). Pallas, Zoogr. Ross.-Asiat., iii, 424, 1811 (mouth river Obi). Richardson, Fauna Bor. Amer., Fish., 258, 1836 (copied). DeKay, N. Y. Fauna, Fishes, p. 302, 1842 (copied). Storer, Syn. Fish. N. A., 1846, p. 479 (copied). Bean, Proc. U. S. Nat. Mus., 1881, p. 241 (Kotzebue Sound, Northern Alaska). Jordan and Gilbert, Syn. Fish. N. A., 1882, 837 (from specimens taken by Dr. Bean). Bean, Cat. Col. Fish. U. S. Nat. Mus., 1883, p. 20 (Kotzebue Sound, Alaska). Bean, Nat. Hist. Aquat. Anim., 1884, 184, pl. 47 (Saint Michael's).

Pleuronectes cicatricosus Pallas, Zoogr. Ross.-Asiat., iii, 424, 1811 (male) (sea between Kamtschatka and Alaska).

Pleuronectes franklinii Günther, Cat. Fish., iv, 442, 1862 (Arctic seas of America) (female). Bean, Proc. U. S. Nat. Mus., 1881, p. 241.

Habitat.—Arctic Ocean south to Saint Michael's.

This small flounder is known to us only from the specimens taken by Dr. Bean. It is said to be abundant in the Arctic Ocean, and as far south as Saint Michael's, "although small, its great abundance and fine flavor make it important as an article of food."

The male is the rough fish described by Pallas as *P. cicatricosus*. The smoother female is Dr. Günther's *Pleuronectes franklinii*, the sexual differences being much as in *Liopsetta putnami*.

Indeed, as already intimated, we have little doubt that the *Liopsetta putnami* of the Atlantic is wholly identical with *Liopsetta glacialis* of the Arctic Ocean, and with *Liopsetta dvinensis* of the northern coasts of Russia.

Genus XXXVI.—PLATICHTHYS.

Platichthys Girard, Proc. Ac. Nat. Sci. Phila., 1854, 136 (*rugosus* = *stellatus*).

TYPE: *Platichthys rugosus* Girard = *Pleuronectes stellatus* Pallas.

This genus is composed of a single species, the largest of the small-mouthed flounders, and distinguished from related forms chiefly by the development of coarse stellate tubercles instead of scales.

ANALYSIS OF SPECIES OF PLATICHTHYS.

a. Body broad and short, very robust, the snout forming a slight angle with the profile; interocular space broad, with very rough scales; tubercles or scales coarsest on head and along bases of fin-rays; lateral line without scales; ridge above opercle rough; head $3\frac{2}{3}$; depth, 2; D. 58; A. 42; vertebrae 34; color dark brown, with lighter markings; fins reddish-brown, dorsal and anal each with four or five black vertical bands; caudal with three or four black longitudinal bands. .STELLATUS, 87.

87. PLATICHTHYS STELLATUS.

(THE CALIFORNIA FLOUNDER.)

[Plate XVIII.]

- Pleuronectes stellatus* Pallas, Zoographia Rosso-Asiatica, iii, 1811, 416 (Alaska). Günther, Cat. Fish., iv, 443, 1862 (Vancouver Islands, Behring Strait, Fraser River, Coronation Gulf). Steindachner, Pleur. von Decastria Bay, 1870, 1, (Decastria Bay). Jordan & Gilbert, Proc. U. S. Nat. Mus., 1880, p. 453 (San Francisco, Puget Sound, Columbia River, Monterey Bay, San Luis Obispo). Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 68 (San Luis Obispo). Bean, Proc. U. S. Nat. Mus., 1881, 240 (San Luis Obispo, Monterey, San Francisco, Columbia River, Puget Sound). Jordan and Gilbert, Syn. Fish. N. A., 1882. Bean, Proc. U. S. Nat. Mus., 1883, p. 353 (Port Simpson, Brit. Col.). Beau, Cat. Col. Fish. U. S. Nat. Mus., 1883, p. 20 (Yakutat Bay, Alaska). Jordan, Nat. Hist. Aquat. Anim., 1884, 184, pl. 46 (San Luis Obispo to Kamtschatka).
- Platessa stellata* DeKay, N. Y. Fauna, Fishes, p. 301, 1842 (copied). Storer, Syn. Fish. N. A., 1846, p. 478 (copied).
- Platichthys stellatus* Lockington, Rep. Com. Fish. Cal., 1878-79, p. 43 (San Francisco Bay, Humboldt Bay). Lockington, Proc. U. S. Nat. Mus., 1879, p. 91 (San Francisco).
- Platichthys rugosus* Girard, Proc. Acad. Nat. Sci. Phila., 1854, pp. 139, 155. Girard, U. S. Pacif. R. R. Sur., Fish., 148, 1859 (San Francisco, Presidio, Petaluma).

Habitat.—Pacific coast of America, from Point Conception to the Arctic Ocean and south to Saghalien.

This is one of the largest of the American flounders, reaching a weight of 15 to 20 pounds. Of the small-mouthed flounders, it is considerably the largest species known. It is an excellent food-fish, and from its size and abundance it is one of the most important of the group in the region where it is found, constituting half the total catch of flounders on our Pacific coast. It lives in shallow water and sometimes ascends the larger rivers. It is one of the most widely distributed of all the flounders, its range extending from San Luis Obispo, where it was obtained by Jordan and Gilbert, to the mouth of the Anderson and Colville Rivers on the Arctic coast, where it was observed by Dr. Bean. A specimen from the island of Saghalien in Asia is in the museum at Cambridge.

Genus XXXVII.—MICROSTOMUS.

Microstomus Gottsche, Wiegmann's Archiv, 1835, 150 (*latidens*) (not *Microstoma* Risso, 1826).

Cynoglossus Bonaparte, Fauna Italica, 1837, fasc., xix (*cynoglossus* Nilsson, not of L.).

Cynoglossa Bonaparte, Catalogo Metódico Pesci Europei, 1846, 48 (*microcephalus*), not *Cynoglossus* Hamilton, 1822).

Brachyprosopon Bleeker, Comptes Rendus Acad. Sci. Amsterd., xiii, Pleuron, 7, 1862 (*microcephalus*).

Cynoglossus Jordan and Gilbert, Syn. Fish. N. A., 1882, 460 (*microcephalus*).

TYPE: *Microstomus latidens* Gottsche = *Pleuronectes kitt* Walbaum.

This genus is widely separated from *Platessa* and its allies by its greatly increased number of vertebrae, a character accompanied by a similar increase in the number of fin-rays. It is close to *Glyptocephalus*, but the lack of the cavernous structure of the bones of the head, a structure peculiar to the species of that genus, sufficiently distinguishes it. Two species are known, small flounders of the Arctic seas, inhabiting considerable depths.

We here retain the generic name *Microstomus*, although in accordance with recent usage of most ornithologists and ichthyologists, it should be suppressed, as identical with *Microstoma*. The two words are from the same root and differ only in the termination. But is not this difference enough? The code of nomenclature of the American Ornithologists' Union very properly declares that "a name is only a name and has no necessary meaning," and, therefore, no necessarily correct spelling, except the spelling selected by the writer from whom it dates its origin. As a result of this, the original spelling of each generic name is (undoubted misprints aside) the orthography to be adopted, regardless of all questions as to the correct etymology of the word. As a necessary sequence, it seems to us that all generic names, not actually preoccupied by names spelled in the same way, should be tenable. There is no other certain boundary line between names tenable and names untenable. We propose therefore to regard all generic names as available unless used in zoology earlier and in exactly the same or-

thography. Among American genera of fishes we may therefore use the following, notwithstanding their earlier analogues:

<i>Microstomus</i> for	<i>Cynicoglossus</i> notwithstanding the prior <i>Microstoma</i> .	
<i>Heterodontus</i>	<i>Cestracion</i>	<i>Heterodon</i> .
<i>Lucania</i>	_____	<i>Lucanus</i> .
<i>Thymallus</i>	_____	<i>Thymalus</i> .
<i>Nebria</i>	_____	<i>Nebria</i> .
<i>Cestresus</i> (κεστρεϋς)	<i>Cynoscion</i>	<i>Cestræus</i> (κεστραιος).
<i>Xiphidion</i>	<i>Xiphister</i>	<i>Xiphidium</i> .
<i>Amitra</i>	<i>Monomitra</i>	<i>Amitrus</i> .
<i>Scytalina</i>	<i>Scyतालiscus</i>	<i>Scyталinus</i> .
<i>Lagochila</i>	<i>Quassilabia</i>	<i>Lagocheilus</i> .
<i>Auchenopterus</i>	<i>Cremnobates</i>	<i>Auchenipterus</i> .
<i>Ophisoma</i>	<i>Congromurana</i>	<i>Ophiosomus</i> .
<i>Leucos</i>	<i>Myloleucus</i>	<i>Leucus</i> .
<i>Pterophryne</i>	<i>Pterophrynoidea</i>	<i>Pterophrynus</i> .
<i>Scaphirhynchus</i>	<i>Scaphirhynchops</i>	<i>Scaphorhynchus</i> .
<i>Brachirus</i>	<i>Synaptura</i>	<i>Brachyrus</i> .

If *Microstomus* be discarded, the name next in order of date is *Cynicoglossus*.

The following is Bonaparte's definition of *Cynicoglossus* as quoted by Gill (Proc. Ac. Nat. Sci. Phila., 1864, 222):

"Secondo è *Cynicoglossus* nob. che come il *Pl. cynoglossus* L. ha la linea laterale retta, la bocca piccola, i denti come quello di sopra [*Platessa*] ma la mascella uguale, con labbra turgide, e l'ano senza spina."

Later, in his Catalogo Metodico dei Pesci Europei, Bonaparte changes this name from *Cynicoglossus* to *Cynoglossa*, giving the sole species as *Cynoglossa microcephala*, and quoting as its synonym "*Pleuronectes cynoglossus* L. Nilss." showing that his identification of the Linnæan species coincided with that of Nilsson, who at first used the name "*Pleuronectes cynoglossus*" for the present species instead of the species of *Glyptocephalus*. In Bonaparte's Catalogo, *Glyptocephalus* Gottsche is regarded by Bonaparte as synonymous with *Platessa*.

It is thus evident, as Dr. Gill has suggested, that Bonaparte meant to refer to the *Pleuronectes microcephalus* instead of *Pl. cynoglossus*, he "having followed Nilsson in his erroneous identification" of the latter with the former. In farther evidence of this we have the fact that *Cynicoglossus microcephalus* (kitt) has no anal spine, while such a spine is present in the species of *Glyptocephalus*. We would be, therefore, justified in the use of *Cynicoglossus* instead of the later *Brachyprosopon*, if *Microstomus* should be regarded as ineligible on account of the prior name *Microstoma*.

ANALYSIS OF SPECIES OF MICROSTOMUS.

- a. Dorsal rays 85 to 93; anal rays 70 to 76. Head very small, $4\frac{1}{2}$ to $5\frac{1}{2}$ in length; depth about $2\frac{1}{2}$; eyes moderate, about 4 in head; pectorals $1\frac{1}{2}$ in head; lat. l., 130; vertebrae $13 + 35 = 48$. Color dull yellowish-brown, body and fins clouded with blackish, KITT, 88.
- aa. Dorsal rays 102; anal rays 85. Head larger, $4\frac{1}{2}$ in length; depth nearly 3 in length; eyes large, 3 in. head, opercle above angle, adnate to the shoulder girdle; pectoral short, $1\frac{1}{2}$ in head; lat. l. 140; vertebrae $12 + 40 = 52$. Olive-brown, blotched on body and fins with darker PACIFICUS, 89.

88. MICROSTOMUS KITT.

(THE SMEAR DAB.)

Rhombus laevis cornubiensis Jago in Ray, "Syn. Pisc., 162, tab. 1, f. 1."*The Smear Dab* Pennant, British Zoology, iii, p. 230, pl. 41, 1776."*Pleuronectes kitt* Walbaum, *Artedi Piscium*, iii, 1792, 120 (after Ray; the description in part confused with that of *Lepidorhombus*).*Pleuronectes kitt* Bloch & Schneider, *Systema Ichthyologia*, 1801, 162 (after Ray).*Pleuronectes microcephalus* Donovan, "British Fishes, ii, pl. 42, 1801." Günther, iv, 447. Steindachner, *Ichth. Beitr.*, viii, 47 (Edinburgh). Day, *Fishes Great Britain*, ii, 28, pl. 102. Collett, *Norges Fiske*, 145, and of recent European writers generally.*Platessa microcephala* Fleming, *British Anim.*, 198, 1828, and of numerous writers.*Cynoglossa microcephala* Bonaparte, *Catalogo Metodico Pesci Eur.*, 1845, 48.*Pleuronectes laevis* Shaw, *Gen'l Zool.*, iv, 299, 1803.*Pleuronectes quenseli* Hölböll, "Bohusläns Fiske, iv, 59."*Pleuronectes quadridens* Fabricius, "Kongl. Dansk. Vid. Selsk. Afhandl.", i, 39."*Pleuronectes microstomus* "Faber, *Isis*, 1828, 886."*Microstomus latidens* Gottsche, *Wiegmann's Archiv*, 1835, 150.*Pleuronectes gilli* Steindachner, *Ichth. Notizen*, 1868, vii, 40. (Polar Sea, north of Iceland.)

Habitat.—Seas of the north of Europe in rather deep water, south to Cornwall.

This small flounder is rather common in the waters of Northern Europe. It reaches the length of a foot or more, and is said to be excellent as food. We have no specimens at hand, and have therefore relied chiefly on the figure and description given by Dr. Day, in our comparison of this species with *M. pacificus*. Like its congener, *M. pacificus*, this species is often very slimy in life.

This species is recorded by Day, on the authority of Dr. Steindachner, as occurring in Kamtschatka. This reference probably belongs to *M. pacificus*.

The specific name "*kitt*," given by Walbaum on the authority of Jago's description, seems to be the one which should be adopted for this species. According to Day, the species is still called "*kitt*" on the coast of Cornwall.

Pleuronectes gilli, as described by Dr. Steindachner, seems to differ from *Microstomus kitt* only in the larger head, which is but $4\frac{3}{8}$ in the length to base of caudal. It is probably not specifically distinct from the latter. Only a single specimen $10\frac{1}{2}$ inches long is known.

89. MICROSTOMUS PACIFICUS.

(THE SLIPPERY SOLE.)

Glyptocephalus pacificus Lockington, *Rep. Com. Fisheries*, 1878-'79, p. 43 (off Point Reyes). Lockington, *Proc. U. S. Nat. Mus.*, 1879, p. 86 (San Francisco). Jordan, *Nat. Hist. Aquat. Anim.*, 1884, 183.*Cynoglossus pacificus* Jordan and Gilbert, *Proc. U. S. Nat. Mus.*, 1880, p. 453 (Puget Sound, San Francisco, Monterey Bay). Jordan and Gilbert, *Proc. U. S. Nat. Mus.*, 1881, p. 68 (Seattle). Jordan and Gilbert, *Synopsis Fish. N. A.*, 1882, 838.

Habitat.—Pacific coast of North America, Monterey to Vancouver's Island, and probably northward.

This small flounder abounds in deep water about San Francisco, but comes near the shore farther north. It is exceedingly slimy when first taken. The large specimens are considered excellent as food, the smaller are thrown away. It rarely reaches the weight of a pound.

Genus XXXVIII.—GLYPTOCEPHALUS.

Glyptocephalus Gottsche, Wiegmann's Archiv, 1835, 156 (*saxicola* = *cynoglossus*).

TYPE: *Glyptocephalus saxicola* Gottsche = *Pleuronectes cynoglossus* L.

This genus is one of the most strongly marked in the family, being distinguished from most of the genera by the greatly increased number of vertebrae, and from all of them by the remarkable cavernous structure of the bones of the head.

There are two species known, found in the deep waters of the northern seas, the one in the Pacific, the other in the Atlantic.

ANALYSIS OF SPECIES OF GLYPTOCEPHALUS.

- a. Pectoral fins very short, not falcate, that of right side about half length of head. Eyes large, about 3 in head, close together. Head 5 in length, depth $2\frac{1}{2}$ ($2\frac{1}{2}$ to 3). D. 101 to 111. A. 87 to 99. Lat. 1. 125. Vertebrae 58. Color grayish-brown; fins with dark spots; tip of pectoral dusky above CYNOGLOSSUS, 90.
- aa. Pectoral fin of colored side falcate, longer than head. Eyes large, $3\frac{1}{2}$ in head, close together. Head $4\frac{1}{2}$ in length, depth 3. D. 94 to 106; A. 79 to 89; Lat. 1. 138. Vertebrae 13 + 52 = 65. Color uniform brown, the fins darker, the blind side dusted with dark points ZACHIRUS, 91.

90. GLYPTOCEPHALUS CYNOGLOSSUS.

(THE CRAIG FLUKE.)

[Plate XIX.]

- Pleuronectes*, sp., Gronow, Museum Ichthyol., 1, iv, 39, &c. (Belgium.)
- Pleuronectes cynoglossus* Linnæus, Syst. Nat., ed. x, 1758, 269 (after Gronow). Günther, iv, 449. Day, Fishes Great Britain, ii, 30, pl. 103. (Lofoten, Finmark) (and of European writers generally.)
- Glyptocephalus cynoglossus* Gill, Proc. Acad. Nat. Sci. Phila., 360, 1873. Goode & Bean, Proc. U. S. Nat. Mus., 1875, p. 21. (Salem, Mass.; Halifax; La Have Bank; Bedford Basin, Halifax; Eastport, Me.) Goode, Proc. U. S. Nat. Mus., 1880, 337. (Deep sea, south coast New England.) Goode, Proc. U. S. Nat. Mus., 1880, p. 475. (Deep sea, New England coast.) Collett, Norske Nord-Havs Exped., 1880, p. 150. (Lofoten; Tana Fjord, Finmark.) Goode & Bean, Bull. Mus. Comp. Zoology, xix, 1883, 195. (Station 343.) Jordan & Gilbert, Syn. Fish. N. A., 1882, 838. Goode, Nat. Hist. Aquat. Anim., 1884.
- Solea cynoglossa* Rafinesque, Indico di Ittiologia Siciliana, 1810, 53 (based on the Pole or *Cynoglossum* of Rondelet).
- Platessa pola* Cuvier (Règne Animal, 1817). Lacépède, Hist. Nat., Poiss., edition of 1832, vi, 50, and of several authors.
- Pleuronectes saxicola* Faber, "Tidsskr. f. Naturv., 5 B., 244, 1828."
- Glyptocephalus saxicola* Gottsche, Wiegmann's Archiv, 1835, 156.
- Platessa saxicola* Krøyer, "Danmark's Fiskep., 1843, 338."

Pleuronectes nigromanus Nilsson, "Prodr. Ichth. Scand., 1832, 55."

Platessa elongata Yarrell, "Supplement Brit. Fish., 1839."

Pleuronectes elongatus Günther, iv, 450 (copied).

Glyptocephalus elongatus Gill, Proc. Acad. Nat. Sci. Phila., 1873, 362.

Glyptocephalus acadianus Gill, Proc. Acad. Nat. Sci. Phila., 1873, 360 (Nova Scotia).

Habitat.—North Atlantic, chiefly in deep water, south to Cape Cod and France.

This species is found in rather deep water on sandy bottoms. It reaches a length of 12 to 18 inches. It is considered a fair food-fish.

The nominal species, *acadianus* and *elongatus*, have been shown by Goode and Bean to be identical with *cynoglossus*. Beyond this the synonymy needs no special remarks.

This flounder has been taken in great numbers with the beam trawl in deep water off our New England coast. It is pronounced by the U. S. Fish Commission to be not inferior as a food-fish to the European sole.

91. GLYPTOCEPHALUS ZACHIRUS.

Glyptocephalus zachirus Lockington, Proc. U. S. Nat. Mus., 1879, p. 88 (San Francisco).
Lockington, Rep. Com. Fisheries California, 1878-'79, p. 42 (off Point Reyes).
Jordan & Gilbert, Proc. U. S. Nat. Mus., 1880, p. 453 (San Francisco; Monterey Bay).
Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, p. 68 (San Francisco; Monterey).
Jordan & Gilbert, Syn. Fish. N. A., 1882, p. 838. Jordan, Nat. Hist. Aquat. Anim., 1884, 188 (deep waters about San Francisco).

Habitat.—Deep waters of the Northern Pacific; thus far known only from about San Francisco.

This species is a thin, dry flounder, reaching a length of something over a foot. It is taken in the sweep-nets in deep water about San Francisco, and thus far has been known from no other locality. It is readily known by its long pectoral fin.

Genus XXXIX.—SOLEA.

Solea Klein, Pisces (non-binomial).

Solea Quensel, Vet. Akad. Handl., 1806, 230 (*solea*).

Pegusa Günther, Cat. Fish. Brit. Mus., 1862, iv, 462 (*aurantiaca*).

TYPE: *Solea vulgaris* Quensel = *Pleuronectes solea* L.

As now understood by us, this genus includes some six or seven species of soles, most of them belonging to the European fauna. The genus is distinguished especially in the group to which it belongs by the elongate body, this elongation being connected with a much increased number of vertebræ. The soles of this genus are the only ones having much value as food. They reach a considerably larger size than any others of the species found in America or Europe, and as food-fishes they are especially excellent. The European sole (*Solea solea*) is the most highly esteemed of them all.

The subgenus *Pegusa* cannot well be separated from the true soles, as *Solea kleini* is intermediate between the two groups.

In the waters of the East Indies the related genus *Pardachirus* Günther (= *Achirus* Kaup, not Cuvier) takes the place of *Solea*. Its species

are destitute of pectoral fins. There is a conspicuous pore at the base of each ray of the dorsal and anal, and on the blind side there is an accessory half lateral line.

ANALYSIS OF SPECIES OF *SOLEA*.

- a. Nostril of blind side simple, not forming a distinct tube, its edge scantily fringed; black spot on pectoral fin at its tip. (*Solea*.)
- b. Pectoral of eyed side about one-third length of head, that of blind side a very little shorter; eyes well separated, the upper considerably in advance of lower; scales small, ctenoid on both sides; those of blind side of head with few fringes; color dark brown, with darker mottlings, rarely plain brown, immaculate (var. *cinevea*); vertical fins with darker edgings; tip of pectoral jet black. D. 73 to 80; A. 61 to 69; lat. l. 140 to 150. Vertebrae $9 + 40 = 49$. Head, 3 in length; depth, about 4. *SOLEA*, 92.
- bb. [Pectoral of eyed side less than one-third length of head, that of blind side similar; eyes well separated; scales small, ctenoid on both sides; color clear brown, thickly covered with pale and dark brown spots and dots; fins similarly spotted; vertical fins without dark edgings; tip of pectoral black. D. 80 to 92; A. 75 to 76; lat. l. 128 to 150. Head, $4\frac{1}{2}$ in length; depth, $2\frac{1}{2}$.] (*Steindachner*) *CAPELLONIS*, 93.
- bbb. [Pectoral of eyed side as long as snout to eye. Form elongate; lower jaw included; teeth sharp, in three rows. Posterior nostril concealed; anterior in a short tube; color uniform blackish. D. 84. A. 65. P. 8. V. 4. C. 21.] (*Kaup*) *BRASILIENSIS*,* 94.
- aa. Nostril of blind side with its margin produced into a tube, which is more or less conspicuously fringed. (*Pegusa* Günther.)
- c. Scales of blind side cycloid; nasal tube moderate, its fringes few and short; scales of blind side of head with few fringes; pectoral fin with its black ocellus near the base, the fin short, that of the eyed side not one-third length of head. Eye rather large, the interorbital space moderate; scales rather small, those on the blind side cycloid. Pectoral fin black at base, its tip and margin whitish; coloration of body subject to many variations, usually gray, profusely dotted and speckled with black and whitish, sometimes very finely mottled and sometimes nearly plain; vertical fins broadly edged with black. Head, $4\frac{1}{2}$; depth, $3\frac{1}{2}$. D. 74 to 82; A. 59 to 64; lat. l. 100 to 110. Vertebrae, $10 + 38 = 48$ *KLEINI*, 95.
- ca. Scales of left side of body ctenoid; nasal tube broad, well fringed, scales of eyed side with fringes; black ocellus on pectoral near the tip of the fin.
- d. [Fringes of left nostril comparatively few, the margin of the nostril very broad; pectoral fin comparatively long, about $2\frac{1}{2}$ in head, the black ocellus on its posterior half; eye small, its diameter equal to the interorbital space; scales small; color yellowish, marbled with round brownish blotches, and speckled with black. Head $5\frac{1}{2}$; depth $2\frac{3}{4}$. Dorsal 81 to 89; anal 66 to 68. Lat. l. 117. Vertebrae 46.] (*Günther*: *Steindachner*) *AURANTIACA*, 96.
- dd. Fringes of left nostril very numerous; longer than the diameter of the nasal tube.
- c. Scales of lateral line 110 to 140.
- f. [Dorsal rays 80 to 89; anal rays 61 to 68. Lat. l. 120 to 140. Pectoral fin 2 to $2\frac{1}{2}$ in head. Depth 3 in length. Head 5. Color ashy gray with a dark brown point at the base of each scale; vertical fins with dark dots; pectoral with a large round black spot near its tip, this spot edged with paler anteriorly.] (*Steindachner*) *LASCARIS*, 97.

* D. 96; A. 84. Head 6 in length; depth 3; middle of pectoral and end of caudal black, according to Agassiz. Possibly two species are confounded under this name.

- ff.* [Dorsal rays 75 to 76; anal rays 59 to 61. Lat. l. 112 to 118; pectoral fins about $2\frac{1}{2}$ in head; depth $2\frac{1}{2}$. Head $4\frac{1}{2}$ in length; color brown, with numerous obscure dusky cloudings; pectoral with a black ocellus in the middle of its posterior half.] (*Steindachner: Günther*) THEOPHILA, 98.
- ee.* [Scales in lateral line 90 to 95; D. 83 or 84. A. 65. Head $5\frac{1}{2}$ in length; depth 3. Eye 5 in head, equal to interorbital width; nasal tube of left side long and much fringed; lips not fringed; blind side of head with many fringes; right pectoral 3 in head. Color grayish, very much mottled and spotted on body and fins; base of caudal dark; pectoral black, edged with paler.] (*Kner*) VARIOLOSA, 99.

92. SOLEA SOLEA.

(THE COMMON SOLE.)

[Plates XX and XXI.]

Pleuronectes solea Linnæus, *Systema Natura*, ed. x, 1758, 270 (and of the earlier copyists).

Solea vulgaris Quensel, *Vet. Akad. Handl.*, 1806, 230, and of nearly all later writers.

Solea buglossa Rafinesque, *Indice*, 1810, 45.

Solea cinerea Guichenot, *Explor. Alger.*, Poiss., 1850, 106 (plain brown variety).

Solea angulosa Kaup, *Wiegmann's Archiv*, 1858, 95. (Algiers; Rochelle) (= *P. angulata*, MSS. Paris Museum.)

Solea azevia Capello, *Journ. Acad. Sci.*, Lisbon, i, 1867, 166, fig. 2 (plain brown variety).

Solea vulgaris var. *azevia* Steindachner, *Ichthyol. Berichte*, vi, 1868, 54, with plate.

Solea linnæi Malm, *Bohusläns Fauna*, 532 (about 1860).

Habitat.—All coasts of Europe, except the extreme north.

This species is the famous sole of Europe, one of the most prized of all food-fishes. It abounds on almost all coasts of central and southern Europe, preferring sandy or gravelly shores, and it is usually captured, according to Dr. Day, with the trawl. It usually reaches a length of 12. to 18 inches.

No specimens of the European sole have yet been taken on the American coasts. Several attempts have been made by the United States Fish Commission to introduce the species into our waters, but thus far without evident success.

The *Solea azevia* of Capello is considered by Steindachner to be an unspotted variety of the common sole. The *Solea cinerea*, scantily described by Guichenot, seems to be the same form.

Solea angulosa Kaup is said to have D. 84; A. 71; P. 7; V. 7-6; C. 19; the pectoral as long as the distance from its root to the lower eye. It may be a common sole, with the number of fin-rays slightly increased.

93. SOLEA CAPELLONIS.

Solea capellonis Steindachner, *Ichthyol. Berichte*, vi, 1868 (with plate) (Gibraltar; Dalmatia).

Habitat.—Mediterranean Sea.

This species is evidently very closely related to the common sole, of which, it seems to us, it may be a mere local variety, with unusually

variegated coloration. Steindachner, however, compares it with *Solea kleini*, which it much resembles in color, but from which it differs in numerous respects. We have not seen the species.

94. SOLEA BRASILIENSIS.

Solea brasiliensis (Cuvier Mss.) Agassiz, Spix Pisc. Brasil., 1829, 87 (Brazil). Kaup, Wiegmann's Archiv, 1858, 95 (Montevideo).

Habitat.—Coast of Brazil.

We know this species only from the descriptions of Agassiz and Kaup. These two accounts do not agree very well and may refer to different fishes. It would appear to be very close to the European sole. None of the collections from Brazil in the museum at Cambridge contain any species of *Solea*.

95. SOLEA KLEINI.

Rhombus kleinii Risso, "Europe Méridionale, iii, 1826, 255."

Solea kleinii Günther, Cat. Fish. Brit. Mus., 1862, iv, 464, and of numerous writers.

Solea luctuosa Guichenot, Explor. Algérie, Poissons, 1850, 107.

Habitat.—Mediterranean Sea.

This species is subject to great variations in color, some of our specimens being excessively spotted, others almost plain. In all cases, however, the coloration of the pectoral is distinctive. Our specimens are from Venice and from Palermo.

96. SOLEA AURANTIACA.

(THE LEMON SOLE.)

Solea aurantiaca Günther, Cat. Fish. Brit. Mus., iv, 1862, 467.

Habitat.—Coasts of Europe, north to England.

We have not seen this species. According to Dr. Day it is identical with *Pleuronectes nasutus* Pallas, and he regards both as the same as the original *Pleuronectes lascaris* Risso. Day therefore adopts for the Lemon Sole the name of *Solea lascaris*. Knowing none of these fishes from autopsy we can have no opinion of value in this matter, but it would seem to us that the *Solea aurantiaca* of Günther and also the *Pl. lascaris* of Risso correspond better to the species called *lascaris* in the present paper than to the *Pleuronectes nasutus* of Pallas, which is the *Solea theophila* of this paper.

97. SOLEA LASCARIS.

Pleuronectes lascaris Risso, Ichth. Nice, 1810, p. 311, tab. 7, f. 32.

Solea lascaris Günther, iv, 467. Steindachner, Ichth. Berichte, vi, 1868, 59.

Rhombus polus Risso, "Europe Méridionale, iii, 249," 1826 (not *Pleuronectes polus* Cuvier).

Solea scriba Valenciennes, Webb & Berthelot, Iles Canaries, Poissons, 84, pl. 18, f. 3.

Habitat.—Mediterranean Sea.

We have not seen this species, and we take the above synonymy from Günther. According to Dr. Day the name *lascaris* belongs to *Solea aurantiaca*. This species should stand in that case, perhaps, as *Solea scriba*.

98. SOLEA THEOPHILA.

Pleuronectes theophilus Risso, Ichth. Nice, 1810, 313.

Pleuronectes nasutus Pallas, Zoogr. Rosso-Asiatica, iii, 1811, 427.

Solea nasuta Steindachner, l. c., 58.

Solea impar Bennett, "Proc. Comm. Soc. Zool., i, 147," 1831. Günther, iv, 468.

Habitat.—Mediterranean Sea.

We do not know this species. According to Dr. Day it is identical with *Solea aurantiaca*, and should receive the name of *Solea lascaris*. Notwithstanding the close relation of *S. theophila* and *S. aurantiaca*, it would seem that the two are different, as the number of fin-rays is considerably smaller in the present species than in *S. aurantiaca*, or than in the species called by us *S. lascaris*.

The Italian naturalists should be able to settle these questions of synonymy. Judging from the literature alone, these three species would appear to be valid. *S. aurantiaca* would seem to be distinguished by the little development of its nasal fringes, its fin-rays being "D. 81 to 89; A. 66 to 68." *S. lascaris* has the nostril with a wreath of fringes and the fin-rays substantially similar, and *S. theophila* (= *nasuta* = *impar*) has the nostril well fringed and the fin-rays fewer; "D. 75 to 76; A. 59 to 61."

Risso says of his *Solea lascaris* that its dorsal rays are 85, anal 68. This agrees with our *S. lascaris*, which is that of Günther, and differs from our *theophila*, the *impar* of Günther, with which Day has identified Risso's *lascaris*.

Risso further says that his *Solea theophila* (named for M. Théophile Rainaut, of Sospel) has 75 dorsal and 64 anal rays. This corresponds with the *Solea impar* of Günther, and as the name *theophila* has priority over *impar* we have adopted it. Possibly all three are forms of a single species, *Solea lascaris* Risso.

99. SOLEA VARIOLOSA.

Solea variolosa Kner, Novara Fische, 1869, 289 (Rio Janeiro).

Habitat.—Coast of Brazil.

This species is known to us from the account given by Professor Kner.

Genus XL.—MONOCHIRUS.

Monochirus Rafinesque, "Précis des Découvertes Somnologiques, 1814" (*hispidus*) (fide Bonaparte).

Monochirus Cuvier, Règne Animal, ed. i, 1817 (*microchirus*). (Not of Rafinesque.)

Monochir Cuvier, Règne Animal, ed. ii, 1828 (*microchir*). (Modified orthography of *Monochirus*.)

Monochirus Swainson, Nat. Hist. Class'n Fishes, ii, 1839, 303 (*linguata*).

Microchirus Bonaparte, Catalogo Metodico dei Pesci Europei, 1845-'50 (after Swainson: *lingula*).

Buglossus Günther, Cat. Fish. Brit. Mus., iv, 1862, 462 (*variegata*).

Monochir Günther, Cat. Fish. Brit. Mus., iv, 1862, 462 (*monochir*).

Quenselia Jordan, Subgenus novum (*ocellata*).

TYPE: *Monochirus hispidus* Rafinesque.

This small group of European soles seems to be worthy of generic distinction from *Solea*, not so much from the reduction of the pectoral fins as on account of the reduced number of vertebræ, which forms a step in the direction of the genus *Achirus*.

The species are, however, much more nearly related to *Solea* than to *Achirus*. Three subgeneric groups are included under the head of *Monochirus* as understood by us, and these might perhaps with no great impropriety be taken as distinct genera. We think it better, however, to place all together in one group, for which the name of *Monochirus* has priority. We have not seen the paper of Rafinesque in which this name is said to occur, but have taken our quotation from Bonaparte.

For the second subgenus, the same name, *Monochirus*, was proposed by Cuvier, but this is antedated by *Monochirus* of Rafinesque. The name *Microchirus* given by Bonaparte to the same group has priority over Günther's name *Buglossus*. For the third group, we have suggested the new name *Quenselia* in honor of the Swedish naturalist who first separated the soles generically from the flounders.

ANALYSIS OF SPECIES OF MONOCHIRUS.

- a. Vertebræ 37 to 40; scales normal, strongly ctenoid.
- b. Pectoral of both sides well developed, that of the eyed side not quite half head, that of blind side not quite a third; vertebræ 37. (*Quenselia* Jordan.)
- c. Interorbital space very narrow, the eyelids thick, covered with rough scales; blind side of head with conspicuous fringes; scales sub-villous, the spinules conspicuous, though less so than in *Monochirus hispidus*; color dark gray, with some vague dusky blotches behind the gill opening; 4 round jet-black spots ocellated with white and about as large as eye disposed in a quadrangle behind the middle of the body; a black bar across base of caudal; fins dusky; pectoral mostly blackish. Vertebræ 9+28=37. Head 4 in length; depth 2½; D. 66 to 67. A. 52 to 54. P. 5-5. Lat. 1. 70 to 75 OCELLATUS, 100.
- bb. Pectoral fin of blind side minute, that of eyed side small, not twice as long as eye. (*Microchirus* Bonaparte.)
- d. Scales in the lateral line 55 to 60. Depth 2½ in length; head 4½; color nearly uniform brownish, sometimes spotted with darker; a few dark spots on dorsal and anal fins, each involving part or all of the membrane of about every fourth ray; pectoral mostly black, its length not quite half more than that of eye LUTEUS, 101.
- dd. Scales in the lateral line 75 to 80. D. 63 to 73. A. 53 to 57. P. 5-3. Vertebræ, 10 + 30 = 40. Depth 3 in length; head 4½; color brownish gray, with broad irregular dark cross-bands which are darkest on the dorsal and anal fins; pectoral partly dusky, its length not greater than that of eye. VARIEGATUS, 10½.

ddd. [Scales very small, 112 to 118; D. 72 to 79; A. 56 to 62. Depth, $2\frac{1}{2}$; head, $4\frac{1}{2}$ in length; colors of *Monochirus luteus*, each sixth or seventh ray of dorsal and anal blackish brown; caudal with brown spots; posterior half of dorsal and anal with narrow, dark brown cross-spots.] (*Steindachner*)

MINUTUS, 103.

aa. Vertebrae 34; pectoral fin of eyed side more than half length of head, that of blind side wanting; scales sub-concave, elongate, and with the free margin somewhat erected; each scale with several long spinules, giving the body a villous appearance (as in *Phrynorhombus*); (*Monochirus*).

c. Scales of blind side with shorter spinules; scales on head slightly reduced; eyes rather large, with thick scaly eyelids; head $4\frac{1}{2}$ in length; depth $2\frac{1}{2}$; D. 52 ("56 to 61," *Günther*). A. 41 (44 to 49, *Günther*). P. about 7; lat. l. 54 (63, *Günther*). Vertebrae $9 + 25 = 34$. Color, brown with irregular dark marblings on body and fins; dorsal and anal mostly dark; caudal abruptly pale, with light brownish cross-streaks.....HISPIDUS, 104.

100. MONOCHIRUS OCELLATUS.

Pleuronectes ocellatus Linnæus, Syst. Nat., ed. x, 1758, 269 ("Surinam").

Solea ocellata Günther, iv, 465.

Quenselia ocellata Jordan, MSS.

Pleuronectes pegasus Lacépède, Hist. Nat., Poiss., iv, 639, 1803:

Pleuronectes rondeloti Shaw, Gen'l Zool., iv, 307, 1803.

Solea oculata Risso, Europe Méridionale, iii, 248, 1826, and of numerous writers.

Habitat.—Mediterranean Sea; Madeira Islands.

Our specimens of this pretty species are from Palermo, where they were collected by Professor Doderlein.

This species, with some other African and Asiatic species, marks a transition between the typical forms of *Monochirus* to those of *Solea*. It may be regarded as forming the type of a new subgenus for which the name *Quenselia* is suggested.

101. MONOCHIRUS LUTEUS.

Pleuronectes luteus Risso, Ichth. Nice, 1810, 312.

Monochirus luteus Costa, "Fauna Napoli, ii, 49."

Solea lutea Günther, iv, 469, 1862, and of most recent writers.

Habitat.—Mediterranean Sea.

Our numerous specimens of this species were collected by Professor Doderlein at Palermo, and by Professor Jordan at Venice.

102. MONOCHIRUS VARIEGATUS.

Pleuronectes variegatus Donovan, British Fishes, 1801, pl. 117.

Solea variegata Günther, iv, 469.

Pleuronectes microchirus Delarocche, Ann. Mus., xiii, 356, f. 2, 1809.

Pleuronectes mangili Risso, Ichth. Nice, 1810, 255.

Pleuronectes lingula "Hamner in Pennant, Brit. Zool., ed. of 1812, iii, 313, pl. 48."

Pleuronectes fasciatus Naccari, "Giornale Fis. Pav., iii, Adr. Ittiol., 9, 1822."

Habitat.—Mediterranean Sea.

Our specimens of this species were collected at Palermo by Professor Doderlein. Most of the synonymy given above is copied from Günther and Bonaparte, and has not been verified by us.

103. MONOCHIRUS MINUTUS.

Monochirus minutus Parnell, Mag. Zool. and Bot., i, 527, 1837.

Solea minuta Günther, iv, 470. Steindachner, Ichth. Berichte, vi, 1868, 61.

Habitat.—Mediterranean Sea.

We know nothing of this species. According to Dr. Day, it is identical with *Monochirus luteus*. Steindachner, however, regards the two as distinct, and describes *M. minutus* as having 112 to 118 scales in the lateral line—a number nearly double that found in his specimens as well as in our specimens of *M. luteus*. If this count is correct, the two species must be different.

104. MONOCHIRUS HISPIDUS.

Pleuronectes pegusa Risso, Ichth. Nice, 1810, 310 (not of Lacépède).

Monochirus hispidus Rafinesque, "Précis des Découvertes 1814" (*fidè* Bonaparte, Catalogo Metodico, 1845, 50).

Solea monochir Bonaparte, "Fauna Italica," about 1840. Günther, iv, 470, 1862.

Habitat.—Mediterranean Sea.

Our specimens of this curious species are from Palermo and from Venice, the former collected by Professor Doderlein, the latter by Dr. Jordan.

Genus XLI.—ACHIRUS.

Achirus Lacépède, Hist. Nat., Poiss., iv, 659, 1803 (*fasciatus*, etc.).

Achirus Cuvier, Règne Animal, 1828, (restriction to *fasciatus*, etc.).

Trinectes Rafinesque, Atlantic Journal and Friend of Knowledge, i, 1832 (*scabra*).

Grammichthys Kaup, Wiegmann's Archiv, 1858, 94 (*lineatus*, *fasciatus*) (*Achirus* being restricted to *Pardachirus barbatus*, etc.).

Monochirus Kaup, l. c. (*maculipinnis*).

?*Aseraggodes* Kaup, l. c., 1858, 103 (*guttulata*).

Baiostoma Bean, Proc. U. S. Nat. Mus., 1882, 413 (*brachiale*).

Bæostoma Jordan & Gilbert, Syn. Fish. N. A., 1882, 965 (amended orthography).

TYPE: *Achirus fasciatus* Lacépède.

This strongly-marked genus contains numerous species, all very closely related, and nearly all American. It has been united by Dr. Günther with *Solea*, but apparently for no good reason, as the number of vertebræ is very much less than in the European soles, and the right ventral fin is decurrent along the abdomen and united with the anal in the American soles, while it is short and wholly free in all the European forms. It is also worth noticing that the name *Achirus* is prior in date to that of *Solea*. The species with rudimentary pectoral fins have been set apart by Dr. Bean to form the genus *Baiostoma*, but the very slight development of these organs in some of the species, and the evidently very close relationship of them all, leads us to regard *Baiostoma* as a subgenus only. If we follow Kaup in restricting the name *Achirus* to the Asiatic group called *Pardachirus*, the present genus would receive the name of *Trinectes*. It seems to us that both Lacépède

and Cuvier regarded the species called by us *fasciatus* as the type of their genus *Achirus*.

ANALYSIS OF SPECIES OF ACHIRUS.*

- a. Pectoral fins small; present at least on the right side. (*Baiostoma* Bean.)
- b. Pectoral fin present on both sides, that of the left side rudimentary, of a single ray; that of the eyed side with about 3.
- c. [Dorsal rays 60 to 67; anal rays about 48; lat. l. 80; depth $1\frac{1}{2}$ in length; color brownish, irregularly spotted with darker, and with about 10 black vertical lines crossing the lateral line.] (*Günther*) ACHIRUS, 105.
- cc. Dorsal rays 53 to 57; anal rays 40 to 42; lat. l. 75 to 80; depth $1\frac{1}{2}$ in length; scales smaller and less rough than usual in this genus, those of nape scarcely enlarged on eyed side, those of blind side much fringed; scales of colored side with scattered, hair-like appendages, some black, others pale; color olivaceous; head, body, dorsal, and anal fins covered with a network of dark lines; traces of about 8 dark cross-streaks sometimes present; caudal fin yellowish, nearly plain, or with a few dark dots or reticulations; its base dusky. Vertebrae $8 + 20 = 28$ INSCRIPTUS, 106.
- bb. Pectoral of right side only present.
- d. Dorsal rays 65 to 66; anal rays 48 to 51.
- e. Pectoral well developed, with about 6 rays. Scales of eyed side without hair-like filaments; scales of lateral line 77 to 80; chin little prominent; dorsal rays 65; anal rays 51; depth $1\frac{1}{2}$ in length; head $3\frac{3}{4}$; right lower lip fringed. Color brownish, with 9 or 10 narrow blackish cross-lines; small rounded blackish spots on the membranes of each of the vertical fins, much as in *A. lineatus*.... KLUNZINGERI, 107.
- ee. Pectoral fin small, its rays about 2 in number; scales of eyed side with numerous hair-like filaments; scales of lateral line about 70; chin prominent, protruding beyond upper jaw; D. 66, A. 48 to 50; depth $1\frac{1}{2}$ in length; pectoral black, not much longer than eye; eyes rather large, the upper not in advance of lower; color brown, with traces of dark cross-bands; numerous irregular blackish clouds and blotches on the body and fins; no small spots..... MENTALIS, 108.
- dd. Dorsal rays, 50 to 58; anal rays, 35 to 47.
- f. Pectoral fin of 4 to 6 rays, considerably longer than eye; body with 8 to 10 narrow vertical dark bars, these sometimes obsolete with age.
- g. Vertical fins, all with round dark spots, these usually especially distinct on the caudal fin; some of the scales of eyed side with black, hair-like appendages; pectoral fin with 5 or 6 rays, about 3 in head; its length equal to that from outer edge of one eye to outer edge of another; head $3\frac{1}{4}$ in length; depth about $1\frac{1}{2}$; color brown, the young spotted with whitish, the adult sometimes with darker; body with about 8 narrow vertical cross-streaks of blackish. LINEATUS, 109.
- z. Dorsal rays 49 to 53; anal rays 38 to 44; scales 70 to 85.

Var. *lineatus*, 109 (a).

* Besides the species here mentioned, another, *Achirus lorentzi* Weyenbergh (Algunos Nuevos Pescados del Museo Nacional y Algunas Noticias Ictiologicas 1877, 13, pl. 1, f. 1—Buenos Ayres), has been described from Santa Fé, Uruguay. We have not seen the description.

- xx. Dorsal rays 50 to 51; anal rays 35 to 37.
- y. Scales 75 to 77.....Var. *brachialis*, 109 (b).
- yy. Scales 55 to 67.....Var. *comifer*, 109 (c).
- gg. Vertical fins dark, without distinct markings. Body broad, ovate, the depth about $1\frac{1}{2}$ in length; pectoral fin with 4 rays; scales of right side with numerous black hair-like appendages; color brownish, with 8 or 9 narrow vertical black bars; fins dark, without distinct markings; D. 56, A. 42, lat. 1. 70.....MAZATLANUS, 110.
- ff. Pectoral fins of 2 or 3 rays, about as long as eye.
- h. Body with 6 to 12 narrow dark bands; these sometimes obsolete.
- i. [Body rather narrowly ovate, its depth $1\frac{1}{2}$ in length; pectoral fin very small, of about 2 rays, not much longer than eye; color brownish olive, with six pairs of deep brown vertical lines extending on the dorsal and anal fins. D. 58, A. 44, lat. 1. 85.] (*Günther*).....FONSECENSIS, 111.
- ii. Body broadly ovate; the depth $1\frac{1}{2}$ in length; pectoral as long as eye; fringes on lip of right side, few and small, inconspicuous; scales on blind side moderately enlarged; hair-like appendages on scales few or none; D. 56. A. about 39. Scales about 76; color brown, finely mottled and speckled with darker, and with about a dozen narrow, very faint cross-streaks; fins with similar dark spots; scales all finely dotted under the lens.....PUNCTIFER, 112.
- hh. Body with very numerous (20 to 40) black cross-bands, which are as broad as the interspaces.
- j. [Blind side of snout with few fringes; pectoral rays 3; depth $1\frac{1}{2}$ in length; D. 53, A. 48, lat. 1. 80. Color grayish; head, body, and fins with numerous blackish, irregular wavy bands, broader than the interspaces; caudal fin with deep black spots.] (*Günther*).....SCURUM, 113.
- jj. Blind side of head profusely covered with fringes; scales on body very rough, those of the eyed side of head enlarged and with long spinules; numerous patches on body covered with appendages like short, coarse black hairs; lower lip with fringes on eyed side nearly half as long as eye; pectoral small, not longer than eye, which is rather large, about 5 in head; lower jaw included; upper eye largest and much advanced; anterior rays of dorsal, with fringes of cirri. Head $3\frac{1}{2}$ in length; depth $1\frac{1}{2}$; D. 55, A. 47. Scales 77 to 80. Color dark-brown, with numerous (about 40) close-set, straight, black cross-bars, each about as wide as the interspaces; vertical fins, with about three elongate black spots on the membrane between each pair of rays. GARMANI, 114.
- aa. Pectoral fins wholly wanting. (*Achirus*.)
- k. [Dorsal rays 46; anal rays 33; right lower lip with serrated fringes; nostril in a fringed tube; depth $1\frac{1}{2}$ in length; head 3; color brown, head and body with numerous large, rounded, or kidney-shaped white spots, edged with dark brown. Lat. 1. 70.] (*Günther*).....FIMBRIATUS, 115.
- kk. Dorsal rays 50 to 55; anal rays 37 to 46; right lower lip fringed; left nostril with some fringes; depth $1\frac{1}{2}$ in length; head 4; none of the scales of eyed side with hair-like appendages; color dusky olive, more or less mottled and with about eight dark vertical stripes, these varying very much

in width and in number; vertical fins with the membrane of every second or third pair of rays blackish, besides dark cloudings at base of fin; caudal with numerous longitudinally oblong spots; blind side often with round, dark spots, especially in northern specimens, usually immaculate in southern ones (var. *browni*). Lat. l. 66 to 75; vertebrae $8 + 20 = 28$ FASCIATUS, 116.

kkk. Dorsal rays 59 or 60; anal rays 41 to 45.

l. [Snout and chin without evident fringe or barbel; right lower lip fringed; head 4 in length; depth $1\frac{1}{2}$; D. 59, A. 45; scales 63 to 65; color brown; about 12 dark cross-bands on head and body; between these faint, paler cross-bands, which form spots on dorsal and anal; caudal similarly spotted, the spots forming obscure cross-bands. (*Steindachner*)..... PANAMENSIS, 117.

ll. Snout with a fringe-like barbel near its tip, as long as eye; a shorter one on the chin; eyed side with some patches of black hairs; scales of blind side of head scarcely enlarged or fringed; scales small, not very rough; head $3\frac{1}{2}$ in length; depth $1\frac{1}{2}$. D. 60, A. 41; scales 80; color pale, the eyed side with small scattered black points and blotches of varying size; a few narrow obscure dark cross-streaks; blind side immaculate..... JENYNSI, 118.

105. ACHIRUS ACHIRUS.

Pleuronectes oculis dextris, corpore glabro, pinnis pectoralibus nullis Gronow, Museum, i, No. 42. (Surinam.)

Pleuronectes achirus Linnæus, Syst. Nat., ed. x, 1758, 268 (based on Gronow).

Solea gronovii Günther, Cat. Fish. Brit. Mus., iv, 1862, 472 (Surinam).

Achirus gronovii Jordan, Proc. U. S. Nat. Mus., 1896, 602. (Name only.)

Habitat.—Coasts of Guiana.

We know this species only from Dr. Günther's description. We place *Achirus gronovii* in the synonymy of the Linnæan species *Pleuronectes achirus*. *Pleuronectes achirus* is based on a description by Gronow of some *Achirus* from Surinam. Gronow's fish agrees with the present species in having 60 dorsal rays and 48 anal rays, in being brown, with transverse black bands, with dark spots on the fins, as well as in coming from Surinam. But Gronow explicitly denies the presence of pectorals, and the present species has rudimentary pectoral fins on both sides. Probably these were overlooked by Gronow, and as no other species found in the same region has so large a number of rays, we feel justified in the use of the name *Achirus achirus* for this species.

106. ACHIRUS INSCRIPTUS.

Achirus inscriptus Gosse, Nat. Sojourn Jamaica, 52, pl. 1, f. 4, 1851 (Jamaica).

Jordan, Proc. U. S. Nat. Mus., 1884, 143 (Key West).

Solea inscripta Günther, iv, 1862, 473 (Jamaica).

Monoclinir reticulatus Poey, Memorias, ii, 1861, 317 (Cuba); Synopsis, 409; Enumeratio, 139.

Solea reticulata Günther, iv, 472 (copied).

Bæostoma reticulatum Bean & Dresel, Proc. U. S. Nat. Mus., 1884, 152 (Jamaica).

Habitat.—West Indian fauna, north to Key West.

This species is known to us from numerous specimens taken by Dr. Jordan at Key West, and from specimens from Hayti, in the museum at Cambridge. These specimens belong undoubtedly to the species called *reticulatus* by Poey, and this is apparently not different from the *inscriptus* of Gosse, as the agreement with the latter is even closer than with the former description.

107. ACHIRUS KLUNZINGERI.

Solea klunzingeri Steindachner, Zur Fische des Cauca und der Flüsse bei Guayaquil, 1879, 44 (Guayaquil).

Achirus klunzingeri Jordan, Proc. U. S. Nat. Mus., 1885, 391 (Panama).

Habitat.—Pacific coast of tropical America. Panama to Guayaquil.

This species is known from Dr. Steindachner's description. A specimen, since destroyed, was obtained by Professor Gilbert at Panama.

108. ACHIRUS MENTALIS.

Solea mentalis Günther, Cat. Fish. Brit. Mus., iv, 475, 1862 (Para).

Habitat.—Coast of Brazil.

This species is known to us from a specimen, 3 inches long (No. 11449, Mus. Comp. Zool.). It was obtained at Para.

109. ACHIRUS LINEATUS.

a. Var. *lineatus*.

Pleuronectes fuscus subrotundus glaber "Brown, Jamaica, 445" (Jamaica).

Passer lincis transversis notatus Sloane, Jamaica, 2, 77, pl. 246, f. 2 (Jamaica).

Pleuronectes lineatus Linnaeus, Syst. Nat., ed. x, 1758, 268 (based on Brown and Sloane; not of ed. xii, which is *Achirus fasciatus*).

Monochir lineatus Quoy & Gaimard, Voy. Uranie, Zool., 238, 1824 (Rio Janeiro, D. 52, A. 42).

Achirus lineatus D'Orbigny, Voyage Amér. Merid. Poiss., pl. 16, f. 2, 1847 (Cayenne).

Monochir maculipinnis Agassiz, Spix Pisc. Brasil., 88, pl. 49, 1829 (Brazil). Poey, Synopsis, 1863, 409 (Cuba).

Solea maculipinnis Günther, iv, 473 (Cuba, Jamaica, Brazil). Kner, Novara Fische, iii, 289 (Rio Janeiro).

Achirus maculipinnis Jordan, Proc. U. S. Nat. Mus., 1896, 602 (name only).

b. Var. *brachialis*.

Baetostoma brachialis Bean, Proc. U. S. Nat. Mus., 1882, 413 (South Florida).

Baetostoma brachiale Jordan & Gilbert, Synopsis Fish. N. A., 1882, 965 (copied).

Achirus brachialis Jordan, Proc. Ac. Nat. Sci. Phila., 1883. (Egmont Key.) Jordan, Proc. U. S. Nat. Mus., 1884, 149.

c. Var. *comifer*.

Achirus comifer Jordan & Gilbert, Proc. U. S. Nat. Mus., 1884, 31, 143 (Key West).

Habitat.—West Indian fauna—Key West, and Egmont Key to Uruquay.

The *Pleuronectes lineatus* of the tenth edition of the Systema Naturæ is based wholly on the description of Brown and the figure and descrip-

tion of Sloane in their works on Jamaica. It is very evident from Sloane's figure that the species he had in view was the *Achirus maculipinnis*. So far as we know, but two species of *Achirus* (*inscriptus* and *maculipinnis*) are found in the waters of the Antilles. There seems to be, then, no doubt that the *maculipinnis* of Agassiz is the original *Pleuronectes lineatus* of Linnæus. If it be so, it must stand as *Achirus lineatus*.

The *Pleuronectes lineatus* of the twelfth edition of the *Systema Naturæ* is described from a fish sent from Charleston by Dr. Garden. This is *Achirus fasciatus*.

We have placed the Florida species, *comifer* and *brachialis*, in the synonymy of *lineatus*. They differ from the latter only in the slightly smaller numbers of the scales and fin-rays.

The following table shows our count of a number of specimens from different localities :

Locality.	D.	A.	Scales.
Key West..... (<i>comifer</i>) ..	50	35	55 to 67
Pensacola..... (<i>brachialis</i>) ..	61	37	75 to 77
Cienfuegos..... (<i>lineatus</i>) ..	54	43	85
Rio Janeiro..... (<i>maculipinnis</i>) ..	57	42	85
Do..... (<i>maculipinnis</i>) ..	54	44	72
Rio Grande do Sul..... (<i>maculipinnis</i>) ..	40	38	70
Coary..... (<i>maculipinnis</i>) ..	53	40	68
Manacapuru..... (<i>maculipinnis</i>) ..	65	42	75

It is evident from this table that neither the fin-rays nor the scales form characters by which the subspecies can be absolutely distinguished. It is evident also, from the examination of large series of specimens, that the coloration is subject to very great variations—as great as in *Achirus fasciatus*. In some of these the caudal is dark and immaculate, in others pale and usually profusely spotted. In some the ground color is nearly plain blackish, in others it is pale, usually with narrow dark cross-bands, but sometimes closely spotted everywhere.

The specimens examined by us are from Pensacola and Egmont Key (*brachialis*), Key West (*comifer*), Cienfuegos (Cuba, Poey), Coary, Teffy, Tapajos, Porto Alegre, Pernambuco, Cannarivieras, Manacapuru, Porto do Moz, Rio Grande do Sul, Rio Janeiro, San Matheo, Rosario, Itabapana, Obidos, Xingu, Gurupa, Jutaby, Curuça, Parà, Bahia, Santarem, Iça, Fonteboa, San Paolo, Rio Trompetas, Sambaia, Manes, Javary, and Tabatinga.

The species would appear to be one of the commonest in Brazil.

110. ACHIRUS MAZATLANUS.

(MEXICAN SOLE; TEIPALCATE.)

Solea mazatlana Steindachner, Ichth. Notizen, ix, 23, 1869 (Mazatlan). Jordan & Gilbert, Bull. U. S. Fish Comm., 1882, 108 (Mazatlan).

Achirus mazatlanus Jordan, Proc. U. S. Nat. Mus., 1885, 391 (Mazatlan).

Solea pilosa Peters, Berliner Monatsber., 1869, 709 (Mazatlan).

Habitat.—Pacific coast of tropical America.

This species is not rare on the west coast of Mexico. We have examined numerous specimens collected by Professor Gilbert at Mazatlan. The *Solea pilosa* of Peters, as Dr. Steindachner has already indicated, is the same fish. The date of Steindachner's paper is said to be a little earlier than that of Professor Peters.

A specimen of this species is in the museum at Cambridge, collected by Professor Sumichrast at Chiapas.

111. ACHIRUS FONSECENSIS.

Solea fonsecensis Günther, Cat. Fish. Brit. Mus., iv, 1862, 475 (Gulf of Fonseca).

Habitat.—Pacific coast of tropical America (Gulf of Fonseca).

Only the original type of this species, obtained by Sir John Richardson, is yet known.

112. ACHIRUS PUNCTIFER.

Monochir punctifer Castelnau, Aninaux Nouv. ou Rares, Amérique du Sud, 1855, 80, pl. 41, f. 3 (Rio Janeiro).

Habitat.—Coast of Brazil.

We refer a sole (11436, M. C. Z.) from Itabapuana to *Monochir punctifer* Castelnau, although the figure published by this author does not represent it very well. The black pepper-like spots are much smaller in nature than in the picture. The following is Castelnau's description: "Longueur totale, 12 centimètres; plus grande largeur sans les nageoires, 7 centimètres; avec les nageoires, 9 centimètres. Nageoire dorsale de 48 rayons; anale de 42 rayons; caudale de 16 rayons. Les écailles sont fines et âpres, surtout celles de la tête. Le poisson est entièrement d'un brun vert et couvert, ainsi que les nageoires, de points noirs nombreux et assez rapprochés les uns des autres; en dessous il est d'un brun rougâtre. J'ai trouvé une seule fois ce *Monochir* au marché de Rio."

113. ACHIRUS SCUTUM.

Solea scutum Günther, Cat. Fish. Brit. Mus., iv, 1862, 475 (Gulf of Fonseca, Panama).

Habitat.—Pacific coast of tropical America.

All that we know of this species is included in the description of Dr. Günther.

114. ACHIRUS GARMANI.

Achirus garmani Jordan, sp. nov. (Rio Grande do Sul).

Habitat.—Coast of Brazil.

The type of this species is an example in good condition, 6 inches long (11246, M. C. Z.), from "the Rio Grande in South America." I have taken pleasure in naming it for my friend Mr. Samuel Garman, curator of ichthyology in the Museum of Comparative Zoology, to whose kindly aid I have been much indebted in my studies of the South American fishes. (D. S. J.)

115. *ACHIRUS FIMBRIATUS*.

Solea fimbriata Günther, Cat. Fish. Brit. Mus., iv, 1862, 477 (Gulf of Fonseca).

Habitat.—Pacific coast of tropical America (Gulf of Fonseca).

This species is known from Günther's description of a specimen taken by Sir John Richardson.

116. *ACHIRUS FASCIATUS*.

(THE AMERICAN SOLE; HOG-CHOKER.)

(Plates XXII and XXIII.)

Pleuronectes lineatus Linnæus, Syst. Nat., ed. xii, 458 (on a specimen from Charleston, received from Dr. Gardon), (not *Pleuronectes lineatus* of edition x). Gronow, Systema, ed. Gray, 1854, 90 (in part, chiefly based on Linnæus).

Achirus lineatus Cuvier, Règne Animal, 1828. Gill, Cat. Fishes East Coast N. Am., Rept. U. S. F. C., 1872-73. Jordan & Gilbert, Proc. U. S. Nat. Mus., 1878, 368 (Beaufort; Neuse R.). Goode, *op. cit.*, 1879, 110 (St. John's R.). Goode & Bean, *op. c.*, 1879, 123 (Pensacola, Potomac R.). Bean, *op. c.*, 1880, 77 (Potomac R., New Bedford, Tompkinsville, N. Y., Newport, Chesapeake Bay, Providence). Jordan & Gilbert, *op. cit.*, 1882, 618 (Charleston). Bean, *op. cit.*, 1883, 365 (Havre de Grace).

Grammichtleya lineatus Kaup, Wiegmann's Archiv, 1858, 101.

Achirus fasciatus Lacépède, Hist. Nat., Poiss., iv, 659, 662, 1803 (excl. syn.; description based entirely on the Linnæan account of the fish sent by Gardon).

Pleuronectes mollis Mitchill, Trans. Lit. and Phil. Soc. N. Y., i, 1815, 388, pl. 2, f. 4 (New York).

Achirus mollis Storer, Synopsis, 1846, 228. Storer, Hist. Fish. Mass., 1867, 206, pl. 32 (Charles River, Holmes' Hole, Mass.). DeKay, New York Fauna, Fishes, 1842, 303, pl. 49, f. 159 (New York, ascending the Hudson River to Peekskill).

Achirus achirus mollis Jordan, Cat. Fish. N. A., 1885, 137.

Pleuronectes apoda Mitchill, Amer. Monthly Mag. and Crit. Rev., Feb'y, 1818, 244 (Straits of Bahama), (perhaps *A. lineatus*).

Trinectes scabra Rafinesque, "Atlantic Journal and Friend of Knowledge, i, 1832 (Pennsylvania, in fresh water)."

Solea achirus Günther, iv, 476, 1862 (New York) (not *Pleuronectes achirus* L.).

Achirus achirus Jordan, Proc. U. S. Nat. Mus., 1885, 19. Jordan, Cat. Fish. N. A., 1885, 137.

Solea browni Günther, iv, 477, 1862 (New Orleans, Texas).

Achirus lineatus var. *browni* Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 305 (Pensacola, Galveston).

Habitat.—Atlantic coast of the United States, from Cape Cod to Texas, often ascending streams.

This species is the best known of the American soles, and it is common along our coast from Cape Cod to Texas, often ascending the rivers for a considerable distance above tide-water. It seldom exceeds 5 or 6 inches in length, and is of but little value as food on account of its small size. It was first described in the twelfth edition of the Systema Naturæ from a specimen sent to Linnæus by Dr. Gardon. This specimen received the name of *Pleuronectes lineatus*, but the *Pleuronectes lineatus* of the tenth edition was a different fish, the name being originally based on a description of an *Achirus* found by Brown

and Sloane in Jamaica, a region in which the present species does not occur.

The specific name next in date to *lineatus* is that of *Achirus fasciatus* Lacépède. Lacépède quotes in his synonymy only the *Pleuronectes achirus* of the tenth edition of the Systema, which is a species from Surinam. His description of *Achirus fasciatus* is however wholly taken from the account given by Linnæus of the fish sent by Garden. It therefore belongs to the present species, for which *fasciatus* seems to be the oldest tenable name.

The *Pleuronectes apoda* of Mitchill seems to be this species, as Mitchill expressly states that it has no pectoral fins. DeKay, however, speaks of it as a species of *Monochirus*. If DeKay examined Mitchill's specimens we may infer that the latter belonged to *A. lineatus* rather than to *A. fasciatus*.

This species has not yet been recorded from the West Indies. The form found along the Gulf coast has been described as a distinct species under the name of *Solea browni*. The differences are not very evident. We have compared a number of specimens from Boston (*fasciatus*) with others from Pensacola, and find the following differences, none of which are constant: In the Gulf variety (*browni*) the blind side is always immaculate, while in almost all Atlantic examples (*fasciatus*) the blind side is profusely covered with round dark spots. In one specimen, however (11360, Boston), the blind side is immaculate. The darker cross-streaks on the eyed side are usually broader and more numerous in southern specimens, and the scales on the blind side of the head rougher. There are no constant differences either in the fin-rays or in the scales.

We have examined specimens of this species from Boston, Chestertown, Tarrytown, New York, Port Monmouth, Havre de Grace, Potomac River, Neuse River, Beaufort, Charleston, Pensacola, Mobile, and Galveston. In one large specimen from Pensacola (11482 M. C. Z.) there is a rudiment of a pectoral fin on the eyed side. It consists of a single ray two-thirds as long as the eye.

117. ACHIRUS PANAMENSIS.

Solea panamensis Steindachner, Ichthyol. Beiträge, v, 10, 1876, Taf. ii (Panama).

Habitat.—Pacific coast of tropical America, Panama.

Our knowledge of this species is derived from the description and excellent figure of Dr. Steindachner. The species is evidently very closely related to *Achirus fasciatus*, which it closely resembles in form and color.

118. ACHIRUS JENYNSI.

Achirus lineatus Jenyns, Voyage Beagle, Fishes, 1842, 139 (Rio de la Plata) (not *P. lineatus* L.).

Solea jenynei Günther, Cat. Fish. Brit. Mus., iv, 476, 1862 (after Jenyns).

Habitat.—Region about Rio de la Plata.

The Museum of Comparative Zoology contains a single specimen (11425, 3 inches long) of this species. It was obtained in the Uruguay River by Prof. Jeffries Wyman. It is near *A. fasciatus*, from which species it differs mainly in having fewer fringes on the scales of the left side of head, and in having rather conspicuous cirri on the snout and chin.

Genus XLII.—GYMNACHIRUS.

Gymnachirus Kaup, Uebersicht der Soleinæ, Wiegmann's Archiv, 1858, 101 (*nudus*).

TYPE: *Gymnachirus nudus* Kaup.

We have examined none of the species of this singular genus. All that we know of it is drawn from the descriptions of Kaup and Günther. Two species have been described.

ANALYSIS OF SPECIES OF GYMNACHIRUS.

- a. [Pectoral fin of right side present, very small, of two rays only, one-third as long as eye; jaws hidden in thick skin; lips slightly fringed; left side of head with a network of fringes; gill opening not reaching upward as far as pectoral; vertical fins covered with thick skin; caudal as long as head; head $5\frac{1}{2}$ (with caudal); depth 2; D. 68, A. 50; color yellowish olive, with 14 brown bands, as broad as the interspaces, which again are crossed by narrower bands, all these bands extending over the dorsal and anal, the first crossing the snout, the second and third the eye; caudal with three brown bands.] (*Günther*).....FASCIATUS, 119.
- aa. [Pectoral fins both wanting. Body somewhat longer than high. D. 51; A. 42. Body with 14 black cross-bands; concentric rings about eyes; caudal with two black bands and a pale margin.] (*Kaup*).....NUDUS, 120.

119. GYMNACHIRUS FASCIATUS.

Gymnachirus fasciatus Günther, Cat. Fish. Brit. Mus., iv, 488, 1862 (locality unknown).

Habitat.—Unknown, probably Brazil.

We know this species from Dr. Günther's description only. Possibly *Gymnachirus nudus* may be the same species carelessly described by Dr. Kaup.

120. GYMNACHIRUS NUDUS.

Gymnachirus nudus Kaup, Wiegmann's Archiv, 1858, 101 (Bahia). Günther, iv, 488 (copied).

Habitat.—Coast of Brazil.

The scanty description of Kaup gives all that is known of this species.

Genus XLIII.—ACHIROPSIS.

Achiropsis Steindachner, Ichth. Beiträge, v, 110, 1876 (*nattereri*).

TYPE: *Solea nattereri* Steindachner.

This is another of the remarkable genera found in the fresh waters of South America. Although its species bear a strong general resemblance to the species of *Achirus*, they differ remarkably from the latter

in some details of structure, and their real relations are with *Apionichthys*. *Achiropsis* differs from *Apionichthys* chiefly in the development of the left ventral fin. This is rudimentary in *Apionichthys* and perfect in *Achiropsis*.

ANALYSIS OF SPECIES OF ACHIROPSIS.

- a. [Gill-opening on both sides present, but reduced to a short slit as long as eye next to the upper end of the opercular margin; eye very small; snout with a proboscis-like prolongation beyond the mouth; blind side anteriorly covered with fringes, but without true scales; scales on body ctenoid; fins scaly. Dorsal and anal fins slightly joined to the caudal; ventral of right side continuous with the anal. Body oblong. Color grayish brown. Head 5 in length; depth $2\frac{1}{2}$. D. 82. A. 61. V. 5-5. P. 0., 37 to 40 scales in an oblique series above lateral line.] (*Steindachner*) NATTERERI, 121.
- aa. Gill-opening of eyed side wanting, the gill-membrane being throughout adnate to the shoulder-girdle; gill-opening of blind side an oblique slit just below posterior angle of opercle, its length $4\frac{1}{2}$ in head. Eyes small, close together, the upper considerably in advance of lower, their diameter equal to the interorbital width; snout protruding over the mouth, proboscis fashion, making the anterior profile a regular curve. Snout $2\frac{1}{2}$ in head. Scales small (larger than in *A. nattereri*), not as rough as in *Achirus*, those on the blind side of the head wanting anteriorly, their place taken by cirri and fringes of moderate length; lateral line distinct, straight; fin-rays scaly; lower lip slightly fringed on eyed side, not on blind side. Nostril as in *Achirus*, a round foramen in front of interorbital space, not produced into a tube. Dorsal beginning on the snout, the dorsal and anal slightly joined to the caudal; ventral fin beginning at the chin, in front of the isthmus, the tip of the snout being in contact with its first ray; ventral of right side with extended base, wholly continuous with the anal; left ventral lateral, normally placed, its five rays opposite the 3d, 4th, and 5th rays of the right ventral; no pectoral fins. Body oblong, less deep than in *Achirus*. Color sand-color, with faint traces of about 8 narrow cross-bands; body and fins profusely and finely mottled and speckled with darker. Head, $4\frac{1}{2}$; depth, $2\frac{1}{2}$. D. 60. A. 44. V. 5-5. P. 0. Scales 70, about 28 in an oblique series above lateral line.

ASPHYXIATUS, 122.

121. ACHIROPSIS NATTERERI.

Solea (Achiropsis) nattereri Steindachner, Ichth. Beiträge, v, 110, 1876 (Rio-Negro).

Habitat.—Rivers of Northern Brazil.

We know this species from Steindachner's description only.

122. ACHIROPSIS ASPHYXIATUS.

Achiropsis asphyxiatus Jordan, sp. nov. (Goyaz, Brazil).

Habitat.—Rivers of Brazil.

The type of this species is a female specimen in good condition, $4\frac{1}{2}$ inches long (11106 M. C. Z.), from Goyaz, Brazil. It differs from all other flounders in having but a single gill-opening. Possibly this character is only accidental in the individual, and that a small gill-opening may normally be present on both sides. It is certainly not present on the eyed side in the typical example.

Genus XLIV.—APIONICHTHYS.

Apionichthys Kaup, Wiegmann's Archiv, 1858, 104 (*dumerili*).

Soleotalpa Günther, Cat. Fish. Brit. Mus., iv, 489, 1862, (*unicolor*).

TYPE: *Soleotalpa unicolor* Günther = *Apionichthys dumerili* Kaup.

Besides the species here mentioned, we find in the Zoological Record a reference to *Apionichthys bleekeri* Horst, Nederl. Tijdschr. Dierk. Verh., iv, 30, 1878. It is described from a specimen from unknown locality in the museum at Utrecht.

This genus is a near ally of *Achiropsis*, from which it is only to be separated by the rudimentary character of the left ventral fin. Although it bears some external resemblance to *Symphurus*, its affinities are with *Achirus*. The species, if more than one really exists, have yet to be exactly defined.

ANALYSIS OF SPECIES OF APIONICHTHYS.

- a. Left ventral reduced to two minute rays; body ovate-lanceolate, slender, and thinner than in *Achiropsis*, the eyes much smaller, reduced to mere points; scales very small, rough, those on head enlarged a little and fringed; upper eye in advance of lower, almost in the middle of the length of the head; gill-openings small, about equal on the two sides; right ventral beginning at the chin, and extending along the abdominal ridge so that it is continuous with the anal (left ventral destroyed in specimen examined); dorsal and anal slightly connected with caudal; color brown, rather pale, the body and fins profusely covered with round, dark spots of varying sizes, the largest as wide as from eye to eye. Head $4\frac{1}{2}$; depth $2\frac{3}{8}$. * D. 78. A. 56. Scales about 100 UNICOLOR, 123.
- aa. [Left ventral wholly obsolete; scales ctenoid, cycloid on blind side; fin-rays scaly; depth, $2\frac{3}{8}$; head, $4\frac{1}{2}$. D. 70 to 73. A. 52 to 54. V. 5-0. Lat. l. 87 to 90. Color clear brownish yellow.] (*Steindachner*) OTTONIS, 124

123. APIONICHTHYS UNICOLOR.

Apionichthys dumerili Kaup, Wiegmann's Archiv, 1858, 104. (No locality; no description.)

Soleotalpa unicolor Günther, Cat. Fish. Brit. Mus., iv, 1862, 489. (West Indies.) (†)

Apionichthys unicolor Jordan, Proc. U. S. Nat. Mus., 1886, 603. (Name only.)

Apionichthys dumerili Bleeker, Nederl. Tydschr. voor Dierkunde, ii, 1865, 305. Steindachner, Ichth. Beitr., viii, 1878, 48. (Surinam.)

Apionichthys nebulosus Peters, Berliner Monatsberichte, 1869, 709. (Surinam.)

Habitat.—Brazilian fauna.

We have examined a single specimen of this species (4677 M. C. Z.) $2\frac{1}{2}$ inches long, from Obydos, in Brazil. It evidently corresponds to the *Apionichthys dumerili* of Bleeker and Steindachner, and apparently also to the *Apionichthys nebulosus* of Peters, although Peters failed to find the rudimentary left ventral fin. This fin, in fact, is not present in the specimen examined by us, it having been destroyed in attaching the metallic tag.

Günther's *Soleotalpa unicolor* may be the same, but the account of the coloration does not accord with the specimen examined by us, nor

* D. 76. A. 57. Scales 92. Color uniform brownish gray (*Günther*). D. 72. A. 53. Scales 95. Color brownish, mottled with darker spots (*Steindachner*).

with the statements of other authors. Perhaps the plain coloration may be due to age, or to the poor condition of the typical specimen.

Kaup's *Apionichthys dumerili* has not been described at all, but simply mentioned as the type of the genus. As his species cannot be identified, its name should not be used.

124. APIONICETHYS OTTONIS.

Apionichthys ottonis Steindachner, Ichth. Notizen, vii, 41, 1868 (Sicily).

Habitat.—Mediterranean Sea.

This species is unknown to us. Judging from the published descriptions, it must be very close to *Apionichthys unicolor*, and only the different locality would appear to indicate specific distinction.

Genus XLV.—BRACHIRUS.

Brachirus Swainson, Nat. Hist. Class'n Fishes, 1839, ii, 303 (*orientalis*, *zebra*, *commer-soniana*, etc.) (not *Brachyrus* Swainson, nor *Brachyurus* Fischer, both prior names).

Synaptura Cantor, Catal. Malayan Fishes, 1850, 232 (*commersonian*, *zebra*) (name a substitute for *Brachirus*, preoccupied by *Brachyurus*, which is regarded as the correct orthography).

Solenoides Bleeker (*vide* Kaup).

? *Euryglossa* Kaup, Wiegmann's Archiv, 1858, 99 (*orientalis*).

? *Eurypleura* Kaup, l. c. (substitute for *Achiroides*).

? *Achiroides* Bleeker, Verh. Bataav. Genootsch., xxiv, Pleuron., 6, 1862 (*melanorhynchus*).

? *Anisochirus* Günther, Cat. Fish. Brit. Mus., iv, 1862, 486 (*panoides*).

TYPE: *Pleuronectes zebra* Bloch (as restricted by Swain., Proc. Ac. Nat. Sci. Phila., 1883).

We have had opportunity to study but few of the numerous species referred to this genus, and have no opinion as to the proper limitation of the group. Possibly neither of the European species should be referred to it.

We retain the name *Brachirus* (*i. e.*, *Brachychirus*), notwithstanding the priority of the name *Brachyrus*, which seems to have the same meaning. If, however, this name of Swainson be rejected, that next in order of date is *Synaptura*, which has now the advantage of general usage.

ANALYSIS OF THE SPECIES OF BRACHIRUS.

- a. [Pectoral fins subequal; one of the nostrils of the blind side large, round, much dilated; depth, 3 in length, with caudal; head, 5; upper jaw overhanging; pectorals both present, equal in length, their length equal to their distance from the eye; color greenish brown, marbled with darker. D. 72; A. 58 to 60; P. 8. (*Kaup*) SAVIGNY, 125.
- aa. [Pectoral fins unequal, the right pectoral $\frac{1}{2}$ its distance from the eye; nostril on each side dilated, trumpet-like; lateral line straight; ventral not inserted at chin; body rather elongate, depth $3\frac{1}{2}$ to 4. D. 72 to 76; A. 58 to 60. Color chestnut, much spotted and variegated; three rows of pale ocelli bordered with dark along side of body.] (*Capello*) LUSITANICUS, 126.

125. BRACHIRUS SAVIGNYI.

Synaptura savignyi Kaup, Wiegmann's Archiv, 1858, 97 (Naples). Günther, iv, 480, 1862 (copied).

Habitat.—Mediterranean Sea.

We know nothing of this species, except what is contained in the scanty description of Kaup. According to Professor Giglioli, none of the Italian naturalists have seen this species.

126. BRACHIRUS LUSITANICUS.

Synaptura lusitanica Capello, Journ. Ac. Sci. Lisb., v, 1868, 92, and vi, 1869, 153, tab. 9, f. 1 (Lisbon).

Habitat.—Coast of Portugal.

We have not examined this species, and know it from Capello's description only.

Genus XLVI.—SYMPHURUS.

Symphurus Rafinesque, Indice all' Ittiologia Siciliana, 1810, 52 (*nigrescens*).

Bibronia Cocco, Alcuni Pesci del mare di Messina, 1844, 15 (*ligulata*; larval form).

Plagusia Cuvier, Règne Animal, ed. ii, 1828 (based on *Plagusia* of Brown; name preoccupied in Crustaceans, Latreille, 1806).

Plagusia Bonaparte, Catalogo Metodico, 1846, 51 (*lactea*; substitute for *Plagusia* preoccupied).

Aphoristia Kaup, Wiegmann's Archiv, 1858, 106 (*ornata*).

Glossichthys Gill, Cat. Fish. E. Coast N. A., 51, 1861 (*nomen nudum*: *plagusia*).

Ammopleurops Günther, Cat. Fish. Brit. Mus., iv, 1862, 490 (*lacteus* = *nigrescens*).

? *Bascanius* Schiödte, "Naturhist. Tydsskr.", v, 269, 1867" (*tadifer*; larval form).

Acedia Jordan, subgenus novum (*nebulosus*).

TYPE: *Symphurus nigrescens* Rafinesque.

We have adopted for this genus the name *Symphurus* instead of *Aphoristia*, as the so-called *Ammopleurops lacteus* is a genuine member of the latter genus, and as it seems to be evident that the latter species is the original of the *Symphurus nigrescens* of Rafinesque.

The following is Rafinesque's description :

"III. Gen. *Symphurus*. Ala caudale acuta, e riunita all' ale dorsali, ed anali, occhj alla sinistra. Osserv. Si dovranno ragguagliare in questo genere due specie del genere *Achirus* di Lacepede, cioè gli *A. bilineatus*, e *A. ornatus*. "Sp. no. 44. *Symphurus nigrescens*. Nerastro senza fascie, allungato, una sola linea laterale da ogni lato."

This single lateral line assumed to distinguish *Ammopleurops* from *Aphoristia* is not a real lateral line, but a depression along the median line produced by the junction of the muscles.

The species of *Symphurus* are somewhat numerous and very closely allied. With the exception of the European *Symphurus nigrescens*, all of them are American.

The development of the species is imperfectly known. According to Giglioli, the larvæ called *Bibronia*, may belong to this genus, and so possibly may *Delothyris* and *Charybdia*.

The name *Plagusia* belongs properly to the present genus rather than to the type of *Plagusia bilineata*, to which it has been restricted by Kaup and Günther. It is, however, preoccupied in crustaceans, and in any case, both *Plagusia* and the substitute name *Plagiusa* are antedated by the name *Symphurus*.

One of the American species referred to *Symphurus*, *nebulosus*, seems to differ widely from the others and is probably the type of a distinct genus, or subgenus, for which we have suggested the name *Acedia*. This name is applied by the Cuban fishermen to *Symphurus plagusia*.

ANALYSIS OF SPECIES OF SYMPHURUS.

a. Scales ctenoid, not keeled. (*Symphurus*.)

b. Scales small, moderately ctenoid; the number in a longitudinal series from 75 to 105.

c. Dorsal and anal fins chiefly black anteriorly and posteriorly, with paler edgings; body moderately elongate, the depth $3\frac{3}{8}$ in length; the head $4\frac{1}{2}$. Scales rather small, not very rough, about 80 in a longitudinal series. D. 90; A. 73 to 75. Color rather pale, plain or more or less mottled with darker, but without cross-bars; fins chiefly black with paler edgings NIGRESCENS, 127.

cc. Dorsal and anal pale anteriorly, becoming more or less abruptly black posteriorly.

d. [Caudal fin abruptly pale; depth $4\frac{1}{2}$ in length; head, $5\frac{1}{4}$. D. 96 to 100; A. 86 to 87. Scales, 88 to 90. Color, grayish, speckled with brown; dorsal and anal fins black on last tenth, the caudal abruptly pale; tips of fin-rays vermilion.] (*Goode & Bean*) MARGINATUS, 128.

dd. Caudal fin black, as is a large part of the dorsal and anal; the black either continuous or in the form of large spots. Color, brownish, often mottled, usually with more or less distinct darker cross-bands, and with longitudinal streaks along the rows of scales, sometimes nearly plain brown.

e. Scales quite small, 98 to 105.

f. Body decidedly elongate, the depth about $4\frac{3}{8}$ in length; D. 97; A. 82; scales, 98 ELONGATUS, 129.

ff. Body less elongate, the depth $3\frac{3}{8}$ in length; head, $5\frac{1}{4}$; longitudinal streaks very distinct; D. 100; A. 80; scales about 105 ATRICAUDA, 130.

ee. Scales somewhat larger, 75 to 85; body rather elongate, the depth $3\frac{1}{10}$ to $3\frac{3}{8}$ in length; the head $5\frac{1}{8}$ to $5\frac{3}{8}$; D. 90 to 95; A. 75 to 80.

PLAGUSIA, 131.

ccc. Dorsal and anal pale throughout, or more or less mottled or spotted with darker; the caudal similarly colored, not distinctly black; body not very elongate, the depth 3 to $3\frac{3}{8}$ in length. (Probably all varieties of *S. plagiusa*) PLAGIUSA, 132.

x. Body with dark cross-bands more or less distinct; the fins mottled or speckled; upper eye slightly in advance of lower.

y. Dorsal rays 86 to 95; anal rays 75 to 80; head 5 in length; depth $3\frac{1}{4}$; scales 85 to 93; cross-bands more distinct than in related species.

Var. *plagiusa*, 132 (a).

yy. Dorsal rays 78 to 85; anal rays 70 to 72; head 5 in length; depth $3\frac{1}{2}$; scales 80 to 90; color light brown, with darker cross-bars, which become obsolete with age. Var. *pusillus*, 132 (b).

xx. [Body uniform grayish, without cross-bands; last part of dorsal and anal with 3 or 4 oblong black blotches, each somewhat larger than the eye; upper eye directly above lower; head, $5\frac{1}{2}$ in length; scales, 85; D. 92; A. 75.] (*Goode & Bean*)

Var. *diomedeanus* 132 (c).

bb. [Scales rather large, very rough-ctenoid, about 65-34; depth, $3\frac{1}{2}$ in length; head, $4\frac{1}{2}$; D. 90; A. 69 to 75; color clouded brown, somewhat blotched.] (*Goode & Bean*)..... PIGER, 133.

aa. [Scales very small, ctenoid, each with a median keel, which is dark and prominent; snout and jaws naked; fin-rays in increased number.] (Subgenus *Acedia* Jordan.)

h. Head, $5\frac{1}{2}$; depth, $4\frac{1}{2}$; D. 119; A. 107; scales, 120; grayish, everywhere mottled with brown.] (*Goode & Bean*).... NEBULOSUS, 134.

127. SYMPHURUS NIGRESCENS.

Symphurus nigrescens Rafinesque, Indice all' Ittiologia Siciliana, 1810, 52 (Palermo).

Plagusia lactea Bonaparte, Fauna Ital. Pesci, about 1840.

Ammopleurops lacteus Günther, iv, 490 (copied).

Plagusia picta Cocco (*vide* Giglioli).

Bibronia tigrinata Cocco, "Alcuni Pesci del mare di Messina, 1844, 390" (Messina) (larva).

? *Bascanius tædifer* Schiödte, Natur. Tydsskr., v, 269, 1867 (free-swimming oceanic larvæ).

Habitat.—Mediterranean Sea.

We have examined three specimens of this rare species, obtained at Palermo by Professor Doderlein. As already noticed, this is a genuine member of the genus usually called *Aphoristia*, having no lateral line. These three specimens have the body nearly uniform in color. They correspond to the *Ammopleurops lacteus* of European authors. A specimen in the museum at Cambridge from Naples is somewhat mottled and represents the nominal species *Ammopleurops pictus*.

128. SYMPHURUS MARGINATUS.

Aphoristia marginata Goode & Bean, Bull. Mus. Comp. Zool., xii, 153. (Off St. Vincent, etc.)

Habitat.—West Indies.

This species is known only from the original types, taken in deep water (94 to 324 fathoms) in the West Indies.

129. SYMPHURUS ELONGATUS.

Aphoristia ornata var. *elongata* Günther, Fishes Centr. Amer., 1869, 473. (Panama.)

Aphoristia elongata Jordan & Gilbert, Bull. U. S. Fish Comm., 1882, 111. (Panama.)

Habitat.—Pacific coast of tropical America.

This species is not uncommon on the Pacific coast of Central America, where it represents the closely related *Symphurus plagusia*. Its relations with *Symphurus atricauda* are still closer.

130. SYMPHURUS ATRICAUDA.

Aphoristia atricauda Jordan & Gilbert, Proc. U. S. Nat. Mus., 1880, 23 (San Diego).
 Jordan & Gilbert, Synopsis Fish. N. A., 1882, 842. Jordan & Gilbert, Proc.
 U. S. Nat. Mus., 1882, 380. (San José, Lower California.) Jordan, Proc. U. S.
 Nat. Mus., 1886, 54.

Habitat.—Lower California, north to San Diego.

This species is common in the bay of San Diego, in which locality the numerous specimens before us were taken. A small specimen $1\frac{1}{2}$ inches long, with light spots on the colored side and a pale ocellation on the black of the tail, taken by Mr. L. Belding near Cape San Lucas, probably belongs to the same species.

Symphurus atricauda is very close to *S. elongatus*, and both might well be regarded as geographical varieties of *S. plagusia*.

131. SYMPHURUS PLAGUSIA.

(ACEDIA.)

Plagusia Brown, Jamaica, 445, No. 1. (Jamaica.)
Pleuronectes plagusia Bloch & Schneider, Syst. Ichth., 1801, 162 (after Brown).
Achirus ornatus Lacépède, Hist. Nat. Poiss., iv, 659, 1803 (on a specimen "presented by
 Holland to France").
Plagusia ornata Cuvier, Règne Animal, ed. ii.
Aphoristia ornata Kaup, Wiegmann's Archiv, 1858, 106. Günther, iv, 490 (San Do-
 mingo, Jamaica). Poey, Synopsis, 1868, 409. Poey, Enumeratio, 1875, 140
 (Havana). Kner, Novara Fische, iii, 292. (D. 90; A. 75; depth $3\frac{1}{4}$ in length;
 Rio Janeiro.)
Plagusia tessellata Quoy & Gaimard, Voyage Uranie, Zoologie, 240, 1824 (Rio Janeiro).
Plagusia brasiliensis Agassiz, Spix Pisc. Brasil., 1827, p. 89, tab. 50. (Brazil.)
Aphoristia plagusia Jordan, Proc. U. S. Nat. Mus., 1886, 53. (Havana.) (Not *S. plagusia*
 of this paper.)

Habitat.—West Indian fauna (south to Rio Janeiro).

The numerous specimens of this species examined by us are from Havana, Pernambuco, Santos, Rio Janeiro, Curuça, and Victoria.

The synonymy of this species is somewhat doubtful. The original type of *Pleuronectes plagusia* was sent to Linnæus by Dr. Garden, of Charleston. It would therefore appear probable that this specimen represented the species of this genus which is found on the Carolina coast. But this typical specimen is still preserved in the rooms of the Linnæan Society in London, where it has been examined by Goode and Bean.

From their notes (Proc. U. S. Nat. Mus., 1885, 196) we quote: "The type of this species may have come from Africa or India. There is considerable doubt as to its origin. (See Garden's Correspondence with Linné, page 314.) D. ca 92, A. ca 80. Scales 77. The species is more elongate than our specimens of *Aphoristia plagusia*, so called, the depth being contained in the total length without caudal $4\frac{1}{2}$ times and the head 6 times."

As, however, no species of this genus are yet known from Africa or India, it is rather probable that Garden's fish actually came from

Charleston. The greater slenderness of the original type is perhaps due to distortion, and the smaller number than usual of the scales does not afford a marked distinction.

On account of the fact that the West Indian species as a rule is a little slenderer than the northern one and has a little larger scales, Dr. Jordan has elsewhere adopted for the former the Linnæan name, but, on the whole, it seems more probable that the original *plagiusa* was the northern fish.

The name *ornatus* is also doubtful in its proper application. The only thing distinctive in the description of Lacépède is that the typical specimen was "given by Holland to France." Many of the species in this Dutch collection seem to have come from Surinam, and this is probably no exception. But Lacépède's description might apply as well to any other species of *Symphurus* as to this.

The name *Pleuronectes plagusia*, given by Schneider to the species described by Brown, seems to admit of no doubt, as this is the only one of the group yet known from Jamaica. If, therefore, the name *plagiusa* be used for the northern species, or dropped altogether as not identified, the present species will stand as *Symphurus plagusia*.

We have compared numerous specimens from Rio Janeiro (representing the nominal species *tessellatus* or *brasiliensis*) with others (*plagiusa* = *ornata*) from Havana. There is certainly no permanent difference. The Brazilian specimens are a little more slender on an average, but there are numerous exceptions, and all variations in color are found in both.

132. SYMPHURUS PLAGIUSA.

(TONGUE-FISH.)

a. Var. *plagiusa*.

Pleuronectes plagusia Linnæus, Syst. Nat., ed. xii, 1766, 455 (on a specimen from Dr. Garden, probably from Charleston, but the locality not quite certain; and of various copyists).

Glossichthys plagusia Gill, Cat. Fish. E. Coast N. Am., 1861, 51 (name only).

Plagiusa plagusia Gill, Cat. Fish. East Coast N. Am., 1872-'3, 794 (name only).

Aphoristia plagusia Jordan & Gilbert, Proc. U. S. Nat. Mus., 1878, 368 (Beaufort). Jordan, *op. cit.*, 1880, 22 (St. John's River). Jordan & Gilbert, *op. cit.*, 1882, 305 (Pensacola); 1882, 618 (Charleston). Jordan & Gilbert, Synopsis Fish. N. A., 1882, 842. Jordan, Proc. U. S. Nat. Mus., 1884, 144 (Key West).

Plagiusa fasciata Holbrook, MSS. De Kay, New York Fauna, Fishes, 1842, 304 (Charleston).

Aphoristia fasciata Jordan, Proc. U. S. Nat. Mus., 1886, 53.

b. Var. *pusillus*.

Aphoristia pusilla Goode & Bean, Proc. U. S. N. Mus., 1885, 590 (Gulf Stream; lat. 40°).

c. Var. *diomedeanus*.

Aphoristia diomedeanus Proc. U. S. Nat. Mus., 1885, 589 (Gulf of Mexico; 24 fathoms).

Habitat.—South Atlantic and Gulf coasts of the United States.

This species is very common on the sandy shores of our South Atlantic and Gulf States. Our numerous specimens are from Beaufort, Charleston, Pensacola, and Key West.

The reasons for continuing to regard this species as the original *Pleuronectes plagiusa* of Linnæus, are given under the head of *Symphurus plagusia*.

If however, the name *plagiusa* be referred to the West Indian form or dropped as unidentifiable, the name *fasciatus* would then hold for this species.

The characters distinguishing *elongatus*, *atricauda*, *plagusia*, *plagiusa*, *pusillus*, and *diomedeanus* are of slight value, and doubtless all will ultimately prove to be varieties of a single one, the coloration of the fins being more marked in southern specimens.

A specimen nearly six inches long collected at Beaufort, N. C., by Prof. O. P. Jenkins seems referable to *pusillus* rather than to the typical *plagiusa*. It is highly mottled in coloration, the body and fins being profusely speckled and blotched with blackish besides 9 or 10 rather distinct cross-bands. D. 85, A. 72. Scales about 80. Depth $3\frac{1}{4}$ in length.

Another large specimen 7 inches long from the Florida Keys is in the museum at Cambridge. This has: D. 82, A. 72, lat. 1. 76. Depth 3 in length. Color brown almost plain, except that the fins are mottled, especially posteriorly; caudal fin not black.

If these two specimens are really typical of *Symphurus pusillus*, it probably cannot be separated as a species from *S. plagiusa*.

The form called *diomedeanus* is known to us from the description only. It is certainly very similar to *S. plagiusa*. Perhaps it is identical with our Key West specimens of the latter. These are very pale, and nearly plain gray, as would be expected in fishes taken from the coral sands.

133. SYMPHURUS PIGER.

Aphoristia pigra Goode & Bean, Bull. Mus. Comp. Zool., xiii, 5, 1886, 154 (St. Kitts, Key West, Cedar Keys, in about 250 fathoms).

Habitat.—West Indies and Gulf of Mexico, in deep water.

This species is known to us from the original description. It is evidently a better-defined species than are most of the others.

134. SYMPHURUS NEBULOSUS.

Aphoristia nebulosa Goode & Bean, Bull. Mus. Comp. Zool., xix, 1883, 192 (Gulf Stream, off the coast of Carolina).

Acedia nebulosa Jordan, MSS.

Habitat.—Gulf Stream.

This species is known from the original account only. The description would indicate a species considerably unlike those forming the rest

of the genus. If its scales are really keeled it may form the type of a distinct genus. The increased number of fin-rays also indicates a probability that the number of vertebrae will be found to be similarly increased. For the subgenus of which this is the type, we have suggested the name of *Acedia*.

LARVAL FORMS.

(BIBRONIDÆ.)

The very young of all the *Pleuronectidæ* so far as known are transparent and with the eyes symmetrical. At a length of from one-fourth of an inch to an inch the eye of one side moves by degrees to the other side, where it becomes the upper eye. The question has been much discussed as to how this change comes about—whether by a twisting of the head so that the eye moves over the line of the profile, whether by passing from side to side beneath the frontal bone, or by passing between the frontal bone and the bases of the dorsal rays, or whether by each of these methods in different genera. The present writers have had no opportunity to make any observations on this point, the statements which follow being entirely drawn from others, chiefly from the papers of Dr. Luigi Facciola.*

According to Prof. Japetus Steenstrup,† who has examined some “plagusiform” specimens (*Symphurus?*) about 25 millimeters in length, the eye, by a combined movement of rotation and translation, goes from its original position to the other side by passing under the frontal bone.

In other flounders examined by Prof. Alexander Agassiz the eye is said to have crossed from side to side above the frontal bone, penetrating the space between this bone and the dorsal fin by sinking into the tissues of the head. In the species examined by Dr. Facciola the eye was found to pass between the frontal bone and the dorsal rays, but without penetrating any tissues. During the passage of the eye the first dorsal ray formed a projection detached from the cranium, and in the notch between this and the head the eye has passed from one side to the other.

It has not been easy to determine with certainty the species to which these larval forms belong. The first of these which were known were described by Cocco as distinct genera, allied to the flounders, but distinguished from them by the symmetrical arrangement of the eyes. For the group thus defined Bonaparte has proposed the family name of Bibronidi (*Bibronidæ*), and this name has been adopted by some of the Italian ichthyologists.

* “Sulla Stato Giovanile del *Rhomboidichthys mancus*,” Facciola, Naturalista Siciliano, vi, 1887, and “Su di Alcuni Rari Pleuronettidi del mare di Messina,” Nat. Sicil., iv, 1885.

† “Om Skjøbheden hos Flynderne og navnlig om Vandringen af det øvre Oie fra Blindsiden til Ojesiden tværs igjennem Hovedet,” 1864.

Lately the relations of these forms have been made the subject of careful study by Dr. Carlo Emery, Dr. Luigi Facciola, and others of the Italian naturalists, and no doubt remains that the "*Bibroniida*" are larval flounders and soles.

For the sake of completeness, we give the following analysis of the nominal genera and the synonymy of the species:

ANALYSIS OF THE NOMINAL GENERA OF BIBRONIÆ OR LARVAL FLOUNDERS AND SOLES.

- a. Eyes wholly sinistral; mouth toothless, shaped as in the soles; upper jaw hook-shaped; head very small; caudal fin subsessile, free from the dorsal and anal; scales small, caducous, cycloid; eyes small; pectoral fins both present, the right pectoral small; ventral fins both present, free from anal; dorsal fin of long, simple rays, their tips much exerted; body moderately elongate; the depth 3 in length; dorsal rays 100; anal rays 80. P. 12-4.
DELOTHYRIS, A.
- aa. Eyes partly sinistral, the one on the left side, the other on the vertex (in the act of transition); form pleuronectoid..... COCCOLUS, B.
- aaa. Eyes, one on either side of the head; strictly symmetrical (or with the right eye somewhat higher than the other), and with a notch before it, between the cranium and the dorsal fin.
- b. Vertical fins scarcely or not confluent; left ventral largest, on abdominal ridge.
- c. Body excessively compressed, broadly ovate, its depth $1\frac{1}{2}$ in its length; both profiles very convex; the snout not forming an angle; no scales; none of the dorsal rays prolonged; ventral fin single (*Facciola*); pectoral fins short, rounded, with fleshy base and fringe-like rays; D. 85; A. 65. Jaws equal, with small, acute teeth..... PELORIA, C.
- cc. Body more elongate; scales present or absent; pectorals adipose, with fringe-like rays.
- d. Ventral fin single; first four rays of the dorsal well separated and with much exerted tips; dorsal and anal slightly joined to caudal; depth about $4\frac{1}{2}$ in length; D. 4, 106; A. 100. (*Emery*)..... ? CHARYBDIA, D.
- dd. Ventral fins both present, the left ventral with more prolonged base; dorsal with only the first ray (if any) prolonged; dorsal and anal free from caudal; depth $2\frac{1}{2}$ to 2 in length (*Facciola*)..... CHARYBDIA, D.
- bb. Vertical fins fully confluent; form lanceolate.
- e. Body linguiform, the depth 6 in length; no teeth; snout obtuse; eyes minute; ventral fins two; four or five of the dorsal rays produced; pectorals pedunculate. D. 90; A. 80..... BIBRONIA, E.
- ee. Body plagusiiform; perfectly transparent..... BASCANIUS, F.

Synonymy of genera of larval Pleuronectida or Bibronia.

Bibronia Cocco, "Intorno ad alcuni Pesci del mare di Messina. Lettera al Sig. Augusto Krohn da Livonia. In Giornale del Gabinetto & Lettere di Messina. Ann. iii, tom. v, fasc. xxv. Gennaio e febbraio 1844, pag. 21-30, tav. 2" (*vide Facciola*) (*ligulata*).

Peloria Cocco, l. c. (*hæckeli*).

Coccolus (Bonaparte) Cocco, l. c. (*annectens*).

Bascanius Schiödte, Naturhist. Tidsskr., v, 269, 1867 (*tædifer*).

Thyris Goode, Proc. U. S. Nat. Mus., 1880, 344 (*pellucidus*: name preoccupied).

Delothyris Goode, Proc. U. S. Nat. Mus., 1883, 110 (*pellucidus*).

Charybdia Facciola, Naturalista Siciliano, iv, 265, 1885 (*rüppelli*).

*Synonymy of species of Bibronia.***1. DELOTHYRIS PELLUCIDUS.**

Thyrus pellucidus Goode, Proc. U. S. Nat. Mus., 1880, 337, 344, 475. (Gulf Stream, off Rhode Island). Jordan & Gilbert, Synopsis Fish. N. A., 1882, 840 (copied).
Delothyris pellucidus Goode, Proc. U. S. Nat. Mus., 1883, 110.

This fish is unquestionably a larval form, but probably the adult is not yet known. In some respects it resembles *Monolene*, in others it seems allied to the *Cynoglossinae*. The type was nearly three inches in length.

2. COCCOLUS ANNECTENS.

Coccolus annectens (Bonaparte) Cocco, l. c., 1844 (Messina).

This species has not yet been described in detail, but from the form of the body it would seem to resemble most closely the young of *Platophrys podas*.

3. PELORIA HÆCKELI.

Peloria hækeli Cocco, l. c., 1844 (Messina). Emery, Contribuzione all' Ittiologia, 405 (Naples). Facciolà, Nat. Sicil., 1885, 5.

The specimens of this species described by Facciolà are 20 to 36 mm in length. According to Facciolà,* it can be confounded with no known species of Pleuronectoid. Dr. Emery has maintained that it is the young of *Platophrys podas*, and his figure and description seem to render this determination almost certain.

4. CHARYBDIA. (Species.)

Peloria rüppelli Emery, Contribuzione all' Ittiologia (Naples).

The description given by Dr. Emery of *P. rüppelli* diverges so widely from that given by Dr. Facciolà, that the identity of the two may be questioned. If, as is possible, the pectorals in the achirous forms disappear with age, this species may belong to the *Cynoglossinae*. More likely, it is a relative of *Arnoglossus*, or of *Monolene*.

5. CHARYBDIA RÜPPELLI.

Peloria rüppelli Cocco, l. c., 1844 (Messina).

Charybdia rüppelli Facciolà, Nat. Sicil., 1885, 5 (Messina).

This is probably the young of some species as yet unknown in the adult condition. Some of its characters suggest *Arnoglossus ventralis*.

According to Facciolà, the body is naked; the form oval; the mouth as long as the eye; right eye higher than left; first dorsal ray only prolonged; no scales; left ventral with its base longer than the right; length 30 to 40 mm. D. 113, A. 91.

*"Non è a dubitarsi che questi Pleuronettidi son giovani di altro specie più grandi. Dico soltanto che la *Peloria hækeli* non puo confondersi con nessun Pleuronettide conosciuto." (Facciolà.)

6. *CHARYBDIA RHOMBOIDICHTHYS*.

Charybdia rhomboidichthys Facciolà, Nat. Sicil., 1885, 6 (Messina).

Form, oval; the two outlines similar; snout, obtuse, somewhat prominent; teeth, insensible; eye, $4\frac{1}{2}$ in head, the right a little above the left; none of the dorsal rays prolonged; scales, cycloid, thin; lateral line without arch; length 40 mm. D. 99, A. 74, V. 6.

This form seems to be allied to *Syacium* and *Arnoglossus*.

7. *BIBRONIA LIGULATA*.

Bibronia ligulata Cocco, l. c., 1844 (Messina). Facciolà, Nat. Sicil., 1885, 4 (Messina).

This form is known from specimens one-third of an inch in length. If we suppose that in *Symphurus* the pectoral fins become atrophied with age, this may well be the larva of *Symphurus nigrescens*.

8. *BASCANIUS TÆDIFER*.

Bascanius tædifer Schiödte, "Naturhist. Tydsskrift, v, 269, 1867" (Oceanic).

We have not seen the original description of this form, but from the references made to it by other authors it would appear to be a larval *Symphurus*.

RECAPITULATION.

The following is the list of the genera and species of flounders now recognized by us as occurring in the waters of North America and Europe:

The general distribution of each may be indicated by the following letters:

- E. Europe (North of Spain).
- M. Mediterranean Sea.
- B. Bassalian or deep-sea fauna of the Atlantic.
- G. Greenland fauna.
- N. East coast of United States; Cape Cod to Cape Hatteras.
- S. South Atlantic and Gulf coast.
- W. West India fauna.
- R. Brazilian fauna (Rio).
- T. Patagonian fauna (Terra del Fuego).
- P. Panama fauna.
- V. Chilian fauna (Valparaiso).
- C. Californian fauna.
- A. Alaskan fauna.

Subfamily I.—HIPPOGLOSSINÆ.

1. *Atheresthes* (Jordan & Gilbert).
 1. *Atheresthes stomias* (Jordan & Gilbert). A.
2. *Platysomatichthys* Bleeker.
 2. *Platysomatichthys hippoglossoides* (Walbaum). G.
3. *Hippoglossus* Cuvier.
 3. *Hippoglossus hippoglossus* (Linnæus). E. G. A.

4. *Lyopsetta* Jordan & Goss.
 4. *Lyopsetta exilis* (Jordan & Gilbert). A.
5. *Eopsetta* Jordan & Goss.
 5. *Eopsetta jordani* (Lockington). C.
6. *Hippoglossoides* Gottsche.
 6. *Hippoglossoides platessoides* (Fabricius). E. G.
 - 6 (b). ———— var. *limandoides* Bloch. E. G.
 7. *Hippoglossoides classodon* Jordan & Gilbert. A.
7. *Paettichthys* Girard.
 8. *Psettichthys melanostictus* Girard. C. A.
8. *Hippoglossina* Steindachner.
 9. *Hippoglossina macrops* Steindachner. P.
 10. *Hippoglossina microps* Günther. V.
9. *Xystreurus* Jordan and Gilbert.
 11. *Xystreurus liolepis* Jordan & Gilbert. C.
10. *Paralichthys* Girard.
 12. *Paralichthys californicus* (Ayres). C.
 13. *Paralichthys brasiliensis* (Ranzani). R. W.
 14. *Paralichthys adspersus* (Steindachner). P. V. (Possibly to be called *P. kingi*)*
 15. *Paralichthys dentatus* (Linnaeus). N. S.
 16. *Paralichthys lethostigma* Jordan & Gilbert. N. S.
 17. *Paralichthys squamilentus* Jordan & Gilbert. S.
 18. *Paralichthys albigutta* Jordan & Gilbert. S.
 19. *Paralichthys patagonicus* Jordan. T.
 20. *Paralichthys oblongus* Mitchill. N.
11. *Ancylosetta* Gill.
 21. *Ancylosetta quadrocellata* Gill. S.
 22. *Ancylosetta ilicota* (Goode & Bean). B.

Subfamily II.—PLEURONECTINÆ.

12. *Phrynorhombus* Günther.
 23. *Phrynorhombus regius* Bonnaterre. M. E.
13. *Zeugopterus* Gottsche.
 24. *Zeugopterus punctatus* (Bloch). E.
14. *Lepidorhombus* Günther.
 25. *Lepidorhombus whiff-iagonis* (Walbaum). E.
 26. *Lepidorhombus norvegicus* (Günther). E. (Doubtful species.)
15. *Citharus* Bleeker.
 27. *Citharus linguatula* (Linnaeus). M.
16. *Pleuronectes* (Linnaeus) Fleming.
 - § *Pleuronectes*.
 28. *Pleuronectes maximus* Linnaeus. E. M.
 - 28 (b). ———— var. *mæoticus* (Pallas). M.
 - § *Bothus* Rafinesque.
 29. *Pleuronectes rhombus* Linnaeus. E. M.
 30. *Pleuronectes maculatus* Mitchill. N.

* *Hippoglossus kingi* is known from a drawing only, executed by unscientific hands. In all respects but one this drawing agrees well with *P. adspersus*. The first 18 of the 66 rays of the dorsal are represented as lower than the others, apparently forming a distinct portion. Depth 2 in length. Anal rays 51.

17. *Arnoglossus* Bleeker.§ *Arnoglossus*.

31. *Arnoglossus lophotes* Günther. M. (Doubtful species; perhaps identical with *A. grohmanni*—perhaps with *Bothus imperialis* Rafinesque.)
 32. *Arnoglossus grohmanni* (Bonaparte). M.
 33. *Arnoglossus conspersus* (Canestrini). M. (Doubtful species; probably same as the next.)
 34. *Arnoglossus latera* (Walbaum). M. E.
 § ———.
 35. *Arnoglossus* ? *imbriatus* (Goode & Bean). B. (Probably type of a distinct genus.)
 § ———.
 36. *Arnoglossus* ? *ventralis* (Goode & Bean). B. (Perhaps type of a distinct genus.)

18. *Platophrys* Swainson.

37. *Platophrys podas* (Delaroche). M.
 38. *Platophrys spinosus* (Poey). W. (Doubtful species.)
 39. *Platophrys constellatus* Jordan. V.
 40. *Platophrys ocellatus* (Agassiz). S. W. R.
 41. *Platophrys maculifer* (Poey). W. (Synonymy doubtful.)
 42. *Platophrys ellipticus* (Poey). W. (Doubtful species.)
 43. *Platophrys lunatus* (Linnæus). W. R.
 44. *Platophrys leopardinus* (Günther). P.

19. *Syacium* Ranzani.

45. *Syacium cornutum* (Günther). R.
 46. *Syacium papillosum* (Linnæus). S. W. R.
 47. *Syacium micrurum* (Ranzani). S. W. R.
 48. *Syacium latifrons* (Jordan & Gilbert). P.
 49. *Syacium ovale* (Günther). P.

20. *Azevia* Jordan.

50. *Azevia panamensis* Steindachner. P.

21. *Citharichthys* Bleeker.§ *Orthopsetta* Gill.

51. *Citharichthys sordidus* (Girard). C.
 52. *Citharichthys stigmæus* Jordan & Gilbert. C. (Doubtful species.)

§ *Citharichthys*.

53. *Citharichthys dinoceros* Goode & Bean. B.
 54. *Citharichthys arctifrons* Goode. B.
 55. *Citharichthys unicornis* Goode. B.
 56. *Citharichthys macrops* Dresel. S.
 57. *Citharichthys uhleri* Jordan. W.
 58. *Citharichthys spilopterus* Günther. S. W. P. R.
 59. *Citharichthys sumichrasti* Jordan. P.
 59 (b). **Citharichthys microstomus* Gill. S.

22. *Etropus* Jordan & Gilbert.

60. *Etropus ectenes* Jordan. V.
 61. *Etropus rimosus** Goode & Bean. S.
 62. *Etropus crossotus* Jordan & Gilbert. S. W. P. R.

*We are probably in error in regarding *Etropus rimosus* as identical with *Citharichthys microstomus*. The latter has a larger mouth, the maxillary $2\frac{1}{2}$ in head, instead of nearly 4 as in the former.

23. *Thysanopsetta* Günther.
63. *Thysanopsetta naresi* Günther. T.
24. *Monolene* Goode. (Genus of uncertain relationships.)
64. *Monolene sessilicauda* Goode. B.
65. *Monolene atrimana* Goode & Bean. B.

Subfamily III.—ONCOPTERINÆ.

25. *Oncopterus* Steindachner.
66. *Oncopterus darwini* Steindachner. T.

Subfamily IV.—PLATESSINÆ.

26. *Pleuronichthys* Girard.
67. *Pleuronichthys decurrens* Jordan & Gilbert. C. A.
68. *Pleuronichthys verticalis* Jordan & Gilbert. C. A.
69. *Pleuronichthys cænosus* Girard. C. A.
27. *Hypsopsetta* Gill.
70. *Hypsopsetta guttulata* (Girard). C.
28. *Parophrys* Girard.
71. *Parophrys vetulus* Girard. C. A.
29. *Inopsetta* Jordan & Goss.
72. *Inopsetta ischyra* (Jordan & Gilbert). A.
30. *Isopsetta* Lockington.
73. *Isopsetta isolepis* (Lockington). A. C.
31. *Lepidopsetta* Gill.
74. *Lepidopsetta bilineata* (Ayres). C.
74 (b). ——— *umbrosa* (Girard). A.
32. *Limanda* Gottsche.
75. *Limanda ferruginea* (Storer). G.
76. *Limanda limanda* (Linnaeus). E.
77. *Limanda aspera* (Pallas). A.
78. *Limanda beani* Goode. B.
33. *Pseudopleuronectes* Bleeker.
79. *Pseudopleuronectes americanus* (Walbaum). N.
80. *Pseudopleuronectes pinnifasciatus* (Kner). A. (Generic relations uncertain.)
34. *Platessa* Cuvier.
§ *Platessa*.
81. *Platessa platessa* (Linnaeus). E. M.
81 (b). ——— ——— *pseudoflesus* (Gottsche). E.
82. *Platessa quadrituberculata* (Pallas). A.
§ *Flesus* Moreau.
83. *Platessa flesus* Linnaeus. E. M.
83 (b). ——— ——— *glabra* (Rathke). M.
35. *Liopsetta* Gill.
84. *Liopsetta dovinensis* (Lilljeborg). E. (Doubtful species, probably identical with *L. glacialis*.)
85. *Liopsetta putnami* (Gill). N. (Probably identical with the next.)
86. *Liopsetta glacialis* (Pallas). A.
36. *Platichthys* Girard.
87. *Platichthys stellatus* (Pallas). A. C.

37. *Microstomus* Gottsche. (To be called *Cynicoglossus* if *Microstomus* be deemed preoccupied.)
 88. *Microstomus kitt* (Walbaum). E.
 89. *Microstomus pacificus* (Lockington). A.
38. *Glyptocephalus* Gottsche.
 90. *Glyptocephalus cynoglossus* (Linnaeus). E. G.
 91. *Glyptocephalus zachirus* (Lockington). A.

Subfamily V.—SOLEINÆ

39. *Solea* Quoy&Gaimard.§ *Solea*.

92. *Solea solea* (Linnaeus). E. M.
 93. *Solea capelloni* (Steindachner). M. (Doubtful species.)
 94. *Solea brasiliensis* (Cuvier). R. (Species unknown to recent writers.)

§ *Pegusa* Günther.

95. *Solea kleini* (Risso). M.
 96. *Solea aurantiaca* (Günther). E. (Doubtful species.)
 97. *Solea lascaris* (Risso). M. (Synonymy doubtful; perhaps to be called *S. scriba*.)
 98. *Solea theophila* (Risso). M. (Synonymy somewhat doubtful.)
 99. *Solea variolosa* (Kner). R.

40. *Monochirus* Rafinesque.§ *Quenselia* Jordan.

100. *Monochirus ocellatus* (Linnaeus). M.

§ *Microchirus* Bonaparte.

101. *Monochirus luteus* (Risso). M.
 102. *Monochirus variegatus* (Donovan). M. E.
 103. *Monochirus minutus* (Parnell). M. (Doubtful species.)

§ *Monochirus*.

104. *Monochirus hispidus* Rafinesque.

41. *Achirus* Lacépède.§ *Baiostoma* Bean.

105. *Achirus achirus* (Linnaeus). W. R. (Possibly to be called *A. gronovii*.)
 106. *Achirus inscriptus* (Gosse). W. S.
 107. *Achirus klunzingeri* (Steindachner). P. V.
 108. *Achirus mentalis* (Günther). R.
 109. *Achirus lineatus* (Linnaeus). S. W. R.
 109 (b). ———— *brachialis* (Bean). S.
 109 (c). ———— *comifer* (Jordan & Gilbert). S.
 110. *Achirus mazatlanus* (Steindachner). P.
 111. *Achirus fonsecensis* (Günther). P.
 112. *Achirus punctifer* (Castelnau). R.
 113. *Achirus scutum* (Günther). P.
 114. *Achirus garmani* (Jordan). R.

§ *Achirus*.

115. *Achirus fimbriatus* (Günther). P.
 116. *Achirus fasciatus* (Lacépède). N. S.
 117. *Achirus panamensis* (Steindachner). P.
 118. *Achirus jennysi* (Günther). R.
 118 (b). *Achirus lorentzi* (Weyenbergh). R. (Species unknown to us.)

42. *Gymnachirus* Kaup.
 119. *Gymnachirus fasciatus* (Günther). R.
 120. *Gymnachirus nudus* (Kaup). R.
43. *Achiropsis* Steindachner.
 121. *Achiropsis nattereri* (Steindachner). R.
 122. *Achiropsis asphyziatus* (Jordan). R.
44. *Apionichthys* Kaup.
 123. *Apionichthys unicolor* (Günther). W. R. (Synonymy a little uncertain.)
 124. *Apionichthys ottonis* (Steindachner). M. (Doubtful species.)
45. *Brachirus* Swainson. (To be called *Synaptura* if *Brachirus* be regarded as preoccupied.)
 125. *Brachirus savignyi* (Kaup). M.
 126. *Brachirus lusitanicus* (Capello). M. (Species unknown to us.)

Subfamily VI.—CYNOGLOSSINÆ.

46. *Symphurus* Rafinesque.

§ *Symphurus*.

127. *Symphurus nigrescens* (Rafinesque). M.
 128. *Symphurus marginatus* (Goode & Bean). W.
 129. *Symphurus elongatus* (Günther). P.
 130. *Symphurus atricauda* (Jordan & Gilbert). C.
 131. *Symphurus plagusia* (Bloch & Schneider). W. R.
 132. *Symphurus plagiusa* (Linnaeus). S.
 132 (b). ———— *pusillus* (Goode & Bean). S.
 132 (c). ———— *diomedeanus* (Goode & Bean). S.
 133. *Symphurus piger* (Goode & Bean). W.

§ *Acedia* Jordan. (Probably a distinct genus.)

134. *Symphurus uebulosus* (Goode & Bean). W.

LARVAL FORMS. (*Bibronia*.)

A. DELOTHYRIS Goode.

1. *Delothyris pellucidus* (Goode). B.

B. COCCOLUS Bonaparte.

2. *Coccolus annectens* (Bonaparte). M.

C. PELORIA Cocco.

3. *Peloria hacketti* (Cocco). M.

D. CHARYBDIA Facciola.

4. *Charybdia* sp. (Emery). M.
 5. *Charybdia rüppelli* (Cocco). M.
 6. *Charybdia rhomboidichthys* (Facciola). M.

E. BIBRONIA Cocco.

7. *Bibronia ligulata* (Cocco). M.

F. BASCANIUS Schiödte.

8. *Bascanius tedifer* (Schiödte). B.

INDIANA UNIVERSITY,

Bloomington, Ind., July 10, 1887.

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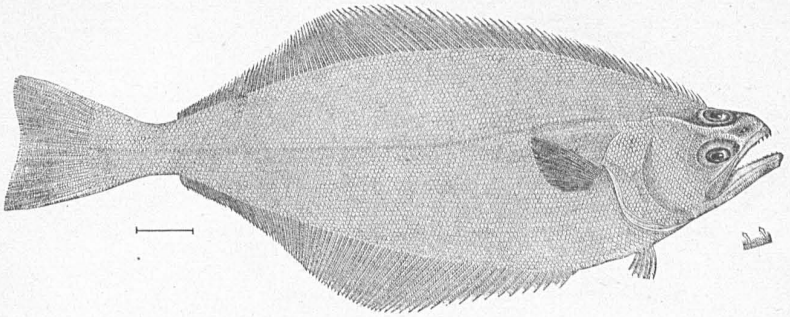


FIG. 1.—*ATHERESTHES STOMIAS* Jordan & Gilbert. The Arrow-toothed Halibut.
(From No. 27186: Point Reyes, California.)

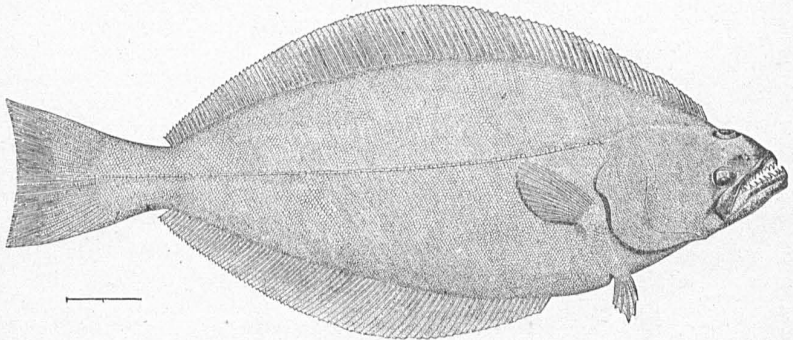


FIG. 2.—*PLATYSOMATICTHYS HIPPOGLOSSOIDES* (Walbaum). The Greenland Halibut.

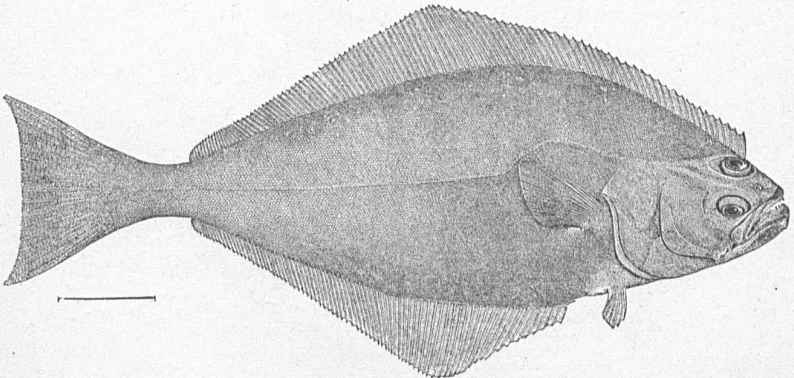


FIG. 3.—*HIPPOGLOSSUS HIPPOGLOSSUS* (Linnæus). The Halibut.
(No. 10439: Eastport, Maine.)

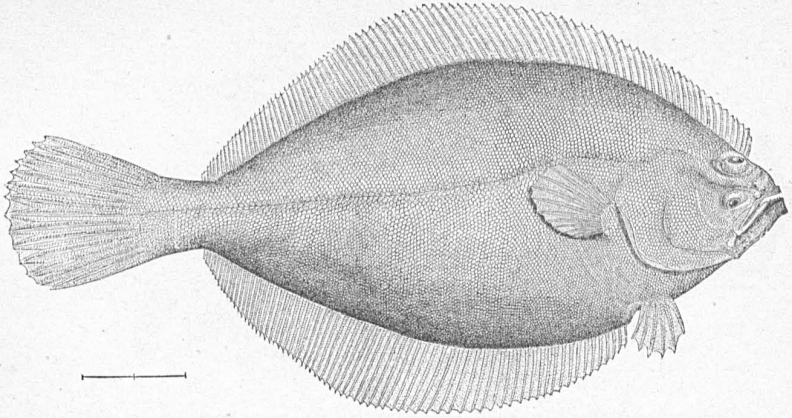


FIG. 4.—HIPPOGLOSSOIDES PLATESSOIDES (Fabricius). The Sand Dab.
(No. 21002: Le Have Bank.)

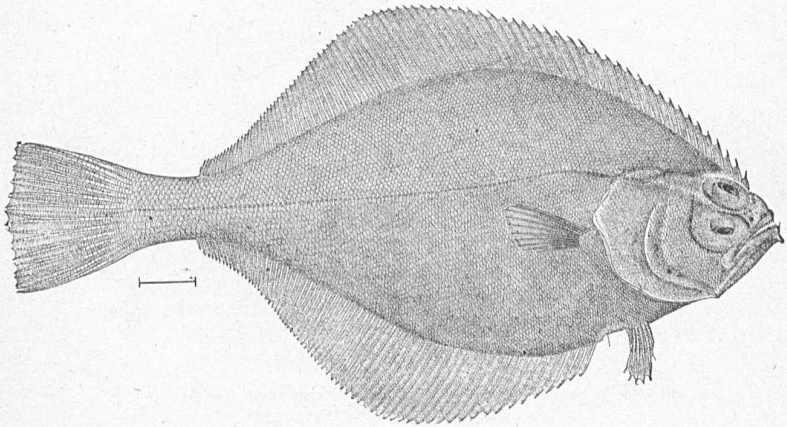


FIG. 5.—HIPPOGLOSSOIDES ELASSODON Jordan & Gilbert. The Alaska Sand Dab.
(No. 27938: Humboldt Harbor, Shumagins, Alaska.)

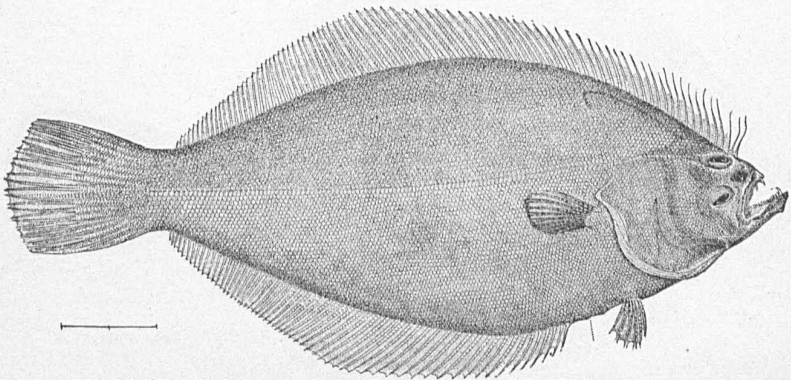


FIG. 6.—PSETTICHTHYS MELANOSTICTUS Girard. The San Francisco "Sole."
(No. 27602: San Francisco, California.)

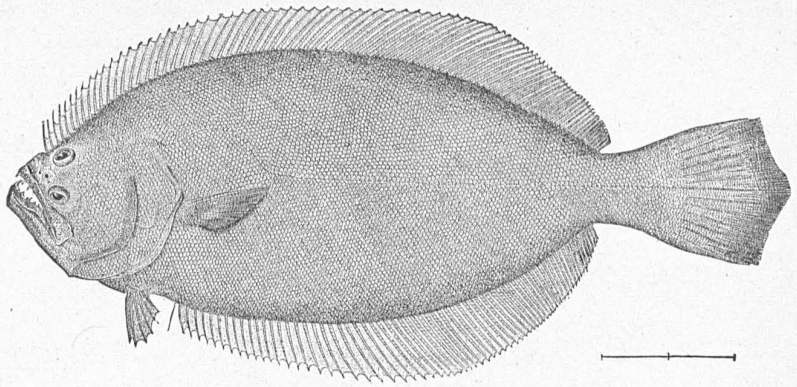


FIG. 7.—*PARALICHTHYS LETHOSTIGMA* Jordan & Gilbert. The Southern Flounder.
(No. 21279: Saint John's River, Florida.)

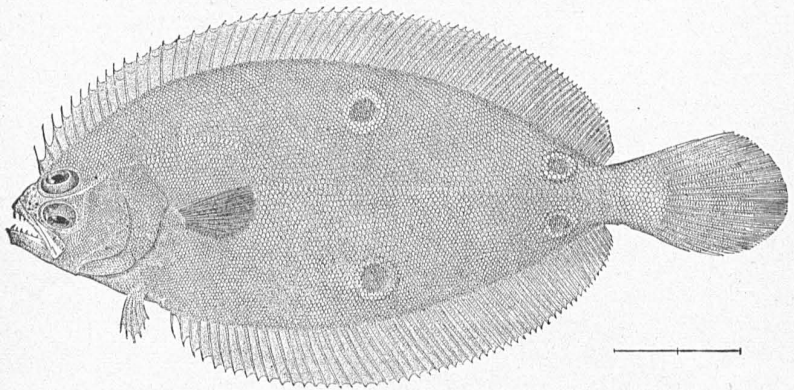


FIG. 8.—*PARALICHTHYS OBLONGUS* (Mitchill). The Four-spotted Flounder.
(No. 10730: Wood's Holl, Massachusetts.)

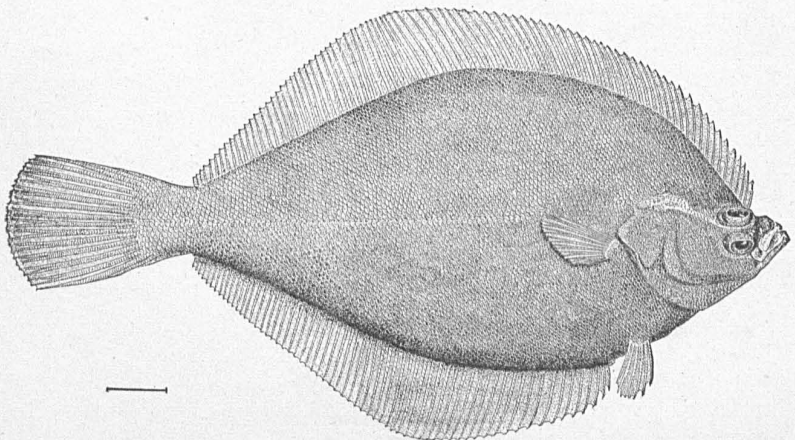
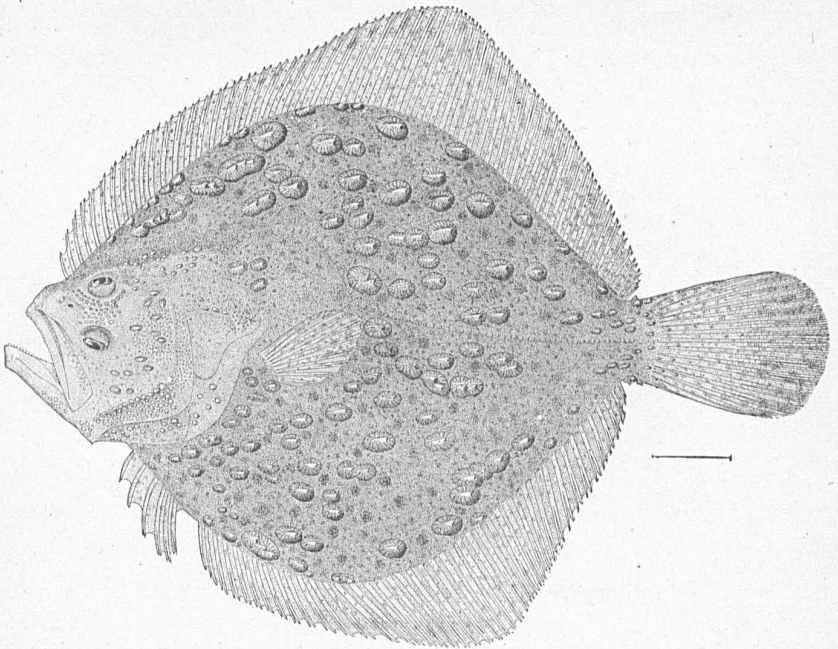
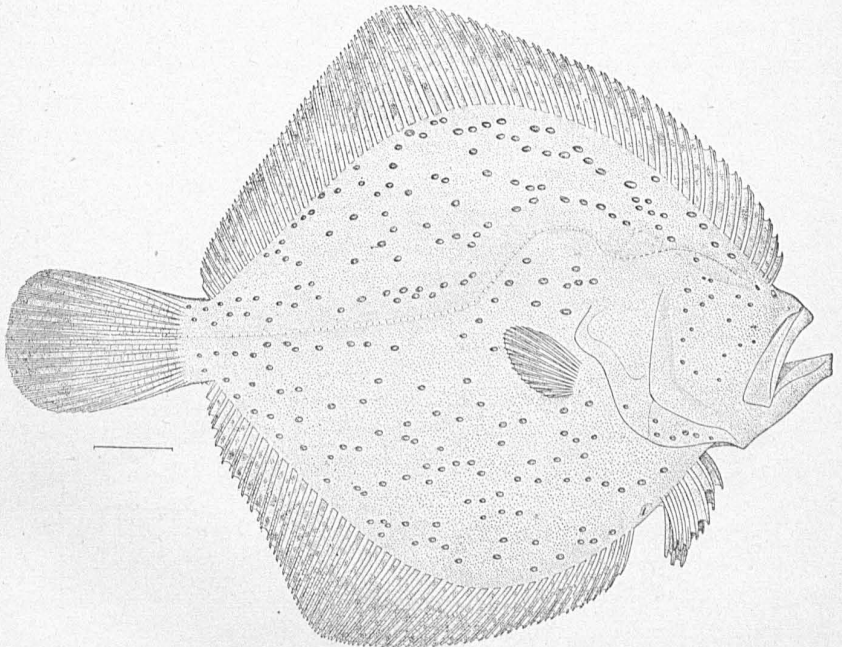


FIG. 12.—*LIMANDA FERRUGINEA* (Storer). The Rusty Dab.
(No. 21020: Halifax, Nova Scotia.)



LEFT SIDE.

FIG. 9.—PLEURONECTES MAXIMUS Linnæus. The Turbot.
(From No. 36902: Europe.)



RIGHT SIDE.

FIG. 10.—PLEURONECTES MAXIMUS Linnæus. The Turbot.
(From No. 36902: Europe.)

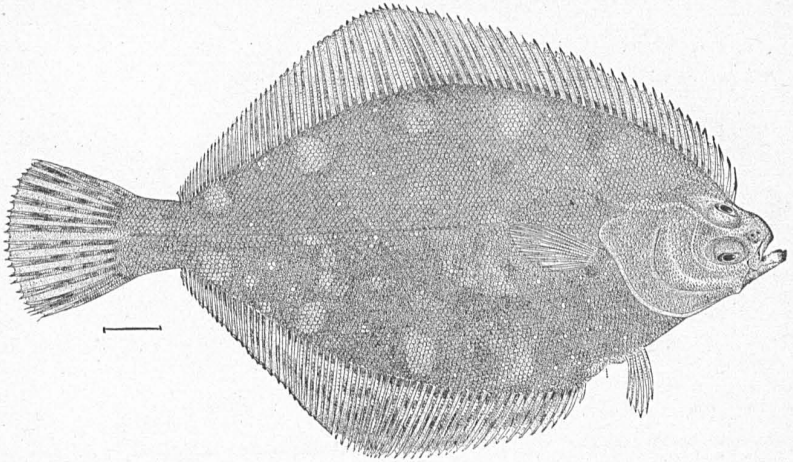


FIG. 11.—LEPIDOPSETTA BILINEATA (Ayres.) The California "Sole."
(Var. *umbrosa* Girard.)
(No. 27602: Saint Paul, Kodiak.)

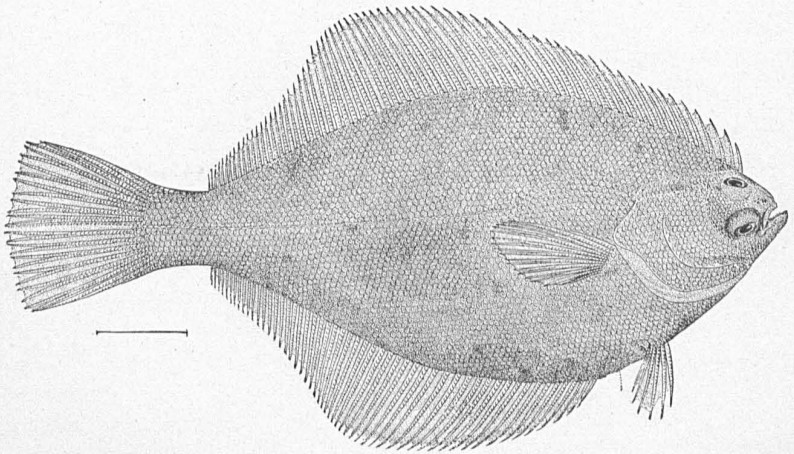


FIG. 13.—LIMANDA ASPERA (Pallas.) The Alaska Rusty Dab.
(No. 27944: Sitka, Alaska.)

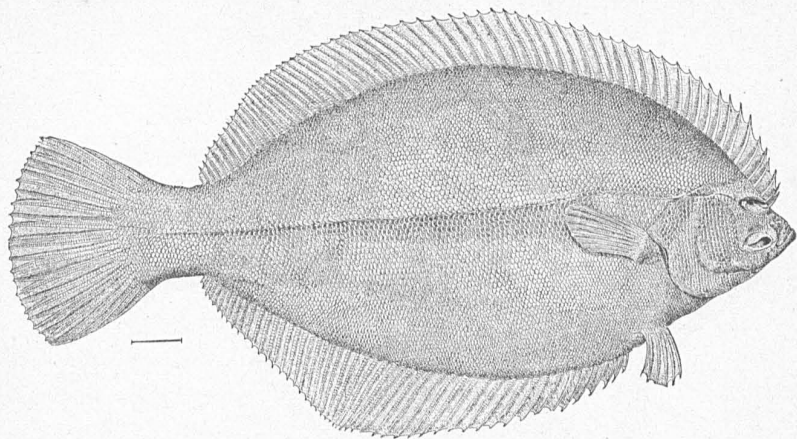


FIG. 14.—*PSEUDOPLEURONECTES AMERICANUS* (Walbaum). The Flat Fish, or Winter Flounder.

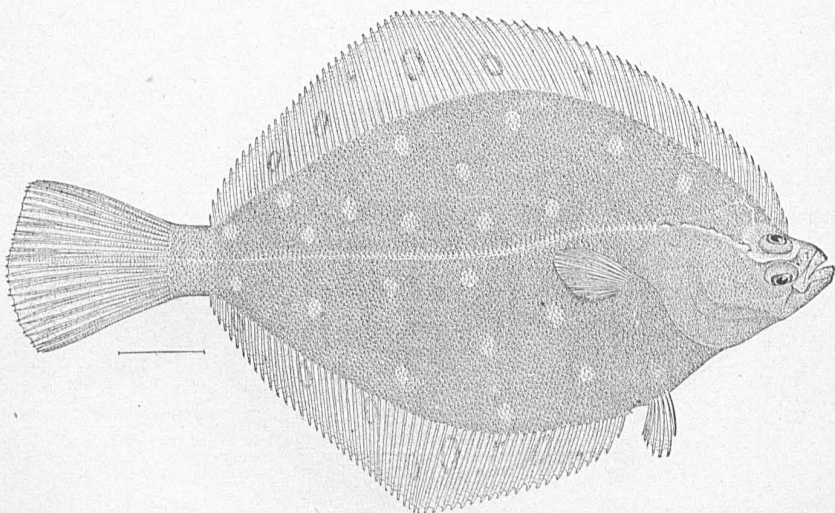


FIG. 15.—*PLATESSA PLATESSA* Linnæus. The Plaice.
(From No. 21175: France.)

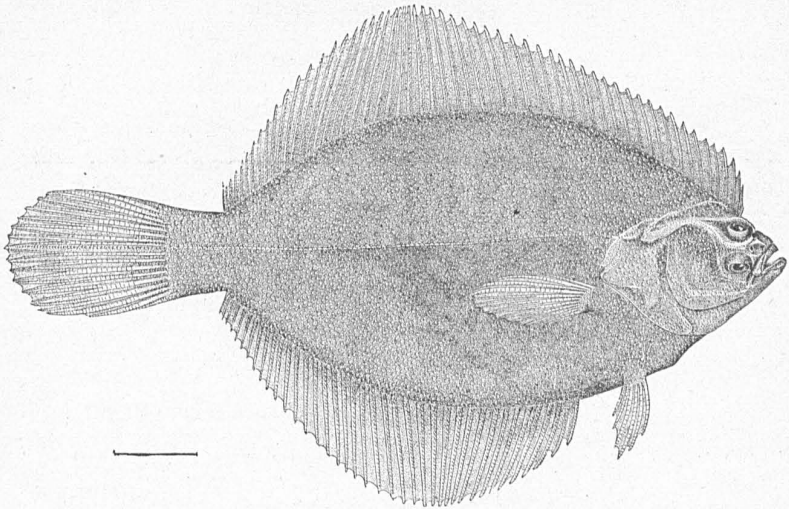


FIG. 16.—*LIOPSETTA PUTNAMI* (Gill). The Eel-back Flounder (male).
(No. 5368: Salem, Massachusetts.)

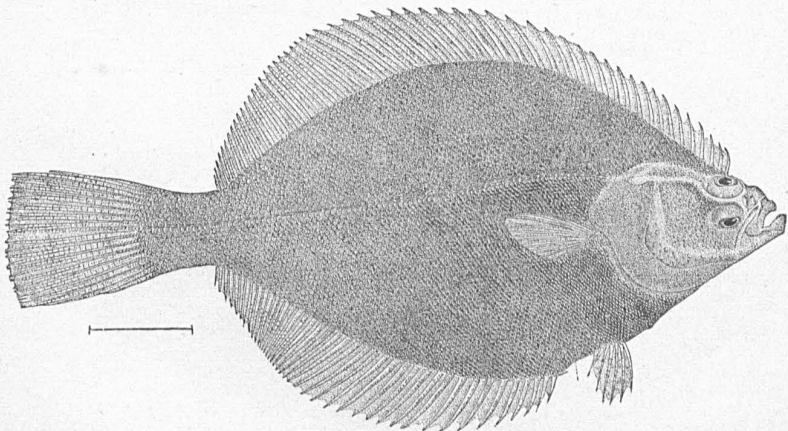


FIG. 17.—*LIOPSETTA GLACIALIS* (Pallas). The Alaska Eel-back Flounder (female).
(No. 27497: Kotzebue Sound.)

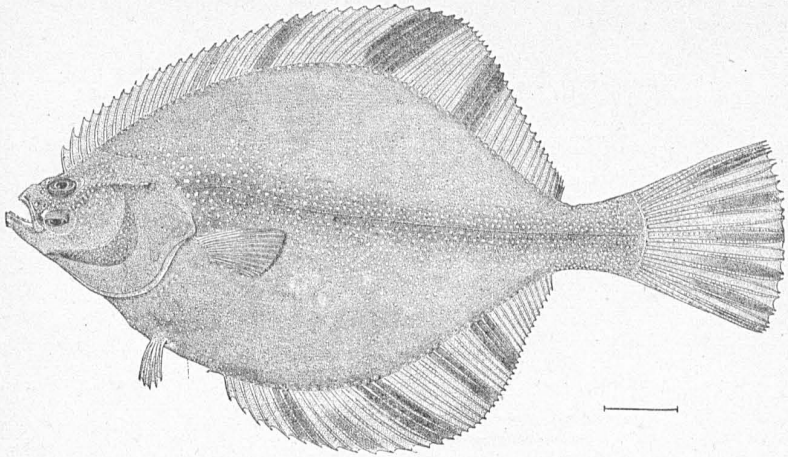


FIG. 18.—*PLATICHTHYS STELLATUS* (Pallas). The Great California Flounder.
(From a reversed example.)
(No. 24164: San Francisco, California.)

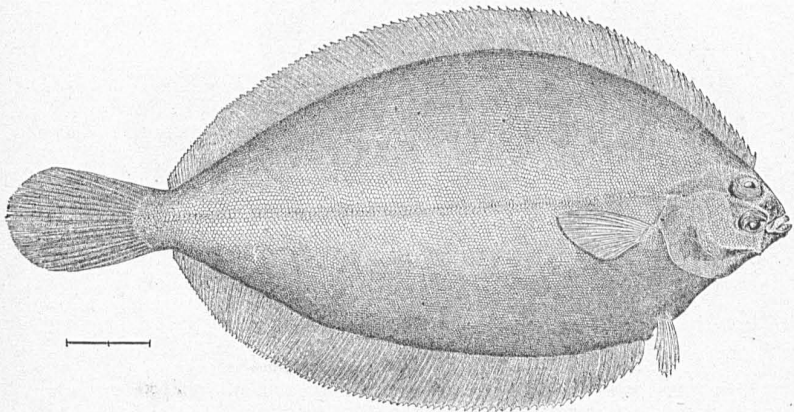
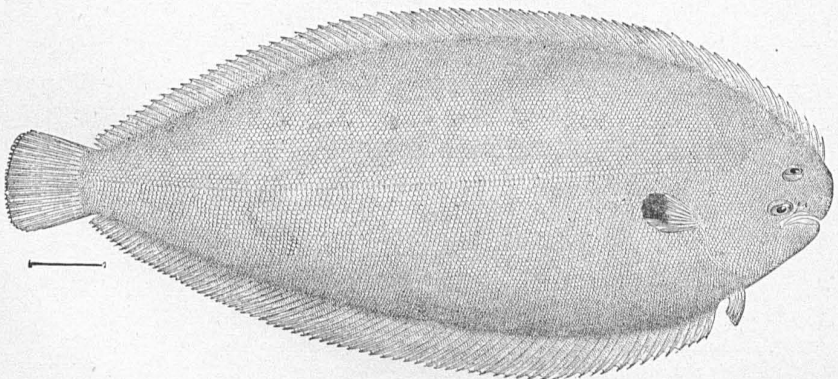
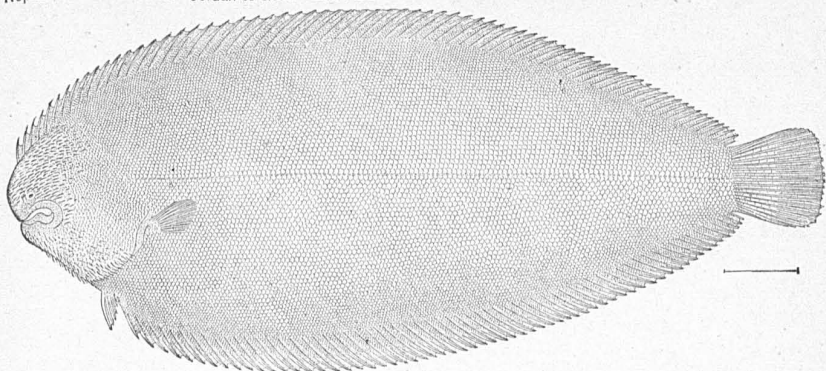


FIG. 19.—*GLYPTOCEPHALUS CYNOGLOSSUS* (Linnæus). The Pole Flounder.
(Atlantic.)

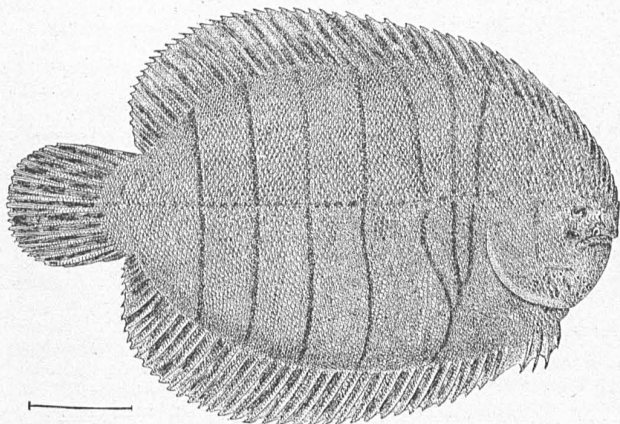


RIGHT SIDE.
FIG. 20.—*SOLEA SOLEA* Linnæus. The Sole.
(From No. 17324: Helsinburg, Sweden.)



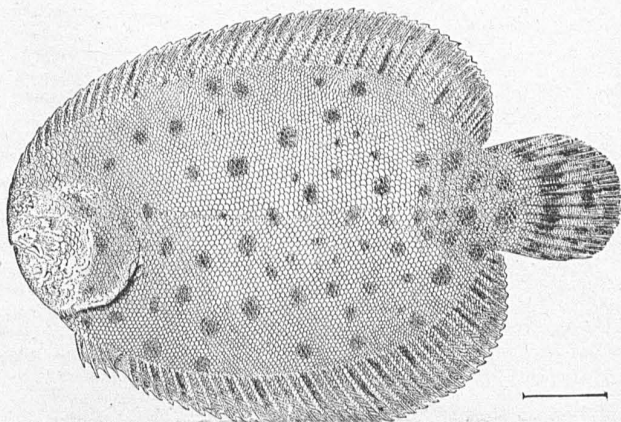
LEFT SIDE.

FIG. 21.—SOLEA SOLEA Linnæus. The Sole.
(From No. 17324: Helsingburg, Sweden.)



RIGHT SIDE.

FIG. 22.—ACHIRUS FASCIATUS Lacépède. The American Sole, or "Hog Choker."
(No. 12985: Wood's Holl, Massachusetts.)



LEFT SIDE.

FIG. 23.—ACHIRUS FASCIATUS Lacépède. The American Sole, or "Hog Choker."
(No. 12985: Wood's Holl, Massachusetts.)

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[NOTE.—The references are to page-figures in brackets.]

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